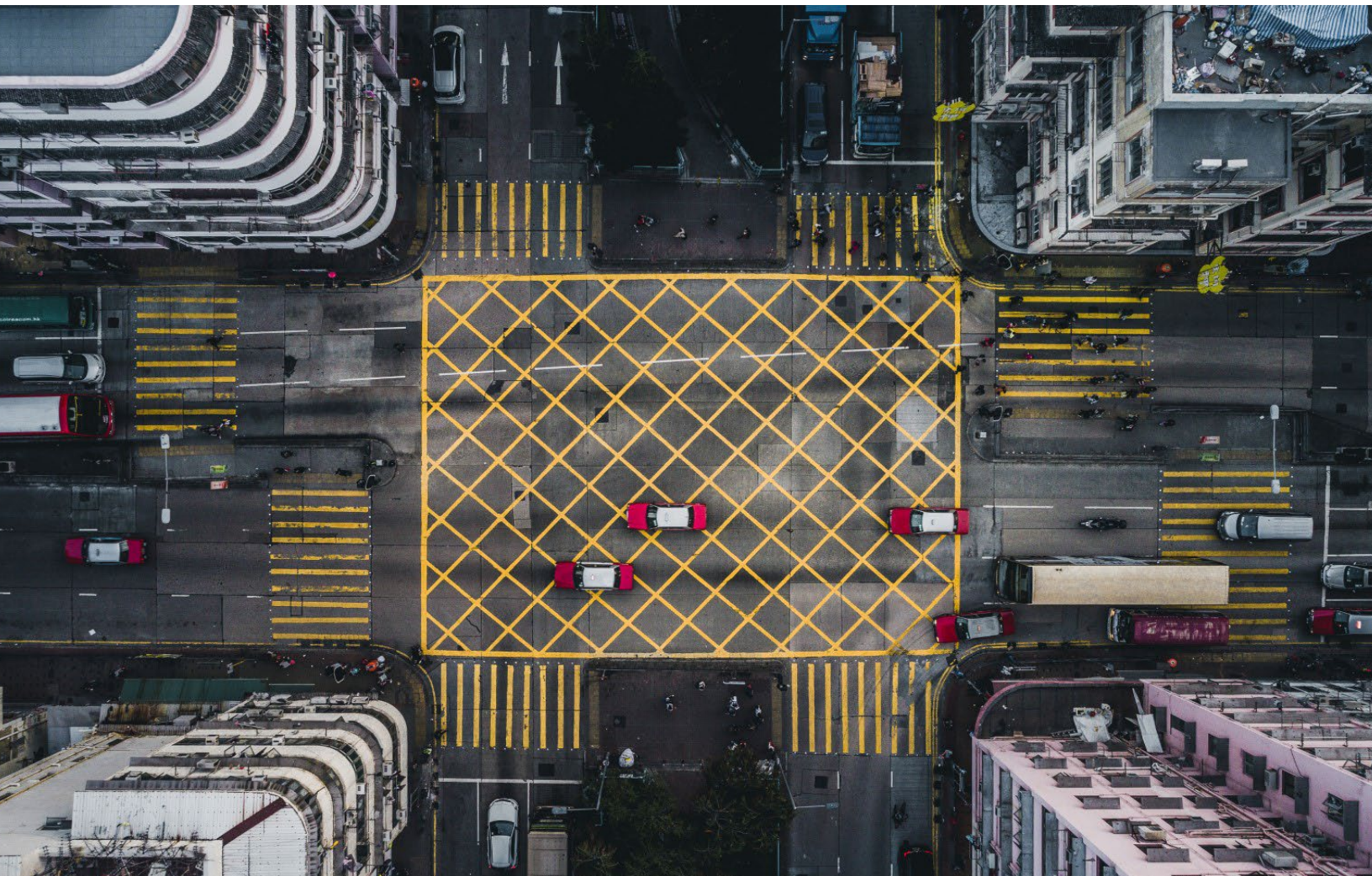
Air Quality & Odour Assessment Report

Brooks Road Landfill Capacity Expansion Environmental Screening

Brooks Road Environmental

March 28, 2024

→ The Power of Commitment



Project name		Brooks Road Landfill Expansion					
Document title		Air Quality & Odour Assessment Report | Brooks Road Landfill Capacity Expansion Environmental Screening					
Project number		12561524-RPT-10					
File name		12561524-RPT-10-Environmental Screening Air Quality and Odour Assessment Report					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
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1. Introduction

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

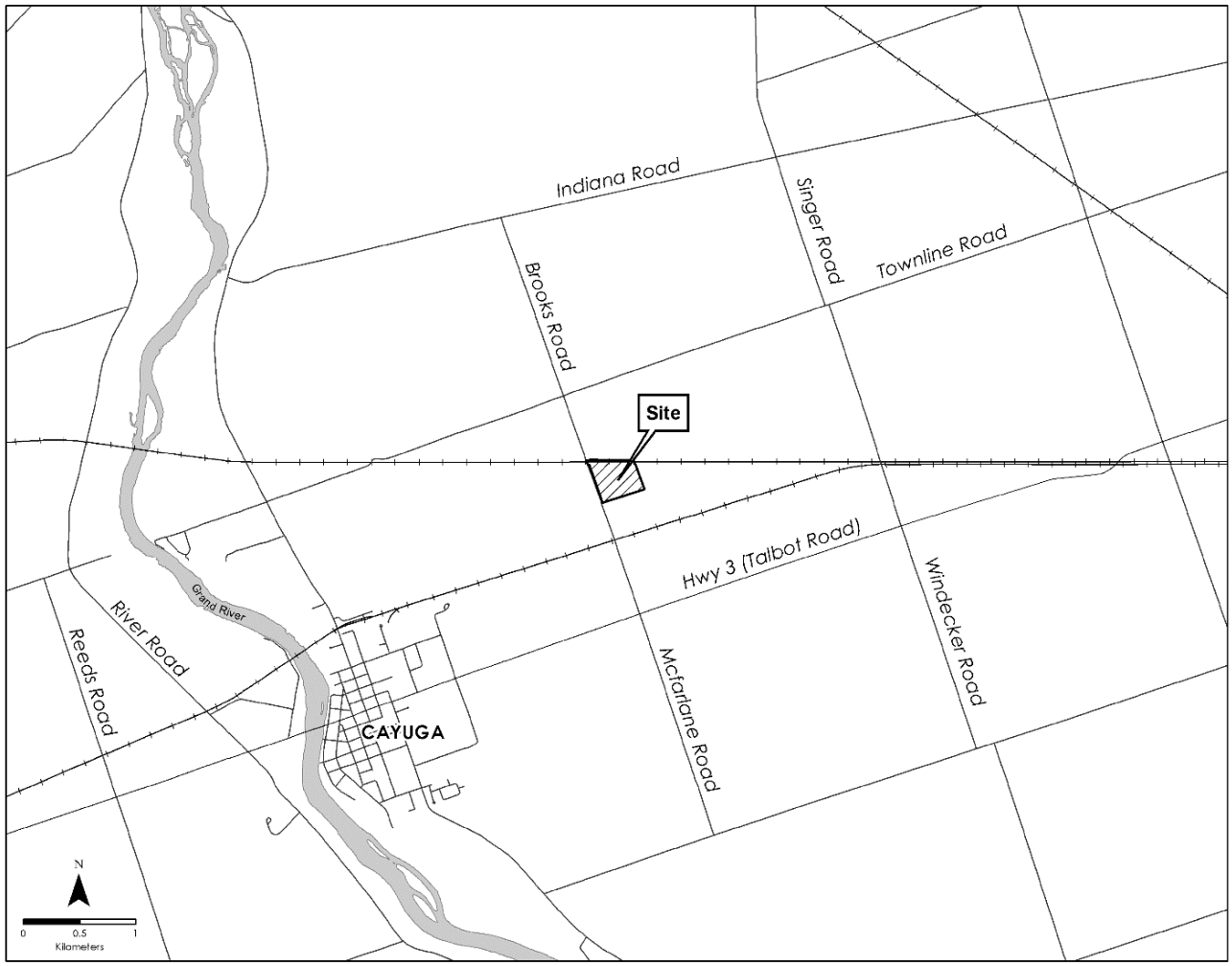

Figure 1.1 Location of the Proposed Undertaking

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

In 2018, BRE completed an Individual Environmental Assessment (EA) to increase the total approved capacity at the site to allow for the continued receipt of post-diversion IC&I waste over a five-to-seven-year planning period and an amendment to the Site's rate of fill to provide for a maximum of 151,000 tonnes per year (known as the Brooks Road

Landfill Vertical Capacity Expansion EA). The Brooks Road Landfill Vertical Capacity Expansion EA was approved by the Minister of Environment, Conservation and Parks on January 15, 2019. The Site ECA was amended in 2021 to increase the annual rate of fill from 151, 000 tonnes per year to a maximum of 250,000 tonnes per year, which is proportional to the daily maximum of 1,000 tonnes per day. The 2021 ECA amendment was subject to the Environmental Screening Process.

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

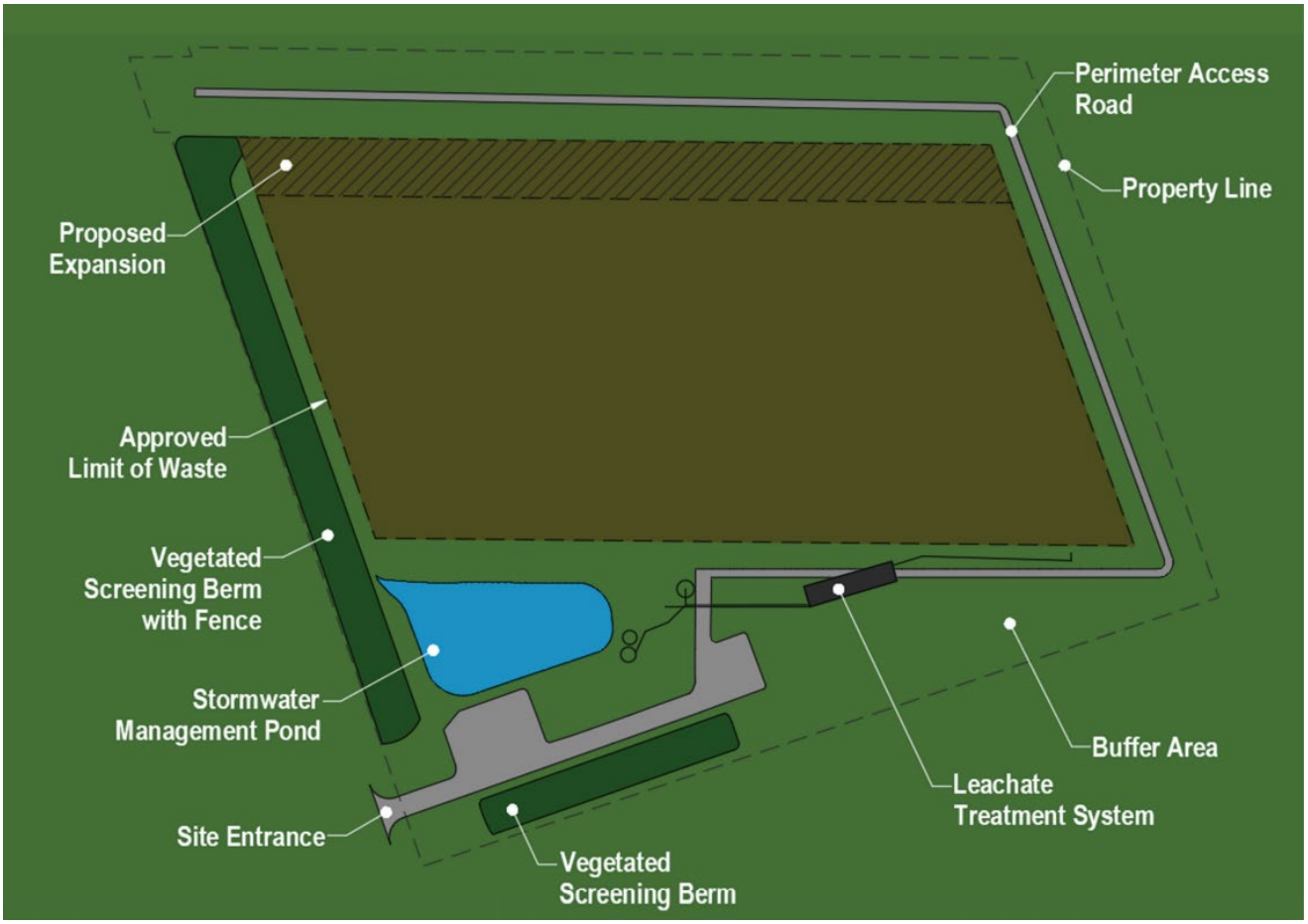

Figure 1.2 Proposed Capacity Expansion Concept

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

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

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

Section 13 of Ontario Regulation 101/07 – Waste Management Projects Regulation exempts this Project from Part II of the *EA Act*, subject to fulfilling the Environmental Screening process. The Screening will be conducted in accordance with the planning and design process outlined in MECP "*Guide to Environmental Assessment Requirements for Waste Management Projects.*" The Environmental Screening Process includes identifying and applying screening criteria to determine and describe potential environmental effects, public/external agency consultation, and the development of measures to mitigate identified environmental effects. The results of the Study will be documented in an Environmental Screening Report, which will be released for review to Stakeholders including Indigenous communities, the public, and government agencies. Upon completion of the Environmental Screening Process, an application will be made to amend the existing ECA No. A110302.

GHD has prepared an Air Quality and Odour Assessment on behalf of BRE for the proposed undertaking. This report documents the following as it relates to Air Quality and Odour:

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

The Study Areas reviewed for the Air Quality and Odour assessment were as follows (see **Figure 1.3**):

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

Figure 1.3 Air Quality and Odour Study Areas

2. Screening Criteria Checklist

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

As noted in the Guide:

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

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

Table 2.1 Screening Criteria Checklist – Air Quality and Odour

	Criterion	YES	NO	Additional Information
	Might the project…			
3. Air and Noise				
3.1	Cause negative effects on air quality due to emissions (for parameters such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other contaminants)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may cause negative effects on air quality due to emissions.
3.2	Cause negative effects from the emission of greenhouse gases (e.g., carbon dioxide, carbon monoxide, methane)?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in emission of greenhouse gases associated with continued operation of the Site.
3.3	Cause negative effects from the emission of dust or odour?	X		The proposed landfill expansion would result in changes to the existing landfill footprint, cover design (daily, intermediate, final), final contours, and on-site operations and may result in a potential increase in dust and odour emissions associated with continued operation of the Site.

3. Existing Conditions

The following subsections describe the existing conditions that are found within the On-Site and Site Vicinity Study Areas of the proposed project.

3.1 Methodology

3.1.1 Available Secondary Source Information Collection and Review

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

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

3.1.2 Process Undertaken

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

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

3.2 Description of Existing Conditions

The following conditions are currently present at the Site, as described in Table 3.1.

Table 3.1 Existing Conditions Relevant to Air Quality and Odour

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

3.3 Climate, Air Quality and Odour

3.3.1 Hamilton Climate Station

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

Figure 3.1 presents a five-year wind rose for the Hamilton Climate Station for the period between 2017 and 2021 and Figure 3.2 presents the wind class frequency distribution. The dominant wind directions, as shown on Figure 3.1, are from the southwest, and northeast.

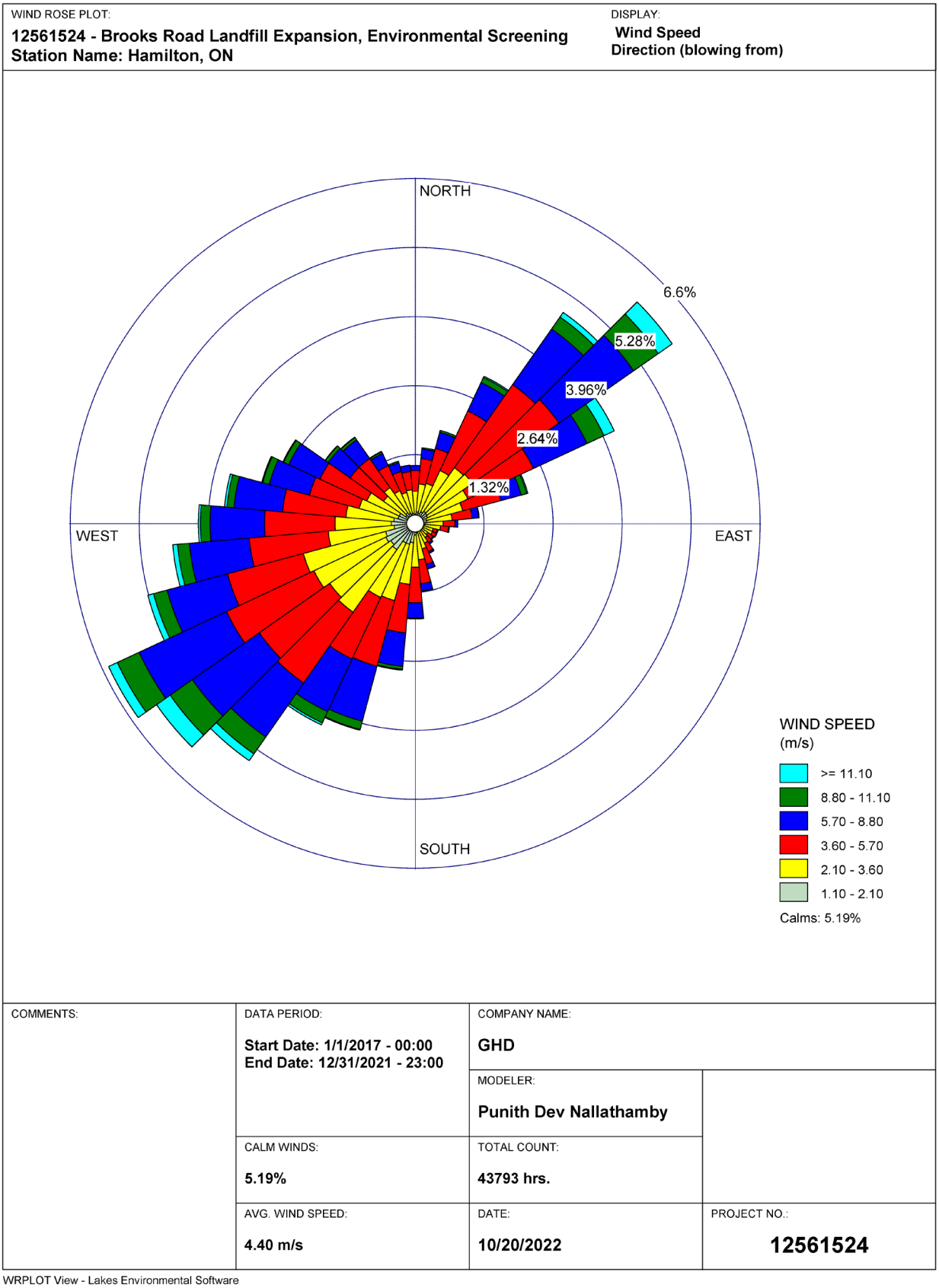

Figure 3.1 Wind Rose, Hamilton AP (2017 – 2021)

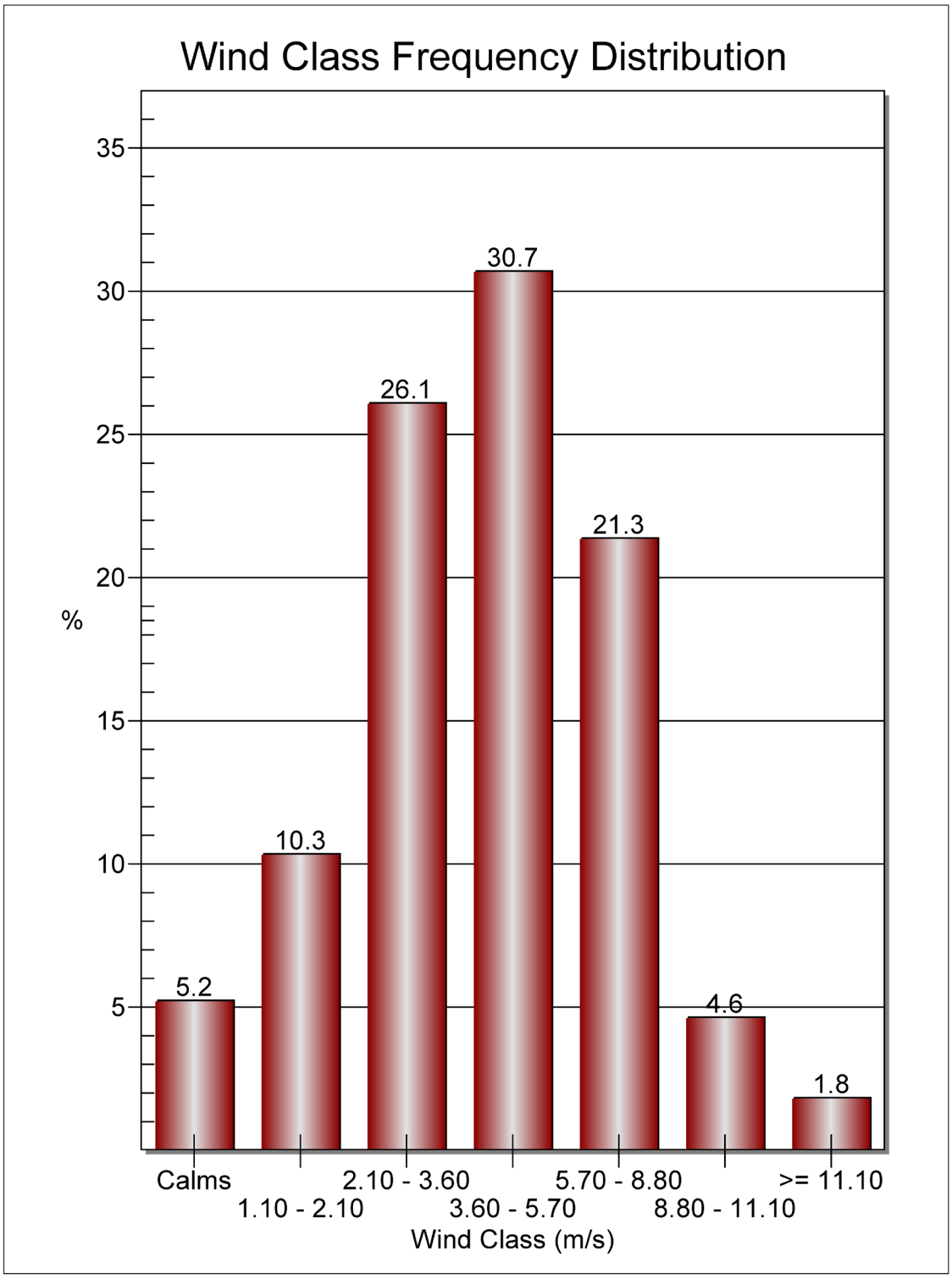

Figure 3.2 *Wind Class Frequency Distribution*

3.3.2 Air Quality

The Site is located approximately 2.8 km northeast of Cayuga and 25 km south of Hamilton and is surrounded by agricultural land. The closest receptor (as per the August 2024 Odour Management Plan) is approximately 223 m from the Site and there are no major industrial sources within the Study Area. The Site has a berm that runs along the west side of the Site and a clay stockpile located along the north side that reduces the line of sight and fugitive particulate matter emissions when the Site is in operation.

3.3.2.1 Vehicle Emissions

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

3.3.2.2 Indicator Compounds

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

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

Landfill gases, such as hydrogen sulfide (H2S) and vinyl chloride, can also be concluded to be insignificant based on the operations at the landfill. GHD completed a theoretical landfill gas generation rate for the Site. Based on the existing and proposed waste to be disposed at the Site, it was determined that the maximum amount of landfill gas that will be generated is less than approximately 200 cubic feet per minute (in 2026). This would be distributed over an area of approximately 7.09 hectares or 70,900 square metres, resulting in a landfill gas exit velocity of only 0.00007 metre per second. This amount of landfill gas generation is anticipated to be insignificant from an overall Site profile and therefore landfill gases are not included in any further assessment.

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

3.3.2.3 MECP Air Monitoring Data

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

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

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

As shown in Table 3.2, the concentration for $PM_{2.5}$ for the 24 hour averaging period is below its respective Canada Ambient Air Quality Standard (CAAQS). The Annual average of the monitoring data indicates $PM_{2.5}$ levels are slowly increasing over time. However, this is a result of an increase in industry in the vicinity of the Hamilton monitoring station and is not expected to be the trend for the Site and its surrounding area. Based on the monitored data, the $PM_{2.5}$ background concentrations in the vicinity of the Site are expected to be well below the CAAQS. It is expected that the levels at the Site are significantly lower as they are not influenced by the industrial and populated areas of Hamilton.

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

Table 3.2 $PM_{2.5}$ Concentration ($\mu g/m^3$) reported from the Hamilton Monitoring Station (STN29102)

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

3.3.3 Odour Quality

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

In addition to the on-Site and off-Site odour monitoring that was completed by BRE, GHD completed a theoretical landfill gas generation rate for the Site. Based on the existing and proposed waste to be disposed at the Site, it was determined that the maximum amount of landfill gas that will be generated is less than 200 cubic feet per minute (in 2026). This would be distributed over an area of approximately 7.09 hectares or 70,900 square metres, resulting in a landfill gas exit velocity of only 0.00007 metre per second. This amount of landfill gas generation is anticipated to be insignificant from an overall odour Site profile.

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

4. Potential Effects, Mitigation Measures & Net Effects

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

4.1 Description of Project Components and Activities

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

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

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

Design Component	Existing Landfill	Proposed Capacity Expansion
Volume (m^3)	1,045,065	1,264,4651
Footprint Area (ha)	6.07	7.15
Peak Elevation (mAMSL) (top of final cover)	221.50	225.66
Peak Elevation – top of waste (mAMSL)	220.75	224.91
Crest of Slope Elevation (mAMSL)	221.0	225.30
Slopes (Top/Sides)	Top – 20:1 (5%) Sides – 4:1 (25%)	Top – 20:1 (5%) Sides – 4:1 (25%) New stage is 4:1 (25%) north side slope, extends to a new peak elevation (i.e., elevated 20:1 [5%] plateau), and the south side slope (25%) ties-in to existing approved top of waste plateau. All other sides remain the same.
Stormwater Pond	Permanent pool – 1,266 m^3 Total live storage – >5,502 m^3	Pond capacity is sufficient for the proposed expansion based on existing Stormwater Management Plan.
Stormwater Drainage Ditch		Stormwater drainage ditch shifted by 30 m. East and west ditches will extend to maintain full perimeter ditch.

Design Component	Existing Landfill	Proposed Capacity Expansion
Perimeter Roads		Northern perimeter access road shifted by 29 m. East access road extended as appropriate. Access road will extend west, proposed to connect to Brooks Road as a secondary site access (locked during normal operation). A turnaround area will be provided in the northwest corner.
Maximum Daily Truck Traffic	25 to 50	25 to 50
Post-Closure Leachate Generation Rate	33 m^3/day	39 m^3/day
Capacity anticipated to be reached (year)	2024	2026

4.2 Methodology and Investigations

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

4.2.1 Potential Odour Effects

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

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

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

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

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

4.2.2 Potential Air Quality Effects

The air contaminant of concern for this Site is particulate matter. Other air contaminants are expected to be insignificant. As previously discussed, potential tailpipe and brake and tire wear emissions from vehicles operating at

the landfill are insignificant. Also, the estimated landfill gas production of only 200 cfm confirms that any potential off-Site impacts of compounds in the gas, such as methane, would be insignificant.

Particulate is primarily produced by vehicle traffic on the landfill roads. The particulate matter that is of concern is based on the re-suspension of particulate matter from traffic on the roads. The tailpipe and brake and tire wear has been determined to be insignificant sources of particulate matter. The Ontario ambient air quality criterion for TSP is 120 µg/m^3 on a 24-hour basis. There are other particulate provincial and federal criteria for PM_{10} and $PM_{2.5}$. These particulate emissions would also occur from vehicle traffic on the landfill roads.

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

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

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

Particulate off-site concentrations were estimated using the AERMOD air dispersion model which is an approved dispersion model under Ontario Regulation 419/05. The AERMOD model incorporates 5 years of meteorological data to determine the worst-case air concentration. Therefore, the modeling results can be considered to be conservative.

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

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

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

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

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

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

4.3 Air Quality & Odour Net Effects

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

As described in Section 2, a "Yes" was applied to the following Air Quality and Odour criteria:

– Cause negative effects on air quality due to emissions (for parameters such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other contaminants)?

– Cause negative effects from the emission of greenhouse gases (e.g., carbon dioxide, carbon monoxide, methane)?
– Cause negative effects from the emission of dust or odour?

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

4.3.1 Potential Effects on Air Quality and Odour

As previously mentioned, the previous application was completed assuming the proposed parameters and there are no changes to the Air Quality and Odour Environment.

4.3.2 Mitigation Measures

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

4.3.3 Net Effects

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

5. Monitoring Requirements and Additional Approvals

To ensure that the mitigation measures identified in **Section 4.0** are implemented as envisioned, a strategy and schedule was developed for monitoring environmental effects. With these mitigation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the proposed undertaking.

5.1 Monitoring Requirements

There are no additional monitoring requirements at this time.

6. Conclusion

There has not been a change in the Air Quality or Odour environment since the previous amendment. The previous amendment was assessed based on the proposed conditions in this amendment. The previous assessment showed that the concentrations of TSP, PM_{10} and $PM_{2.5}$ were all well below the AAQC at the sensitive receptors and will continue to be so with the proposed amendment. The cumulative effect for $PM_{2.5}$ was below the $PM_{2.5}$ AAQC at the sensitive receptors as well. The Site has implemented the control measures that were identified in the previous

assessment and will continue with these controls to minimize the Air Quality and Odour impacts from the Site operations.

The Site previously completed an Odour Management Plan based on the proposed conditions and sources. The proposed capacity expansion is not expected to change the odour profile of the Site or the management of odour. The Site will continue to strive for zero odour complaints from the Site operations. The Odour Management Plan will be updated and submitted as part of the ECA process.

The change in the predicted gas generation rate for the Site is negligible compared to previous assessments and is not expected to have an impact on the air emissions from the site. The Site is in the process of updating the Emission Summary and Dispersion Modelling (ESDM) Report for this negligible change for submission and review by the Ministry of Environment, Conservation, and Parks (MECP) as part of the ECA process.

Appendix A

Odour Management Plan

Odour Management Plan

Brooks Road Landfill Site
Haldimand County

2270386 Ontario Limited

18 March 2024

→ The Power of Commitment

Project name		Brooks Road Landfill Stage 9					
Document title		Odour Management Plan | Brooks Road Landfill Site					
Project number		12561524-RPT-13					
File name		12561524-RPT-13-Odour Management Plan					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
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Version Control History

Date	Description of Changes	Author/Reviewer Initials
September 2022	Original Document	PN/MG
October 2023	Updated gas volumes	AC/MG
March 2024	Updated gas volumes	MG/DB

1. Introduction

GHD was retained by Brooks Road Environmental (BRE) to prepare an Odour Management Plan (OMP) for the Brooks Road Landfill Site (Site) located in Cayuga, Ontario. The Site is located at 160 Brooks Road in Cayuga, Ontario approximately one kilometre north of Kings Highway No. 3 (Talbot Road). A Site location plan is provided as Figure 1. The Site operates under Waste amended Environmental Compliance Approval (ECA) number A110302 (Waste ECA), Industrial Sewage amended ECA number 1122-BKUPSM (Industrial Sewage ECA), and Air ECA number 7323-C6EJUM (Air ECA).

The purpose of this OMP is for persons engaging in activities at the Site to be aware of all odorous sources at the Site, potential causes of odourous emissions and to implement best practices and procedures to minimize odours.

This report contains the following:

– A description of the Site infrastructure
– Approval requirements related to odour
– Potential on-Site sources and causes of odour
– An Emissions Summary and Dispersion Model (ESDM) for the Site
– Inspection, maintenance and monitoring procedures
– Mitigation measures
– Contingency measures
– Complaint response procedures
– Training
– Recording keeping
– Landfill gas mitigation plan

As required, this document will be reviewed on an annual basis in accordance with ECA A110302 and updated as necessary to reflect applicable changes.

1.1 Change Log

The following changes were made in the October 2023 document:

– Updated based Stage 9 and 219,400 m^3 of additional airspace for a total landfill capacity of 1,264,465 m^3 and associated revisions to the ESDM in Appendix A.

1.2 Scope and Limitations

This report has been prepared by GHD for 2270386 Ontario Limited and may only be used and relied on by 2270386 Ontario Limited for the purpose agreed between GHD and 2270386 Ontario Limited as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than 2270386 Ontario Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

2. Facility Description

The Site operates as a landfill. The total Site area is 14.3 hectares (ha) (35.3 acres) of which 6 ha (15 acres) is approved for landfilling. The Site is bounded to the north by a rural property consisting of undeveloped fields (i.e., long-term inactive agricultural crop production lands) and forested areas. To the south and east of the Site is undeveloped rural property consisting of a combination of fields and forested areas. The Site is bounded to the west by Brooks Road. On the west side of Brooks Road is an undeveloped rural property which is characterized primarily by undeveloped fields with occasional bush lots.

The Site has an approved fill rate of up to 1,000 tonnes per day, with a proposed maximum of 250,000 tonnes per year and a capacity of 1,264,465 cubic metres (m^3) (including waste and daily cover). The Site is approved to accept solid non-hazardous Industrial, Commercial, and Institutional (ICI) waste, including contaminated soils and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), generated from within the geographic boundaries of the Province of Ontario. Waste is brought to the Site by truck, inspected and weighed at the weigh scale located in the Site entrance, and then transported to the active tip face for disposal. The active tip face location varies over time as the landfill is filled. All exposed waste is covered by daily cover at the end of the work day. Any areas of the landfill where waste will not be placed for a period of 6 months or more is covered by a layer of interim cover a minimum of 300 mm thick. As the landfill reaches final waste contours, it will be progressively closed by installing final cover, which consists of 600 mm of compacted clay and 150 mm of topsoil.

The Site operates a leachate treatment system (LTS) that treats leachate generated in the landfill. Leachate is collected in the leachate collection system (LCS) and conveyed to a sump in the southeast corner of the landfill. From the sump, it is pumped to the LTS. The LTS consists of a treatment system and an effluent discharge system. The treatment system consists of a primary settling tank located adjacent to the landfill sump, an aeration system including two, below-grade, concrete tanks and a dissolved air flotation (DAF) unit, a membrane biofiltration reactor (MBR), ultraviolet (UV) disinfection, a sludge storage tank, and chemical feed systems. The treatment system has a rated capacity of 200 m^3/day. The effluent discharge system consists of an effluent transfer tank, three effluent discharge holding tanks, and discharge piping from the effluent discharge holding tanks to the Brooks Road roadside ditch. The discharge to the Brooks Road roadside ditch has a rated capacity of 45 m^3/day on average and 60 m^3/day at peak and discharges continuously. Treated effluent from the treatment system generated in excess of the rated capacity of the discharge to the roadside ditch is stored in the effluent discharge holding tanks prior to removal from the Site by tanker trucks to a licensed facility.

3. Approval Requirements

3.1 Environmental Compliance Approval

The Site is required to prepare an OMP based on Condition 3(1) outlined in the Site's Air ECA. This OMP is subject to an annual review and to be included in the annual report in accordance with Condition 12(7)(e) of the Site's Waste ECA.

The OMP details the method of monitoring Site-originating fugitive odours, provides mitigation measures to prevent nuisance odour complaints, provides contingency measures to address potential ongoing odour issues, and the respective scenarios in which the contingency measures are to be implemented. These monitoring methods,

mitigation measures, and contingency measures are provided to detail the efforts to be taken in accordance with Conditions 2(2), 2(3), and 2(4) of the Air ECA.

4. Potential Odour Sources

The sources identified below are considered the main sources of potential odour at the landfill. The potential causes of odour impacts for each source are also discussed below. Mitigation measures are discussed in Section 7.0 of this report. The location of the potential odour sources are provided in Figure 2. The sensitive receptors that were included in the ESDM Report are provided in Figure 3.

4.1 Waste Receiving

The Site receives non-hazardous ICI waste including contaminated soils and process organic waste (e.g. de-watered sewage sludge from the Caledonia Sewage Treatment Plant). The waste material is transported to Site using trucks. The Site can currently receive a maximum of 1,000 tonnes of waste per day.

Waste receiving may generate odour through the queuing of trucks transporting waste to the Site.

The potential for odours during waste receiving activities depend on:

– Queue time for waste transport trucks
– Characteristics and/or composition of the waste material
– Truck cover or container type
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from waste receiving operations include:

– Ensure all trucks bringing waste to the Site maintain tarps and keep contents enclosed until they reach the active face.
– Schedule arrival of waste trucks such that trucks do not need to queue at the entrance while waiting to be inspected and weighed.
– Once a truck has completed tipping, close or tarp the truck prior to leaving the active face.

4.2 Landfill Working Face

Trucks transporting waste to the Site complete an incoming weigh-in and then travel to the landfill working face to unload. Heavy equipment, including excavators and landfill dozers/compactors handle the waste and compact it within the working face. At the end of the day, the working face is covered by daily cover in accordance with Condition 3(24a). This daily cover may consist of soil, compost, wood chips, or other approved daily cover.

The potential for odours during landfilling activities depend on:

– The footprint size of the active face
– The location of the active face
– The location of previously-placed, odour-generating waste
– Characteristics and/or composition of the waste
– Type and amount of daily cover used to cover the working face
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from the landfill working face include:

– If any particularly odourous waste arrives on Site, ensure that it is covered immediately after placement and/or consider placement in a location furthest from the receptors noted on Figure 3. Place in a location and depth so as to prevent accumulation of water that could increase the landfill gas generation from this waste. All waste has the potential to generate odour but waste that may be particularly odourous include but are not limited to:
  - Waste with organics
  - Processed organic waste (dewatered sewage sludge from the Caledonia Sewage Treatment Plant)
  - Waste that is high in sulphur content
– If waste from a particular source or of a particular composition is identified to be odourous, Site staff will make note of when this material is being delivered to the Site and the weigh scale attendant will notify the landfill attendant to plan for appropriate placement of the material.
– Apply daily cover at the end of each working day.
– Keep the active face as small as reasonable for operations.

4.3 Leachate Collection System and Leachate Treatment System

Leachate is collected from the landfill by the LCS and conveyed through a primary settling tank, to the LTS for treatment and disposal. Treated effluent is stored in effluent holding tanks. Treated effluent is periodically loaded into tanker trucks for shipment to facilities licensed to accept the treated effluent. Leachate may occasionally be loaded into tanker trucks from the LCS or from temporary storage tanks. Potential odour generation from leachate management may include exposed locations of the LCS granular drainage blanket, the LCS cleanout or sump riser pipes, and LTS tanks.

The potential for odours from leachate collection and storage depends on:

– Volume of leachate stored in temporary tanks
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from the leachate collection and treatment systems include:

– Reduce storage of leachate in tanks
– Keep all LCS cleanout pipes and riser pipes sealed with a blind flange
– Keep the granular drainage blanket of the LCS at the top of slope covered

4.4 Covered Portions of the Landfill

Covered portions of the landfill include areas completed with interim cover or final cover. Odour may originate from the emission of landfill gas from cracks, or seeps in interim or final cover.

The potential for odours from covered portions of the landfill depends on:

– Condition of the cover
– The location of previously-placed, odour-generating waste
– Weather conditions including wind direction, temperature, precipitation, and relative humidity

Odour prevention measures to reduce the likelihood of odour emissions from covered portions of the landfill include:

– Apply interim and final cover over portions of the landfill that are temporarily not to receive waste or are completed to final grades
– Maintain vegetation on final cover
– Inspect covered portions of the landfill quarterly

The above potential odour sources were identified during the on-going operations. If other sources of odour are present the OMP will be updated to account for them.

5. Emissions Summary and Dispersion Modelling

GHD has prepared an ESDM Report attached as Appendix A. The ESDM Report was prepared in accordance with s.26 of Ontario Regulation (O. Reg.) 419/05 and considers potential sources of contaminants, including odour. Dispersion modeling was used to determine maximum potential Point of Impingement (POI) concentrations at potential receptors with all sources operating at maximum potential emission rates. The resulting POI concentrations are compared to criteria published in the MECP Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants. The ESDM Report indicates that the Site can operate in compliance with O. Reg. 419/05.

6. Inspection, Maintenance and Monitoring Procedures

Regular inspections allow Site operators to identify odours and initiate responsive actions to prevent the odours from having negative effects off-Site. Daily Site inspections are required per Condition 12 of the Waste ECA. The Site is inspected on a daily basis by shift supervisors and includes inspection for fugitive odours. A daily inspection ensures that potential issues are addressed immediately. All inspections should be documented in the Inspections Log, which is provided as Appendix B.

The entire Site will be inspected on a daily basis in accordance with Condition 12 of the Waste ECA and emphasis should be placed on the following areas of the Site, with respect to the potential for odour generation:

– Waste receiving area
– Landfill working faces
– Closed areas
– Leachate collection system, storage tanks

Other activities that should occur during the inspection include:

– Evaluate the waste receiving area and truck queue times to ensure that waste is landfilled in timely fashion.
– Evaluate the size of the working face. The size of the working face should not be oversized.
– Check that a daily cover is applied to the working face at the end of each working day.
– Evaluate the interim and final cover in closed/decommissioned areas of the landfill for cracks, fissures and/or erosion and evaluate the coverage and health of vegetation.

– Inspect the leachate collection system, storage tanks for exposed areas, leaks and spills.
– Determine and document weather conditions including wind speed, direction, humidity, precipitation, and temperature.

If an odour is confirmed to be coming from an on-Site source and can be detected at the property boundary, mitigation measures should be implemented and documented in the daily log. Subsequent daily inspections must include inspection of the source area and mitigation measures implemented to determine if effective odour prevention and control is being accomplished.

The Site Supervisor is responsible to ensure this OMP is followed by landfill operators.

7. Mitigation Measures

The following section lists mitigation measures to reduce the potential for fugitive odours to migrate to off-Site receptors. These mitigation measures are intended to be implemented within one working day in response to the detection of odour during daily inspections or in response to an odour complaint confirmed to be as a result of Site operations.

7.1 Waste Receiving

If odour is determined to be emanating from the waste receiving operations, such as the trucks entering the Site for inbound or outbound weighing, the following are potential mitigation measures to implement:

– Discuss with waste generators if efforts can be made to minimize odours from waste prior to coming to the Site.
– Investigate if trucks are removing tarps/covers prior to reaching the active face or failing to reinstate tarps/covers prior to leaving the active face and direct haulers to maintain covers in accordance with Section 4.1.

7.2 Landfill Working Face

If odour is determined to be emanating from the landfill working face, the following are potential mitigation measures to implement:

– Apply daily cover to portions of the working face to limit its size for the remainder of the day
– Apply additional daily cover material
– Apply odour control granules to the daily cover
– Operate the odour control misting system if climatic conditions are appropriate

7.3 Leachate Collection System and Storage Tank

If odour is determined to be emanating from the leachate collection system or storage tanks, the following are potential mitigation measures to implement:

– If an area of the leachate collection system granular drainage blanket is identified to be exposed, place cover material over the exposed area and apply odour control granules.
– If a blind flange is determined to have been removed from a leachate collection system cleanout or sump riser pipe, reinstall the blind flange(s).

– If any raw leachate is being temporarily stored in an above ground tank and odour is determined to be emanating from the tank, if applicable, drain the tank back to the landfill.
– If odour is determined to be coming from loading of a tanker truck with raw leachate and climatic conditions are appropriate, operate the odour control misting system. Consider if tanker loading can be postponed if climatic conditions are increasing the odour migration.

7.4 Covered Portions of Landfill

If odour is determined to be emanating from a covered portion of the Landfill, such as from a crack in interim or final cover, the following are potential mitigation measures to implement:

– Apply odour control granules to the crack.
– For interim cover, wet the area, scarify, apply additional cover soil, and compact the soil to repair erosion or cracking due to desiccation. Evaluate if additional repair work is necessary.
– For final cover, initiate a repair in accordance with the final cover repair contingency measure noted in Section 8.

8. Contingency Measures

Contingency measures represent actions that may be required if odour is confirmed to be coming from the Site and the implementation of preventative and mitigation measures described in Sections 4 and 7, respectively, are deemed to be ineffective. Contingency measures are intended to be actions that would take longer than a day to implement and may warrant additional investigation activities.

In accordance with Condition 2(3) of the Air ECA, if odour is not mitigated through implementation of mitigation measures, the MECP District Manager may provide written notice to conduct an investigation as to why the odour was not mitigated and assess the need for implementation of contingency measures.

To evaluate a mitigation measure, the area or practice identified to be contributing to the detected odour will be inspected as part of subsequent daily inspections. Where mitigation measures are implemented, the inspection will also include evaluation of the observed effectiveness. If the odour source is determined to continue to be resulting in off-Site impacts and the mitigation measures are observed to be ineffective, or if the MECP District Manager issues notification requiring the implementation of additional measures, then an investigation will be conducted per Condition 2(3) and include assessment of potentially effective contingency measures. Such an investigation will be provided to the MECP District Manager within the time frame identified in the notice pursuant to Condition 2(3).

Prior to implementation of contingency measures, the applicability of the proposed contingency measures will be assessed based on the confirmed source of odour. Potential contingency measures are identified in the sections below.

8.1 Application of Interim Cover

If an area of the landfill will not have waste placed for 6 months or more, interim cover should be applied.

Interim cover should be applied at a minimum thickness of 300 mm and should consist of low permeability soil in accordance with Condition 3(24) of the Waste ECA. Interim cover can be sourced from the on-Site clay stockpile. Heavy equipment including an excavator, rock trucks, a bulldozer, and a compactor would be required to move and place interim cover soil. The on-Site clay may require the addition of moisture if it is noted to be dry during placement.

Application of interim cover is expected to take approximately 4 weeks to implement and could take longer depending on the size of the targeted interim cover area.

8.2 Application of Final Cover

If an area of the Landfill has reached final waste grades as shown in the D&O Report, final cover may be applied.

Final cover consists of a minimum 600 mm thick low permeability soil with 150 mm of vegetated topsoil and must comply with Condition 3(24) of the Waste ECA. The additional thickness and use of a vegetated topsoil layer helps prevent desiccation of the cover, which may result in cracks that could release odour. On-Site clay may only be used for final cover if it can be tested to indicate a construction methodology that allows a minimum 150 mm of infiltration per year. Therefore, material may need to be sourced from off-Site. Topsoil would also require procurement. Heavy equipment including an excavator, rock trucks, a bulldozer, and a compactor would be required to install final cover.

Application of final cover is expected to take approximately 2 months to implement and could take longer depending on the size of the targeted final cover area.

8.3 Repair or Re-Vegetation of Cover

Interim or final cover may dry over time and begin to desiccate. This could lead to the development of cracks where odour can escape.

Cracks in interim or final cover can be repaired through:

– Removal of any vegetation and topsoil around the crack
– Application of moisture
– Scarification of the low permeability soil
– Placement of additional low permeability soil
– Compaction of the repaired area

If the repair is on final cover, the repaired area also requires the placement of 150 mm of topsoil and re-vegetation.

Areas of final cover observed to have poor vegetation are susceptible to crack development. If poor vegetation coverage is noted on final cover, the area can be re-vegetated through placement of additional topsoil and hydroseed.

Though not required for interim cover, if interim cover is observed to continually develop cracks, placement of topsoil and hydroseed can minimize this concern.

The implementation timeline for repair and revegetation of cover materials varies depending on the area requiring repair and may take between 2 weeks and 2 months.

8.4 Application of Odour Suppressing Material

If the active waste face is producing odour that can’t be mitigated through application of daily cover, reduction in size or odour control granules, additional odour suppressing material may be warranted. There are various landfill odour suppression materials available that include:

– Foams
– Sprays
– Biological covers

These materials may require bench-scale testing to determine appropriate usage. Application of odour suppressing material does not eliminate the requirements for application of cover materials in accordance with Condition 3(24) of the Waste ECA.

Odour suppressing materials will take approximately 3 weeks to source and up to 8 weeks to adjust formulation/application. Once conditions and materials have been determined, subsequent applications can be completed within 1-week.

8.5 Relocation of the Active Face

During the progressive landfilling at the Site, the active waste face will change locations frequently. The location of the active waste face and seasonal climatic conditions may result in an increased potential for odour generation and migration. If seasonal climatic conditions are determined to increase odour levels at the active waste face and the location is conducive to the potential for off-Site impacts, the active waste face may require relocation.

Relocating the active waste face may require removal of interim cover at another location and preparation of landfill access roads. Implementation of a relocated active waste face may take approximately 2 weeks. If the active waste face is relocated, daily cover must be maintained on the former active waste face. Interim cover application on the former active waste face may also be warranted, though not strictly required if landfilling will recommence in that area within 6 months.

8.6 Reduction in Incoming Waste Volumes

If the size of the active waste face is determined to be contributing to generation of odours and the waste face can not be reduced due to the volume of material to be managed in a day, the size of the active waste face may be reduced through rescheduling to reduce daily incoming waste volumes. If a portion of the incoming waste has a high odour potential, rescheduling waste shipments can reduce daily incoming rates of this waste.

Furthermore, receipt of odourous waste may be restricted.

Incoming waste rescheduling may take 2 weeks to achieve to work with generators and haulers to reschedule shipments.

8.7 Installation of Odour Control System on Piping or Tanks

If odour is determined to be coming from tank vents associated with the leachate collection and treatment systems under normal operating conditions, odour control may be required on the venting systems.

All tank vents are passive, in that there is no collection system. Therefore, if odour control on passive tank vents is considered necessary, a carbon filtration system may prove effective. Prior to implementation, the tank vent odour control system should be designed based on potential flow rates, odour-causing parameters, and connection details.

Installation of odour control systems on piping or tanks requires minor design effort and procurement, therefore implementation is expected to take approximately 2 months.

8.8 Surface Emissions Monitoring

If odour is determined to be emanating from the closed portions of the landfill and obvious cracks are not visible upon inspection, surface emissions monitoring may be conducted to identify “hot spots” where odour may be escaping from cover material. The identification of “hot spots” may be used in conjunction with other contingency measures to address the odour migration.

As there are no established guidelines in Canada for landfill surface emissions monitoring, the general intent of the surface emissions monitoring procedures outlined in the United States Environmental Protection Agency’s (US EPA’s) New Source Performance Standards (NSPS) Method 21 Guidelines per the Code of Federal Regulations (CFR) 40, Part 60, Subpart WWW would be used.

In general accordance with the NSPS Method 21 Guidelines, observed areas with methane concentration readings in exceedance of 500 ppm will require re-monitoring and/or cover repairs/re-monitoring to ensure the corrective actions have successfully mitigated the emissions.

Other surface scanning methods to identify areas of concern may be considered, including thermal imagery through the use of aerial imaging equipment.

9. Complaint Response Protocol

The Site is committed to minimizing odour generation, as much as possible. On occasion there may be complaints regarding odour from the Site. Site workers are be trained on facility protocol for handling and recording complaints. The Site has a Complaint Protocol prepared in May 2020 that may be revised occasionally. The Complaint Protocol outlines the procedures to be implemented in response to receipt of a complaint either through the MECP or directly to the Site. The source of odour resulting in a complaint is investigated when the complaint is received in a timely manner.

The Complaint Protocol also includes a complaint form to be filled out by Site staff. The complaint form will identify any mitigation measures or contingency measures taken as a result of the complaint. The Complaint Protocol is provided as Appendix C. Currently the closest source of weather condition information is the Environment Canada – Hamilton A station. This station will be used during complaint investigation as a consistent source of weather condition information. If another source of weather condition information becomes available, the OMP and the Complaint Protocol will be revised.

10. Training

All employees at the Site are required to receive training on the contents of this OMP. Refresher training for all employees is recommended on an annual basis. Training requirements for management and non-management staff are identified below.

The non-management training should include the following topics:

– Approval requirements
– Potential sources of odour at the Site
– Preventative measures outlined in Section 4
– How to report findings of potential odour sources
– Odour complaint response procedures

The management training should include the following topics:

– All topics covered under non-management training
– Site inspection requirements
– Implementation of mitigation measures
– Initiation of investigations requested by MECP District Manager
– Implementation of contingency measures
– Recordkeeping and annual reporting requirements

All employees who receive training need to fill out the Training Log. The Training Log is provided in Appendix D.

11. Record Keeping

The following records should be kept on Site:

– Daily Inspection Sheets
– Complaint Response Sheet
– Training Signature Page
– A copy of this OMP for review or inspection by the MECP

In addition, this OMP will be reviewed on an annual basis through the annual report prepared in accordance with the Waste ECA. Any recommended changes to this OMP require revision to the report and submission to the MECP District Manager.

12. Landfill Gas Mitigation Plan

Landfill gas (LFG) is produced by the biological decomposition of wastes placed in a landfill. LFG composition is highly variable and depends upon a number of Site-specific conditions including solid waste composition, density, moisture content, and age. The specific composition of LFG varies significantly from landfill to landfill and even from place to place within a single landfill. However, LFG is typically comprised of methane (approximately 50 percent by volume) and carbon dioxide (approximately 50 percent by volume). LFG may also contain nitrogen (N2), oxygen (O2), and trace quantities of other gases (such as hydrogen sulfide (H2S), mercaptans, etc.). In addition to the above methane-related LFG constituents, non-methane organic compounds (NMOCs) such as vinyl chloride, may also be generated and emitted at a landfill.

As noted in the D&O Report, Ontario Regulation (O. Reg.) 232/98 requires the mandatory collection of LFG for sites with a total waste disposal volume greater than 1.5 million m^3. Given that the total landfill capacity including Stage 9 will be approximately 1,264,465 m^3, LFG collection is not required as per O. Reg. 232/98. Also based on the significantly low estimated LFG production rates, a LFG collection and control system is not considered feasible for the Site.

However, the landfill does produce LFG, which is a potential source of odour. LFG generation is affected by the composition of waste and the physical, chemical, and biological properties of the waste mound. Factors that may increase LFG generation or the odour in landfill gas include:

– Moisture in the landfill
– Methane generation potential of waste

Leachate management will reduce LFG generation rate through limiting the moisture content of the waste. The leachate management plan for the Site is described in the D&O, the Waste ECA, and the Leachate Removal Plan (LRP). The D&O describes the methodology of minimizing leachate generation through progressive closure and installation of interim and final cover to separate surface water from waste. The LRP describes the methods to reduce the leachate volume within the landfill to an average depth measured on the base liner of 0.3 m over a five-year period prior to landfill closure. The implementation of the leachate management plan serves to reduce the moisture content within the waste and reduce LFG generation. Compliance with the LRP is evaluated annually within the annual report required by the Waste ECA.

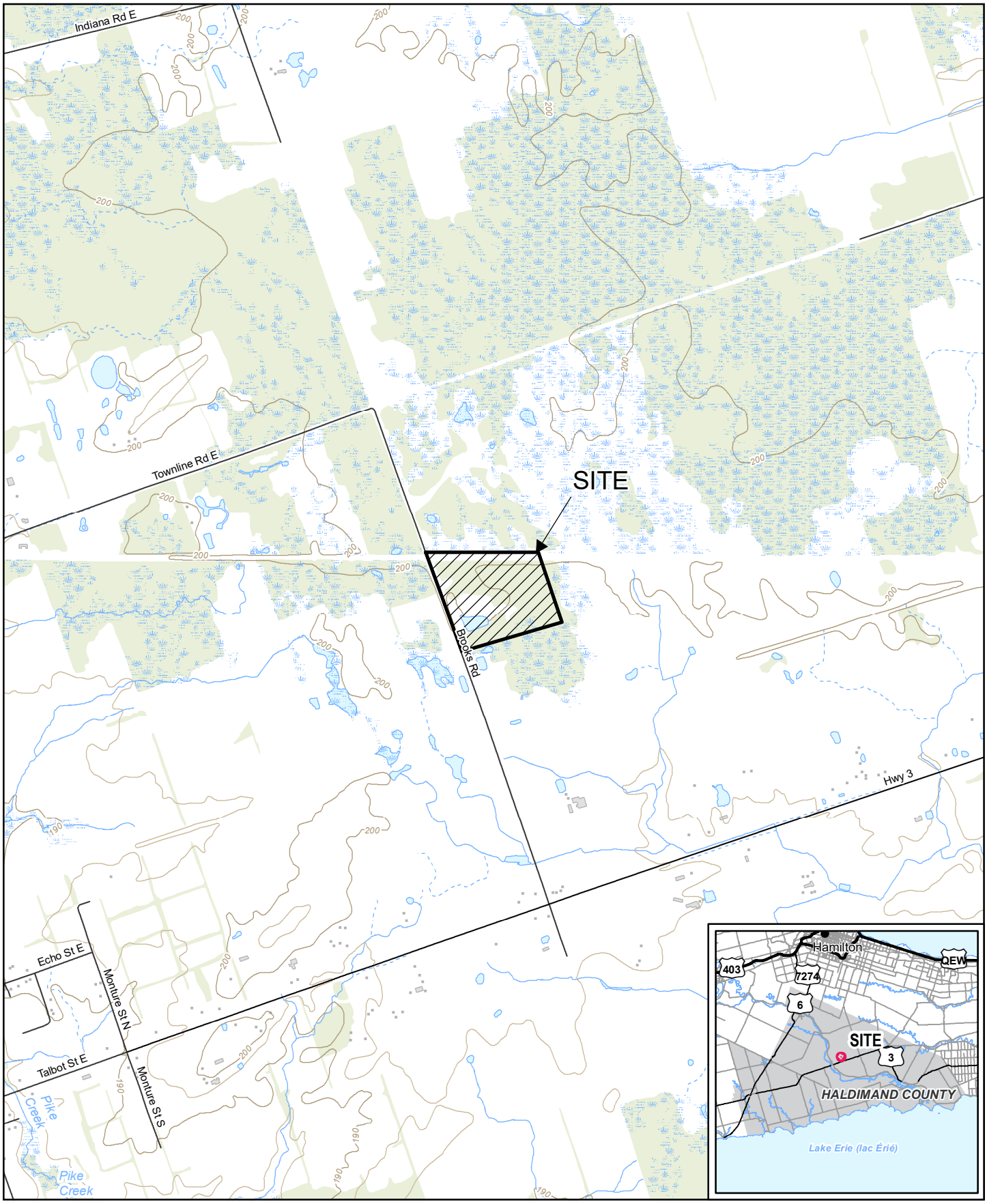
The LFG production assessment contained in the D&O report identified a waste composition based on data from 2009 through 2020. The assumed waste composition is provided below:

Table 1 Assumed Waste Composition by Type

Waste Type	Percent of Total	Waste Description	Total LFG Generated (tonnes per year)
Bulk Waste	5.7	Residential Rolloffs	2,856
C&D Waste	27.3	C&D from transfer stations, contractor demolition wastes, roofing/shingles	13,768
Sewage Sludge	0	Dewatered sludge from sewage treatment facilities	0
Garden Waste	0.6	Leaf and yard waste	313
Food Waste	1.9	Organics	952
Inert Waste	64.6	Glass, contaminated soil, ash	32,594

Mitigation measures to reduce LFG generation include continued compliance with ongoing leachate management activities, and alteration to the waste composition brought to the Site. To measure the results of LFG mitigation measures the following is proposed:

1. Identify compliance status with LRP.
2. Compare annual waste composition to modeled waste composition in Table 1 and identify reduction in LFG generation potential of actual waste composition compared to modeled waste composition.
3. Include findings from 1 and 2 in Annual Report.



Paper Size ANSI A

0 130 260 390 520

Metres

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

N

GHD

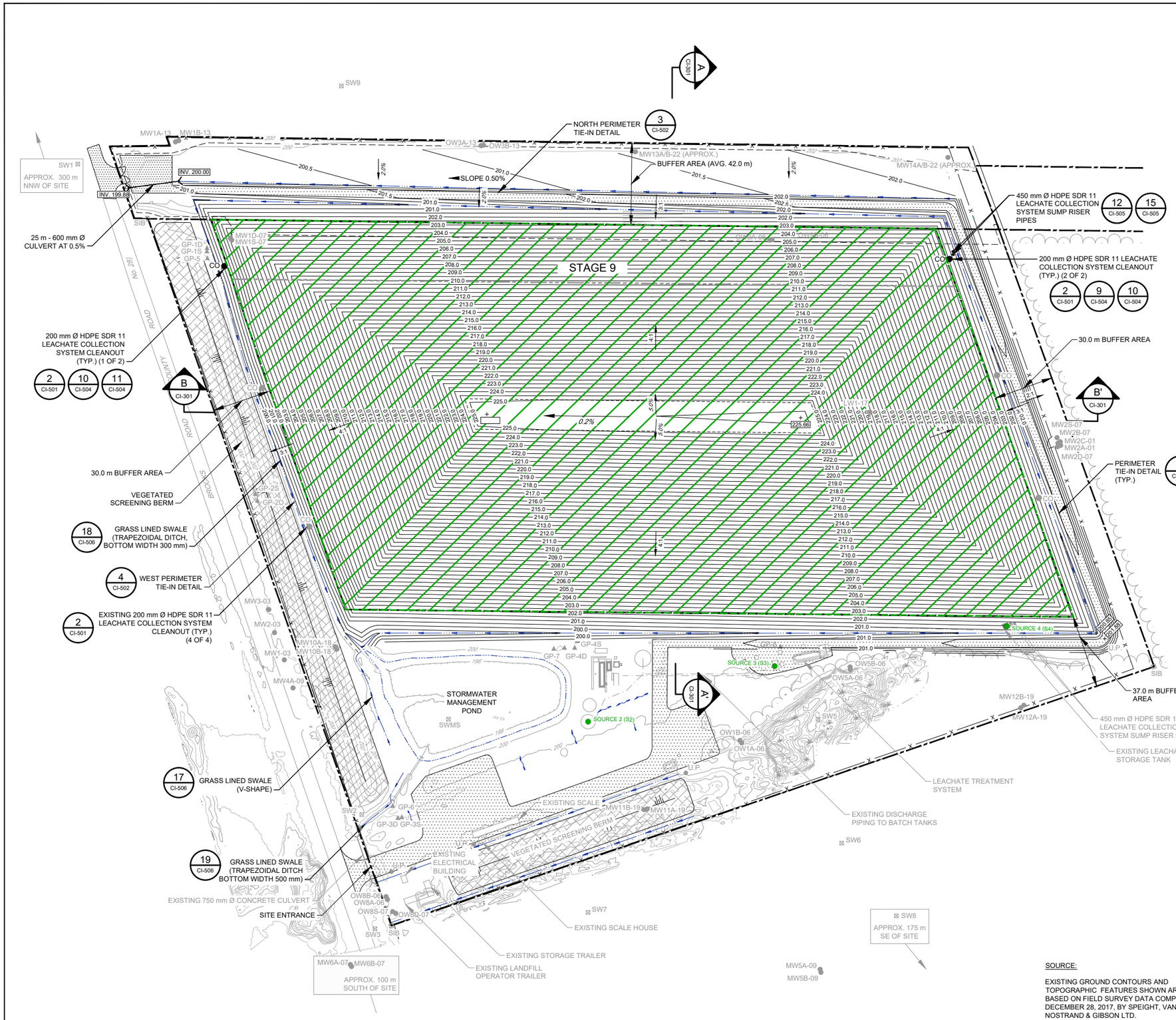
BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
ODOUR MANAGEMENT PLAN

SITE LOCATION MAP

Project No. **12561524**
Revision No. **-**
Date **Aug 3, 2022**

FIGURE 1

O:\GIS\PROJECTS\12561000s\12561524\Layouts\202208_ESDMR\12561524_202208_ESDMR_GIS001.mxd
Print date: 03 Aug 2022 - 13:24



LEGEND:

- TOP OF FINAL COVER CONTOUR (1.0 m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5 m INTERVAL (m AMSL))
- EXISTING CONTOUR (2.0 m INTERVAL)
- EXISTING CONTOUR (1.0 m INTERVAL)
- PROPERTY LINE
- FENCE LINE
- EXISTING CLAY STOCKPILE AREA
- DRAINAGE DITCH
- EXISTING FORCEMAIN
- APPROVED LIMIT OF WASTE
- EXISTING LOW AREA
- GRANULAR SURFACE / ACCESS ROADS
- SCREENING BERM
- EXISTING TREELINE
- EXISTING OBSERVATION WELL
- EXISTING MONITORING WELL
- EXISTING CLEANOUT
- CLEANOUT
- EXISTING SURFACE WATER MONITORING LOCATION
- EXISTING GAS PROBE
- EXISTING UTILITY POLE
- EXISTING LEACHATE WELL
- EXISTING CULVERT
- CULVERT
- EXISTING DOUBLE GATE
- EXISTING SINGLE GATE
- EXISTING STANDARD IRON BAR
- DOUBLE GATE
- AREA SOURCE (SOURCE 1)
- EMISSION SOURCE LOCATION

NOTES:

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

SOURCE:

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

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

BENCH MARK:

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

GHD Ltd.
455 Phillip Street
Waterloo, Ontario N2L 3X2 Canada
T 1 519 884 0510 F 1 519 884 0525
www.ghd.com

Bar is 25mm on original size sheet
0 25mm

No.	Issue	Author	Checked	Approved	Date
C01	STAGE 9 APPROVAL	D.B.	R.L.		02-26-2024

Designer
Drafting
Design
Check
Check
Project Manager
Project Director

Client
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Project
ODOUR MANAGEMENT PLAN

Date: **FEBRUARY 26, 2024**
Scale: **AS SHOWN**
Project No.: **12561524**
Size: **ANSI D**

Title
SOURCE LOCATION PLAN

Sheet No.
FIGURE 2

Plot Date: 18 March 2024 - 3:12 PM
Plotted By: Spencer Holland
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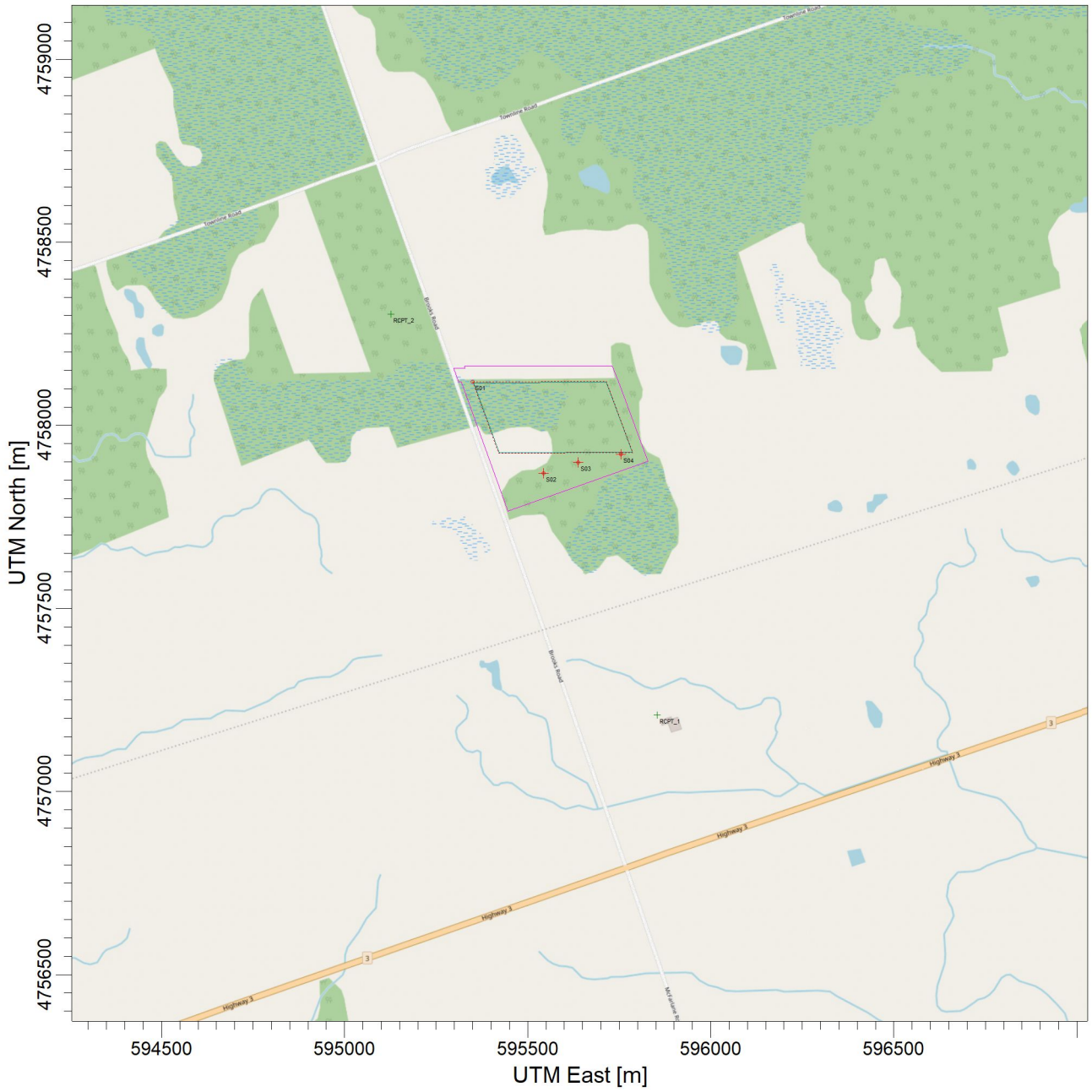
PROJECT TITLE:

Brooks Road Landfill
Sensitive Receptor Locations



COMMENTS:	SOURCES: **4**	COMPANY NAME: **GHD**	
	RECEPTORS: **2**	MODELER:	**Figure 3**
	OUTPUT TYPE:	SCALE: 1:17,451 0 0.5 km	
	MAX:	DATE: **4/1/2024**	PROJECT NO.: **12561524**

Appendices

Appendix A

Emissions Summary and Dispersion Modelling Report

Emission Summary and Dispersion Modelling Report

Brooks Road Landfill
Haldimand County

2270386 Ontario Limited

18 March 2024

→ The Power of Commitment

Ontario

Ministry of the Environment, Conservation and Parks

Emission Summary and Dispersion Modelling Report Checklist

Company Name

2270386 Ontario Limited

Company Address

Unit Number	Street Number	Street Name	PO Box
	162	Cumberland Street	

City/Town	Province	Postal Code
Toronto	Ontario	M5R 3N5

Location of Facility

160 Brooks Rd North, Cayuga, Haldimand County, Ontario

The attached Emission Summary and Dispersion Modeling Report was prepared in accordance with s. 26 of O. Reg. 419/05 and the guidance in the MECP document "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 and "Air Dispersion Modelling Guideline for Ontario" dated March 2009 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact

Company Contact

Company Contact Name

Last Name	First Name	Middle Initial

Title	Telephone Number

Signature	Date (yyyy/mm/dd)
	2024/03/14

Technical Contact

Technical Contact

Matthew Griffin

Technical Contact Name

Last Name	First Name	Middle Initial
Griffin	Matthew	

Representing	Telephone Number
GHD	519-340-3794

Signature	Date (yyyy/mm/dd)
	2024/03/18

Disponible en français

* This checklist is taken from the document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009.

Emission Summary and Dispersion Modelling Report Checklist

	Required Information	Submitted	Explanation/Reference
	Executive Summary and Emission Summary Table		
	1.1 Overview of ESDM Report	☑ Yes	Executive Summary
	1.2 Emission Summary Table	☑ Yes	Executive Summary, Table 4
1.0	**Introduction and Facility Description**		
	1.1 Purpose and Scope of ESDM Report (when report only represents a portion of facility)	☑ Yes	Section 1.1
	1.2 Description of Processes and NAICS code(s)	☑ Yes	Section 1.2
	1.3 Description of Products and Raw Materials	☑ Yes	Section 1.3
	1.4 Process Flow Diagram	☑ Yes	Section 1.4, Figures 4
	1.5 Operating Schedule	☑ Yes	Section 1.5
2.0	**Initial Identification of Sources and Contaminants**		
	2.1 Sources and Contaminants Identification Table	☑ Yes	Table 1
3.0	**Assessment of the Significance of Contaminants and Sources**		
	3.1 Identification of Negligible Contaminants and Sources	☑ Yes	Section 3.1, Appendix C
	3.2 Rationale for Assessment	☑ Yes	Section 3.2, Appendix C
4.0	**Operating Conditions, Emission Rate Estimating and Data Quality**		
	4.1 Description of operating conditions, for each significant contaminant that results in the maximum POI concentration for that contaminant	☑ Yes	Section 4.1
	4.2 Explanation of Method used to calculate the emission rate for each contaminant	☑ Yes	Section 4.2, Appendix B
	4.3 Sample calculation for each method	☑ Yes	Appendix B
	4.4 Assessment of Data Quality for each emission rate	☑ Yes	Appendix B
5.0	**Source Summary Table and Property Plan**		
	5.1 Source Summary Table	☑ Yes	Table 2a and Table 2b
	5.2 Site Plan (scalable)	☑ Yes	Figure 1, Figure 3
6.0	**Dispersion Modelling**		
	6.1 Dispersion Modelling Input Summary Table	☑ Yes	Table 3
	6.2 Land Use Zoning Designation Plan	☑ Yes	Figure 2
	6.3 Dispersion Modelling Input and Output Files	☑ Yes	Appendix D
7.0	**Emission Summary Table and Conclusions**		
	7.1 Emission Summary Table	☑ Yes	Table 4
	7.2 Assessment of Contaminants with no MECP POI Limits	☑ Yes	Section 7.2
	7.3 Conclusions	☑ Yes	Section 7.3
	Appendices (Provide supporting information or details such as…)		
	Supporting Calculations	☑ Yes	Appendix B
	Supporting Information for Assessment of Negligibility	☑ Yes	Appendix C
	Air Dispersion Modelling Files	☑ Yes	Appendix D

Project name		Brooks Road Landfill Stage 9					
Document title		Emission Summary and Dispersion Modelling Report | Brooks Road Landfill					
Project number		12561524-RPT-14					
File name		12561524-RPT-14-ESDM Report					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S4	0	Amin Costas, B.Eng., E.I.T.	Matt Griffin, P.Eng.		David Barton MEng, P.Eng., PE (FL)		Mar.18, 2024

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Version Control

Revision	Date	Revised Description	Reviewer Initials
1.0	May 2021	Landfill emission rate increased due to the proposed fill rate amendment. Updated based on comments received from MECP.	MG
2.0	August 2022	Landfill emission rate increased due to the proposed expansion.	MG
3.0	March 2024	Landfill emission rate increased due to the Stage 9.	MG

Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared to assist Brooks Road Environmental c/o 2270386 Ontario Limited (BRE) in evaluating the inclusion of Stage 9 at the Site for compliance with Ontario Regulation (O. Reg.) 419/05 and to support the Odour Management Plan. Stage 9 is estimated to yield 219,400 m^3 of additional space for a total landfill capacity of 1,264,465 m^3.

The ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05. In addition, guidance in the Ministry of Environment, Conservation and Parks (MECP) publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018 (ESDM Procedure Document) was followed as appropriate.

The Site is currently covered under Amended Environmental Compliance Approval (ECA) (Air) No. 7323-C6EJUM, issued on September 24, 2021. A copy of the existing ECA (Air) is provided in Appendix A.

BRE owns and operates a landfill at 160 Brooks Road in Cayuga, Ontario (Site). The NAICS code that applies to this Facility is 562210 – Waste Treatment and Disposal. The Facility is subject to s.20 of O. Reg. 419/05, and the modelled impact of contaminant emissions must be assessed using a Ministry approved dispersion model for each contaminant and applicable averaging period.

The Site is expected to emit Volatile Organic Compounds (VOCs) and odour. Some of the sources and contaminants were considered negligible in accordance with s.8 of O. Reg. 419/05.

The maximum point-of-impingement (POI) concentrations were calculated based on the operating conditions where all significant sources are operating simultaneously at their individual maximum rates of production. The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with s.11 of O. Reg. 419/05 and the data quality assessment follows the process outlined in the requirements of the ESDM Procedure Document.

A POI concentration for each significant contaminant emitted from the Site was calculated based on the calculated emission rates and the output from the approved dispersion model; the results are presented in the Emission Summary Table in accordance with s.26 of O. Reg. 419/05.

The POI concentrations listed in the Emission Summary Tables were compared against criteria listed in the MECP publication "Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants".

All of the predicted POI concentrations for contaminants listed in the Emission Summary Table that are included in the MECP's ACB List, are below the corresponding limits.

This ESDM Report demonstrates that the Facility can operate in compliance with O. Reg. 419/05.

Contents

Figure index

Table index

Appendices

1. Introduction and Site Description

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared in accordance with s.26 of Ontario Regulation (O. Reg.) 419/05. In addition, guidance in the Ministry publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018 (ESDM Procedure Document) PIBS 3614e04.1 was followed as appropriate.

For ease of review and to promote clarity this ESDM Report is structured to correspond to each of the items listed in the Ministry publication "Emission Summary and Dispersion Modelling Check-List" PIBS 5357e (2021).

This section provides a description of the Site as required by subparagraph 1 of s.26 (1) of O. Reg. 419/05.

1.1 Purpose and Scope of ESDM Report

This ESDM Report was prepared to evaluate the inclusion of Stage 9 at the Site and compliance with O. Reg. 419/05 and to support the Odour Management Plan. Stage 9 is estimated to yield 219,400 m^3 of additional airspace for a total landfill capacity of 1,264,465 m^3. The ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05 and guidance provided in the Ontario Ministry of the Environment, Conservation and Parks (MECP) publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report, Version 4.1" dated March 2018 (ESDM Procedure Document) PIBS 3614e04 was followed as appropriate.

The Site is legally described as Part of Lot 24, Concession I-N.T.R., Haldimand County. The total Site area is approximately 14.3 hectares (ha) (35.3 acres) of which approximately 6 hectares (15 acres) is approved for landfilling.

The location of the Site is presented on Figure 1 and the land use designation of the Site and surrounding area is presented on Figure 2. The location of the property line is presented on Figure 3. The location of the discharges from each of the sources are also presented on Figure 3; the location of each of the sources is specified with the source reference number.

1.2 Description of Processes and NAICS Codes

The Site is currently operating as a landfill that has an approved maximum fill rate of 250,000 tonnes per year and a capacity of 1,264,465 cubic metres (m^3) (including waste and daily cover).

The North American Industry Classification System (NAICS) Code that applies to this Site is 562210 – Waste Treatment and Disposal.

1.3 Description of Products and Raw Materials

Brooks Road Landfill is approved to accept solid non-hazardous Industrial, Commercial and Institutional (ICI) waste, including contaminated soils and processed organic waste (e.g., dewatered sewage sludge from the Caledonia Sewage Treatment Plant), generated from within the geographic boundaries of the Province of Ontario.

A copy of the current ECA (Air) for the Site is included in Appendix A.

Process information is provided in greater detail in Appendix B – Sample Calculations. Refer to Table 1 - Sources and Contaminants Identification Table, which tabulates the individual sources of emissions at the Site.

1.4 Process Flow Diagram

Refer to Figure 4 – Process Flow Diagram for a graphical representation of the leachate management process at the Site.

1.5 Operating Schedule

The Site operates from 6:00 a.m. to 6:00 p.m., Monday to Friday and from 6:00 a.m. to 2:00 p.m. on Saturdays.

Waste receipt occurs from 7:00 a.m. to 5:00 p.m. Monday to Friday and from 7:00 a.m. to 1:00 p.m. on Saturdays.

1.6 Scope and Limitations

This report: has been prepared by GHD for 2270386 Ontario Limited and may only be used and relied on by 2270386 Ontario Limited for the purpose agreed between GHD and 2270386 Ontario Limited as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than 2270386 Ontario Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared the AERMOD dispersion model (v. 22112) and AERMAP surface pre-processor (v. 18081) models ("Models") for, and for the benefit and sole use of, 2270386 Ontario Limited to support dispersion modelling and must not be used for any other purpose or by any other person.

The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Model are from publicly available sources or provided by or on behalf of the 2270386 Ontario Limited, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs becomes available.

The Model is limited by the mathematical rules and assumptions that are set out in the Report or included in the Model and by the software environment in which the Model is developed.

The Model is a customised model and not intended to be amended in any form or extracted to other software for amending. Any change made to the Model, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Model including any outputs.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

2. Initial Identification of Sources and Contaminants

This section provides an initial identification of all of the sources and contaminants emitted at the Site, as required by subparagraphs 2 to 4 of s.26 (1) of O. Reg. 419/05.

The air emissions generated from the Site are detailed below.

Landfill (Source 1)

The waste is received and landfilled within the proposed landfill footprint. The potential emissions from the landfill are Volatile Organic Compounds (VOCs) and odour.

Treated Effluent Tank (Source 2)

BRE operates an on-site leachate treatment system (LTS) in accordance with an approved ECA. Effluent from the LTS is temporarily stored in above-grade effluent storage tanks. The potential emissions from the treated effluent tank is odour.

Aeration System (Source 3)

BRE operates an on-site LTS in accordance with an approved ECA. The LTS includes an aeration system as a treatment component. The potential emissions from the aeration system is odour.

Raw Leachate Tank (Source 4)

BRE operates an on-site LTS in accordance with an approved ECA. Raw leachate is pumped from the landfill leachate collection system to the primary settling tank prior to gravity flow to the LTS. The potential emissions from the leachate tank is odour.

2.1 Sources and Contaminants Identification Table

Table 1 – Sources and Contaminants Identification Table tabulates all the emission sources at the Site. Table 1 provides the information required for subparagraphs 2 to 4 of s.26 (1) of O. Reg. 419/05.

The expected contaminants emitted from each source are also identified in Table 1. Each of the identified sources has been assigned a source reference number.

The location of the discharges from each of the sources is presented on Figure 3 – Site Plan and Air Emission Source Locations as identified by the source reference number.

3. Assessment of Significance of Sources and Contaminants

This section provides an explanation for each source and contaminant identified as negligible in Table 1, as required by subparagraph 5 of s.26 (1) of O. Reg. 419/05.

In accordance with s.8 of O. Reg. 419/05, emission rate calculations and dispersion modelling do not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from significant sources.

3.1 Identification of Negligible Contaminants and Sources

Each negligible source is identified in Table 1.

The remaining sources are significant. These sources will be included in the dispersion modelling for the Site.

Some contaminants from sources that are considered significant have been identified as negligible upon further investigation. This is shown in further detail in Appendix C.

3.2 Rationale for Assessment

For each source or contaminant in Table 1 that has been identified as being negligible there is an accompanying documented rationale. The technical information required to substantiate the argument that each of the identified sources or contaminants is negligible is presented in Appendix C – Supporting Information for Assessment of Negligibility.

4. Operating Conditions, Emissions Estimating, and Data Quality

This section provides a description of the operating conditions used in the calculation of the emission estimates and an assessment of the data quality of the emission estimates for each significant contaminant from the Site as required by subparagraphs 6 and 7 of s.26 (1) of O. Reg. 419/05.

4.1 Description of Operating Conditions

Section 10 of O. Reg. 419/05 states that an acceptable operating condition is a scenario that assumes operating conditions for the Site that would result, for the relevant contaminant, in the highest concentration of the contaminant at a POI that the Site is capable of. The operating condition described in this ESDM Report meets this requirement.

The averaging time for the operating condition is based on the applicable averaging time for each contaminant. The contaminants have either a 10-minute, 1-hour, 24-hour or annual averaging period. The operating condition used for this Site that results in the maximum concentration at a POI is the scenario where all significant sources are operating simultaneously at their individual maximum rates of production.

The individual maximum rates of production for each significant source of emissions correspond to the maximum emission rate during any hour period. The individual maximum rates of production for each significant source of emissions are explicitly described in Appendix B.

4.2 Explanation of the Methods Used to Calculate Emission Rates

The maximum daily and hourly emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with requirements of the ESDM Procedure Document.

The emission rate for each significant contaminant emitted from a significant source was estimated and the methodology for the calculation is documented in Table 2A and Table 2B.

4.3 Sample Calculations

The technical rationale, including sample calculations, required to substantiate the emission rates presented in Table 2A and Table 2B are documented in Appendix B.

4.4 Assessment of Data Quality

This section provides an assessment of the data quality of the emission estimates for each significant contaminant from the Site.

The assessment of the data quality of the emission rate estimates for each significant contaminant emitted from the significant sources was performed in accordance with the requirements of subparagraph 7iii of s.26 (1) of O. Reg. 419/05.

For each contaminant the emission rate was estimated and the data quality of the estimate is documented in Table 2A and Table 2B. The assessment of data quality for each source listed in Table 2A and Table 2B is documented in Appendix B.

All the emission rates listed in Table 2A and Table 2B are documented as having their highest available data quality and correspond to the operating scenario where all significant sources are operating simultaneously at their individual maximum rates of production. Therefore, emission rate estimates listed in Table 2A and Table 2B are not likely to be an underestimate of the actual emission rates and use of these emission rates will result in a calculated concentration at POI greater than the actual concentrations.

5. Source Summary Table and Site Plan

This section provides the table required by subparagraph 8 and the Site plan required by subparagraph 9 of s.26 (1) of O. Reg. 419/05.

5.1 Source Summary Table

For each source of significant contaminants, the following parameters are referenced in Table 2A and Table 2B and are as follows:

- Contaminant
- Chemical Abstract Society (CAS) reference number
- Source reference number
- Source description
- Stack parameters (flow rate, exhaust temperature, diameter, height above grade, height above roof)
- Location referenced to a Universal Transverse Mercator (UTM) coordinate system presented on Figure 3
- Maximum emission rate
- Averaging period
- Emission estimating technique
- Estimation of data quality
- Percentage of overall emission

5.2 Site Plan

The locations of the emission sources listed in Table 1 are presented on Figure 3; the location of each of the sources is specified with the source reference number. The location of the property-line is indicated on Figure 3, with the end points of each section of the property-line clearly referenced in UTM coordinate system. The location of each source is referenced to the UTM coordinates system under a column in Table 2A and Table 2B.

6. Dispersion Modelling

This section provides a description of how the dispersion modelling was conducted at the Site to calculate the maximum concentration at a POI.

The dispersion modelling was conducted in accordance with the Ministry publication "Air Dispersion Modelling Guideline for Ontario (February 2017)" PIBS 5165e03 (The ADMGO). A general description of the input data used in the dispersion model is summarized in Table 3.

As identified in Section 1.2, this Site is subject to s. 20 of O. Reg. 419/05, and the Site's compliance is assessed using Schedule 5 of O. Reg. 419/05. Furthermore, compliance is assessed using the United States Environmental Protection Agency (USEPA) atmospheric dispersion model AERMOD.

The AERMOD modelling system has been identified by the MECP as one of the approved dispersion models under O. Reg. 419/05, and currently includes the Plume Rise Model Enhancements (PRIME) algorithms for assessing the effects of buildings on air dispersion.

The AERMOD modelling system is made up of the AERMOD dispersion model, the AERMET meteorological pre-processor and the AERMAP terrain pre-processor. The following approved dispersion model and pre-processors were used in the assessment:

– AERMOD dispersion model (v. 22112)
– AERMAP surface pre-processor (v. 18081)

AERMET was not used in this assessment, as a pre-processed MECP meteorological dataset was used.

A summary of the AERMOD source input parameters is provided in Appendix D.

The emission rates used in the dispersion model meet the requirements of Section 11 (1) 1 of O. Reg. 419/05, which requires that the emission rate used in the dispersion model is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant. These emission rates are further described in Appendix B.

There is no childcare facility, health care facility, senior's residence, long-term care facility or an education facility located at the Site.

6.1 Dispersion Modelling Input Summary Table

A description of how the approved dispersion model was performed is included in Table 3. This table meets both requirements of s.26 (1) 11 and Sections 8-17 of O. Reg. 419/05 and follows formatting provided in the ESDM Procedure Document.

6.2 Co-ordinate System

The Universal Transverse Mercator (UTM) coordinate system, as per Section 5.2.2 of the ADMGO, was used to specify model object sources and receptors. All coordinates were defined in the North American Datum of 1983 (NAD83).

All sources and the property line coordinates are provided on Figure 3.

6.3 Meteorology and Land Use Zoning Plan

Subparagraph 10 of s.26 (1) of O. Reg. 419/05 requires a description of the local land use conditions if meteorological data described in paragraph 2 of s.13 (1) of O. Reg. 419/05 was used. The AERMOD model was run using a MECP site specific pre-processed 5-year dispersion meteorological data set (i.e., surface and profile files).

A land use zoning plan is provided on Figure 2. Figure 2 also illustrates the extents of the Site property boundary and provides zoning of adjacent land uses. The Site is located in an area zoned Disposal Industrial. The land surrounding the Site is zoned Agricultural.

6.4 Terrain

AERMOD captures the essential physics of dispersion in complex terrain though the use of a separate height scale factor for each receptor (USEPA, 1998 – AERMAP UG). The highest scale factor represents the terrain that would dominate flow in the vicinity of the receptor.

The height scale factor that is used by AERMOD is generated by an AERMAP terrain pre-processor. AERMAP utilizes terrain data, or Digital Elevation Model (DEM) data in conjunction with a layout of receptors and sources to height scale factors that can be directly used in AERMOD. Terrain data used in this assessment was obtained from MECP (7.5-minute format).

6.5 Receptors

Receptors were chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of O. Reg. 419/05. A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

– 20-m spacing within 200 m of the edge of the bounding box
– 50-m spacing from 200 to 500 m
– 100-m spacing from 500 to 1,000 m
– 200-m spacing from 1,000 to 2,000 m
– 500-m spacing from 2,000 to 5,000 m

A property line ground level receptor grid with 10-m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Site's property line. Sensitive receptors used for this assessment are shown in Figure 5.

6.6 Deposition

AERMOD has the ability to account for wet and dry deposition of substances that would reduce ground level concentrations at POIs. However, the deposition algorithm has not been implemented in this assessment and therefore, the predicted POI concentrations are considered to be more conservative.

6.7 Averaging Time and Conversions

The shortest time scale that AERMOD predicts is a 1-hour average value. Schedule 3 standards of O. Reg. 419/05 apply to this Site; these standards are based on 1-hour and 24-hour averaging times, which are averaging times that are easily provided by AERMOD Dispersion Modelling Options.

The options used in the AERMOD dispersion model are summarized in the table below:

Modelling Parameter	Description	Used in the Assessment?
DFAULT	Specifies that regulatory default options will be used	No, the non-default BETA option was used
BETA	Specifies that horizontal and capped sources dispersion algorithms will be used	Yes, the BETA option is the only non-default option that may be used without prior MECP approval

Modelling Parameter	Description	Used in the Assessment?
CONC	Specifies that concentration values will be calculated	Yes
DDPLETE	Specifies that dry deposition will be calculated	No
WDPLETE	Specifies that wet deposition will be calculated	No
FLAT	Specifies that the non-default option of assuming flat terrain will be used	No, the model will use elevated terrain as detailed in the AERMAP output
NOSTD	Specifies that the non-default option of no stack-tip downwash will be used	No
AVERTIME	Time averaging periods calculated	1-hour, 24-hour
URBANOPT	Allows model to incorporate the effects of increased surface heating from an urban area on pollutant dispersion under stable atmospheric conditions	No
URBANROUGHNESS	Specifies the urban roughness length (mm)	Not Applicable
FLAGPOLE	Specifies that receptor heights above local ground levels are allowed on the receptors	No

6.8 Dispersion Modelling Input and Output Files

The information input into the approved dispersion model is recorded in Appendix D. Appendix D also includes the input and output files from the AERMOD model in electronic form.

Table D.1 provides a detailed description of the source input parameters.

7. Emission Summary Table and Conclusions

This section provides the table required by subparagraph 14 of s.26 (1) of O. Reg. 419/05 and provides an interpretation of the results as required by the ESDM Procedure Report.

7.1 Emission Summary Table

A POI concentration for each significant contaminant emitted from the Site was calculated based on the emission rates listed in Table 2. The output from the approved dispersion model is presented in Appendix D. The results are presented in Table 4. This Table follows the format provided in the ESDM Procedure Document. For each source of significant contaminants, the following parameters are referenced:

– Contaminant name
– CAS number
– Total Site emission rate
– Approved dispersion model used
– Maximum POI concentration
– Averaging period for the dispersion modelling
– MECP POI limit
– Indication of limiting effect
– Schedule in Regulation 419/05
– The percentage of standard

The POI concentrations listed in Table 4 were compared against criteria listed in the MECP ACB List

7.2 Assessment of Contaminants with No MECP POI Limits

All contaminants have corresponding criteria.

7.3 Conclusions

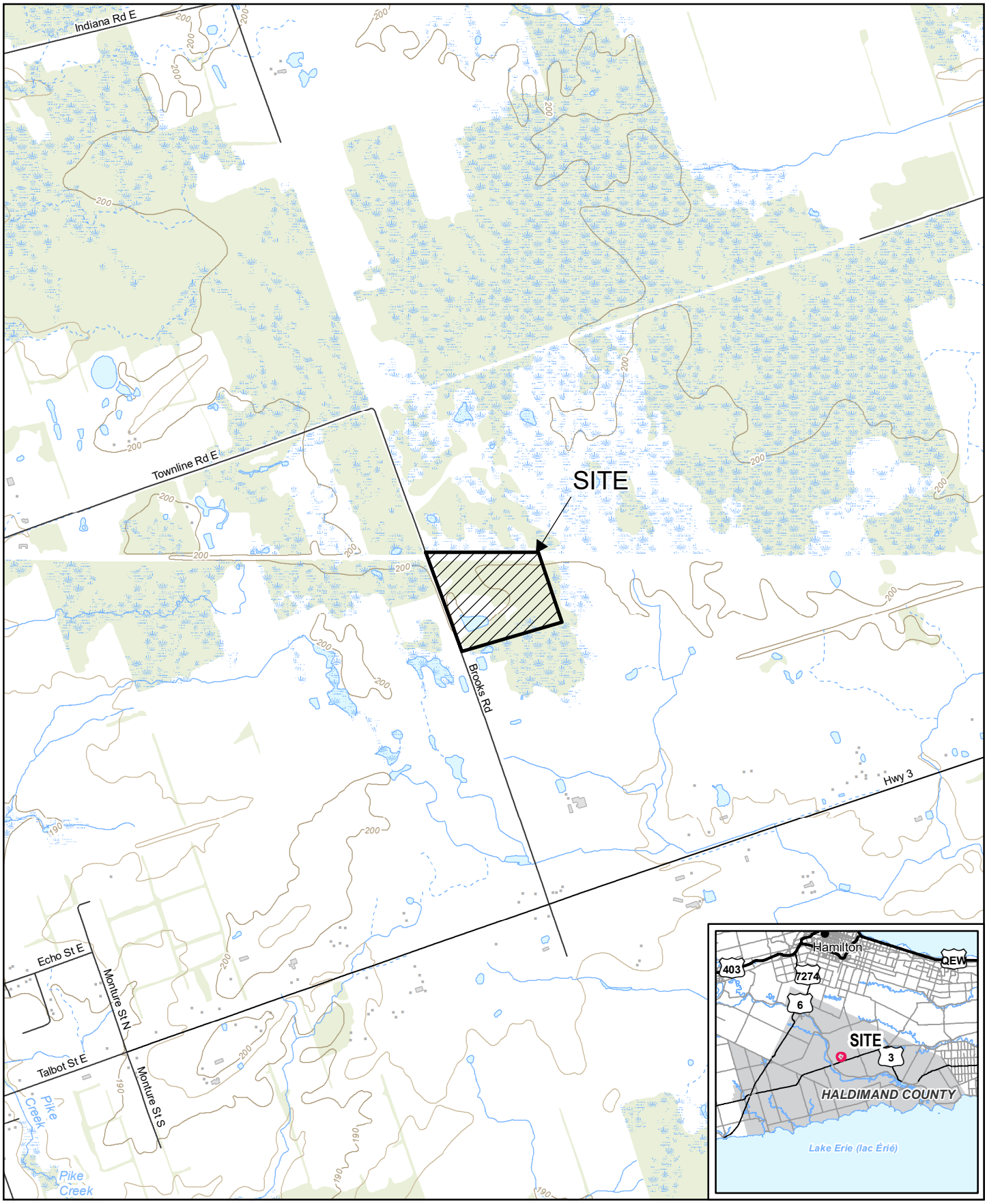
This ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05. In addition, guidance in the ESDM Procedure Document was followed as appropriate.

The emission rate estimates for each source of significant contaminants are documented in Table 2A and Table 2B. All the emission rates listed in Table 2A and Table 2B are documented as having their highest available data quality and correspond to the operating scenario where all significant sources are operating simultaneously at their individual maximum rates of production. Therefore, these emission rate estimates listed in Table 2A and Table 2B are not likely to be an underestimate of the actual emission rates.

A POI concentration for each significant contaminant emitted from the Site was calculated based on the calculated emission rates and the output from AERMOD model; the results are presented in Table 4.

The POI concentrations listed in Table 4 were compared against criteria listed in the MECP ACB List.

This ESDM Report demonstrates that the Site can operate in compliance with O. Reg. 419/05.



Paper Size ANSI A

0 200 400 600

Metres

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

N

GHD

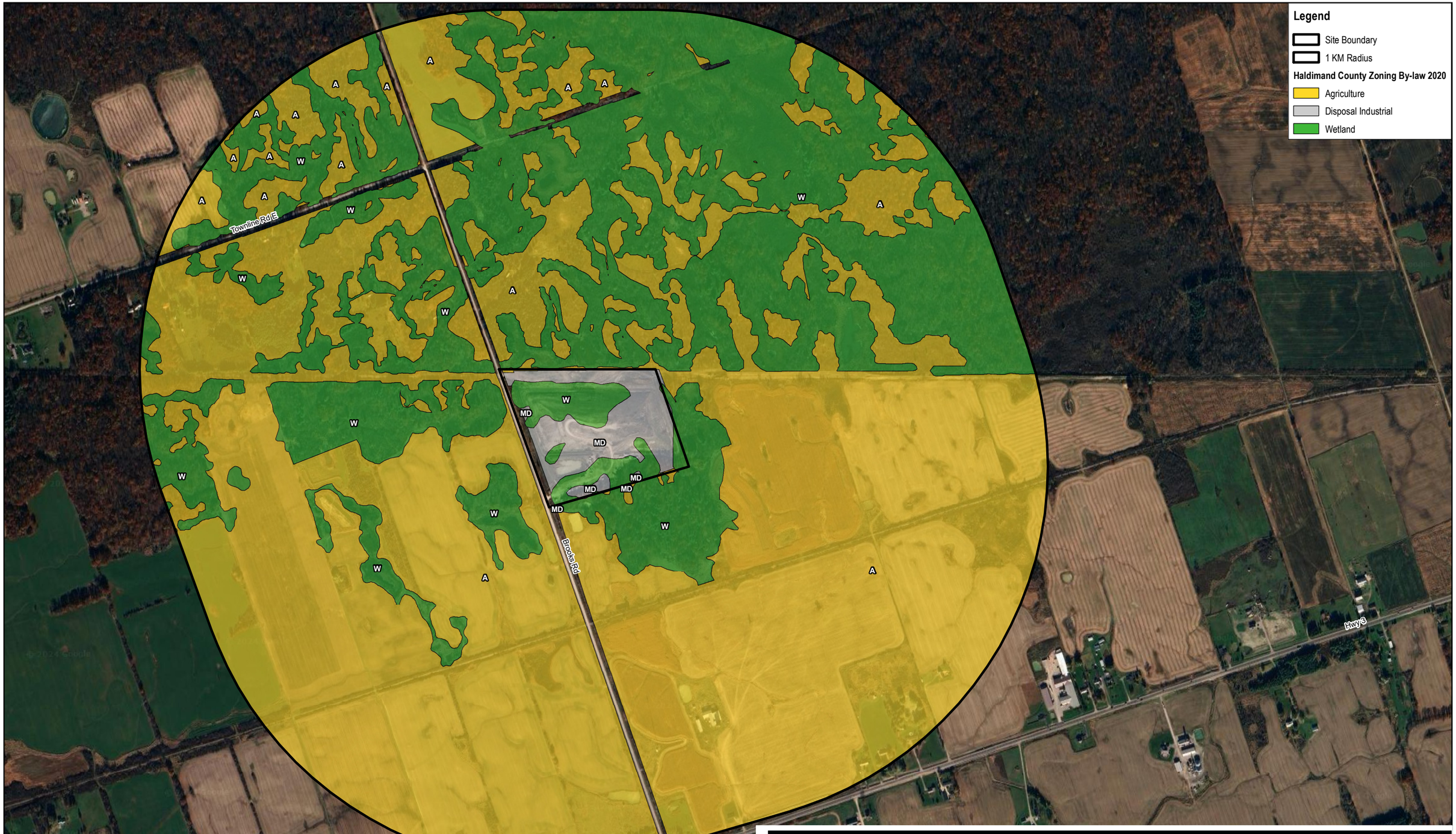
BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

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

SITE LOCATION MAP

FIGURE 1

O:\GIS\PROJECTS\12561000s\12561524\Layouts\202208_ESDMR\12561524_202208_ESDMR_GIS001.mxd
Print date: 27 Feb 2024 - 13:37



Paper Size ANSI B

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Meters

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

N

GHD

BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

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

LAND USE ZONING DESIGNATION PLAN

FIGURE 2

Q:\GIS\PROJECTS\12561000s\12561524\Layouts\202208_ESDMR\12561524_202208_ESDMR_GIS002.mxd
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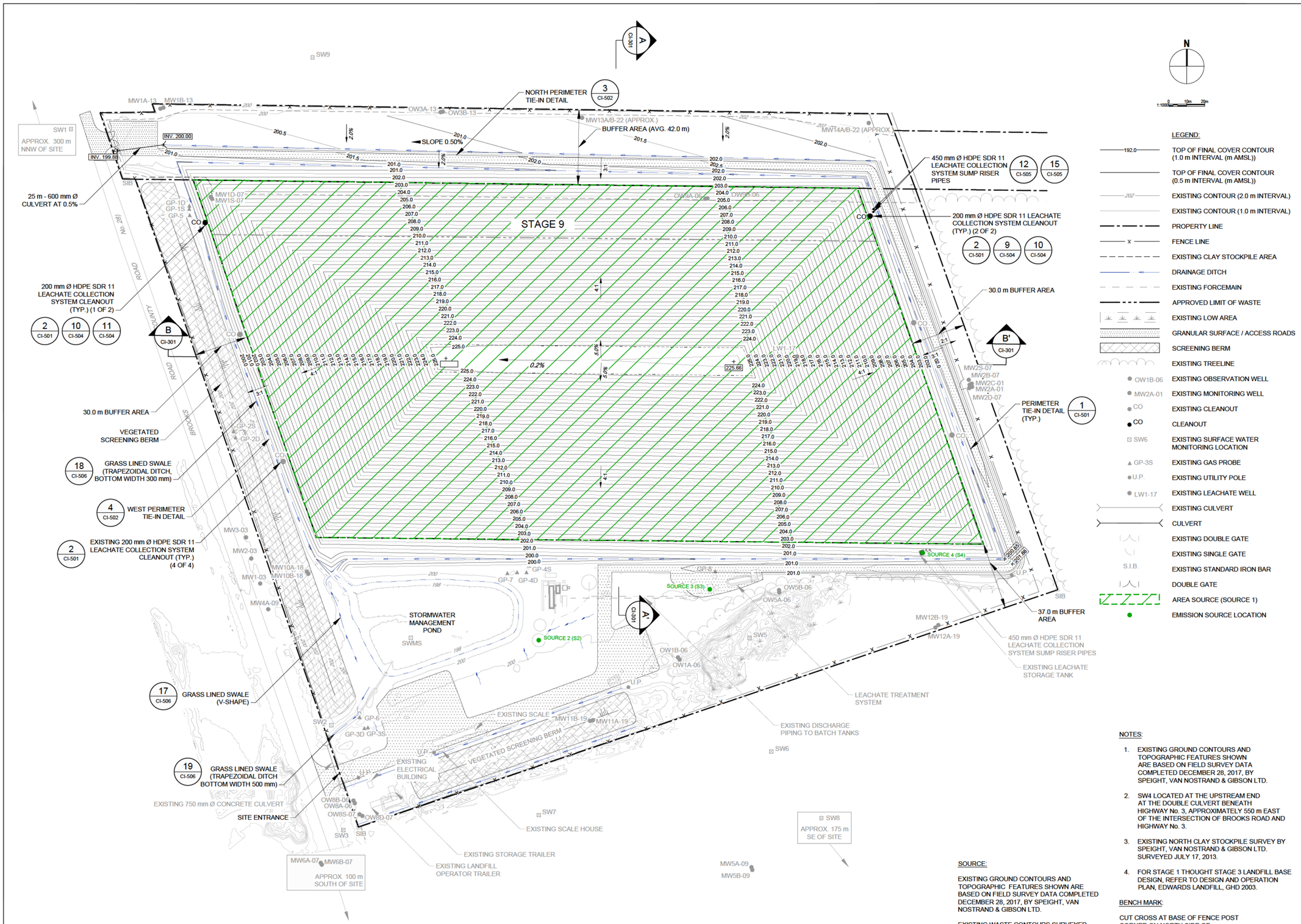


LEGEND:

- 192.0 — TOP OF FINAL COVER CONTOUR (1.0 m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5 m INTERVAL (m AMSL))
- 202 — EXISTING CONTOUR (2.0 m INTERVAL)
- EXISTING CONTOUR (1.0 m INTERVAL)
- PROPERTY LINE
- FENCE LINE
- EXISTING CLAY STOCKPILE AREA
- DRAINAGE DITCH
- EXISTING FORCEMAIN
- APPROVED LIMIT OF WASTE
- EXISTING LOW AREA
- GRANULAR SURFACE / ACCESS ROADS
- SCREENING BERM
- EXISTING TREELINE
- OW1B-06 — EXISTING OBSERVATION WELL
- MW2A-01 — EXISTING MONITORING WELL
- CO — EXISTING CLEANOUT
- CO — CLEANOUT
- SW6 — EXISTING SURFACE WATER MONITORING LOCATION
- GP-3S — EXISTING GAS PROBE
- U.P. — EXISTING UTILITY POLE
- LW1-17 — EXISTING LEACHATE WELL
- EXISTING CULVERT
- CULVERT
- EXISTING DOUBLE GATE
- EXISTING SINGLE GATE
- S.I.B. — EXISTING STANDARD IRON BAR
- DOUBLE GATE
- AREA SOURCE (SOURCE 1)
- EMISSION SOURCE LOCATION

NOTES:

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

SOURCE:

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

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

BENCH MARK:

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

GHD Ltd.
455 Phillip Street
Waterloo, Ontario N2L 3X2 Canada
T 1 519 884 0510 F 1 519 884 0525
www.ghd.com

Bar is 25mm on original size sheet
0 25mm

No.	Issue	Checked	Approved	Date
C01	STAGE 9 APPROVAL	D.B.	R.L.	02-26-2024

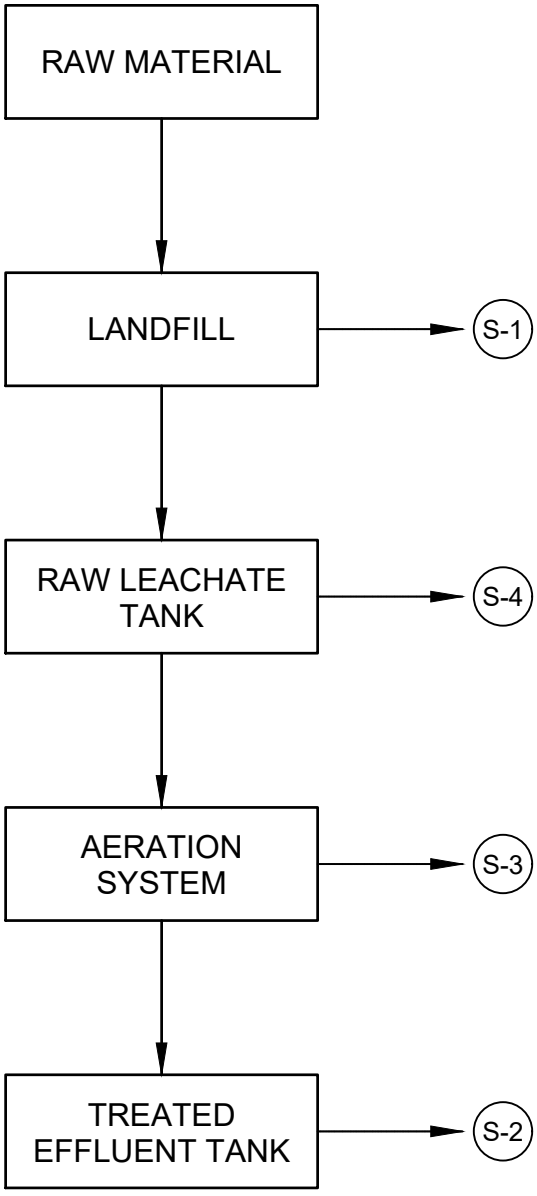
Author: Designer
Drafting: Design
Check: Check
Project Manager: Project Director

Client
BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTY, ONTARIO

Project
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Date: FEBRUARY 26, 2024
Scale: AS SHOWN
Project No.: 12561524
Title: SOURCE LOCATION PLAN
Size: ANSI D
Sheet No.: FIGURE 3

Plot Date: 18 March 2024 - 3:12 PM
Plotted By: Spencer Holland
Path and Filename: N:\CA\Waterloo\Projects\66\21256\524\Digital_Design\ACAD\Figures\RPT-OMP\12561524-GHD-00-00-RPT-EN-D101_WA-OMP.dwg



BROOKS ROAD LANDFILL
160 BROOKS ROAD, CAYUGA, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Project No. **12561524**
Date **February 2024**

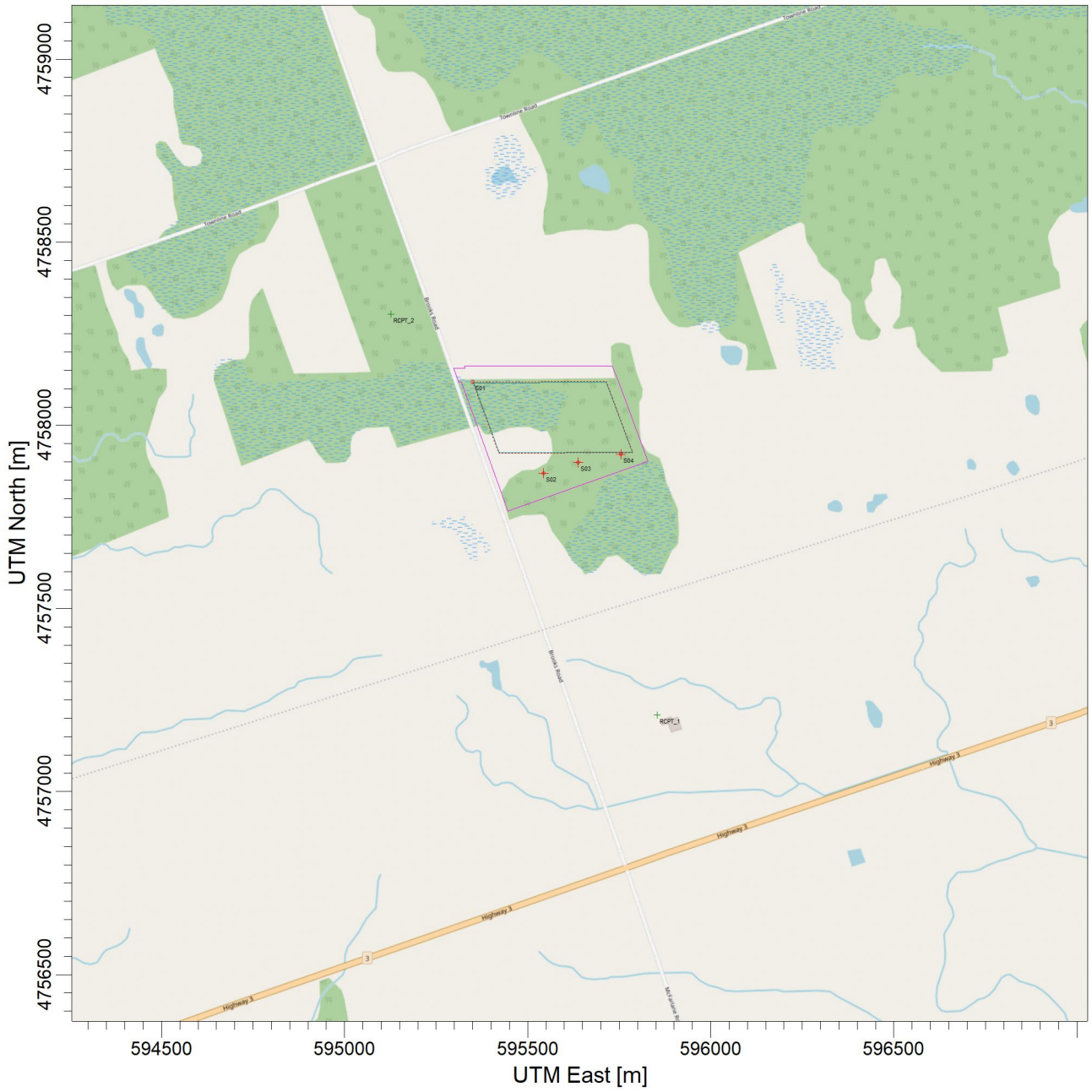
PROCESS FLOW DIAGRAM

FIGURE 4

Filename: N:\CA\Waterloo\Projects\662\12561524\Digital_Design\ACAD\Figures\RPT-ESDM\12561524-GHD-00-00-RPT-EN-D102_WA-ESDM.dwg
Plot Date: 28 February 2024 3:03 PM

PROJECT TITLE:

Brooks Road Landfill
Sensitive Receptor Locations



COMMENTS:	SOURCES: **4**	COMPANY NAME: **GHD**	
	RECEPTORS: **2**	MODELER:	**Figure 5**
	OUTPUT TYPE:	SCALE: 1:17,451 (0 — 0.5 km)	
	MAX:	DATE: **4/1/2024**	PROJECT NO.: **12561524**

Table 1

Sources and Contaminants Identification Table
Brooks Road Landfill
Cayuga, Ontario

Source Information		Location	Expected Contaminants	Significant (Y/N)	Rationale
Source ID	**Source Description**				
S-1	Landfill	Outside	Volatile Organic Compounds	Y/N	Some has been classified as insignificant, see App. C.
			Odour	Y	
S-2	Treated Effluent Tank	Outside	Odour	Y	
S-3	Aeration System	Outside	Odour	Y	
S-4	Raw Leachate Tank	Outside	Odour	Y	
N/A	Roads, Parking Lot	Outside	Dust	N	Fugitive Dust Management Plan has been prepared for the Site

Table 2A

Source Summary Table - By Contaminant
Brooks Road Landfill
Cayuga, Ontario

Contaminant	CAS No.	Source Data								Emission Data				
		Source ID	Source Description	Stack Flow Rate (Am^3/s)	Stack Exit Gas Temperature (C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (x) (m)	Source Coordinates (y) (m)	Maximum Emission Rate (g/s)	Averaging Period (hours)	Emission Estimation Technique	Emission Data Quality	% of Overall Emissions (%)
1,1,2,2-tetrachloroethane	79-34-5	S-1	Landfill	0.083	Area Source		24.00	-	-	-	7.31E-04	24	EF	Average	100%
Acrylonitrile	107-13-1	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.32E-03	24	EF	Average	100%
Benzene	71-43-2	S-1	Landfill	0.083	Area Source		24.00	-	-	-	6.13E-04	Annual/Daily	EF	Average	100%
Dimethyl sulfide	75-18-3	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.91E-03	10-minute	EF	Average	100%
Ethyl mercaptan	75-08-1	S-1	Landfill	0.083	Area Source		24.00	-	-	-	5.56E-04	10-minute	EF	Average	100%
Hydrogen Sulphide	7783-06-4	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.20E-02	24, 10-minute	EF	Average	100%
Methyl mercaptan	74-93-1	S-1	Landfill	0.083	Area Source		24.00	-	-	-	4.70E-04	10-minute	EF	Average	100%
Odour	NA	S-1	Landfill	0.083	Area Source		24.00	-	-	-	9.41E+02 ou/s	10-minute	EF	Average	26%
Odour	NA	S-2	Treated Effluent Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595543.9	4757869.2	1.89E+00 ou/s	10-minute	EC	Average	<1%
Odour	NA	S-3	Aeration System	0.367	Outdoor Ambient	0.30	3.00	-	595637.5	4757898.5	2.57E+03 ou/s	10-minute	EC	Average	70%
Odour	NA	S-4	Raw Leachate Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595754.1	4757920.3	1.32E+02 ou/s	10-minute	EC	Average	4%
Vinyl Chloride	75-01-4	S-1	Landfill	0.083	Area Source		24.00	-	-	-	1.80E-03	24	EF	Average	100%

Notes:

EF - Emission Factor
EC - Engineering Calculation

Table 2B

Source Summary Table - By Source
Brooks Road Landfill
Cayuga, Ontario

Source ID	Contaminant	CAS No.	Source Data							Emission Data				
			Source Description	Stack Flow Rate (Am^3/s)	Stack Exit Gas Temperature (C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (x) (m)	Source Coordinates (y) (m)	Maximum Emission Rate (g/s)	Averaging Period (hours)	Emission Estimation Technique	Emission Data Quality	% of Overall Emissions (%)
S-1	1,1,2,2-tetrachloroethane	79-34-5	Landfill	0.083	Area Source		24.00	-	-	-	7.31E-04	24	EF	Average	100%
S-1	Acrylonitrile	107-13-1	Landfill	0.083	Area Source		24.00	-	-	-	1.32E-03	24	EF	Average	100%
S-1	Benzene	71-43-2	Landfill	0.083	Area Source		24.00	-	-	-	6.13E-04	Annual/Daily	EF	Average	100%
S-1	Dimethyl sulfide	75-18-3	Landfill	0.083	Area Source		24.00	-	-	-	1.91E-03	10-minute	EF	Average	100%
S-1	Ethyl mercaptan	75-08-1	Landfill	0.083	Area Source		24.00	-	-	-	5.56E-04	10-minute	EF	Average	100%
S-1	Hydrogen Sulphide	7783-06-4	Landfill	0.083	Area Source		24.00	-	-	-	1.20E-02	24, 10-minute	EF	Average	100%
S-1	Methyl mercaptan	74-93-1	Landfill	0.083	Area Source		24.00	-	-	-	4.70E-04	10-minute	EF	Average	100%
S-1	Odour	NA	Landfill	0.083	Area Source		24.00	-	-	-	9.41E+02 ou/s	10-minute	EF	Average	26%
S-1	Vinyl Chloride	75-01-4	Landfill	0.083	Area Source		24.00	-	-	-	1.80E-03	24	EF	Average	100%
S-2	Odour	NA	Treated Effluent Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595543.9	4757869.2	1.89E+00 ou/s	10-minute	EC	Average	<1%
S-3	Odour	NA	Aeration System	0.367	Outdoor Ambient	0.30	3.00	-	595637.5	4757898.5	2.57E+03 ou/s	10-minute	EC	Average	70%
S-4	Odour	NA	Raw Leachate Tank	0.0189	Outdoor Ambient	0.30	3.00	-	595754.1	4757920.3	1.32E+02 ou/s	10-minute	EC	Average	4%

Note:
EF - Emission Factor
EC - Engineering Calculation

Table 3

Dispersion Modelling Input Summary Table
Brooks Road Landfill
Cayuga, Ontario

Relevant Section of the Regulation	Section Title	Description of How the Approved Dispersion Model was Used
Section 8	Negligible Sources	Sources and contaminants that were considered negligible were explicitly identified, and therefore were not modelled, in accordance with s.8 of O. Reg. 419. See Table 1 - Sources and Contaminants Identification Table and Appendix C of the ESDM Report for more information
Section 9	Same Structure Contamination	Not applicable as Brooks Road is the only tenant occupying the building, and does not have a child care facility, health care facility, senior's residence, long-term care facility or an educational facility located at the Facility
Section 10	Operating Conditions	All equipment was assumed to be operating at the maximum production rates at the same time. See Section 4.1 and Appendix B of the ESDM Report.
Section 11	Source of Contaminant Emission Rate	The emission rate for each significant contaminant emitted from a significant source was estimated, the methodology for the calculation is documented in Table 2 - Source Summary Table. See Section 4.1 and Section 4.2 and Appendix B of the ESDM Report for more information.
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	The operating conditions were estimated in accordance with s.10(1) and 1 and S.11 (1) 1 of O. Reg. 419 and are therefore considered to result in the highest concentrations at POI that the Facility is capable of for the contaminants emitted. See Section 4.1 and Section 4.2 of the ESDM Report.
Section 13	Meteorological Conditions	MECP site specific screening data was used.
Section 14	Area of Modelling Coverage	Completed in compliance with MECP Modelling Guidance
Section 15	Stack Height	Documented in accordance with MECP guidance
Section 16	Terrain Data	MECP available terrain data sets were used.
Section 17	Averaging Periods	The averaging periods used for each contaminant are summarized on Table 4 and Appendix C.

Table 4

Emission Summary Table
Brooks Road Landfill
Cayuga, Ontario

Contaminant	CAS No.	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Max. POI Concentration (µg/m^3)	Averaging Period (hours)	MECP POI Limit [(2)] (µg/m^3)	Limiting Effect	Regulation Schedule #	Percentage of MECP POI Limit
1,1,2,2-tetrachloroethane	79-34-5	7.31E-04	AERMOD v. 22112	1.37E-02	24	0.1	Health	B2	13.65%
Vinyl Chloride	75-01-4	1.80E-03	AERMOD v. 22112	3.36E-02	24	1	Health	B1	3.36%
Vinyl Chloride	75-01-4	1.80E-03	AERMOD v. 22112	3.36E-02	URT	100	Health	B1	<1%
Acrylonitrile	107-13-1	1.32E-03	AERMOD v. 22112	2.46E-02	24	0.6	Health	B1	4.10%
Acrylonitrile	107-13-1	1.32E-03	AERMOD v. 22112	2.46E-02	URT	60	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	2.42E-03	Annual	0.45	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	2.42E-03	AAV	4.5	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	1.14E-02	DAV	100	Health	B1	<1%
Benzene	71-43-2	6.13E-04	AERMOD v. 22112	1.14E-02	URT	100	Health	B1	<1%
Total Reduced Sulphur	N/A	1.52E-02	AERMOD v. 22112	2.84E-01	24	7	Health	B1	4.06%
Total Reduced Sulphur	N/A	1.52E-02	AERMOD v. 22112	1.99E+00	10-minute	13	Odour	B1	15.29%
Total Reduced Sulphur	N/A	1.52E-02	AERMOD v. 22112	2.84E-01	URT	70	Odour	B1	<1%
Odour, MECP grid	NA	3.64E+03	AERMOD v. 22112	-	10-minute	1	Odour	Guidance	- [(3)]
Odour, sensitive receptor	NA	3.64E+03	AERMOD v. 22112	-	10-minute	1	Odour	Guidance	- [(3)]

Notes:

(1) The 1-hr maximum concentration was converted to a 10-min average using a conversion factor of 1.65 as specified in the ADMGO, MECP guidance document.
(2) Schedule 3 Standard criteria listed in the MECP Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants
(3) See Table 5 for Frequency Analysis Results.
B1 - Benchmark 1 - Exceedance of a Benchmark 1 concentration triggers specific actions under the Regulation.
B2 - Benchmark 2 - Exceedance of a Benchmark 2 concentration triggers a toxicological assessment to determine the likelihood of adverse effect.

Table 5

Odour Frequency Analysis at Sensitive Receptor
Brooks Road Landfill
Cayuga, Ontario

			Model Year [1]				
			2015	**2016**	**2017**	**2018**	**2019**
SR01	Residence	Total Hours	8760	8784	8760	8760	8760
		Max. Predicted Odour (OU)	1.05	1.00	0.90	0.98	0.99
		Hours Exceeding 1 OU	2	1	0	0	0
		Frequency of Exceedances (%)	0.02%	0.01%	0.00%	0.00%	0.00%
SR02	Residence	Total Hours	8760	8784	8760	8760	8760
		Max. Predicted Odour (OU)	1.81	1.81	1.78	1.79	1.81
		Hours Exceeding 1 OU	28	21	26	26	30
		Frequency of Exceedances (%)	0.32%	0.24%	0.30%	0.30%	0.34%

Note:

(1) Site-specific meteorological data, as processed and provided by MECP.

Appendices

Appendix A

Environmental Compliance Approval No. 7323-C6EJUM

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 7323-C6EJUM
Issue Date: September 24, 2021

2270386 Ontario Limited
162 Cumberland Street
Toronto, Ontario
M5R 3N5

Site Location: Brooks Road Landfill Site
160 Brooks Rd North, Cayuga, Haldimand County, Ontario.

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

- one (1) landfill site, having a capacity of 1,045,065 cubic metres (including waste and daily cover), a maximum fill rate of 250,000 tonnes per year and 1,000 tonnes per day;
- one (1) leachate treatment system, having a rated capacity of 200 cubic metres per day, complete with a leachate collection sump, a raw leachate primary settling tank, an aeration system and above-grade treated effluent storage tanks;

all in accordance with the supporting information listed in Schedule A.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Acoustic Assessment Report" means the report, prepared in accordance with Publication NPC-233 submitted in support of the application, that documents all sources of noise emissions and Noise Control Measures present at the Facility. "Acoustic Assessment Report" also means the Acoustic Assessment Report prepared by GHD, dated September 7, 2021 and signed by Michael Masschaele;
2. "Approval" means this Environmental Compliance Approval, including the application and supporting documentation listed above;
3. "Company" means 2270386 Ontario Limited, that is responsible for the construction or operation of the Facility and includes any successors and assigns;
4. "District Manager" means the District Manager of the appropriate local district office of the Ministry, where the Facility is geographically located;

5. "EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;
6. "Equipment" means all the equipment, described in the Company's application, this Approval and in the supporting documentation submitted with the application, to the extent approved by this Approval;
7. "ESDM report" means the Emission Summary and Dispersion Modelling Report which was prepared in accordance with section 26 of O. Reg. 419/05 and the Procedure Document by GHD and dated June 11, 2021, submitted in support of the application, and includes any changes to the report made up to the date of issuance of this Approval;
8. "Facility" means the entire operation located on the property where the Equipment is located;
9. "Manual" means a document or a set of documents that provide written instructions to staff of the Company;
10. "Ministry" means the ministry of the government of Ontario responsible for the EPA and includes all officials, employees or other persons acting on its behalf;
11. "Noise Control Measures" means measures to reduce the noise emissions from the Facility and/or Equipment including, but not limited to, silencers, acoustic louvres, enclosures, absorptive treatment, plenums and barriers;
12. "Noise Guidelines for Landfill Sites" means the Ministry draft publication "Noise Guidelines for Landfill Sites", October 1998, as amended;
13. "Odour Management Plan" means the Odour Management Plan, Brooks Road Landfill Site, Haldimand County, prepared by GHD, dated June 11, 2021 that includes mitigation measures to minimize off-Site odour impacts, and if appropriate, a trigger mechanism and contingency plan;
14. "Publication NPC-233" means the Ministry Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995;
15. "Publication NPC-300" means the Ministry Publication NPC-300, “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300”, August 2013, as amended;
16. “Site" means the entire waste disposal site, including the buffer lands, at the Brooks Road Landfill Site, Lot 24, Concession 1 North, Haldimand County; and
17. "Truck(s)" means trucks carrying waste for disposal at the Facility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **OPERATION AND MAINTENANCE**
    1. The Company shall prepare, not later than three (3) months from the date of this Approval, implement and continue to update as necessary, a Manual outlining the operating procedures and maintenance programs for the Equipment/Facility, which shall specify as a minimum:
        a. routine operating and maintenance procedures in accordance with good engineering practices;
        b. emergency procedures;
        c. frequency of inspections and scheduled preventative maintenance;
        d. procedures to prevent upset conditions;
        e. all appropriate measures to prevent/minimize fugitive particulate matter, noise and odorous emissions from all potential sources at the Site; and
        f. procedures for record keeping activities relating to the operation and maintenance programs.
    2. The Company shall ensure that the Facility/Equipment is properly operated and maintained at all times and in accordance with this Approval, the operating procedures and maintenance Manual, and the Odour Management Plan.

2. **ODOUR MANAGEMENT PLAN**
    1. The Company shall forthwith implement the Odour Management Plan and continue to review and update as necessary and in consultation with the District Manager as applicable.
    2. If there is any odour complaint, or significant odour is detected during daily inspection, and the odour is confirmed to originate from the Site, mitigation measures shall be implemented immediately in accordance with the Odour Management Plan.
    3. If odour causes adverse off-site impacts that are not mitigated through implementation of odour mitigation measures according to the Odour Management Plan, the Company shall, upon written notification from the District Manager, conduct an investigation into the cause as to why the impacts were not mitigated and submit to the District Manager within the time frame identified in the notice, an assessment of the issues and the need for implementation of contingency actions in accordance with the Odour Management Plan.
    4. If the Ministry deems the odour mitigation measures taken as per Condition

2.3 to be unsuitable, insufficient or ineffective, the District Manager may direct the Company, in writing, to propose further measures to address the noted failure, upset or malfunction, which may include requiring a reduction in the receipt of waste, cessation of the receipt of waste, removal and disposal of waste from the waste diversion area, the removal of leachate from the Site as well as, making repairs or modifications to equipment or processes. Such measures shall be implemented by the Company upon approval by the District Manager.

5. If the cessation of the receipt of waste is required, as determined by Condition 2.4, no waste shall be received at the Site until the District Manager is satisfied that odour impacts have been adequately mitigated.
6. The Company shall prepare and maintain an annual summary of the actions taken and achievements made under the Odour Management Plan as of December 31 of the previous calendar year.

3. **NOISE**
    1. The Company shall, at all times, ensure that the noise emissions from the Facility comply with the limits set out in Ministry Publication NPC-300.
    2. The Company shall, at all times, ensure that the noise emissions from the landfill site operations at the Facility comply with the limits set out in Ministry draft publication "Noise Guidelines for Landfill Sites".
    3. The Company shall ensure that the operating times and numbers of Equipment are limited as detailed in Section 2 of the Acoustic Assessment Report.
    4. The Company shall limit Truck arrivals and departures to a maximum of sixteen (16) trucks per sixty (60) minute period, restricted to the daytime hours from 7 a.m. to 7 p.m.

4. **COMPLAINTS RESPONSE PROCEDURE**
    1. The Company shall develop in consultation with the District Manager, not later than three (3) months from the date of this Approval, implement and continue to update as necessary, a Complaint Response Protocol for dealing with and responding to environmental complaints as a result of operation of the Equipment/Facility approved by this Approval. The Complaint Response Protocol shall include:
        a. procedures for recording the complaint;
        b. procedures for investigating the complaint, including determining all possible causes of the complaint, and the necessary actions to appropriately deal with the cause of the subject matter of the complaint;

c. procedures for taking the necessary actions to appropriately deal with the cause of the subject matter of the complaint in a timely and effective manner;

d. a description of any measures taken to address the complaint, outcome of the actions taken and steps to be taken to avoid the recurrence of similar incidents;

e. procedures for record keeping of activities relating to the complaints;

f. procedures for notifying the District Manager of the complaint in a manner acceptable to the District Manager; and

g. procedures for replying to the complainant.

5. **RECORD RETENTION**
    1. Any information requested by any employee in or agent of the Ministry concerning the Facility and its operation under this Approval, including, but not limited to, any records required to be kept by this Approval, shall be provided to the employee in or agent of the Ministry, upon request, in a timely manner. Unless otherwise specified in this Approval, the Company shall retain, for a minimum of five (5) years from the date of their creation all reports, records and information described in this Approval, including,
        a. a copy of the ESDM Report;
        b. a copy of the Odour Management Plan and activities pertaining to the implementation of the Odour Management Plan;
        c. a copy of the Acoustic Assessment Report;
        d. records of maintenance, repair and inspection of Equipment/Facility;
        e. all records of any upset conditions associated with the operation of the Equipment/Facility;
        f. all records on the environmental complaints, as required under condition 4.

SCHEDULE A

Supporting Documentation

1. Environmental Compliance Approval Application and all supporting information, dated June 1, 2021, signed by Richard Weldon and submitted by the Company;
2. Emission Summary and Dispersion Modelling Report, dated June 11, 2021 and prepared by GHD;

3. Odour Management Plan, dated June 11, 2021 and prepared by GHD;
4. Acoustic Assessment Report prepared by GHD, dated September 7, 2021 and signed by Michael Masschaele; and the additional information provided by Sam East of GHD in the email dated September 7, 2021 and Daniel Turner of GHD in the email dated September 10, 2021.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition No. 1 is included to emphasize that the Equipment/Facility must be maintained and operated according to a procedure that will result in compliance with the EPA, the Regulations and this Approval.
2. Condition No. 2 is included to ensure that the Equipment/Facility is operated in a manner that does not result in unacceptable odour emissions and mitigation measures are employed in event of an odour impact.
3. Condition No. 3 is included to provide the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the Equipment/Facility.
4. Condition Nos. 4 and 5 are included to require the Company to keep records and to provide information to the Ministry so that compliance with the EPA, the regulations and this Approval can be verified.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 8922-9ZHR29 issued on October 8, 2015.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of September, 2021

Neryed Ragbar, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

QN/
c: District Manager, MECP Hamilton - District
Daniel Turner, GHD

Appendix B

Sample Calculations

Appendix B Supporting Calculations Brooks Road Environmental

Source S-1: Landfill

Methodology: Emission Factor

The emission rates were based on the Volatile Organic Compound (VOC) factor and the maximum landfill gas generation. The VOC Factors from the Landfill were calculated based on the average concentrations reported in US EPA Chapter 2.4 "Municipal Solid Waste Landfills", as published in November 1998 and the ratio of the non-methane organic compounds and the molecular weight of hexane (average non-methane organic compound). For the parameters that are not VOCs, the VOC factor was calculated from the average concentration. The maximum landfill gas generation was based on the memorandum in Appendix E.

Table B.1 provides a summary of the emission calculations from the Landfill.

Sample Calculation: Dichlorodifluoromethane (VOC)

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times {}^{Molecular\ Weight}/_{Hexane\ Molecular\ Weight} \times Concentration$$

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times {}^{120.91}/_{86.18} \times 15.7\ ppm$$

$$VOC\ Factor = 7.92\ \times 10^{-8} \frac{kg}{L}$$

$$Emission\ Rate = \ Maximum\ Landfill\ Gas\ Generation\ \times VOC\ Factor$$

$$ER = 2{,}888{,}172 \frac{m^3}{yr} \times 7.92\ \times 10^{2} \frac{kg}{L} \times 1000 \frac{L}{m^3} \times 1000 \frac{g}{kg} \times 365\ \frac{days}{year} \times 24 \frac{hours}{day} \times 3600 \frac{seconds}{hour}$$

$$ER = 7.25\ \times 10^{-3} \frac{g}{s}$$

Sample Calculation: Mercury (non-VOC)

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times Concentration$$

$$VOC\ Factor = 3.595 \times 10^{-9} \frac{kg/L}{ppm} \times 2.92 \times 10^{-4}\ ppm$$

$$VOC\ Factor = 1.05\ \times 10^{-12} \frac{kg}{L}$$

$$Emission\ Rate = \ Maximum\ Landfill\ Gas\ Generation\ \times VOC\ Factor$$

$$ER = 2{,}888{,}172 \frac{m^3}{yr} \times 1.05\ \times 10^{-12} \frac{kg}{L} \times 1000 \frac{L}{m^3} \times 1000 \frac{g}{kg} \times 365\ \frac{days}{year} \times 24 \frac{hours}{day} \times 3600 \frac{seconds}{hour}$$

$$ER = 9.61\ \times 10^{-8} \frac{g}{s}$$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes emission rate estimates developed from tests on a reasonable number of sources.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-1: Landfill

Methodology: Emission Factor

The odour emissions from the Landfill was based on the default landfill gas concentration from the "Interim Guide to Estimate and Assess Landfill Air Impacts", as published by Resource Branch in October 1992 and the landfill gas generation rate. The landfill gas generation rate was based on the landfill gas generation rate, provided in the report found in Appendix E.

Table B.2 provides a summary of the Odour emission calculations from the Landfill.

Sample Calculation: Odour

$ER = 10{,}000\ ou\ \times 0.0916 \frac{m^3}{s}$

$ER = 9.16\ \times 10^2 \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes emission rate estimates developed from tests on a reasonable number of sources.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-2: *Treated* Effluent Odour Emissions

Methodology: Engineering Calculation

The emissions from the treated leachate were based on the "Design and Operations Report" published by GHD in April, 2019 and the fill rate of 18.92 L/s.

Table B.3 provides a summary of the Odour emission calculations from the treated leachate tank.

Sample Calculation: Odour

$ER = 100\ ou\ \times 0.0189 \frac{m^3}{s}$

$ER = 1.89\ \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes engineering calculations.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-3: Aeration System Odour Emissions

Methodology: Engineering Calculation

The emissions from the aeration system were assumed to be similar to a Sludge Blend Tank "Odour Threshold Emission Factor for Common WWTP Processes", as published in 2008 and the flow rate of 22 m^3 per minute.

Table B.4 provides a summary of the Odour emission calculations from the aeration system.

Sample Calculation: Odour

$ER = 7{,}000\ ou\ \times 0.3667 \frac{m^3}{s}$

$ER = 2.57\ \times 10^3 \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes engineering calculations.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Source S-4: *Raw* Leachate Odour Emissions

Methodology: Engineering Calculation

The emissions from the raw leachate were assumed to be similar to a Sludge Blend Tank "Odour Threshold Emission Factor for Common WWTP Processes", as published in 2008 and the fill rate of 18.92 L/s.

Table B.5 provides a summary of the Odour emission calculations from the raw leachate tank.

Sample Calculation: Odour

$ER = 7{,}000\ ou\ \times 0.0189 \frac{m^3}{s}$

$ER = 1.32\ \times 10^2 \frac{ou}{s}$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes engineering calculations.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for this source is based on the maximum capacity of the source.

Table B.1

Landfill Gas Composition and Emission Rate
Brooks Road Landfill
Cayuga, Ontario

Landfill Gas Generation Rate (4) 2,966,136 m^3/yr

Parameter		Average Concentration (ppm) (1)	VOC Factor (kg/L) (2)	Emission Rate (kg/yr)	Emission Rate (g/s)
Dichlorodifluoromethane	75-71-8	15.7	7.92E-08	2.35E+02	7.45E-03
Chlorodifluoromethane	75-45-6	1.3	4.69E-09	1.39E+01	4.41E-04
1,1,2,2-tetrachloroethane	79-34-5	1.11	7.77E-09	2.31E+01	7.31E-04
Chloromethane	74-87-3	1.21	2.55E-09	7.56E+00	2.40E-04
Vinyl Chloride	75-01-4	7.34	1.91E-08	5.68E+01	1.80E-03
1,2-dichloroethane	107-06-2	0.41	1.69E-09	5.02E+00	1.59E-04
Chloroethane	75-00-3	1.25	3.36E-09	9.98E+00	3.16E-04
Trichlorofluoromethane	75-69-4	0.76	4.36E-09	1.29E+01	4.10E-04
Dichlorofluoromethane	75-43-4	2.62	1.12E-08	3.34E+01	1.06E-03
1,2-dichloropropane	78-87-5	0.18	8.48E-10	2.52E+00	7.98E-05
1,1-Dichloroethylene	75-35-4	0.2	8.09E-10	2.40E+00	7.61E-05
Acrylonitrile	107-13-1	6.33	1.40E-08	4.16E+01	1.32E-03
Dichloromethane	75-09-2	14.30	5.07E-08	1.50E+02	4.77E-03
Bromodichloromethane	75-27-4	3.13	2.14E-08	6.34E+01	2.01E-03
Butane	106-97-8	5.03	1.22E-08	3.62E+01	1.15E-03
1,1,1-Trichloroethane	71-55-6	0.48	2.67E-09	7.92E+00	2.51E-04
Chlorobenzene	108-90-7	0.25	1.17E-09	3.48E+00	1.10E-04
Carbon tetrachloride	56-23-5	0.004	2.57E-11	7.61E-02	2.41E-06
Carbonyl sulphide	463-58-1	0.49	1.23E-09	3.64E+00	1.15E-04
1,4-Dichlorobenzene	106-46-7	0.21	1.29E-09	3.82E+00	1.21E-04
Propane	74-98-6	11.1	2.04E-08	6.06E+01	1.92E-03
Pentane	109-66-0	3.29	9.90E-09	2.94E+01	9.31E-04
Ethanol	64-17-5	27.2	5.23E-08	1.55E+02	4.92E-03
Acetone	67-64-1	7.01	1.70E-08	5.04E+01	1.60E-03
Carbon Disulfide	75-15-0	0.58	1.84E-09	5.46E+00	1.73E-04
Isopropyl Alcohol	67-63-0	50.1	1.26E-07	3.73E+02	1.18E-02
Hexane	110-54-3	6.57	2.36E-08	7.01E+01	2.22E-03
MEK	78-93-3	7.09	2.13E-08	6.33E+01	2.01E-03
MIBK	108-10-1	1.87	7.81E-09	2.32E+01	7.35E-04
Chloroform	67-66-3	0.03	1.49E-10	4.43E-01	1.41E-05
Dimethyl sulfide	75-18-3	7.82	2.03E-08	6.01E+01	1.91E-03
Ethane	74-84-0	889	1.12E-06	3.31E+03	1.05E-01
Ethyl mercaptan	75-08-1	2.28	5.91E-09	1.75E+01	5.56E-04
Ethylene dibromide	106-93-4	0.001	7.84E-12	2.32E-02	7.37E-07
Mercury (3)	7439-97-6	2.92E-04	1.05E-12	3.11E-03	9.87E-08
Methyl mercaptan	74-93-1	2.49	5.00E-09	1.48E+01	4.70E-04
cis-1,2-Dichloroethene	540-59-0	2.84	1.15E-08	3.41E+01	1.08E-03
t-1,2-dichloroethene	156-59-2	2.84	1.15E-08	3.41E+01	1.08E-03
Benzene	71-43-2	2.00	6.52E-09	1.93E+01	6.13E-04
Trichloroethene	79-01-6	2.82	1.55E-08	4.58E+01	1.45E-03
Toluene	108-88-3	36.00	1.38E-07	4.10E+02	1.30E-02
Tetrachlorothene	127-18-4	3.73	2.58E-08	7.65E+01	2.43E-03
Ethylbenzene	100-41-4	4.61	2.04E-08	6.05E+01	1.92E-03
Total Xylenes	1330-20-7	12.10	5.36E-08	1.59E+02	5.04E-03
1,2,4-Trimethylbenzene	95-63-6	3.00	1.50E-08	4.46E+01	1.41E-03
1,1-Dichloroethane	75-34-3	2.35	9.70E-09	2.88E+01	9.13E-04
Cyclohexane	110-82-7	2.10	7.37E-09	2.19E+01	6.93E-04
NMOC (1)		454	1.63E-06	4.84E+03	1.54E-01
Hydrogen Sulphide (3)	7783-06-4	35.5	1.28E-07	3.79E+02	1.20E-02

Notes:

NMOC -non methane organic compound - based on hexane as the average NMOC.
(1) The concentrations are based on the reported USEPA AP42, Chapter 2.4 - Municipal Solid Waste Landfills (November 1998) values.
(2) VOC factor is calculated based on the ratio of the molecular weight of the NMOC and the molecular weight of hexane (the average NMOC as detailed above) and the average concentration of the NMOC.
(3) As these compounds are not VOC's, the VOC factor has been calculated just from the average concentration and not the ratio of the molecular weight of the compound and the molecular weight of hexane.
(4) Gas generation rate based on memorandum in Appendix E.

Table B.2

Summary of Odour Emissions from Landfill
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (ou) (1)	Landfill Gas Generation Rate (m^3/s) (2)	Emission Rate (ou/s)
S-1	Landfill	10,000	0.094	9.41E+02

Notes:

(1) Default landfill gas concentration from "Interim Guide to Estimate and Assess Landfill Air Impacts", Resource Branch, October 1992.

(2) Based on landfill gas generation rate of 338.6 m^3/hr of landfill gas, report provided in Appendix E.

Table B.3

Estimated Treated Effluent Odour Emissions
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (OU) (1)	Fill Rate (m^3/s) (2)	Estimated Maximum Emission Rate (ou/s)
S-2	Treated Effluent Tank	100	0.019	1.89E+00

Notes:

(1) The leachate odour concentration was based on Report 81 published by GHD titled "Design and Operations Report" in April, 2019.
(2) Based on a filling rate of 18.92 Litres per second.

Table B.4

Estimated Aeration System Odour Emissions
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (OU) (1)	Fill Rate (m^3/s) (2)	Estimated Maximum Emission Rate (ou/s)
S-3	Aeration System	7,000	0.367	2.57E+03

Notes:

(1) The leachate odour concentration was assumed to be similar to a Sludge Blend Tanks "Odor Threshold Emission Factor for Common WWTP Processes" 2008.

(2) Based on an aeration system flow rate of 22 m^3/minute.

Table B.5

Estimated Raw Leachate Odour Emissions
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Odour Concentration (OU) (1)	Fill Rate (m^3/s) (2)	Estimated Maximum Emission Rate (ou/s)
S-4	Raw Leachate Tank	7,000	0.019	1.32E+02

Notes:

(1) The leachate odour concentration was assumed to be similar to a Sludge Blend Tanks "Odor Threshold Emission Factor for Common WWTP Processes" 2008.
(2) Based on a filling rate of 18.92 Litres per second.

Appendix C

Supporting Information for Assessment of Negligibility

Appendix C Supporting Information for Assessment of Negligibility Brooks Road Environmental

Sources were screened for negligibility using the following screening protocols listed in the ESDM Procedure Document:

– Identifying significant contaminants using an emission threshold (Section 7.1.2)
– Fugitive dust from on-site roadways (Section 7.4)

The results of the screening are discussed in greater detail in the following text.

Identifying Significant Contaminants using an Emission Threshold:

Section 7.1.2 of the ESDM Procedure Document states that contaminants that are emitted from a specific facility may be identified as negligible when they are below emissions thresholds that are developed using the following formula:

$$\text{Emission Threshold (g/s)} = \frac{0.5 \times \text{MECP POI Limit } (\mu g/m^3)}{\text{Dispersion Factor } (\mu g/m^3 \text{ per g/s emission})}$$

All Site emissions of contaminants with an MECP POI limit were assessed against the appropriate emission threshold based on the appropriate 1-hour rural dispersion factor of 10,000 $\mu g/m^3$ per g/s 20 m from the property boundary. For 10-minute standards a conversion of 1.65 was used. For 30-minute standards a conversion of 1.2 was used. For 24-hour standards a conversion of 0.4 was used. A number of contaminants are deemed to be emitted in negligible amounts, as indicated in Table C.1.

Table C.1

Assessment of Significance of Contaminants Using Emission and Concentration Thresholds
Brooks Road Landfill
Cayuga, Ontario

Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period (hrs)	MECP Criteria ($\mu g/m^3$)	Regulation Schedule	Emission Threshold (g/s)	Significant? (Y/N)
Dichlorodifluoromethane	75-71-8	7.45E-03	24	500,000	B1	6.25E+01	N
Chlorodifluoromethane	75-45-6	4.41E-04	24	350,000	B1	4.38E+01	N
1,1,2,2-tetrachloroethane	79-34-5	7.31E-04	24	0.1	B2	1.25E-05	Y
Chloromethane	74-87-3	2.40E-04	24	320	B1	4.00E-02	N
Vinyl Chloride	75-01-4	1.80E-03	24	1	B1	1.25E-04	Y
1,2-dichloroethane	107-06-2	1.59E-04	24	2	B1	2.50E-04	N
Chloroethane	75-00-3	3.16E-04	24	5,600	B1	7.00E-01	N
Trichlorofluoromethane	75-69-4	4.10E-04	24	6,000	B1	7.50E-01	N
Dichlorofluoromethane	75-43-4	1.06E-03	24	500	B2	6.25E-02	N
1,2-dichloropropane	78-87-5	7.98E-05	24	2,400	B1	3.00E-01	N
1,1-Dichloroethylene	75-35-4	7.61E-05	24	10	B1	1.25E-03	N
Acrylonitrile	107-13-1	1.32E-03	24	1	B1	7.50E-05	Y
Dichloromethane	75-09-2	4.77E-03	24	220	B1	2.75E-02	N
Bromodichloromethane	75-27-4	2.01E-03	24	350	B2	4.38E-02	N
Butane	106-97-8	1.15E-03	24	3,600	B2	4.50E-01	N
1,1,1-Trichloroethane	71-55-6	2.51E-04	24	115,000	B1	1.44E+01	N
Chlorobenzene	108-90-7	1.10E-04	1	3,500	B1	1.75E-01	N
Chlorobenzene	108-90-7	1.10E-04	10-minute	4,500	B1	1.36E-01	N
Carbon tetrachloride	56-23-5	2.41E-06	24	2	B1	3.00E-04	N
Carbonyl sulphide	463-58-1	1.15E-04	24	13	B2	1.63E-03	N
1,4-Dichlorobenzene	106-46-7	1.21E-04	24	95	B1	1.19E-02	N
Propane	74-98-6	1.92E-03	24	215,000	B2	2.69E+01	N
Pentane	109-66-0	9.31E-04	24	35,500	B2	4.44E+00	N
Ethanol	64-17-5	4.92E-03	1	19,000	B1	9.50E-01	N
Acetone	67-64-1	1.60E-03	24	11,880	B1	1.49E+00	N
Carbon Disulfide	75-15-0	1.73E-04	24	330	B1	4.13E-02	N
Isopropyl Alcohol	67-63-0	1.18E-02	24	7,300	B1	9.13E-01	N
Hexane	110-54-3	2.22E-03	24	2,500	B1	3.13E-01	N
MEK	78-93-3	2.01E-03	24	1,000	B1	1.25E-01	N
MIBK	108-10-1	7.35E-04	24	1,200	B1	1.50E-01	N
Chloroform	67-66-3	1.41E-05	24	1	B1	1.25E-04	N
Dimethyl sulfide	75-18-3	1.91E-03	10-minute	30	B1	9.09E-04	Y
Ethane	74-84-0	1.05E-01	24	14,500	B2	1.81E+00	N
Ethyl mercaptan	75-08-1	5.56E-04	10-minute	13	B1	3.94E-04	Y
Ethylene dibromide	106-93-4	7.37E-07	24	3	B1	3.75E-04	N
Mercury	7439-97-6	9.87E-08	24	1	B1	6.25E-05	N
Methyl mercaptan	74-93-1	4.70E-04	10-minute	13	B1	3.94E-04	Y
cis-1,2-Dichloroethene	540-59-0	1.08E-03	24	105	B1	1.31E-02	N
t-1,2-dichloroethene	156-59-2	1.08E-03	24	105	B1	1.31E-02	N
Benzene	71-43-2	6.13E-04	Annual	0.5	-	-	Y (1)
Benzene	71-43-2	6.13E-04	AAV	5	-	-	Y (1)
Benzene	71-43-2	6.13E-04	DAV	100	-	-	Y (1)
Trichloroethene	79-01-6	1.45E-03	24	12	B1	1.50E-03	N
Toluene	108-88-3	1.30E-02	24	2,000	B1	2.50E-01	N
Tetrachlorothene	127-18-4	2.43E-03	24	360	B1	4.50E-02	N
Ethylbenzene	100-41-4	1.92E-03	10-minute	1,900	B1	5.76E-02	N
Total Xylenes	1330-20-7	5.04E-03	10-minute	3,000	B1	9.09E-02	N
Total Xylenes	1330-20-8	5.04E-03	24	730	B1	9.13E-02	N
1,2,4-Trimethylbenzene	95-63-6	1.41E-03	24	220	B1	2.75E-02	N
1,1-Dichloroethane	75-34-3	9.13E-04	24	165	B1	2.06E-02	N
Cyclohexane	110-82-7	6.93E-04	24	6,100	B1	7.63E-01	N
Hydrogen Sulphide	7783-06-4	1.20E-02	24	7	B1	8.75E-04	Y
Hydrogen Sulphide	7783-06-4	1.20E-02	24	7	B1	8.75E-04	Y

Notes:

(1) Compounds with an annual averaging period cannot be considered negligible.

Appendix D

Dispersion Modelling Files (Electronic)

Table D.1

AERMOD Input Source Parameters
Brooks Road Landfill
Cayuga, Ontario

Source ID	Description	Source Type	Stack Velocity (m/s)	Stack Exit Gas Temperature (K)	Stack Inner Diameter (m)	Release Height (m)	Building Height (m)	Stack Height Above Roof (m)	Stack Orientation
S01	Landfill	Area	MODELLED AS AN AREA SOURCE			24.00	-	-	-
S02	Treated Effluent Tank	Point	0.269	Ambient	0.3	3	-	-	Capped
S03	Aeration System	Point	5.192	Ambient	0.3	3	-	-	Capped
S04	Raw Leachate Tank	Point	0.269	Ambient	0.3	3	-	-	Capped

Appendix E

Predicted Methane Generation Memorandum

Memorandum

February 27, 2024

To	Neil Shannick, PEng		
From	Bryan Szalda	**Tel**	+1 519 884 0510
Subject	**Predicted Methane Generation Brooks Road Landfill**	**Project no.**	12561524

Purpose of this Memorandum

This memorandum presents a summary of the methane generation modelling analysis for the Brooks Road Landfill located in Cayuga, Ontario (Site). This assessment is a revision to the previous assessment for the Site initially undertaken in November 2016 as part of the Environmental Assessment for a Landfill Expansion project that was used to approve the existing Site Environmental Compliance Approval (ECA) No. A110302, dated October 1, 2021. This assessment forms part of an ECA amendment application to seek approval for Stage 9.

Scope and Limitations

This report: has been prepared by GHD for 2270386 Ontario Limited and may only be used and relied on by 2270386 Ontario Limited for the purpose agreed between GHD and 2270386 Ontario Limited as set out in the introductory paragraph of this report.

GHD otherwise disclaims responsibility to any person other than 2270386 Ontario Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared the Scholl Canyon model ("Model") for, and for the benefit and sole use of, 2270386 Ontario Limited to support estimation of methane generation and must not be used for any other purpose or by any other person.

The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Model are from publicly available sources or provided by or on behalf of the 2270386 Ontario Limited, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs becomes available.

The Model is limited by the mathematical rules and assumptions that are set out in the Report or included in the Model and by the software environment in which the Model is developed.

The Model is a customised model and not intended to be amended in any form or extracted to other software for amending. Any change made to the Model, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Model including any outputs.

GHD has prepared this report on the basis of information provided by 2270386 Ontario Limited and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

Predicted Methane Generation

Consistent with the previous methane generation assessment, modelling was undertaken in accordance with Title 40 of the United States Code of Federal Regulations (CFR), Part 98, Subpart HH (Mandatory Greenhouse Gas [GHG] Reporting for Municipal Solid Waste [MSW] Landfills) (Title 40 CFR Mandatory GHG Reporting Requirements). This method is generally in accordance with the Ontario Ministry of the Environment, Conservation and Parks (MECP), (formerly Ministry of the Environment [MOE]) Air Resources Branch guidance document entitled “Interim Guide to Estimate and Assess Landfill Air Impacts” dated October 1992 that references methods and default parameters within US Title 40 CFR. This assessment uses the most recent methods for estimating landfill gas within US Title 40 CFR as supplemented by Environment and Climate Change Canada’s (ECCC’s) Greenhouse Gas Reporting Program (GHGRP).

There are two modelling simulations considered in this revised assessment:

– Simulation 1: The modelling methodology was taken from the Title 40 CFR Mandatory GHG Reporting Requirements. The waste types were broken down into specific categories (bulk waste, garden waste, construction and demolition (C&D) waste, sewage sludge, food waste, and inert waste) and the degradable organic content (DOC) and reactivity constant (k) values from 40 CFR 98 Subpart HH were applied to each respective waste category.
– Simulation 2: An average degradable organic content (DOC) and reactivity constant (k) were taken from ECCC’s document *National Inventory Report 1990 – 2018: Greenhouse Gas Sources and Sinks in Canada* and applied to total putrescible waste accepted. Inert waste was excluded from the model as it does not break down into methane.

This modelling analysis only details anthropogenic emissions from the landfill and does not include biogenic emissions.

Simulation 1 – Waste Category Specific Model

Modelling Methane Generation – No Gas Collection System

The methane generation within a landfill for a given year, G_{CH4}, was calculated based on historical waste records. Equation 1 presents the Scholl Canyon equation which is used to calculate the methane generation from a landfill for a given year:

$$G_{CH4} = \sum \{W_x * L_{o,x} * (e^{-k\,(T - x - 1)} - e^{-k\,(T - x)})\} \quad \text{[for x = S through T-1]} \quad (1)$$

Where:

– G_{CH4} = modelled methane generation rate in year, T, in metric tonnes per year
– x = year in which waste was disposed
– S = start year of calculation

– T = reporting year for which emissions are calculated
– W_x = quantity of waste disposed in year x (metric tonnes, wet weight)
– L_o = CH_4 generation potential (metric tonnes CH_4/metric tonnes waste)
– k = decay rate constant from Table 1 (yr^{-1})

The methane generation potential, L_o, is calculated using Equation 2:

$$L_o = \frac{MCF * DOC * DOC_F * F * 16}{12} \quad (2)$$

Where:

– L_o = CH_4 generation potential (metric tonnes CH_4/metric tonnes waste)
– MCF = Methane correction factor (default value is 1)
– DOC = Degradable organic carbon from Table 1 (metric tonnes of carbon/metric tonne waste)
– DOC_F = Fraction of DOC dissimilated (default value is 0.5)
– F = Fraction by volume of CH_4 in landfill gas from measurement data, if available (default value is 0.5)

Actual waste disposal numbers were provided by the Site in the form of a Material Activity Report for the period of October 8, 2009 through October 9, 2016 and annual reports for the period of 2016 through 2020. Refer to Attachment 1 for these reports. Table 1 provides a summary of the potential modelling parameters from 40 CFR 98 Subpart HH differentiated by waste categories (i.e., bulk waste, C&D waste, food waste, garden waste, sewage sludge, or inerts). Tables 2A through 2F present the breakdown of waste into the categories shown in Table 1 along with the approximate composition (percent of total landfilled waste in a given year).

The approved capacity of the existing landfill is 1,045,065 m^3. Stage 9 includes an additional 219,400 m^3 for a total proposed capacity of 1,264,465 m^3. A waste acceptance rate of 250,000 tonnes per year was assumed for future years (starting in 2023) until the total proposed landfill capacity was reached (approximately 2026). While landfill closure is anticipated to occur in 2026 based on recent filling rates, the evaluation of an accelerated closure period represents a conservative estimate, providing a higher peak year methane generation rate (i.e., representing a worst-case scenario). Waste composition for future years (starting in 2021) was assumed to be the same as shown in Table 2F, which presents average waste composition data from 2016 to 2020. Table 3 presents the annual breakdown of waste quantities for the Brooks Road Landfill from the open year (2009) to closure (approximately 2026). Capacity consumed each future year is based on the in-place waste density of 1.956 tonnes/m^3.

Table 4 presents a summary of the input values used for the model. A review of climate data for the Site shows that the average precipitation is 500-1,000 mm (20-40 inches) per year. It is assumed that mean annual precipitation exceeds the potential evapotranspiration rate at the Site. The default methane concentration of 50 percent by volume was also assumed.

The estimated methane generation in the peak year (2026) for each waste category is shown in the following tables:

– Table 5 bulk waste
– Table 6 C&D
– Table 7 sewage sludge
– Table 8 garden waste
– Table 9 food waste
– Table 10 all waste types (please note that inert waste does not generate methane emissions)

Methane generation values (in tonnes per year) were converted to carbon dioxide equivalent (as tonnes CO_2e per year) by applying a 100-year warming factor of 25 (for methane).

For landfills without landfill gas collection and control systems, methane emissions are calculated using an oxidation factor shown in Equation 3:

$$MG = G_{CH4} * (1 – OX) \quad (3)$$

where,

MG = methane generation, after adjustment for oxidation (metric tonnes CH_4)

G_{CH4} = modelled methane generation rate in reporting year, calculated from Equation 1 (metric tonnes CH_4)

OX = Oxidation fraction

This equation accounts for methane that is oxidized upon diffusion through the soil cover. Table 11 presents the estimated peak methane emissions from the Brooks Road Landfill when accounting for soil cover oxidation. Therefore, without an LFG collection and control system, peak methane emissions from the Brooks Road Landfill (in 2026) are estimated to be approximately 902 tonnes of methane (approximately 22,540 tonnes CO_2e). Converting to units of flow, the maximum methane generation rate is approximately 152 cubic metres per hour (m^3/hr) (90 standard cubic feet per minute [scfm]) in 2026.

Figure 1 presents the projected methane generation for the Brooks Road Landfill. This figure provides total generation quantities prior to cover oxidation. This figure was produced by utilizing the USEPA LandGEM model upon which the first-order Scholl Canyon model used in Ontario for estimating landfill gas volumes is based.

Modelling Methane Generation – With Gas Collection and Control System

The total proposed capacity of the landfill is 1,264,465 m^3. In accordance with Ontario Regulation (O. Reg. 347) Section 11.1(2) all landfills in Ontario meeting the following criteria are required to install facilities for the collection and the burning or use of LFG generated by the site during operation of the site and during site closure if:

– The site accepts only MSW
– On or after June 30, 2009, the site will landfill waste under a certificate of approval (C of A) or provisional C of A issued under Part V of the EPA (now referred to as an Environmental Compliance Approval [ECA])
– On or after June 30, 2009, the site will have a total waste disposal volume of more than 1.5 million m^3

As an operating landfill not meeting the above criteria, the Site is not required to install LFG collection or control facilities, either at the current capacity of the proposal expanded capacity.

Notwithstanding the above, ECCC has recently issued a proposed regulatory framework entitled “Reducing Canada’s Landfill Methane Emissions” (PRF), inviting interested parties to provide their feedback on the PRF (feedback closure date of May 19, 2023). The PRF seeks to require landfills exceeding either a methane generation or a methane emission threshold to comply with regulatory requirements for controlling methane emissions. A tiered approach to identifying specific regulatory obligations is proposed that generally includes:

– Applicability threshold based on quantity of MSW disposed
– Methane generation assessment and threshold
– Methane emission assessment and thresholds (optional approach)

The PRF indicates that this approach is in line with the way other North American jurisdictions have identified which landfills are required to take action to reduce methane emissions. The regulation would apply to landfills that have received more than a specified quantity of MSW, i.e., waste generated by the residential, industrial, commercial and institutional (ICI), and construction, renovation and demolition (CRD) sectors. ICI sector waste is defined as waste from sources like office buildings, shopping malls, schools and hospitals. As proposed, the regulations would apply to landfills that meet the following criteria:

– Closed landfills that accepted MSW for disposal after January 1, 2009 and that have more than 450,000 tonnes of MSW in place (total waste disposed)

– Open landfills that:
  - Have more than 100,000 tonnes of MSW in place or
  - Accepted more than 10,000 tonnes of MSW for disposal per year in any year following the coming into force of the regulations

Landfills that meet these criteria would have requirements under the regulation. Some landfills would only be required to do minimal assessment, while others may have further obligations based on the results of the assessment.

As this Site currently has more than 100,000 tonnes of MSW or bulk waste in place this section will consider the environmental, energy, and economic impacts associated with the operation of a landfill gas collection and control system.

To determine the effectiveness of the system, the estimated methane emission reduction was calculated. In accordance with Table HH-3 of 40 CFR 98, Subpart HH, a gas collection recovery factor of 60 percent was assumed as most of the Site currently has daily cover (see Table 11). The methane that is generated in the landfill and not recovered by the collection system is given an oxidation factor. A destruction efficiency is applied to the methane that is recovered by the collection system (the lesser of 99 percent and the manufacturer's specified destruction efficiency). Equation 4 is used to calculate total annual methane emissions:

$$E_{CH4} = [(G_{CH4} – R) * (1 – OX)] + [R * (1 – (DE * f_{dest}))] \qquad (4)$$

Where:

– E_{CH4} = Methane emissions from landfill (metric tonnes CH_4)
– R = Quantity of recovered CH_4 in collection system [R= Collection Efficiency (%) * G_{CH4}]
– OX = Oxidation fraction
– DE = Destruction efficiency
– f_{dest} = fraction of hours the control device was operating (annual operating hours/8,760 hours per year). If the gas is destroyed in a back-up flare (or similar device) or if the gas is transported off-site for destruction, use f_{dest} = 1

Figure 2 presents the projected methane collection for the Site. Table 12 presents a summary of the methane emissions for each option (Option 1: No Collection System, Option 2: With Gas Collection System), as well as the estimated methane reduction by going forward with Option 2. It is assumed that the only feasible control option is an open/utility flare since the Site does not generate enough gas to support an enclosed flare.

Gas Collection and Control System – Environmental Impacts

In an open/utility flare, LFG is burned in the elevated flare tip located at the top of the gas flare stack. Commonly the flame is open at the top of the gas flare stack and hence the name. Due to the open flame, this type of flare system can be a source of noise. Also, the radiant heat from open flame renders some area around the stack unsuitable for installation of some equipment.

Gas Collection and Control System – Energy Impacts

An active gas collection system would require the operation of a blower system. In addition, the open flare would require a fuel source for startup. An active collection and control system would also require much more monitoring and maintenance, which would result in more vehicle traffic to and from the Site. All the aforementioned items would be a source of GHG emissions which would partially offset any methane reduction that is achieved by a gas collection and control system.

Gas Collection and Control System – Economic Impacts

The average annual costs (capital and operating) associated with the operation of a utility flare and a gas collection system over a 25-year period is presented in Tables 13 and 14, respectively. The total annual cost for the operation of a gas collection and control system is estimated to be $334,000 per year. The average annual methane emission reduction for the period of 2026-2050 is estimated to be 8,118 tonnes CO_2e per year. Therefore, the cost effectiveness with this option is estimated to be $41 per tonne CO_2e reduced. Historically, when evaluated based on Ontario's discontinued Cap-and-Trade system, the threshold for determining if a project is cost effective was in the range of $3-$15 per tonne CO_2e reduced (for GHG). Based on this, the operation of a gas collection and control system at the Brooks Road Landfill is not considered cost-effective. Consideration can be given to credits that would be generated under the ECCC's Clean Fuel Regulations (CFR), though it is unclear if the ECCC's PRF would remove eligibility for generation of credits under the CFR.

Simulation 2 – Model Based on Parameters from ECCC's National Inventory Report 1990-2018: Greenhouse Gas Sources and Sinks in Canada

Modelling Methane Generation – No Gas Collection System

GHD prepared a second model simulation in which DOC and k values were referenced from the document "*National Inventory Report 1990 – 2018: Greenhouse Gas Sources and Sinks in Canada*", dated 2020. Table A3.6-4 from Part 2 provides average DOC and k values broken down by provinces within Canada. For Ontario, a DOC value of 0.21 is specified for the period of 2002-2014 and a DOC value of 0.18 is specified for 2015 to present. Table A3.6-5 specifies a k value of 0.045 yr^{-1} for Ontario for the period of 2008 to present. These model parameters are only being applied to the putrescible waste accepted at the Site, defined as the total waste minus inert waste categories shown in Table 3.

The estimated methane generation in the peak year (2026) is shown in the following tables:

– Table 15 presents the estimated peak methane generation for the putrescible waste accepted in 2009 through 2014
– Table 16 presents the estimated peak methane generation for the putrescible waste accepted in 2015 through 2026
– Table 17 presents the estimated peak methane generation for all wasted types combined (please note that inert waste does not generate methane emissions)

Methane generation values (in tonnes per year) were converted to carbon dioxide equivalents (as tonnes CO_2e per year) by applying a 100-year warming factor of 25 for methane.

Table 18 presents the estimated peak methane emissions from the Site when accounting for soil cover oxidation. Therefore, without an LFG collection and control system, peak methane emissions from the Site in 2026 are estimated to be approximately 1,525 tonnes of methane (approximately 38,117 tonnes CO_2e). Converting to units of flow, the maximum methane generation rate is approximately 257 m^3/hr (152 scfm) in 2026.

Figure 3 presents the projected methane generation for the Site. This figure provides total generation quantities prior to cover oxidation. This figure was produced by utilizing the USEPA LandGEM model.

Modelling Methane Generation – With Gas Collection and Control System

This section presents a discussion of the impacts associated with the operation of a gas collection and control system. The environmental, energy, and economic impacts were evaluated for the installation of a gas collection and control system at the Site.

To determine the effectiveness of the system, the estimated methane emission reduction was calculated. In accordance with Table HH-3 of 40 CFR 98, Subpart HH, a gas collection recovery factor of 60 percent was assumed as most of the Site currently has daily cover (see Table 18). The methane that is generated in the landfill and not recovered by the collection system is given an oxidation factor. A destruction efficiency is

applied to the methane that is recovered by the collection system (the lesser of 99 percent and the manufacturer's specified destruction efficiency).

Figure 4 presents the projected methane collection for the Site. Table 19 presents a summary of the methane emissions for each option (Option 1: No Collection System, Option 2: With Gas Collection System), as well as the estimated methane reduction by going forward with Option 2. It is assumed that the only feasible control option is an open/utility flare since the Site does not generate enough gas to support an enclosed flare.

Gas Collection and Control System – Environmental Impacts

In an open/utility flare, LFG is burned in the elevated flare tip located at the top of the gas flare stack. Commonly the flame is open at the top of the gas flare stack and hence the name. Due to the open flame, this type of flare system can be a source of noise. Also, the radiant heat from open flame renders some area around the stack unsuitable for installation of some equipment.

Gas Collection and Control System – Energy Impacts

An active gas collection system would require the operation of a blower system. In addition, the open flare would require a fuel source for startup. An active collection and control system would also require much more monitoring and maintenance, which would result in more vehicle traffic to and from the Site. All the aforementioned items would be a source of GHG emissions which would partially offset any methane reduction that is achieved by a gas collection and control system.

Gas Collection and Control System – Economic Impacts

The average annual costs (capital and operating) associated with the operation of a utility flare and a gas collection system over a 25-year period is presented in Tables 13 and 14, respectively. The total annual cost for the operation of a gas collection and control system is estimated to be $333,712 per year. The average annual methane emission reduction for the period of 2026-2050 is estimated to be 14,027 tonnes CO_2e per year. Therefore, the cost effectiveness with this option is estimated to be $24 per tonne CO_2e reduced. Historically, when evaluated based on Ontario's discontinued Cap-and-Trade system, the threshold for determining if a project is cost effective was in the range of $3 - $15 per tonne CO_2e reduced (for GHG). Based on this, the operation of a gas collection and control system at the Brooks Road Landfill is not considered cost-effective. Consideration can be given to credits that would be generated under the ECCC's CFR, though it is unclear if the ECCC's PRF would remove eligibility for generation of credits under the CFR.

Discussion/Conclusion

The estimated maximum landfill gas generation and methane generation quantities for the Site are shown in the table below (adjusted for cover oxidation):

	Maximum Generation – Simulation 1		Maximum Generation – Simulation 2	
	m^3/hr	cfm	m^3/hr	cfm
LFG	338.6	199.3	572.1	336.7
Methane	152.4	89.7	257.4	151.5

Based on an evaluation of the waste quantities shown in Table 2F, the landfill accepts mostly construction/demolition waste (~27 percent) and inert material (~65 percent). These waste categories contain a very low amount of DOC when compared to higher organic materials such as bulk waste and food waste. Therefore, the landfill is not expected to generate a large amount of methane emissions as a typical MSW landfill would.

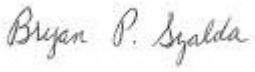
GHD concludes that model Simulation 1 is more indicative of what is occurring at the Site since this scenario accounts for actual waste types accepted at the Site. Simulation 2 is based on estimated average DOC and k values collected across Canada (by province) and is more aligned with MSW sites that contain more organic waste than what is accepted at the Site. Brooks Road Landfill accepts ICI waste which generally contains less

degradable organic content than MSW. We should note that for both model simulations, the landfill is expected to generate less than 100,000 tonnes of carbon dioxide equivalent in the peak year of generation and a gas collection system is not considered feasible in either case.

It should be noted that the Site did accept waste prior to 2009. However, the Site does not have detailed waste records for years prior to 2009. Therefore, it is more conservative (i.e., biases landfill gas conservatively high) to start the modelling analysis in 2009 using a fixed design capacity of 624,065 tonnes for the existing landfill. By employing a fixed design capacity of 624,065 tonnes, the waste is assumed to be deposited in the landfill sooner than it was and is expected to produce more gas in the present time than older waste.

Based on the relatively low levels of methane expected to be generated at the Brooks Road Landfill and the lack of regulatory or economic drivers associated with the installation of a gas collection and control system, it is not recommended to install such a system at this time. The installation of a gas collection or control system will need to be revisited should ECCC adopt the PRF put out for public comment this year.

Regards,



Bryan Szalda
Senior Engineer

Figure 1
LandGEM - Modelled Methane Generation - Simulation 1
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

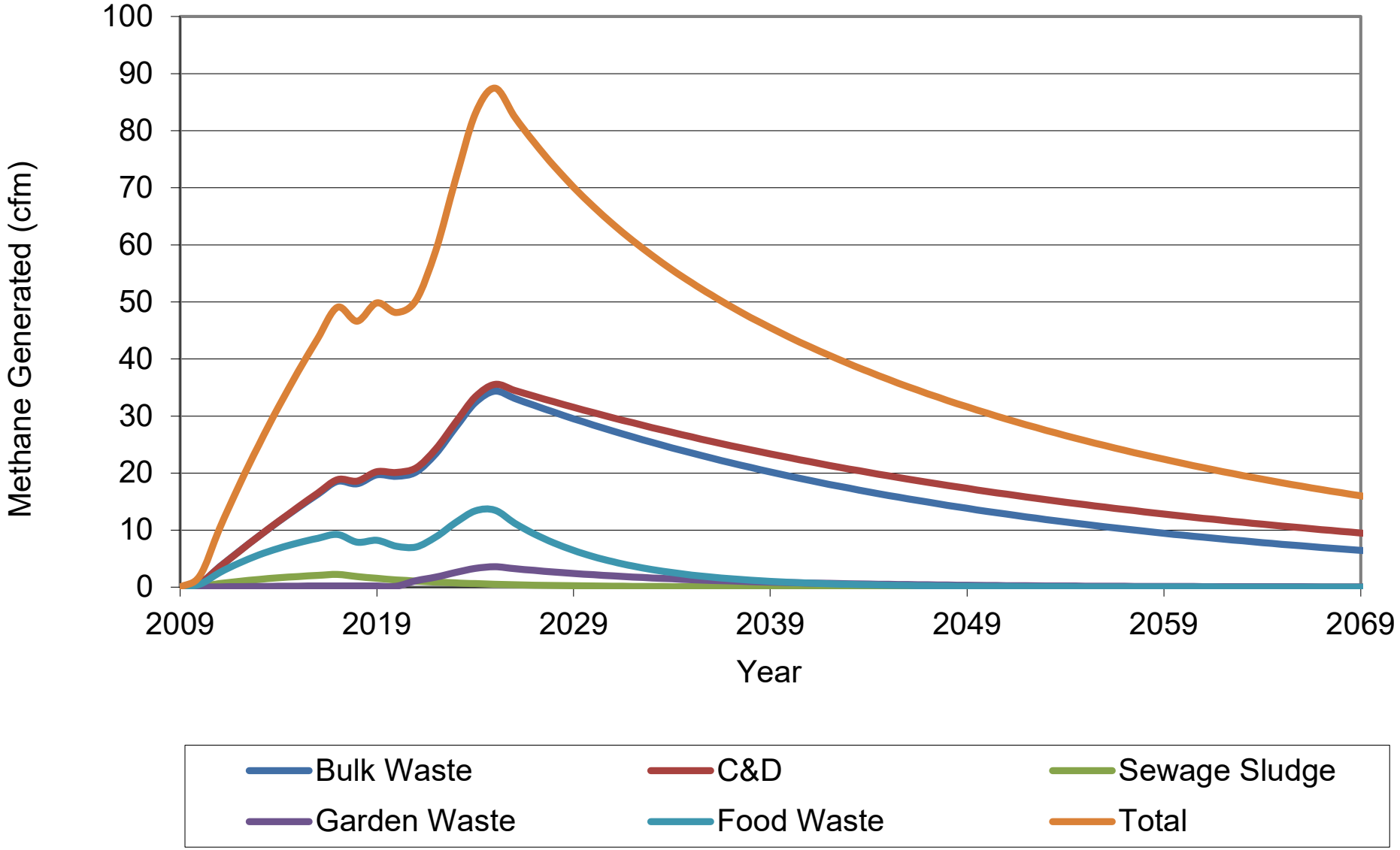


Figure 2
LandGEM - Modelled Methane Collection - Simulation 1
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

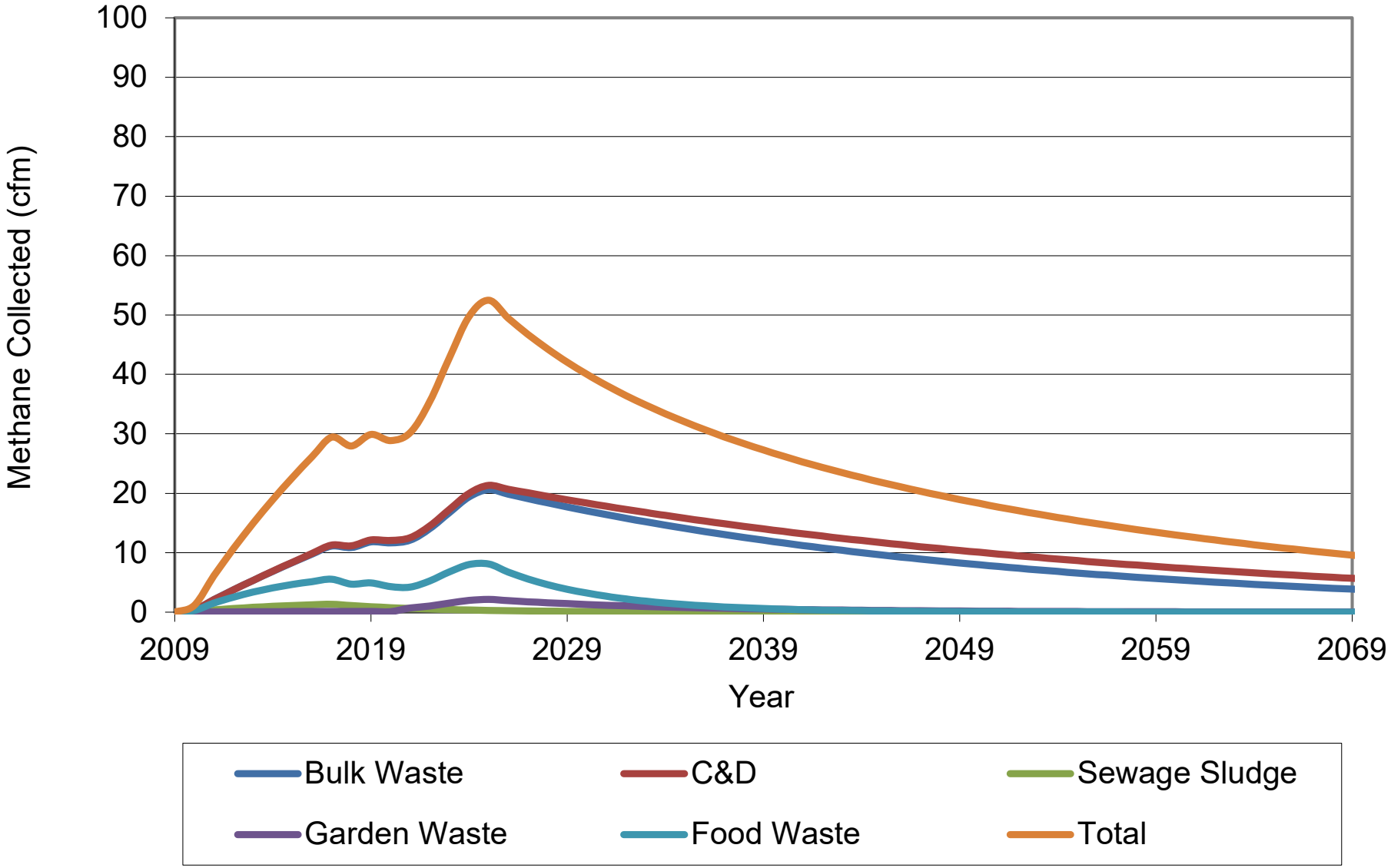


Figure 3
LandGEM - Modelled Methane Generation - Simulation 2
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

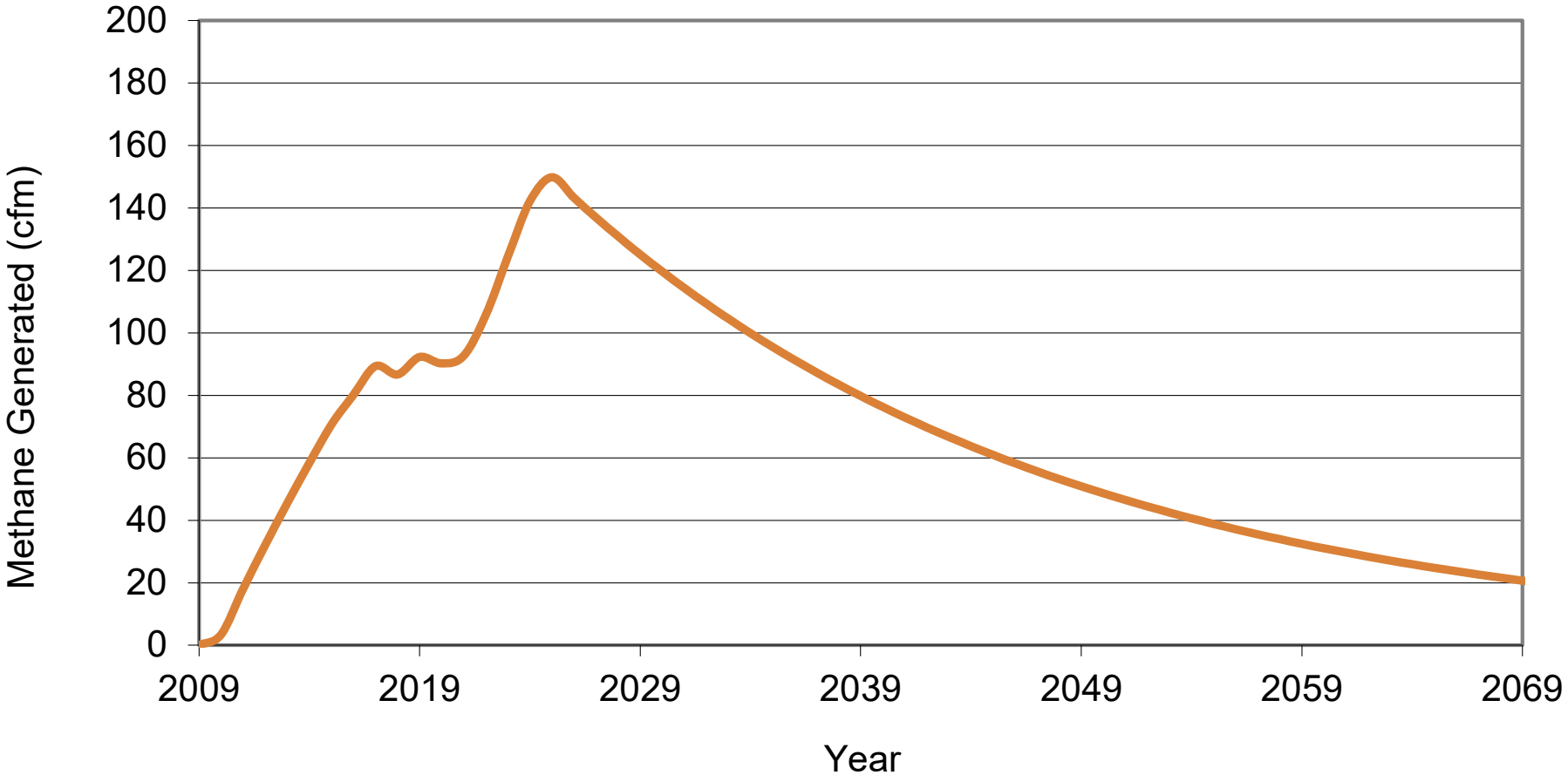


Figure 4
LandGEM - Modelled Methane Collection - Simulation 2
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

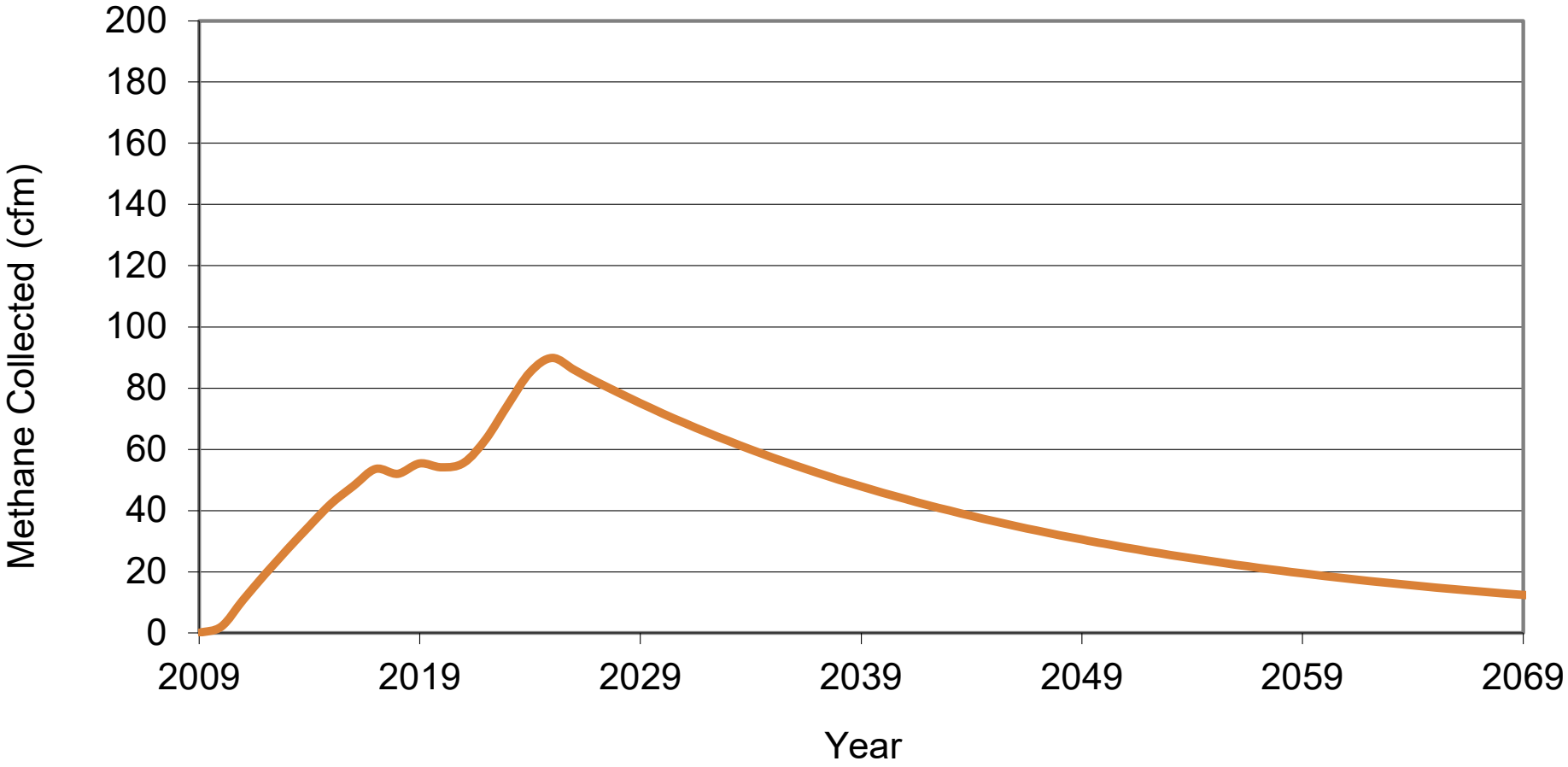


Table 1

Modelling Parameters
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Factor	Default value	Units
DOC and k values—Bulk waste option		
DOC (bulk waste)	0.2	Weight fraction, wet basis.
k (precipitation plus recirculated leachate[(a)] <20 inches/year)	0.02	yr^{-1}
k (precipitation plus recirculated leachate[(a)] 20-40 inches/year)	0.038	yr^{-1}
k (precipitation plus recirculated leachate[(a)] >40 inches/year)	0.057	yr^{-1}
DOC and k values—Modified bulk MSW option		
DOC (bulk MSW, excluding inerts and C&D waste)	0.31	Weight fraction, wet basis.
DOC (inerts, e.g., glass, plastics, metal, concrete)	0	Weight fraction, wet basis.
DOC (C&D waste)	0.08	Weight fraction, wet basis.
k (bulk MSW, excluding inerts and C&D waste)	0.02 to 0.057[(b)]	yr^{-1}
k (inerts, e.g., glass, plastics, metal, concrete)	0	yr^{-1}
k (C&D waste)	0.02 to 0.04[(b)]	yr^{-1}
DOC and k values—Waste composition option		
DOC (food waste)	0.15	Weight fraction, wet basis.
DOC (garden)	0.2	Weight fraction, wet basis.
DOC (paper)	0.4	Weight fraction, wet basis.
DOC (wood and straw)	0.43	Weight fraction, wet basis.
DOC (textiles)	0.24	Weight fraction, wet basis.
DOC (diapers)	0.24	Weight fraction, wet basis.
DOC (sewage sludge)	0.05	Weight fraction, wet basis.
DOC (inerts, e.g., glass, plastics, metal, cement)	0	Weight fraction, wet basis.
k (food waste)	0.06 to 0.185[(c)]	yr^{-1}
k (garden)	0.05 to 0.10[(c)]	yr^{-1}
k (paper)	0.04 to 0.06[(c)]	yr^{-1}
k (wood and straw)	0.02 to 0.03[(c)]	yr^{-1}
k (textiles)	0.04 to 0.06[(c)]	yr^{-1}
k (diapers)	0.05 to 0.10[(c)]	yr^{-1}
k (sewage sludge)	0.06 to 0.185[(c)]	yr^{-1}
k (inerts e.g., glass, plastics, metal, concrete)	0	yr^{-1}
Other parameters—All MSW landfills		
Methane Correction Factor, MCF	1	
Fraction of DOC Dissimilated, DOC_F	0.5	
Fraction by volume of CH4 in landfill gas from measurement data, if available, F	0.5	
Oxidation Fraction, OX	See Table HH-4 of this subpart	
Destruction Efficiency, DE	0.99	

Notes:

Source: 40 CFR 98 Subpart HH, Table HH-1
DOC - degradable organic carbon

k - decay rate constant

a. Recirculated leachate (in inches/year) is the total volume of leachate recirculated from company records or engineering estimates divided by the area of the portion of the landfill containing waste with appropriate unit conversions. Alternatively, landfills that use leachate recirculation can elect to use the k value of 0.057 rather than calculating the recirculated leachate rate.

b. Use the lesser value when precipitation plus recirculated leachate is less than 20 inches/year. Use the greater value when precipitation plus recirculated leachate is greater than 40 inches/year. Use the average of the range of values when precipitation plus recirculated leachate is 20 to 40 inches/year (inclusive). Alternatively, landfills that use leachate recirculation can elect to use the greater value rather than calculating the recirculated leachate rate.

c. Use the lesser value when the potential evapotranspiration rate exceeds the mean annual precipitation rate plus recirculated leachate. Use the greater value when the potential evapotranspiration rate does not exceed the mean annual precipitation rate plus recirculated leachate. Alternatively, landfills that use leachate recirculation can elect to use the greater value rather than assessing the potential evapotranspiration rate or recirculated leachate rate.

Table 2A

Historical Waste Receipt Categorization (2009 - 2016)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		350,951.53		
70% C&D - Transfer Stations	X	245,666.07	245,666.07	C&D
5% Food Waste	X	17,547.58	17,547.58	FOOD
10% Inerts (Glass, Roxul)		35,095.15		INERT
15% Residential Rolloffs	X	52,642.73	52,642.73	BULK
C&D	X	5,514.35	5,514.35	C&D
Shingles		15,876.78		INERT
Contaminated Soil		87,691.42		INERT
Sludge	X	12,644.03	12,644.03	SEWAGE SLUDGE
Yard Waste	X	461.11	461.11	GARDEN
Asbestos		5,398.30		INERT
Demolition	X	105.44	105.44	C&D
Demo/brick/block	X	2,112.12	2,112.12	C&D
Clay		0.00		INERT
Tire Fluff		770.67		INERT
Salt Cake		233.14		INERT
Ash		2,289.55		INERT
C&D/Roofing/Shingles	X	2,056.40	2,056.40	C&D
Total Material (2009 - 2016)		**486,105**	**338,750**	
Total Material (per year)		**69,444**	**48,393**	
Total Bulk Waste (per year)		**7,520**	**tonnes per year**	
Total Bulk Waste (% of Total)		**10.8**		
Total C&D Waste (per year)		**36,493**	**tonnes per year**	
Total C&D Waste (% of Total)		**52.6**		
Total Sewage Sludge (per year)		**1,806**	**tonnes per year**	
Total Sewage Sludge (% of Total)		**2.6**		
Total Garden Waste (per year)		**66**	**tonnes per year**	
Total Garden Waste (% of Total)		**0.1**		
Total Food Waste (per year)		**2,507**	**tonnes per year**	
Total Food Waste (% of Total)		**3.6**		
Total Inert Waste (per year)		**21,051**	**tonnes per year**	
Total Inert Waste (% of Total)		**30.3**		

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 2B

Historical Waste Receipt Categorization (2017)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		4,529.59		
70% C&D - Transfer Stations	X	3,170.71	3,170.71	C&D
5% Food Waste	X	226.48	226.48	FOOD
10% Inerts (Glass, Roxul)		452.96		INERT
15% Residential Rolloffs	X	679.44	679.44	BULK
C&D	X	0.00	0.00	C&D
Shingles		0.00		INERT
Contaminated Soil		13,478.45		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		0.00		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	894.28	894.28	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Total Material (2017)		**18,902**	**4,971**	
Total Material (per year)		**18,902**	**4,971**	
Total Bulk Waste (per year)		**679**	**tonnes per year**	
Total Bulk Waste (% of Total)		**3.6**		
Total C&D Waste (per year)		**4,065**	**tonnes per year**	
Total C&D Waste (% of Total)		**21.5**		
Total Sewage Sludge (per year)		**0**	**tonnes per year**	
Total Sewage Sludge (% of Total)		**0.0**		
Total Garden Waste (per year)		**0**	**tonnes per year**	
Total Garden Waste (% of Total)		**0.0**		
Total Food Waste (per year)		**226**	**tonnes per year**	
Total Food Waste (% of Total)		**1.2**		
Total Inert Waste (per year)		**13,931**	**tonnes per year**	
Total Inert Waste (% of Total)		**73.7**		

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 2C

Historical Waste Receipt Categorization (2018)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		39,179.67		
70% C&D - Transfer Stations	X	27,425.77	27,425.77	C&D
5% Food Waste	X	1,958.98	1,958.98	FOOD
10% Inerts (Glass, Roxul)		3,917.97		INERT
15% Residential Rolloffs	X	5,876.95	5,876.95	BULK
C&D	X	0.00	0.00	C&D
Shingles		0.00		INERT
Contaminated Soil		19,122.72		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		82.87		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	503.70	503.70	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Total Material (2018)		**58,889**	**35,765**	
Total Material (per year)		**58,889**	**35,765**	
Total Bulk Waste (per year)		**5,877**	**tonnes per year**	
Total Bulk Waste (% of Total)		**10.0**		
Total C&D Waste (per year)		**27,929**	**tonnes per year**	
Total C&D Waste (% of Total)		**47.4**		
Total Sewage Sludge (per year)		**0**	**tonnes per year**	
Total Sewage Sludge (% of Total)		**0.0**		
Total Garden Waste (per year)		**0**	**tonnes per year**	
Total Garden Waste (% of Total)		**0.0**		
Total Food Waste (per year)		**1,959**	**tonnes per year**	
Total Food Waste (% of Total)		**3.3**		
Total Inert Waste (per year)		**23,124**	**tonnes per year**	
Total Inert Waste (% of Total)		**39.3**		

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 2D

Historical Waste Receipt Categorization (2019)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		8,371.84		
70% C&D - Transfer Stations	X	5,860.29	5,860.29	C&D
5% Food Waste	X	418.59	418.59	FOOD
10% Inerts (Glass, Roxul)		837.18		INERT
15% Residential Rolloffs	X	1,255.78	1,255.78	BULK
C&D	X	0.00	0.00	C&D
Shingles		0.00		INERT
Contaminated Soil		65,084.88		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		0.00		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	0.00	0.00	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D

Total Material (2019)	**73,457**	**7,535**
Total Material (per year)	**73,457**	**7,535**
Total Bulk Waste (per year)	**1,256**	**tonnes per year**
Total Bulk Waste (% of Total)	**1.7**	
Total C&D Waste (per year)	**5,860**	**tonnes per year**
Total C&D Waste (% of Total)	**8.0**	
Total Sewage Sludge (per year)	**0**	**tonnes per year**
Total Sewage Sludge (% of Total)	**0.0**	
Total Garden Waste (per year)	**0**	**tonnes per year**
Total Garden Waste (% of Total)	**0.0**	
Total Food Waste (per year)	**419**	**tonnes per year**
Total Food Waste (% of Total)	**0.6**	
Total Inert Waste (per year)	**65,922**	**tonnes per year**
Total Inert Waste (% of Total)	**89.7**	

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Historical Waste Receipt Categorization (2020)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		25,622.69		
70% C&D - Transfer Stations	X	17,935.88	17,935.88	C&D
5% Food Waste	X	1,281.13	1,281.13	FOOD
10% Inerts (Glass, Roxul)		2,562.27		INERT
15% Residential Rolloffs	X	3,843.40	3,843.40	BULK
C&D	X	0.00	0.00	C&D
Shingles		2,382.12		INERT
Contaminated Soil		30,410.29		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		45.94		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	0.00	0.00	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Wood	X	1,564.47	1,564.47	GARDEN

Total Material (2020)	**60,026**	**24,625**
Total Material (per year)	**60,026**	**24,625**
Total Bulk Waste (per year)	**3,843**	**tonnes per year**
Total Bulk Waste (% of Total)	**6.4**	
Total C&D Waste (per year)	**17,936**	**tonnes per year**
Total C&D Waste (% of Total)	**29.9**	
Total Sewage Sludge (per year)	**0**	**tonnes per year**
Total Sewage Sludge (% of Total)	**0.0**	
Total Garden Waste (per year)	**1,564**	**tonnes per year**
Total Garden Waste (% of Total)	**2.6**	
Total Food Waste (per year)	**1,281**	**tonnes per year**
Total Food Waste (% of Total)	**2.1**	
Total Inert Waste (per year)	**35,401**	**tonnes per year**
Total Inert Waste (% of Total)	**59.0**	

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 2F

Historical Waste Receipt Categorization (2016 - 2020)
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Putrescible?	Total Waste (tonnes)	Putrescible Waste (tonnes)	Waste Category (tonnes)
Waste [1]		95,197.66		
70% C&D - Transfer Stations	X	66,638.36	66,638.36	C&D
5% Food Waste	X	4,759.88	4,759.88	FOOD
10% Inerts (Glass, Roxul)		9,519.77		INERT
15% Residential Rolloffs	X	14,279.65	14,279.65	BULK
C&D	X	12.50	12.50	C&D
Shingles		2,382.12		INERT
Contaminated Soil		150,928.49		INERT
Sludge	X	0.00	0.00	SEWAGE SLUDGE
Yard Waste	X	0.00	0.00	GARDEN
Asbestos		140.34		INERT
Demolition	X	0.00	0.00	C&D
Demo/brick/block	X	2,188.53	2,188.53	C&D
Clay		0.00		INERT
Tire Fluff		0.00		INERT
Salt Cake		0.00		INERT
Ash		0.00		INERT
C&D/Roofing/Shingles	X	0.00	0.00	C&D
Wood	X	1,564.47	1,564.47	GARDEN

Total Material (2016 - 2020)	**252,414**	**89,443**
Total Material (per year)	**50,483**	**17,889**
Total Bulk Waste (per year)	**2,856**	**tonnes per year**
Total Bulk Waste (% of Total)	**5.7**	
Total C&D Waste (per year)	**13,768**	**tonnes per year**
Total C&D Waste (% of Total)	**27.3**	
Total Sewage Sludge (per year)	**0**	**tonnes per year**
Total Sewage Sludge (% of Total)	**0.0**	
Total Garden Waste (per year)	**313**	**tonnes per year**
Total Garden Waste (% of Total)	**0.6**	
Total Food Waste (per year)	**952**	**tonnes per year**
Total Food Waste (% of Total)	**1.9**	
Total Inert Waste (per year)	**32,594**	**tonnes per year**
Total Inert Waste (% of Total)	**64.6**	

Notes:
1. Breakdown of 'Waste' provided by Brooks Road Environmental.

Table 3

Average Annual Waste Quantities
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Year	Existing Permitted Landfill							Stage 9							Total Waste Acceptance [2, 3]							Total Waste
	Total Waste	Bulk	C&D	Sludge	Garden	Food	Inert	Total Waste	Bulk	C&D	Sludge	Garden	Food	Inert	Total Waste	Bulk	C&D	Sludge	Garden	Food	Inert	
	(tonnes/yr)	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*	*(tonnes/yr)*
2009	15,982	1,731	8,399	416	15	577	4,845								15,982	1,731	8,399	416	15	577	4,845	15,982
2010	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2011	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2012	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2013 [1]	119,444	7,520	36,493	1,806	66	2,507	71,051								119,444	7,520	36,493	1,806	66	2,507	71,051	119,444
2014	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2015	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2016	69,444	7,520	36,493	1,806	66	2,507	21,051								69,444	7,520	36,493	1,806	66	2,507	21,051	69,444
2017	18,902	679	4,065	0	0	226	13,931								18,902	679	4,065	0	0	226	13,931	18,902
2018	58,889	5,877	27,929	0	0	1,959	23,124								58,889	5,877	27,929	0	0	1,959	23,124	58,889
2019	73,457	1,256	5,860	0	0	419	65,922								73,457	1,256	5,860	0	0	419	65,922	73,457
2020	60,026	3,843	17,936	0	1,564	1,281	35,401								60,026	3,843	17,936	0	1,564	1,281	35,401	60,026
2021	183,977	10,408	50,175	0	1,140	3,469	118,785								183,977	10,408	50,175	0	1,140	3,469	118,785	183,977
2022	164,527	9,308	44,870	0	1,020	3,103	106,226								164,527	9,308	44,870	0	1,020	3,103	106,226	164,527
2023	250,000	14,143	68,181	0	1,550	4,714	161,412								250,000	14,143	68,181	0	1,550	4,714	161,412	250,000
2024	85,677	4,847	23,366	0	531	1,616	55,317	164,323	9,296	44,815	0	1,018	3,099	106,095	250,000	14,143	68,181	0	1,550	4,714	161,412	250,000
2025								250,000	14,143	68,181	0	1,550	4,714	161,412	250,000	14,143	68,181	0	1,550	4,714	161,412	250,000
2026								14,823	839	4,043	0	92	280	9,570	14,823	839	4,043	0	92	280	9,570	14,823
Total	1,447,541	104,735	506,236	13,060	6,281	34,912	782,318	429,146	24,278	117,038	0	2,660	8,093	277,077	1,876,687	129,013	623,275	13,060	8,941	43,004	1,059,395	1,876,687

Total Capacity - Existing	Total Capacity - Stage 9	Total Capacity
1,045,065 m^3	219,400 m^3	1,264,465 m^3

Notes:
Waste for the years 2009 to 2016 is an average of the Material Activity Report for the period of October 8, 2009 to October 9, 2016.
1. Includes 50,000 cubic metres of relocated waste from decommissioned Original Landfill Area. Due to the composition and age of this waste, it is assumed to be inert material with respect to current waste stream.
2. Actual waste totals used through **2022** (based on material reports in Attachment 1).
3. Projected waste totals for future years (**2023** to closure) based on percentages calculated in Table 2F for each waste type and a density of 1.956 tonnes per cubic metre.

Table 4

Methane Generation Model Input Values - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Enter the Landfill Open Year:	2009
Enter the Peak Year:	2026

Step 1 - Selection of rate constant (k) for bulk waste

		Bulk Waste k (yr^{-1})	C&D k (yr^{-1})
Option 1:	Mean annual precipitation less than 20 inches/year and landfill does not practice leachate recirculation	0.02	0.02
Option 2:	Mean annual precipitation between 20 - 40 inches/year and landfill does not practice leachate recirculation	0.038	0.03
Option 3:	Mean annual precipitation greater than 40 inches/year or landfill does practice leachate recirculation	0.057	0.04

Select option using criteria above (Enter 1, 2, or 3): **2**

Step 2 - Selection of rate constants (k) for categorized wastes

Waste Type	Option 1: Potential evapotranspiration rate exceeds mean annual precipitation and no leachate recirculation at landfill **k (yr^{-1})**	Option 2: Mean annual precipitation exceeds potential evapotranspiration rate or landfill practices leachate recirculation **k (yr^{-1})**
Food Waste	0.06	0.185
Garden Waste	0.05	0.1
Paper Waste	0.04	0.06
Wood & Straw	0.02	0.03
Textiles	0.04	0.06
Diapers	0.05	0.1
Sewage Sludge	0.06	0.185

Select option using criteria above (Enter 1 or 2): **2**

Step 3 - Selection of methane concentration (F) for landfill gas

If measured methane concentration is available, enter value as a percent by volume; if measured methane concentration is not available, use default value of 50%

Select methane concentration (F) using criteria above: **50** **%**

Notes:
DOC and k parameters above referenced from 40 CFR 98 Subpart HH, Table HH-1

Methane Generation Model - Bulk Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.31	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.038	yr^{-1}
Calculated L_o	0.1033	tonnes CH_4 / tonne waste

Year	Bulk Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	1,731	4
2010	7,520	16
2011	7,520	17
2012	7,520	18
2013	7,520	18
2014	7,520	19
2015	7,520	20
2016	7,520	21
2017	679	2
2018	5,877	17
2019	1,256	4
2020	3,843	12
2021	10,408	34
2022	9,308	32
2023	14,143	51
2024	14,143	52
2025	14,143	54

Total 2026 CH_4 Generated (tonnes): 392
Total 2026 CO_2 Equivalents Generated (tonnes): 9,796

Notes:
Methane generation from bulk waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Methane Generation Model - Construction and Demolition Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.08	(Construction & Demolition)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.03	yr^{-1}
Calculated L_o	0.0267	tonnes CH_4 / tonne waste

Year	C&D Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	8,399	4
2010	36,493	18
2011	36,493	19
2012	36,493	19
2013	36,493	20
2014	36,493	21
2015	36,493	21
2016	36,493	22
2017	4,065	3
2018	27,929	18
2019	5,860	4
2020	17,936	12
2021	50,175	35
2022	44,870	32
2023	68,181	51
2024	68,181	52
2025	68,181	54

Total 2026 CH_4 Generated (tonnes): 405
Total 2026 CO_2 Equivalents Generated (tonnes): 10,127

Notes:
Methane generation from C&D waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Table 7

Methane Generation Model - Sewage Sludge Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.05	(sewage sludge waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.185	yr^{-1}
Calculated L_o	0.0167	tonnes CH_4 / tonne waste

Year	Sewage Sludge Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	416	0
2010	1,806	0
2011	1,806	0
2012	1,806	0
2013	1,806	1
2014	1,806	1
2015	1,806	1
2016	1,806	1
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	0
2022	0	0
2023	0	0
2024	0	0
2025	0	0

Total 2026 CH_4 Generated (tonnes): 4
Total 2026 CO_2 Equivalents Generated (tonnes): 105

Notes:
Methane generation from sewage sludge based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Table 8

Methane Generation Model - Garden Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.2	(garden waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.1	yr^{-1}
Calculated L_o	0.0667	tonnes CH_4 / tonne waste

Year	Garden Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	15	0
2010	66	0
2011	66	0
2012	66	0
2013	66	0
2014	66	0
2015	66	0
2016	66	0
2017	0	0
2018	0	0
2019	0	0
2020	1,564	6
2021	1,140	5
2022	1,020	5
2023	1,550	8
2024	1,550	9
2025	1,550	10

Total 2026 CH_4 Generated (tonnes): 43
Total 2026 CO_2 Equivalents Generated (tonnes): 1,084

Notes:
Methane generation from garden waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Table 9

Methane Generation Model - Food Waste - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.15	(food waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.185	yr^{-1}
Calculated L_o	0.0500	tonnes CH_4 / tonne waste

Year	Food Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	577	0
2010	2,507	1
2011	2,507	2
2012	2,507	2
2013	2,507	2
2014	2,507	3
2015	2,507	3
2016	2,507	4
2017	226	0
2018	1,959	5
2019	419	1
2020	1,281	4
2021	3,469	14
2022	3,103	15
2023	4,714	27
2024	4,714	33
2025	4,714	40

Total 2026 CH_4 Generated (tonnes): 157
Total 2026 CO_2 Equivalents Generated (tonnes): 3,933

Notes:
Methane generation from food waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from 40 CFR 98 Subpart HH, Table HH-1

Table 10

Methane Generation Model - Totals - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open: 2009
Reporting Year: 2026

Waste Type	2026 CH_4 Generation (tonnes)
Bulk Waste	392
C&D	405
Sewage Sludge	4
Garden	43
Food	157
Inerts	0

Total 2026 CH_4 Generated (tonnes): 1,002
Total 2026 CO_2 Equivalents Generated (tonnes): 25,045

Threshold (tonnes): 100,000

Notes:
Methane generation from food waste based on calculation methodology in 40 CFR 98.343(a)(1). This table provides aggregate of all waste types.

Table 11

Methane Generation Adjusted for Methane Oxidation - Simulation 1
Predicted Methane Generation
Brooks Landfill Site, Cayuga, Ontario
Brooks Road Environmental

Calculation of methane generation, adjusted for oxidation, from the modelled CH_4, using Equation HH-5

$$MG = G_{CH\,4} * (1 - OX)$$

G_{CH4} =	Modelled methane generation rate =	1,001.8	tonnes CH_4 in 2026
SArea =	Surface area of the landfill =	60,703	square metres
MF =	Methane flux rate from the landfill =	45	g/m^2/day
OX =	Oxidation fraction =	0.1	(Landfill has 1 foot of interim cover; 6" of daily cover, option C4)

MG = 901.6 tonnes CH_4

MG = 22,540.2 tonnes CO_2 equivalent

Table HH-4 to Subpart HH of Part 98—Landfill Methane Oxidation Fractions

Under these conditions:	Use this landfill methane oxidation fraction:
I. For all reporting years prior to the 2013 reporting year	
C1: For all landfills regardless of cover type or methane flux	0.10
II. For the 2013 reporting year and all subsequent years	
C2: For landfills that have a geomembrane (synthetic) cover with less than 12 inches of cover soil for the majority of the landfill area containing waste	0.0
C3: For landfills that do not meet the conditions in C2 above, and for which you elect not to determine methane flux	0.10
C4: For landfills that do not meet the conditions in C2 above and that do not have a soil cover of at least 24 inches for a majority of the landfill area containing waste	0.10
C5: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is less than 10 grams per square meter per day ($g/m^2/d$)	0.35
C6: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is 10 to 70 $g/m^2/d$	0.25
C7: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is greater than 70 $g/m^2/d$	0.10

[a]Methane flux rate (in grams per square meter per day; $g/m^2/d$) is the mass flow rate of methane per unit area at the bottom of the surface soil prior to any oxidation and is calculated as follows:

Table 12

Methane Modelling Results - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated						Methane Collected						Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	1	1	0	0	0	2	0	0	0	0	0	1	439	178	260
2011	4	3	1	0	3	10	2	2	0	0	2	6	2,312	940	1,372
2012	6	6	1	0	4	18	4	4	1	0	3	11	4,045	1,645	2,400
2013	9	9	1	0	6	25	5	5	1	0	3	15	5,655	2,300	3,355
2014	11	12	2	0	7	32	7	7	1	0	4	19	7,157	2,910	4,246
2015	14	14	2	0	8	38	8	8	1	0	5	23	8,564	3,483	5,081
2016	16	16	2	0	9	44	10	10	1	0	5	26	9,886	4,020	5,866
2017	19	19	2	0	9	49	11	11	1	0	6	29	11,133	4,528	6,606
2018	18	19	2	0	8	47	11	11	1	0	5	28	10,581	4,303	6,278
2019	20	20	2	0	8	50	12	12	1	0	5	30	11,308	4,599	6,709
2020	19	20	1	0	7	48	12	12	1	0	4	29	10,922	4,442	6,481
2021	20	21	1	1	7	50	12	13	1	1	4	30	11,418	4,643	6,775
2022	23	24	1	2	9	59	14	15	1	1	5	35	13,397	5,448	7,949
2023	26	27	1	2	10	66	16	16	0	1	6	40	14,975	6,090	8,885
2024	31	32	1	3	12	78	18	19	0	2	7	47	17,682	7,191	10,491
2025	35	36	1	4	14	89	21	22	0	2	8	53	20,221	8,223	11,998
2026	39	40	0	4	16	100	23	24	0	3	9	60	22,609	9,195	13,415
2027	38	39	0	4	13	95	23	24	0	2	8	57	21,509	8,747	12,762
2028	36	38	0	4	11	90	22	23	0	2	7	54	20,316	8,262	12,054
2029	35	37	0	3	9	85	21	22	0	2	6	51	19,239	7,824	11,415
2030	34	36	0	3	8	80	20	22	0	2	5	48	18,262	7,426	10,835
2031	32	35	0	3	6	77	19	21	0	2	4	46	17,371	7,064	10,307
2032	31	34	0	2	5	73	19	20	0	1	3	44	16,555	6,732	9,823
2033	30	33	0	2	4	70	18	20	0	1	3	42	15,804	6,427	9,377
2034	29	32	0	2	4	67	17	19	0	1	2	40	15,109	6,144	8,965
2035	28	31	0	2	3	64	17	19	0	1	2	38	14,464	5,882	8,582
2036	27	30	0	2	3	61	16	18	0	1	2	37	13,862	5,637	8,225
2037	26	29	0	1	2	59	16	17	0	1	1	35	13,300	5,409	7,891
2038	25	28	0	1	2	56	15	17	0	1	1	34	12,772	5,194	7,578
2039	24	27	0	1	1	54	14	16	0	1	1	32	12,274	4,992	7,283
2040	23	27	0	1	1	52	14	16	0	1	1	31	11,805	4,801	7,004
2041	22	26	0	1	1	50	13	16	0	1	1	30	11,360	4,620	6,741
2042	21	25	0	1	1	48	13	15	0	1	0	29	10,939	4,448	6,490
2043	21	24	0	1	1	46	12	15	0	0	0	28	10,538	4,285	6,252
2044	20	24	0	1	1	45	12	14	0	0	0	27	10,156	4,130	6,026
2045	19	23	0	1	0	43	11	14	0	0	0	26	9,792	3,982	5,810
2046	18	22	0	1	0	42	11	13	0	0	0	25	9,444	3,840	5,603
2047	18	22	0	1	0	40	11	13	0	0	0	24	9,111	3,705	5,406
2048	17	21	0	0	0	39	10	13	0	0	0	23	8,792	3,575	5,216
2049	16	20	0	0	0	37	10	12	0	0	0	22	8,486	3,451	5,035
2050	16	20	0	0	0	36	9	12	0	0	0	22	8,192	3,332	4,861
2051	15	19	0	0	0	35	9	11	0	0	0	21	7,910	3,217	4,694
2052	15	19	0	0	0	34	9	11	0	0	0	20	7,640	3,107	4,533
2053	14	18	0	0	0	33	8	11	0	0	0	20	7,379	3,001	4,378
2054	14	18	0	0	0	31	8	11	0	0	0	19	7,128	2,899	4,230
2055	13	17	0	0	0	30	8	10	0	0	0	18	6,887	2,801	4,086
2056	13	16	0	0	0	29	8	10	0	0	0	18	6,655	2,706	3,948
2057	12	16	0	0	0	28	7	10	0	0	0	17	6,431	2,615	3,815
2058	12	16	0	0	0	27	7	9	0	0	0	16	6,215	2,527	3,687
2059	11	15	0	0	0	26	7	9	0	0	0	16	6,007	2,443	3,564
2060	11	15	0	0	0	26	6	9	0	0	0	15	5,806	2,361	3,445
2061	10	14	0	0	0	25	6	9	0	0	0	15	5,612	2,282	3,330
2062	10	14	0	0	0	24	6	8	0	0	0	14	5,425	2,206	3,219

Table 12

Methane Modelling Results - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated						Methane Collected						Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2063	10	13	0	0	0	23	6	8	0	0	0	14	5,245	2,133	3,112
2064	9	13	0	0	0	22	6	8	0	0	0	13	5,071	2,062	3,009
2065	9	13	0	0	0	22	5	8	0	0	0	13	4,903	1,994	2,909
2066	9	12	0	0	0	21	5	7	0	0	0	13	4,741	1,928	2,813
2067	8	12	0	0	0	20	5	7	0	0	0	12	4,584	1,864	2,720
2068	8	12	0	0	0	20	5	7	0	0	0	12	4,433	1,803	2,630
2069	8	11	0	0	0	19	5	7	0	0	0	11	4,286	1,743	2,543
2070	7	11	0	0	0	18	4	7	0	0	0	11	4,145	1,686	2,460
2071	7	11	0	0	0	18	4	6	0	0	0	11	4,009	1,630	2,379
2072	7	10	0	0	0	17	4	6	0	0	0	10	3,877	1,577	2,300
2073	7	10	0	0	0	17	4	6	0	0	0	10	3,750	1,525	2,225
2074	6	10	0	0	0	16	4	6	0	0	0	10	3,627	1,475	2,152
2075	6	9	0	0	0	15	4	6	0	0	0	9	3,508	1,426	2,081
2076	6	9	0	0	0	15	4	5	0	0	0	9	3,393	1,380	2,013
2077	6	9	0	0	0	14	3	5	0	0	0	9	3,282	1,335	1,947
2078	5	9	0	0	0	14	3	5	0	0	0	8	3,174	1,291	1,883
2079	5	8	0	0	0	14	3	5	0	0	0	8	3,071	1,249	1,822
2080	5	8	0	0	0	13	3	5	0	0	0	8	2,970	1,208	1,762
2081	5	8	0	0	0	13	3	5	0	0	0	8	2,873	1,169	1,705
2082	5	8	0	0	0	12	3	5	0	0	0	7	2,780	1,130	1,649
2083	5	7	0	0	0	12	3	4	0	0	0	7	2,689	1,094	1,596
2084	4	7	0	0	0	11	3	4	0	0	0	7	2,601	1,058	1,544
2085	4	7	0	0	0	11	3	4	0	0	0	7	2,517	1,023	1,493
2086	4	7	0	0	0	11	2	4	0	0	0	6	2,435	990	1,445
2087	4	7	0	0	0	10	2	4	0	0	0	6	2,356	958	1,398
2088	4	6	0	0	0	10	2	4	0	0	0	6	2,279	927	1,352
2089	4	6	0	0	0	10	2	4	0	0	0	6	2,205	897	1,308
2090	3	6	0	0	0	9	2	4	0	0	0	6	2,134	868	1,266
2091	3	6	0	0	0	9	2	3	0	0	0	5	2,064	839	1,225
2092	3	6	0	0	0	9	2	3	0	0	0	5	1,997	812	1,185
2093	3	5	0	0	0	9	2	3	0	0	0	5	1,933	786	1,147
2094	3	5	0	0	0	8	2	3	0	0	0	5	1,870	760	1,110
2095	3	5	0	0	0	8	2	3	0	0	0	5	1,809	736	1,074
2096	3	5	0	0	0	8	2	3	0	0	0	5	1,751	712	1,039
2097	3	5	0	0	0	7	2	3	0	0	0	4	1,694	689	1,005
2098	3	5	0	0	0	7	2	3	0	0	0	4	1,640	667	973

Table 12

Methane Modelling Results - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated						Methane Collected						Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Bulk Waste (cfm)	C&D (cfm)	Sewage Sludge (cfm)	Garden Waste (cfm)	Food Waste (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2099	2	5	0	0	0	7	1	3	0	0	0	4	1,587	645	941
2100	2	4	0	0	0	7	1	3	0	0	0	4	1,535	624	911
2101	2	4	0	0	0	7	1	3	0	0	0	4	1,486	604	882
2102	2	4	0	0	0	6	1	2	0	0	0	4	1,438	585	853
2103	2	4	0	0	0	6	1	2	0	0	0	4	1,391	566	826
2104	2	4	0	0	0	6	1	2	0	0	0	4	1,347	548	799
2105	2	4	0	0	0	6	1	2	0	0	0	3	1,303	530	773
2106	2	4	0	0	0	6	1	2	0	0	0	3	1,261	513	748
2107	2	4	0	0	0	5	1	2	0	0	0	3	1,221	496	724
2108	2	3	0	0	0	5	1	2	0	0	0	3	1,181	480	701
2109	2	3	0	0	0	5	1	2	0	0	0	3	1,143	465	678
2110	2	3	0	0	0	5	1	2	0	0	0	3	1,107	450	657
2111	2	3	0	0	0	5	1	2	0	0	0	3	1,071	436	636
2112	1	3	0	0	0	5	1	2	0	0	0	3	1,037	422	615
2113	1	3	0	0	0	4	1	2	0	0	0	3	1,003	408	595
2114	1	3	0	0	0	4	1	2	0	0	0	3	971	395	576
2115	1	3	0	0	0	4	1	2	0	0	0	2	940	382	558
2116	1	3	0	0	0	4	1	2	0	0	0	2	910	370	540
2117	1	3	0	0	0	4	1	2	0	0	0	2	881	358	523
2118	1	3	0	0	0	4	1	2	0	0	0	2	853	347	506
2119	1	2	0	0	0	4	1	1	0	0	0	2	825	336	490
2120	1	2	0	0	0	4	1	1	0	0	0	2	799	325	474
2121	1	2	0	0	0	3	1	1	0	0	0	2	773	315	459
2122	1	2	0	0	0	3	1	1	0	0	0	2	749	304	444
2123	1	2	0	0	0	3	1	1	0	0	0	2	725	295	430
2124	1	2	0	0	0	3	1	1	0	0	0	2	702	285	416
2125	1	2	0	0	0	3	1	1	0	0	0	2	679	276	403
2126	1	2	0	0	0	3	1	1	0	0	0	2	657	267	390
2127	1	2	0	0	0	3	1	1	0	0	0	2	637	259	378
2128	1	2	0	0	0	3	0	1	0	0	0	2	616	251	366
2129	1	2	0	0	0	3	0	1	0	0	0	2	597	243	354

Cost Analysis - Utility Flare - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Capital Costs

Direct Costs		
Utility Flare	$100,000	(estimated)
(includes enclosed stack, control panel/ instrumentation, and blower skid/ mechanical components)		
Auxiliary Equipment	$6,000	(6% of Flare System Costs)
Equipment Cost ($) ……	$106,000	
Sales Tax	$3,180	(3% of Equipment Cost)
Freight	$5,300	(5%of Equiment Cost)
Purchased Equipment Cost (PEC) ($) ……	$114,480	
Direct Installation Costs		
Foundations & Supports	$13,738	12% of PEC
Handling & Erection	$45,792	40% of PEC
Electrical	$1,145	1% of PEC
Piping	$2,290	2% of PEC
Insulation	$1,145	1% of PEC
Painting	$1,145	1% of PEC
Direct Installation Cost ($)	$65,254	
Site Preparation	$0	
Facilities & Buildings	$0	
Total Direct Costs, DC ($) ……	$179,734	
Indirect Costs, IC		
Engineering	$11,448	10% of PEC
Construction and Field Expenses	$11,448	10% of PEC
Contractor Fees	$11,448	10% of PEC
Start-up	$1,145	1% of PEC
Performance Test	$1,145	1% of PEC
Contingencies	$3,434	3% of PEC
Total Indirect Costs, IC	$40,068	
Total Capital Investment (TCI) ($) ……	$219,802	

Table 13

Cost Analysis - Utility Flare - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Annual Cost Inputs

Operating factor (hr/yr):		8,760	100% operation capacity
Annual interest rate (fraction):		0.05	
Project life (years):		30	
Capital recovery factor:		0.06505	
Flare Operator Labor Rate	$	30.00	/ hour
Maintenance Labor Rate	$	33.00	/ hour

Direct Annual Costs

Operator labor costs	$18,900	630 hours/year
Supervisor	$2,835	(15% of Operator labor)
Maintenance Labor	$18,068	(0.5 hr per shift)
Maintenance Materials	$18,068	(100% of Maintenance Labor)
Utilities		
Electricity	$33,328	(30 hp blower; $0.17/kw-hr)
Propane	$1,000	(estimated)

Total Direct Costs, DC ($) …… $92,198

Indirect Annual Costs, IC

Overhead	$34,722	(60% of labor % material costs)
Administrative Charges	$4,396	2% of TCI
Property Tax	$2,198	1% of TCI
Insurance	$2,198	1% of TCI
Capital Recovery	$14,298	

Total Indirect Costs, IC ($) …… $57,812

Total Annual Costs ($) …… $150,011

Notes:
Cost assumptions and recommendations were referenced from the EPA Air Pollution Cost Control Manual, Sixth Edition (January 2002).

Cost Analysis - Installation of Gas Collection System - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Capital Costs

Direct Costs		
Installation of Gas Collection System	$450,000	($30,000 per acre)
Equipment Cost ($) ……	$450,000	
Sales Tax	$13,500	(3% of Equipment Cost)
Freight	$22,500	(5% of Equiment Cost)
Purchased Equipment Cost (PEC) ($) ……	$486,000	
Direct Installation Costs		
Foundations & Supports	$58,320	12% of PEC
Handling & Erection	$194,400	40% of PEC
Electrical	$4,860	1% of PEC
Piping	$9,720	2% of PEC
Insulation	$4,860	1% of PEC
Painting	$4,860	1% of PEC
Direct Installation Cost ($)	$277,020	
Site Preparation	$0	
Facilities & Buildings	$0	
Total Direct Costs, DC ($) ……	$763,020	
Indirect Costs, IC		
Engineering	$48,600	10% of PEC
Construction and Field Expenses	$48,600	10% of PEC
Contractor Fees	$48,600	10% of PEC
Start-up	$4,860	1% of PEC
Performance Test	$4,860	1% of PEC
Contingencies	$14,580	3% of PEC
Total Indirect Costs, IC	$170,100	
Total Capital Investment (TCI) ($) ……	$933,120	

Cost Analysis - Installation of Gas Collection System - Simulation 1
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Annual Cost Inputs

Operating factor (hr/yr):	8,760	100% operation capacity
Annual interest rate (fraction):	0.05	
Project life (years):	30	
Capital recovery factor:	0.06505	
Direct Annual Costs		
Operating Costs	$61,500	($4,100 per acre)
Total Direct Costs, DC ($) ……	$61,500	
Indirect Annual Costs, IC		
Capital Recovery	$60,701	
Operating Costs	$61,500	
Total Indirect Costs, IC ($) ……	$122,201	
Total Annual Costs ($) ……	$183,701	

Notes:
Cost assumptions and recommendations were referenced from the EPA Air Pollution Cost Control Manual, Sixth Edition (January 2002).

Table 15

Methane Generation Model - Bulk Waste (2009-2014) - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.21	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.045	yr^{-1}
Calculated L_o	0.0700	tonnes CH_4 / tonne waste

Year	Putrescible Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2009	11,137	17
2010	48,393	76
2011	48,393	79
2012	48,393	83
2013	48,393	87
2014	48,393	91

Total 2026 CH_4 Generated (tonnes): 433
Total 2026 CO_2 Equivalents Generated (tonnes): 10,819

Notes:
Methane generation for putrescible waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from National Inventory Report 1990 – 2018: Greenhouse Gas Sources and Sinks in Canada.

Methane Generation Model - Bulk Waste (2015-2024) - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.18	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.045	yr^{-1}
Calculated L_o	0.0600	tonnes CH_4 / tonne waste

Year	Putrescible Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)
2015	48,393	81
2016	48,393	85
2017	4,971	9
2018	35,765	69
2019	7,535	15
2020	24,625	52
2021	65,193	144
2022	58,300	134
2023	88,588	214
2024	88,588	224
2025	88,588	234

Total 2026 CH_4 Generated (tonnes): 1,261
Total 2026 CO_2 Equivalents Generated (tonnes): 31,533

Notes:
Methane generation for putrescible waste based on calculation methodology in 40 CFR 98.343(a)(1). DOC and k values referenced from National Inventory Report 1990 – 2018: Greenhouse Gas Sources and

Methane Generation Model - Bulk Waste (2015-2024) - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open:	2009	
Peak Year:	2026	
MCF:	1.0	(default value)
DOC:	0.18	(bulk waste)
DOC_F:	0.5	(default value)
F:	0.5	
k:	0.045	yr^{-1}
Calculated L_o	0.0600	tonnes CH_4 / tonne waste

Year	Putrescible Waste Disposed (tonnes of waste disposed)	Contribution to 2026 Generation (tonnes of CH_4 Generated)

Sinks in Canada.

Methane Generation Model - Totals - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

Landfill Year Open: 2009
Reporting Year: 2026

Waste Type	2026 CH_4 Generation (tonnes)
2009-2014	433
2015-2024	1,261

Total 2026 CH_4 Generated (tonnes): 1,694
Total 2026 CO_2 Equivalents Generated (tonnes): 42,352

Threshold (tonnes): 100,000

Notes:
Methane generation from food waste based on calculation methodology in 40 CFR 98.343(a)(1). This table provides aggregate of all waste types.

Table 18

Methane Generation Adjusted for Methane Oxidation - Simulation 2
Predicted Methane Generation
Brooks Landfill Site, Cayuga, Ontario
Brooks Road Environmental

Calculation of methane generation, adjusted for oxidation, from the modelled CH_4, using Equation HH-5

$$MG = G_{CH\,4} * (1 - OX)$$

G_{CH4} =	Modelled methane generation rate =	1,694.1	tonnes CH_4 in 2026
SArea =	Surface area of the landfill =	60,703	square metres
MF =	Methane flux rate from the landfill =	76	g/m^2/day
OX =	Oxidation fraction =	0.1	(Landfill has 1 foot of interim cover; 6" of daily cover, option C4)

MG = 1,524.7 tonnes CH_4

MG = 38,116.8 tonnes CO_2 equivalents

Table HH-4 to Subpart HH of Part 98—Landfill Methane Oxidation Fractions

Under these conditions:	Use this landfill methane oxidation fraction:
I. For all reporting years prior to the 2013 reporting year	
C1: For all landfills regardless of cover type or methane flux	0.10
II. For the 2013 reporting year and all subsequent years	
C2: For landfills that have a geomembrane (synthetic) cover with less than 12 inches of cover soil for the majority of the landfill area containing waste	0.0
C3: For landfills that do not meet the conditions in C2 above, and for which you elect not to determine methane flux	0.10
C4: For landfills that do not meet the conditions in C2 above and that do not have a soil cover of at least 24 inches for a majority of the landfill area containing waste	0.10
C5: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is less than 10 grams per square meter per day ($g/m^2/d$)	0.35
C6: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is 10 to 70 $g/m^2/d$	0.25
C7: For landfills that have a soil cover of at least 24 inches for a majority of the landfill area containing waste and for which the methane flux rate is greater than 70 $g/m^2/d$	0.10

Table 19

Methane Modelling Results - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated			Methane Collected			Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2009	0		0	0	0	0	0	0	0
2010	3		3	2	0	2	774	315	459
2011	18		18	11	0	11	4,101	1,668	2,433
2012	32		32	19	0	19	7,282	2,961	4,321
2013	45		45	27	0	27	10,323	4,198	6,125
2014	58		58	35	0	35	13,230	5,380	7,850
2015	71	0	71	42	0	42	16,010	6,511	9,499
2016	67	13	80	40	8	48	18,186	7,396	10,791
2017	64	25	89	39	15	54	20,267	8,242	12,025
2018	62	25	87	37	15	52	19,672	8,000	11,672
2019	59	33	92	35	20	55	20,935	8,514	12,422
2020	56	34	90	34	20	54	20,463	8,322	12,141
2021	54	39	93	32	23	56	21,028	8,552	12,477
2022	51	54	106	31	33	63	23,985	9,754	14,231
2023	49	67	116	30	40	70	26,400	10,736	15,664
2024	47	87	134	28	52	81	30,513	12,409	18,104
2025	45	107	152	27	64	91	34,445	14,008	20,437
2026	43	125	168	26	75	101	38,203	15,536	22,667
2027	41	121	162	25	73	97	36,835	14,980	21,855
2028	39	116	155	24	70	93	35,214	14,320	20,894
2029	38	111	148	23	66	89	33,665	13,690	19,974
2030	36	106	142	22	64	85	32,183	13,088	19,095
2031	34	101	136	21	61	81	30,767	12,512	18,255
2032	33	97	130	20	58	78	29,413	11,961	17,452
2033	31	93	124	19	56	74	28,119	11,435	16,684
2034	30	88	118	18	53	71	26,882	10,932	15,950
2035	29	85	113	17	51	68	25,699	10,451	15,248
2036	27	81	108	16	49	65	24,568	9,991	14,577
2037	26	77	104	16	46	62	23,487	9,551	13,936
2038	25	74	99	15	44	59	22,454	9,131	13,322
2039	24	71	95	14	42	57	21,466	8,729	12,736
2040	23	68	90	14	41	54	20,521	8,345	12,176
2041	22	65	86	13	39	52	19,618	7,978	11,640
2042	21	62	83	13	37	50	18,755	7,627	11,128
2043	20	59	79	12	35	47	17,930	7,291	10,638
2044	19	56	76	11	34	45	17,141	6,971	10,170
2045	18	54	72	11	32	43	16,386	6,664	9,723
2046	17	52	69	10	31	41	15,665	6,371	9,295
2047	17	49	66	10	30	40	14,976	6,090	8,886
2048	16	47	63	10	28	38	14,317	5,822	8,495
2049	15	45	60	9	27	36	13,687	5,566	8,121
2050	15	43	58	9	26	35	13,085	5,321	7,764
2051	14	41	55	8	25	33	12,509	5,087	7,422
2052	13	39	53	8	24	32	11,959	4,863	7,095
2053	13	38	50	8	23	30	11,432	4,649	6,783

Table 19

Methane Modelling Results - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated			Methane Collected			Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2054	12	36	48	7	22	29	10,929	4,445	6,485
2055	12	34	46	7	21	28	10,448	4,249	6,199
2056	11	33	44	7	20	26	9,989	4,062	5,927
2057	11	31	42	6	19	25	9,549	3,883	5,666
2058	10	30	40	6	18	24	9,129	3,712	5,417
2059	10	29	38	6	17	23	8,727	3,549	5,178
2060	9	27	37	6	16	22	8,343	3,393	4,950
2061	9	26	35	5	16	21	7,976	3,244	4,732
2062	9	25	34	5	15	20	7,625	3,101	4,524
2063	8	24	32	5	14	19	7,290	2,964	4,325
2064	8	23	31	5	14	18	6,969	2,834	4,135
2065	7	22	29	4	13	18	6,662	2,709	3,953
2066	7	21	28	4	13	17	6,369	2,590	3,779
2067	7	20	27	4	12	16	6,089	2,476	3,613
2068	6	19	26	4	11	15	5,821	2,367	3,454
2069	6	18	25	4	11	15	5,565	2,263	3,302
2070	6	18	23	4	11	14	5,320	2,163	3,156
2071	6	17	22	3	10	13	5,086	2,068	3,018
2072	5	16	21	3	10	13	4,862	1,977	2,885
2073	5	15	20	3	9	12	4,648	1,890	2,758
2074	5	15	20	3	9	12	4,444	1,807	2,636
2075	5	14	19	3	8	11	4,248	1,728	2,520
2076	5	13	18	3	8	11	4,061	1,652	2,410
2077	4	13	17	3	8	10	3,882	1,579	2,304
2078	4	12	16	2	7	10	3,712	1,509	2,202
2079	4	12	16	2	7	9	3,548	1,443	2,105
2080	4	11	15	2	7	9	3,392	1,379	2,013
2081	4	11	14	2	6	9	3,243	1,319	1,924
2082	3	10	14	2	6	8	3,100	1,261	1,839
2083	3	10	13	2	6	8	2,964	1,205	1,758
2084	3	9	12	2	6	7	2,833	1,152	1,681
2085	3	9	12	2	5	7	2,709	1,102	1,607
2086	3	9	11	2	5	7	2,589	1,053	1,536
2087	3	8	11	2	5	7	2,476	1,007	1,469
2088	3	8	10	2	5	6	2,367	962	1,404
2089	3	7	10	2	4	6	2,262	920	1,342
2090	2	7	10	1	4	6	2,163	880	1,283
2091	2	7	9	1	4	5	2,068	841	1,227
2092	2	7	9	1	4	5	1,977	804	1,173
2093	2	6	8	1	4	5	1,890	769	1,121
2094	2	6	8	1	4	5	1,807	735	1,072
2095	2	6	8	1	3	5	1,727	702	1,025
2096	2	5	7	1	3	4	1,651	671	980
2097	2	5	7	1	3	4	1,578	642	937
2098	2	5	7	1	3	4	1,509	614	895

Table 19

Methane Modelling Results - Simulation 2
Predicted Methane Generation
Brooks Road Landfill, Cayuga, Ontario
Brooks Road Environmental

	Methane Generated			Methane Collected			Option 1: No Collection System	Option 2: With Collection System	Option 2: With Collection System
Year	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Bulk Waste 1 (cfm)	Bulk Waste 2 (cfm)	Total (cfm)	Methane Emissions (tonnes CO2e/yr)	Methane Emissions (tonnes CO2e/yr)	Methane Reduction (tonnes CO2e/yr)
2099	2	5	6	1	3	4	1,443	587	856
2100	2	5	6	1	3	4	1,379	561	818
2101	1	4	6	1	3	3	1,318	536	782
2102	1	4	6	1	2	3	1,260	513	748
2103	1	4	5	1	2	3	1,205	490	715
2104	1	4	5	1	2	3	1,152	468	683
2105	1	4	5	1	2	3	1,101	448	653
2106	1	3	5	1	2	3	1,053	428	625
2107	1	3	4	1	2	3	1,006	409	597
2108	1	3	4	1	2	3	962	391	571
2109	1	3	4	1	2	2	920	374	546
2110	1	3	4	1	2	2	879	358	522
2111	1	3	4	1	2	2	841	342	499
2112	1	3	4	1	2	2	804	327	477
2113	1	3	3	1	2	2	768	312	456
2114	1	2	3	0	1	2	735	299	436
2115	1	2	3	0	1	2	702	286	417
2116	1	2	3	0	1	2	671	273	398
2117	1	2	3	0	1	2	642	261	381
2118	1	2	3	0	1	2	614	249	364
2119	1	2	3	0	1	2	587	239	348
2120	1	2	2	0	1	1	561	228	333
2121	1	2	2	0	1	1	536	218	318
2122	1	2	2	0	1	1	512	208	304
2123	1	2	2	0	1	1	490	199	291
2124	1	2	2	0	1	1	468	190	278
2125	0	1	2	0	1	1	448	182	266
2126	0	1	2	0	1	1	428	174	254
2127	0	1	2	0	1	1	409	166	243
2128	0	1	2	0	1	1	391	159	232
2129	0	1	2	0	1	1	374	152	222

Attachment 1

Material Activity Reports

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2016 to December 31, 2016
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	17,493.87	0.00 MT	0.00	0.00 YD	0.00	0.00	17,493.87 MT	$700,469.29	$91,061.53	$791,530.82	1006	
C&D	12.50	0.00 MT	0.00	0.00 YD	0.00	0.00	12.50 MT	$812.50	$105.63	$918.13	1	
Contaminated Soil	22,832.15	0.00 MT	0.00	0.00 YD	0.00	0.00	22,832.15 MT	$603,137.57	$77,149.33	$680,286.90	716	
Asbestos	11.53	0.00 MT	0.00	0.00 YD	0.00	0.00	11.53 MT	$2,594.25	$337.25	$2,931.50	2	
Demo/brick/block	790.55	0.00 MT	0.00	0.00 YD	0.00	0.00	790.55 MT	$28,723.60	$3,734.05	$32,457.65	63	
	41,140.60	0.00 MT	0.00	0.00 YD	0.00	0.00	41,140.60 MT	$1,335,737.21	$172,387.79	$1,508,125.00	1788	1788

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2017 to December 31, 2017
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	4,529.59	0.00 MT	0.00	0.00 YD	0.00	0.00	4,529.59 MT	$171,789.47	$22,332.69	$194,122.16	245	
Contaminated Soil	13,478.45	0.00 MT	0.00	0.00 YD	0.00	0.00	13,478.45 MT	$335,226.82	$43,579.84	$378,806.66	432	
Demo/brick/block	894.28	0.00 MT	0.00	0.00 YD	0.00	0.00	894.28 MT	$32,505.24	$4,225.68	$36,730.92	68	
	18,902.32	0.00 MT	0.00	0.00 YD	0.00	0.00	18,902.32 MT	$539,521.53	$70,138.21	$609,659.74	745	745

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2018 to December 31, 2018
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	39,179.67	0.00 MT	0.00	0.00 YD	0.00	0.00	39,179.67 MT	$1,447,045.85	$188,116.40	$1,635,162.25	1748	
Contaminated Soil	19,122.72	0.00 MT	0.00	0.00 YD	0.00	0.00	19,122.72 MT	$426,024.57	$55,383.23	$481,407.80	585	
Asbestos	82.87	0.00 MT	0.00	0.00 YD	0.00	0.00	82.87 MT	$14,916.60	$1,939.16	$16,855.76	31	
Demo/brick/block	503.70	0.00 MT	0.00	0.00 YD	0.00	0.00	503.70 MT	$17,196.41	$2,235.55	$19,431.96	39	
	58,888.96	0.00 MT	0.00	0.00 YD	0.00	0.00	58,888.96 MT	$1,905,183.43	$247,674.34	$2,152,857.77	2403	2403

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2019 to December 31, 2019
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	8,371.84	0.00 MT	0.00	0.00 YD	0.00	0.00	8,371.84 MT	$339,391.67	$44,121.06	$383,512.73	532	
Contaminated Soil	65,084.88	0.00 MT	0.00	0.00 YD	0.00	0.00	65,084.88 MT	$1,448,021.78	$188,242.99	$1,636,264.77	1689	
	73,456.72	0.00 MT	0.00	0.00 YD	0.00	0.00	73,456.72 MT	$1,787,413.45	$232,364.05	$2,019,777.50	2221	2221

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2020 to December 31, 2020
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	25,622.69	0.00 MT	0.00	0.00 YD	0.00	0.00	25,622.69 MT	$1,056,662.22	$137,366.34	$1,194,028.56	1453	
Shingles	2,382.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,382.12 MT	$71,463.60	$9,290.31	$80,753.91	68	
Contaminated Soil	30,410.29	0.00 MT	0.00	0.00 YD	0.00	0.00	30,410.29 MT	$898,652.30	$116,825.14	$1,015,477.44	719	
Asbestos	45.94	0.00 MT	0.00	0.00 YD	0.00	0.00	45.94 MT	$6,891.00	$895.85	$7,786.85	5	
Wood	1,564.47	0.00 MT	0.00	0.00 YD	0.00	0.00	1,564.47 MT	$46,934.10	$6,101.47	$53,035.57	46	
	60,025.51	0.00 MT	0.00	0.00 YD	0.00	0.00	60,025.51 MT	$2,080,603.22	$270,479.11	$2,351,082.33	2291	2291

Summary Material Activity Report

All Ticket Types
History and Waiting
* - Confirmed Qty Applied to Billing

October 08, 2009 to October 09, 2016
All Materials

All Facilities

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	350,951.53	0.00 MT	0.00	0.00 YD	21,440.00	0.00	350,951.53 MT	$13,407,183.54	$1,632,115.30	15,039,298.84	17867	
C&D	5,514.35	0.00 MT	0.00	0.00 YD	0.00	0.00	5,514.35 MT	$165,093.44	$19,760.71	$184,854.15	238	
Shingles	15,876.78	0.00 MT	0.00	0.00 YD	0.00	0.00	15,876.78 MT	$453,567.55	$39,846.11	$493,413.66	427	
Contaminated Soil	87,691.42	19.24 MT	0.00	0.00 YD	68,450.00	0.00	87,710.66 MT	$1,960,418.49	$227,003.64	$2,187,422.13	2903	
Sludge	12,644.03	0.00 MT	0.00	0.00 YD	0.00	0.00	12,644.03 MT	$288,658.61	$22,780.75	$311,439.36	310	
Yard Waste	461.11	1,308.44 MT	0.00	0.00 YD	0.00	0.00	1,769.55 MT	$8,299.98	$1,079.02	$9,379.00	47	
Asbestos	5,398.30	0.00 MT	0.00	0.00 YD	0.00	0.00	5,398.30 MT	$938,551.27	$121,539.09	$1,060,090.36	1219	
Demolition	105.44	0.00 MT	0.00	0.00 YD	0.00	0.00	105.44 MT	$3,780.65	$189.03	$3,969.68	4	
Demo/brick/block	2,112.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,112.12 MT	$67,203.57	$7,973.54	$75,177.11	125	
Clay	0.00	40,000.00 MT	0.00	0.00 YD	0.00	0.00	40,000.00 MT	$180,000.00	$23,400.00	$203,400.00	2	
Leachate	(123.20)	18,781.94 MT	0.00	0.00 YD	0.00	0.00	18,658.74 MT	$0.00	$0.00	$0.00	500	
Tire Fluff	770.67	0.00 MT	0.00	0.00 YD	0.00	0.00	770.67 MT	$20,181.42	$2,623.59	$22,805.01	63	
Salt Cake	233.14	0.00 MT	0.00	0.00 YD	0.00	0.00	233.14 MT	$8,159.90	$1,060.79	$9,220.69	6	
Ash	2,289.55	0.00 MT	0.00	0.00 YD	0.00	0.00	2,289.55 MT	$59,528.30	$7,738.67	$67,266.97	68	
C&D/Roofing/Shingles	2,056.40	0.00 MT	0.00	0.00 YD	0.00	0.00	2,056.40 MT	$52,586.06	$3,459.97	$56,046.03	88	
	485,981.64	60,109.62 MT	0.00	0.00 YD	9,890.00	0.00	546,091.26 MT	$17,613,212.78	$2,110,570.21	$19,723,782.99	23867	23867

Material Summary	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Quantity	Material Total	Tax Total	Total
Waste	350,951.53	0.00 MT	0.00	0.00 YD	21,440.00	0.00	350,951.53 MT	407,183.54	2,115.30	39,298.84
C&D	5,514.35	0.00 MT	0.00	0.00 YD	0.00	0.00	5,514.35 MT	165,093.44	9,760.71	84,854.15
Shingles	15,876.78	0.00 MT	0.00	0.00 YD	0.00	0.00	15,876.78 MT	453,567.55	9,846.11	93,413.66
Contaminated Soil	87,691.42	19.24 MT	0.00	0.00 YD	68,450.00	0.00	87,710.66 MT	960,418.49	7,003.64	87,422.13
Sludge	12,644.03	0.00 MT	0.00	0.00 YD	0.00	0.00	12,644.03 MT	288,658.61	2,780.75	11,439.36
Yard Waste	461.11	1,308.44 MT	0.00	0.00 YD	0.00	0.00	1,769.55 MT	$8,299.98	1,079.02	$9,379.00
Asbestos	5,398.30	0.00 MT	0.00	0.00 YD	0.00	0.00	5,398.30 MT	938,551.27	1,539.09	60,090.36
Demolition	105.44	0.00 MT	0.00	0.00 YD	0.00	0.00	105.44 MT	$3,780.65	$189.03	$3,969.68
Demo/brick/block	2,112.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,112.12 MT	67,203.57	7,973.54	75,177.11
Clay	0.00	40,000.00 MT	0.00	0.00 YD	0.00	0.00	40,000.00 MT	180,000.00	3,400.00	03,400.00
Leachate	(123.20)	18,781.94 MT	0.00	0.00 YD	0.00	0.00	18,658.74 MT	$0.00	$0.00	$0.00
Tire Fluff	770.67	0.00 MT	0.00	0.00 YD	0.00	0.00	770.67 MT	20,181.42	2,623.59	22,805.01
Salt Cake	233.14	0.00 MT	0.00	0.00 YD	0.00	0.00	233.14 MT	$8,159.90	1,060.79	$9,220.69
Ash	2,289.55	0.00 MT	0.00	0.00 YD	0.00	0.00	2,289.55 MT	59,528.30	7,738.67	67,266.97
C&D/Roofing/Shingles	2,056.40	0.00 MT	0.00	0.00 YD	0.00	0.00	2,056.40 MT	52,586.06	3,459.97	56,046.03

All Ticket Types
History and Waiting

Summary Material Activity Report

January 01, 2016 to December 31, 2020
All Materials
All Facilities

* - Confirmed Qty Applied to Billing

Material	Weight Inbound	Weight Outbound	Volume Inbound	Volume Outbound	Count Inbound	Count Outbound	Billing Qty	Material Total	Tax Total	Total	Item Count	Ticket Count
Waste	95,197.66	0.00 MT	0.00	0.00 YD	0.00	0.00	95,197.66 MT	$3,715,358.50	$482,998.02	$4,198,356.52	4984	
C&D	12.50	0.00 MT	0.00	0.00 YD	0.00	0.00	12.50 MT	$812.50	$105.63	$918.13	1	
Shingles	2,382.12	0.00 MT	0.00	0.00 YD	0.00	0.00	2,382.12 MT	$71,463.60	$9,290.31	$80,753.91	68	
Contaminated Soil	150,928.49	0.00 MT	0.00	0.00 YD	0.00	0.00	150,928.49 MT	$3,711,063.04	$481,180.53	$4,192,243.57	4141	
Asbestos	140.34	0.00 MT	0.00	0.00 YD	0.00	0.00	140.34 MT	$24,401.85	$3,172.26	$27,574.11	38	
Wood	1,564.47	0.00 MT	0.00	0.00 YD	0.00	0.00	1,564.47 MT	$46,934.10	$6,101.47	$53,035.57	46	
Demo/brick/block	2,188.53	0.00 MT	0.00	0.00 YD	0.00	0.00	2,188.53 MT	$78,425.25	$10,195.28	$88,620.53	170	
	252,414.11	0.00 MT	0.00	0.00 YD	0.00	0.00	252,414.11 MT	$7,648,458.84	$993,043.50	$8,641,502.34	9448	9448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Appendix B

Sample Odour Inspection Sheet

Appendix B

Odour Management Plan

Odour Inspection Sheet

Inspection Completed by: _____ **Date:** _____ **Time:** _____

General Description of Weather Conditions: (Temperature, Wind speed and direction, precipitation, humidity) _____

General Description of Site Activity (make note of any activity that is abnormal): _____

Area Inspected	Was the area in good working condition?	Were any odours detected?	Is any mitigation or contingency action required? (1)	Person responsible for initiating corrective action	Notes
Waste Receiving					
Landfill Working Face					
Leachate Collection and Treatment System					
Covered Portions of Landfill					

Note: If a mitigation or contingency measure that is implemented and not listed in Section 7 or 8 of the OMP, the OMP will be required to be updated.

(1) Refer to OMP for Mitigation Measures and Contingency Actions

Appendix C

Complaint Protocol

Brooks Road Environmental

Brooks Road Landfill Site Vertical Capacity Expansion

Complaint Protocol

Brooks Road Landfill

160 Brooks Road Haldimand County, Ontario

May 2020 (Revised)
REF. NO. 018235 (94)

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Table of Contents

List of Appendices

1. Introduction

1.1 Purpose and Background

This document describes the Complaint Protocol prepared in accordance with Condition No. 6 of the Minister of Environment, Conservation and Parks' (Minister) Notice of Approval to Proceed with the Undertaking. The Minister approved the EA for the Brooks Road Landfill Site Vertical Capacity Expansion on February 14, 2019.

The Notice of Approval, issued under Section 9 of the *Environmental Assessment Act*, gives Brooks Road the approval to proceed with the proposed vertical expansion of the waste disposal capacity of the Brooks Road Landfill Site, subject to the conditions set out in it. With this in mind, the Minister's Notice of Approval specified the following compliance monitoring and reporting related conditions:

6. Complaints Protocol

6.1 The Proponent shall prepare and Implement a complaint protocol that sets out provisions for dealing with and responding to inquiries and complaints during all stages of the Undertaking. The complaint protocol shall include a procedure for notifying the Ministry's Hamilton District Office for the complaints received.

6.2 The Proponent shall submit the complaint protocol to the Director for approval and for the public record within one year from the Date of Approval, or 60 days before the start of Construction, whichever is earlier, or by another date agreed upon by the director.

6.3 The Director may require the Proponent to amend the complaint protocol at any time. Should an amendment be required, the Director shall notify the proponent in writing of the amendment required and when the amendment must be completed.

6.4 The Proponent shall submit the amended complaint protocol to the Director within the time period specified by the Director.

6.5 The Proponent shall implement the complaint protocol and any amendments to it.

6.6 The Proponent shall provide a summary on the complaints received and how they were addressed as part of the annual compliance reporting (Condition 5) and post the summary on the website as part of the public record.

In addition, the following conditions are included in the Amended Environmental Compliance Approval No. A110302:

9. Complaints Response Procedure

(1) If at any time the Owner receives complaints regarding the operation of the Site, the Owner shall respond to these complaints according to the following procedure:

a. The Owner shall record and number each complaint, either electronically or in a log book, and shall include the following information: the nature of the complaint, the

name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;

b. The Owner, upon notification of the complaint, shall initiate appropriate steps to determine possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint. When possible, the Owner will forward a written reply to the complainant; and

c. The Owner shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

11. Public Liaison Committee (PLC)

(1) The Owner/Operator shall maintain and participate in a landfill PLC, which shall function in accordance with the Terms of Reference for the PLC, as amended from time to time. Any amendment to the Terms of Reference must be approved by the District Manager. The PLC shall serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the landfill Site, including environmental monitoring, maintenance, complaint resolution, and new approvals or amendments to existing approvals related to the operation of this landfill Site.

With these EA and ECA conditions in mind, Section 2 provides details on the complaints procedure that is in place at the Site, including complaint documentation and issues resolutions mechanisms, and Section 3 outlines the complaint reporting process.

2. Complaints Procedure

The purpose of this procedure is to establish a clear process for residents to voice any concerns they may have with respect to operating issues at the Site. This Public Complaint Procedure is an update to the currently approved procedure dated December 2004. The following steps outline the various avenues the public may follow to lodge any complaint resulting from operations at the Site:

1. During regular hours of operation, 7:00 am to 5:00 pm (Monday to Friday) any complaints should be made directly to the Site by calling 1-888-40-BRENV (27368) or 416-389-8876. The Site Supervisor on duty at the time will ensure the issue is dealt with immediately. Alternatively, complainants may choose to visit the Site in person and speak directly to the Site Supervisor during the above noted regular hours, provided the Site is not closed between these hours. Upon entering the Site, the complainant shall check-in at the scale house.
2. Outside regular hours of operation, a voice message can be left at 1-888-40-BRENV (27368) or 416-389-8876. In cases of emergency, residents should call 911 so that appropriate action(s) can be taken
3. When making a complaint, residents should be prepared to provide the following information

    i) Date and time

ii) Resident's name

iii) Resident's address

iv) Location relative to the Site

v) Contact information (email address is preferred for follow-up purposes)

vi) Nature of the complaint

vii) Weather conditions at the time of the complaint

Each complaint will be assigned a unique identifier for tracking purposes. The unique identifier will include the date and the complaint number.

Weather conditions will be documented to determine if the weather was a contributing factor to the complaint (e.g., litter impacts can be associated with periods of high winds, or odour impacts can be associated with overcast periods with little wind). The weather condition information at the time of the complaint will be taken from the Environment Canada – Hamilton A station.

In the event of receipt of a complaint related to odour, BRE personnel will travel to the location of the odour complaint (or the nearest accessible location) to assess for the presence of odour. BRE personnel will then trace back toward the Site and complete a perimeter inspection for the presence of odour. This inspection will be in addition to any daily inspections already carried out by BRE. The purpose will be to determine if odour is coming from the Site and to determine the potential on-Site source. If odour is confirmed to originate from the Site, per Condition 3(29) of ECA No. A110302, BRE will initiate mitigation measures in accordance with the Odour Management Plan. Mitigation measures to be implemented are specific to the source of on-Site odour.

Complaint forms will be completed and logged by Brooks Road Environmental (BRE) when a complaint has been received. This will be undertaken for all complaints, whether written or verbal. The complaint form template is provided in Appendix A. This form can be used for the different types of complaints received, such as dust, noise, or other, in addition to odour complaints. As the potential for dust, noise or other complaints at locations away from BRE are minimal the complaint investigation would be focused on the BRE operations. These forms will provide a record to be kept on file, along with copies of any correspondence to, or discussion with, the complainant. Upon request, members of the Public Liaison Committee (PLC) will receive a copy of each complaint.

BRE will ensure the Ministry of Environment, Conservation, and Parks (MECP) is notified within two business days of each complaint.

A response will be made to the complainant by the end of the next business day (from the day that BRE receives the complaint) confirming the receipt of the complaint, the nature of the complaint, and results of any follow-up. If the complaint cannot be resolved within a reasonable time period, the complainant will be notified of the action to be taken.

Appropriate signage will be placed at the Site entrance/exit indicating the overview of the Public Complaint Procedure, including the phone number for registering any complaint. Phone numbers for

the MECP Hamilton District Office and Haldimand County By-law enforcement will also be included on the signs.

MECP Hamilton District Office: Taylor Buck, 365-336-7491	Haldimand County By-law Enforcement Caledonia Office, 905-318-5932

3. Complaint Reporting

All complaints will be reviewed on an annual basis and summarized in the Annual Monitoring Report. BRE will be responsible to ensure that the following is undertaken and documented:

- Circulating all complaints to members of the PLC, MECP Hamilton District Office and Haldimand County prior to each PLC meeting, and keeping a public record at the Owner offices. Copies of complaint forms will be available at the Site office.
- Reviewing with the PLC and County all complaints received and Owner's response/ action at each PLC meeting.
- Provide a summary of complaints received and how they were addressed as part of the Annual Compliance Report and posting that summary on the website, as per EA Condition of Approval 6.6

Appendix A
Complaint Form

Brooks Road Environmental

160 Brooks Road, Cayuga N0A 1E0
Tel: 416-389-8876

COMMUNITY REPORT 2021 -

Complaint Details	
Complaint Number (MM-DD-YY-##)	
How was the complaint received	
Date / Time of Complaint Received	
Resident Name	
Address	
Phone Number	
Nature of Complaint	
Date / Time of Complaint Occurred	
Type of complaint received (Odour, Dust, Noise, other)	
Quality of the odour	
Intensity	
Frequency	
Duration	
Reported weather conditions	
Affect on the complainant	
Investigation	
Did the Complaint occur during business hours	
Was Odour or complaint detected by Staff at the time of complaint	
Weather condition (Environment Canada - Hamilton A)	
What mitigation measures were being utlized at time of complaint	
Other	
Contingency Measures	
Measures used to mitigate the complaint	
Agencies notified	
Community Report Details	
Completed by	
Name	
Title	
Date	

Items relate to odour complaints only

Appendix D

Sample Training Signature Page

Appendix D

Fugitive Odour Best Management Practices Plan

Training Signature Page

Name (Print)	Signature	Date Trained	Supervisor's Signature


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