Brooks Road Environmental

Agriculture, Soils and Mining Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment

Brooks Road Landfill Site
160 Brooks Road
Haldimand County, Ontario

DECEMBER 2016
REF. NO. 018235 (58)

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Section 1.0 Introduction

In July 2015 the Minister of the Environment and Climate Change approved the Terms of Reference (ToR) for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment (EA). This report provides an overview of the alternative conceptual vertical capacity expansion designs (i.e., 'Alternative Methods') for the Brooks Road Landfill Site Vertical Capacity Expansion EA (**Section 2.0**) and documents the following with respect to Agriculture, Soils and Mining:

- Describes the Agriculture, Soils and Mining Existing Conditions associated with the EA Study Areas (**Section 3.0**);
- Details the mitigation measures to be incorporated into the Alternative Method designs in order to prevent or minimize effects on Agriculture, Soils and Mining (**Section 4.0**);
- Documents the net effects analysis for each Alternative Method with respect to Agriculture, Soils and Mining (**Section 5.0**); and
- Identifies the Preferred Alternative Method from an Agriculture, Soils and Mining perspective through a comparative evaluation process (**Section 6.0**).

Section 2.0 Alternative Methods for Vertical Expansion

Three vertical expansion alternatives have been developed for comparative analysis. The alternatives were identified in consideration of the criteria and assumptions outlined in the Conceptual Design Report (CDR) and based on public input received during the ToR.

The following aspects will be identical across all three vertical expansion alternatives, including:

- An expansion capacity of 421,000 m^3, including waste, daily cover, and interim cover
- The limit of waste (i.e., landfill footprint)
- Traffic associated with importing waste, daily cover, and interim cover
- The location of the site entrance, scalehouse, and other ancillary supporting features
- The size and location of all buffer areas
- The final cover design (0.6 m of compacted fine-grained soil overlain by a 0.15 m thick vegetative layer)
- The leachate treatment (i.e., batch leachate treatment system)

The three vertical expansion alternatives are illustrated on **Drawings C-02** through **C-07** (following text) and their unique attributes are outlined in **Table 2.1**, below. Further information on the vertical expansion alternatives is found in the CDR.

Table 2.1 Comparison of Vertical Expansion Options			
Attribute	**Alternative 1**	**Alternative 2**	**Alternative 3**
General Description	Expansion capacity with 3H to 1V (33%) side slopes to a crest height of 218.075 m	Expansion capacity with 4H to 1V (25%) side slopes to a crest height of 221.0 m	Expansion capacity with 3H to 1V (33%) side slopes to a crest height of 221.25 m and bench at approx. 210.0 m
Approximate Elevation of Top of Landfill (including final cover)	219.65 m	221.50 m	222.13 m
Approximate Height of Landfill Above Existing Grade of 198.96	20.69 m	22.54 m	23.17 m
Post-Closure Leachate Generation Rate	36 m^3/day	36 m^3/day	36 m^3/day
Number of Vehicles Per Day Associated with Waste and Construction Materials	16	16	16

Section 3.0 Agriculture, Soils and Mining Environment Potentially Affected

The July 2015 Minister-approved ToR includes a preliminary description of the existing environmental conditions within the Study Areas and commits to providing an expanded description of the existing environmental conditions within the Study Areas in the EA. The following section provides a more detailed description and understanding of the Agriculture, Soils and Mining Existing Conditions within the Study Areas for use in the assessment and evaluation of Alternative Methods.

3.1 Study Areas

The following two generic study areas were established for preparation of the EA:

- **Site Study Area**, including all lands (i.e., 14.3 hectares [ha]) within the existing, approved boundaries of the Brooks Road Landfill Site (Site), as defined by Environmental Compliance Approval (ECA) No. A110302, dated July 21, 2014, as amended; and
- **Local Study Area**, including all lands and waters within a 1 kilometre (km) radius of the Site Study Area boundaries.

As provided for in the approved ToR, each technical discipline may modify the Local Study Area, as required, during the EA. For Agriculture, Soils and Mining only the Local Study Area is applicable (see **Figure 3.1**).

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

figure 3.1

LOCAL STUDY AREA
AGRICULTURE, SOILS AND MINING ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

Legend

Site Location

Local Study Area (1km Radius)

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3.2 Methodology

Available secondary sources of information were collected and reviewed to determine Agriculture, Soils and Mining existing conditions within the Local Study Area. The following sources of secondary information were collected and reviewed:

- Most recent aerial photos available of the Study Area
- National Household Survey Profile from Statistics Canada
- Government of Ontario Agricultural Information Atlas
- Haldimand County Official Plan, 2009
- Ontario Ministry of Northern Development and Mines Mineral Deposit Information Search
- Abandoned Mines Hazard Abatement Program London District Site Examinations, 1994

In addition, information contained in the Geology and Hydrogeology Assessment Report prepared as part of the Brooks Road Vertical Capacity Expansion EA was also drawn upon to complete this report.

3.3 Existing Agriculture, Soils and Mining Conditions

3.3.1 Agricultural Existing Conditions

For the 2014 tax year, 19 property parcels within the Local Study Area were assessed as Farm Tax Rated parcels. These parcels are shown on **Figure 3.2,** and include the two parcels immediately adjacent to the Site boundary to the east and south, both of which are forested along this boundary. Eligibility criteria for classification as a Farm Tax Rated property include, among others[1]:

- The property must be assessed and valued as farmland. This is determined by the Municipal Property Assessment Corporation (MPAC).
- The property must be used as part of a farming operation generating Gross Farm Income (GFI) of at least $7,000 as reported to Canada Revenue Agency for income tax purposes.
- A valid Farm Business Registration number is required for the farm business operating on the land, unless one of the exemptions applies and is granted. Under the Farm Registration and Farm Organizations Funding Act, a farm business generating Gross Farm Income of at least $7,000 as reported to Canada Revenue Agency for income tax purposes must register annually with Agricorp (1-866-327-3678). Continued eligibility for the Farm Property Class tax rate requires the yearly renewal of your Farm Business Registration number.

It can therefore be inferred, based on the eligibility criteria described above, that all properties within the Local Study Area classified as Farm Tax Rated are being actively farmed or used for farming purposes, either wholly or in part. Farming operations within the Local Study Area can be classified as

[1] Farm Property Class Tax Rate Program – Questions & Answers. Ministry of Agriculture, Food & Rural Affairs, 2016

cash crop farms (e.g., soybean) and passive livestock pasture (this includes the southern, non-forested portion of the property immediately adjacent to the Site to the south as well as the eastern portion of the property immediately adjacent to the Site to the east).

3.3.2 Soils Existing Conditions

According to the Canada Land Inventory (Government of Ontario, 2014), lands within the Local Study Area are comprised of Class 2 soils (generally north and west of the Site) and Class 3 soils (generally east and south of the Site) (see **Figure 3.3**).

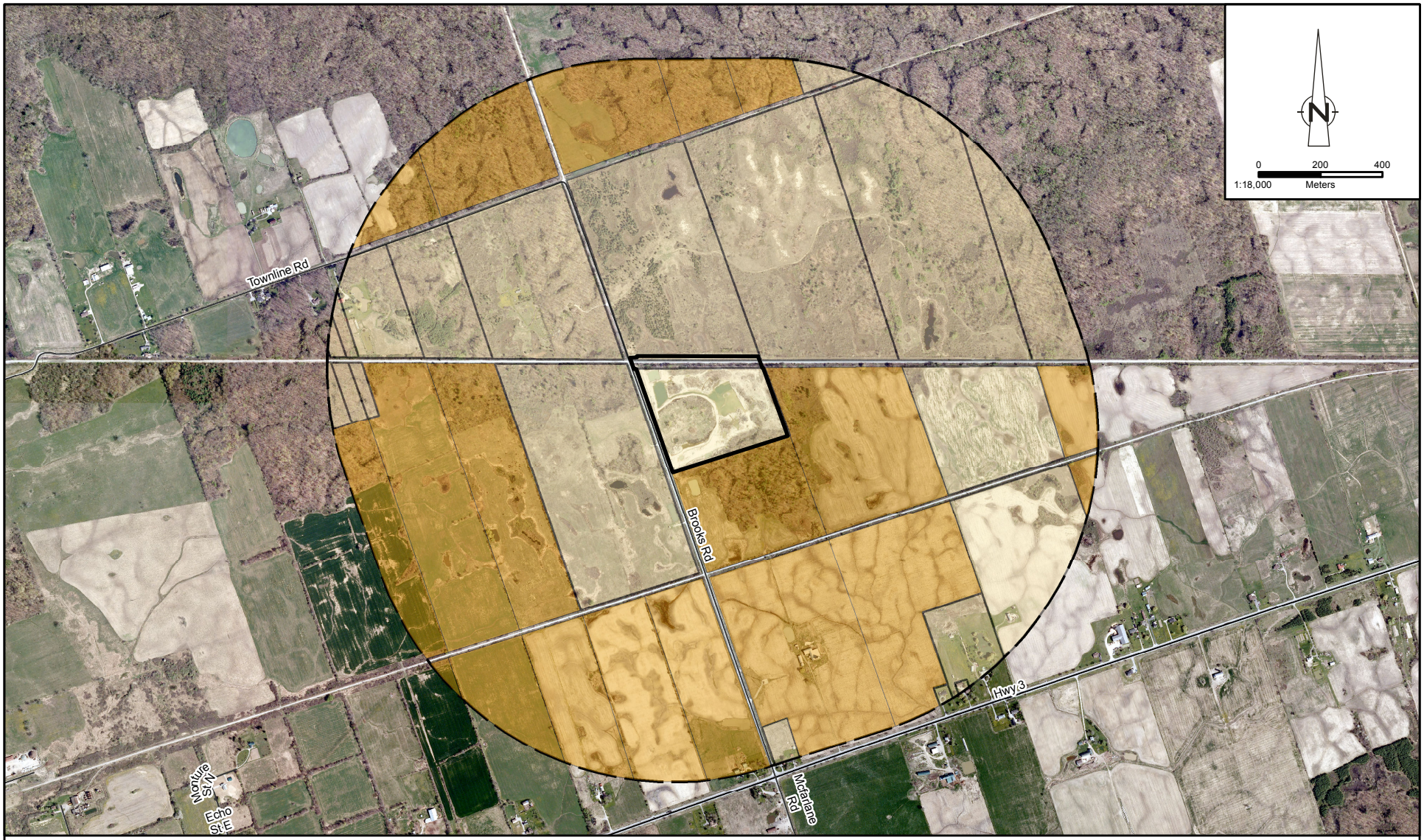
3.3.3 Mining Existing Conditions

Haldimand County Official Plan (2009) identifies an abandoned mine within the northwest corner of the Local Study Area (see **Figure 3.4** for approximate location). The Ontario Ministry of Northern Development and Mines (MNDM) (2008) locates this abandoned gypsum mine on Lot 25, Concession 1-N.T.R, approximately 112 m south of Townline Road East and approximately 300 m west of Brooks Road, in the Township of Cayuga, and identifies it as having been owned and operated by the Cayuga Gypsum Company (CGC) between 1942 and 1949. Gypsum was mined from a 1 m thick bed at a depth of approximately 26 m below ground surface (BGS). The reported quantity of gypsum removed was approximately 10,300 tonnes. The MNDM records indicate the description of the location as an abandoned mine shaft.

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

The second shaft was located approximately 305 m south of the first shaft. The 1994 inspection was reportedly unable to locate the second shaft. The second shaft was also a vertical prospect shaft of unknown support, however it is unknown if the shaft has been filled. It is also unknown how much gypsum was removed from this shaft.

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



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

figure 3.2

LOCAL STUDY AREA FARM TAX RATED PROPERTY PARCELS
AGRICULTURE, SOILS AND MINING ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

Legend

- Site Location
- Local Study Area (1km Radius)
- Assessment Parcel
- Farm Tax Rated Parcel

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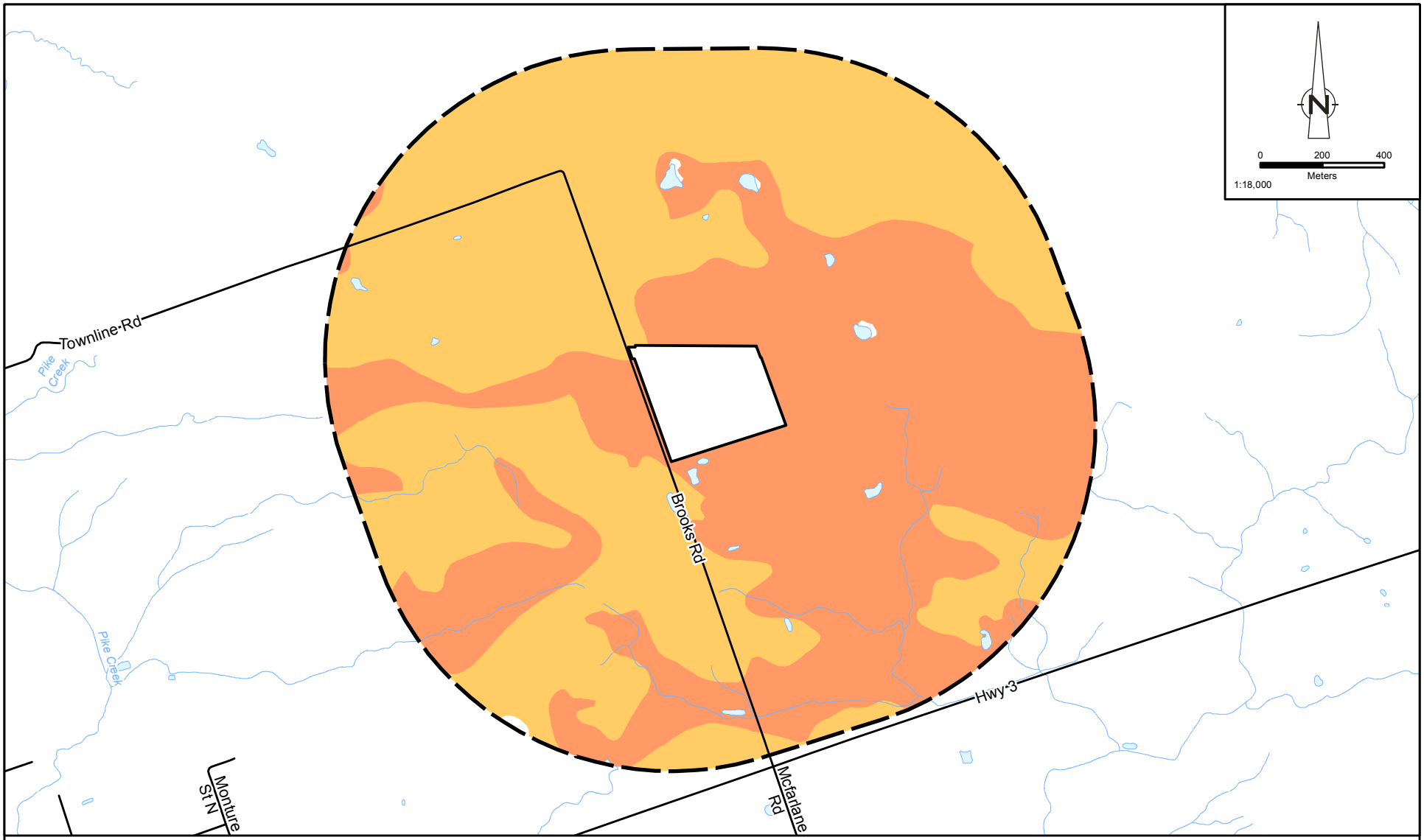

Source: MNRF NRVIS, 2014. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016;
Aerial: 2006 Grand River Conservation Authority
Coordinate System: NAD 1983 UTM Zone 17N

figure 3.3

LOCAL STUDY AREA SOIL CLASSIFICATION
AGRICULTURE, SOILS AND MINING ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

Legend

- Site Location
- Local Study Area (1km Radius)
- Class 2 Soil (CLI)
- Class 3 Soil (CLI)

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

figure 3.4

LOCAL STUDY AREA ABANDONED MINES
AGRICULTURE, SOILS AND MINING ASSESSMENT REPORT
BROOKS ROAD LANDFILL
160 Brooks Road, Cayuga, Ontario

Legend

Site Location

Local Study Area (1km Radius)

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Section 4.0 Mitigation Measures to be Incorporated into the Alternative Method Designs

Based on the description of the Alternative Methods provided in **Section 2.0** and the characterization of Agriculture, Soils and Mining Existing Conditions within the Study Areas described in **Section 3.0**, there are no mitigation measures recommended to be incorporated into the Alternative Methods designs in order to avoid or minimize impacts on Agriculture, Soils and Mining.

Section 5.0 Net Effects Assessment

This section documents the net effects assessment for the Alternative Methods for the Brooks Road Landfill Site Vertical Capacity Expansion EA from an Agriculture, Soils, and Mining perspective.

5.1 Net Effects Assessment Methodology

The assessment of the Alternative Methods was conducted in two steps:

- **Step 1: Confirm Evaluation Criteria and Indicators/Measures**
  Prior to undertaking the net effects assessment, the Agriculture, Soils and Mining evaluation criteria, indicators and measures developed in the Minister approved ToR were reviewed and confirmed for application to each of the Alternative Methods.
- **Step 2: Undertake the Net Effects Analysis**
  With the evaluation criteria, indicators and measures confirmed through the preceding step, a net effects analysis of the Alternative Methods was carried out consisting of the following activities:
  - Identify potential effects (based on measures) on the Agriculture, Soils and Mining;
  - Develop and apply avoidance/mitigation/compensation/enhancement measures; and
  - Determine net effects on the environment.

5.2 Criteria/Indicators

The evaluation criteria, indicators, rationale and data sources for the Agriculture, Soils and Mining environmental component are shown below.

	Environmental Component	Evaluation Criteria	Study Area	Indicators	Rationale	Data Sources
BUILT	**Agriculture/ Soils & Mining**	Effects on soils and existing agricultural and mining operations	Local Study Area	• Predicted impacts on surrounding agricultural operations • Type(s) and proximity of agricultural operations (i.e., organic, cash crop, livestock) • Type(s) and proximity of mining operations • Soil classification	Soils, agricultural and mining operations in the Local Study Area may be disturbed by the continued operation of the landfill.	• Provincial Policy Statement, 2005 • Haldimand County Official Plan • Aerial photographic mapping and field reconnaissance • Haldimand County Zoning • Canadian Lands Inventory (CLI) mapping

5.3 Potential Environmental Effects

5.3.1 Alternative Method 1

Alternative Method 1 is a vertical expansion of the existing Brooks Road Landfill and would not require the development of any additional land beyond the existing landfill footprint. As such, there will be no loss of soil with agricultural capability. As there are 19 property parcels within the Local Study Area assessed as Farm Tax Rated, including two immediately adjacent to the Site boundary to the east and south, there is potential for landfill operations to result in nuisance related effects to surrounding cash crop agricultural operations. There is no potential for effects on active mining operations as there are none located within the Local Study Area.

5.3.2 Alternative Method 2

Alternative Method 2 is a vertical expansion of the existing Brooks Road Landfill and would not require the development of any additional land beyond the existing landfill footprint. As such, there will be no loss of soil with agricultural capability. As there are 19 property parcels within the Local Study Area assessed as Farm Tax Rated, including two immediately adjacent to the Site boundary to the east and south, there is potential for landfill operations to result in nuisance related effects to surrounding cash crop agricultural operations. There is no potential for effects on active mining operations as there are none located within the Local Study Area.

5.3.3 Alternative Method 3

Alternative Method 3 is a vertical expansion of the existing Brooks Road Landfill and would not require the development of any additional land beyond the existing landfill footprint. As such, there will be no loss of soil with agricultural capability. As there are 19 property parcels within the Local Study Area assessed as Farm Tax Rated, including two immediately adjacent to the Site boundary to the east and south, there is potential for landfill operations to result in nuisance related effects to surrounding cash crop agricultural operations. There is no potential for effects on active mining operations as there are none located within the Local Study Area.

5.4 Mitigation Measures Beyond Those Incorporated into the Design

5.4.1 Alternative Method 1

As there are no potential effects on active mining operations and no loss of agricultural soil, no specific mitigation measures are required with respect to these indicators. Nuisance related effects to surrounding agricultural operations can be mitigated through the implementation of landfill Best Management Practices (BMPs) (e.g., dust suppression, vermin control, etc.) by Brooks Road Environmental.

5.4.2 Alternative Method 2

As there are no potential effects on active mining operations and no loss of agricultural soil, no specific mitigation measures are required with respect to these indicators. Nuisance related effects to surrounding agricultural operations can be mitigated through the implementation of landfill BMPs (e.g., dust suppression, vermin control, etc.) by Brooks Road Environmental.

5.4.3 Alternative Method 3

As there are no potential effects on active mining operations and no loss of agricultural soil, no specific mitigation measures are required with respect to these indicators. Nuisance related effects to surrounding agricultural operations can be mitigated through the implementation of landfill BMPs (e.g., dust suppression, vermin control, etc.) by Brooks Road Environmental.

5.5 Net Environmental Effects

5.5.1 Alternative Method 1

The implementation of landfill BMPs is expected to result in low net environmental effects to agricultural operations within the Local Study Area, including the two cash crop farms located immediately adjacent to the eastern and southern boundaries of the Site. There will be no net effects to active mining operations or loss of soil with agricultural capability within the Local Study Area.

5.5.2 Alternative Method 2

The implementation of landfill BMPs is expected to result in low net environmental effects to agricultural operations within the Local Study Area, including the two cash crop farms located immediately adjacent to the eastern and southern boundaries of the Site. There will be no net effects to active mining operations or loss of soil with agricultural capability within the Local Study Area.

5.5.3 Alternative Method 3

The implementation of landfill BMPs is expected to result in low net environmental effects to agricultural operations within the Local Study Area, including the two cash crop farms located immediately adjacent to the eastern and southern boundaries of the Site. There will be no net effects to active mining operations or loss of soil with agricultural capability within the Local Study Area.

Table 5.1 Alternative Method 1 Agriculture / Soils & Mining Potential Environmental Effects, Mitigation Measures & Net Effects

	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
BUILT	Agriculture / Soils & Mining	Effects on Soils and Existing Agricultural and Mining Operations	Predicted impacts on surrounding agricultural operations	Potential for nuisance related effects to surrounding agricultural operations resulting from landfill operations.	BMPs will be implemented by Brooks Road Environmental to manage nuisance related effects during construction and operation.	Low net effects to surrounding agricultural operations.
			Type(s) and proximity of agricultural operations (i.e., organic, cash crop, livestock)	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south.	BMPs will be implemented by Brooks Road Environmental to manage nuisance related effects during construction and operation.	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south will continue to operate.
			Type(s) and proximity of mining operations	No potential effects on active mining operations as there are none located within the Local Study Area.	No mitigation measures required.	No effects on active mining operations within the Local Study Area.
			Soil classification	No loss of soil with agricultural capability. All onsite lands are considered to be disturbed and are not rated under the Canada Land Inventory.	No mitigation measures required.	No loss of soil with agricultural capability. All onsite lands are considered to be disturbed and are not rated under the Canada Land Inventory.

Table 5.2 Alternative Method 2 Agriculture / Soils & Mining Potential Environmental Effects, Mitigation Measures & Net Effects

	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
BUILT	Agriculture / Soils & Mining	Effects on Soils and Existing Agricultural and Mining Operations	Predicted impacts on surrounding agricultural operations	Potential for landfill operations to affect surrounding agricultural operations.	BMPs will be implemented by Brooks Road Environmental to manage nuisance related effects during construction and operation.	Low net effects to surrounding agricultural operations.
			Type(s) and proximity of agricultural operations (i.e., organic, cash crop, livestock)	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south.	BMPs will be implemented by Brooks Road Environmental to manage nuisance related effects during construction and operation.	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south will continue to operate.
			Type(s) and proximity of mining operations	No potential effects on active mining operations as there are none located within the Local Study Area.	No mitigation measures required.	No effects on active mining operations within the Local Study Area.
			Soil classification	No loss of soil with agricultural capability. All onsite lands are considered to be disturbed and are not rated under the Canada Land Inventory.	No mitigation measures required.	No loss of soil with agricultural capability. All onsite lands are considered to be disturbed and are not rated under the Canada Land Inventory.

Table 5.3 Alternative Method 3 Agriculture / Soils & Mining Potential Environmental Effects, Mitigation Measures & Net Effects

	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
BUILT	Agriculture / Soils & Mining	Effects on Soils and Existing Agricultural and Mining Operations	Predicted impacts on surrounding agricultural operations	Potential for landfill operations to affect surrounding agricultural operations.	BMPs will be implemented by Brooks Road Environmental to manage nuisance related effects during construction and operation.	Low net effects to surrounding agricultural operations.
			Type(s) and proximity of agricultural operations (i.e., organic, cash crop, livestock)	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south.	BMPs will be implemented by Brooks Road Environmental to manage nuisance related effects during construction and operation.	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south will continue to operate.
			Type(s) and proximity of mining operations	No potential effects on active mining operations as there are none located within the Local Study Area.	No mitigation measures required.	No effects on active mining operations within the Local Study Area.
			Soil classification	No loss of soil with agricultural capability. All onsite lands are considered to be disturbed and are not rated under the Canada Land Inventory.	No mitigation measures required.	No loss of soil with agricultural capability. All onsite lands are considered to be disturbed and are not rated under the Canada Land Inventory.

Section 6.0 Comparative Evaluation

This section documents the comparative evaluation of the Alternative Methods from an Agriculture, Soils, and Mining perspective based on the net environmental effects identified in **Section 5.0**.

6.1 Comparative Evaluation Methodology

The Minister approved ToR states that the comparative evaluation of the Alternative Methods will be carried out using a Reasoned Argument (or Trade-off) method, with evaluation criteria as the basis for comparison. Under the Reasoned Argument approach, the differences in the net effects associated with each Alternative Method are highlighted. Based on these differences, the advantages and disadvantages of each alternative can be identified according to the evaluation of trade-offs between the various evaluation criteria and indicators. The relative significance of potential impacts is then examined to provide a clear rationale for the selection of a preferred alternative from an Agriculture, Soils and Mining perspective. The term *trade-offs* is defined as "*things of value given up in order to gain different things of value.*" Each Alternative Method will be compared against the others to distinguish relative differences in impacts to the environment, taking into account possible mitigation measures.

6.2 Comparative Evaluation Results

There are no net effects associated with any of the proposed Alternative Methods in relation to mining operations and loss of soil with agricultural capability. Similarly, with the implementation of BMPS, low net effects to surrounding agricultural operations, including the two neighbouring cash crop farms, are anticipated for all three alternatives. As such, there is no distinction between the alternatives in relation to their effects on Agriculture, Soils and Mining within the Local Study Area and, therefore, all alternatives rank the same.

Table 6.1 Agriculture / Soils & Mining Comparative Evaluation

	Environmental Component	Evaluation Criteria	Indicator	Alternative Method 1 Net Effects	Alternative Method 2 Net Effects	Alternative Method 3 Net Effects
BUILT	Agriculture / Soils & Mining	Effects on Soils and Existing Agricultural and Mining Operations	Predicted impacts on surrounding agricultural operations	Low net effects to surrounding agricultural operations. **LOW NET EFFECTS**	Low net effects to surrounding agricultural operations. **LOW NET EFFECTS**	Low net effects to surrounding agricultural operations. **LOW NET EFFECTS**
			Type(s) and proximity of agricultural operations (i.e., organic, cash crop, livestock)	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south will continue to operate. **LOW NET EFFECTS**	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south will continue to operate. **LOW NET EFFECTS**	19 farm tax rated property parcels within the Local Study Area, including 2 cash crop farms immediately adjacent to the Site boundary to the east and south will continue to operate. **LOW NET EFFECTS**
			Type(s) and proximity of mining operations	No effects on active mining operations within the Local Study Area. **NO NET EFFECTS**	No effects on active mining operations within the Local Study Area. **NO NET EFFECTS**	No effects on active mining operations within the Local Study Area. **NO NET EFFECTS**
			Soil classification	No loss of soil with agricultural capability. **NO NET EFFECTS**	No loss of soil with agricultural capability. **NO NET EFFECTS**	No loss of soil with agricultural capability. **NO NET EFFECTS**
		Environmental Component Ranking:		**Tied for 1st**	**Tied for 1st**	**Tied for 1st**
	RATIONALE			There is no distinction between the alternatives in relation to their effects on soils and existing agricultural and mining operations within the Local Study Area.		

Section 7.0 Conclusion

The existing environment within a 1 km radius of the Brooks Road Landfill Site was examined from an Agriculture, Soils and Mining perspective. The results of this review were utilized in the assessment of net effects for each of the three vertical capacity expansion alternatives, which were then comparatively evaluated against one another, the conclusion of which is that, from an Agriculture, Soils and Mining perspective, all three of the Alternative Methods are preferred.

Section 8.0 References

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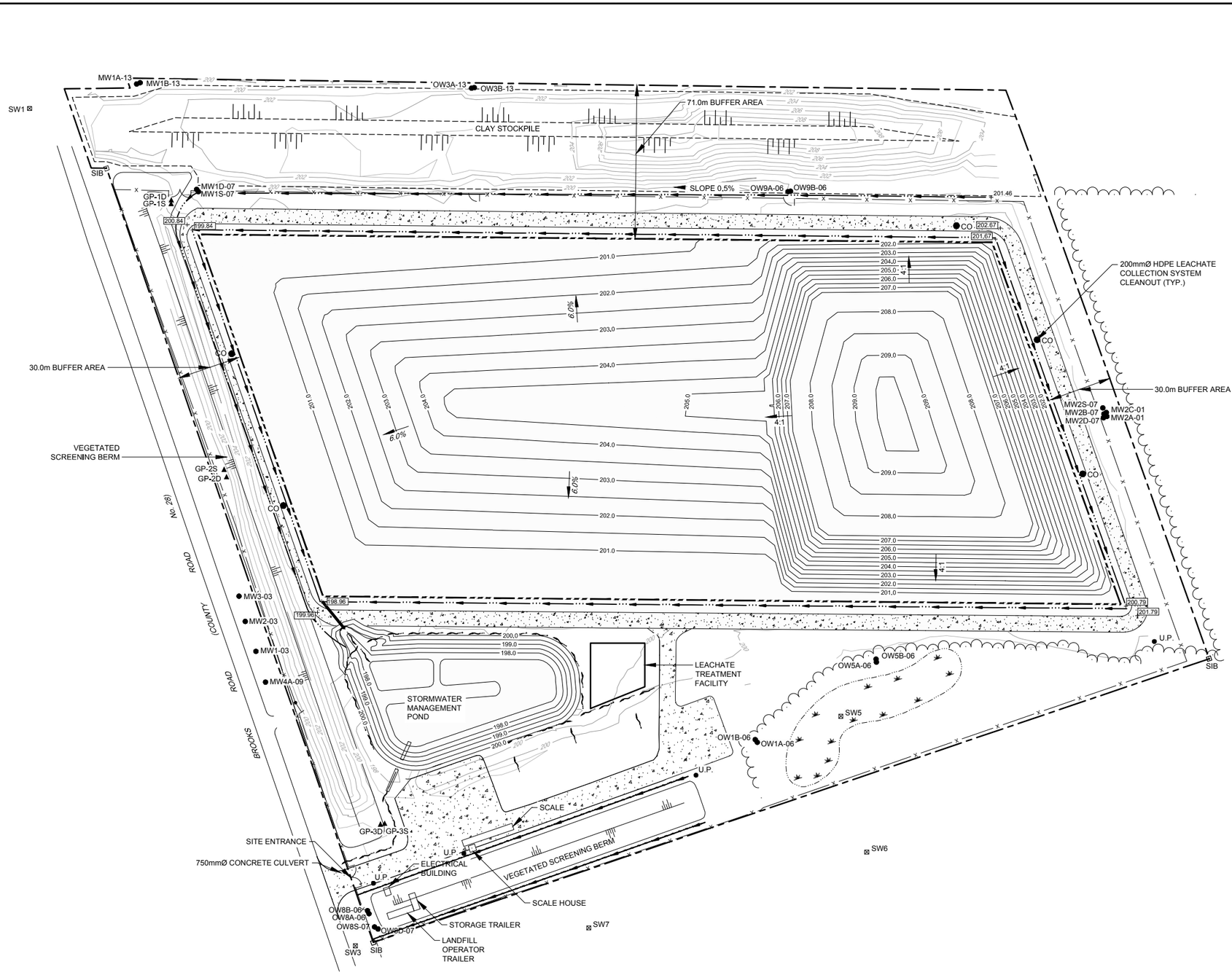
Statistics Canada, 2011. National Household Survey Profile – Haldimand County. Available at: https://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3528018&Data=Count&SearchText=haldimand&SearchType=Begins&SearchPR=01&A1=All&B1=All&Custom=&TABID=1

Drawings



No.	Revision	Date	Initial

LEGEND

- 202.0 — FINAL CONTOURS BEFORE VERTICAL EXPANSION (1.0m INTERVAL (m AMSL))
- FINAL CONTOURS BEFORE VERTICAL EXPANSION (0.5m INTERVAL (m AMSL))
- 202 — GROUND CONTOUR (2.0m INTERVAL)
- GROUND CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- APPROVED LIMIT OF WASTE
- x — EXISTING FENCELINE
- CLAY STOCKPILE AREA
- PERIMETER DITCH
- TREELINE
- GRANULAR SURFACE ACCESS ROAD
- SWAMPY AREA
- 201.67 — SPOT ELEVATION (m AMSL)
- CO — LEACHATE COLLECTION SYSTEM CLEAN OUT
- SIB — STANDARD IRON BAR
- OW1B-06 — OBSERVATION WELL
- MW2A-01 — MONITORING WELL
- SW6 — SURFACE WATER MONITORING
- GP-3S — GAS PROBE
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

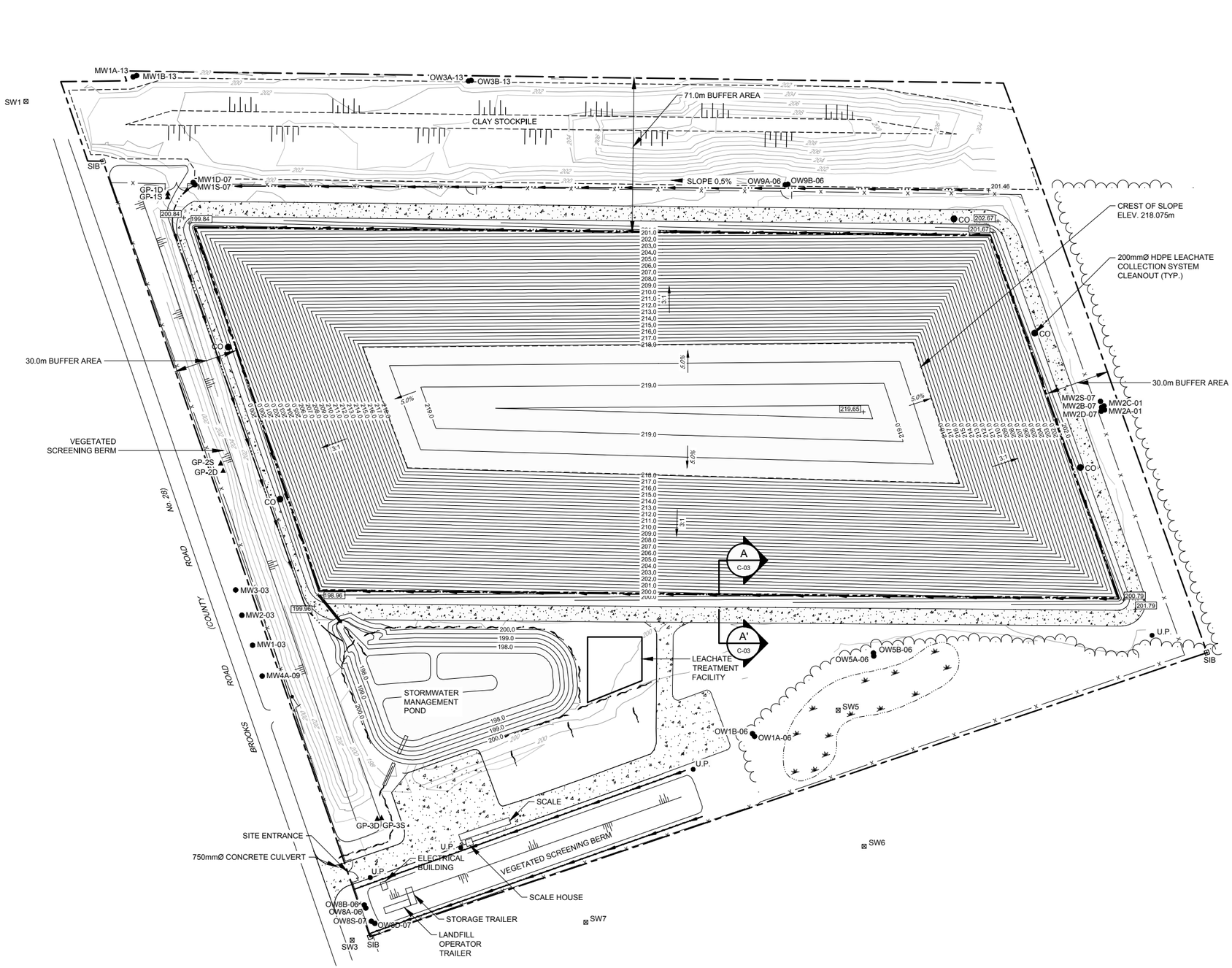
CONCEPTUAL DESIGN REPORT

EXISTING CONDITIONS INTERIM CLOSURE

GHD

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project N°: 18235-20	Report N°: 051	Drawing N°: C-01



No.	Revision	Date	Initial

LEGEND

- 202.0 — TOP OF FINAL CONTOUR (1.0m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5m INTERVAL (m AMSL))
- 202 — GROUND CONTOUR (2.0m INTERVAL)
- GROUND CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- APPROVED LIMIT OF WASTE
- x — EXISTING FENCELINE
- CLAY STOCKPILE AREA
- PERIMETER DITCH
- TREELINE
- GRANULAR SURFACE ACCESS ROAD
- SWAMPY AREA
- 201.67 — SPOT ELEVATION (m AMSL)
- CO — LEACHATE COLLECTION SYSTEM CLEAN OUT
- SIB — STANDARD IRON BAR
- OW1B-06 — OBSERVATION WELL
- MW2A-01 — MONITORING WELL
- SW6 — SURFACE WATER MONITORING
- GP-3S — GAS PROBE
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

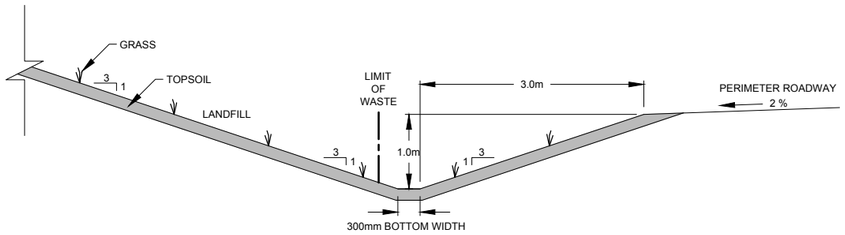
VERTICAL EXPANSION ALTERNATIVE 1

GHD

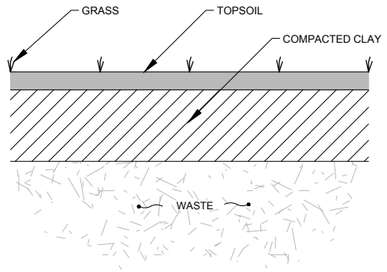
Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project N°: 18235-20	Report N°: 051	Drawing N°: C-02

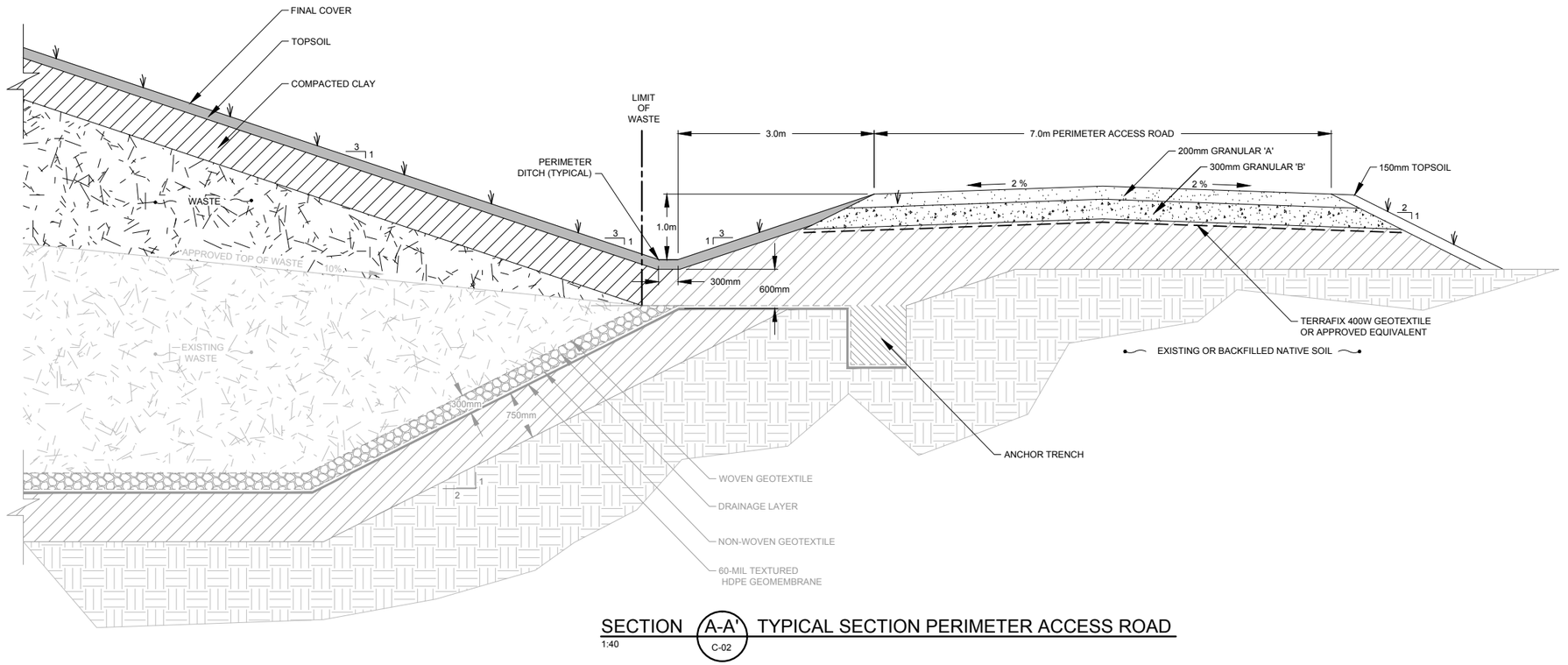
18235-20(051)CI-WA002 JAN 19/2016



DETAIL 1 PERIMETER DITCH (TYPICAL)
1:40 C-03



DETAIL 2 FINAL COVER
1:40 C-03



SECTION A-A' TYPICAL SECTION PERIMETER ACCESS ROAD
1:40 C-02

No.	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

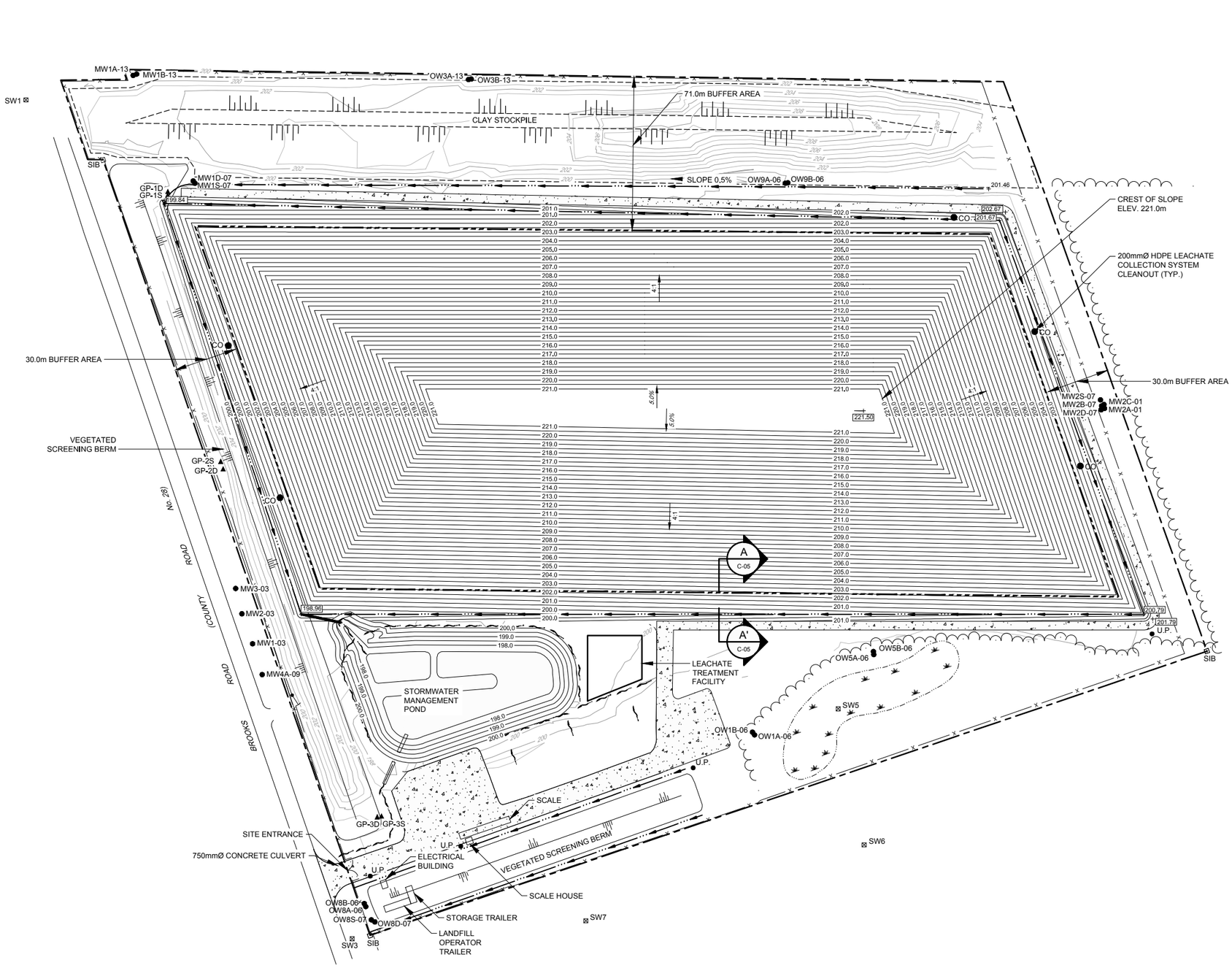
CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION
ALTERNATIVE 1 DETAILS

GHD

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project No: 18235-20	Report No: 051	Drawing No: C-03



No.	Revision	Date	Initial

LEGEND

- 202.0 — TOP OF FINAL COVER CONTOUR (1.0m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5m INTERVAL (m AMSL))
- 202 — GROUND CONTOUR (2.0m INTERVAL)
- GROUND CONTOUR (1.0m INTERVAL)
- PROPERTY LINE
- APPROVED LIMIT OF WASTE
- x — EXISTING FENCELINE
- CLAY STOCKPILE AREA
- PERIMETER DITCH
- TREELINE
- GRANULAR SURFACE ACCESS ROAD
- SWAMPY AREA
- 201.67 — SPOT ELEVATION (m AMSL)
- CO — LEACHATE COLLECTION SYSTEM CLEAN OUT
- SIB — STANDARD IRON BAR
- OW1B-06 — OBSERVATION WELL
- MW2A-01 — MONITORING WELL
- SW6 — SURFACE WATER MONITORING
- GP-3S — GAS PROBE
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

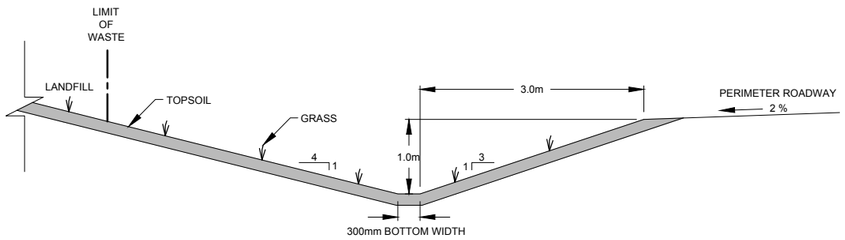
CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION ALTERNATIVE 2

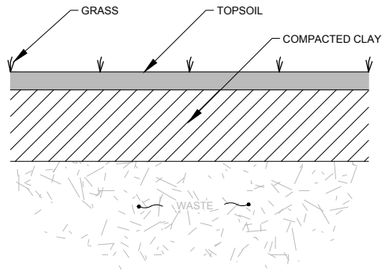
GHD

Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

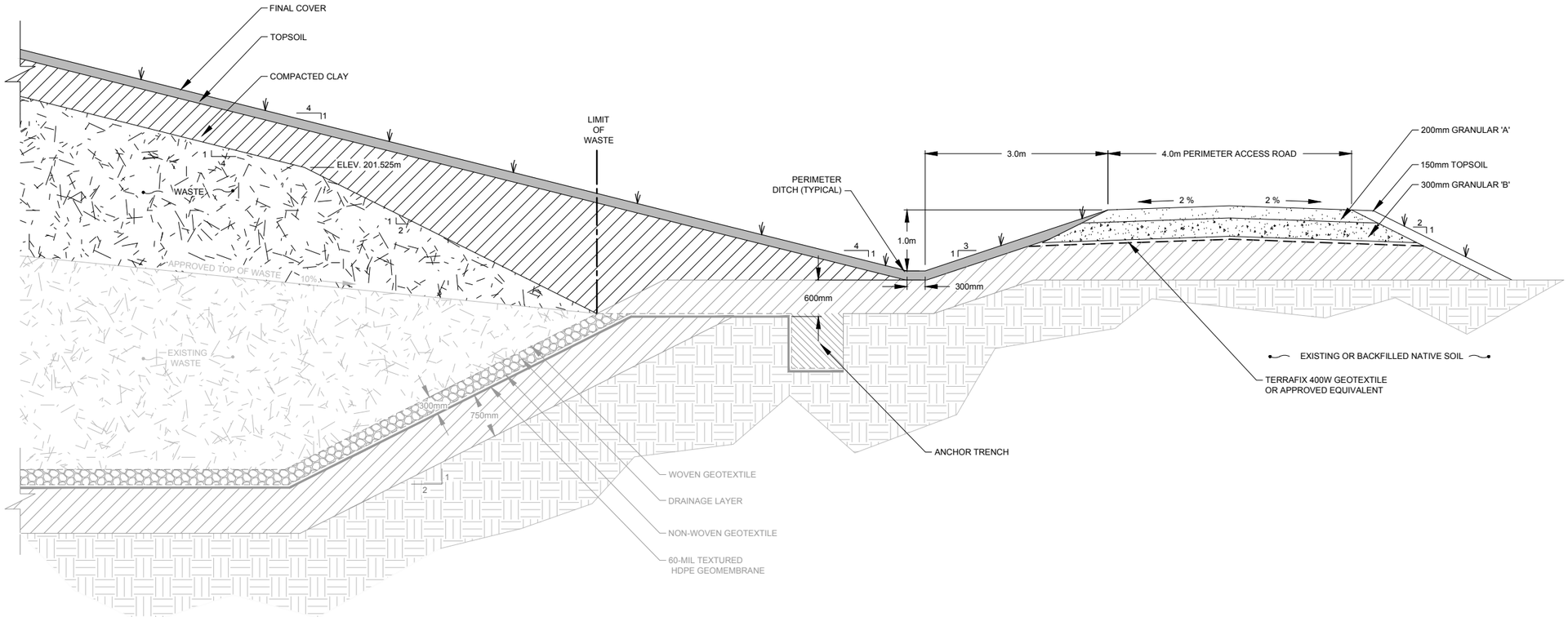
Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project N°: 18235-20	Report N°: 051	Drawing N°: C-04



DETAIL 1 PERIMETER DITCH (TYPICAL)
1:40 C-05



DETAIL 2 FINAL COVER
1:40 C-05



SECTION A-A' TYPICAL SECTION PERIMETER ACCESS ROAD
1:40 C-04

No.	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION
ALTERNATIVE 2 DETAILS

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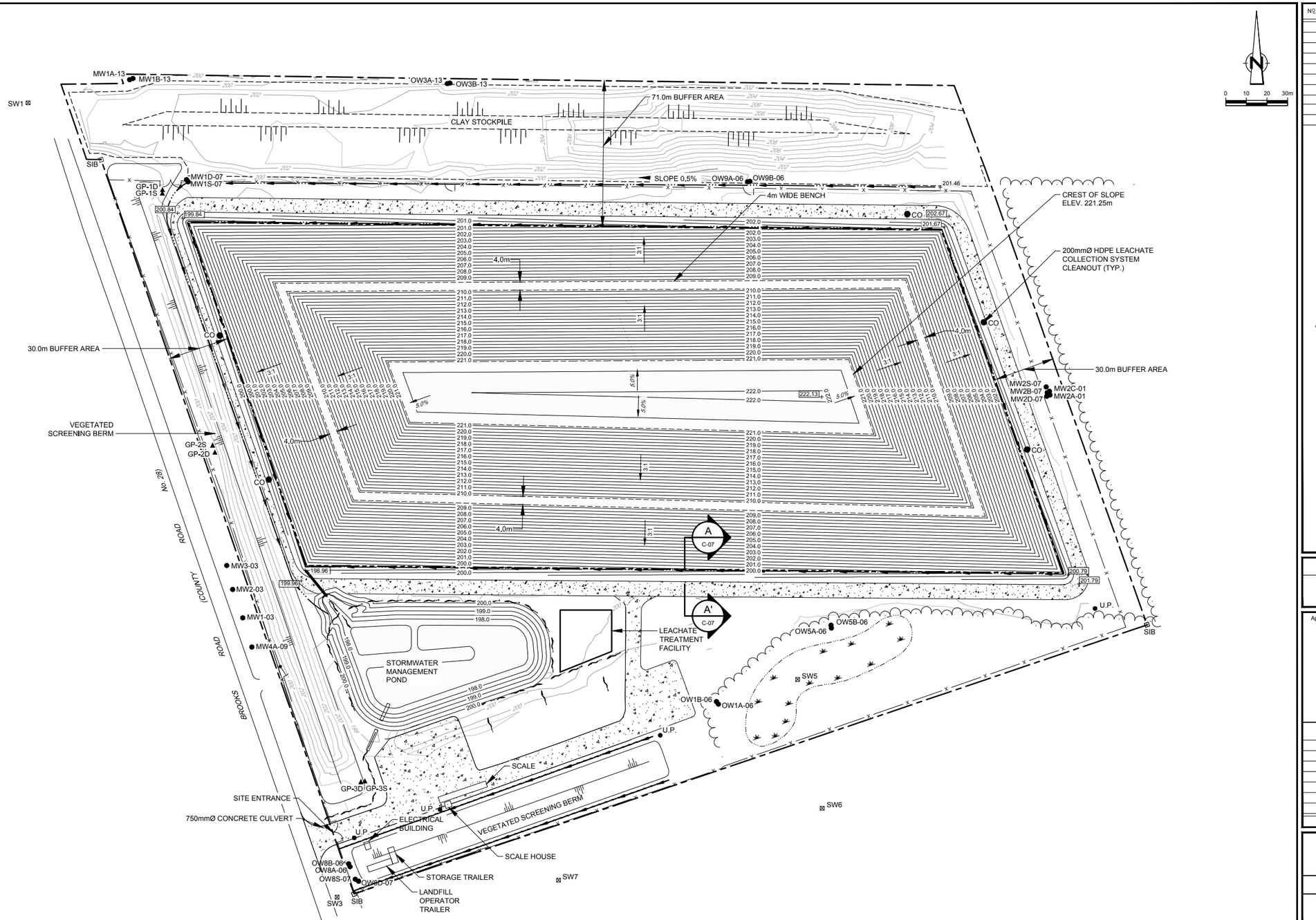
Source Reference:

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project No: 18235-20	Report No: 051	Drawing No: C-05

18235-20(051)CI-WA005 DEC 11/2015



No.	Revision	Date	Initial

LEGEND

- 202.0 — TOP OF FINAL COVER CONTOUR (1.0m INTERVAL (m AMSL))
- TOP OF FINAL COVER CONTOUR (0.5m INTERVAL (m AMSL))
- 202 — GROUND CONTOUR (2.0m INTERVAL)
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- PROPERTY LINE
- APPROVED LIMIT OF WASTE
- x — EXISTING FENCELINE
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- 201.67 — SPOT ELEVATION (m AMSL)
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- SW6 — SURFACE WATER MONITORING
- GP-3S — GAS PROBE
- U.P. — UTILITY POLE
- DOUBLE GATE
- SINGLE GATE

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

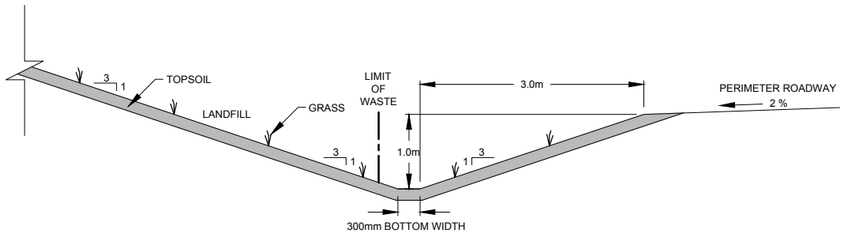
VERTICAL EXPANSION
ALTERNATIVE 3

GHD

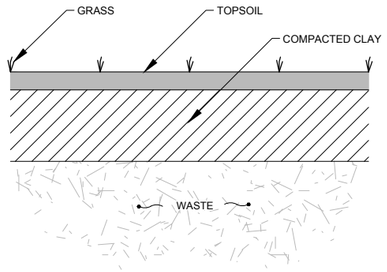
Source Reference:
EXISTING GROUND CONTOURS AND TOPOGRAPHIC FEATURES SHOWN ARE BASED ON TERVITA AS-BUILT FOR FINAL CONDITIONS FOR STAGE 2A, 2B AND STAGE 3A, AND NORTH CLAY STOCKPILE SURVEY BY VAN NOSTRAND AND GIBSON SURVEYED JULY-17-2013

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project N°: 18235-20	Report N°: 051	Drawing N°: C-06

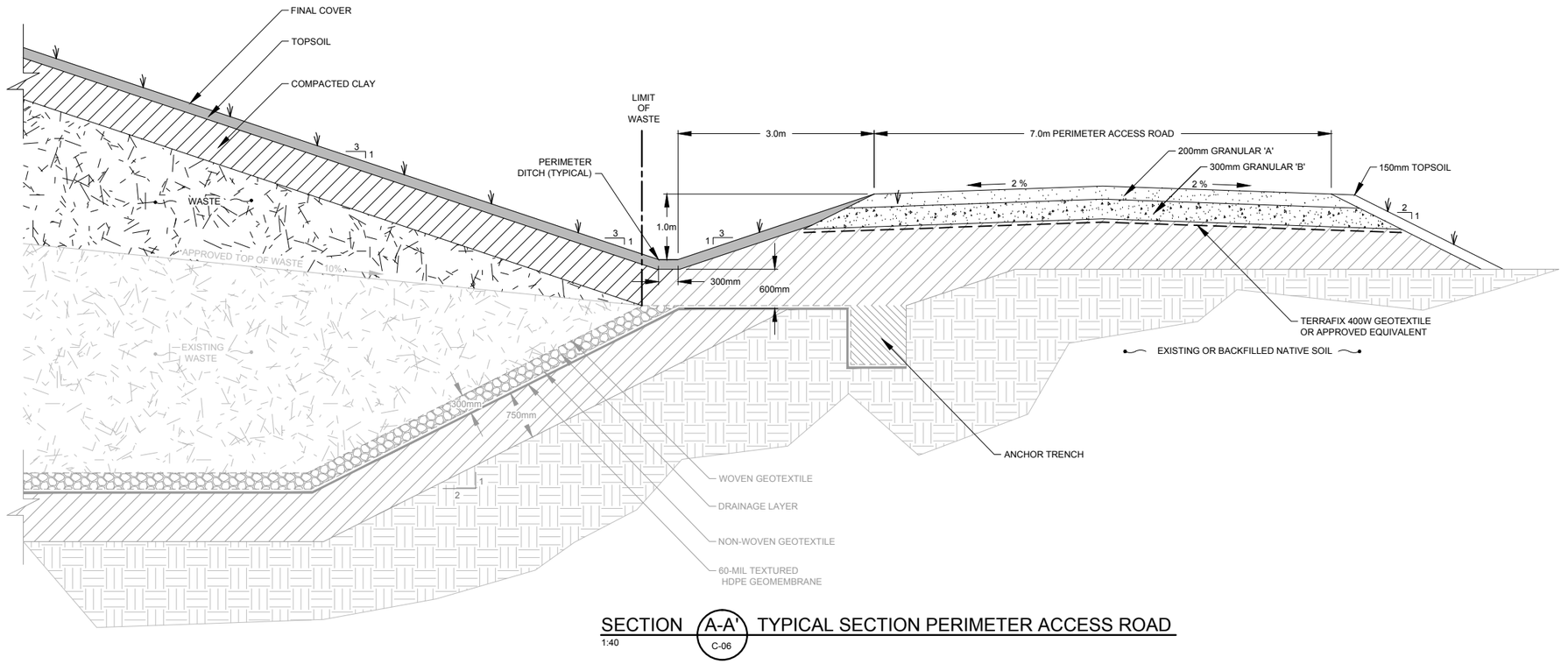
18235-20(051)CI-WA006 JAN 19/2016



DETAIL 1 PERIMETER DITCH (TYPICAL)
1:40 C-07



DETAIL 2 FINAL COVER
1:40 C-07



SECTION A-A' TYPICAL SECTION PERIMETER ACCESS ROAD
1:40 C-06

No.	Revision	Date	Initial

SCALE VERIFICATION

THIS BAR MEASURES 50mm ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

BROOKS ROAD LANDFILL SITE
HALDIMAND COUNTRY, ONTARIO

CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION
ALTERNATIVE 3 DETAILS

.

Source Reference:

Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale: 1:1000	Project No: 18235-20	Report No: 051	Drawing No: C-07