



**Brooks Road  
Environmental**



## **Noise Assessment Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment**

**Brooks Road Landfill Site  
160 Brooks Road  
Haldimand County, Ontario**

**JULY 2016  
REF. NO. 018235 (65)**

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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 Noise:

- Describes the Noise 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 Noise (**Section 4.0**)
- Documents the net effects analysis for each Alternative Method with respect to Noise (**Section 5.0**)
- Identifies the Preferred Alternative Method from a Noise 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<sup>3</sup>, 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.



<b>Table 2.1 Comparison of Vertical Expansion Options</b>			
<b>Attribute</b>	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
<b>General Description</b>	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
<b>Approximate Elevation of Top of Landfill (including final cover)</b>	219.65 m	221.50 m	222.13 m
<b>Approximate Height of Landfill Above Existing Grade of 198.96</b>	20.69 m	22.54 m	23.17 m
<b>Post-Closure Leachate Generation Rate</b>	36 m <sup>3</sup> /day	36 m <sup>3</sup> /day	36 m <sup>3</sup> /day
<b>Number of Vehicles Per Day Associated with Waste and Construction Materials</b>	16	16	16

## Section 3.0 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 Noise 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
- **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 Noise both the Site and Local Study Areas are applicable (see **Figure 3.1**).

The Study Area for the noise discipline was defined by the area extending 1 km from the existing Brooks Road Landfill property boundary. The Ministry of the Environment and Climate Change (MOECC) Noise Screening Process Questionnaire requires that industries with significant potential environmental noise profiles, or equipment, evaluate the off-site environmental noise impact within 1 km from the site; the noise impact beyond 1 km is expected to be environmentally insignificant.

The rationale for the Study Area for the noise discipline is that the off-site environmental noise impact from the existing Brooks Road Landfill facility (Facility) or the development of the proposed landfill expansion alternatives will be defined by the sound power generated by the equipment and activities on-site and the proximity and line-of-sight noise exposure to the off-site receiver locations subject of analysis. In the absence of other developments and intervening built structures, such as businesses or institutions, the rural residential dwellings within the Study Area represent the receiver locations subject of the assessment. The net change to the noise impact predicted at these residences based on the design of the landfill expansion alternatives will be directly compared to the Existing Conditions and to the applicable sound level limits and guidelines.





Source: MNR/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

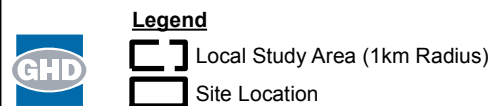


figure 3.1  
 STUDY AREAS  
 NOISE ASSESSMENT REPORT  
 BROOKS ROAD LANDFILL  
 160 Brooks Road, Cayuga, Ontario



## **3.2 Methodology**

Information on the Existing Conditions for Noise within the Study Areas was gathered from a combination of secondary source research, field investigations and agency consultation.

### **3.2.1 Available Secondary Source Information Collection and Review**

Available secondary sources of information were collected and reviewed to determine the existing conditions within the Study Area including:

- Review of Historic Complaints
- Review of current zoning plans, definitions and land use designations
- Field Observations and Investigations
- Review of local traffic data
- MOECC technical guidelines and standards
- September 2014 ECA Application

### **3.2.2 Historic Complaints**

Brooks Road Landfill has not received any noise complaints for the previous operations on-site based on information provided by BRE Site operators as of September 2015.

### **3.2.3 Review of Zoning**

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

A zoning map is provided as Figure A.1 and definitions are included in Appendix A.

### **3.2.4 Site Visit & Field Investigations**

The Study Area is rural in character and surrounded by agricultural fields. There are no existing industries within the Study Area other than the Facility that may contribute to the background noise levels.

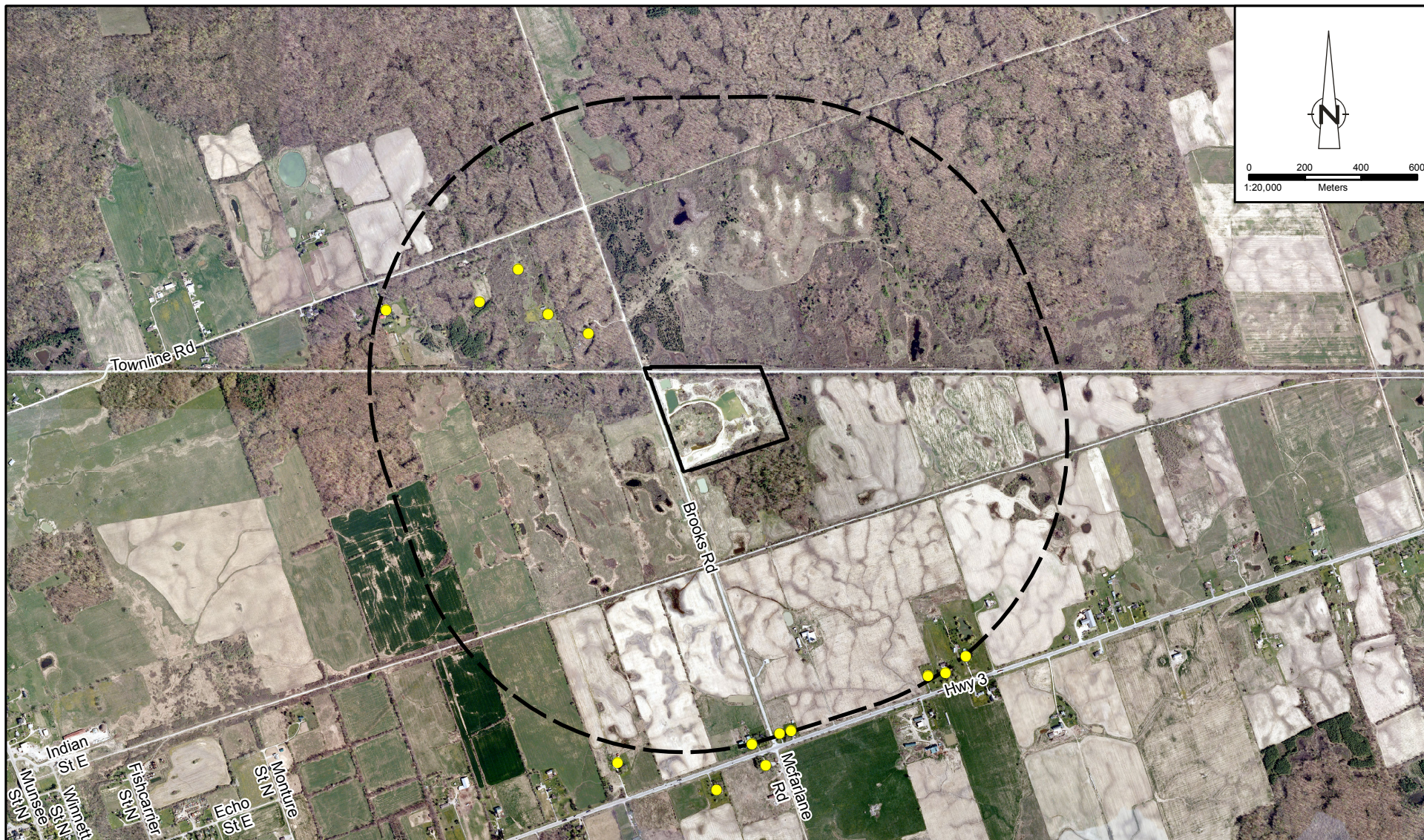
A site visit was conducted on Friday September 11, 2015, and the following activities were completed by the Study Team:

- Updated sound level measurements were completed for the shredder unit
- Site observations confirmed the Acoustic Class of the Study Area
- Site observations confirmed the site layout and activities on-site

Off-site residential dwelling locations were reviewed and the height of structures for noise impact exposure analysis was determined.

The nearest residential dwelling is approximately 232 metres (m) northwest of the existing property boundary. There are approximately 14 existing one-storey (1.5 m above grade) and two-storey (4.5 m above grade) residential dwellings within the Study Area as identified on **Figure 3.2**.





Source: MNR/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

#### Legend

- Sensitive Receiver Location
- Local Study Area (1km Radius)
- Site Location



figure 3.2  
 SENSITIVE RECEIVER LOCATIONS  
 NOISE ASSESSMENT REPORT  
 BROOKS ROAD LANDFILL  
 160 Brooks Road, Cayuga, Ontario



### 3.2.5 Local Traffic Data

There are three roads located within the Study Area including:

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

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

### 3.2.6 MOECC Technical Guidelines and Standards

The acoustic character of the Study Area will be defined in accordance with the MOECC guidelines NPC-300 "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning," October 2013.

As stated in the guideline:

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

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

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

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

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

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

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

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

### **3.2.7 September 2014 ECA**

The September 2014 ECA amendment application that was prepared for the shredder unit confirmed that the Study Area immediately surrounding the Site is Acoustic Class 3 and that the nearest residential dwelling is approximately 232 m from the property boundary. The ECA amendment application has been submitted and is currently under technical review by the MOECC.

## **3.3 Noise Existing Conditions**

### **3.3.1 Site Activities**

Brooks Road Landfill is proposed to be vertically expanded and the landfill capacity increased. The significant environmental noise sources at the Landfill include:

- 1 x Leachate Treatment Plant (pumps and aerator equipment located inside heavy gauge sheet steel structure)
- 1 x Caterpillar D7 Bulldozer
- 1 x Caterpillar 826G Compactor
- 1 x Caterpillar 826C Compactor
- 1 x John Deer 225 Rock Truck
- 1 x Caterpillar 330 Excavator
- 1 x Hyundai 210 Excavator
- 1 x Buffel Doppstadt DW 3060 K Shredder (subject of September 2014 ECA Application)
- 1 x Primary Haul Route
- 1 x Primary Scale Route

These noise sources generate continuous steady state mechanical noise and will be the subject of analysis for the Alternative Methods evaluation. There are no ground-borne vibration sources at the Facility as defined in NPC-207. These noise sources are input into an industry standard acoustic model that includes all significant on-site structures (buildings, equipment, storage tanks and silos).

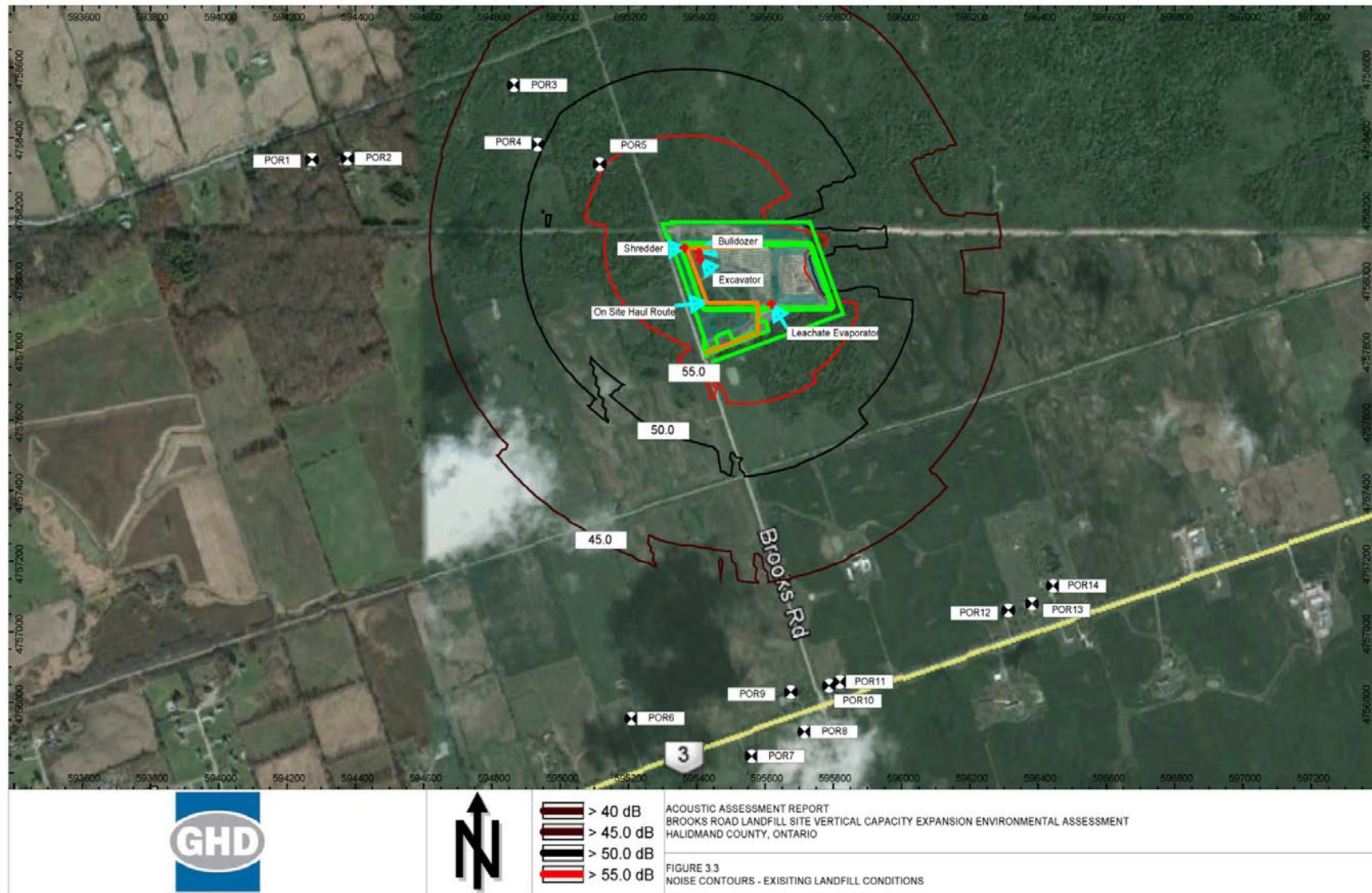
Computer Aided Noise Abatement Acoustical Modeling Software (CADNA A), version 4.5, is based on the ISO 9613-2 standard "Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General

Method of Calculation." The CADNA model is the industry standard for environmental noise modeling in Ontario.

The existing Landfill noise contours are presented on **Figure 3.3**. The noise impacts predicted at the fourteen residential dwellings are below the 55 dBA noise limit defined in Guideline N-1. The future off-site environmental noise impact from the Brooks Road Landfill Facility will be modelled using this industry standard acoustical model methodology to evaluate the future expansion alternatives in terms of the net effects as defined in the TOR.



Figure 3.3 Noise Contours (Existing Landfill Conditions)



### 3.3.2 Off-Site Road Traffic Noise

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

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

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

- Highway 3 (MTO, 2010) – 3,450 vehicles / day
- Brooks Road (Haldimand County, 2011) – 114 vehicles / day

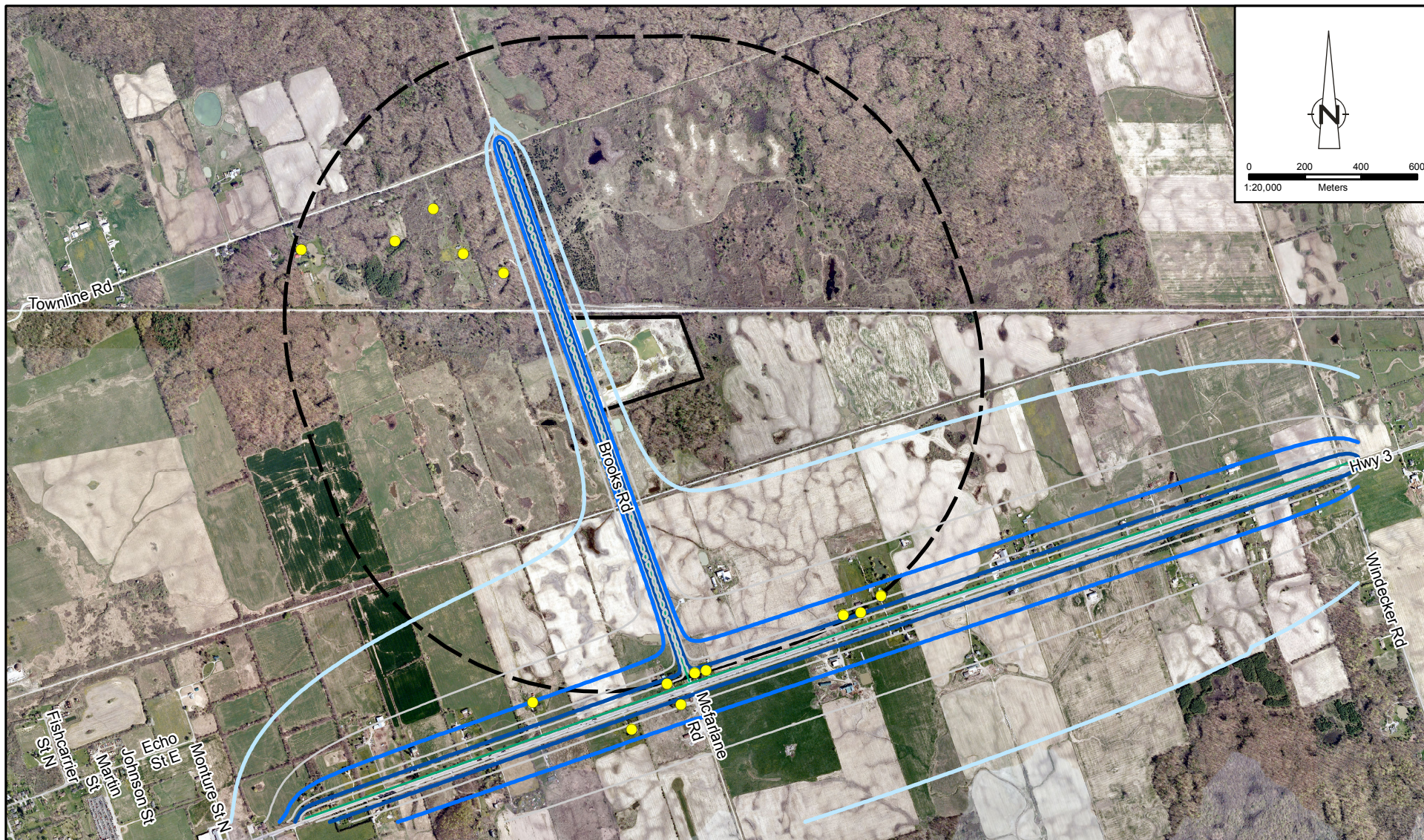
The existing noise conditions within the Study Area were quantified using the industry standard CADNA A software and the road traffic data provided by the regulatory authorities. The US Department of Transportation Federal Highway Administration Traffic Noise Model (TNM) calculation standard was used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

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

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

**Figure 3.4** and **Figure 3.5** present the road traffic sound level contours within the Study Area for the daytime and nighttime periods, respectively.





Source: MNR/NRVS, 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

#### Legend



- Sensitive Receiver Location
- Local Study Area (1km Radius)
- Site Location
- 30 dBA
- 40 dBA
- 50 dBA

figure 3.4  
 ROAD TRAFFIC SOUND LEVEL CONTOURS – DAYTIME  
 NOISE ASSESSMENT REPORT  
 BROOKS ROAD LANDFILL  
 160 Brooks Road, Cayuga, Ontario





Source: MNR 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

#### Legend

- Sensitive Receiver Location
- Local Study Area (1km Radius)
- Site Location
- 30 dBA
- 40 dBA
- 50 dBA

figure 3.5  
 ROAD TRAFFIC SOUND LEVEL CONTOURS – NIGHTTIME  
 NOISE ASSESSMENT REPORT  
 BROOKS ROAD LANDFILL  
 160 Brooks Road, Cayuga, Ontario



### **3.3.3 Off-Site Haul Routes**

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

### **3.3.4 Summary of Existing Conditions**

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

The 9 residential dwellings located along Highway 3 are considered to be Class 2 receivers and the 5 residential dwellings situated away from the corridor are considered to be Class 3 receivers. However, N-1 is the applicable regulatory Guideline for compliance assessment purposes for this Facility and the proposed Landfill expansion.

## **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 Noise 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 from Noise. Mitigation measures are not required because the predicted off-site noise impact meets the applicable 55 dBA regulatory noise limit.

## **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 a Noise 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 Noise evaluation criteria and indicators 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 noise effects (based on measures)
- Develop and apply avoidance/mitigation/compensation/enhancement measures
- Determine net effects on the environment

## 5.2 General Assumptions

The Site activity and modelling assumptions are summarized in Section 3.3.1. The three development Alternative assumptions are documented in Section 2.0. The worst-case equipment locations were selected based on proximity and elevated line-of-sight exposure to the off-site residential dwellings. The worst-case elevation was selected based on Landfill cell development and the corresponding topography detail.

## 5.3 Criteria/Indicators

	Environmental Component	Evaluation Criteria	Study Area	Indicators	Rationale	Data Sources
NATURAL	Atmospheric Environment	Noise	Site & Local Study Areas	<ul style="list-style-type: none"> <li>• Predicted off-Site noise level</li> <li>• Number of off-Site receptors potentially affected (residential properties, public facilities, businesses, and institutions).</li> </ul>	The cumulative environmental noise from the existing facility and the proposed vertical capacity landfill expansion may result in increased noise impacts off-site	<ul style="list-style-type: none"> <li>• Site-specific equipment noise measurements</li> <li>• Manufacturer provided noise specifications</li> <li>• Applicable MOE guidelines and technical standards (Noise guidelines for landfill sites N-1, Oct, 1998; NPC-300, August, 2013; NPC-233)</li> <li>• Aerial photographic mapping and field reconnaissance to confirm off-Site receptors</li> <li>• Land Use Zoning Plans</li> <li>• Acoustic Assessment Reports</li> <li>• Proposed facility operational characteristics and scenarios</li> <li>• Landfill design and operations data</li> </ul>

## **5.4 Potential Environmental Effects**

Fourteen off-site residential dwellings will be potentially impacted from the existing Landfill activities. The predicted noise impact range is 40 to 55 dBA (rounded). POR5 is the most impacted at 55 dBA. All residential dwellings are below the 55 dBA noise limit.

Noise contours for the Existing Conditions are presented on **Figure 3.3**.

From a potential noise impact exposure perspective, Alternative Methods 1, 2 and 3 are near identical and the difference in final landfill height is environmentally insignificant, as discussed below. However, the increased height will result in a potential change to the line-of-sight noise impact exposure for the fourteen off-site residential dwellings.

### **5.4.1 Alternative Method 1**

There is a potential for an increased line-of-sight due to the + 20.69 m elevation change associated with Alternative Method 1 and in comparison to the Existing Conditions. Up to fourteen off-site residential dwellings will be affected.

### **5.4.2 Alternative Method 2**

There is a potential for an increased line-of-sight due to the + 22.54 m elevation change associated with Alternative Method 2 and in comparison to the Existing Conditions. Up to fourteen off-site residential dwellings will be affected.

### **5.4.3 Alternative Method 3**

There is a potential for an increased line-of-sight due to the + 23.17 m elevation change associated with Alternative Method 3 and in comparison to the Existing Conditions. Up to fourteen off-site residential dwellings will be affected.

## **5.5 Mitigation Measures Beyond Those Incorporated into the Design**

### **5.5.1 Alternative Method 1**

As all residential dwellings are below the 55 dBA noise limit, no specific mitigation measures are required. The implementation of Best Management Practices (BMPs), such as barriers and/or berms at Landfill perimeter and administrative controls that limit on-site landfilling activities will serve to minimize noise impacts from the Site.

### **5.5.2 Alternative Method 2**

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

### **5.5.3 Alternative Method 3**

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

## **5.6 Net Environmental Effects**

### **5.6.1 Alternative Method 1**

The predicted noise impact range is 40 to 52 dBA (rounded). POR5 is the most impacted at 52 dBA. The predicted noise impact range and the noise impact at critical POR5 is lower for Alternative Method 1 than the Existing Conditions.

Noise contours for Alternative Method 1 are presented on **Figure 5.1**.

### **5.6.2 Alternative Method 2**

The predicted noise impact range is 40 to 52 dBA (rounded). POR5 is the most impacted at 52 dBA. The predicted noise impact range and the noise impact at critical POR5 is lower for Alternative Method 2 than the Existing Conditions.

Noise contours for Alternative Method 2 are presented on **Figure 5.2**.

### **5.6.3 Alternative Method 3**

The predicted noise impact range is 40 to 52 dBA (rounded). POR5 is the most impacted at 52 dBA. The predicted noise impact range and the noise impact at critical POR5 is lower for Alternative Method 3 than the Existing Conditions.

Noise contours for Alternative Method 3 are presented on **Figure 5.3**.





**Table 5.1 Alternative Method 1 Noise Potential Environmental Effects, Mitigation Measures & Net Effects**

	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
NATURAL	Atmospheric Environment	Noise	Predicted off-Site noise level	Potential noise impact change due to increased elevation of + 20.69 m above the Existing Conditions that will affect line-of-sight noise impact exposure.	<ul style="list-style-type: none"> <li>No mitigation measures are required.</li> <li>BMPs, such as barriers and/or berms at Landfill perimeter and administrative controls that limit on-site landfilling activities, will be implemented by Brooks Road Environmental (BRE) to minimize noise impacts from the Site.</li> </ul>	Potential change to the predicted off-site noise impact from the Existing Conditions.
			Number of off-Site receptors potentially affected (residential properties, public facilities, businesses, and institutions)	Up to 14 existing off-site residential dwellings affected by the proposed Landfill expansion.		Up to 14 residences may experience a change in the predicted off-site noise impact due to the Landfill expansion based on the Existing Conditions.

**Table 5.2 Alternative Method 2 Noise Potential Environmental Effects, Mitigation Measures & Net Effects**

	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
NATURAL	Atmospheric Environment	Noise	Predicted off-Site noise level	Potential noise impact change due to increased elevation of + 22.54 m above the Existing Conditions that will affect line-of-sight noise impact exposure.	<ul style="list-style-type: none"> <li>No mitigation measures are required.</li> <li>BMPs, such as barriers and/or berms at Landfill perimeter and administrative controls that limit on-site landfilling activities, will be implemented by Brooks Road Environmental (BRE) to minimize noise impacts from the Site.</li> </ul>	Potential change to the predicted off-site noise impact from the Existing Conditions.
			Number of off-Site receptors potentially affected (residential properties, public facilities, businesses, and institutions)	Up to 14 existing off-site residential dwellings affected by the proposed Landfill expansion.		Up to 14 residences may experience a change in the predicted off-site noise impact due to the Landfill expansion based on the Existing Conditions.



**Table 5.3 Alternative Method 3 Noise Potential Environmental Effects, Mitigation Measures & Net Effects**

	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
NATURAL	Atmospheric Environment	Noise	Predicted off-Site noise level	Potential noise impact change due to increased elevation of + 23.17 m above the Existing Conditions that will affect line-of-sight noise impact exposure.	<ul style="list-style-type: none"> <li>No mitigation measures are required.</li> <li>BMPs, such as barriers and/or berms at Landfill perimeter and administrative controls that limit on-site landfilling activities, will be implemented by Brooks Road Environmental (BRE) to minimize noise impacts from the Site.</li> </ul>	Potential change to the predicted off-site noise impact from the Existing Conditions.
			Number of off-Site receptors potentially affected (residential properties, public facilities, businesses, and institutions)	Up to 14 existing off-site residential dwellings affected by the proposed Landfill expansion.		Up to 14 residences may experience a change in the predicted off-site noise impact due to the Landfill expansion based on the Existing Conditions.



Figure 5.1 Noise Contours – Vertical Expansion Alternative 1

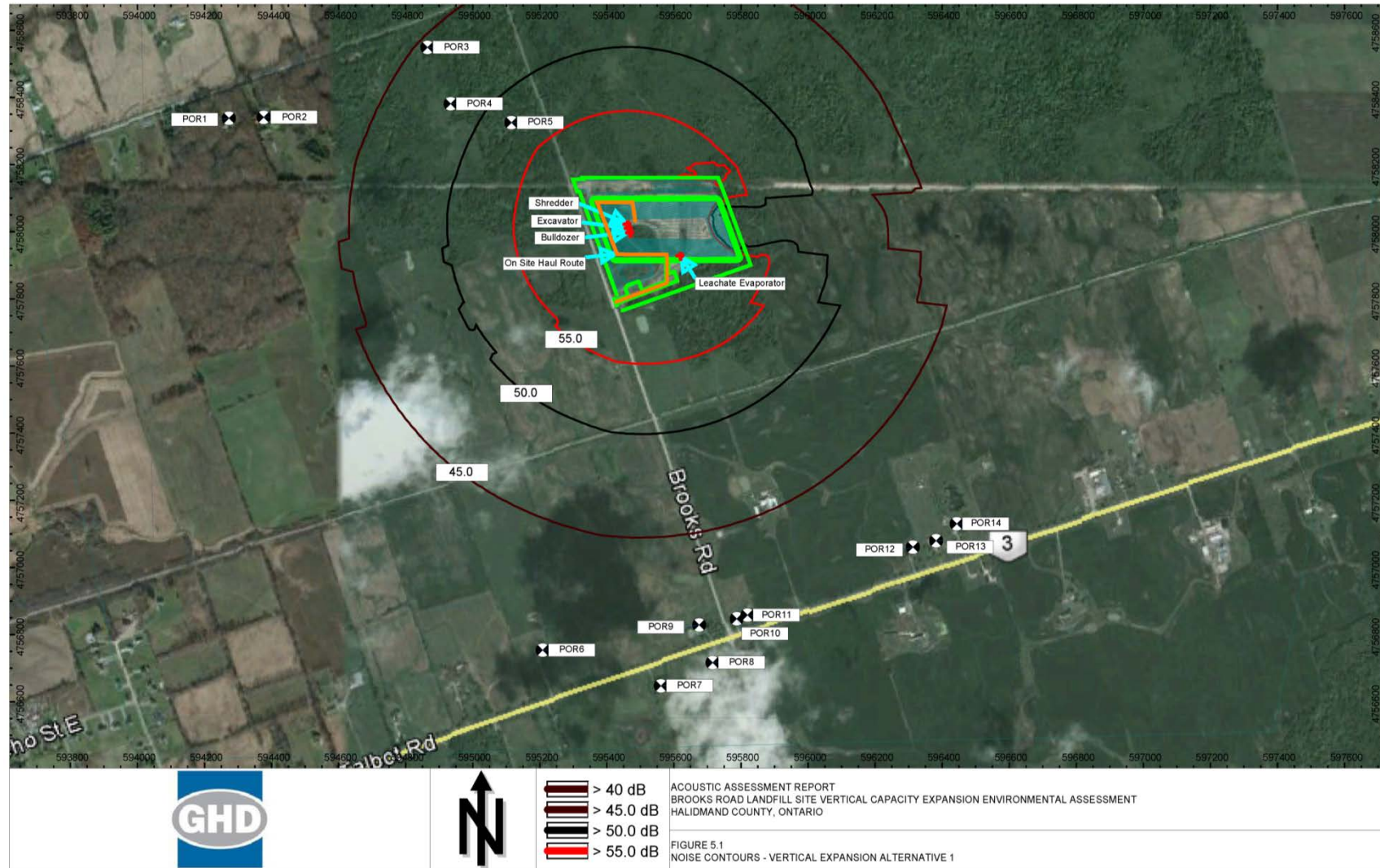






Figure 5.2 Noise Contours – Vertical Expansion Alternative 2

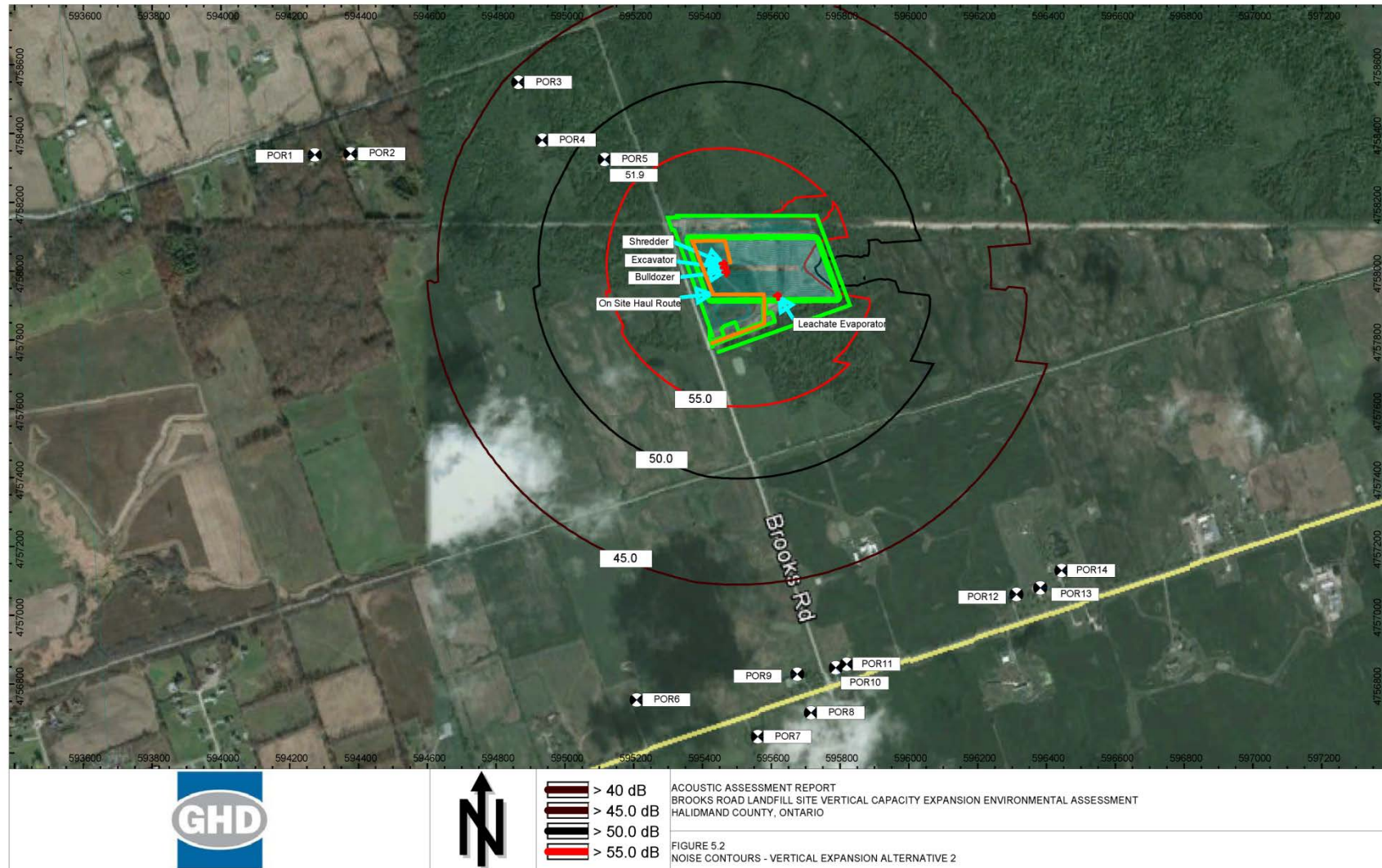
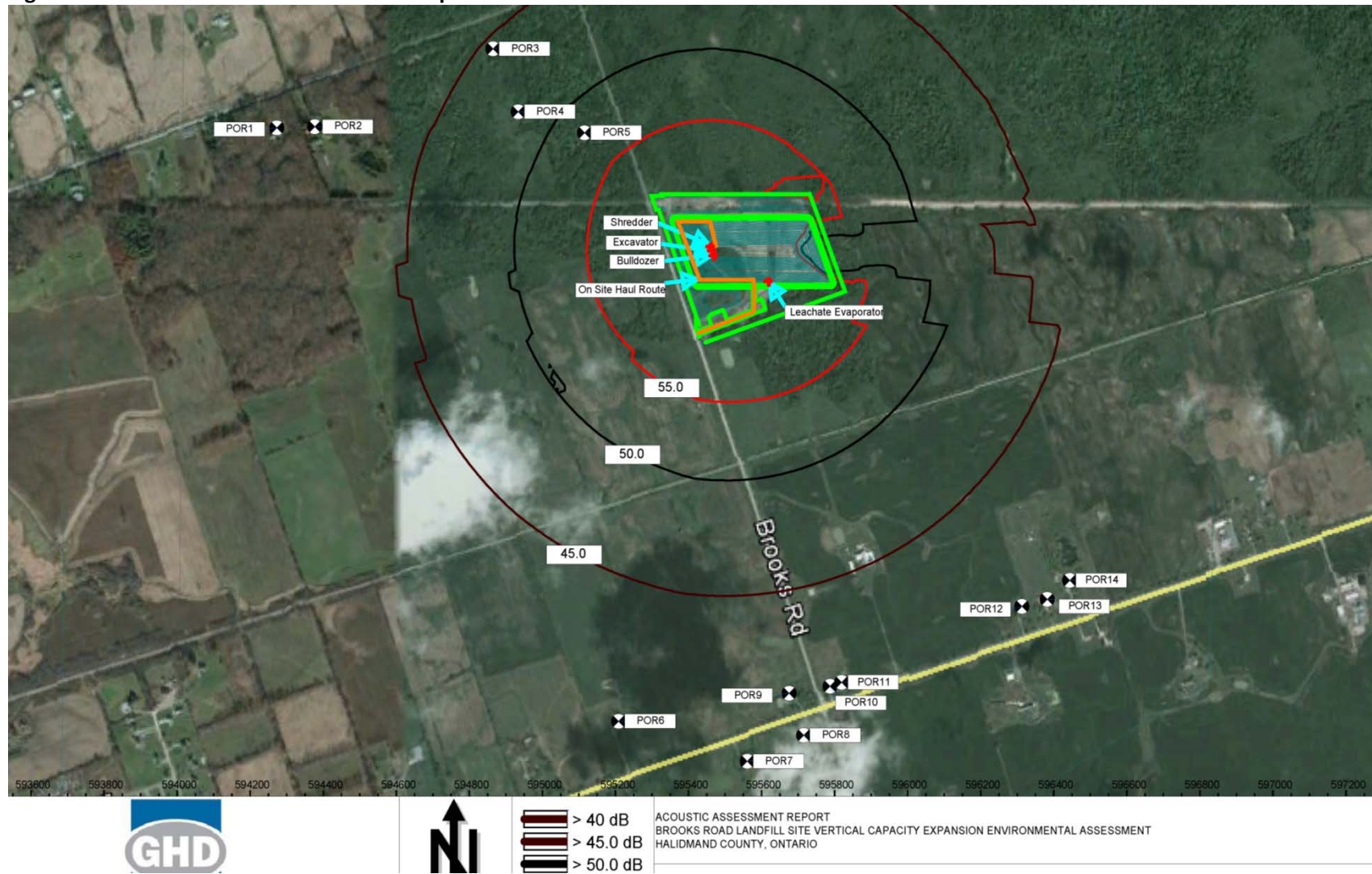




Figure 5.3 Noise Contours – Vertical Expansion Alternative 3



## Section 6.0 Comparative Evaluation

This section documents the comparative evaluation of the Alternative Methods from a Noise 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 a Noise 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

All three Alternative Methods will have a low net effect on the predicted off-Site noise level with a noise impact exposure range from 40 dBA to 52 dBA for each. The number of potentially affected off-Site receptors and extent of effect is identical for all three Alternative Methods, with POR5 being impacted the most at 52 dBA (which is a -3 dBA reduction from the existing condition). For all 14 off-Site receptors within the Local Study Area, the net sound level change associated with each Alternative Method is 3 dBA or lower, which is recognized as environmentally and acoustically insignificant and; therefore, the net effects are considered low. As such, there is no distinction between the alternatives in relation their effects on Noise within the Local Study Area and; therefore, all alternatives rank the same.





**Table 6.1 Noise Comparative Evaluation**

NATURAL	Environmental Component	Evaluation Criteria	Indicator	Alternative Method 1 Net Effects	Alternative Method 2 Net Effects	Alternative Method 3 Net Effects
	Atmospheric Environment	Noise	Predicted off-Site noise level	Noise impact exposure ranges from 40 dBA to 52 dBA, which is below the 55 dBA noise limit.  <b>LOW NET EFFECT</b>	Noise impact exposure ranges from 40 dBA to 52 dBA, which is below the 55 dBA noise limit.  <b>LOW NET EFFECT</b>	Noise impact exposure ranges from 40 dBA to 52 dBA, which is below the 55 dBA noise limit.  <b>LOW NET EFFECT</b>
			Number of off-Site receptors potentially affected (residential properties, public facilities, businesses, and institutions)	Net sound level change for 14 off-Site receptors is 3 dBA or lower <sup>1</sup> : <ul style="list-style-type: none"><li>10 residences = 0 to + 1 dBA change</li><li>1 residence = 2 dBA change</li><li>3 residences = 2 to 3 dBA noise reduction</li><li>POR5 = 52 dBA (-3 dBA reduction from existing condition)</li><li>POR7 = 40 dBA (+ 2 dBA increase from existing condition)</li></ul> <b>LOW NET EFFECT</b>	Net sound level change for 14 off-Site receptors is 3 dBA or lower <sup>1</sup> : <ul style="list-style-type: none"><li>10 residences = 0 to + 1 dBA change</li><li>1 residence = 2 dBA change</li><li>3 residences = 2 to 3 dBA noise reduction</li><li>POR5 = 52 dBA (-3 dBA reduction from existing condition)</li><li>POR7 = 40 dBA (+ 2 dBA increase from existing condition)</li></ul> <b>LOW NET EFFECT</b>	Net sound level change for 14 off-Site receptors is 3 dBA or lower <sup>1</sup> : <ul style="list-style-type: none"><li>10 residences = 0 to + 1 dBA change</li><li>1 residence = 2 dBA change</li><li>3 residences = 2 to 3 dBA noise reduction</li><li>POR5 = 52 dBA (-3 dBA reduction from existing condition)</li><li>POR7 = 40 dBA (+ 2 dBA increase from existing condition)</li></ul> <b>LOW NET EFFECT</b>
		Environmental Component Ranking:	Tied for 1 <sup>st</sup>	Tied for 1 <sup>st</sup>	Tied for 1 <sup>st</sup>	
	RATIONALE			There is no distinction between the alternatives in terms of their predicted off-Site noise levels and the number of off-Site receptors potentially affected. As such, all three alternatives are preferred.		

Notes:

1. A net sound level change of 0 to 3 dBA is recognized as environmentally and acoustically insignificant.

## **Section 7.0 Conclusion**

The BRE Facility is located in a mixed Acoustical Class 2 and Class 3 area based on the MOECC NPC 300 guideline and depending on the proximity of the off-site residential dwellings to Highway 3.

Nine residential dwellings located along Highway 3 are considered to be Class 2 receivers and the five residential dwellings situated away from the corridor are considered to be Class 3 receivers. N-1 is the applicable regulatory Guideline for compliance assessment purposes for the Facility and the proposed Landfill expansion and requires that the BRE Facility achieve a noise limit of 55 dBA at all off-site residential dwellings of concern. The Landfill is limited to daytime only operations from 7 a.m. to 7 p.m. The Existing Conditions at the BRE Facility are below the 55 dBA noise limit.

The BRE Landfill Expansion considers three development alternatives identified as Alternative Methods 1 to 3. All three Alternatives remain well below the Guideline N-1 noise limit of 55 dBA.

Alternative Methods 1 to 3 were ranked equally as "Tied for 1<sup>st</sup>" based on the noise discipline criteria established in the ToR.

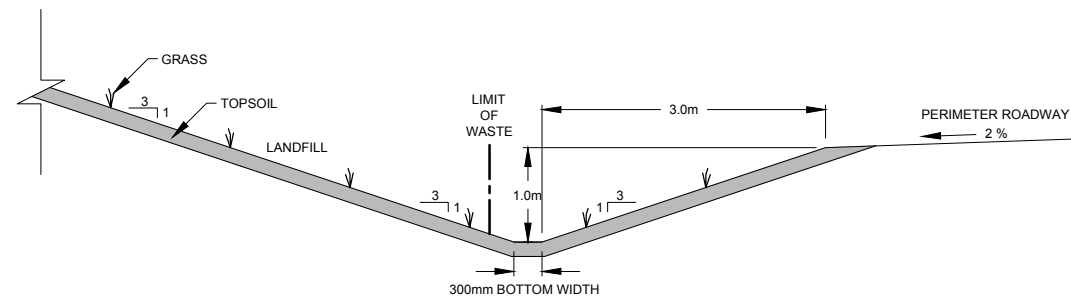


**Brooks Road  
Environmental**

## **Drawings**



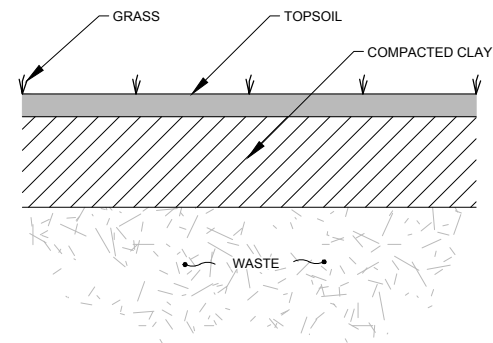




DETAIL 1 PERIMETER DITCH (TYPICAL)

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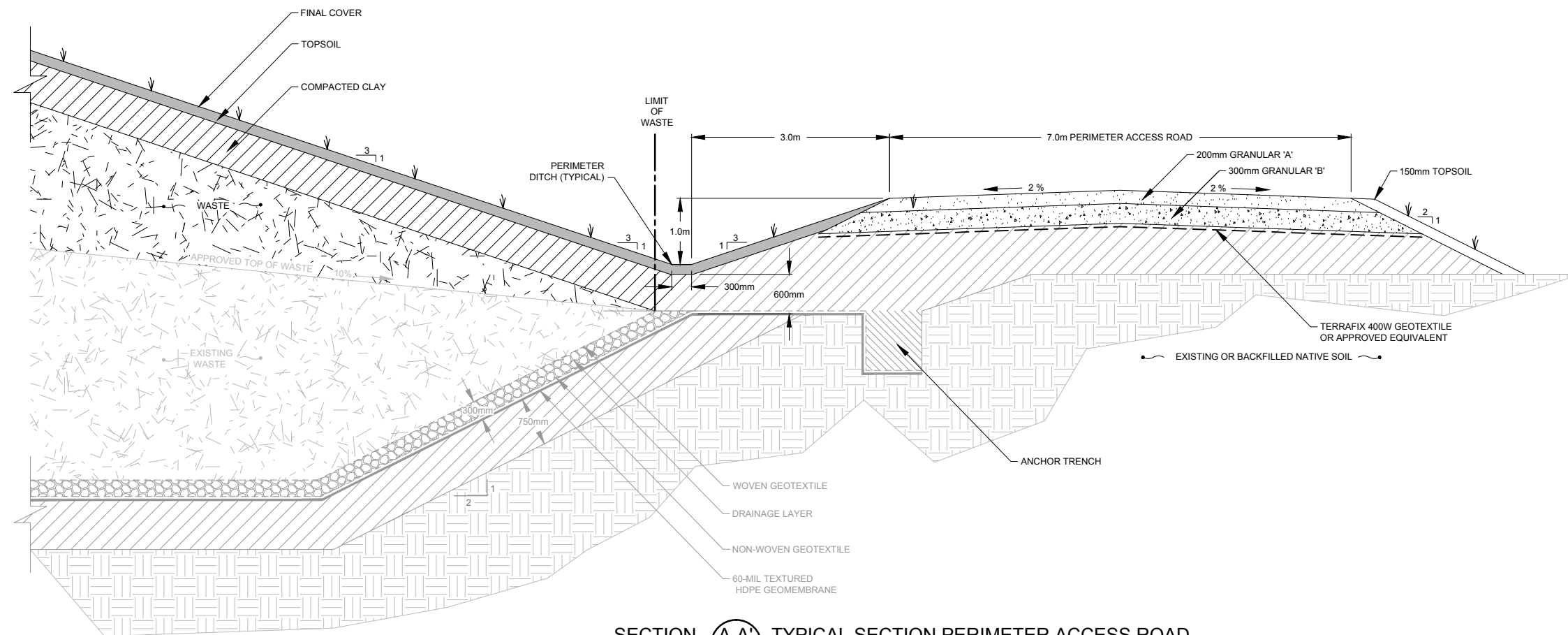
C-03



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

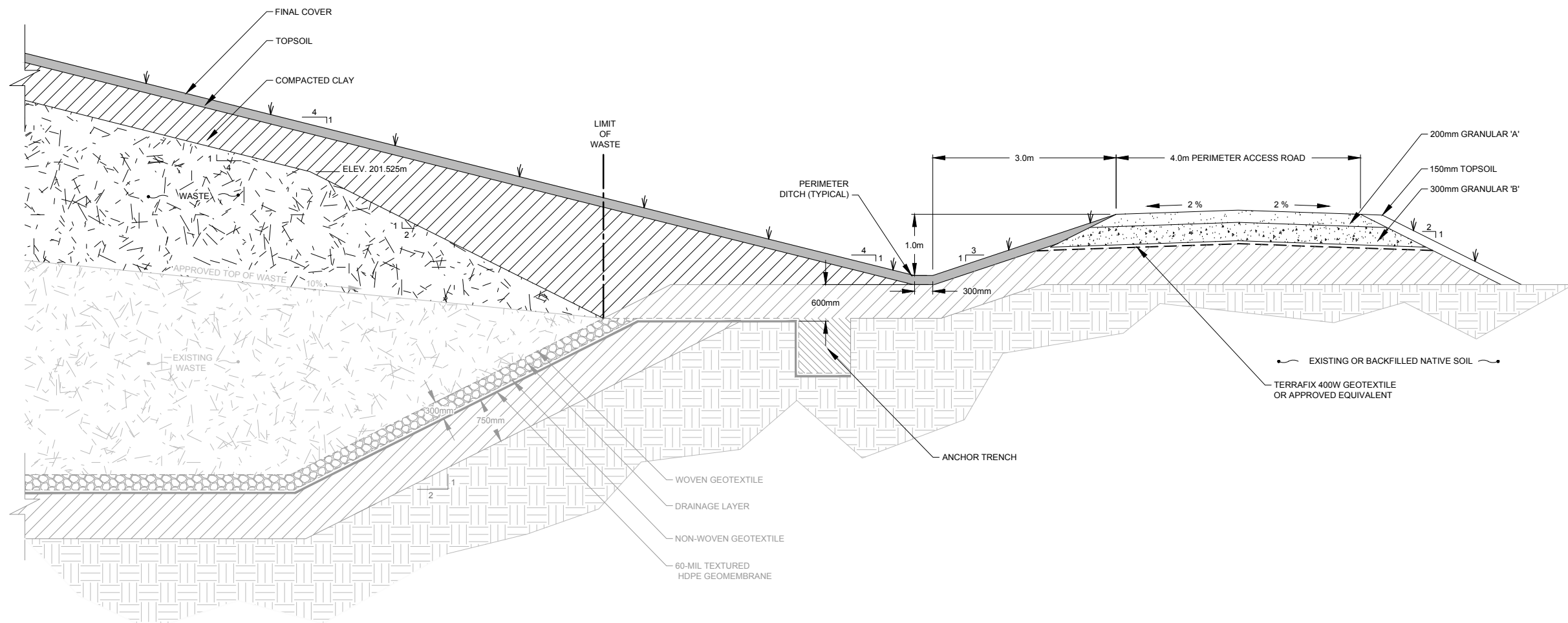
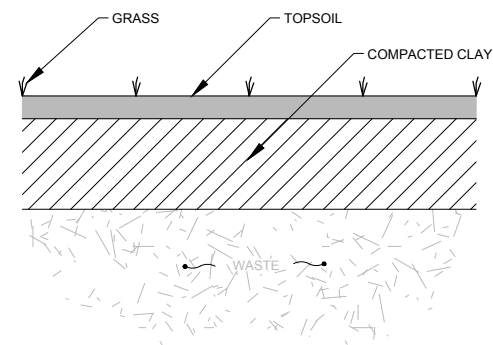
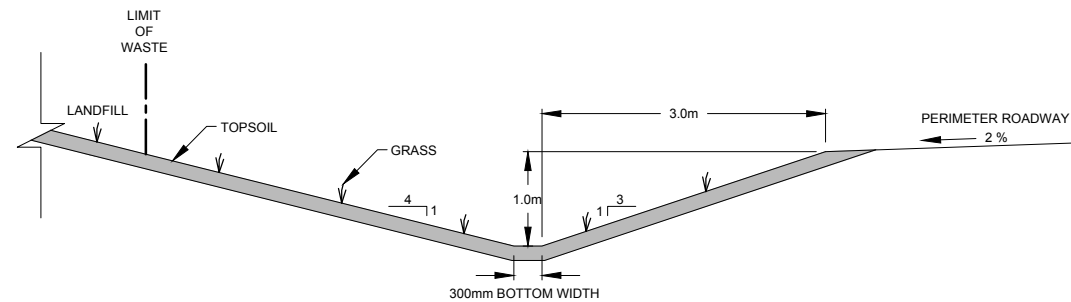


Source Reference:

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







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			

Source Reference:			
Project Manager:	Reviewed By:	Date:	
G.FERRARO	P.KEMP	DECEMBER 2015	
Scale:	Project N°:	Report N°:	Drawing N°:
1:1000	18235-20	051	C-05







## **Appendix A**

### **Land Use Zoning**



Source: MNR 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

**Legend**





-  Site Location
  -  Local Study Area (1km Radius)
  -  Zoning
- 

figure A.1

**STUDY AREA LAND USE ZONING**  
**NOISE ASSESSMENT REPORT**  
**BROOKS ROAD LANDFILL**  
*160 Brooks Road, Cayuga, Ontario*