



**Brooks Road
Environmental**



**Terrestrial and Aquatic Environment
Assessment Report for the Brooks Road
Landfill Site Vertical Capacity Expansion
Environmental Assessment**

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

**FEBRUARY 2017
REF. NO. 018235 (55)**

Table of Contents

Section 1.0	Introduction.....	4
Section 2.0	Alternative Methods for Vertical Expansion.....	4
Section 3.0	Terrestrial and Aquatic Environment Potentially Affected.....	5
3.1	Study Areas	5
3.2	Methodology	8
3.2.1	Available Secondary Source Information Collection and Review	8
3.2.2	Field Investigations	8
3.2.2.1	Wetland Delineation and Ecological Land Classification.....	9
3.2.2.2	Calling Amphibian Surveys	9
3.2.2.3	Breeding Bird Survey	9
3.2.2.4	Aquatic Habitat Assessment.....	10
3.2.2.5	Incidental Species Observations.....	10
3.2.6	Agency Consultation	10
3.3	Existing Terrestrial and Aquatic Environment Conditions	10
3.3.1	Topography and Hydrology	10
3.3.2	Significant Natural Features.....	13
3.3.3	Wetland Delineation.....	16
3.3.4	Vegetation.....	18
3.3.5	Aquatic Habitat and Species	27
3.3.6	Wildlife	30
3.3.6.1	Herpetofauna	30
3.3.6.1.1	AMPHIBIANS.....	30
3.3.6.1.2	REPTILES	30
3.3.6.2	Birds.....	31
3.3.6.3	Mammals.....	32
3.3.6.4	Species at Risk	32
Section 4.0	Mitigation Measures to be Incorporated into the Alternative Method Designs	38
Section 5.0	Net Effects Assessment	38
5.1	Net Effects Assessment Methodology	38
5.2	General Assumptions.....	39
5.3	Criteria/Indicators.....	39
5.4	Potential Environmental Effects	39
5.4.1	Alternative Method 1.....	39
5.4.2	Alternative Method 2.....	39
5.4.3	Alternative Method 3.....	40
5.5	Mitigation Measures Beyond Those Incorporated into the Design	40
5.5.1	Alternative Method 1.....	40
5.5.2	Alternative Method 2.....	40
5.5.3	Alternative Method 3.....	40
5.5.4	Best Management Practices	40

5.6	Net Environmental Effects.....	41
5.6.1	Alternative Method 1.....	41
5.6.2	Alternative Method 2.....	41
5.6.3	Alternative Method 3.....	41
Section 6.0	Comparative Evaluation	45
6.1	Comparative Evaluation Methodology.....	45
6.2	Comparative Evaluation Results	45
Section 7.0	Conclusion	48
Section 8.0	References	49

List of Figures

Figure 3.1	Study Area
Figure 3.2	Physiography
Figure 3.3	Natural Areas of Concern
Figure 3.4	Provincially Significant Wetlands
Figure 3.5	Wetland Boundaries and Ecological Land Classification
Figure 3.6	Ecological Land Classification
Figure 3.7	Aquatic Habitat Features
Figure 3.8	Provincially Tracked Species

List of Drawings (Following Text)

Drawing C-02	Vertical Expansion Alternative 1
Drawing C-03	Vertical Expansion Alternative 1 Details
Drawing C-04	Vertical Expansion Alternative 2
Drawing C-05	Vertical Expansion Alternative 2 Details
Drawing C-06	Vertical Expansion Alternative 3
Drawing C-07	Vertical Expansion Alternative 3 Details

List of Tables

Table 2.1	Comparison of Vertical Expansion Options
Table 3.1	Secondary Source Information Reviewed
Table 3.2	Field Investigations
Table 3.3	Incidental Faunal Species Observations (following text)
Table 3.4	Species at Risk Summary

List of Appendices

Appendix A	Response Letter from MNRF
Appendix B	Vegetation Inventory
Appendix C	Wildlife Survey Results
	C-1: 2014 Amphibian Survey Results
	C-2: 2015 Breeding Bird Survey Results

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 the Terrestrial and Aquatic Environment discipline:

- Describes the Terrestrial and Aquatic Environment 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 the Terrestrial and Aquatic Environment (**Section 4.0**)
- Documents the net effects analysis for each Alternative Method with respect to the Terrestrial and Aquatic Environment (**Section 5.0**)
- Identifies the Preferred Alternative Method from a Terrestrial and Aquatic Environment 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 m³, 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 Terrestrial and Aquatic 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 Area in the EA. The following section provides a more detailed description and understanding of the Terrestrial and Aquatic Environment Existing Conditions within the Study Area 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

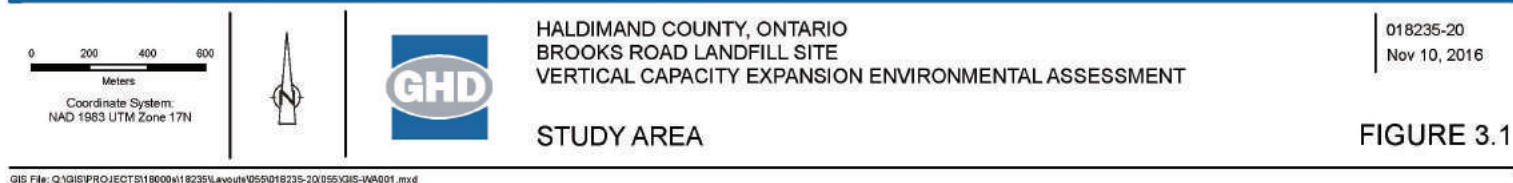
As provided for in the approved ToR, each technical discipline may modify the Local Study Area, as required, during the EA. For the Terrestrial and Aquatic Environment both the Site and Local Study Areas are applicable, and are depicted on **Figure 3.1**. Field investigations generally focused primarily on the surrounding natural features in the Local Study Area and less so on the Site Study Area (i.e., the Brooks



Road Landfill Site) due to active disturbance and the general lack of natural features within the landfill property.

Various field investigations were focused on specific portions of the Local Study Area (**Figure 3.1**). The area to the south and east of the Site Study Area (herein referred to as 'East Lands') consists of undeveloped rural property consisting of a combination of agricultural fields and forested lands. On the west side of Brooks Road (herein referred to as 'West Lands') is a rural property which is characterized by agricultural fields and small forested plots. To the north of the Site Study Area, there is a rural property consisting of limited agricultural fields and forested lands.

Figure 3.1 Study Area



3.2 Methodology

Information on the Terrestrial and Aquatic Environment Existing Conditions 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 existing Natural Environment conditions within the Study Areas. The sources reviewed are outlined in **Table 3.1**.

Table 3.1 Secondary Source Information Reviewed

Source	Information Reviewed
Ministry of Natural Resources and Forestry (MNRF)	<ul style="list-style-type: none"> Species at Risk (SAR) Natural Heritage Features data layers from Land Information Ontario Aquatic Resource Area (ARA) Survey Points
Fisheries and Oceans Canada (DFO)	<ul style="list-style-type: none"> Species at Risk Fish and Mussel Maps (2015)
Grand River Conservation Authority (GRCA)	<ul style="list-style-type: none"> Fisheries Management Plan (2001) Wetlands map layer
Natural Resource Solutions Incorporated (NRSI)	<ul style="list-style-type: none"> Natural Heritage Features Assessment-Edwards Landfill Site (November, 2004)
Conestoga-Rovers and Associates (CRA)	<ul style="list-style-type: none"> Scoped Environmental Impact Study Former Railway Corridor Lands North of Brooks Road Landfill, Haldimand County, ON (December, 2013)
Ontario Reptile and Amphibian Atlas	<ul style="list-style-type: none"> Species records for Study Areas
eBird	<ul style="list-style-type: none"> Avian species records in vicinity of Study Areas
Government of Canada	<ul style="list-style-type: none"> The Atlas of Canada- Toporama

3.2.2 Field Investigations

GHD staff conducted various site investigations between 2013 and 2015 to identify aquatic and terrestrial habitats and features present within the Study Areas. No wildlife species surveys were conducted in the Site Study Area due to active operation of the landfill site and limited suitable habitat; however, incidental observations were collected at all Site visits and are discussed in Section 3.3.6. Investigations were conducted in spring and summer 2013, spring and summer 2014, summer 2015, and fall 2016. Dates and locations of specific surveys are presented in **Table 3.2**.

Table 3.2 Field Investigations

Field Investigation	Dates
Wetland Delineation, Ecological Land Classification (ELC), and/or Vegetation Inventory	June 10, 2013; July 2, 2013; August 15, 2013; August 19, 2013 (North Lands) May 22, 2014; May 28, 2014; June 12, 2014; June 17, 2014; July 16, 2014; July 8, 2015 (East Lands) April 11, 2014; May 14, 2014 (West Lands)
Amphibian Surveys	April 11, 2014; May 12, 2014; June 9, 2014 (West Lands)
Breeding Bird Survey	July 8, 2015 (East Lands)
Aquatic Habitat Assessment	October 28, 2016
Incidental Species Observations	Collected on all site visits

3.2.2.1 Wetland Delineation and Ecological Land Classification

Wetlands delineations and ELC were conducted as per available protocols at the time of survey. Wetland delineations of the Study Areas were prepared following Ontario Wetland Evaluation System (OWES) methods (MNR, 1994; MNR, 2013), while ELC mapping of the Study Areas was prepared in accordance with Lee et al (1998). In accordance with the 2008 ELC revisions, the updated ELC categories were applied as appropriate. The vegetation inventory was compiled and refined by incidental observations recorded throughout all site visits.

3.2.2.2 Calling Amphibian Surveys

Amphibians were surveyed according to the Great Lakes Marsh Monitoring Protocol at 6 stations throughout the West Lands in spring 2014. At each station, all calling frogs and toads were recorded. Direction of call, distance of call, species and numbers of individuals were documented. When too many individuals of one species were calling, making it difficult to detect separate individuals and make an accurate estimate of their number, they were recorded as a chorus.

3.2.2.3 Breeding Bird Survey

Breeding bird surveys were conducted on July 8, 2015 in the East Lands. This was conducted during the breeding bird season when most birds are on their territories engaged in breeding activities. Surveys were conducted between 5:00 and 11:00 a.m. A point count methodology was utilized, where a point count location was surveyed for 5 minutes and all species seen and heard were recorded. Breeding evidence was recorded to determine if the species was a possible, probable or confirmed breeder following protocols of the Ontario Breeding Bird Atlas (Cadman et al., 2007).

3.2.2.4 Aquatic Habitat Assessment

A rapid habitat assessment was conducted along the roadside where property access was permitted on October 28, 2016, to determine the presence and type of fish habitat within the Local Study Area. Parameters collected included stream channel dimensions, flow characteristics including evidence of groundwater discharge, substrates, instream/in-water cover opportunities, riparian and instream vegetation, and the presence of physical barriers to fish movement and disturbances (past and present). Surface water resources are further documented and considered as part of the Surface Water Resources Assessment Report (GHD, 2016).

3.2.2.5 Incidental Species Observations

Incidental species observations were recorded during all site visits, and are described in greater detail in Section 3.3.5.

3.2.6 Agency Consultation

The MNRF was consulted multiple times during recent projects in the Local Study Area to request available natural heritage information, SAR records, and relevant wildlife records. The Guelph District MNRF was contacted on July 17, 2013 and April 15, 2014, and a response was received on July 29, 2013 and April 29, 2014 respectively. The response letters from MNRF correspondence are provided in **Appendix A**.

The Grand River Conservation Authority (GRCA) and Niagara Peninsula Conservation Authority (NPCA) were also involved in the development and review of the ToR, and the Scoped Environmental Impact Study (EIS) of the North Lands in 2013. GRCA and NPCA also participated in a site walk with GHD ecologists to confirm wetland boundaries in the North Lands on July 5, 2013. GRCA conducted a site walk with GHD ecologists on June 12, 2014 to confirm the wetland boundaries in the East Lands. The investigations and findings of the EIS were reviewed and accepted by both the GRCA and NPCA.

3.3 Existing Terrestrial and Aquatic Environment Conditions

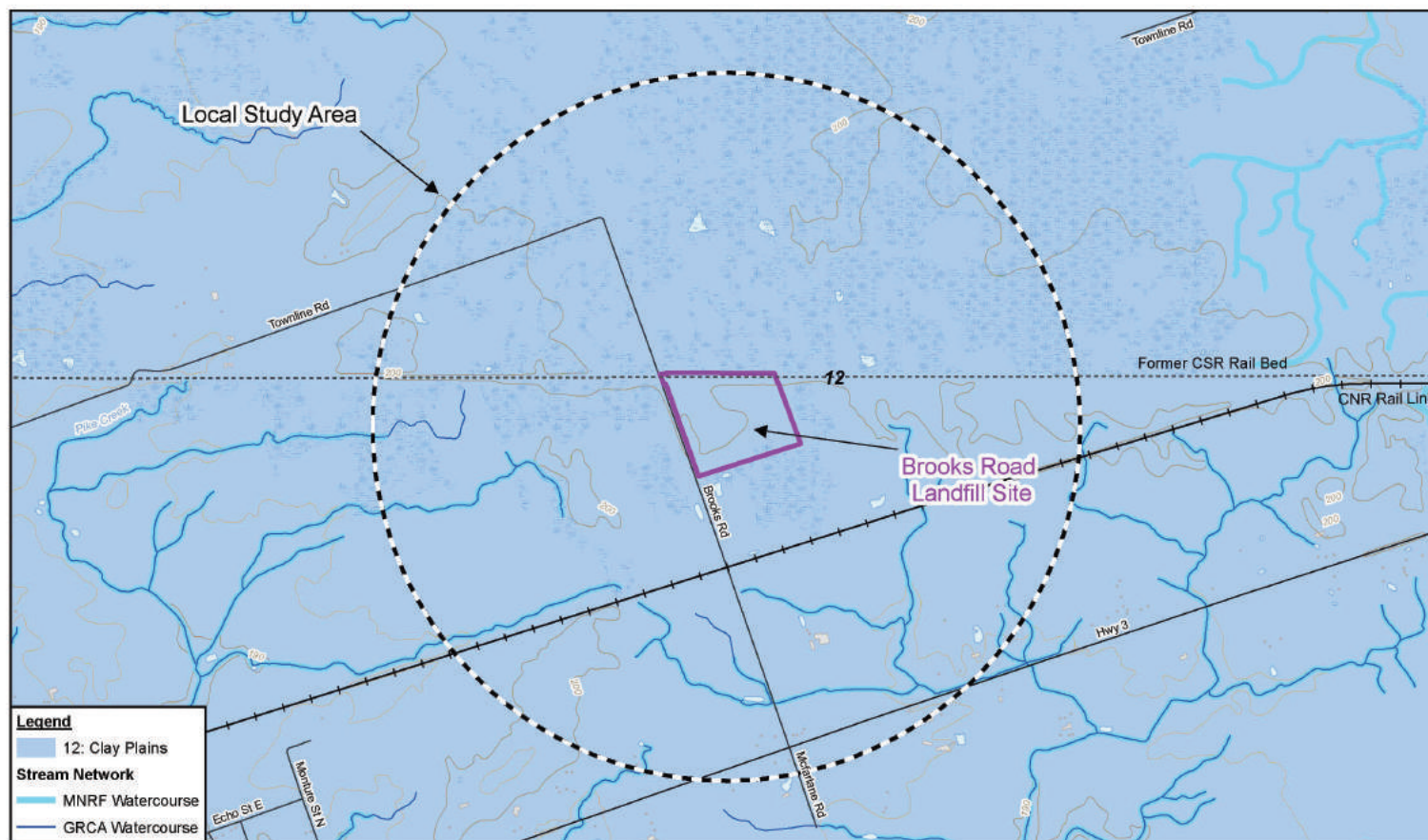
3.3.1 Topography and Hydrology

The Local Study Area is located within the Haldimand Clay Plain which is characterized by level topography and relatively poor drainage (**Figure 3.2**). The former Canadian Southern Railway (CSR) has functioned as a topographic and hydrologic divide between the northernmost portion of the Site Study Area and the area south of the Site Study Area since the former CSR railway was established in the 1870's.

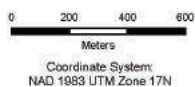
The roadside ditch along the east side of Brooks Road, adjacent to the Site Study Area, drains south through a culvert under the Canadian National Railway (CNR) rail bed, and empties into a small stream channel which is part of the headwaters of Norton Creek. Drainage from adjacent lands to the west of Brooks Road also flows through culverts under Brooks Road augmenting surface runoff to Norton Creek. Other surface runoff contributions include ephemeral streams on lands south of the Site that enter Norton Creek via culverts under the CNR rail bed. Norton Creek eventually discharges into the Grand River, which is located approximately 3 km south of the Site.

Pike Creek is also shown on mapping to extend into the western portion of the Local Study Area. However, it is shown on the Atlas of Canada's Toporama mapping to be an intermittent watercourse in this area.

Figure 3.2 Physiography



Source: MNRFS NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry, © Queen's Printer 2016;



HALDIMAND COUNTY, ONTARIO
BROOKS ROAD LANDFILL SITE
VERTICAL CAPACITY EXPANSION ENVIRONMENTAL ASSESSMENT

PHYSIOGRAPHY

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FIGURE 3.2

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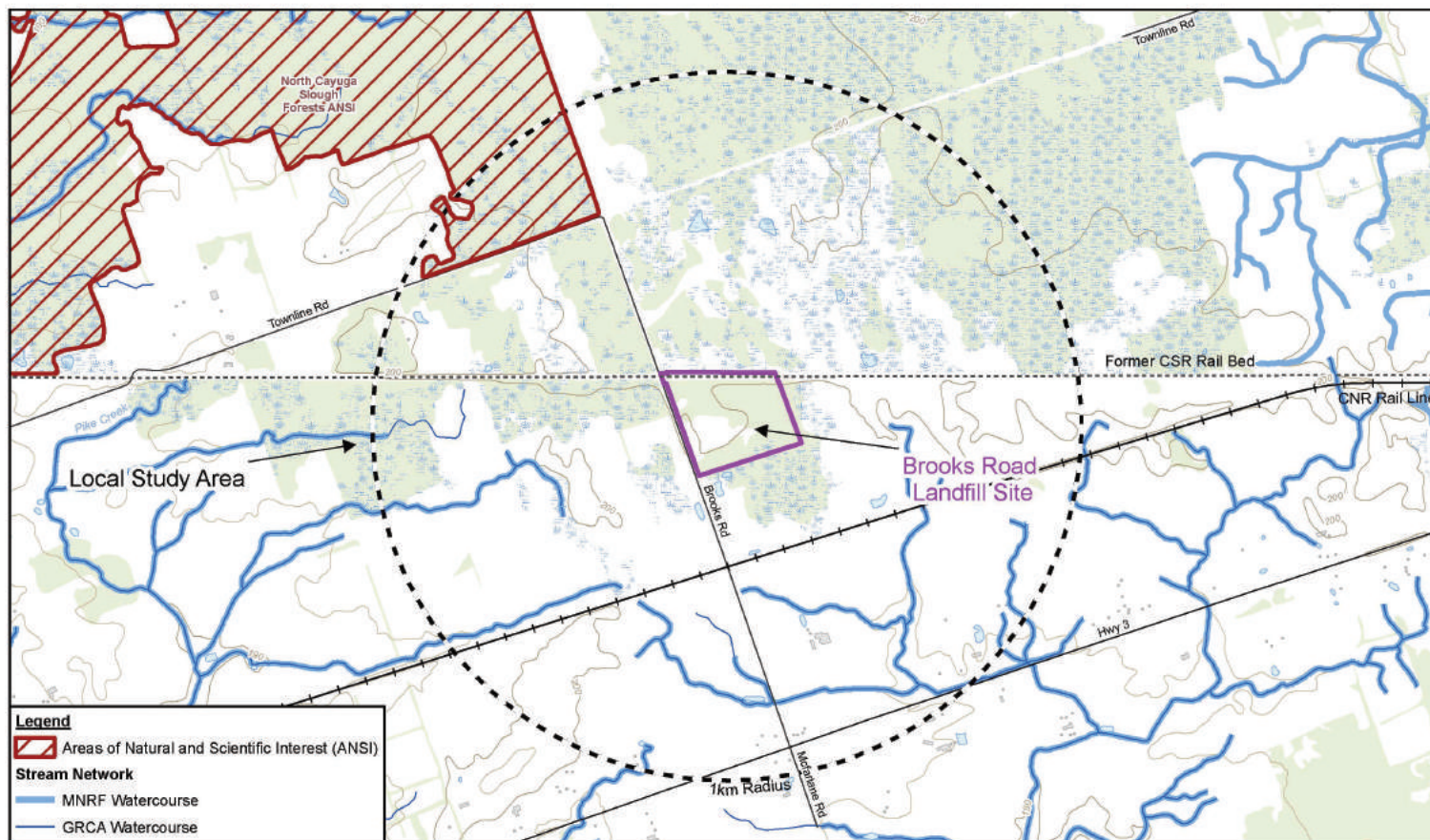
3.3.2 Significant Natural Features

The Site Study Area is bordered by natural landscape features of regional and/or provincial significance.

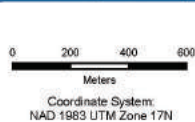
The North Cayuga Slough Forest is an Area of Natural and Scientific Interest (ANSI), located in the northwest portion of the Local Study Area and the Brooks Road/Townline Road intersection (**Figure 3.3**). This 1,214 ha landscape feature is composed of a diverse complex of woodlands, vernal pools and sloughs which are bordered by swamps (GRCA, 1997). The sloughs are a result of the Beverly and Toledo silty clay plains and the Lincoln clay plains. Generally the area is dominated by imperfectly to poorly drained lacustrine silty clay and heavy clay. The upland areas are dominated by sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*) and red oak (*Quercus rubra*). Red maple (*A. rubrum*), swamp white oak (*Q. bicolor*) and black ash (*F. nigra*) typically dominate the low, wet basins. Field communities are characterized by hawthorns (*Crataegus spp.*), southern arrow wood (*Viburnum dentatum*) and narrow-leaved meadowsweet (*Spirea alba*), representing some of the many transitional environments between the distinct upland and low land areas. This area is of special importance due to its textbook clay-plain sediments and sand ridges which lead to the very distinct vegetation patterns. Previous studies have documented that 14 vegetation species and 4 bird species that are rare nationally, provincially and/or regionally occur in the area. This area is also home to a heronry (GRCA, 1997).

The North Cayuga Swamp Wetland Complex is a provincially significant wetland (PSW) complex that is also present within the Site Study Area and throughout the Local Study Area in general (**Figure 3.4**). The wetland boundary shown on **Figure 3.4** was verified by MNRF in 2010. This wetland complex is made up of numerous individual wetlands dominated by swamp with some marsh wetlands (MNR, 2010). The PSW extends to the northernmost portion of the Site Study Area and incorporates the wetland elements of the North Cayuga Slough Forest. The complex vegetation community is characterized by thicket swamps of narrow-leaved meadowsweet, buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex verticillata*), or speckled alder (*Alnus incana ssp. rugosa*) with red maple, gray dogwood (*Cornus foemina ssp. racemosa*), highbush blueberry (*Vaccinium corymbosum*), and willows (*Salix spp.*) as associates (NPCA, 2010). The soil is a clay, loam or silt composition.

Figure 3.3 Natural Areas of Concern



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry. © Queen's Printer 2016.



HALDIMAND COUNTY, ONTARIO
BROOKS ROAD LANDFILL SITE
VERTICAL CAPACITY EXPANSION ENVIRONMENTAL ASSESSMENT

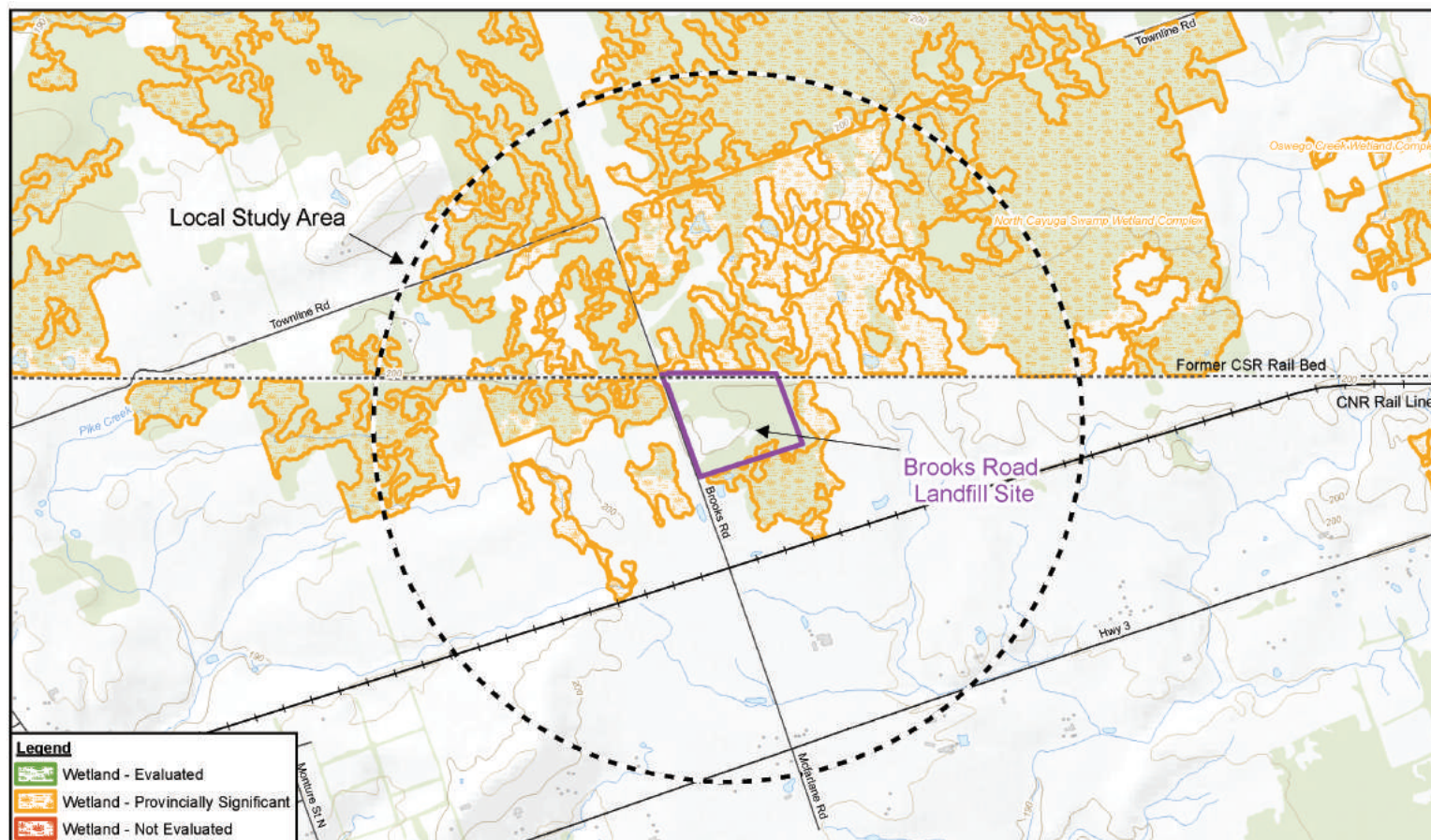
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NATURAL AREAS OF CONCERN

FIGURE 3.3

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Figure 3.4 Provincially Significant Wetlands



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry. © Queen's Printer 2016.

0 200 400 600
Meters
Coordinate System:
NAD 1983 UTM Zone 17N



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PROVINCIALY SIGNIFICANT WETLANDS

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FIGURE 3.4

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3.3.3 Wetland Delineation

GHD conducted a wetland delineation of the North and East Lands within the Local Study Areas. The wetland delineation was completed over multiple site visits in 2013 and 2014 by an ecologist certified under the Ontario Wetland Evaluation System (OWES) protocol through the MNRF. The wetland delineation was prepared following Ontario Wetland Evaluation System (OWES) methods (MNR, 1994; MNR, 2013) and is presented on **Figure 3.5**. Vegetation, soil characteristics, hydrological features and topography were surveyed as part of this wetland delineation. Soil horizons were sampled at depth using a soil hand core auger to verify soil type and potential hydric soils. Boundaries were flagged for visual representation of the wetland boundary and future verification. In order to verify the wetland boundaries and site conditions, GRCA and NPCA representatives conducted a site walk of the North Lands with GHD ecologists on July 5, 2013, and on June 12, 2014 for the East Lands (GRCA only). Once complete, a surveyor using a Total Station GPS unit captured the wetland boundaries. This information was transposed to create **Figure 3.5**. Twenty-five wetland units were delineated within a 1km radius of the landfill property.

Figure 3.5 Wetland Boundaries and Ecological Land Classification



3.3.4 Vegetation

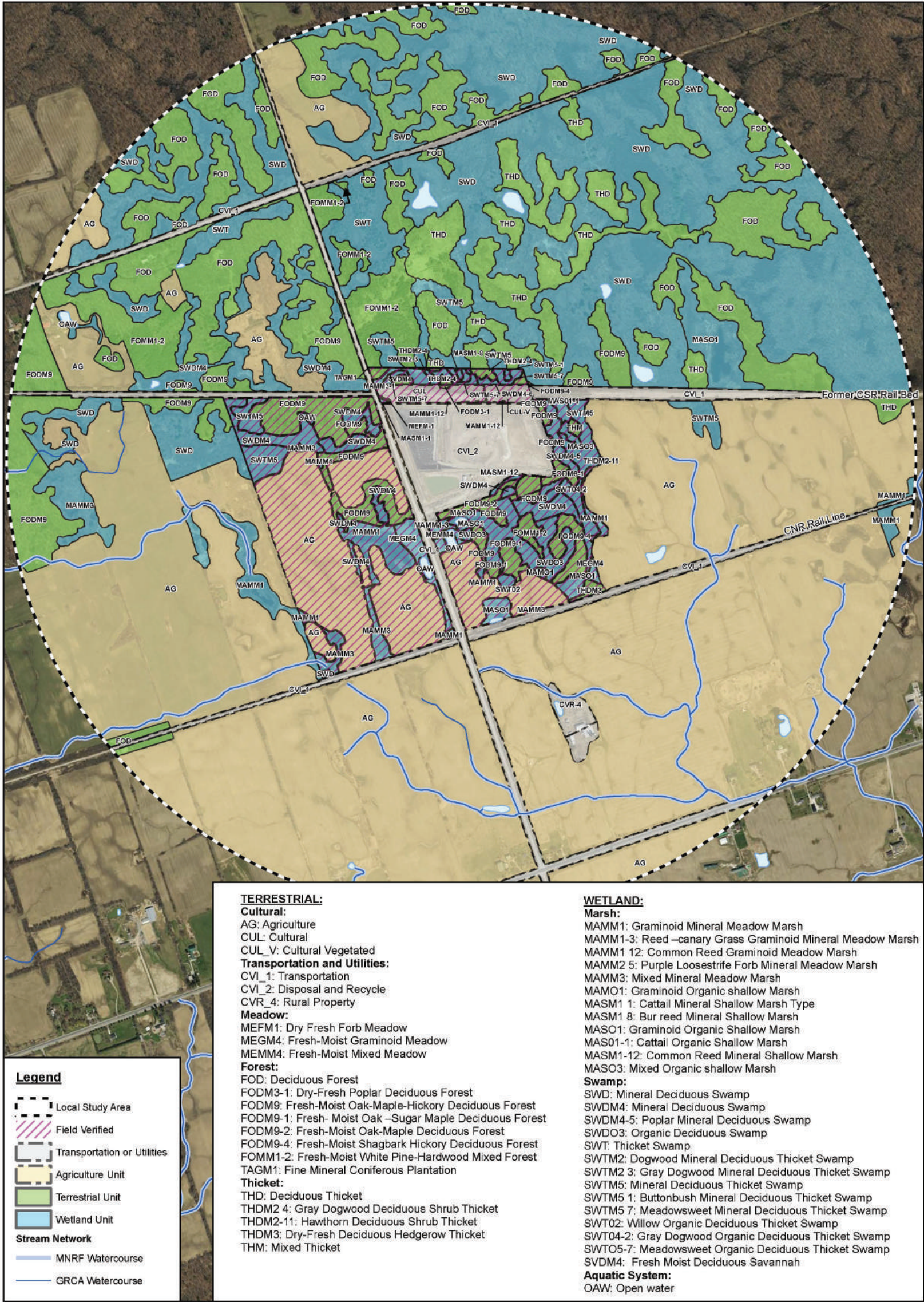
GHD conducted a vegetation inventory and Ecological Land Classification (ELC) of select areas within the Local Study Areas which included the East, West and North Lands. The inventory and classification were refined over the course multiple site visits between 2013 and 2015.

A species of interest detected during field activities was pumpkin ash (*F. profunda*), which is ranked as an S2 provincially and is a regionally rare species in the Haldimand-Norfolk County. It is found in swampy areas with standing water for most of the year. A single specimen in poor condition was found along the south base of the abandoned rail line to the east of the landfill property.

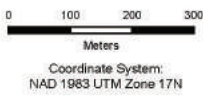
Another species of interest that was detected in past field investigations conducted by others was black gum (*Nyssa sylvestre*). Black gum is found to grow in low, wet sites (MNRF, 2015). A small stand of black gum was found on site by NRSI in 2004 at the southeast corner of the landfill prior to clearing activities. The stand of black gum was identified by GHD on the landfill property during 2016 field investigations. The trees were found to be tagged and located in the direct vicinity of active landfilling activities, without any tree protection measures. Black gum is a provincially rare species (S3) in Ontario, but within Haldimand-Norfolk County black gum is considered common.

ELC mapping of the Study Area was prepared following Ecological Land Classification for Southern Ontario: A First Approximation (Lee et al., 1998), and is presented on **Figure 3.6**. To complete the classification, ELC certified ecologists conducted site visits to assess the landform and parent material, soil, and vegetation present on site. Through assessment of these characteristics, classification of the ecological communities was completed for the North, East, and South Lands. The balance of the Local Study Area (up to a 1 km radius from the Site) was assessed using aerial photography interpretation and knowledge of the area. Forty-four ecological land classification community classes are represented within the Study Area and include aquatic, swamp, marsh, meadow, thicket, forest, transportation and utilities, and cultural systems. Characteristics of each of the identified community types are provided in the following paragraphs. The vegetation inventory is presented in **Appendix B**.

Figure 3.6 Ecological Land Classification



Source: MNRF NRVS, 2014. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry. © Queen's Printer 2016, Grand River Conservation Authority. Aerial: ESRI Basemap Imagery, Haldimand County, 2015.
Image Source: ESRI Basemap Imagery, Acquisition Date: 2010, Accessed 2016.



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ECOLOGICAL LAND CLASSIFICATION

FIGURE 3.6

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TERRESTRIAL:

AG: Agriculture

Agricultural fields are present throughout the Local Study Area and are actively farmed. At the time of survey, soy bean (*Glycine max*) crops were planted within all fields of the East and West Lands. Small wetland and drainage areas were present throughout the actively farmed agriculture fields.

CVI_1: Transportation

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

CVI_2: Disposal and Recycle

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

CVR_4: Rural Property

This is a rural property with residential and accessory structures.

CUL: Cultural

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

CUL_V: Cultural Vegetated

The vegetation community of the vegetated portion of the clay stockpile is comprised of low growing upland herbaceous and occasional small shrub species. This young community is dominated by species such as pigweed (*Chenopodium album*), white sweet clover (*Melilotus alba*), bird's foot trefoil (*Lotus corniculatus*), and Queen Anne's lace (*Daucus carota*), many of which are non-native. Some remnant woody debris and stumps are present at the toe of the stockpile on Site property.

MEFM-1: Dry Fresh Forb Meadow

This pioneer open meadow borders the common reed graminoid meadow marsh (*MAMM1-12*), between the active landfill and the clay stockpile. Soil in this area is characterized by clay. The vegetation community is highly disturbed and slightly patchy as a result of its proximity to the active clay stockpile. The dominant vegetation layer is the understory and is characterized by bird's-foot trefoil (*Lotus corniculatus*). Additional layers include the sub-canopy and ground layer, dominated by Queen Anne's lace (*Daucus carota*) and coltsfoot (*Tussilago farfara*) respectively.

MEGM4: Fresh Moist Graminoid Meadow

The fresh moist graminoid meadow is mainly characterized by mineral soil and low growing grass species. Garlic mustard (*Alliaria petiolata*), cow vetch (*Vicia cracca*), goldenrod (*Solidago spp.*), blueberry

(*Vaccinium sp.*), bebb's sedge (*Carex bebbi*), reed canary grass (*Phalaris arundacea*), common teasel (*Dipsacus fullonum*), lesser burdock (*Arctium minus*), large-fruited bur-reed (*Sparganium eurycarpum*), wood sorrel (*Oxalis acetosella*) and other sedge, forb and grass species are present within this meadow, with Serviceberry (*Amelanchier spp.*), hawthorn (*Crataegus spp.*), and European buckthorn (*Rhamnus cathartica*) present along its periphery. A very small stream also runs through this unit.

MEMM4: Fresh-Moist Mixed Meadow

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

FOD: Deciduous Forest

This upland forest interior landscape is surrounded by slough wetlands and thicket. This area was determined by aerial photo interpretation. This forested landscape is similar to the surrounding forests in the local area and composed of red maple, shagbark hickory, sugar maple, balsam poplar, American beech, and ironwood.

FODM3-1: Dry-Fresh Poplar Deciduous Forest

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

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

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

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

This upland forest interior landscape is surrounded by slough wetlands. Sugar maple, red maple, shagbark hickory, ironwood and swamp white oak compose the canopy of this forest. The understory is

composed of fern species (*Polypodiidae spp.*), trout lily, mayapple, garlic mustard, spotted jewelweed, and Canada thistle.

FODM9-2: Fresh-Moist Oak-Maple Deciduous Forest

This forested area is dominated by mature white oak (*Quercus alba*), red oak (*Quercus rubra*), and sugar maple species. American beech (*Fagus grandifolia*) is present along the periphery bordering the adjacent wetland habitat. This is a forest-swamp interface and includes upland and wetland species, each found depending on specific moisture conditions. The sub-canopy composition is similar to the canopy through succession. Groundcover includes a variety of upland and wetland herbaceous plants with ferns, sedges and other herbaceous plants.

FODM9-4: Fresh-Moist Shagbark Hickory Deciduous Forest

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

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

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

TAGM1: Fine Mineral Coniferous Plantation

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

THD: Deciduous Thicket

As a transitional community between terrestrial and wetland areas, this thicket is dominated by shrub species including gray dogwood, hawthorn species, red osier dogwood (*Cornus sericea*), poplar species (*Populus spp.*) and ironwood. Distribution of vegetated areas is patchy.

THDM2-4: Gray Dogwood Deciduous Shrub Thicket

This mid-age transitional community is present in multiple locations throughout the Study Area and is typically associated with the drier edges of wetlands. The area is similar to the fresh moist deciduous savannah community (*SVDM4*), but is characterized by a dominant shrub cover of gray dogwood. Other community species indicative of an upland environment include white ash, hawthorn and goldenrod.

THDM2-11: Hawthorn Deciduous Shrub Thicket

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

THDM3: Dry-Fresh Deciduous Hedgerow Thicket

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

THM: Mixed Thicket

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

WETLAND:
MAMM1: Graminoid Mineral Meadow Marsh

This unit has a broad range of vegetation composition in the shrub and ground vegetation layers. Within the wetland, narrow-leaved cattail (*Typha augustifolia*) and reed canary grass. Vegetation along the edge of this unit includes common teasel, common chicory, red clover (*Trifolium pratense*), cow parsnip (*Heracleum maximum*), goldenrod, bird's-foot trefoil, serviceberry, gray dogwood, reed-canary grass, and oxe eye daisy (*Leucanthemum vulgare*).

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

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

MAMM1-12: Common Reed Graminoid Meadow Marsh

This early succession community is located between the North Lands clay stockpile and the active landfill Site, and appears to have developed as a result of earthworks activities associated with site management and stockpiling on poorly drained soils. Common reed grass (*Phragmites australis*) dominates this young anthropogenic wetland area. Horsetail (*Equisetum spp.*), canary reed grass and purple loosestrife (*Lythrum salicaria*) were also present in the understory and ground layer.

MAMM2-5: Purple Loosestrife Forb Mineral Meadow Marsh

Purple loosestrife, large-fruited bur-reed (*Sparganium eurycarpum*), buttonbush (*Cephalanthis occidentalis*) and wool grass (*Scirpus cyperinus*) create a dense understory in this community which surrounds the bur-reed mineral shallow marsh (MASM1-8). This community provides

a transition between the bur-reed mineral shallow marsh and a meadowsweet mineral deciduous thicket swamp (SWT05-7) present in the north Study Area.

MAMM3: Mixed Mineral Meadow Marsh

This marsh is located directly beside an agriculture field and receives surface water flow from the surrounding agriculture area due to its low elevation. Graminoid and forb species dominate, and the composition includes common reed grass, goldenrod, bird's-foot trefoil, common teasel, reed canary grass, Queen Anne's lace, and purple loosestrife. Narrow-leaved cattail, narrow leaved meadowsweet (*Spiraea alba*), and large-fruited bur-reed are also present within the understory layer.

MAMO1: Graminoid Organic Shallow Marsh

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

MASM1-1: Cattail Mineral Shallow Marsh

The cattail mineral shallow marsh is a small pioneer understory community. It is characterized by narrow-leaved cattail and common reed which are indicative of a disturbed area.

MASM1-8: Bur-reed Mineral Shallow Marsh

Large-fruited bur-reed exclusively dominates this community. Standing water was observed within the unit throughout the field investigations, however there was little to no evidence of submerged aquatic, or floating aquatic species indicating a marsh rather than an open water environment.

MASO1: Graminoid Organic Shallow Marsh

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

MASO1-1: Cattail Organic Shallow Marsh

The cattail organic shallow marsh is a small community located at the base of the old railline to the east of the landfill property. The marsh is comprised of organic soils and is dominated by narrow leaved cattail. Willow shrubs (*Salix spp.*), and sedges (*Cyperaceae sp.*) were established around the periphery. This wetland is attached by a small channel which flows south to another wetland (MASO3).

MASO3: Mixed Organic Shallow Marsh

The mixed organic shallow marsh is comprised of organic soils and surface water with maximum depths over 0.5m in some areas. Within the wetland, narrow leaved cattail, reed canary grass, fowl manna grass (*Glyceria striata*), rice cut grass (*Leersia oryzoides*), water parsnip (*Sium suave*) and other sedge and grass species dominate. Along the edge of the wetland, willow shrubs, gray dogwood, sensitive fern, speckled alder (*Alnus incana* spp. *rugosa*), hawthorn and serviceberry are present. Willow trees and shrubs are present throughout the wetland.

SWD: Deciduous Swamp

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

SWDM4: Mineral Deciduous Swamp

The mineral deciduous swamp is located within a forest community near agricultural fields. Aerial photographic interpretation was used to determine this habitat. Based on this interpretation, it is expected that this swamp is comprised of mineral soils and many deciduous tree species including red maple, American beech, shagbark hickory, trembling aspen, willow and sugar maple. Red-osier dogwood and gray dogwood are expected to be present in the shrub layer. Forb and graminoid species are expected to comprise the ground layer.

SWDM4-5: Poplar Mineral Deciduous Swamp

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

SWDO3: Organic Deciduous Swamp SWD02: Maple Organic Deciduous Swamp

Sloughs with deep organic soils are present in most areas of the maple organic deciduous swamp unit. The canopy layer is dominated by red maple, American beech, shagbark hickory, black ash and sugar maple. Small sporadic open water habitats are present and many wetland sedge, fern and aquatic species are present. These include sensitive fern, bracken fern (*Pteridium aquilinum*), sphagnum moss (*Spagnaceae* spp.), spotted jewelweed, duckweed species, black ash, false soloman's seal (*Maianthemum racemosum*), narrow leaved meadow sweet, etc.

SWT: Thicket Swamp

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

SWTM2: Dogwood Mineral Deciduous Thicket Swamp

The dogwood mineral deciduous thicket swamp is a mid-age community acting as a transition area between the similarly characterized meadowsweet mineral deciduous thicket swamp (SWTM5-7) and the large mineral deciduous swamp (SWDM4). It is located to the south east from the corner of the landfill property and is characterized by a robust understory dominated by gray dogwood.

SWTM2-3: Gray Dogwood Mineral Deciduous Thicket Swamp

The gray dogwood mineral deciduous thicket swamp represents a mid-age transition community between the similarly characterized meadowsweet mineral deciduous thicket swamp (SWTM5-7) and the large mixed mineral meadow marsh (MAMM3). It is characterized by a robust sub-canopy dominated by gray dogwood. Specimens of white spruce, green alder (*Alnus viridis*) and red maple form the canopy layer, while *Pleurocarpus spp.* moss species constitute the groundcover layer.

SWTM5: Mineral Deciduous Thicket Swamp

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

SWTM5-1: Buttonbush Mineral Deciduous Thicket Swamp

The buttonbush mineral deciduous thicket swamp is surrounded by a large meadowsweet mineral deciduous thicket swamp (SWTM5-7). This community is comprised of thick sub-canopy of buttonbush and willow species. Purple loosestrife, water parsnip and common bur reed (*Sparganium eurycarpum*) were also present, indicating wetter conditions than the surrounding meadowsweet thicket swamp.

SWTM5-7: Meadowsweet Mineral Deciduous Thicket Swamp

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

SWT02: Willow Organic Deciduous Thicket Swamp

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

SWT04-2: Gray Dogwood Organic Deciduous Thicket Swamp

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

SWT05-7: Meadowsweet Organic Deciduous Thicket Swamp

The meadowsweet organic deciduous thicket swamp and covers a relatively large area of land. This community is characterized by a robust understory which was composed of obligate and facultative species such as narrow leaved meadowsweet and gray dogwood. Ground cover was often characterized by *Pleurocarpus spp.* moss.

SVDM4: Fresh Moist Deciduous Savannah

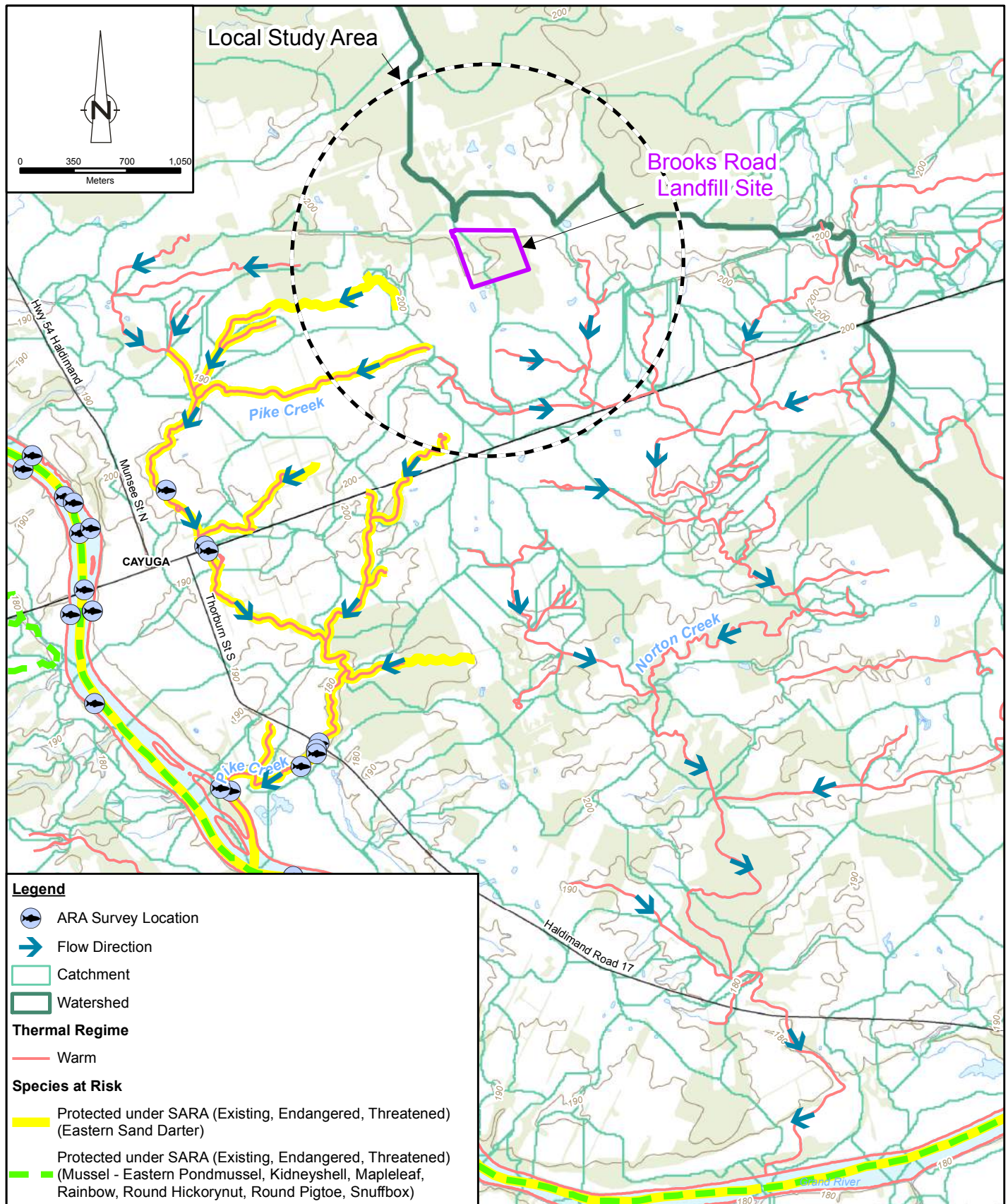
The fresh moist deciduous savannah is an upland community dominated by a gray dogwood with patchy canopy coverage of white ash, elm (*Ulmus spp.*) and red maple. The ground layer is dominated by timothy grass (*Phleum pretense*), goldenrod, common cinquefoil (*Potentilla simplex*) and deptford pink (*Dianthus armeria*).

OAW: Open Water

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

3.3.5 Aquatic Habitat and Species

Aquatic habitat features are shown on **Figure 3.7**. As noted above in section 3.3.1, the ditch drainage system originating near the Site Study Area is part of the headwaters of the Norton Creek drainage system. The headwaters of Pike Creek are present in the western portion of the Local Study Area, and drain predominantly west and south where they eventually meet the Grand River. Within the Local Study Area, the drainage system consists of intermittent watercourses that provide contributing fish habitat with no direct fish use.



HALDIMAND COUNTY, ONTARIO
BROOKS ROAD LANDFILL SITE
VERTICAL CAPACITY EXPANSION ENVIRONMENTAL ASSESSMENT

018235-20
Jan 19, 2017

AQUATIC HABITAT FEATURES

FIGURE 3.7

Ditch drainage along the east side of Brooks Road flows south along the ditch and flows under the abandoned CNR rail bed through a small corrugated steel pipe (CSP). Wetted widths through this reach range from approximately 1 – 1.5 m at the time of survey, with a bankfull width of approximately 2.5 m. The ditch was predominantly dry at the time of the fall survey, however, wetted depths in the small pockets of water throughout ranged from 2 – 10 cm with a bankfull depth of approximately 0.5 m. Substrates consisted of clay, detritus, and muck with some sand and silt. The entire reach was heavily vegetated with mainly cultural meadow species, dominated by grasses and cattails (wet indicator species) that choked the ditch with approximately 95% instream cover. There was nominal overhead cover with a lack of shrubs and trees.

Approximately 85 m downstream of the CNR CSP, the ditch continues southeast as a swale feature through an active agricultural field. It appears that the swale is actively farmed up to the confluence with Highway 3 and the adjacent drainage features from the west, creating a permanent barrier to any upstream fish movement.

The drainage feature continues along both sides of Highway 3 (north and south) through two large CSPs, flowing east for approximately 380 m. Wetted widths along the north side of Highway 3 were approximately 0.5 m at the time of survey, with a 1.5 m bankfull width. Wetted depths ranged from 2 – 10 cm in pockets through a predominantly dry ditch, except for the area immediately approaching the culvert that drains across Highway 3 to the south where water accumulated to approximately 15 cm in depth. Substrates were consistent with the ditch along Brooks Road and vegetated with similar cultural meadow and wet indicator species (grasses and cattails). Minimal overhead cover was present with a few sparse ash trees along the highway right-of-way.

The ditch along the south side of the Highway 3 appears to have been recently dredged along the entire reach to the confluence with the north side of Highway 3. It is at this confluence, where the drainage flows south through a large concrete box culvert, that a large excavated pool (approximately 8 m x 4 m) has been dug and where standing water was present at the time of the survey. The drainage in this area is likely seasonally obstructed from a small berm created by the excavated area and may be a seasonal barrier to fish movement upstream.

The Norton Creek drainage system continues to flow generally south beyond the Local Study Area through agriculture fields and forested areas with no known barriers to fish movement. Further south at the crossings of Concession 1 Road S and Hwy 17, Norton Creek becomes a much larger system with apparent fish habitat (e.g., permanent watercourse feature, overhead and instream cover), and eventually discharges to the Grand River approximately 3 km south of the Site.

The GRCA Fisheries Management Plan (Wright & Imhof, 2001) indicates the presence of a warmwater fish community in the Grand River downstream of Cayuga. The Grand River fishery in this area includes

species such as bullhead, carp, Channel catfish (*Ictalurus punctatus*), suckers, Rock bass (*Ambloplites rupestris*), crappie, Freshwater drum (*Aplodinotus grunniens*), sunfish species, American eel (*Anguilla rostrata*) and Bowfin (*Amia calva*) (Wright & Imhof, 2001).

ARA Survey Point data was reviewed to determine if there were applicable survey points in the vicinity of the Site and Local Study Areas to assess the potential for aquatic species presence; however, applicable survey locations were not found. Based on the warm water thermal regime of the identified watercourse features within the Local Study Area and the available habitat observed during the aquatic habitat assessment, these watercourses may host a warm water fish community where suitable habitat/access exists, as noted above.

3.3.6 Wildlife

Wildlife observations were collected during each site visit in addition to breeding bird and amphibian surveys. A list of incidental faunal species observations can be found in **Table 3.3**. The results of these investigations are detailed below.

3.3.6.1 Herpetofauna

3.3.6.1.1 Amphibians

Six calling amphibian stations were surveyed in the West Lands according to the Great Lakes Marsh Monitoring Protocol in spring 2014. All stations had detections of calling amphibians. The results of the amphibian surveys can be found in **Appendix C-1**. Detection rate in **Appendix C-1** is displayed as the number of stations that each species was detected at, out of the total of six stations surveyed.

The composition of species detected during the amphibian surveys is representative of the amphibian population in the adjacent areas, where suitable habitat exists. Incidental observations on the East Lands confirmed the presence of chorus frog (*Pseudacris triseriata*), spring peeper (*P. crucifer*), wood frog (*Lithobates sylvaticus*), American toad (*Anaxyrus americanus*), gray tree frog (*Hyla versicolor*), green frog (*L. clamitans*), and northern leopard frog (*L. pipiens*), while incidental observations in the North Lands confirmed the presence of chorus frog and green frog. Seven calling amphibian species were documented throughout the 2014 surveys. In total, eight species of amphibians were documented in the Local Study Area (Table 3.3).

3.3.6.1.2 Reptiles

Reptile-specific field surveys were not conducted during field investigations. However, the Ontario Reptile and Amphibian Atlas was reviewed and incidental species observations were recorded at each site visit.

Reptile species identified in the Ontario Herpetofaunal Atlas as occurring within the Study Areas are:

- Blanding's turtle (*Emydoidea blandingii*)*
- Midland painted turtle (*Chrysemys picta marginata*)
- Snapping turtle (*Chelydra serpentina*)
- Northern map turtle (*Graptemys geographica*)
- Eastern newt (*Notophthalmus viridescens*)*
- Spotted salamander (*Ambystoma maculatum*)*
- Blue-spotted salamander (*Ambystoma laterale*)*
- Eastern red-backed salamander (*Plethodon cinereus*)*
- Jefferson/blue-spotted salamander hybrid*
- Jefferson/blue-spotted salamander complex
- Red-bellied snake (*Storeria occipitomaculata*)*
- Eastern ribbonsnake (*Thamnophis sauritus*)*
- Smooth greensnake (*Opheodrys vernalis*)*
- Eastern gartersnake (*Thamnophis sirtalis sirtalis*)
- Milksnake (*Lampropeltis triangulum*)
- Northern watersnake (*Nerodia sipedon sipedon*)*
- Dekay's brownsnake (*Storeria dekayi*)*

*Note: * denotes historical sighting (pre-1990)*

Blanding's turtle, snapping turtle, Dekay's brownsnake, and eastern gartersnake were observed during field investigations.

3.3.6.2 Birds

Breeding bird surveys were conducted on July 8, 2015 in the East Lands. A total of 27 species were detected during the surveys, 13 of which displayed evidence of breeding. A list of the species detected on July 8, 2015 along with evidence of breeding is provided as **Appendix C-2**.

In total, 38 species of birds have been observed in the Study Area by GHD ecologists. Four of these species are Species at Risk (SAR): barn swallow (*Hirundo rustica*), eastern wood-pewee (*Contopus virens*), least bittern (*Ixobrychus exilis*), and wood thrush (*Hylocichla mustelina*). Species at risk will be discussed in greater detail in **Section 3.3.6.4**.

Although breeding bird surveys were not conducted within the Site Study Area, the species which have been utilizing the landfill site itself in some capacity include species known to frequent landfills such as turkey vultures (*Cathartes aura*) and gull (*Laridae sp.*) species.

3.3.6.3 Mammals

Mammal-specific field surveys were not conducted as part of the project, but incidental observations were recorded. During field investigations white-tailed deer (*Odocoileus virginianus*), chipmunk (*Sciuridae sp.*), and coyote (*Canis latrans*) were observed.

3.3.6.4 Species at Risk

Correspondence with MNRF provided numerous SAR with a documented presence within the Cayuga area (**Appendix A**). Provincially tracked species records for the Study Area are shown on **Figure 3.8**. A variety of SAR have been observed in the Study Area, identified by MNRF to have the potential occur in the vicinity, or have been identified on DFO mapping within the Local Study Area (**Table 3.4**). Incidental observations of all species, including any SAR encountered, were collected during field investigations and are detailed in **Table 3.3**. SAR species-specific surveys were not completed for a number of reasons including:

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

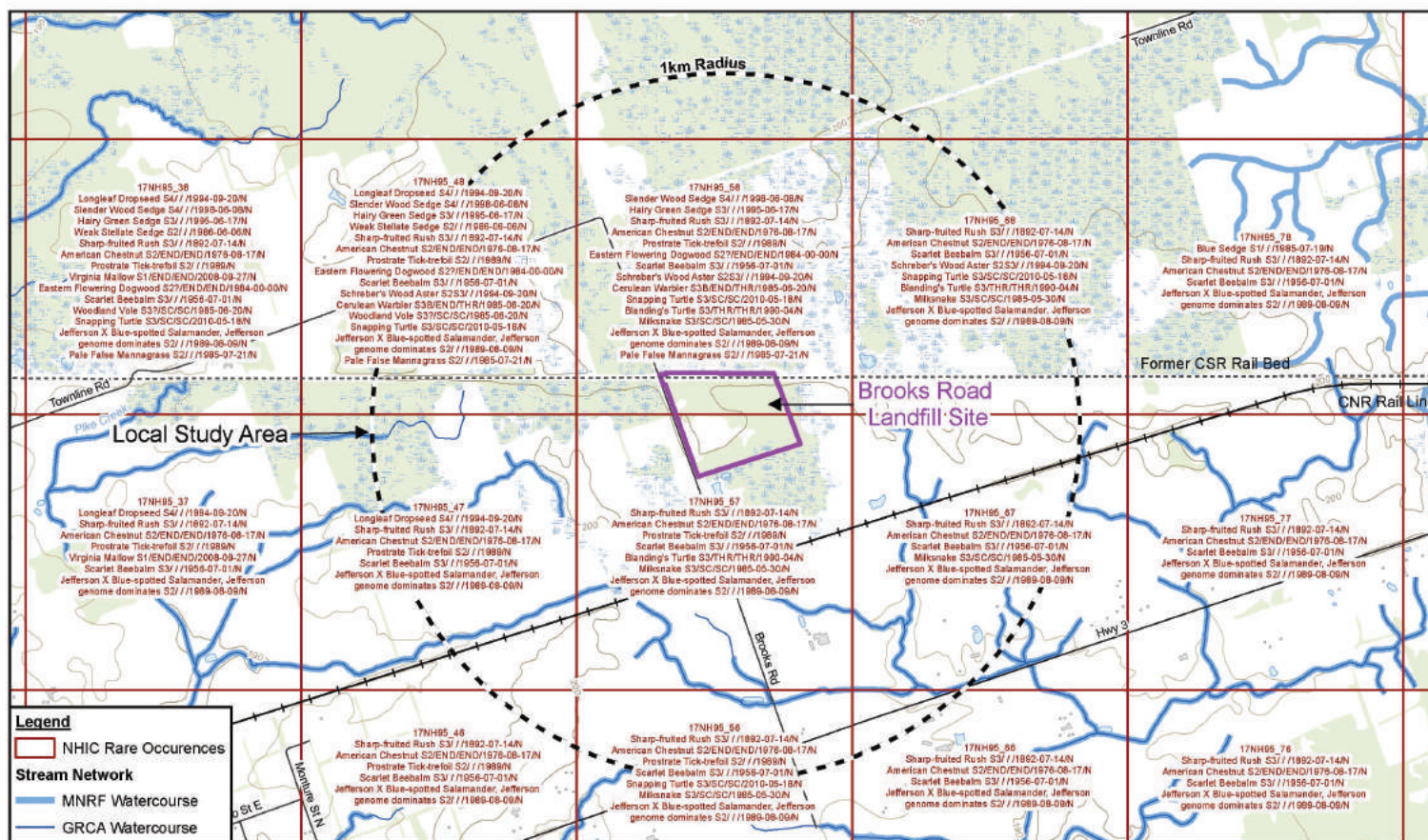
Operational practices (i.e. daily cover) further act to deter wildlife use of the Site.



Table 3.4 Species at Risk Summary

Species		Observed on Site	Conservation Status	
Common Name	Scientific Name		SARO	SARA
Birds				
Barn swallow	<i>Hirundo rustica</i>	Yes	Threatened	No Status
Chimney swift	<i>Chaetura pelagica</i>	No	Threatened	Threatened
Eastern wood-pewee	<i>Contopus virens</i>	Yes	Special Concern	No Status
Least bittern	<i>Ixobrychus exilis</i>	Yes	Threatened	Threatened
Wood thrush	<i>Hylocichla mustelina</i>	Yes	Threatened	No Status
Bobolink	<i>Dolichonyx oryzivorus</i>	No	Threatened	No Status
Eastern meadowlark	<i>Sturnella magna</i>	No	Threatened	No Status
Cerulean warbler	<i>Setophaga cerulea</i>	No	Threatened	Special Concern
Reptiles				
Blanding's turtle	<i>Emydoidea blandingii</i>	Yes	Threatened	Threatened
Snapping turtle	<i>Chelydra serpentine</i>	Yes	Special Concern	Special Concern
Milksnake	<i>Lampropeltis triangulum</i>	No	Special Concern	Special Concern
Eastern ribbonsnake	<i>Thamnophis sauritus</i>	No	Special Concern	Special Concern
Plants				
Eastern flowering dogwood	<i>Cornus florida</i>	No	Endangered	Endangered
Fish				
Eastern sand darter	<i>Ammocrypta pellucida</i>	No	Endangered	Threatened

Figure 3.8 Provincially Tracked Species



Source: MNRF NRVIS, 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry. © Queen's Printer 2016.

Barn Swallow

Barn swallows (*Hirundo rustica*) are a provincially threatened species, with no status federally. They are typically found in agricultural areas, cities, and suburbs, and along highways (Rodewald, 2015). Barn swallows were observed throughout the Study Area on multiple occasions. Barn swallows are generally present in southwestern Ontario from early-April to late September (eBird, 2015).

Chimney Swift

Chimney swift (*Chaetura pelagica*) is a provincially and federally threatened species. They are mainly associated with urban and rural areas where there are chimneys available for nesting and resting (Rodewald, 2015). It is possible that there may be buildings with uncapped chimneys in the local Study Area that would provide nesting habitat, and the surrounding areas could be used as a foraging habitat. No chimney swifts were detected on any of the Site visits.

Eastern Wood-Pewee

The eastern wood-pewee (*Contopus virens*) is a provincially designated special concern species, with no status federally. They generally occur in deciduous forest and woodland, even breeding in smaller woodlots (Rodewald, 2015). They are generally present in southwestern Ontario from early May to late September (eBird, 2015). Eastern wood-pewee was detected multiple times within the Study Area.

Least Bittern

Least bittern (*Ixobrychus exilis*) is a threatened species both provincially and federally. They generally occur in freshwater marshes with tall emergent vegetation (Rodewald, 2015). The coo-coo-coo call of the least bittern was detected in the East Lands in the small cattail wetland east of Brooks Road on the southern portion of the Study Area on May 28, 2014. Least bittern are identified by the MNRF to occur in the Haldimand-Norfolk area. However, optimal breeding habitat is not available on the East Lands; least bittern prefer large marshes that have relatively stable water levels throughout the nesting period (Rodewald, 2015). The wetland area that the call was originating from was very small. The least bittern was not detected on subsequent site visits, indicating that this area was likely not used for breeding in 2014.

Wood Thrush

Wood thrush (*Hylocichla mustelina*) is a provincially designated special concern species, with no status federally. Wood thrush is an area-sensitive species and is more likely to occur in larger-area forests (Rodewald, 2015). Wood thrushes were detected on several of the Site visits. Wood thrushes are generally present in this area from early May to late September (eBird, 2015).

Bobolink

The bobolink (*Dolichonyx oryzivorus*) is a provincially threatened bird, with no status federally, that has the potential to occur in the Study Area. They generally occur in hayfields and uncut pastures in agricultural areas (Rodewald, 2015). MNRF have advised that records of bobolink exist in the Study Area. Bobolink are migratory birds that are generally present in southwestern Ontario from mid-May to mid-August (eBird, 2015). No bobolink were detected during any of the Site visits. Suitable habitat currently does not exist for bobolink in the Study Areas as the majority of agricultural land present is currently being used primarily for monoculture crops such as soybeans.

Eastern Meadowlark

The eastern meadowlark (*Sturnella magna*) is a provincially threatened bird, with no status federally, that has the potential to occur in the Study Area. They generally occur in farm fields and grasslands, often in agricultural areas (Rodewald, 2015). Eastern meadowlarks are migratory in this part of their range and are generally present in southwestern Ontario from late March to mid-October (eBird, 2015). MNRF have advised that records of eastern meadowlark exist in the Study Area, although none were detected during any of the Site visits. Suitable habitat currently does not exist for eastern meadowlark in the Study Areas as the majority of agricultural land present is currently being used primarily for monoculture crops such as soybeans.

Cerulean Warbler

Cerulean warbler (*Setophaga cerulea*) is a provincially threatened and federally special concern species that MNRF has identified that has the potential to occur in the Study Area. This species was not detected during any of the Site visits, however, it has been documented during the breeding season <5km from the Site (eBird, 2015). Potentially suitable habitat (larger tracts of mature deciduous forest) exists within the local Study Area.

Blanding's Turtle

Blanding's turtle (*Emydoidea blandingii*) is a provincially and federally threatened species. They generally occur in shallow water, usually in large wetlands and shallow lakes with lots of water plants (MNRF, 2015a). A blanding's turtle was observed on Brooks Road in the vicinity of the entrance of the landfill, on June 12, 2014 during the site walk with GRCA.

Snapping Turtle

Snapping turtle (*Chelydra serpentina*), a provincially and federally special concern species, has the potential to be found in the Study Area according to MNRF and the Ontario Reptile and Amphibian Atlas. Snapping turtles prefer habitat characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation (MNRF, 2015b). A snapping turtle was observed during 2013 field investigations.

Milksnake

The milksnake (*Lampropeltis triangulum*) is a provincially and federally special concern species. MNRF has identified the potential for milksnake in the Study Area, and this species was observed as part of the Ontario Reptile and Amphibian Atlas in 2011 as occurring in the area. The milksnake can be found in a wide variety of habitats. Important features of good milksnake habitat are proximity to water, and suitable locations for basking and egg-laying (MNRF, 2015c). Basking habitat is likely limited in the immediately adjacent area. Milksnake were not observed during field investigations.

Eastern Ribbonsnake

Eastern ribbonsnake (*Thamnophis sauritus*) are a provincially and federally designated special concern species. MNRF has identified the potential for eastern ribbonsnake; however, according to the Ontario Reptile and Amphibian Atlas, it has not been detected in the area since 1985. They are usually found close to water, especially in marshes, where they hunt for frogs and small fish (MNRF, 2015d). Habitat may be available on or in the vicinity of the Site, but no eastern ribbonsnake were detected during any of the field investigations.

Eastern Flowering Dogwood

Eastern flowering dogwood (*Cornus florida*) is a provincially and federally endangered species. MNRF has identified the potential for the presence of this species. It generally grows in deciduous and mixed forests, in the drier areas of its habitat, although it is occasionally found in slightly moist environments (MNRF, 2015e). Eastern flowering dogwood was not detected by during any of the site investigations.

Eastern Sand Darter

The eastern sand darter (*Ammocrypta pellucida*) is a provincially endangered and federally threatened fish. The eastern sand darter prefers shallow habitats in lakes, streams, and rivers with clean, sandy bottoms (MNRF, 2015f). This species was identified on DFO Fish and Mussel mapping as having the potential to occur in Pike Creek, in the western portion of the Local Study Area. Surveys for habitat potential for the eastern sand darter within the Local Study Area were not conducted as part of field investigations.

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 the Terrestrial and Aquatic Environment Existing Conditions within the Study Areas described in **Section 3.0**, **Table 4.1** presents the mitigation measures recommended to be incorporated into the Alternative Methods designs in order to avoid or minimize impacts on the Terrestrial and Aquatic Environment.

Table 4.1 Mitigation Measures to be Incorporated into the Design		
	<i>Recommended Design Mitigation Measure</i>	<i>Resulting Net Effect</i>
<i>Alternative Method 1</i>	Based on the current conceptual design, no mitigation measures are required.	No net effects to the terrestrial and aquatic environment.
<i>Alternative Method 2</i>	Based on the current conceptual design, no mitigation measures are required.	No net effects to the terrestrial and aquatic environment.
<i>Alternative Method 3</i>	Based on the current conceptual design, no mitigation measures are required.	No net effects to the terrestrial and aquatic environment.

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 Terrestrial and Aquatic Environment 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 Terrestrial and Aquatic Environment 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 Terrestrial and Aquatic Environment;
 - Develop and apply avoidance/mitigation/compensation/enhancement measures; and
 - Determine net effects on the environment.

5.2 General Assumptions

The following evaluation was carried out under the assumption that the April 2016 Draft Conceptual Design Report for the Brooks Road Landfill Site Vertical Capacity Expansion Environmental Assessment depicts the most up-to-date conceptual design for each alternative. Should the conceptual design change, the need for mitigation and the potential for net effects would need to be reassessed.

5.3 Criteria/Indicators

	Environmental Component	Evaluation Criteria	Study Area	Indicators	Rationale	Data Sources
NATURAL	Terrestrial & Aquatic Environment	Terrestrial ecosystems	Site & Local Study Areas	<ul style="list-style-type: none"> Predicted impact on vegetation communities Predicted impact on wildlife habitat Predicted impact on vegetation and wildlife including rare, threatened or endangered species 	Continued operation of the waste disposal facility may disturb the functioning of natural terrestrial habitats and vegetation, including rare, threatened or endangered species.	<ul style="list-style-type: none"> Site surveys Published data sources
		Aquatic ecosystems	Site & Local Study Areas	<ul style="list-style-type: none"> Predicted changes in water quality Predicted impact on aquatic habitat Predicted impact on aquatic biota 	Continued operation of the waste disposal facility may disturb the functioning of natural aquatic habitats and species, including rare, threatened or endangered species.	<ul style="list-style-type: none"> Site surveys Published data sources

5.4 Potential Environmental Effects

5.4.1 Alternative Method 1

Many aspects of landfill activities will not change as a result of the vertical expansion. Buffer areas surrounding the limit of waste, stormwater management, and traffic conditions are expected to remain unchanged from existing to proposed conditions. As a result, no adverse environmental effects to the terrestrial and aquatic environment are expected as a result of the proposed vertical expansion.

5.4.2 Alternative Method 2

Many aspects of landfill activities will not change as a result of the vertical expansion. Buffer areas surrounding the limit of waste, stormwater management, and traffic conditions are expected to remain unchanged from existing to proposed conditions. As a result, no adverse environmental effects to the terrestrial and aquatic environment are expected as a result of the proposed vertical expansion.

5.4.3 Alternative Method 3

Many aspects of landfill activities will not change as a result of the vertical expansion. Buffer areas surrounding the limit of waste, stormwater management, and traffic conditions are expected to remain unchanged from existing to proposed conditions. As a result, no adverse environmental effects to the terrestrial and aquatic environment are expected as a result of the proposed vertical expansion.

5.5 Mitigation Measures Beyond Those Incorporated into the Design

5.5.1 Alternative Method 1

No adverse environmental effects to the terrestrial and aquatic environment are expected as a result of the proposed vertical expansion; therefore no additional mitigation measures are recommended at this time.

5.5.2 Alternative Method 2

No adverse environmental effects to the terrestrial and aquatic environment are expected as a result of the proposed vertical expansion; therefore no additional mitigation measures are recommended at this time.

5.5.3 Alternative Method 3

No adverse environmental effects to the terrestrial and aquatic environment are expected as a result of the proposed vertical expansion; therefore no additional mitigation measures are recommended at this time.

5.5.4 Best Management Practices

There are a number of existing mitigation measures in place to dissuade wildlife access to the existing landfill Site and to prevent human/wildlife conflicts. Chain link fence is present around the perimeter of the property, which dissuades larger reptile and mammal access to the site. The silt fence along the north perimeter of the property, a higher risk area for wildlife access to the Site based on proximity to the Provincially Significant Wetland to the north, is an effective deterrent for small reptiles, mammals, and amphibian access to the Site. There are also very limited natural areas on the landfill Site itself and daily landfilling activities (e.g. noise, human presence, heavy machinery) also provide deterrents for use of the Site by wildlife. Other operational practices (i.e. daily cover) further act to deter wildlife use of the Site.

General Best Management Practices (BMPs) for continued operation of the landfill should include:

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

As this project suggests a continuation of the current land use and activity with no increase in footprint, and existing storm water management infrastructure is to be maintained with no changes to quantity of quality of discharge, monitoring of the wetland area adjacent to the Site is not recommended at this stage. Should changes to these elements be proposed, the need for long-term monitoring may be re-evaluated.

5.6 Net Environmental Effects

5.6.1 Alternative Method 1

As there are no proposed changes to the terrestrial or aquatic environment as a result of the proposed vertical expansion, no net effects to the natural environment are anticipated within the Study Areas.

5.6.2 Alternative Method 2

As there are no proposed changes to the terrestrial or aquatic environment as a result of the proposed vertical expansion, no net effects to the natural environment are anticipated within the Study Areas.

5.6.3 Alternative Method 3

As there are no proposed changes to the terrestrial or aquatic environment as a result of the proposed vertical expansion, no net effects to the natural environment are anticipated within the Study Areas.



Table 5.1 Alternative Method 1 Terrestrial & Aquatic Environment Potential Environmental Effects, Mitigation Measures & Net Effects

NATURAL	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
	Terrestrial & Aquatic Environment	Terrestrial Ecosystems	Predicted impact on vegetation communities	As there is no proposed change to the footprint of waste or buffer areas, and no vegetation clearing is required as part of the proposed conditions, no change to vegetation communities within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to vegetation communities within the Site and Local Study Areas.
			Predicted impact on wildlife habitat	As there is no proposed change to the footprint of waste or buffer areas, and no vegetation clearing is required as part of the proposed conditions, no change to wildlife habitat within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to wildlife habitat within the Site and Local Study Areas.
			Predicted impact on vegetation and wildlife including rare, threatened or endangered species	As there is no proposed change to the footprint of waste or buffer areas, and traffic conditions are expected to remain the same as current conditions, no impact to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas is anticipated.	No specific mitigation measures required; however, BMPs will be implemented by Brooks Road Environmental for the protection of wildlife and SAR.	No net effects to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas.
		Aquatic Ecosystems	Predicted changes in water quality	As there are no proposed changes to stormwater discharge quality or quantity, no change to water quality within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to water quality within the Site and Local Study Areas.
			Predicted impact on aquatic habitat	As there are no proposed changes to stormwater discharge quality or quantity, no change to aquatic habitat within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to aquatic habitat within the Site and Local Study Areas.
			Predicted impact on aquatic biota	As there are no proposed changes to stormwater discharge quality or quantity, no impact to aquatic biota within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to aquatic biota within the Site and Local Study Areas.



Table 5.2 Alternative Method 2 Terrestrial & Aquatic Environment Potential Environmental Effects, Mitigation Measures & Net Effects

NATURAL	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
	Terrestrial & Aquatic Environment	Terrestrial Ecosystems	Predicted impact on vegetation communities	As there is no proposed change to the footprint of waste or buffer areas, and no vegetation clearing is required as part of the proposed conditions, no change to vegetation communities within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to vegetation communities within the Site and Local Study Areas.
			Predicted impact on wildlife habitat	As there is no proposed change to the footprint of waste or buffer areas, and no vegetation clearing is required as part of the proposed conditions, no change to wildlife habitat within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to wildlife habitat within the Site and Local Study Areas.
			Predicted impact on vegetation and wildlife including rare, threatened or endangered species	As there is no proposed change to the footprint of waste or buffer areas, and traffic conditions are expected to remain the same as current conditions, no impact to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas is anticipated.	No specific mitigation measures required; however, BMPs will be implemented by Brooks Road Environmental for the protection of wildlife and SAR.	No net effects to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas.
		Aquatic Ecosystems	Predicted changes in water quality	As there are no proposed changes to stormwater discharge quality or quantity, no change to water quality within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to water quality within the Site and Local Study Areas.
			Predicted impact on aquatic habitat	As there are no proposed changes to stormwater discharge quality or quantity, no change to aquatic habitat within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to aquatic habitat within the Site and Local Study Areas.
			Predicted impact on aquatic biota	As there are no proposed changes to stormwater discharge quality or quantity, no impact to aquatic biota within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to aquatic biota within the Site and Local Study Areas.



Table 5.3 Alternative Method 3 Terrestrial & Aquatic Environment Potential Environmental Effects, Mitigation Measures & Net Effects

NATURAL	Environmental Component	Evaluation Criteria	Indicator	Potential Effects	Mitigation Measures	Net Effects
	Terrestrial & Aquatic Environment	Terrestrial Ecosystems	Predicted impact on vegetation communities	As there is no proposed change to the footprint of waste or buffer areas, and no vegetation clearing is required as part of the proposed conditions, no change to vegetation communities within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to vegetation communities within the Site and Local Study Areas.
			Predicted impact on wildlife habitat	As there is no proposed change to the footprint of waste or buffer areas, and no vegetation clearing is required as part of the proposed conditions, no change to wildlife habitat within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to wildlife habitat within the Site and Local Study Areas.
			Predicted impact on vegetation and wildlife including rare, threatened or endangered species	As there is no proposed change to the footprint of waste or buffer areas, and traffic conditions are expected to remain the same as current conditions, no impact to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas is anticipated.	No specific mitigation measures required; however, BMPs will be implemented by Brooks Road Environmental for the protection of wildlife and SAR.	No net effects to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas.
		Aquatic Ecosystems	Predicted changes in water quality	As there are no proposed changes to stormwater discharge quality or quantity, no change to water quality within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to water quality within the Site and Local Study Areas.
			Predicted impact on aquatic habitat	As there are no proposed changes to stormwater discharge quality or quantity, no change to aquatic habitat within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to aquatic habitat within the Site and Local Study Areas.
			Predicted impact on aquatic biota	As there are no proposed changes to stormwater discharge quality or quantity, no impact to aquatic biota within the Site and Local Study Areas is anticipated.	No mitigation measures required.	No net effects to aquatic biota within the Site and Local Study Areas.

Section 6.0 Comparative Evaluation

This section documents the comparative evaluation of the Alternative Methods from a Terrestrial and Aquatic Environment 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 Terrestrial and Aquatic Environment 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

The results of the Terrestrial and Aquatic Environment Comparative Evaluation are documented in **Table 6.1** below. There is no distinction between the alternatives in terms of their effects on the terrestrial and aquatic environment. Therefore all three alternatives are preferred as they would all result in no net effects to the terrestrial and aquatic environment.



Table 6.1 Terrestrial & Aquatic Environment Comparative Evaluation

	Environmental Component	Evaluation Criteria	Indicator	Alternative Method 1 Net Effects	Alternative Method 2 Net Effects	Alternative Method 3 Net Effects
NATURAL	Terrestrial & Aquatic Environment	Terrestrial Ecosystems	Predicted impact on vegetation communities	No predicted changes to vegetation communities within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to vegetation communities within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to vegetation communities within the Site and Local Study Areas. NO NET EFFECT
			Predicted impact on wildlife habitat	No predicted changes to wildlife habitat within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to wildlife habitat within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to wildlife habitat within the Site and Local Study Areas. NO NET EFFECT
			Predicted impact on vegetation and wildlife including rare, threatened or endangered species	No predicted changes to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to vegetation or wildlife (including rare, threatened, or endangered species) within the Site and Local Study Areas. NO NET EFFECT
			Criteria Ranking:	Tied for 1st	Tied for 1st	Tied for 1st
			Criteria Rationale:	There is no distinction between the alternatives in terms of their effects on the terrestrial environment. All three alternatives are preferred as they would all result in no net effects to the terrestrial environment.		
		Aquatic Ecosystems	Predicted changes in water quality	No predicted changes to water quality within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to water quality within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to water quality within the Site and Local Study Areas. NO NET EFFECT
			Predicted impact on aquatic habitat	No predicted changes to aquatic habitat within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to aquatic habitat within the Site and Local Study Areas. NO NET EFFECT	No predicted changes to aquatic habitat within the Site and Local Study Areas. NO NET EFFECT



Table 6.1 Terrestrial & Aquatic Environment Comparative Evaluation

TERRESTRIAL	Environmental Component	Evaluation Criteria	Indicator	Alternative Method 1 Net Effects	Alternative Method 2 Net Effects	Alternative Method 3 Net Effects
			Predicted impact on aquatic biota	No predicted changes to aquatic biota within the Site and Local Study Areas.	No predicted changes to aquatic biota within the Site and Local Study Areas.	No predicted changes to aquatic biota within the Site and Local Study Areas.
				NO NET EFFECT	NO NET EFFECT	NO NET EFFECT
			Criteria Ranking:	Tied for 1st	Tied for 1st	Tied for 1st
			Criteria Rationale:	There is no distinction between the alternatives in terms of their effects on the aquatic environment. All three alternatives are preferred as they would all result in no net effects to the aquatic environment.		
		Environmental Component Ranking:		Tied for 1st	Tied for 1st	Tied for 1st
	RATIONALE			There is no distinction between the alternatives in terms of their effects on the terrestrial and aquatic environment. All three alternatives are preferred as they would all result in no net effects to the terrestrial and aquatic environment.		

Section 7.0 Conclusion

There are limited existing terrestrial and aquatic environment conditions on Site, while the Local Study Area is a combination of forest, slough wetland, and agricultural fields. A Net Effects Assessment and Comparative Evaluation were also conducted in order to identify any potential Net Effects to the terrestrial and aquatic environment as a result of the proposed conditions, and to rank each alternative in order of preference based on those potential Net Effects.

As the proposed vertical expansion of the landfill maintains the same landfiling footprint and existing criteria for operations and quality of discharge from the Site under all evaluated alternatives, there is no distinction between the alternatives in terms of their effects on the terrestrial and aquatic environment. Therefore, all three alternatives rank in first place as they would all result in no Net Effects to the terrestrial and aquatic environment.

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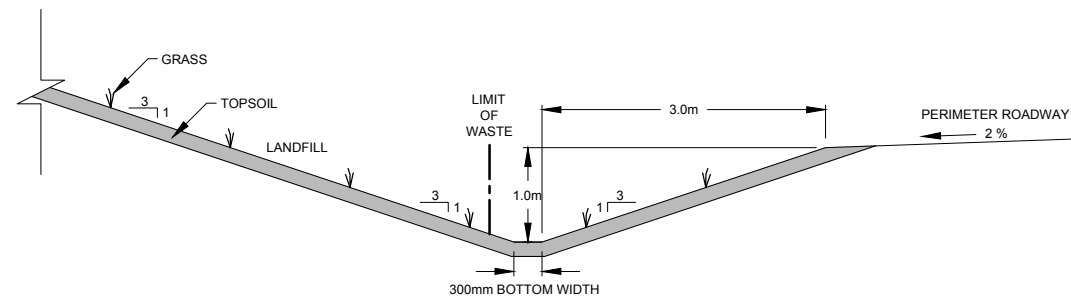
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**Brooks Road
Environmental**

Drawings

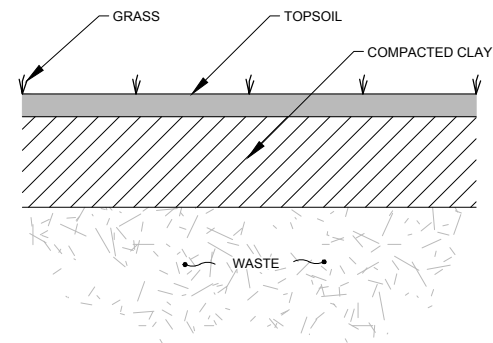


DETAIL 1 PERIMETER DITCH (TYPICAL)

1:40

1

C-03

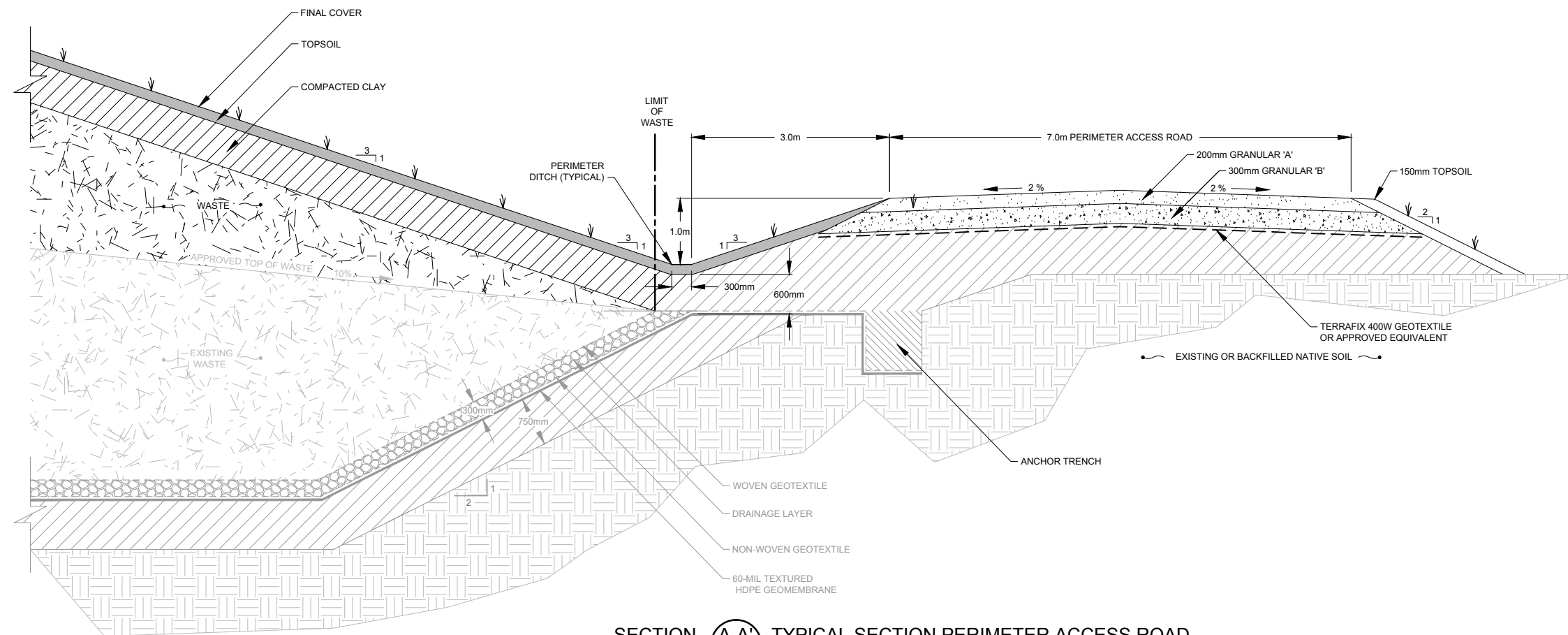


DETAIL 2 FINAL COVER

1:40

2

C-03



SECTION A-A' TYPICAL SECTION PERIMETER ACCESS ROAD

1:40

A-A'

C-02

Nº	Revision	Date	Initial

SCALE VERIFICATION

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



Approved

DRAWING STATUS

Status	Date	Initial

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HALDIMAND COUNTRY, ONTARIO

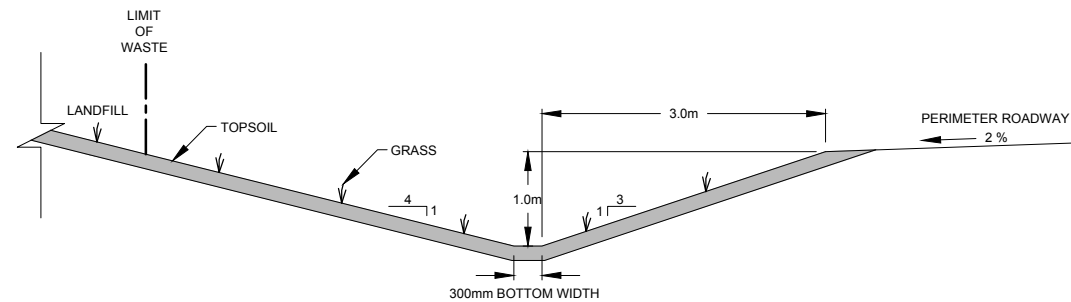
CONCEPTUAL DESIGN REPORT

VERTICAL EXPANSION
ALTERNATIVE 1 DETAILS

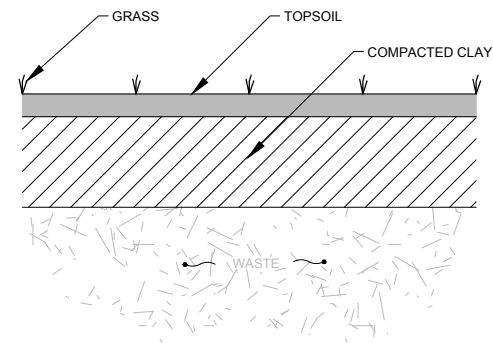


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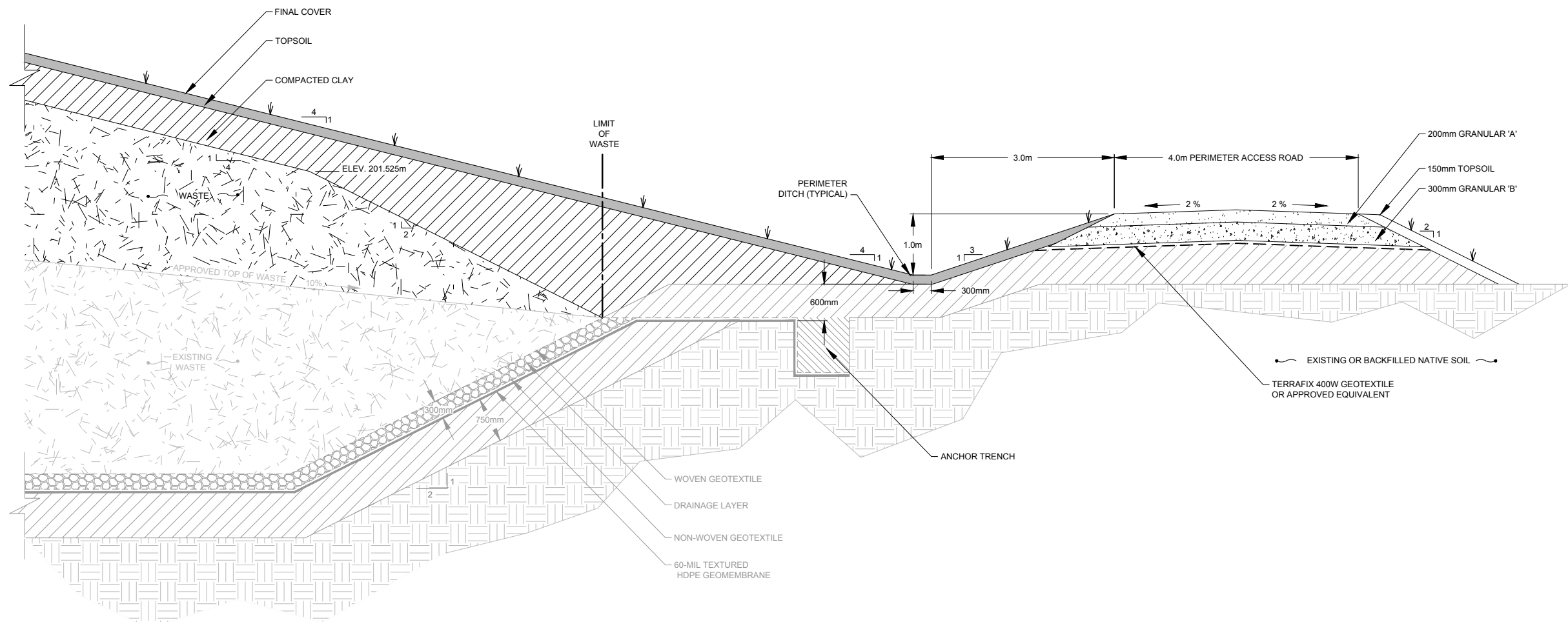
Project Manager: G.FERRARO	Reviewed By: P.KEMP	Date: DECEMBER 2015
Scale: 1:1000	Project Nº: 18235-20	Report Nº: 051
		Drawing Nº: C-03



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.	

DRAWING STATUS	
Approved	

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

Tables Following Text

Table 3.3

**Incidental Faunal Species Observations
Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON**

Species		Provincial Status	Conservation Status	
Common Name	Scientific Name		SARO	SARA
Amphibians and Reptiles				
American bullfrog	Lithobates catesbeianus	S4	Threatened	Threatened
American toad	Anaxyrus americanus	S5		
Blanding's turtle	Emydoidea blandingii	S3		
Chorus frog	Pseudacris triseriata	S4		
Dekay's brownsnake	Storeria dekayi	S5		
Eastern garter snake	Thamnophis sirtalis sirtalis	S5		
Gray tree frog	Hyla versicolor	S5		
Green frog	Lithobates clamitans	S5	Special Concern	Special Concern
Northern leopard frog	Lithobates pipiens	S5		
Snapping turtle	Chelydra serpentina	S3		
Spring peeper	Pseudacris crucifer	S5		
Wood frog	Lithobates sylvaticus	S5		
Birds				
American crow	Corvus brachyrhynchos	S5B	Threatened	No Status
American goldfinch	Spinus tristis	S5		
American robin	Turdus migratorius	S5B		
Baltimore oriole	Icterus galbula	S4B		
Barn swallow	Hirundo rustica	S4B		
Black-capped chickadee	Poecile atricapillus	S5		
Blue jay	Cyanocitta cristata	S5		
Brown-headed cowbird	Molothrus ater	S4B		
Bufflehead	Bucephala albeola	S4		
Canada goose	Branta canadensis	S5		
Chestnut-sided warbler	Setophaga pensylvanica	S5B		
Chipping sparrow	Spizella passerina	S5B		
Common grackle	Quiscalus quiscula	S5B		
Common yellowthroat	Geothlypis trichas	S5B		
Downy woodpecker	Picoides pubescens	S5		
Eastern screech-owl	Megascops asio	S4		
Eastern towhee	Pipilo erythrophthalmus	S4B	Special Concern	No Status
Eastern wood-peewee	Contopus virens	S4B		
Field sparrow	Spizella pusilla	S4B		

Table 3.3

**Incidental Faunal Species Observations
Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON**

Species		Provincial Status	Conservation Status	
Common Name	Scientific Name		SARO	SARA
Amphibians and Reptiles				
Gray catbird	Dumetella carolinensis	S4B	Threatened	Threatened
Great blue heron	Ardea herodias	S4		
Great crested flycatcher	Myiarchus crinitus	S4B		
Gull	Laridae sp.	-		
Indigo bunting	Passerina cyanea	S4B		
Killdeer	Charadrius vociferus	S5B,S5N		
Least bittern	Ixobrychus exilis	S4B		
Mallard	Anas platyrhynchos	S5		
Northern flicker	Colaptes auratus	S4B		
Red-winged blackbird	Agelaius phoeniceus	S4		
Rose-breasted grosbeak	Pheucticus ludovicianus	S4B		
Ruby-throated hummingbird	Archilochus colubris	S5B		
Scarlet tanager	Piranga olivacea	S4B		
Song sparrow	Melospiza melodia	S5B		
Sora	Porzana carolina	S4B		
Swamp sparrow	Melospiza georgiana	S5B	Special Concern	No Status
Tree swallow	Tachycineta bicolor	S4B		
Turkey vulture	Cathartes aura	S5B		
Warbling vireo	Vireo gilvus	S5B		
Wild turkey	Meleagris gallopavo	S5		
Wood thrush	Hylocichla mustelina	S4B	Special Concern	No Status
Yellow warbler	Setophaga petechia	S5B		

**Incidental Faunal Species Observations
Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON**

Insects				
Bluet sp.	Enallagma sp.	-		
Cherry-face meadowhawk	Sympetrum internum	S5		
Common whitetail	Plathemis lydia	S5		
Great spangled fritillary	Speyeria cybele	S5		
Hummingbird clearwing moth	Hemaris thysbe	S5		
Painted lady	Vanessa cardui	S5		
Viceroy	Limnitis archippus	S5		
Mammals				
Chipmunk	Sciuridae sp.	-		
Coyote	Canis latrans	S5		
White-tailed deer	Odocoileus virginianus	S5		

Notes:

Provincial Status Rank Definitions

SARA: Species at Risk Act

SARO: Species at Risk in Ontario

S3: Rare to uncommon in Ontario; usually between 20 and 100 occurrences in the province

S4: Common in Ontario; apparently secure with over 80 occurrences in the province

S5: Demonstrably secure; species is widespread in Ontario

- : Indicates no information available

Rank qualifiers (e.g. S1B, S2N) are used for some migratory or transitory species to indicate different conservation statuses at specific times of the year, such as during the breeding (B) and non-breeding (N) seasons.

Appendix A

Response Letter from MNRF

MNRF PROVIDED INFORMATION IN 2013

HALDIMAND					
Species At Risk Designations					
ENDANGERED					
THREATENED					
SPECIAL CONCERN					
EXTIRPATED					
AMPHIBIANS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Fowler's Toad (<i>Anaxyrus fowleri</i>)	Known to Occur	Habitat Protection	generally found in sand dunes and lakeshore habitats; found in shallow areas of permanent water bodies; only occurs on the shores of Lake Erie	Active: April – October Hibernates: October – April Breeding: May - July	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)	Known to Occur	Habitat Regulations	inhabit deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	Active: March – October Hibernates: October – March Breeding: Late March - Mid April	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
BIRDS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Acadian Flycatcher (<i>Empidonax virescens</i>)	Known to Occur	Species Protection Only	generally requires large areas of mature, undisturbed forest; avoids the forest edge; often found in well wooded swamps and ravines	Migrate South before Winter	Follow Breeding Bird Survey Protocol
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Known to Occur	N/A	prefers deciduous and mixed-deciduous forest; and habitat close to water bodies such as lakes and rivers; They roost in super canopy trees such as Pine	Breed and Nest - April or May Some Migrate South when water bodies freeze over	Follow Breeding Bird Survey Protocol
Barn Owl (<i>Tyto alba</i>)	Suspected to Occur	Habitat Regulations	generally prefer low-elevation, open country; often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees and cavities in cliffs.	Active Year Round Some leave for the Winter	Follow Breeding Bird Survey Protocol Night surveys may be helpful as they are very vocal
Barn Swallow (<i>Hirundo rustica</i>)	Known to Occur	Habitat Protection	prefers farmland; lake/river shorelines; wooded clearings; urban populated areas; rocky cliffs; and wetlands. They nest inside or outside buildings; under bridges and in road culverts; on rock faces and in caves etc.	Migrate South before Winter	Follow Breeding Bird Survey Protocol
Black Tern (<i>Chidonias niger</i>)	Known to Occur	N/A	generally prefer freshwater marshes and wetlands; nest either on floating material in a marsh or on the ground very close to water	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Bobolink (<i>Dolichonyx oryzivorus</i>)	Known to Occur	Habitat Protection	generally prefers open grasslands and hay fields. In migration and in winter uses freshwater marshes and grasslands	Migrate South for the Winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Cerulean Warbler (<i>Dendroica cerulea</i>)	Known to Occur	Habitat Protection	generally found in mature deciduous forests with an open understory; also nests in older, second-growth deciduous forests.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Chimney Swift (<i>Chaetura pelagica</i>)	Known to Occur	Habitat Protection	historically found in deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer; now most are found in urban areas in large uncapped chimneys	Nesting - Late April to Mid- May Migrate South in September or Early October	Consult: Chimney Swift Monitoring Protocol. Bird Studies Canada, March 2009
Common Nighthawk (<i>Chordeiles minor</i>)	Known to Occur	N/A	generally prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops)	Migrate South for the Winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Eastern Meadowlark (<i>Sturnella magna</i>)	Known to Occur	Habitat Protection	generally prefers grassy pastures, meadows and hay fields. Nests are always on the ground and usually hidden in or under grass clumps.	Migrate South for the Winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Henslow's Sparrow (<i>Ammodramus henslowii</i>)	Historically Known to Occur	Habitat Protection	generally found in old fields, pastures and wet meadows. They prefer areas with dense, tall grasses, and thatch, or decaying plant material	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Hooded Warbler (<i>Wilsonia citrina</i>)	Known to Occur	N/A	generally found in the Carolinian Zone, in the interiors of large upland tracts of mature deciduous and mixed forest, and in ravines; can breed in low shrubby such as raspberry canes	Breed from Late May to Early July	Follow Breeding Bird Survey Protocol
King Rail (<i>Rallus elegans</i>)	Known to Occur	Habitat Protection	generally this species requires large marshes with open shallow water that merges with shrubby areas	Breed from Late April to mid-May Migrate South for the Winter	Follow March Monitoring Protocol
Least Bittern (<i>Ixobrychus exilis</i>)	Known to Occur	Species Protection Only	generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants	Migrate South for the Winter	Follow Marsh Monitoring Protocol; 10 day window of male calling (variable timing). Does not respond well to playback. Very difficult to detect.
Yellow-breasted Chat (<i>Icteria virens</i>)	Known to Occur	Habitat Protection	generally prefer dense thickets around wood edges, riparian areas, and in overgrown clearings	Migrate South for the Winter Arrive in Ontario Early May	Follow Breeding Bird Survey Protocol
FISH		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Eastern Sand Darter (<i>Ammocrypta pellucida</i>)	Known to Occur	Habitat Protection	generally prefer sandy-bottomed streams and rivers	Active Year Round	For information please contact your local MNR office, DFO, and Lakes and Rivers

River Redhorse (<i>Moxostoma carinatum</i>)	Known to Occur	N/A	generally inhabit moderate to large rivers where the current is fast, and the bottom is composed of stones, rubble and bedrock with very little siltation.	Spawning occurs in late May or early June,	<ul style="list-style-type: none"> • Electrofishing For information please contact your local MNR office, DFO, and Lakes and Rivers
Silver Shiner (<i>Notropis photogenis</i>)	Known to Occur	Habitat Protection	generally prefer moderate to large, deep, relatively clear streams with swift currents, and moderate to high gradients	Spawning occurs in May and June	For information please contact your local MNR office, DFO, and Lakes and Rivers

INSECTS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Monarch Butterfly (<i>Danaus plexippus</i>)	Known to Occur	N/A	exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	Migrate South for the Winter Usually in Late September and October	<ul style="list-style-type: none"> • Watch for adults along roadsides and in open fields • Caterpillars feed on milkweeds: Common milkweed grows in open disturbed habitats (fields, roadsides, etc) and swamp milkweed grows in wet habitats (along streams, lakes, marshes) • Adults can be spotted from a distance; caterpillars must be looked for carefully on the host plant.
West Virginia White (<i>Pieris virginienensis</i>)	Known to Occur	N/A	generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (Cardamine diphylla), which is a small, spring-blooming plant of the forest floor.	Adult butterfly emerges from pupa in late March; flies only in April and May	<ul style="list-style-type: none"> • Watch for adults within moist, deciduous woodlands • Caterpillars feed on the two-leaved toothwort: Toothwort grows in damp, open, rich hardwood woodlands • Adults can be spotted from a distance; caterpillars must be looked for carefully on the host plant.

MAMMALS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
American Badger (<i>Taxidea taxus jacksoni</i>)	Known to Occur	Habitat Regulations	generally prefer open habitats, whether natural (grasslands) or man-made (agricultural fields, road right-of-ways, golf courses)	Breed: Late Summer Semi-dormant over Winter	<ul style="list-style-type: none"> • Determine if soils are suitable (sandy or loamy) • Dens and Woodchuck burrows should be surveyed for use
Grey Fox (<i>Urocyon cinereoargenteus</i>)	Suspected to Occur	Species Protection Only	generally prefers deciduous forests, marshes, swampy areas, and urban areas	Active Year Round	<ul style="list-style-type: none"> • Opportunistically or by examining tracks in winter and in mud in summer
Little Brown Myotis (Myotis lucifugus)	Known to Occur	Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	Hibernates in caves and mines during winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Northern Myotis (Myotis septentrionalis)	Known to Occur	Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 Maternal Roosts: Often associated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.)	Hibernates in caves and mines during winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Woodland Vole (<i>Microtus pinetorum</i>)	Known to Occur	N/A	generally associated with deciduous forests in areas of soft, friable, often sandy soil beneath deep humus, where it can burrow easily.	Active Year Round	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol

MOLLUSCS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Eastern Pondmussel (<i>Ligumia nasuta</i>)	Known to Occur	Habitat Protection	generally inhabit sheltered areas of lakes or slow streams in substrates of fine sand and mud	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Kidneyshell (<i>Ptychobranchnus fasciolaris</i>)	Suspected to Occur	Species Protection Only	generally found in small to medium-sized rivers and streams, where it prefers shallow areas with clear, swift-flowing water and substrates of firmly packed coarse gravel and sand	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Rainbow Mussel (<i>Villosa iris</i>)	Known to Occur	Species Protection Only	most abundant in shallow, well-oxygenated reaches of small- to medium-sized rivers and sometimes lakes, on substrates of cobble, gravel, sand and occasionally mud	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Round Pigtoe (<i>Pleurobema sintoxia</i>)	Known to Occur	Species Protection Only	generally occur in small rivers in areas of moderate flow on substrates of gravel, cobble and boulder. In larger rivers, they are found in mud, sand and gravel at varying depths.	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Snuffbox (<i>Epioblasma triquetra</i>)	Known to Occur	Species Protection Only	generally found in small to medium-sized rivers in shallow riffle areas with clean, clear, swift-flowing water and firm rubble/gravel/sand substrates that are free of silt.	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Wavy-rayed lampmussel (<i>Lampsilis fasciola</i>)	Known to Occur	Habitat Protection	generally inhabit clear rivers and streams of a variety of sizes, where the water flow is steady and the substrate is stable	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.

MOSESSES		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
PLANTS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey

American Chestnut (<i>Castanea dentata</i>)	Known to Occur	Species Protection Only	found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils.	Flowers occur in Late Spring and Early Summer	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species <ul style="list-style-type: none"> Perform detailed floristic inventory Look for distinctive fruits on the ground
American Columbo (<i>Frasera carolinensis</i>)	Known to Occur	Species Protection Only	most commonly associated with open deciduous forested slopes, thickets and clearings; grows in a variety of relatively stable habitats as well as on a wide variety of soils	Germination and development of the rosette begin in early spring; Flowers open in May; Fruit production continues until October or November	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species Look for spikes from last years flowers
Broad Beech Fern (<i>Phegopteris hexagonoptera</i>)	Known to Occur	N/A	generally inhabits shady areas of beech and maple forests where the soil is moist or wet	The frond of the Broad Beech Fern appears towards the end of May	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Butternut (<i>Juglans cinerea</i>)	Known to Occur	Species Protection Only	generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows	Flowers from April to June. Fruits reach maturity during the month of September or October	Walk slowly and systematically in grid fashion through suitable habitat pausing every 30 meters for a detailed scan of trees within sight. Areas with dense foliage or many saplings will require a more intensive survey to detect sapling butternut and yearlings. Look for distinctive fruit on the ground
Common Hoptree (<i>Ptelea trifoliata</i>)	Known to Occur	Species Protection Only	generally grows in sandy soils in areas with a lot of natural disturbance - such as the outer edge of shoreline vegetation, sand spits, and sand points.	Flowering occurs in early summer Fruiting occurs in July	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Eastern Flowering Dogwood (<i>Cornus florida</i>)	Known to Occur	Habitat Regulations	generally grows in deciduous and mixed forests, in the drier areas of its habitat, although it is occasionally found in slightly moist environments; Also grows around edges and hedgerows	flowering occurs in mid-spring, just as the leaves begin to develop. Fruit turns red at the end of summer.	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species Easiest to detect during Spring when in flower <ul style="list-style-type: none"> Also look for distinctive bark
Green Dragon (<i>Arisaema dracontium</i>)	Known to Occur	N/A	generally grows in damp deciduous forests and along streams.	Flowering occurs in May and June	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Virginia Mallow (<i>Sida hermaphrodita</i>)	Known to Occur	Habitat Regulation	generally grows on streambanks and bottomlands, as well as disturbed places like roadsides and railroad grades that are in proximity to the stream corridors	Flowers (white) bloom from July - October	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
White Wood Aster (<i>Eurybia divaricata</i>)	Suspected to Occur	Species Protection Only	generally grows in open, dry, deciduous forests. It has been suggested that it may benefit from some disturbance, as it often grows along trails.	Flowering occurs in early September, and sets fruit later in the month	<ul style="list-style-type: none"> Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species

REPTILES		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Blanding's Turtle (<i>Emydonidea blandingii</i>)	Known to Occur	Species Protection Only	generally occur in freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams.	Eggs are laid in June, with hatchlings emerging in late September and early October.	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Common Five-lined Skink (<i>Plestiodon fasciatus</i>)	Suspected to Occur	Habitat Regulations	generally occur near dunes, fields, and deciduous forests. This species is generally associated with relatively open environments.	Active from mid-April to late September or early October	<ul style="list-style-type: none"> Watch for individuals sunning themselves on rocks (or trees) Lift rocks and downed woody debris carefully to avoid disturbing skinks or their eggs Avoid handling individuals; If disturbed, they can lose their tail as a defence strategy. While their tails grow back, it may affect their movement, social status, growth, and winter survival (it is a fat reserve).
Eastern Hog-nosed Snake (<i>Heterodon platirhinos</i>)	Historically Known to Occur	Species Protection Only	generally prefer habitats with sandy, well-drained soil and open vegetative cover, such as open woods, brushland, fields, forest edges and disturbed sites. The species is often found near water.	Mating occurs in spring and in August and early September. Hatching occurs in late August or early September	<ul style="list-style-type: none"> In early spring, look for individuals near ideal hibernation sites During egg-laying period (June), look for nesting females in sandy areas in early morning and late evening. Rest of the season, survey intensively and systematically by flipping rocks and examining small shrubs in forest openings while listening carefully for hissing or retreat of the animal <ul style="list-style-type: none"> More active at Dusk

Eastern Ribbonsnake (<i>Thamnophis sauritus</i>)	Known to Occur	N/A	generally occur along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.	Hibernate: October - April Mating: Early Spring Hatching: Early Fall (September)	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Gray Ratsnake (<i>Pantherophis spiloides</i>)	Known to Occur	Habitat Regulations	generally associated with deciduous forests, with a preference for a mosaic of forest and open habitats, such as fields and rocky outcrops	Nesting: July - Early August Breeding: Late May - Mid June Eggs hatch between late August to early October	<ul style="list-style-type: none"> • Best time to survey is during the spring emergence (April - mid-May) from hibernation • They stage near hibernating sites and thermoregulate • Survey on warm sunny calm days • During the cooler times of the year survey on the warmest time of the day • During hot weather survey during cooler times like morning and late afternoon • Road surveys and surveys of anthropogenic features may also be useful
Milksnake (<i>Lampropeltis triangulum</i>)	Known to Occur	N/A	generally occur in rural areas, where it is most frequently reported in and around buildings, especially old structures. It is also found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. They must also be in proximity of water, and suitable locations for basking and egg-laying.	Active at dawn and dusk in the spring and fall, and at night in the summer. Hibernate: Late October to Early May	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Northern Map Turtle (<i>Graptemys geographica</i>)	Known to Occur	N/A	generally inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day.	Active: At night Hibernate: October - April Hatching: Late August - Early September	<ul style="list-style-type: none"> • scan shoreline in spring and partially submerged logs/rocks in summer for basking turtles • Be aware that map turtles do not allow as close of approach as other turtles before leaving a basking site • Snorkel in desired aquatic habitat! • Nesting season: search suitable habitat for nests
Snapping Turtle (<i>Chelydra serpentina</i>)	Known to Occur	N/A	generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	Nesting: Late May and June Hibernate: October - April	<ul style="list-style-type: none"> • Scan offshore rocks and logs for basking turtles (10am-2pm) • Snorkel in desired aquatic habitat! • Nesting Season: Search known or preferred nesting habitat areas for females
Spiny Softshell (<i>Apalone spinifera</i>)	Historically Known to Occur	Species Protection Only	generally prefer marshy creeks, swift-flowing rivers, lakes, impoundments, bays, marshy lagoons, ditches and ponds near rivers	Lay eggs in June or July Hibernate over winter	<ul style="list-style-type: none"> • Best time to survey is during nesting season when females are active laying eggs • Visual searches should be conducted in appropriate habitat

**Ministry of Natural
Resources**

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Guelph District

April 29, 2014

Lisa Horn, B.E.S.

Conestoga-Rovers & Associates

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Dear Lisa,

Thank you for your inquiry regarding the presence of species at risk on the Brooks Road Landfill and adjacent property located at Brooks Road (as seen in the map you provided MNR on April 15, 2014), in Cayuga, Ontario.

Digital mapping for some natural heritage features is available from Land Information Ontario (LIO). MNR recommends contacting LIO to obtain relevant feature mapping. Datasets of potential interest (and the corresponding LIO dataset) include – wetlands ('Wetland Unit' dataset), ANSI ('ANSI dataset'), wooded areas ('Wooded Areas'), wintering areas ('Wintering Areas'), and fish spawning areas ('Spawning Areas').

Notwithstanding the recommendation to obtain mapping from LIO, MNR Guelph District has records for Provincially Significant Wetlands (North Cayuga Swamp Wetland Complex) on the study area and ANSI (North Cayuga Slough Forests, Life Science ANSI) adjacent to the study area of interest to you.

There does not appear to be any other watercourses on or directly adjacent to the study area. However, if you are interested in fisheries information for watercourses in the greater surrounding area to your study site, please contact Anne Yagi, Management Biologist at (905) 562-1196 to determine what information may be required.

I can inform you that we have observations of Blanding's Turtle, Snapping Turtle, Milksnake, Eastern Ribbonsnake, Chimney Swift, Bobolink, Eastern Meadowlark, Barn Swallow, Cerulean Warbler, and Eastern Flowering Dogwood on or in the vicinity of the above properties.

Please note that because the province has not been surveyed comprehensively for the presence of species at risk (SAR), the absence in the NHIC database of an EO in a particular geographic area does not indicate the absence of the species in that area. Consequently, the presence of an EO is useful to flag the presence of the species in the area, but is not an appropriate tool to determine whether a species is absent, or whether it should be surveyed for or not in a particular area.

**This office does not provide access to direct services.
To meet with our staff please be sure to call ahead and make an appointment.
Visit us at our website: www.gov.on.ca**

Consequently, we provide the following advice with respect to determining the presence of species at risk on a property for which a land-use change or on-the-ground activity is being proposed (note that some of the following may not apply to a given type of proposed activity, or for a given study area):

I. Habitat Inventory

The District recommends undertaking a comprehensive botanical inventory of the entire area that may be subject to direct and indirect impacts from the proposed activity. The vegetation communities and aquatic habitats in the study area should be classified as per the "Ecological Land Classification (ELC) for Southern Ontario" system, to either the "Ecosite" or "Vegetation Type" level. With respect to aquatic habitats in the study area, we recommend you collect data on the physical characteristics of the waterbodies and inventory the riparian zone vegetation, so that these habitats can be classified as per the Aquatic Ecosites described in the ELC manual.

II. Potential SAR on the property

A list of species at risk that have the potential to occur in the area can be produced by cross-referencing the ecosites described during the habitat inventory with the habitat descriptions of species at risk known to occur in the county or regional municipality within which the area is located. The list of species at risk known to occur in Haldimand County is attached. The species-specific COSEWIC status reports (www.cosewic.gc.ca) are a good source of information on species at risk habitat needs and will be helpful in determining the suitability of the property's ecosites for a given species.

Please note that the Species at Risk in Ontario list (SARO) is a living document and is amended periodically as a result of species assessment and re-assessments conducted by the Committee on the Status of Species at Risk in Ontario (COSSARO). The SARO list can be accessed on the webpage http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CSSR_SARO_LST_EN.html

COSSARO also maintains a list of species to be assessed in the future. It is recommended to take COSSARO's list of anticipated assessments into consideration, especially when the proposed start date of the activity is more than 6 months away, or the project will be undertaken over a period greater than 6 months. The list can be viewed by going to <http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/244543.html> and clicking on the link [Priority List of Species to be Assessed and Classified by COSSARO](#).

III. SAR surveys

The District is of the opinion that each species at risk identified under Step II should be surveyed for, regardless of whether or not the species has been previously recorded in the area, or whether previous records are historical in nature. The survey report should describe how each species at risk was surveyed for, and provide a rationale for why, if any, certain species appearing on the county/ regional municipal list were not the subject of the survey. These rationales must be based on evidence demonstrating either that: suitable habitat for the species is not present on the property or; the project will not have any impacts -including indirect impacts- on the species. Some SAR surveys require an authorization under the *Endangered Species Act 2007* and/or a Scientific Collector's Permit; please contact me if you require further direction regarding these.

Guelph District additionally recommends contacting the municipal planning approval authority and the conservation authority to determine if they have any additional information or records of interest for the study area.

Please contact me if your investigations reveal the presence of species at risk on the subject property. I will be happy to provide further advice regarding the provisions of the *Endangered Species Act* at that time.

Sincerely,

Karine Bériault

Karine Bériault
Management Biologist
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HALDIMAND		Jump to: List of Municipalities											
<div>Species At Risk Designations</div> <table><tr><td>ENDANGERED</td><td></td></tr><tr><td>THREATENED</td><td></td></tr><tr><td>SPECIAL CONCERN</td><td></td></tr><tr><td>EXTIRPATED</td><td></td></tr></table>		ENDANGERED		THREATENED		SPECIAL CONCERN		EXTIRPATED					
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AMPHIBIANS													
		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey								
Fowler's Toad (<i>Anaxyrus fowleri</i>)	Known to Occur	Species and General Habitat Protection	generally found in sand dunes and lakeshore habitats; found in shallow areas of permanent water bodies; only occurs on the shores of Lake Erie	Active: April – October Hibernates: October – April Breeding: May - July	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol								
Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)	Known to Occur	Species Protection and Habitat Regulation	inhabit deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	Active: March – October Hibernates: October – March Breeding: Late March - Mid April	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol								
BIRDS													
		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey								
Acadian Flycatcher (<i>Empidonax virescens</i>)	Known to Occur	Species and General Habitat Protection	generally requires large areas of mature, undisturbed forest; avoids the forest edge; often found in well wooded swamps and ravines	Migrate South before Winter	Follow Breeding Bird Survey Protocol								
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Known to Occur	N/A	prefers deciduous and mixed-deciduous forest; and habitat close to water bodies such as lakes and rivers; They roost in super canopy trees such as Pine	Breed and Nest - April or May Some Migrate South when water bodies freeze over	Follow Breeding Bird Survey Protocol								
Barn Owl (<i>Tyto alba</i>)	Suspected to Occur	Species Protection and Habitat Regulation	generally prefer low-elevation, open country; often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees and cavities in cliffs.	Active Year Round Some leave for the Winter	Follow Breeding Bird Survey Protocol Night surveys may be helpful as they are very vocal								
Barn Swallow (Hirundo rustica)	Known to Occur	Species and General Habitat Protection	prefers farmland; lake/river shorelines; wooded clearings; urban populated areas; rocky cliffs; and wetlands. They nest inside or outside buildings; under bridges and in road culverts; on rock faces and in caves etc.	Migrate South before Winter	Follow Breeding Bird Survey Protocol								
Black Tern (<i>Childonias niger</i>)	Known to Occur	N/A	generally prefer freshwater marshes and wetlands; nest either on floating material in a marsh or on the ground very close to water	Migrate South for the Winter	Follow Breeding Bird Survey Protocol								
Bobolink (<i>Dolichonyx oryzivorus</i>)	Known to Occur	Species and General Habitat Protection	generally prefers open grasslands and hay fields. In migration and in winter uses freshwater marshes and grasslands	Migrate South for the Winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol								
Canada Warbler (<i>Cardellina canadensis</i> ; formerly <i>Wilsonia canadensis</i>)	Known to Occur	N/A	Generally prefers wet coniferous, decediuous and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	Migrate South for the Winter Arrive in Ontario Early May	Follow Breeding Bird Survey Protocol								
Cerulean Warbler (<i>Setophaga cerulea</i> ; formerly <i>Dendoica cerulea</i>)	Known to Occur	Species and General Habitat Protection	generally found in mature deciduous forests with an open understorey; also nests in older, second-growth deciduous forests.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol								
Chimney Swift (<i>Chaetura pelagica</i>)	Known to Occur	Species and General Habitat Protection	historically found in deciduous and coniferous, usually wet forest types, all with a welldesveloped, dense shrub layer; now most are found in urban areas in large uncapped chimneys	Nesting - Late April to Mid- May Migrate South in September or Early October	Consult: Chimney Swift Monitoring Protocol. Bird Studies Canada, March 2009								
Common Nighthawk (<i>Chordeiles minor</i>)	Known to Occur	N/A	generally prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops)	Migrate South for the Winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol								
Eastern Meadowlark (<i>Sturnella Magna</i>)	Known to Occur	Species and General Habitat Protection	generally prefers grassy pastures, meadows and hay fields. Nests are always on the ground and usually hidden in or under grass clumps.	Migrate South for the Winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol								
Eastern Whip-poor-will (<i>Caprimlugus vociferus</i>)	Suspected to Occur	Species and General Habitat Protection	generally prefer semi-open deciduous forests or patchy forests with clearings; areas with little ground cover are also preferred; In winter they occupy primarily mixed woods near open areas.	Nesting: May - July	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol								

Golden-winged Warbler (<i>Vermivora chrysoptera</i>)	Known to Occur	N/A	generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Henslow's Sparrow (<i>Ammodramus henslowii</i>)	Historically Known to Occur	Species and General Habitat Protection	generally found in old fields, pastures and wet meadows. They prefer areas with dense, tall grasses, and thatch, or decaying plant material	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
King Rail (<i>Rallus elegans</i>)	Known to Occur	Species and General Habitat Protection	generally this species requires large marshes with open shallow water that merges with shrubby areas	Breed from Late April to mid-May Migrate South for the Winter	Follow March Monitoring Protocol
Least Bittern (<i>Ixobrychus exilis</i>)	Known to Occur	Species and General Habitat Protection	generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants	Migrate South for the Winter	Follow Marsh Monitoring Protocol; 10 day window of male calling (variable timing). Does not respond well to playback. Very difficult to detect.
Louisiana Waterthrush (<i>Seiurus motacilla</i>)	Known to Occur	N/A	generally inhabits mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Peregrine Falcon (<i>Falco peregrinus</i>)	Known to Occur	N/A	generally nest on tall, steep cliff ledges adjacent to large waterbodies; some birds adapt to urban environments and nest on ledges of tall buildings, even in densely populated downtown areas.	Active Year Round Lay Eggs around Easter Hatching occurs around Mother's Day Young fledge around Father's Day	Visit ideal habitat locations and listen/look for individuals in the vicinity.
Prothonotary Warbler (<i>Protonotaria citrea</i>)	Known to Occur	Species and General Habitat Protection	generally found in the dead trees of flooded woodlands or deciduous swamp forests; Carolinian zone	Migrate South for the Winter Eggs are layed from Late May - Early July	Follow Breeding Bird Survey Protocol
Red-Headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	Known to Occur	N/A	generally prefer open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks	Active from May to September	Follow Breeding Bird Survey Protocol
Short-eared Owl (<i>Asio flammeus</i>)	Known to Occur	N/A	generally prefers a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures and agricultural fields	Active Year Round	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Yellow-breasted Chat (<i>Icteria virens</i>)	Known to Occur	Species and General Habitat Protection	generally prefer dense thickets around wood edges, riparian areas, and in overgrown clearings	Migrate South for the Winter Arrive in Ontario Early May	Follow Breeding Bird Survey Protocol

FISH		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Eastern Sand Darter (<i>Ammocrypta pellucida</i>)	Known to Occur	Species and General Habitat Protection	generally prefer sandy-bottomed streams and rivers	Active Year Round	For information please contact your local MNR office, DFO, and Lakes and Rivers
River Redhorse (<i>Moxostoma carinatum</i>)	Known to Occur	N/A	generally inhabit moderate to large rivers where the current is fast, and the bottom is composed of stones, rubble and bedrock with very little siltation.	Spawning occurs in late May or early June,	<ul style="list-style-type: none">• Electrofishing For information please contact your local MNR office, DFO, and Lakes and Rivers
Silver Chub (<i>Macrhybopsis storeriana</i>)	Historically Known to Occur	Species and General Habitat Protection	In Ontario, generally found in Lake Erie, Lake St. Clair, and Lake Huron, but may also occur in connecting rivers; probably spawns in open water but may have historically spawned over clean gravel substrates in tributaries of Lake Erie	In Ohio,spawns in late May or early June, possibly in open water, when water temperature reaches 21°C	For information please contact your local MNR office, DFO, and Lakes and Rivers
Silver Shiner (<i>Notropis photogenis</i>)	Known to Occur	Species and General Habitat Protection	generally prefer moderate to large, deep, relatively clear streams with swift currents, and moderate to high gradients	Spawning occurs in May and June	For information please contact your local MNR office, DFO, and Lakes and Rivers

INSECTS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Monarch Butterfly (<i>Danaus plexippus</i>)	Known to Occur	N/A	exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	Migrate South for the Winter Usually in Late September and October	<ul style="list-style-type: none">• Watch for adults along roadsides and in open fields• Caterpillars feed on milkweeds: Common milkweed grows in open disturbed habitats (fields, roadsides, etc) and swamp milkweed grows in wet habitats (along streams, lakes, marshes)• Adults can be spotted from a distance; caterpillars must be looked for carefully on the host plant.
West Virginia White (Pieris virginiensis)	Known to Occur	N/A	generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (Cardamine diphylla), which is a small, spring-blooming plant of the forest floor.	Adult butterfly emerges from pupa in late March; flies only in April and May	<ul style="list-style-type: none">• Watch for adults within moist, deciduous woodlands• Caterpillars feed on the two-leaved toothwort: Toothwort grows in damp, open, rich hardwood woodlands and blooms from April to June.• Adults can be spotted from a distance; caterpillars must be looked for carefully on the host plant.

MAMMALS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
American Badger (<i>Taxidea taxus jacksoni</i>)	Known to Occur	Species Protection and <i>Habitat Regulation</i>	generally prefer open habitats, whether natural (grasslands) or man-made (agricultural fields, road right-of-ways, golf courses)	Breed: Late Summer Semi-dormant over Winter	<ul style="list-style-type: none"> Determine if soils are suitable (sandy or loamy) Dens and Woodchuck burrows should be surveyed for use
Grey Fox (<i>Urocyon cineroargenteus</i>)	Suspected to Occur	Species and General Habitat Protection	generally prefers deciduous forests, marshes, swampy areas, and urban areas	Active Year Round	<ul style="list-style-type: none"> Opportunistically or by examining tracks in winter and in mud in summer
Little Brown Myotis (Myotis lucifugus)	Known to Occur	Species and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	Hibernates in caves and mines during winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Northern Myotis (Myotis septentrionalis)	Known to Occur	Species and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 Maternal Roosts: Often associated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.)	Hibernates in caves and mines during winter	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Woodland Vole (<i>Microtus pinetorum</i>)	Known to Occur	N/A	generally associated with deciduous forests in areas of soft, friable, often sandy soil beneath deep humus, where it can burrow easily.	Active Year Round	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol

MOLLUSCS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Eastern Pondmussel (<i>Ligumia nasuta</i>)	Known to Occur	Species and General Habitat Protection	generally inhabit sheltered areas of lakes or slow streams in substrates of fine sand and mud	Active Year Round	<u>Please reference:</u> Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Kidneyshell (<i>Ptychobranchnus fasciolaris</i>)	Suspected to Occur	Species and General Habitat Protection	generally found in small to medium-sized rivers and streams, where it prefers shallow areas with clear, swift-flowing water and substrates of firmly packed coarse gravel and sand	Active Year Round	<u>Please reference:</u> Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Rainbow Mussel (<i>Villosa iris</i>)	Known to Occur	Species and General Habitat Protection	most abundant in shallow, well- oxygenated reaches of small- to medium-sized rivers and sometimes lakes, on substrates of cobble, gravel, sand and occasionally mud	Active Year Round	<u>Please reference:</u> Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Round Pigtoe (<i>Pleurobema sintoxia</i>)	Known to Occur	Species and General Habitat Protection	generally occur in small rivers in areas of moderate flow on substrates of gravel, cobble and boulder. In larger rivers, they are found in mud, sand and gravel at varying depths.	Active Year Round	<u>Please reference:</u> Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Snuffbox (<i>Epioblasma triquetra</i>)	Known to Occur	Species and General Habitat Protection	generally found in small to medium-sized rivers in shallow riffle areas with clean, clear, swift-flowing water and firm rubble/gravel/sand substrates that are free of silt.	Active Year Round	<u>Please reference:</u> Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Wavy-rayed lampmussel (<i>Lampsilis fasciola</i>)	Known to Occur	Species and General Habitat Protection	generally inhabit clear rivers and streams of a variety of sizes, where the water flow is steady and the substrate is stable	Active Year Round	<u>Please reference:</u> Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.

MOSESSES		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
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PLANTS		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
American Chestnut (<i>Castanea dentata</i>)	Known to Occur	Species and General Habitat Protection	found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils.	Flowers occur in Late Spring and Early Summer	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species<ul style="list-style-type: none">• Perform detailed floristic inventory• Look for distinctive fruits on the ground
American Columbo (<i>Frasera caroliniensis</i>)	Known to Occur	Species and General Habitat Protection	most commonly associated with open deciduous forested slopes, thickets and clearings; grows in a variety of relatively stable habitats as well as on a wide variety of soils	Germination and development of the rosette begin in early spring; Flowers open in May; Fruit production continues until October or November	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species<ul style="list-style-type: none">• Look for spikes from last years flowers
Broad Beech Fern (<i>Phegopteris hexagonoptera</i>)	Known to Occur	N/A	generally inhabits shady areas of beech and maple forests where the soil is moist or wet	The frond of the Broad Beech Fern appears towards the end of May	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species
Butternut (<i>Juglans cinerea</i>)	Known to Occur	Species and General Habitat Protection	generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows	Flowers from April to June. Fruits reach maturity during the month of September or October	Walk slowly and systematically in grid fashion through suitable habitat pausing every 30 meters for a detailed scan of trees within sight. Areas with dense foliage or many saplings will require a more intensive survey to detect sapling butternut and yearlings Look for distinctive fruit on the ground
Common Hoptree (<i>Ptelea trifoliata</i>)	Known to Occur	Species and General Habitat Protection	generally grows in sandy soils in areas with a lot of natural disturbance - such as the outer edge of shoreline vegetation, sand spits, and sand points.	Flowering occurs in early summer Fruiting occurs in July	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species
Eastern Flowering Dogwood (<i>Cornus florida</i>)	Known to Occur	Species Protection and Habitat Regulation	generally grows in deciduous and mixed forests, in the drier areas of its habitat, although it is occasionally found in slightly moist environments; Also grows around edges and hedgerows	flowering occurs in mid-spring, just as the leaves begin to develop. Fruit turns red at the end of summer.	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species<ul style="list-style-type: none">• Easiest to detect during Spring when in flower• Also look for distinctive bark
Green Dragon (<i>Arisaema dracontium</i>)	Known to Occur	N/A	generally grows in damp deciduous forests and along streams.	Flowering occurs in May and June	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species
Virginia Mallow (<i>Sida hermaphrodita</i>)	Known to Occur	Species Protection and Habitat Regulation	generally grows on streambanks and bottomlands, as well as disturbed places like roadsides and railroad grades that are in proximity to the stream corridors	Flowers (white) bloom from July - October	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species
White Wood Aster (<i>Eurybia divaricata</i>)	Suspected to Occur	Species and General Habitat Protection	generally grows in open, dry, deciduous forests. It has been suggested that it may benefit from some disturbance, as it often grows along trails.	Flowering occurs in early September, and sets fruit later in the month	<ul style="list-style-type: none">• Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters• Use a plant field guide to distinguish from similar species

REPTILES		ESA Protection	Key Habitats Used By Species	Timing Of Life History Events	How to Conduct a Proper Survey
Blanding's Turtle (<i>Emydonidea blandingii</i>)	Known to Occur	Species and General Habitat Protection	generally occur in freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams.	Eggs are laid in June, with hatchlings emerging in late September and early October.	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Common Five-lined Skink (<i>Plestiodon fasciatus</i>)	Suspected to Occur	Species Protection and Habitat Regulation	generally occur near dunes, fields, and deciduous forests. This species is generally associated with relatively open environments.	Active from mid-April to late September or early October	<ul style="list-style-type: none">• Watch for individuals sunning themselves on rocks (or trees)• Lift rocks and downed woody debris carefully to avoid disturbing skinks or their eggs• Avoid handling individuals; If disturbed, they can lose their tail as a defence strategy. While their tails grow back, it may affect their movement, social status, growth, and winter survival (it is a fat reserve).
Eastern Hog-nosed Snake (<i>Heterodon platirhinos</i>)	Historically Known to Occur	Species and General Habitat Protection	generally prefer habitats with sandy, well-drained soil and open vegetative cover, such as open woods, brushland, fields, forest edges and disturbed sites. The species is often found near water.	Mating occurs in spring and in August and early September. Hatching occurs in late August or early September	<ul style="list-style-type: none">• In early spring, look for individuals near ideal hibernation sites• During egg-laying period (June), look for nesting females in sandy areas in early morning and late evening.• Rest of the season, survey intensively and systematically by flipping rocks and examining small shrubs in forest openings while listening carefully for hissing or retreat of the animal• More active at Dusk
Eastern Ribbonsnake (<i>Thamnophis sauritus</i>)	Known to Occur	N/A	generally occur along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.	Hibernate: October - April Mating: Early Spring Hatching: Early Fall (September)	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Gray Ratsnake (<i>Pantherophis spiloides</i>)	Known to Occur	Species Protection and Habitat Regulation	generally associated with deciduous forests, with a preference for a mosaic of forest and open habitats, such as fields and rocky outcrops	Nesting: July - Early August Breeding: Late May - Mid June Eggs hatch between late August to early October	<ul style="list-style-type: none">• Best time to survey is during the spring emergence (April - mid-May) from hibernation• They stage near hibernating sites and thermoregulate<ul style="list-style-type: none">• Survey on warm sunny calm days• During the cooler times of the year survey on the warmest time of the day• During hot weather survey during cooler times like morning and late afternoon• Road surveys and surveys of anthropogenic features may also be useful
Milksnake (<i>Lampropeltis triangulum</i>)	Known to Occur	N/A	generally occur in rural areas, where it is most frequently reported in and around buildings, especially old structures. It is also found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. They must also be in proximity of water, and suitable locations for basking and egg-laying.	Active at dawn and dusk in the spring and fall, and at night in the summer. Hibernate: Late October to Early May	Contact MNR Guelph District SAR Bio to obtain a copy of the protocol
Northern Map Turtle (<i>Graptemys geographica</i>)	Known to Occur	N/A	generally inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day.	Active: At night Hibernate: October - April Hatching: Late August - Early September	<ul style="list-style-type: none">• scan shoreline in spring and partially submerged logs/rocks in summer for basking turtles• Be aware that map turtles do not allow as close of approach as other turtles before leaving a basking site<ul style="list-style-type: none">• Snorkel in desired aquatic habitat!• Nesting season: search suitable habitat for nests
Snapping Turtle (<i>Chelydra serpentina</i>)	Known to Occur	N/A	generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravelly or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	Nesting: Late May and June Hibernate: October - April	<ul style="list-style-type: none">• Scan offshore rocks and logs for basking turtles (10am-2pm)<ul style="list-style-type: none">• Snorkel in desired aquatic habitat!• Nesting Season: Search known or preferred nesting habitat areas for females
Spiny Softshell (<i>Apalone spinifera</i>)	Historically Known to Occur	Species and General Habitat Protection	generally prefer marshy creeks, swift-flowing rivers, lakes, impoundments, bays, marshy lagoons, ditches and ponds near rivers	Lay eggs in June or July Hibernate over winter	<ul style="list-style-type: none">• Best time to survey is during nesting season when females are active laying eggs• Visual searches should be conducted in appropriate habitat

Appendix B

Vegetation Inventory

Appendix B

Vegetation Inventory
Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON

Common Name	Scientific Name	Wetness Index	Provincial Rank	Regional Significance
American basswood	<i>Tilia americana</i>	3	S5	C
American beech	<i>Fagus grandifolia</i>	3	S5	C
Balsam poplar	<i>Populus balsamifera</i>	-3	S5	U
Beaked hazelnut	<i>Corylus cornuta</i>	5	S5	U
Bebb's sedge	<i>Carex bebbii</i>	-5	S5	C
Bebb's willow	<i>Salix bebbiana</i>	-4	S5	C
Bedstraw	<i>Galium sp.</i>	-	-	-
Bird's-foot trefoil	<i>Lotus corniculatus</i>	1	SNA	I
Bittersweet nightshade	<i>Solanum dulcamara</i>	0	SNA	I
Black ash	<i>Fraxinus nigra</i>	-4	S4	C
Black raspberry	<i>Rubus occidentalis</i>	5	S5	C
Black walnut	<i>Juglans nigra</i>	3	S4	C
Blue beech	<i>Carpinus caroliniana</i>	0	S5	C
Canada blue joint	<i>Calamagrostis canadensis</i>	-5	S5	C
Blue spruce	<i>Picea pungens</i>	-	SNA	-
Blue vervain	<i>Verbena hastata</i>	-4	S5	C
Boneset	<i>Eupatorium perfoliatum</i>	-4	S5	C
Bracken fern	<i>Pteridium aquilinum</i>	3	S5	C
Bristly buttercup	<i>Ranunculus hispidus</i>	-5	S3	VU
Broadleaf plantain	<i>Plantago major</i>	-1	S5	I
Broad-leaved water plantain	<i>Alisma subcordatum</i>	-5	S4?	-
Bur oak	<i>Quercus macrocarpa</i>	1	S5	C
Bush honeysuckle	<i>Diervilla lonicera</i>	5	S5	C
Buttonbush	<i>Cephalanthus occidentalis</i>	-5	S5	C
Canada thistle	<i>Cirsium arvense</i>	3	SNA	I
Chicory	<i>Cichorium intybus</i>	5	SNA	I
Chokecherry	<i>Prunus virginiana</i>	1	S5	C
Coltsfoot	<i>Tussilago farfara</i>	3	SNA	I
Common apple	<i>Malus pumila</i>	5	SNA	I
Common cinquefoil	<i>Potentilla simplex</i>	4	S5	C
Common hawkweed	<i>Hieracium vulgatum</i>	5	SNA	--
Common milkweed	<i>Asclepias syriaca</i>	5	S5	C
Common ragweed	<i>Ambrosia artemisiifolia</i>	3	S5	C
Common reed	<i>Phragmites australis</i>	-4	SNR	C
Common teasel	<i>Dipsacus fullonum</i>	5	S5	I
Common wintercress	<i>Barbarea vulgaris</i>	0	SNA	I
Common witch-hazel	<i>Hamamelis virginiana</i>	3	S5	C
Cow parsnip	<i>Heraclium maximum</i>	-3	S5	C
Cow vetch	<i>Vicia cracca</i>	5	SNA	I
Curled dock	<i>Rumex crispus</i>	-1	SNA	I
Daisy fleabane	<i>Erigeron annuus</i>	1	S5	U
Dandelion	<i>Taraxacum sp.</i>	3	-	-
Deptford pink	<i>Dianthus armeria</i>	5	SNA	I
European buckthorn	<i>Rhamnus cathartica</i>	3	SNA	I
False solomon's seal	<i>Maianthemum racemosum</i>	3	S5	C
Fowl blue grass	<i>Poa palustris</i>	-4	S5	C
Fowl manna grass	<i>Glyceria striata</i>	-5	S5	C
Garlic mustard	<i>Alliaria petiolata</i>	0	SNA	I
Giant bur-reed	<i>Sparganium eurycarpum</i>	-5	S5	C
Goldenrod species	<i>Solidago spp.</i>	-	-	-
Grass	<i>Panicum sp.</i>	-	-	-
Gray dogwood	<i>Cornus racemosa</i> spp. <i>Racemosa</i>	-2	S5	U
Green alder	<i>Alnus viridis</i>	-	S5	N/A
Haircap moss	<i>Polytrichum spp.</i>	-	-	-
Hawthorn	<i>Crataegus sp.</i>	-	-	-
Heal-all	<i>Prunella vulgaris</i>	5	S5	C
Herb-robert	<i>Geranium robertianum</i>	5	S5	C
Highbush blueberry	<i>Vaccinium corymbosum</i>	-3	S4	C
Highbush cranberry	<i>Viburnum trilobum</i>	-3	S5	U
Ironwood	<i>Ostrya virginiana</i>	4	S5	C

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Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON

Common Name	Scientific Name	Wetness Index	Provincial Rank	Regional Significance
Lake-bank sedge	Carex lacustris	-5	S5	C
Leatherwood	Dirca palustris	5	S4?	U
Lesser burdock	Arctium minus	5	SNA	I
Lily of the valley	Convallaria majalis	5	SNA	I
Little green sedge	Carex viridula	-5	S5	U
Serviceberry sp.	Amelanchier spp.	-	S4S5	R4
Mayapple	Podophyllum peltatum	3	S5	C
Morning glory	Ipomoea purpurea	4	SNA	--
Moss	Pleurocarpus spp.	-	-	-
Mullein	Verbascum thapsus	5	SNA	I
Nannyberry	Viburnum lentago	-1	S5	C
Narrow leaved meadowsweet	Spiraea alba	-4	S5	C
Narrow-leaved cattail	Typha angustifolia	-5	SNA	C
Nodding smartweed	Polygonum lapathifolium	-4	S5	N/A
Orchard grass	Dactylis glomerata	3	SNA	I
Ostrich fern	Matteuccia struthiopteris	-3	S5	C
Oxeye daisy	Leucanthemum vulgare	5	SNA	I
Pasture rose	Rosa carolina	4	SNR	U
Pickeralweed	Pontederia cordata	-5	S5	U
Pigweed	Chenopodium album	1	SNA	I
Pin oak	Quercus palustris	-3	S4	-
Poison ivy	Toxicodendron radicans	-1	S5	C
Poison sumac	Toxicodendron vernix	-5	S4	C
Prickly wildrose	Rosa acicularis	3	S5	-
Pumpkin ash	Fraxinus profunda	-5	S2?	R
Purple loosestrife	Lythrum salicaria	-5	SNA	I
Queen Anne's lace	Daucus carota	5	SNA	I
Red ash	Fraxinus pennsylvanica	-3	S4	C
Red clover	Trifolium pratense	2	SNA	I
Red maple	Acer rubrum	0	S5	C
Red oak	Quercus rubra	3	S5	C
Red osier dogwood	Cornus sericea	-3	S5	C
Reed canary grass	Phalaris arundinacea	-4	S5	C
Rice cut grass	Leersia oryzoides	-5	S5	C
Riverbank grape	Vitis riparia	-2	S5	C
Rock elm	Ulmus thomasi	-1	S4?	VU
Rough avens	Geum virginianum	-3	S4	N/A
Running strawberry bush	Euonymus obovatus	5	S5	C
Sedge	Scirpus sp.	-	-	-
Sensitive fern	Onoclea sensibilis	-3	S5	C
Shagbark hickory	Carya ovata	3	S5	C
Soft rush	Juncus effusus	-5	S5	C
Southern arrowwood	Viburnum recognitum	-2	S4	C
Soy bean	Glycine max	5	SNA	-
Speckled alder	Alnus incana ssp. Rugosa	-5	S5	U
Spotted jewelweed	Impatiens capensis	-3	S5	C
St. John's wort	Hypericum perforatum	5	S5	I
Staghorn sumac	Rhus typhina	5	S5	C
Sugar maple	Acer saccharum	0	S5	C
Swamp rose	Rosa palustris	-5	S5	C
Swamp white oak	Quercus bicolor	-4	S4	C
Sweet gale	Myrica gale	-5	S5	-
Tall goldenrod	Solidago altissima var. altissima	3	S4?	C
Timothy grass	Phleum pratense	3	SNA	I
Trembling aspen	Populus tremuloides	0	S5	C
Trout lily	Erythronium americanum	5	S5	U
Virginia creeper	Parthenocissus quinquefolia	1	S4?	VU
Water parsnip	Sium suave	-5	S5	U
White ash	Fraxinus americana	4	S5	C
White pine	Pinus strobus	3	S5	C

Appendix B

Vegetation Inventory
Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON

Common Name	Scientific Name	Wetness Index	Provincial Rank	Regional Significance
White spruce	<i>Picea glauca</i>	3	S5	R1
White sweet clover	<i>Melilotus alba</i>	2	SNA	I
Wild crabapple	<i>Malus coronaria</i>	5	S4	C
Willow species	<i>Salix</i> sp.	-	-	-
Winterberry	<i>Ilex verticillata</i>	-4	S5	C
Wood sorrel	<i>Oxalis acetosella</i>	3	S5	-
Woodland strawberry	<i>Fragaria vesca</i>	4	S5	C
Woolgrass	<i>Scirpus cyperinus</i>	-4	S5	U
Yarrow	<i>Achillea millefolium</i>	3	S5	I

Notes:

Observations were collected over multiple site visits between June 10, 2013 and July 8, 2015

Provincial rank information retrieved from <http://nhic.mnr.gov.on.ca/> in January, 2016

None of the species observed during field activities are Species at Risk (SAR) under provincial legislation

Provincial Rank Definitions

- S2** Imperiled; imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.
- S3** Vulnerable; due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
- S4** Common in Ontario; apparently secure with over 80 occurrences in the province
- S5** Demonstrably secure; species is widespread in Ontario
- SNR** Unranked, status not yet assessed
- SNA** Not Applicable; not suitable target for conservation activities
- Indicates no information available
 - ? If following a rank, Rank Uncertain (e.g. S3?).

Regional Rank Definitions

- C** Common; known from more than 15 sites in Haldimand-Norfolk.
- U** Uncommon; known from 9 to 15 sites in Haldimand-Norfolk.
- VU** Very Uncommon; known from 6 to 8 sites in Haldimand-Norfolk.
- R** Rare; known from 1 to 5 sites in Haldimand-Norfolk, number of sites indicated.
- I** Introduced; not native to Haldimand-Norfolk.
- Not present in Haldimand-Norfolk, according to Sutherland (1997).
- N/A** Does not appear on list

Appendix C

Wildlife Survey Results

C-1: 2014 Amphibian Survey Results

C-2: 2015 Breeding Bird Survey Results

Appendix C-1

**2014 Amphibian Survey Results
Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON**

Common Name	Scientific Name	Detection Rate
Chorus frog	<i>Pseudacris triseriata</i>	5/6
Spring peeper	<i>Pseudacris crucifer</i>	6/6
Wood frog	<i>Lithobates sylvaticus</i>	3/6
American toad	<i>Anaxyrus americanus</i>	6/6
Gray tree frog	<i>Hyla versicolor</i>	6/6
Green frog	<i>Lithobates clamitans</i>	5/6
American bullfrog	<i>Lithobates catesbeianus</i>	2/6

Note:

1. Survey dates: April 11, 2014; May 12, 2014; June 9, 2014 (West Lands)

Appendix C-2

2015 Breeding Bird Survey Results
Vertical Capacity Expansion Environmental Assessment
Brooks Road Landfill
Haldimand County, ON

Species		Provincial Status	Conservation Status		Breeding Evidence
Common Name	Scientific Name		SARO	SARA	
Birds					
American crow	Corvus brachyrhynchos	S5B	Threatened	No Status	Confirmed Breeding Probable Breeding
American goldfinch	Spinus tristis	S5			
American robin	Turdus migratorius	S5B			
Baltimore oriole	Icterus galbula	S4B			
Barn swallow	Hirundo rustica	S4B			
Black-capped chickadee	Poecile atricapillus	S5			
Brown-headed cowbird	Molothrus ater	S4B			
Chipping sparrow	Spizella passerina	S5B			
Common yellowthroat	Geothlypis trichas	S5B			
Downy woodpecker	Picoides pubescens	S5			
Eastern wood-pewee	Contopus virens	S4B	Special Concern	No Status	Possible Breeding Possible Breeding
Field sparrow	Spizella pusilla	S4B			
Gray catbird	Dumetella carolinensis	S4B			
Great blue heron	Ardea herodias	S4			
Great crested flycatcher	Myiarchus crinitus	S4B			
Gull	Laridae sp.	-			
Killdeer	Charadrius vociferus	S5B, S5N			
Northern cardinal	Cardinalis cardinalis	S5			
Northern flicker	Colaptes auratus	S4B			
Red-winged blackbird	Agelaius phoeniceus	S4			
Rose-breasted grosbeak	Pheucticus ludovicianus	S4B			Possible Breeding Possible Breeding
Song sparrow	Melospiza melodia	S5B			
Swamp sparrow	Melospiza georgiana	S5B			
Turkey vulture	Cathartes aura	S5B			
Warbling vireo	Vireo gilvus	S5B			
Wild turkey	Meleagris gallopavo	S5			
Yellow warbler	Setophaga petechia	S5B			

Notes: Survey was conducted on July 8, 2015. Survey area was limited to the East Lands.

SARA/SARO Provincial Status Rank Definitions:

S4: Common in Ontario; apparently secure with over 80 occurrences in the province

S5: Demonstrably secure; species is widespread in Ontario

- : Indicates no information available

S#B: Breeding; Conservation status refers to the breeding population of the species in Ontario

S#N: Non-breeding; Conservation status refers to the non-breeding population of the species in Ontario