# Draft Environmental Assessment Study Report

Eastern Ontario Waste Handling Facility Landfill Expansion Environmental Assessment

GFL Environmental Inc.

*Moose Creek, Ontario*

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# Acknowledgements

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# Executive Summary

This Report documents the Environmental Assessment (EA) undertaken by GFL Environmental Inc. (formerly Lafleche Environmental Inc.) to provide additional landfill disposal capacity at their existing Eastern Ontario Waste Handling Facility (EOWHF) (referred to as the "Project") in accordance with the approved Terms of Reference (ToR) (**Appendix A** of the EA Study Report). The EOWHF Landfill Expansion EA was initiated in June 2017 following approval of the ToR by the Minister of the Environment and Climate Change (May 2017).

## Section 1 – Introduction and Background

The existing EOWHF, which includes the landfill site, is located on Lots 17, 18 and the western half of Lot 16, Concession 10, Township of Roxborough (now Township of Stormont), United Counties of Stormont, Dundas and Glengarry. The EOWHF is located within the Township of North Stormont, approximately 5 km north-northwest of the village of Moose Creek, Ontario, and 5 km east of the village of Casselman, Ontario. The landfill, which is one of several services offered on the site, occupies approximately 66 hectares (ha) of the entire 189 ha licenced property.

The existing EOWHF landfill was previously approved under the Ontario *Environmental Assessment Act* (OEAA) in 1999. The EA that was prepared outlined an overall concept for the EOWHF which included development of the landfill in two phases through four stages. The total capacity of the landfill will be approximately 11.6 million cubic metres ($m^3$) when fully developed. Phase 1 was approved in 1999 including Stages 1 to 3A with a total landfill capacity of 7.4 million $m^3$. The development of the remaining Stages 3B and 4 will provide approximately 4.2 million $m^3$ of landfill disposal capacity and extend the operating life of the landfill by approximately 5 to 10 years. The proposed undertaking is to provide additional disposal capacity by developing the remaining Stage 3B and Stage 4 (Phase 2) of the existing landfill, within the boundaries of the EOWHF site. These landfill stages were identified for future development in the original approval for the EOWHF.

## Section 2 – Overview of the Environmental Assessment Process and Study Organization

The EA was undertaken in compliance with the requirements for an expanding waste landfill (as identified in Ontario Regulation (O. Reg.) 101/07, Section 4) under the OEAA, which are described in **Section 2.2** of the EA Study Report. The EA was conducted in accordance with the ToR dated July 2015, and approved by the Minister of the Environment and Climate Change in May 2017 (**Appendix A** of the EA Study Report).

The ToR was the first step of a two-step OEAA approval process for the proposed undertaking, with the second step being the EA. An overview of the EA process for the EOWHF Landfill Expansion EA is provided in **Figure 2-1** of the EA Study Report.

# Section 3 – Overview of the Undertaking

The purpose of the proposed undertaking is to provide approximately 4.2 million m³ of additional landfill disposal capacity at the existing EOWHF, which will enable GFL to continue to provide disposal services for residual non-hazardous solid waste to their customers once it reaches its currently approved disposal capacity. Based upon the historical and forecasted filling rate at the landfill, GFL estimates that the landfill will reach its approved capacity in 2019. The development of this disposal capacity will extend the operating life of the landfill by approximately 5 to 10 years. The proposed undertaking will be within the existing EOWHF site boundaries allowing GFL to continue its existing integrated business operations at this site which are closely linked to the landfill operation.

GFL understands there is an on-going need to continue to develop the existing EOWHF landfill to its originally planned capacity for the following reasons:

- The company can continue to provide its customer base with an integrated set of services including collection, transfer, processing and disposal in a reliable and cost effective manner;
- long term contractual obligations to municipalities across Ontario can be honoured and fulfilled;
- the Province's waste diversion programs and objectives are and will continue to be supported; and,
- environmental impacts of greenhouse gas (GHG) emissions will be minimized through:
    - reducing the number of waste related trucks hauling material long distances;
    - diversion of organic material and composting;
    - closure of small municipal landfill sites without gas collection systems; and
    - the capture of landfill (methane) gas and generation of green energy at the EOWHF.

GFL provides a broad range of waste management services integrated with the EOWHF landfill including:

- collection services (including collection of recyclables, source separated organics, leaf and yard material, and waste, both at the curb and at the EOWHF);
- processing of recyclables;
- composting of source separated organic material; and
- collection of used tires, waste electrical and electronic equipment and construction and demolition (C&D) waste.

Many of these services are provided at the EOWHF and supported by a number of smaller collection facilities located in Eastern Ontario. The distribution of these facilities and service capabilities continues to expand as GFL enters into new business contracts with municipalities and businesses across Ontario.

The continued operation of the EOWHF landfill is integrated with, and critical to, the on-site composting facility by providing efficient access to dispose of non-compostable materials from the composting process. The GFL EOWHF landfill now provides disposal capacity to over 500 villages / towns / cities across Eastern Ontario in addition to Indigenous communities within the region. The majority of these municipalities have long term (e.g., 15 years) waste disposal contracts at the EOWHF through their responsible authority (i.e., Township, Town, City or County).

Continued operation of the EOWHF landfill aligns with the Province of Ontario's Strategy for a Waste Free Ontario and Climate Change Action Plan goal of reducing GHG emissions as follows:

- GFL has installed a landfill gas (LFG) collection system at the EOWHF to collect methane gas (a major source of GHGs) which is converted to produce green energy. The LFG collection system is being expanded as additional cells and stages of the landfill are completed.
- GFL's EOWHF composting facility keeps organic material out of landfills which also reduces GHG emissions through the avoidance of methane generation produced through the decomposition of organic materials.
- GFL supports further reductions in greenhouse gas emissions by providing disposal services to smaller municipalities allowing them to close their landfills which do not have gas control systems.
- GFL has partnered with Habitat for Humanity to allow individuals to drop off items for redistribution, instead of being disposed, at GFL transfer station locations and at the EOWHF public drop off area.
- GFL has developed a large pollinator garden on the EOWHF site.
- GFL is an active educator and during a year provides presentations, tours and information to thousands of individuals.
- GFL is in the initial planning stages for developing a process to recycle mattresses at the EOWHF.
- GFL has recently completed a research study with the St. Lawrence Institute of Environmental Sciences on utilizing leachate from the EOWHF composting facility as a value added liquid fertilizer.
- GFL is in the planning process for the development of greenhouses and/or an aquaponics facility at the EOWHF utilizing the heat generated from the existing LFG utilization facility.
- GFL provides a network of regional transfer stations to collect material from a larger number of generators and consolidate the material for transport, the number of

vehicles travelling long distances to appropriate processing and disposal facilities is significantly reduced.

As outlined in the ToR, GFL has focused the preparation of the EA and the consideration of alternatives to the undertaking to address their specific needs and circumstances. The following four alternatives to the undertaking were identified:

1. Do nothing;
2. Establish a new landfill at another location;
3. Export waste to a disposal facility elsewhere; and
4. Expansion of the approved capacity of the EOWHF.

Based upon the screening of the "alternatives to", GFL concluded that Alternative #4 – Expansion of the approved capacity of the EOWHF was the only reasonable option for the company, its customers and the Province of Ontario. The other alternatives do not address GFL's opportunity to meet long-term customer commitments or avoid business risks, and they are not consistent with the Ontario government priorities of addressing waste diversion and climate change.

GFL will continue to support provincial initiatives to maximize waste diversion from disposal and for Ontario to become waste-free. Given the provincial transition to a circular economy is projected to occur between now and 2050, the proposed landfill expansion will continue to provide necessary disposal capacity in the short term of this projected 30-year plus transition period.

# Section 4 – Description of the Environment Potentially Affected by the Undertaking

The existing EOWHF is located on the western half of Lot 16 and Lots 17 and 18, Concession 10, Township of North Stormont, United Counties of Stormont, Dundas and Glengarry, near the intersection of Highway 417 and Highway 138. The municipal street address for the EOWHF is 17125 Lafleche Road, Moose Creek, Ontario. The EOWHF encompasses a site area of 189 ha which includes the following waste management related activities and services (**Figure 4-6** of the EA Study Report):

- 66 hectare approved landfill site;
- Composting facility;
- Waste transfer and processing station;
- Leachate waste water treatment facility;
- Small vehicle waste drop off;
- LFG utilization facility;
- Enclosed flare and natural gas fired comfort heating equipment;
- Ontario Electronic Stewardship (OES) drop off;

- Ontario Tire Stewardship (OTS) drop off; and
- Supporting facilities (office building, vehicle maintenance building).

The study areas identified for the EA include the existing EOWHF site, which encompasses an area of 189 ha, as well as potentially affected surrounding areas. The generic on-site and off-site study areas identified for the EA in the approved ToR are as follows (**Figure 4-1** of the EA Study Report):

- On-site study area – the existing EOWHF 189 ha site area; and
- Off-site study area – the lands in the vicinity of the EOWHF extending approximately 1 km from the property boundary of the EOWHF.

As outlined in the approved ToR, the generic study areas identified above were refined during the EA to better suit the requirements of specific environmental components. Modifications to the study areas are outlined in **Table 4-2** of the EA Study Report. The generic on-site study area was adopted for all environmental components, while the off-site study area was modified for select environmental components as outlined in **Section 4.2** of the EA Study Report.

In order to generate a more detailed description and understanding of the existing conditions that were presented in the ToR, investigative studies of the following environmental components were carried out:

- Atmospheric Environment (Air Quality, Noise and Odour)
- Geology and Hydrogeology (Groundwater Quality and Quantity)
- Surface Water Environment (Surface Water Quantity and Quality)
- Ecological Environment (Terrestrial and Aquatic Ecosystems)
- Socio-Economic Environment (Economic, Social, Visual)
- Cultural Environment (Cultural Heritage and Archaeological Resources)
- Built Environment (Transportation, Land Use, Aggregate Resources and Agriculture, Design and Operations)

Results of the investigative studies are detailed in **Section 4.3** of the EA Study Report. The existing conditions were updated, as appropriate, during the course of the EA based on comments received.

# Section 5 – Alternative Methods of Carrying Out the Undertaking

Two “alternative methods” of developing additional landfill disposal capacity at the EOWHF were identified and are described below. These alternative methods were developed to the level of preliminary conceptual designs and were presented at two open houses as part of the consultation and engagement process during the ToR and EA. The conceptual designs of the landfill expansion alternative methods were developed in greater detail as part of the EA to confirm feasibility, constructability and approvability under the *Environmental Protection Act* (EPA).

The landfill design and operations concepts summarized in **Section 5** of the EA Study Report and presented in the Conceptual Design Report (CDR) (**Supporting Document 2**) for the two alternative methods will be further developed during the detailed technical design stage for the Preferred Alternative (i.e., the Environmental Compliance Approval (ECA)). During the technical approval of the Preferred Alternative, the conceptual design of the Preferred Alternative may be refined and optimized in order to meet or exceed the applicable sections of O. Reg. 232/98.

# Overview of Alternative Method 1

Alternative Method 1 consists of developing the areas of Stage 3B in line with the existing Stage 3A, and Stage 4 parallel to Stages 3A and 3B. Alternative Method 1 (Stages 3B and 4) will provide a total landfill footprint of approximately 40.3 ha with an ultimate capacity (airspace) of approximately 4.2 million m³, excluding final cover. This alternative method extends west and northward closer to the wastewater treatment plant, onto land currently used for storing finished compost.

The following are some of the key aspects of the conceptual design for Alternative Method 1:

- The Stages will be developed based on a series of ten (10) cells.
- The proposed design consists of a natural containment landfill that relies on the existing in situ low permeability silty clay deposit to form an effective hydraulic containment layer with performance criteria equivalent to or exceeding a generic composite liner system, as was included in the design for Stages 1, 2 and 3A. This is overlain by a leachate collection system (LCS).
- The maximum elevation of the final cover for the two stages will be 80 m above mean sea level (AMSL), which accounts for the consolidation settlement of the silty clay deposit that will occur due to the applied load of the waste mound. As such, the maximum height of waste will be approximately 15 m.
- In Stage 3B, two (2) leachate sumps with submersible pumps will be installed. There will be eight (8) pumps installed for Stage 4, one for each cell.
- The existing buffer area along the southern, eastern and western property boundary of the EOWHF will remain the same for the expansion. As such, the 120-m-wide buffer area will be maintained along the south limit of the existing Stage 1, while a 50-m-wide buffer area will remain along the east and west sides between the limit of waste and the property boundary. The minimum separation distance between the fill areas in Stage 4 and the north property boundary will be 285 m.
- The maximum leachate flow is expected to be generated at the mid-point of development of Stage 4 with four cells open. Leachate generation is estimated to peak at approximately 267,000 m³/year.
- The existing leachate treatment facility (LTF) at the EOWHF has the capacity to treat 833 m³/day for a total annual volume of 304,000 m³. The LTF is currently approved to treat up to 200,000 m³ of leachate annually.

- LFG generation rates will increase gradually until a maximum is reached at site capacity with collection of 54,648,271 m³/year (or 6,238 m³/h) of LFG. A second enclosed flare will be installed to manage additional gas volumes and/or as a contingency in the event the four existing internal combustion engines are down.
- Two additional stormwater management (SWM) ponds are required in order to provide control of the runoff volume from the higher of the 24-hour, 100-year design storm or the prevailing Regional Storm event and with consideration of climate change. The ponds will provide additional storage volume of 54,500 m³.
- Landfill operations including nuisance control measures will remain unchanged.

# Overview of Alternative Method 2

Alternative Method 2 consists of developing the areas of Stage 3B in line with the existing Stage 3A and Stage 4 parallel to Stages 3A and 3B in an L-shape configuration into the northeast corner of the property. Alternative Method 2 (Stages 3B and 4) will provide a total landfill footprint of approximately 38.4 ha with an ultimate site capacity (airspace) of approximately 4.2 million m³ excluding final cover. This alternative method will allow the continued use of land near the wastewater treatment plant for convenient, accessible storage of finished compost product and bulking material.

The following are some of the key aspects of the conceptual design for Alternative Method 2:

- The Stages will be developed based on a series of twelve (12) cells.
- The proposed design consists of a natural containment landfill that relies on the existing in situ low permeability silty clay deposit to form an effective hydraulic containment layer with performance criteria equivalent to or exceeding a generic composite liner system, as was included in the design for Stages 1, 2 and 3A. This is overlain by an LCS.
- The maximum elevation of the final cover for the two stages will be 80 m AMSL, which accounts for the consolidation settlement of the silty clay deposit that will occur due to the applied load of the waste mound. As such, the maximum height of waste will be approximately 15 m.
- In Stage 3B, two (2) leachate sumps with submersible pumps will be installed. There will be ten (10) pumps installed for Stage 4, one for each cell.
- The existing buffer area along the southern, eastern and western property boundary of the EOWHF will remain the same for the expansion. As such, the 120-m-wide buffer area will be maintained along the south limit of the existing Stage 1, while a 50-m-wide buffer area will remain along the east and west sides between the limit of waste and the property boundary. The minimum separation distance between the fill areas in Stage 4 and the north property boundary will be 240 m.
- The maximum leachate flow is expected to be generated at the mid-point of development of Stage 4 with four cells open. Leachate generation is estimated to peak at approximately 242,000 m³/year.

- The existing LTF at the EOWHF has the capacity to treat 833 m³/day for a total annual volume of 304,000 m³. The LTF is currently approved to treat up to 200,000 m³ of leachate annually.
- LFG generation rates will increase gradually until a maximum is reached at site capacity with collection of 54,648,271 m³/year (or 6,238 m³/h) of LFG. A second enclosed flare will be installed to manage additional gas volumes and/or as a contingency in the event the four existing internal combustion engines are down.
- Two additional SWM ponds are required in order to provide control of the runoff volume from the higher of the 24-hour, 100-year design storm or the prevailing Regional Storm event and with consideration of climate change. The ponds will provide additional storage volume of 54,000 m³.
- Landfill operations including nuisance control measures will remain unchanged.

# Section 6 – Net Effects of the Alternative Methods

The potential effects of the landfill expansion alternative methods were identified based on the application of evaluation criteria, indicators and data sources that were identified in the approved ToR. The potential environmental effects from each alternative method were identified based on the currently approved maximum predicted waste receipt level (i.e., 755,000 tonnes per year) and the design considerations presented in the CDR (**Supporting Document 2**). The key design considerations and assumptions for the effects assessment for each environmental component were documented, including the mitigation measures incorporated into the project design. Mitigation measures, beyond those included in the CDR, were identified (when required) to minimize or mitigate the potential effects associated with each alternative method. The net environmental effects were then identified taking into account the identified mitigation measures. The potential effects, mitigation measures, and net effects associated with the alternative methods were documented in a stand-alone Effects Assessment Report for each environmental component.

Potential net effects were identified for the following environmental components and are summarized below:

- Atmospheric Environment (Air Quality, Noise and Odour)
- Geology and Hydrogeology (Groundwater Quality and Quantity)
- Surface Water Environment (Surface Water Quantity and Quality)
- Ecological Environment (Terrestrial and Aquatic Ecosystems)
- Socio-Economic Environment (Economic, Social, Visual)
- Cultural Environment (Cultural Heritage and Archaeological Resources)
- Built Environment (Transportation, Land Use, Aggregate Resources and Agriculture, Design and Operations)

# Atmospheric Environment

## Air Quality

The potential net effects of Alternative Method 1 and Alternative Method 2 on Air Quality are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| • It is expected that there will be an increase of 18%, 26%, and 38% (depending on the averaging period) in off-site ground-level concentrations of contaminants of concern at the location of maximum existing off-site concentrations, and an increase of 34% and 75% (depending on the averaging period) at the nearest residential receptor to the northwest relative to existing conditions; however, concentrations are expected to be within the relevant MOECC Point of Impingement (POI) limits for all contaminants of concern at all off-site locations.<br>• No substantial difference is expected in the number of off-site receptors potentially affected. | • It is expected that there will be an increase of 16%, 24%, and 34% (depending on the averaging period) in off-site ground-level concentrations of contaminants of concern at the location of maximum existing off-site concentrations, and an increase of 37% and 67% (depending on the averaging period) at the nearest residential receptor to the northwest relative to existing conditions; however, concentrations are expected to be within the relevant MOECC POI limits for all contaminants of concern at all off-site locations.<br>• No substantial difference is expected in the number of off-site receptors potentially affected. |

## Odour

The potential net effects of Alternative Method 1 and Alternative Method 2 on Odour are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| • It is expected that there will be an increase of 18%, 26% and 38% (depending on the averaging period) in the maximum off-site concentrations of odorous compounds of concern, and an increase of 34% and 75% (depending on the averaging period) at the nearest residential receptor to the northwest relative to the existing conditions; however, concentrations are expected to be within the relevant MOECC odour-based POI limits at all receptor locations within the off-site study area.<br>• Under normal operating conditions, negligible off-site odour impacts from the EOWHF are anticipated.<br>• No substantial difference is expected in the number of off-site receptors potentially affected. | • It is expected that there will be an increase of 16%, 24% and 34% (depending on the averaging period) in the maximum off-site concentrations of odorous compounds of concern, and an increase of 37% and 67% (depending on the averaging period) at the nearest residential receptor to the northwest relative to the existing conditions; however, concentrations are expected to be within the relevant MOECC odour-based POI limits at all receptor locations within the off-site study area.<br>• Under normal operating conditions, negligible off-site odour impacts from the EOWHF are anticipated.<br>• No substantial difference is expected in the number of off-site receptors potentially affected. |

## Noise

The potential net effects of Alternative Method 1 and Alternative Method 2 on Noise are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| • Points of Reception (PORs) will experience a minor increase in noise levels, resulting from landfilling activities at the EOWHF, below the MOECC noise limits. Landfilling activity may be audible at times, during lulls in background sound levels.<br>• Noise levels at all PORs within off-site study area are at or below the MOECC's applicable regulatory sound level limits. | • PORs will experience a minor increase in noise levels, resulting from landfilling activities at the EOWHF, below the MOECC noise limits. Landfilling activity may be audible at times, during lulls in background sound levels.<br>• Noise levels at all receptors within off-site study area are below the MOECC's applicable regulatory sound level limits. |

# Geology and Hydrogeology

The potential net effects of Alternative Method 1 and Alternative Method 2 on Geology and Hydrogeology, including Groundwater Quality and Groundwater Quantity, are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| • The predicted maximum chloride concentration in the receiving bedrock aquifer at the northern property boundary is 95.6 mg/L after 3,900 years, which is above the background concentration of 89 mg/L, but below the regulatory limit of 170 mg/L.<br>• No net effects to groundwater quantity are anticipated. Normally there is an upward gradient. The presence of the leachate locally generates a temporary downward gradient. The low hydraulic conductivity of the marine silty clay impedes flow to the extent that the increase in flux to the bedrock is negligible. | • The predicted maximum chloride concentration in the receiving bedrock aquifer at the northern property boundary is 96.1 mg/L after 3,700 years, which is above the background concentration of 89 mg/L, but below the regulatory limit of 170 mg/L.<br>• No net effects to groundwater quantity are anticipated. Normally there is an upward gradient. The presence of the leachate locally generates a temporary downward gradient. The low hydraulic conductivity of the marine silty clay impedes flow to the extent that the increase in flux to the bedrock is negligible. |

# Surface Water Environment

The potential net effects of Alternative Method 1 and Alternative Method 2 on the Surface Water Environment, including Surface Water Quality and Surface Water Quantity, are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| • Surface water quality meets MOECC monitoring requirements and trigger concentration criteria specified in ECA (Industrial Sewage Works, Section III) prior to release off-site.<br>• Increase in total suspended solids (TSS), but no net effects since water quality is treated with the ponds by providing sufficient detention prior to discharge.<br>• Considering effluent contaminate concentrations are still limited to the effluent discharge limits currently in place, no substantial effects are expected to off-site surface water quality. | • Surface water quality meets MOECC monitoring requirements and trigger concentration criteria specified in ECA (Industrial Sewage Works, Section III) prior to release off-site.<br>• Increase in TSS, but no net effects since water quality is treated with the ponds by providing sufficient detention prior to discharge.<br>• Considering effluent contaminate concentrations are still limited to the effluent discharge limits currently in place, no substantial effects are expected to off-site surface water quality.<br>• Increase in total surface water quantity |

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| • Increase in total surface water quantity volume, but no net effects since peak flows to the site outlet are controlled with the ponds within the predevelopment conditions values up to a 100-year return period. | volume, but no net effects since peak flows to the site outlet are controlled with the ponds within the predevelopment conditions values up to a 100-year return period. |

# Ecological

The potential net effects of Alternative Method 1 and Alternative Method 2 on the Ecological Environment, including Terrestrial and Aquatic Ecosystems, are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| ***Terrestrial Ecosystems***<br>Vegetation Communities<br>• The construction of Alternative Method 1 will result in the removal of approximately 3.18 ha (22%) of the treed swamp in the northeast corner of the site and the loss of native species.<br><br>On-site Habitat<br>• Loss of 3.18 ha (22%) of bird habitat<br>• Addition of amphibian habitat in SWM ponds.<br>• Minimal potential for increased disturbance.<br><br>Off-site Habitat<br>• No net effects identified.<br><br>Vegetation and Wildlife<br>• Minimal effect due to loss of 3.18 ha (22%) of bird habitat. The treed swamp on site provides interior habitat for area-sensitive birds, and will continue to be of an appropriate size to support these species. Migrating blackbirds that use forested habitat will still have habitat on site.<br>• Addition of amphibian habitat via SWM ponds.<br>• Minimal potential for increased disturbance to on-site wildlife.<br><br>***Aquatic Ecosystems***<br>• No additional effects to surface water quality anticipated.<br>• No net effects to aquatic habitat predicted.<br>• No net effects to aquatic biota predicted. | ***Terrestrial Ecosystems***<br>Vegetation Communities<br>• The construction of Alternative Method 2 will result in the removal of approximately 6.28 ha (44%) of the treed swamp in the northeast corner of the site and the loss of native species.<br><br>On-site Habitat<br>• Loss of 6.28 ha (44%) of bird habitat.<br>• Addition of amphibian habitat in SWM ponds.<br>• Minimal potential for increased disturbance.<br><br>Off-site Habitat<br>• No net effects identified.<br><br>Vegetation and Wildlife<br>• Minimal effect due to loss of 6.28 ha (44%) of bird habitat. The treed swamp on site provides interior habitat for area-sensitive birds, and will continue to be of an appropriate size to support these species. Migrating blackbirds that use forested habitat will still have habitat on site.<br>• Addition of amphibian habitat via SWM ponds.<br>• Minimal potential for increased disturbance to on-site wildlife.<br><br>***Aquatic Ecosystems***<br>• No additional effects to surface water quality anticipated.<br>• No net effects to aquatic habitat predicted.<br>• No net effects to aquatic biota predicted. |

# Socio-Economic

The potential net effects of Alternative Method 1 and Alternative Method 2 on the Socio-Economic environment, including economic, social, and visual, are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| ***Economic***<br>• Beneficial effect from extended duration of employment for an additional 5 to 10 years.<br>• Beneficial effect of continued provision of cost-effective and environmentally-secure waste management services to municipalities and businesses across Eastern Ontario for an additional 5 to 10 years.<br>• Beneficial effect from an additional $50 million to $100 million contributed to the local economy through the procurement of local goods and services.<br><br>***Social***<br>• No net effects to the number of residents.<br>• No net effects on residents and their use of property.<br><br>***Visual***<br>• No net effects on the visual landscape. | ***Economic***<br>• Beneficial effect from extended duration of employment for an additional 5 to 10 years.<br>• Beneficial effect of continued provision of cost-effective and environmentally-secure waste management services to municipalities and businesses across Eastern Ontario for an additional 5 to 10 years.<br>• Beneficial effect from an additional $50 million to $100 million contributed to the local economy through the procurement of local goods and services.<br><br>***Social***<br>• No net effects to the number of residents.<br>• No net effects on residents and their use of property.<br><br>***Visual***<br>• No net effects on the visual landscape. |

## Cultural

The potential net effects of Alternative Method 1 and Alternative Method 2 on the Cultural environment, including Cultural Heritage and Archaeological Resources, are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| • No net effects on cultural heritage resources.<br>• No net effects on archaeological resources. | • No net effects on cultural heritage resources.<br>• No net effects on archaeological resources. |

## Built Environment

The potential net effects of Alternative Method 1 and Alternative Method 2 on the Built Environment, including Transportation, Current and Planned Future Land Use, Aggregate Resources and Agricultural, and Design and Operations, are:

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| ***Transportation***<br>• There are no net effects on the transportation component of the Built Environment:<br>  • All study intersections will operate well, with Level of Service (LOS) 'C' or better, and with residual capacity.<br>  • There are no operational concerns at any study intersections as a result of the EOWHF landfill expansion.<br>  • No road network improvements are necessary.<br>  • The addition of left-turn lanes along Highway 138 is not warranted.<br>  • There are no substantial safety concerns based on a review of Highway 138 accident rates. | ***Transportation***<br>• There are no net effects on the transportation component of the Built Environment:<br>  • All study intersections will operate well, with LOS 'C' or better, and with residual capacity.<br>  • There are no operational concerns at any study intersections as a result of the EOWHF landfill expansion.<br>  • No road network improvements are necessary.<br>  • The addition of left-turn lanes along Highway 138 is not warranted.<br>  • There are no substantial safety concerns based on a review of Highway 138 accident rates. |

| Alternative Method 1 | Alternative Method 2 |
|---|---|
| ***Current and Planned Future Land Use***<br>• No net effects on current or planned land use.<br>• No net effects on off-site recreational resources.<br>• No net effects on off-site sensitive land uses.<br><br>***Aggregate Resources and Agricultural***<br>• No net effects on aggregate resources.<br>• No net effects on agricultural land.<br><br>***Design and Operations***<br>• No net effects: Complexity of site infrastructure will be low considering similarities with the previous design and construction techniques.<br>• Operational flexibility maximized for Alternative Method 1. | ***Current and Planned Future Land Use***<br>• A portion of Alternative Method 2 will require an amendment to the current zoning by-law.<br>• No net effects on off-site recreational resources.<br>• No net effects on off-site sensitive land uses.<br><br>***Aggregate Resources and Agricultural***<br>• No net effects on aggregate resources.<br>• No net effects on agricultural land.<br><br>***Design and Operations***<br>• No net effects: Complexity of site infrastructure will be low considering similarities with the previous design and construction techniques.<br>• Operational flexibility maximized for Alternative Method 2. |

# Section 7 – Comparative Evaluation of Net Effects and Identification of the Preferred Alternative

The results of the comparative evaluation of net effects for each alternative method, and the identification of the Preferred Alternative, as detailed in Chapter 7 are provided below.

A comparison of Alternative Method 1 and Alternative Method 2 was conducted to identify a Preferred Alternative for the undertaking. The predicted net effect(s) associated with each alternative method for each indicator were identified and a preference rating was assigned (i.e., Preferred, Not Preferred, No Substantial Difference). Each alternative method was then rated at the criteria level (i.e., Preferred, Not Preferred, No Substantial Difference) based on the identified preference rating for each indicator and a rationale was provided.

The results of the comparative evaluation, at the criteria and environmental component level, are summarized in the table below. As shown in the table, Alternative Method 1 was preferred for two of the nineteen evaluation criteria including Terrestrial Ecosystems and Current and Planned Future Land Uses. The remainder of the evaluation criteria indicate “No Substantial Difference” between net effects for the alternative methods. Alternative Method 2 was not identified a being preferred for any of the criteria.

| Environmental Component | Evaluation Criteria | Preferred Alternative | |
|---|---|---|---|
| | | Alternative Method 1 | Alternative Method 2 |
| ***Natural Environment*** | | | |
| Atmospheric Environment | Air Quality | No Substantial Difference | No Substantial Difference |
| | Odour | No Substantial Difference | No Substantial Difference |
| | Noise | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for the Atmospheric Environment** | | **No Substantial Difference** | |
| Geology and Hydrogeology | Groundwater Quality | No Substantial Difference | No Substantial Difference |
| | Groundwater Quantity | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for Geology and Hydrogeology** | | **No Substantial Difference** | |
| Surface Water Environment | Surface Water Quality | No Substantial Difference | No Substantial Difference |
| | Surface Water Quantity | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for the Surface Water Environment** | | **No Substantial Difference** | |
| Ecological Environment | Terrestrial Ecosystems | ✓ | |
| | Aquatic Ecosystems | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for the Ecological Environment** | | ✓ | |
| ***Socio-Economic Environment*** | | | |
| Economic | Economic Effects on / Benefits to Local Community | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for Economic** | | **No Substantial Difference** | |
| Social | Effects on Local Community | No Substantial Difference | No Substantial Difference |
| | Visual Impact of Facility | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for Social** | | **No Substantial Difference** | |
| ***Cultural Environment*** | | | |
| Cultural Environment | Cultural Heritage Resources | No Substantial Difference | No Substantial Difference |
| | Archaeological Resources | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for the Cultural Environment** | | **No Substantial Difference** | |
| ***Built Environment*** | | | |
| Transportation | Effects from Truck Transportation along Access Roads | No Substantial Difference | No Substantial Difference |

| Environmental Component | Evaluation Criteria | Preferred Alternative | |
|---|---|---|---|
| | | Alternative Method 1 | Alternative Method 2 |
| **Preferred Alternative for Transportation** | | **No Substantial Difference** | |
| Current and Planned Future Land Use | Effects on Current and Future Land Uses | ✓ | |
| **Preferred Alternative for Current and Planned Future Land Use** | | ✓ | |
| Aggregate Extraction and Agricultural | Aggregate Resources | No Substantial Difference | No Substantial Difference |
| | Effects on Agricultural Land | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for Aggregate Extraction and Agricultural** | | **No Substantial Difference** | |
| Design and Operations | Site Design and Operational Characteristics | No Substantial Difference | No Substantial Difference |
| **Preferred Alternative for Design and Operations** | | **No Substantial Difference** | |
| **Overall Preferred Alternative** | | ✓ | |

As a result, the overall Preferred Alternative was identified as Alternative Method 1.

# Section 8 – Net Effects Assessment of the Preferred Alternative

## Net Effects

A summary of the assessment of the environmental effects of the Preferred Alternative, Alternative Method 1, is presented in **Section 8** of the EA Study Report. The summary is based on the effects identified previously in **Section 6** of the EA Study Report.

## Cumulative Effects

An assessment of cumulative effects focused on the net effects of the Preferred Alternative (Alternative Method 1) combined with the potential effects from other projects in the immediate area. The net effects identified for the Preferred Alternative relate to air quality, odour, noise, groundwater quality, vegetation communities, wildlife habitat, vegetation and wildlife, and economics. The net effects take the existing EOWHF operations and other past and existing projects into account as part of the existing conditions; consequently, the focus of the cumulative effects assessment was on planned and future projects in the area.

The EOWHF is located within a predominantly agricultural area. As per the Official Plan[1], the majority of the off-site study area is designated as "Agricultural Resource Lands" with some "Rural District" areas located to the south of the site. The land within 1 km of the site is used for agricultural purposes, and there are no known aggregate resources in the vicinity of the site. The local municipality, the Township of North Stormont, passed Zoning By-law 40-2015 which limits new incompatible land uses (e.g., dwellings) within 200 m of active or closed waste disposal sites.

No planned or future projects, including road network improvements, have been identified in the vicinity of the EOWHF. The Ministry of Transportation of Ontario (MTO) is currently undertaking an EA for Highway 138 from Highway 417 southward; however, the MTO indicated that there are no impacts expected to the study areas of the EOWHF Landfill Expansion EA. Consequently, the net effects presented also represent the cumulative effects for the Preferred Alternative.

# Climate Change Considerations

Climate change considerations for the Preferred Alternative included the effect of climate change on the project, the effect of the project on climate change, and the effects of the *Waste Free Ontario Act* consistent with the MOECC guidance document Considering Climate Change in the Environmental Assessment Process (2017). On-going changes to the global climate related to increased emissions and concentrations of greenhouse gases in the atmosphere are addressed in the conceptual design for the EOWHF landfill expansion, both in adapting to changes in climate and for the mitigation of greenhouse gas emissions. This has been addressed primarily by evaluating the impact of increased intensity of storm events, potential impacts to leachate generation associated with higher temperatures and increased intensity of rainfall events and snowmelt, assessing LFG generation rates and designing the expanded LFG management system to optimize collection efficiency to mitigate atmospheric emissions.

The Preferred Alternative will be operational for approximately 5 to 10 years, which is not long enough to see substantial changes in rainfall patterns resulting from climate change. Once the landfill reaches its approved capacity, it will be closed and capped resulting in a decrease in the leachate volumes generated and requiring subsequent treatment. No further landfilling will occur in Stage 4 after the approved landfill contours have been reached, which will result in a gradual decrease in LFG generation. Incorporating a flexible geomembrane in the cover design significantly reduces migration through the cover system, increasing the collection efficiency of the gas collection system.

There is also potential for methane production in the landfill to decrease over time as a result of the Province's proposed organics disposal ban under Bill 151, *Waste Free Ontario Act*. The current schedule is for the proposed organics disposal ban to come into effect by 2022. In this case, the landfill will generate less LFG from the final cells in Stage 4 decreasing the overall contribution of fugitive and combustion emissions from the EOWHF.

[1] United Counties of Stormont, Dundas and Glengarry. 2017. *Official Plan*. Adopted July 17, 2017.

## Advantages and Disadvantages of the Preferred Alternative

A description of the advantages and disadvantages of the Preferred Alternative is provided based on the net effects. The differences in the potential environmental effects remaining following the implementation of potential mitigation/management measures were used to identify and compare the advantages and disadvantages. Overall, the advantages of the Preferred Alternative are greater than the disadvantages.

# Section 9 – Consultation and Engagement Summary

In accordance with the MOECC's Code of Practice for Preparing and Reviewing Environmental Assessments in Ontario (January 2014) and Consultation in Ontario's Environmental Assessment Process (January 2014), GFL undertook a consultation program throughout the EA process. As required by Section 5.1 of the OEAA, GFL consulted with agencies, Indigenous communities and organizations, and the public.

A broad group of participants were consulted and engaged in the EA process. This included:

- governmental departments, ministries and agencies with an interest in the project, typically referred to as the Government Review Team (GRT);
- local municipalities, including the host Township of North Stormont;
- Indigenous communities in the vicinity of the study areas or with an interest in the project; and
- the general public including residents, landowners, businesses and other stakeholders with an interest in the outcome of the EA.

A participants list for the EA was prepared based on the consultation process completed during the ToR. The participants list was updated throughout the EA process including both the addition and removal of participants as required and when requested.

During the preparation of the ToR, the following Indigenous communities and organizations were identified as having a potential interest in the project. These Indigenous communities and organizations were contacted during the development of the ToR and throughout the EA process.

- Mohawk Council of Akwesasne
- Huron Wendat Nation Council
- Mohawks of the Bay of Quinte – Tyendinaga Mohawk Council
- Algonquins of Ontario Consultation Office
- Métis Nation of Ontario (MNO) Council
- MNO Ottawa Region Métis Council

Comments were received from the Huron-Wendat Nation during the EA process requesting further information, and responses were provided.

The following consultation activities were undertaken during the EA:

Notice of Commencement

The GRT, Indigenous communities and members of the public, including neighbouring property owners, were notified of the EA by a Notice of Commencement. All participants were sent a copy by mail of the Notice in both English and French languages. The EA Notice of Commencement was published in English and French in two local newspapers and posted on the project website on June 7, 2017.

Open Houses

The EA consultation program outlined in the approved ToR identified that one open house (Public Open House #2) would be held during the EA. It was intended that the open house be held following the comparative evaluation of the alternative methods and identification of the Preferred Alternative. Given the period of time that had elapsed between submission of the final ToR (July 2015) and the approval of the ToR (May 2017), GFL considered it appropriate to host an additional open house. The purpose of this additional event was to update the community on the project, present information on the existing environmental conditions, and provide additional details on the development of the two alternative methods being assessed in the EA. The second EA open house (Public Open House #3) would then present the results of the assessment.

The Open Houses were held on June 21, 2017 and November 22, 2017. Open House presentation materials were available in English and French. Presentation materials were posted to the project website after the open house.

Comments Received

Comments were received from the GRT, Indigenous communities and organizations and the public following the Notice of Commencement, Open Houses and the release of the draft existing conditions reports. The comments received and how the comments were addressed by GFL was documented in Comment Response Tables.

Other Consultation Activities

GFL utilized other methods to engage the project participants on an on-going basis, including:

- Project website;
- Telephone number and staff contact; and
- Site tour.

A Record of Consultation has been prepared as part of the EA.

# Section 10 – Monitoring and Commitments for the Undertaking

Monitoring strategies were developed so that any respective environmental effects can be monitored during construction, operation and maintenance of the landfill. Monitoring strategies were developed for the Preferred Alternative to confirm that:

- predicted net effects are not exceeded;
- unexpected negative effects are addressed; and
- implemented mitigation measures are effective.

Specific monitoring details and commitments relating to each environmental component are outlined in **Section 10** of the EA Study Report. GFL will also develop a Compliance Monitoring Program to detail how GFL will report annually on their compliance with the commitments made in the EA Study Report.

# Section 11 – Approvals

The proposed undertaking will require additional approvals following EA approval of the proposed undertaking. These approvals are expected to include:

- An amendment to the existing ECA No. A420018 for the landfill site prior to construction and operation of the landfill expansion. The information required to support this ECA (Waste) application includes a Design and Operations Report describing the design and development plans for Stages 3B and 4, including environmental control measures, daily operations and maintenance, contingency measures, site closure, and post-closure monitoring and maintenance. An updated estimate of the financial assurance for the EOWHF will also be included.
- An amendment to the Industrial Sewage Works ECA No. 3962-AQPJDP (previously 4299-9U8PV6) issued under the *Ontario Water Resources Act* (OWRA) prior to construction and operation of the enhanced SWM system. An amendment is necessary to incorporate the additional on-site drainage features, modifications to the perimeter channel and the two new stormwater ponds.
- An amendment to the Industrial Sewage Works ECA No. 3962-AQPJDP will be required in order to increase the approved treatment capacity of the existing LTF from the current 200,000 $m^3$/year (547 $m^3$/day) to approximately 267,000 $m^3$/year (730 $m^3$/day) to treat additional leachate volumes generated by the landfill expansion.
- An amendment to the ECA (Air) No. 1387-7QUGFA will be required for the expansion of the LFG collection system and for the addition of a second enclosed flare. An amendment to the ECA (Air) No. 5665-8STRV7 will be required if additional LFG combustion engines are added to the LFG utilization facility.

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