Supporting Document 3-6

Ecological Environment Effects Assessment Report

Twin Creeks Environmental Centre Landfill Optimization Project Environmental Assessment

WM Canada

Watford, Ontario

May 2026

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Revision History

Revision	Date
1	November 2024
2	August 2025
3	May 2026

Executive Summary

Natural Resource Solutions Inc. (NRSI) was contracted by HDR Corporation on behalf of WM Canada (WM) to prepare this Ecological Environment Effects Assessment Report as part of the Twin Creeks Environmental Centre (TCEC) Landfill Optimization Project Environmental Assessment (EA). The EA is being carried out in accordance with the requirements of the *Environmental Assessment Act* (*EAA*) and the EA Terms of Reference (ToR), which was approved by the Ministry of Environment, Conservation and Parks (MECP) on December 13, 2022. The Ecological Environment considers both terrestrial and aquatic ecosystems, and includes vegetation communities, plant and wildlife species and habitats, fish and fish habitat, and aquatic resources.

The purpose of this Effects Assessment Report is to present the:

- potential environmental effects of the alternative methods on the ecological environment;
- comparison of the net effects of each alternative method;
- selection of a preferred alternative;
- assessment of the environmental effects of the preferred alternative; and
- commitments and monitoring.

There are approximately 5 years of approved landfill airspace capacity remaining at the TCEC (i.e., capacity will be reached in approximately 2031). The proposed optimization would provide additional airspace of approximately 14.3 million cubic metres (m^3), which could extend the site life by approximately 12 years (from 2031 to 2043), and may be achieved through alternative landfill configurations (alternative methods) within the existing 301-hectare TCEC site area. No changes are proposed to the size of the TCEC site area, approved service area, or annual fill rate.

Three alternative methods for carrying out the optimization were developed to a preliminary conceptual design level in the Conceptual Design Report (CDR). Each of the alternative methods includes a vertical expansion over the existing landfill with an increase in height of waste ranging from 39 m to 80 m. Alternative Methods 1, 2 and 3 are all comparable as the existing approved waste disposal footprint area of the TCEC will not encroach into the off-site terrestrial and aquatic habitats. Furthermore, the alternative methods will not have a significant effect on leachate, landfill gas (LFG), or stormwater management.

The study areas for the Ecological Environment are as follows:

- On-site Study Area: the existing TCEC and lands owned by WM; and
- Off-site Study Area: lands within the vicinity of the TCEC extending approximately 1 km out from the On-site Study Area and including the Gilliland-Geerts Drain downstream and westward of the TCEC to Underpass Road.

A net effects assessment was carried out for the three alternative methods following the methods outlined in the approved ToR incorporating the information contained in the CDR, and the Ecological Environment Existing Conditions Report. The results of the net effects assessment were used in a comparative evaluation of the three alternative methods.

No anticipated direct impacts to terrestrial and aquatic ecosystems were identified in the net effects assessment of the alternative methods as no vegetation communities, plant and wildlife species and habitats, fish and fish habitat, or aquatic resources were identified within the approved landfill limit. In addition, no anticipated indirect impacts to terrestrial and aquatic ecosystems (as well as those within downstream receiving water courses) were identified in the net effects assessment as leachate seeps, stormwater runoff, landfill gas (LFG) production and increases in surface water quantity will continue to be managed by the mitigation measures currently in place for the Active Landfill and are effective enough as well as have the capacity to support Alternative Methods 1, 2 and 3. It is also recommended that avifaunal scavengers continue to be managed through the implementation of the Gull Management Plan using acoustic deterrent devices as well as a bird of prey.

There is no substantial difference between the Alternative Methods and no Preferred Alternative for the Ecological Environment.

To confirm that the commitments related to the Ecological Environment are carried out, it is recommended that prior commitments to environmental mitigation and monitoring are continued. This includes commitments to manage leachate seeps in the On-site and Off-site Study Areas, LFG production, stormwater runoff in the On-site and Off-site Study Areas, as well as traffic, dust, and noise. It is also recommended that avifaunal scavengers continue to be managed through the implementation of the Gull Management Plan using acoustic deterrent devices as well as a bird of prey. No additional approvals are required beyond the EA approvals.

Acronyms, Units and Glossary

Acronyms

Acronym	Definition
CDR	Conceptual Design Report
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment
EAA	*Environmental Assessment Act*
ESA	*Endangered Species Act*
EVGS	Early Vertical Gas System
IGF	Information Gathering Form
LFG	Landfill Gas
MECP	Ministry of the Environment, Conservation and Parks
MNR	Ministry of Natural Resources
NRSI	Natural Resource Solutions Inc.
PLCS	Primary Leachate Collection System
POR	Point of Reception
SAR	Species at Risk
SARA	*Species at Risk Act*
SARB	MECP Species at Risk Branch
SCA	*Species Conservation Act*
SCC	Species of Conservation Concern
SCRCA	St. Clair Region Conservation Authority
SWH	Significant Wildlife Habitat
TCEC	Twin Creeks Environmental Centre
ToR	Terms of Reference
WM	WM Canada

Units

Unit	Definition
dBAI	A-weighted sound pressure level of an impulsive sound measured with a sound level meter set to "impulse" response corresponding to a rising slope time of 35 ms
h	hour
ha	hectares
km	kilometre

Units

Unit	Definition
m	metre
m^3	cubic metres
masl	metres above sea level
V	voltage

Glossary

Term	Definition
Avifauna	Birds found in a specific region.
Capacity (Disposal Volume)	The total volume of air space available for disposal of waste at a landfill site for a particular design (typically in m^3); includes both waste and daily cover materials, but excludes the final cover.
Environment	As defined by the *Environmental Assessment Act*, environment means: • air, land or water; • plant and animal life, including human life; • the social, economic and cultural conditions that influence the life of humans or a community; • any building, structure, machine or other device or thing made by humans; • any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities; or • any part or combination of the foregoing and the interrelationships between any two or more of them (ecosystem approach).
Environmental Assessment (EA)	A systematic planning process that is conducted in accordance with applicable laws or regulations aimed at assessing the effects of a proposed project on the environment.
Evaluation Criteria	Evaluation criteria are considerations or factors taken into account in assessing the advantages and disadvantages of various alternatives being considered.
Indicators	Indicators are specific characteristics of the evaluation criteria that can be measured or determined in some way, as opposed to the actual criteria, which are fairly general.
Landfill gas (LFG)	The gases produced from the wastes disposed in a landfill; the main constituents are typically carbon dioxide and methane, with small amounts of other organic and odour-causing compounds.
Landfill site	An approved engineered site/facility used for the final disposal of waste. Landfills are waste disposal sites where waste is spread in layers, compacted to the smallest practical volume, and typically covered by soil.
Leachate	Liquid that drains from solid waste in a landfill and which contains dissolved, suspended and/or microbial contaminants from the breakdown of this waste.
Mitigation	Measures taken to reduce adverse impacts on the environment.
Natural Heritage	Refers to the components of the natural environment, inclusive of flora, fauna, ecosystems, and geological structures that provide important functions and hold special value for present and future generations.
Point of Reception (POR)	Refers to the location where noise from landfill operations, ancillary facilities, pest control devices or haul route is received.

Glossary

Term	Definition
Project	Is defined in the *Environmental Assessment Act* as: one or more enterprises or activities or a proposal, plan or program in respect of an enterprise or activity.
Protected Species	Species listed on the Protected Species in Ontario List, Ontario Regulation (O. Reg.) 60/26. These include species identified by the Committee on the Status of Species at Risk in Ontario (COSSARO) as provincially Endangered or Threatened. Species listed by COSSARO as Endangered or Threatened are protected by the *Species Conservation Act* (SCA), which includes protection of their habitat.
Receptor	The person, plant or wildlife species that may be affected due to exposure to a contaminant.
Riparian Area	Refers to the area immediately adjacent to a waterbody that is the interface between terrestrial and aquatic ecosystems.
Significant Wildlife Habitat	Specific habitat types used by wildlife that are considered significant in Ontario based on a discrete set of criteria developed by the Ministry of Natural Resources and Forestry. Includes seasonal concentration areas, rare vegetation communities or specialized habitats for wildlife, habitats of Species of Conservation Concern, and animal movement corridors.
Species of Conservation Concern	Inclusive of species in the following categories: • Species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre (Ministry of Natural Resources and Forestry). • Species that are designated as Special Concern by the Committee on the Status of Species at Risk in Ontario (COSSARO). • Species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC), but not provincially by COSSARO. If these species are listed under the *Species at Risk Act* (*SARA)* under Schedule 1 they are protected by the federal Act but not the provincial *SCA*.
Study Area	A designated region covered under the scope of a particular scientific investigation or study. For ecological impact studies, the Study Area typically includes a specific tract of land plus the surrounding area, or primary zone of influence. The Study Area usually considers adjacent lands (that is, the distance from a particular natural feature for considering potential negative impacts from a proposed project) within at least 120m.
Terms of Reference (ToR)	A terms of reference is a document that sets out detailed requirements for the preparation of an Environmental Assessment.
Waste	Refuse from places of human or animal habitation; unwanted materials left over from a manufacturing process.

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1 Introduction

Natural Resource Solutions Inc. (NRSI) was contracted by HDR Corporation on behalf of WM Canada (WM) to prepare this Ecological Environment Effects Assessment Report as part of the Twin Creeks Environmental Centre (TCEC) Landfill Optimization Project Environmental Assessment (EA). The EA is being carried out in accordance with the requirements of the *Environmental Assessment Act* (*EAA*) and the EA Terms of Reference (ToR), which was approved by the Ministry of Environment, Conservation and Parks (MECP) on December 13, 2022.

The *EAA* defines the environment in a broad, general sense that comprises physical, biological, and human considerations. In this EA, the environment has been separated broadly into the natural, socio-economic, cultural, and built aspects, with environmental components and evaluation criteria identified within each aspect as listed in **Table 1-1**, consistent with the approved ToR. The organization of the Effects Assessment Reports is also provided in **Table 1-1**.

Table 1-1. Environmental Aspects, Components, and Evaluation Criteria

Environmental Aspect	Environmental Component	Evaluation Criteria	Effects Assessment Report
Natural Environment	Atmospheric Environment	• Air Quality – Dust • Air Quality – Landfill Gas and Combustion By-Products • Air Quality – Blowing Litter • Odour	• Air Quality
		• Noise	• Noise
	Hydrogeology	• Groundwater Quality • Groundwater Quantity	• Hydrogeology
	Surface Water Environment	• Surface Water Quality	• Surface Water Quality
		• Surface Water Quantity	• Surface Water Quantity
	Ecological Environment	• Terrestrial Ecosystems • Aquatic Ecosystems	• Ecological Environment
Socio-Economic Environment	Social Environment	• Human Health	• Human Health
		• Effects on Local Community	• Socio-Economic Environment
	Economic Environment	• Economic Effects on Local Community	
	Visual Landscape	• Visual Impact of Facility	• Visual Landscape
Cultural Environment	Cultural Environment	• Cultural Heritage Resources	• Cultural Heritage Resources
		• Archaeological Resources	• Archaeological Resources
Built Environment	Transportation	• Traffic Operations	• Transportation
	Current and Planned Future Land Use	• Effects on Current and Future Land Uses	• Land Use

The Ecological Environment considers both the terrestrial and aquatic ecosystems and includes vegetation communities and species, wildlife and wildlife habitat, aquatic organisms such as fish, and aquatic habitat. Rare, threatened, and endangered species are included as applicable. The purpose of this Effects Assessment Report is to present the potential environmental effects of the alternative methods on the Ecological Environment, a comparison of the net effects of each alternative method, the selection of a preferred alternative, the assessment of the environmental effects of the preferred alternative, and commitments and monitoring.

This Ecological Environment Effects Assessment Report is one component of the EA. The EA Study Report will incorporate the information presented herein as appropriate, and this report will be included with the EA Study Report as a supporting document.

1.1 Project and Alternative Methods

There are approximately 5 years of approved landfill airspace capacity remaining at the TCEC (i.e., capacity will be reached in approximately 2031). The proposed landfill optimization would provide additional airspace of approximately 14.3 million cubic metres (m^3), which could extend the site life by approximately 12 years (from 2031 to 2043) and may be achieved through alternative landfill configurations (alternative methods) within the existing 301-hectare TCEC site area. No changes are proposed to the size of the TCEC site area, approved service area, haul route, or annual fill rate.

Three alternative methods for carrying out the landfill optimization were developed to a preliminary conceptual design level in the Conceptual Design Report (CDR) and are described below as they are relevant to the Ecological Environment.

1.1.1 Alternative Method 1

Alternative Method 1 includes an increase in the final landfill side slopes from 4H:1V to 3H:1V and an increase in the approved height of waste by 44.5 m, peaking at elevation 324.5 masl. The existing approved waste disposal footprint area of the TCEC will not change or encroach into surrounding terrestrial and aquatic habitat as indicated in **Figure 1-1**.

Leachate that is not properly managed and escapes from landfills, has the potential to contaminate groundwater and surface water with toxic organic and inorganic pollutants that in turn impact both terrestrial and aquatic ecosystems. With regard to leachate management, Alternative Method 1 will not have a significant effect on the functionality of the leachate collection system, and leachate will continue to drain toward the designated withdrawal points. Alternative Method 1 will not change the current expected infiltration rate. Instead, it will increase the rate of run-off due to higher side slopes. Consequently, the leachate collection system will not require changes as a result of Alternative Method 1 as higher slope grades result in increased seeps and lower infiltration. As such, Alternative Method 1 is expected to generate less leachate than the existing design.

Stormwater can cause erosion, flooding, poor water quality and pollution which impacts both terrestrial and aquatic ecosystems. With regard to stormwater

management, the landfill optimization will not change the total runoff volume from the landfill site; however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. For this reason, all catchments experiencing one or both of these above-noted changes under Alternative Method 1 were modelled under Existing Conditions, Future Baseline, and Alternative Method 1 scenarios to both compare changes to stormwater runoff and assess any capacity issues with the detention ponds and swales. The results for the Alternative Method 1 scenario closely mirror those of the Future Baseline scenario. Furthermore, the data indicates that all four stormwater management ponds on the landfill site have enough capacity to store the 100-year flows across the Future Baseline and Alternative Method 1 scenarios. They do not require alteration or enlargement. The ponds are designed to control the water to not permit more than a maximum discharge through each outlet.

Changes in runoff volumes and peak flows are a result of steeper and longer side slopes consequently affecting drainage areas on-site due to redistribution of catchment areas. The increase in peak flows leaving the landfill site is within 10% of current existing conditions under this alternative method. However, when compared to the Future Baseline condition, the changes are insignificant. As such, no effects are anticipated.

Gas generated from landfills includes methane which is one of the most potent greenhouse gases and is a major contributor to climate change which can have devastating impacts to terrestrial and aquatic ecosystems. With regard to landfill gas (LFG) generation, it is estimated that the Expansion Landfill as Alternative Method 1 will produce a peak amount of LFG of approximately 20,203 m^3/hr in 2043, of which 18,169 m^3/hr or 90% is estimated to be collected. The LFG collection system includes conventional vertical wells within the closed Old Landfill footprint and mostly Early Vertical Gas System (EVGS) wells within the Expansion Landfill. The Expansion Landfill also draws gas from the Primary Leachate Collection System (PLCS). The LFG collection system has a collection efficiency of approximately 75% for areas without final cover based on operational data and can be improved to 90% for areas with final clay cover. It is anticipated that this level of collection efficiency will continue to be achieved for Alternative Method 1.

Anthropogenic noise, such as that caused from the operation of a landfill, can impact terrestrial and aquatic wildlife by interfering with animal communication, hindering foraging abilities, and impacting where they live. Alternative Method 1 has the greatest potential for increased off-site noise due to landfilling sources as the modifications to the existing side slope extend to the landfill limits. The new slope will require modifications up to the existing landfill limit, which will require construction sources such as dozers and compactors to work the area. This will result in potentially greater off-site sound levels. Mitigation measures are to either construct temporary operational berms or limit the amount of equipment near the perimeter of the landfill in order to comply with Landfilling Guideline sound level limits.

The Expansion Landfill area has already been prepared for landfilling and is currently active. Daily/interim cover will continue to be placed as part of the landfill operations

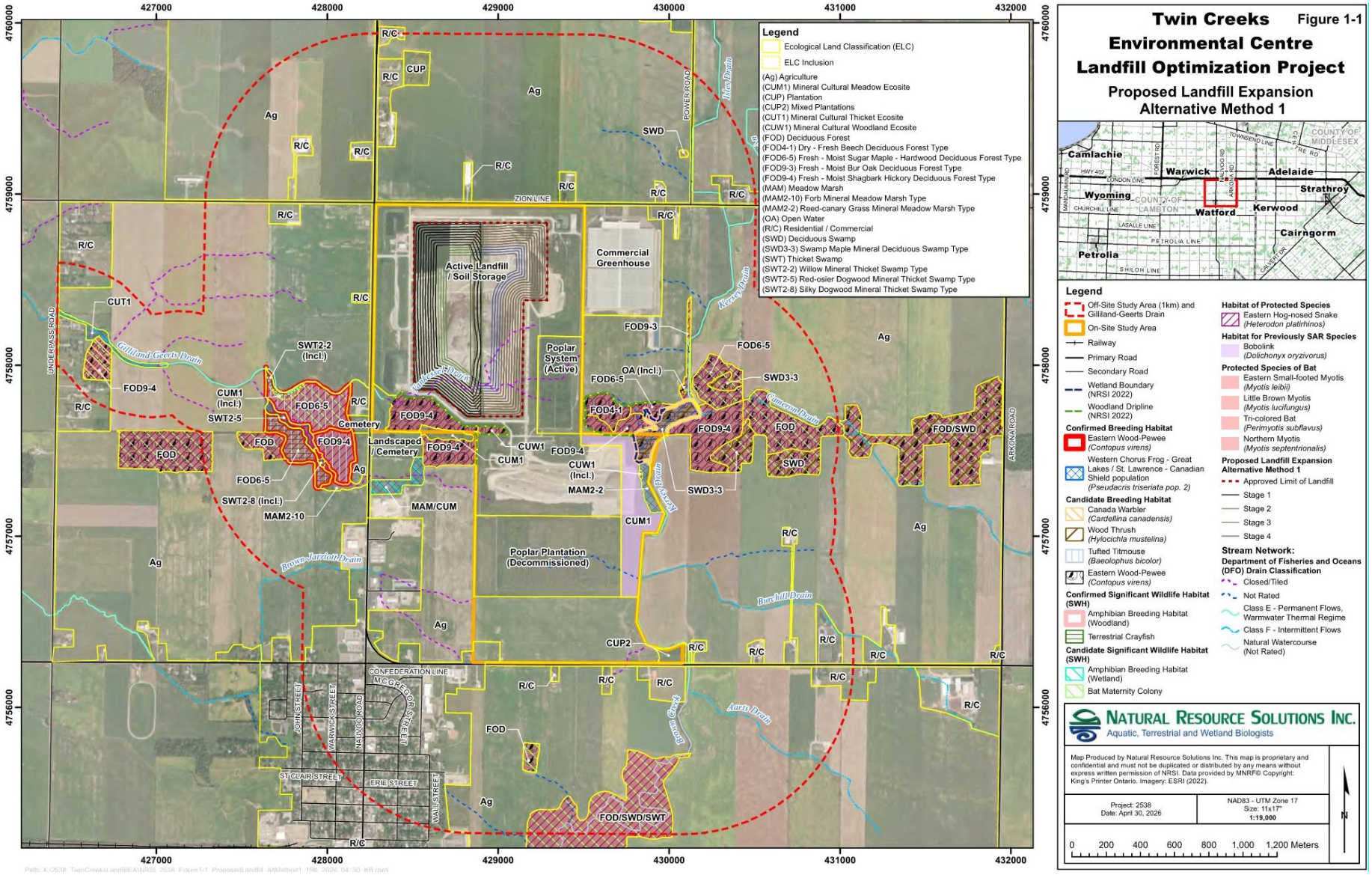
as per current landfill operations. The final cover will be placed on the side slopes of the phases that are no longer operational as an erosion control measure, to minimize the potential for leachate seeps, and to improve LFG collection. Furthermore, there are no operational changes anticipated to result from the landfill optimization and it will operate consistent with current conditions with the same 1.4 million tonnes annual capacity, and landfilling of waste will continue to occur in phases.

The following acoustic devices will continue to be used to scare away Gulls and other bird scavengers from the landfill:

- Whistling and/or Pyrotechnic Pistol Cartridges;
- Shots fired from a starter pistol or other type of gun;
- Propane canons (“bird bangers”); and
- Electronic distress calls.

The devices listed above produce impulsive noise which is less than the MECP landfill sound level limit of 70 dBAI, for all receptors, regardless of the position of firing within the TCEC. A bird of prey is also utilized for bird control at the site.

Figure 1-1. Alternative Method 1



1.1.2 Alternative Method 2

Alternative Method 2 includes an increase in the final landfill side slopes from 4H:1V to 2.5H:1V and an increase in the approved height of waste by 39 m, peaking at an elevation of 319 masl, which is lower than Alternative Methods 1 and 3. Consistent with Alternative Method 1, the existing approved waste disposal footprint area of the TCEC will not change or encroach into surrounding terrestrial and aquatic habitat as indicated in **Figure 1-2**.

Leachate that is not properly managed and escapes from landfills, has the potential to contaminate groundwater and surface water with toxic organic and inorganic pollutants that in turn impact both terrestrial and aquatic ecosystems. Similar to Alternative Method 1, Alternative Method 2 will not have a significant effect on the functionality of the leachate collection system, and leachate will continue to drain toward the designated withdrawal points. Furthermore, Alternative Method 2 also will not change the current expected infiltration rate. Instead, it increases the rate of run-off due to the higher side slopes compared to the existing condition. Therefore, the leachate collection system will remain the same after vertical expansion.

Stormwater can cause erosion, flooding, poor water quality, and pollution which impacts both terrestrial and aquatic ecosystems. The impacts to stormwater management would be similar to that of Alternative Method 1 in that the factors altering the magnitude and timing of the peak flows (although not the total runoff volume) are the same. The same scenarios were modelled: Existing; Future Baseline; and Alternative Method 2. Consistent with Alternative Method 1, the results for the Alternative Method 2 scenario are similar to those of the Future Baseline scenario. Furthermore, the data indicates that all four stormwater management ponds on the landfill site have enough capacity to store the 100-year flows across the Future Baseline and Alternative Method 2 scenarios. The ponds are designed to control the water to not permit more than a maximum discharge through each outlet.

Peak flows leaving the landfill site are approximately 20% greater when compared to existing conditions and are only slightly higher when compared to the Future Baseline condition under this alternative method. The timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. However, the peak flow and timing impacts can be mitigated by an increase in storage within perimeter swales.

Gas generated from landfills includes methane which is one of the most potent greenhouse gases and is a major contributor to climate change which can have devastating impacts to terrestrial and aquatic ecosystems. With regard to LFG generation, it is estimated that the Expansion Landfill will produce a peak amount of LFG of approximately 20,203 m^3/hr in 2043, of which 18,169 m^3/hr or 90% is estimated to be collected. The LFG collection system includes conventional vertical wells within the closed Old Landfill footprint and mostly EVGS wells within the Expansion Landfill. The Expansion Landfill also draws gas from the PLCS. The LFG collection system has a collection efficiency of approximately 75% for areas without final cover based on

operational data and could be improved to 90% for areas with final clay cover. It is anticipated that this level of collection efficiency will continue to be achieved.

Anthropogenic noise, such as that caused from the operation of a landfill, can impact terrestrial and aquatic wildlife by interfering with animal communication, hindering foraging abilities, and impacting where they live. Alternative Method 2 has a reduced potential for increased offsite noise due to landfilling sources (relative to Alternative Method 1) as the modifications to the existing side slope stop approximately 50-60 m from the landfill limits. The new slope will require modifications up to the existing landfill limit, which will require construction sources such as dozers and compactors to work the area. This will result in potentially greater off-site sound levels. Mitigation measures are to either construct temporary operational berms or limit the amount of equipment near the perimeter of the landfill in order to comply with Landfilling Guideline sound level limits.

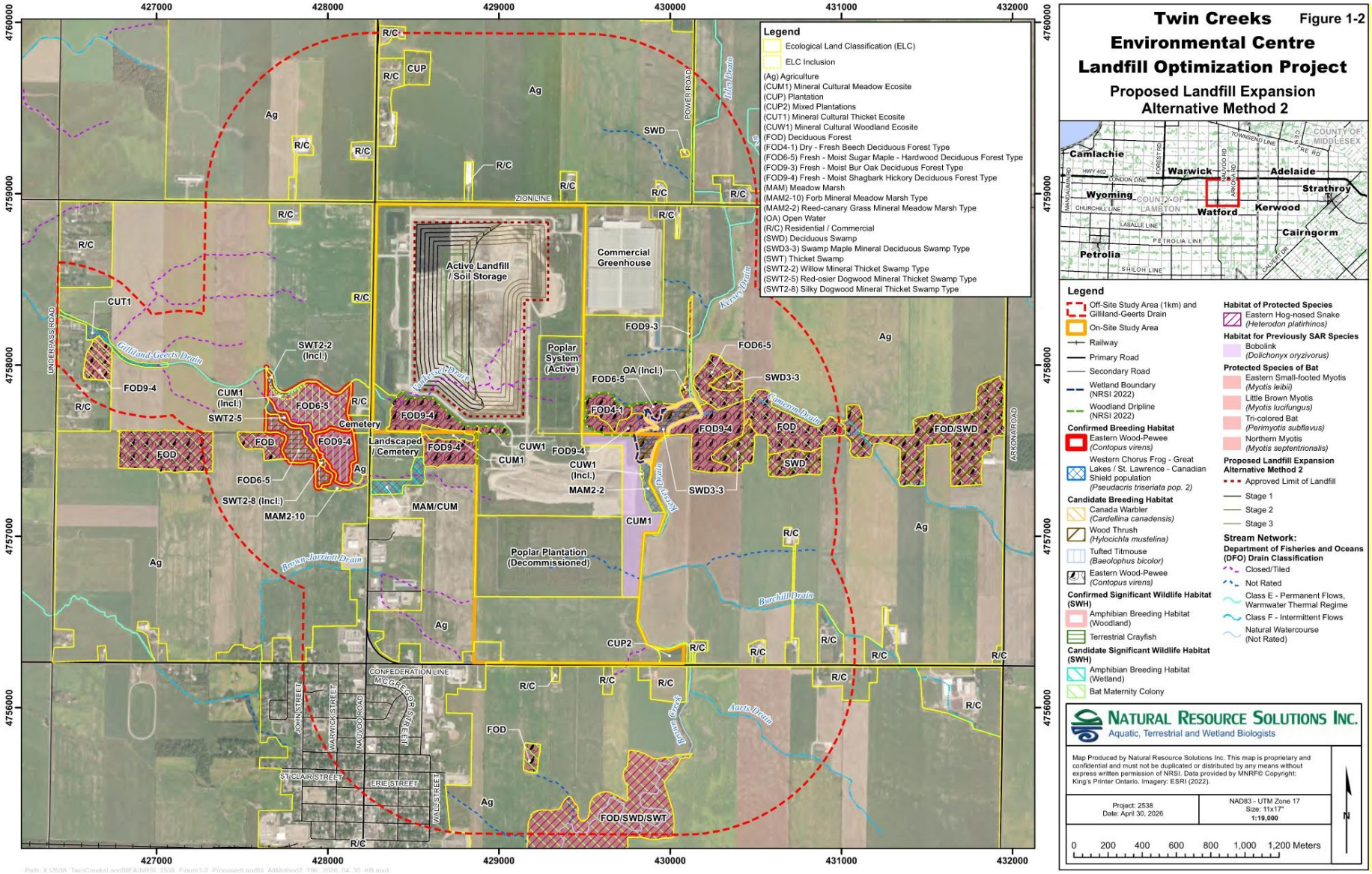
The Expansion Landfill area has already been prepared for landfilling and is currently active. Daily/interim cover will continue to be placed as part of the landfill operations as per current landfill operations. The final cover will be placed on the side slopes of the phases that are no longer operational as an erosion control measure, to minimize the potential for leachate seeps, and to improve LFG collection. Furthermore, there are no operational changes anticipated to result from the landfill optimization and it will operate consistent with current conditions with the same 1.4 million tonnes annual capacity and landfilling of waste will continue to occur in phases.

The following acoustic devices will continue to be used to scare away Gulls and other bird scavengers from the landfill:

- Whistling and/or Pyrotechnic Pistol Cartridges;
- Shots fired from a starter pistol or other type of gun;
- Propane canons (“bird bangers”); and
- Electronic distress calls.

The devices listed above produce impulsive noise which is less than the MECP landfill sound level limit of 70 dBAI, for all receptors, regardless of the position of firing within the TCEC. A bird of prey is also utilized for bird control at the site.

Figure 1-2. Alternative Method 2



1.1.3 Alternative Method 3

Alternative Method 3 includes the increase of the final landfill side slopes from 4H:1V to 2.5H:1V (the same as Alternative Method 2) and an increase in the approved height by 80 m, peaking at an elevation of 360 masl, which is higher than Alternative Methods 1 and 2. Consistent with Alternative Methods 1 and 2, the existing approved waste disposal footprint area of the TCEC will not change or encroach into surrounding terrestrial and aquatic habitat as indicated in **Figure 1-3**.

Leachate that is not properly managed and escapes from landfills, has the potential to contaminate groundwater and surface water with toxic organic and inorganic pollutants that in turn impact both terrestrial and aquatic ecosystems. Similar to Alternative Methods 1 and 2, Alternative Method 3 will not have a significant effect on the functionality of the leachate collection system, and leachate will continue to drain toward the designated withdrawal points. Furthermore, Alternative Method 3 also will not change the current expected infiltration rate. Instead, it will increase the rate of run-off due to the higher side slopes compared to the existing condition. Therefore, the leachate collection system will remain the same after vertical expansion.

Stormwater can cause erosion, flooding poor water quality and pollution which impacts both terrestrial and aquatic ecosystems. The impacts to stormwater management will be similar to that of Alternative Methods 1 and 2. The factors altering the magnitude and timing of the peak flows (although not the total runoff volume) are consistent. The same scenarios were modelled: Existing; Future Baseline; and Alternative Method 3. Consistent with Alternative Methods 1 and 2, the results for the Alternative Method 3 scenario are similar to those of the Future Baseline scenario. The data indicates that all four stormwater management ponds on the landfill site have enough capacity to store the 100-year flows across the Future Baseline and Alternative Method 3 scenarios. The ponds are designed to control the water to not permit more than a maximum discharge through each outlet.

Peak flows leaving the landfill site are approximately 18% greater when compared to existing conditions and are only slightly higher when compared to the future baseline condition under this alternative. The timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. However, the peak flow and timing impacts can be mitigated by an increase in storage within perimeter swales.

Gas generated from landfills includes methane which is one of the most potent greenhouse gases and is a major contributor to climate change which can have devastating impacts to terrestrial and aquatic ecosystems. With regard to LFG generation, it is estimated that the Expansion Landfill as will produce a peak amount of LFG of approximately 20,203 m^3/hr in 2043, of which 18,169 m^3/hr or 90% is estimated to be collected. The LFG collection system includes conventional vertical wells within the closed Old Landfill footprint and mostly EVGS wells within the Expansion Landfill. The Expansion Landfill also draws gas from the PLCS. The LFG collection system has a collection efficiency of approximately 75% for areas without

final cover based on operational data and could be improved to 90% for areas with final clay cover. It is anticipated that this level of collection efficiency will continue to be achieved.

Anthropogenic noise, such as that caused from the operation of a landfill, can impact terrestrial and aquatic wildlife by interfering with animal communication, hindering foraging abilities, and impacting where they live. Alternative Method 3 has a reduced potential for increased offsite noise due to landfilling sources as the modifications to the existing side slope stop approximately 50-60 m from the landfill limits. The new slope will require modifications up to the existing landfill limit, which will require construction sources such as dozers and compactors to work the area. This will result in potentially greater off-site sound levels. Mitigation measures are to either construct temporary operational berms or limit the amount of equipment near the perimeter of the landfill in order to comply with Landfilling Guideline sound level limits.

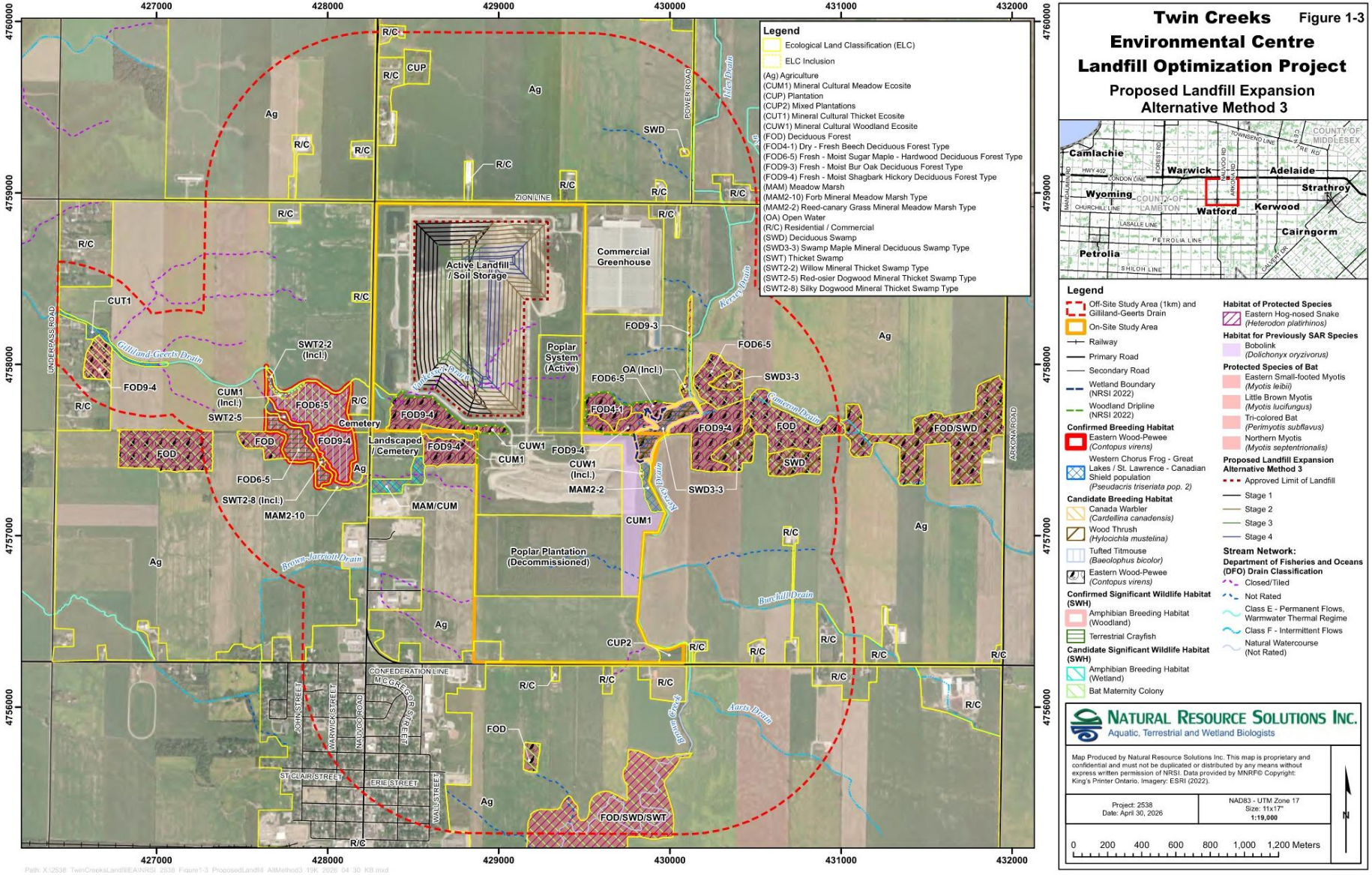
The Expansion Landfill area has already been prepared for landfilling and is currently active. Daily/interim cover will continue to be placed as part of the landfill operations as per current landfill operations. The final cover will be placed on the side slopes of the phases that are no longer operational as an erosion control measure, to minimize the potential for leachate seeps, and to improve LFG collection. Furthermore, there are no operational changes anticipated to result from the landfill optimization and it will operate consistent with current conditions with the same 1.4 million tonnes annual capacity and landfilling of waste will continue to occur in phases.

The following acoustic devices will continue to be used to scare away Gulls and other bird scavengers from the landfill:

- Whistling and/or Pyrotechnic Pistol Cartridges;
- Shots fired from a starter pistol or other type of gun;
- Propane canons (“bird bangers”); and
- Electronic distress calls.

The devices listed above produce impulsive noise which is less than the MECP landfill sound level limit of 70 dBAI, for all receptors, regardless of the position of firing within the TCEC. A bird of prey is also utilized for bird control at the site.

Figure 1-3. Alternative Method 3



2 Effects Assessment Methods

Using the evaluation criteria, indicators, rationale and data sources from the approved ToR and the existing conditions from the Ecological Environment Existing Conditions Report, the effects assessment is carried out as follows:

- predict the potential environmental effects for each alternative method (**Section 2.1**);
- identify the Preferred Alternative based on a comparative evaluation of the potential environmental effects of each alternative method (**Section 2.2**);
- conduct an effects assessment on the Preferred Alternative, including the identification of mitigation measures and monitoring programs (**Section 2.3**); and
- compare the effects of the preferred alternative to those of the 'Do Nothing' Alternative (i.e., the Expansion Landfill as approved) (**Section 2.4**).

2.1 Predict Potential Environmental Effects for Alternative Methods

The potential environmental effects for each alternative method are identified within the study areas based on the application of the evaluation criteria, indicators and data sources in the approved ToR and based on the maximum allowable waste receipt level for the TCEC landfill. The potential effects can be positive or negative, direct or indirect, and short- or long-term. Mitigation measures are identified to minimize or mitigate the potential effects and then the net effects are evaluated taking into consideration the application of mitigation measures. The study areas, evaluation criteria, indicators, data source, and key design considerations and assumptions for the Ecological Environment are provided below.

2.1.1 Study Areas

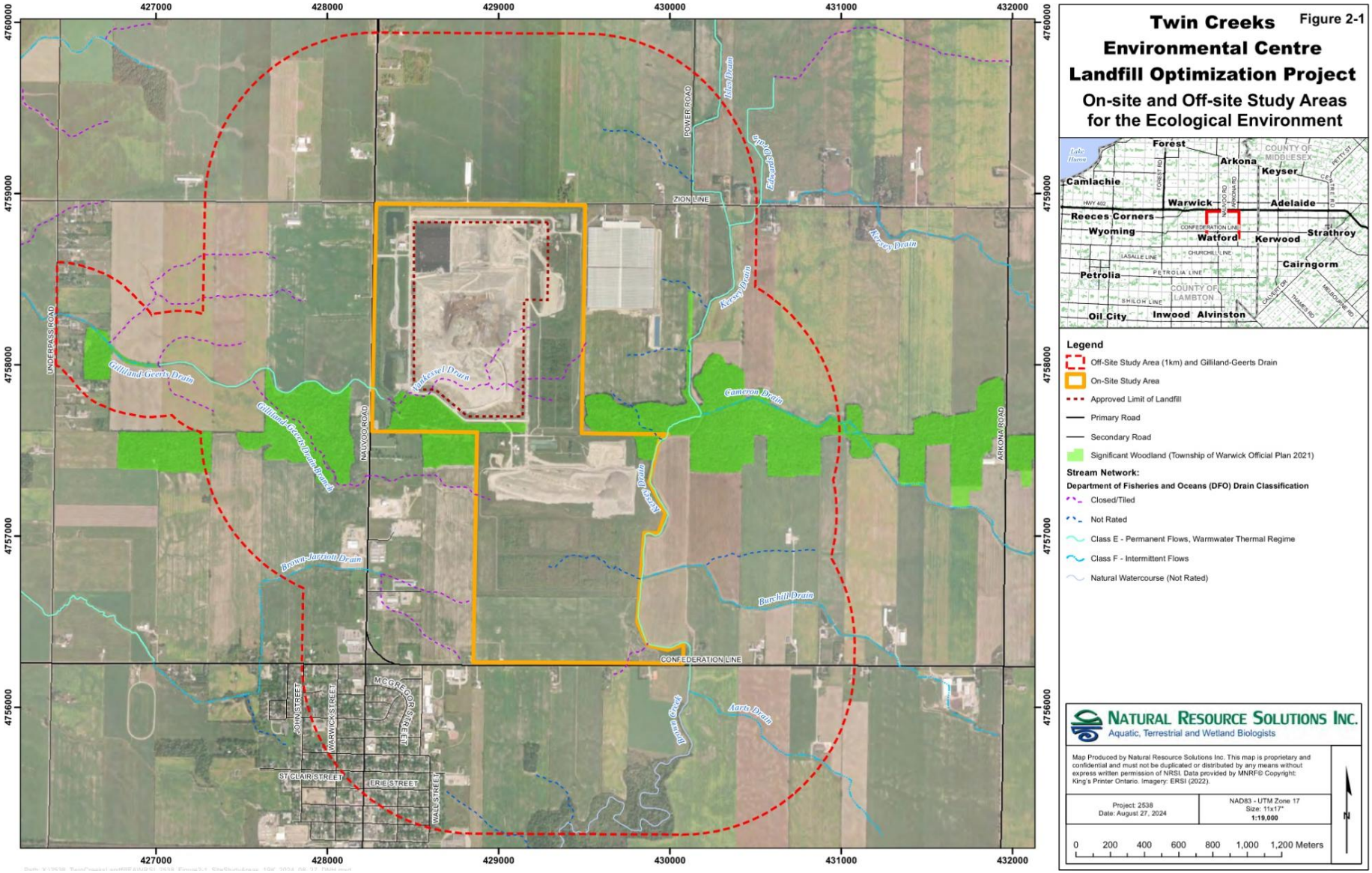
The TCEC landfill is located within the Township of Warwick, in the County of Lambton, approximately 1 km north of the Village of Watford. The TCEC is situated south of Highway 402 and southeast of the intersection of Nauvoo Road and Zion Line. The municipal street address of the TCEC is 5768 Nauvoo Road, Watford, Ontario. The area being considered for the landfill optimization is within the approved Expansion Landfill footprint located within the northern portion of the 301 ha TCEC site.

The study areas include the existing TCEC site as well as the potentially-affected surrounding areas. The general On-site and Off-site Study Areas identified for the EA in the approved ToR are as follows:

- On-site Study Area: the existing TCEC;
- Off-site Study Area: the lands within the vicinity of the TCEC extending approximately 1 km out from the On-site Study Area.

For the Ecological Environment, the Off-site Study Area was extended to include the Gilliland-Geerts Drain downstream and westward of the TCEC to Underpass Road (**Figure 2-1**). The Off-site Study Area encompasses a ‘primary zone of influence’ extending 120 m from the existing TCEC in keeping with the definition of ‘adjacent lands’ as set forth in the Natural Heritage Reference Manual (MNR 2010).

Figure 2-1. On-site and off-Site Study Areas for the Ecological Environment



2.1.2 Evaluation Criteria, Indicators, and Data Sources

The evaluation criteria, rationale, indicators, and data sources used for the Ecological Environment as per the approved ToR are provided in **Table 2-1**.

Table 2-1. Evaluation Criteria, Indicators, and Data Sources for the Ecological Environment

Evaluation Criteria	Rationale	Indicators	Data Sources
Natural Environment			
Ecological Environment			
Terrestrial Ecosystems	Continued or expanded operation of the waste disposal facility may disturb the functioning of natural terrestrial habitats, including rare, threatened, or endangered species.	• Predicted effects on vegetation communities and species including rare, threatened, or endangered species • Predicted effects on wildlife and wildlife habitat including rare, threatened, or endangered species	• Vegetation and wildlife data, including Protected Species data from previous studies • Terrestrial field studies • Aerial imagery • Local and Indigenous sources of information on the ecological functions of features within the On-site and Off-site Study Areas. • Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement (Ontario Ministry of Natural Resources 2010) • Significant Wildlife Habitat Technical Guide (Ontario Ministry of Natural Resources 2000) • Significant Wildlife Habitat (Schedule Criteria for Ecoregion 7E (MNRF 2015a) • Ministry of the Environment, Conservation and Parks (MECP) background data • Ministry of Natural Resources (MNR) background data • St. Clair Region Conservation Authority (SCRCA) background data • Natural Heritage Information Centre background data • Ontario Breeding Bird Atlas • Ontario Butterfly Atlas • Ontario Reptile and Amphibian Atlas • Ontario Odonata Atlas • Ontario Mammal Atlas • eBird • iNaturalist • Proposed facility characteristics • Landfill design and operations data • Annual monitoring report data • Results of other discipline assessments • Survey protocol for Ontario's Species at Risk Snakes (MNRF 2016b) • Survey Protocol for Blanding's Turtle in Ontario (MNRF 2015b) • Blanding's Turtle Nest and Nesting Survey Guidelines (MNRF 2016a) • Ontario Wetland Evaluation System: Southern Manual (MNRF 2022)

Table 2-1. Evaluation Criteria, Indicators, and Data Sources for the Ecological Environment

Evaluation Criteria	Rationale	Indicators	Data Sources
Aquatic Ecosystems	Continued or expanded operation of the waste disposal facility may disturb the functioning of direct aquatic habitat features and species, including rare, threatened, or endangered species.	• Predicted effects on aquatic habitat, including fish habitat • Predicted effects on aquatic biota including rare, threatened, or endangered species	• Fish and fish habitat survey data from previous studies • Aquatic field studies • Local and Indigenous sources of information on the ecological functions of features within the On-site and Off-site Study Areas. • MNR review letters of previous existing conditions reports • MNR aquatic resource data • Fisheries and Oceans Canada (DFO) Aquatic Species at Risk mapping • Annual monitoring report data • Proposed facility characteristics • Landfill design and operations data • Annual monitoring report data • Results of other discipline assessments • Observations obtained as part of interviews with riparian landowners

2.1.3 Key Considerations and Assumptions

The key existing conditions elements, design considerations, and assumptions for the Ecological Environment effects assessment are described below.

2.1.3.1 Key Elements of Existing Conditions

The following are the key elements of existing conditions for the Ecological Environment.

Terrestrial ecosystems within the On-site Study Area are characterized by active landfill areas, sedimentation ponds, Poplar (*Populus* spp.) tree phytoremediation systems, soil storage and maintenance facilities, a leachate storage area, and agricultural lands. Natural vegetation communities within the On-site Study Area are very limited, but include forest, swamp, marsh, and culturally-influenced meadow communities. The Off-site Study Area is dominated by agricultural fields interspersed with residential and commercial properties, a cemetery, woodlots, and riparian areas surrounding municipal drains and watercourses. The On-site and Off-site Study Areas contain unevaluated wetlands, areas identified on Lambton County and Warwick Township Official Plans as Significant Woodland, and several species of vascular flora considered ‘Rare’ in Lambton County.

Soil and aggregate material are currently stockpiled on-site. The current excess soil stockpile consists of native fill and is characterized as silty clay (i.e., brown or grey clay, depending on excavation depth). Soil is added to the excess soil stockpile during the construction of each landfill cell, which in general, occurs annually. In the future,

soil will be removed from the excess soil stockpile to cap cells once they are full of waste materials.

The entire site is fully fenced with 6' high wire-woven, paige wire fence. At present, no sediment and erosion control or wildlife exclusion fencing is installed around the site, or around any of the existing stockpiles.

Confirmed Significant Wildlife Habitat (SWH) types that occur within both Study Areas include:

- Amphibian Breeding Habitat (Woodland);
- Terrestrial Crayfish Habitat; and
- Breeding habitat for the Species of Conservation Concern (SCC) Western Chorus Frog (*Pseudacris triseriata* pop. 2).

Within the On-site Study Area, potential breeding habitat may also be present for two other SCC, Eastern Wood-Pewee (*Contopus virens*) and Wood Thrush (*Hylocichla mustelina*). When confirmed, important habitats of SCC are considered SWH. Note that SCC as listed by the Committee on the Status of Species at Risk in Ontario (COSSARO) are still considered for SWH, even with the implementation of the *Species Conservation Act* (*SCA*). Within the Off-site Study Area, breeding habitat for Eastern Wood-Pewee was confirmed, and potential habitat was identified for three additional bird SCC: Wood Thrush, Canada Warbler (*Cardellina canadensis*), and Tufted Titmouse (*Baeolophus bicolor*). Candidate Amphibian Breeding Habitat (Wetland) and Bat Maternity Colony SWH may also be present within the Off-site Study Area, but not within the TCEC On-site Study Area.

Natural features within the On-site and Off-site Study Areas have the potential to support habitat for Protected Species, listed on the Protected Species in Ontario List (O. Reg. 60/26). These include species identified by the COSSARO as provincially threatened or endangered. These species are protected under the provincial *SCA*, which includes protection of their habitat, including:

- Eastern Hog-nosed Snake (*Heterodon platirhinos*);
- Eastern Small-footed Myotis (*Myotis leibii*);
- Little Brown Myotis (*Myotis lucifungus*);
- Northern Myotis (*Myotis septentrionalis*);
- Tri-colored Bat (*Perimyotis subflavus*);
- Eastern Red Bat (*Lasiurus borealis*);
- Hoary Bat (*Lasiurus cinereus*); and
- Silver-haired Bat (*Lasionnycteris noctivagagans*).

Overall use of the active landfill area by avifaunal scavengers appeared to be low during ecological surveys completed in 2022 and this is expected to continue to be the case in the future with the described mitigation measures.

Aquatic ecosystems are mainly found within the Off-site Study Area; however, the On-site Study Area drains to aquatic features within both the Brown Creek and Bear Creek Headwaters subwatersheds. Other than a small portion of Brown Creek present as a naturalized watercourse south of Confederation Line, all aquatic features within the Off-site Study Area are constructed open or closed (i.e., tiled) municipal drains with a history of channelization and other anthropogenic modifications. Open channel features include Kersey Drain (the channelized reach of Brown Creek), Cameron Drain, Burchill Drain, Gilliland-Geerts Drain, Gilliland-Geerts Drain Branch, and Brown-Jarriott Drain. Perennial or seasonal direct fish habitat of moderate to good quality is present within all features except for Gilliland-Geerts Drain Branch and Burchill Drain, which were determined to provide indirect fish habitat only. Kersey Drain provides the best quality habitat and supports the most diverse fish community when compared with other assessed features. Aquatic ecosystems within the Off-site Study Area provide habitat for fish species with both coolwater and warmwater thermal regime tolerances. No aquatic SAR, protected under the federal *Species at Risk Act* (*SARA*), Protected Species, or SCC were documented during electrofishing surveys completed by NRSI biologists in 2022.

2.1.3.2 Key Design Considerations

The following are the key design elements for the proposed landfill expansion that were considered for the Ecological Environment:

- Leachate seeps in the On-site and Off-site Study Areas.
- Landfill gas production.
- Increase in surface water quantity.
- Stormwater runoff in the On-site and Off-site Study Areas.
- Noise mitigation will continue as per current operations.
- Site development footprint will be within the approved Expansion Landfill footprint.
- Landfill operations – bird management will continue as per current operations.

2.1.3.3 Key Assumptions

The following are key assumptions that will be used in the effects assessment for the Ecological Environment:

- No changes to traffic patterns;
- No changes to typical equipment used; and
- No changes to operating hours.

2.2 Comparative Evaluation and Identification of the Preferred Alternative

The three alternative methods are comparatively assessed and evaluated using the criteria and indicators to determine the Preferred Alternative. The differences in the potential environmental effects remaining following the implementation of potential mitigation/management measures (i.e., net effects) are used to identify and compare each alternative method.

The net environmental effects are used to compare the three alternative methods to one another at the criteria and indicator level for each discipline. The following two step methodology was applied to carry out the comparative evaluation for the Ecological Environment:

1. Identify the predicted net effect(s) associated with each alternative method for each indicator and assign a preference rating (i.e., Preferred, Not Preferred, No Substantial Difference); and
2. Rate each alternative method at the criteria level (i.e., Preferred, Not Preferred, No Substantial Difference) based on the identified preference rating for each indicator and provide a rationale.

2.3 Effects Assessment of the Preferred Alternative

An assessment of the environmental effects of the Preferred Alternative is carried out considering the same criteria, indicators, and data sources, considering potential mitigation/management measures and cumulative effects. The effects assessment of the Preferred Alternative will be compiled and presented in the EA Study Report.

2.4 Comparison of the Preferred Alternative against the ‘Do Nothing’ Alternative

The effects of the Preferred Alternative are compared against the predicted effects of the currently approved Expansion Landfill based on similar environmental criteria and indicators, with the understanding that the criteria and indicators used in the current effects assessment may differ from those used for the effects assessment of the Expansion Landfill. The effects are compared against each other in terms of magnitude, extent, and duration. The advantages and disadvantages of the Preferred Alternative compared to the ‘Do Nothing’ Alternative are identified. The comparison of the effects of the Preferred Alternative against the ‘Do Nothing’ Alternative will be compiled and presented in the EA Study Report.

3 Net Effects Assessment

To identify the potential effects of the Project on the Ecological Environment, the conceptual design of each alternative method for the landfill optimization is examined to determine if it will have an effect on:

- terrestrial ecosystems through changes in vegetation communities and species, wildlife habitat, and wildlife, including rare, threatened or endangered species; and
- aquatic ecosystems through changes in aquatic habitat, including fish habitat, and changes in aquatic biota, including rare, threatened or endangered species.

The results of the net effects assessment for each alternative method are provided in **Sections 3.2** through **3.4**, below.

3.1 Future Baseline Conditions

The landfill operations will continue until the landfill has reached its full horizontal footprint and currently approved height of 280 masl. This scenario is considered the future baseline and was modelled as part of the assessment of the proposed expansion as detailed below. All existing natural heritage features will remain on the landscape. Wildlife in the area is also expected to remain stable, as wildlife have adapted to the landfill operations, since its construction in 1972, over the last 52 years.

3.1.1 Terrestrial Ecosystems

3.1.1.1 Vegetation Communities and Species

No vegetation communities (including woodlands and wetlands) or rare, threatened or endangered species were identified in the approved limit of the Expansion Landfill. Natural vegetation communities within the On-site Study Area are limited, but include forest, swamp, marsh, and culturally-influenced meadow communities. The Off-site Study Area is dominated by agricultural fields interspersed with residential and commercial properties, a cemetery, woodlots, and riparian areas surrounding municipal drains and watercourses. The On-site and Off-site Study Areas contain unevaluated wetlands, areas identified on Lambton County and Warwick Township Official Plans as Significant Woodland, and several species of vascular flora considered ‘Rare’ in Lambton County. The current ecological conditions as described are expected to persist and be present when the Project begins.

A poplar plantation and poplar system are also present within the On-site Study Area. It is understood that these are not expected to become saturated. The poplar system has been monitored annually, with no indication of chemical build-up in the roots, stems, or leaves. As poplar trees are short-lived, trees are regularly harvested and replanted. As no chemical build-up has been documented, this wood can be used for beneficial use, such as mulch.

3.1.1.2 Wildlife and Wildlife Habitat

No wildlife habitat (including significant wildlife habitat) or rare, threatened or endangered species were identified in the approved limit of the Expansion Landfill. However, confirmed Significant Wildlife Habitat (SWH) types that occur within the On-site and Off-site Study Areas include: Amphibian Breeding Habitat (Woodland); Terrestrial Crayfish Habitat; and Breeding habitat for the Species of Conservation Concern (SCC) species Western Chorus Frog. Within the On-site Study Area, potential breeding habitat may also be present for two other SCC, Eastern Wood-Pewee and Wood Thrush. When confirmed, important habitats of SCC are considered SWH. Within the Off-site Study Area, breeding habitat for Eastern Wood-Pewee was confirmed, and potential habitat was identified for three additional bird SCC: Wood Thrush, Canada Warbler, and Tufted Titmouse. Candidate Amphibian Breeding Habitat (Wetland) and Bat Maternity Colony SWH may also be present within the Off-site Study Area (but not within the TCEC On-site Study Area).

In addition, natural features within the On-site and Off-site Study Areas have the potential to support habitat for Protected Species, afforded protection under the provincial *SCA*, including: Eastern Hog-nosed Snake; Eastern Small-footed Myotis; Little Brown Myotis; Northern Myotis; Tri-colored Bat; Eastern Red Bat; Silver-haired Bat; and Hoary Bat.

The current ecological conditions as described are expected to persist and be present when the Project begins.

Multiple avifaunal scavengers were documented within the approved limit of the Expansion Landfill. As mentioned in **Section 1.1**, the TCEC uses multiple acoustic devices, in addition to a bird of prey, to scare away these birds from the active landfill. These acoustic devices also reduce the potential for birds and other wildlife drinking from the ponds. As outlined in the Existing Conditions Report during 2022 and 2025 field surveys, the largest documented groupings of Gulls were observed at the landfill on August 25, 2022 (~200 Gulls) and October 25, 2022 (~500 Gulls). Otherwise, across the 29 site visits completed for this work, very few Gulls were observed over the landfill. All observations are listed in the Existing Conditions Report (NRSI 2026). The largest grouping of 500 individuals was observed during a two-day field visit, with gulls only observed on the second day. This suggests that such groupings are acute, single-day events, and appear to be mitigated through the proactive discouragement measures. Large gatherings such as these later in the season may also be related to fall migration or redistribution of fall populations. Ring-billed gull in particular is a partial migrator, meaning that some individuals travel south in the winter, while others remain.

Observations of other avifaunal scavengers such as American Crow (*Corvus brachyrhynchos*) and Turkey Vulture (*Cathartes aura*) were documented. These records, as well as incidental observations of Gulls in the Off-site Study Area, are summarized in in the Existing Conditions Report (NRSI 2026).

Soil stockpiles on-site have the potential to provide limited habitat for Bank Swallow (*Riparia riparia*) if not properly managed. In addition to the above bird deterrents, any soil stockpiles on-site are always kept below a 70 degree angle (i.e., typically a 4:1

slope), which avoids inadvertent habitat creation. No Bank Swallow nesting activities were observed during any of the ecological surveys. The constantly active nature of these stockpiles discourages nest creation. Inactive piles are vegetated to eliminate potential nesting areas. Use of stockpiles by Bank Swallow is not expected to occur with the proposed changes.

Summer foraging and thermoregulation habitat for Eastern Hog-nosed Snake may be present in the woodlands within the On-site and Off-site Study Areas. However, follow-up surveys in 2026 confirmed that suitable nesting and overwintering habitat for the species is not present within the on-site soil stockpiles.

3.1.2 Aquatic Ecosystems

3.1.2.1 Aquatic Habitat

No aquatic habitat associated with Brown Creek (Kersey Drain) or the municipal drains was identified in the approved limit of the Expansion Landfill. The Vankessel Drain is within the approved limit of the Expansion Landfill but is now closed and therefore does not provide aquatic habitat. Aquatic ecosystems are mainly found within the Off-site Study Area; however, the On-site Study Area drains to aquatic features within both the Brown Creek and Bear Creek Headwaters subwatersheds. Other than a small portion of Brown Creek present as a watercourse south of Confederation Line, all aquatic features within the Off-site Study Area are constructed open or closed (i.e., tiled) municipal drains with a history of channelization and other anthropogenic modifications. Open channel features include Kersey Drain (the channelized reach of Brown Creek), Cameron Drain, Burchill Drain, Gilliland-Geerts Drain, Gilliland-Geerts Drain Branch, and Brown-Jarriott Drain. Perennial or seasonal direct fish habitat of moderate to good quality is present within all features except for Gilliland-Geerts Drain Branch and Burchill Drain, which were determined to provide indirect fish habitat only. Kersey Drain provides the best quality habitat and supports the most diverse fish community when compared with other assessed features.

Due to the stormwater quality treatment purpose of the On-site stormwater management ponds, and fenced nature of the site they are not considered to present suitable habitat for native fish and wildlife within the On-site study area. A wildlife salvage is still recommended prior to any major pond maintenance or cleanout.

Existing On-site stormwater is managed through a series of ponds and stormwater swales to maintain peak site runoff at pre-development levels, providing water quality treatment at a 75% TSS removal rate, as established by the Stormwater Management Planning and Design Manual (2003). This level of treatment is understood to minimize the risk of impacts to downstream aquatic habitat features resulting from surface runoff and sediment transfer. Resulting stormwater flows meet Provincial Water Quality Standards minimizing the risk of impacts to downstream aquatic resources. As such, no negative impacts to downstream resources and fish habitat are anticipated under future baseline conditions. The current ecological conditions as described are expected to persist and be present when the Project begins.

3.1.2.2 Aquatic Biota

No aquatic biota, including rare, threatened, or endangered species were identified in the approved limit of the Expansion Landfill. Aquatic ecosystems within the Off-site Study Area provide habitat for fish species with both coolwater and warmwater thermal regime tolerances. No aquatic Species at Risk, protected under the federal *Species at Risk Act* (*SARA*), Protected Species, or SCC were documented in the On-site or Off-site Study Areas. As noted in the Existing Conditions Report, the Kersey Drain/Brown Creek and the Gilliland-Geerts Drain may provide habitat for Northern Sunfish (*Lepomis peltastes* pop. 2) within the Off-site Study Area. This species is no longer considered SCC with the implementation of the *SCA*.

Fencing around the facility will continue to discourage large wildlife from using the area. Turtles and salamanders are not expected to use the On-site stormwater ponds. Despite basking surveys at all four stormwater management ponds, no turtles were observed. No turtles were observed in the Off-site Study Area either. Spotted Salamander (*Ambystoma maculatum*) was observed from the woodland east of the landfill. This species is confined to woodland habitats; it will not traverse open fields and breed in open stormwater management ponds. No other species of salamander were noted. It is possible that Red-backed Salamander (*Plethodon cinereus*) is present within the woodlands surrounding the landfill. This species is also confined to woodland habitats and does not breed in ponds.

The proposed systems meet the “Enhanced” level of stormwater protection as per the MOE’s SWM planning and design manual to minimize the risks associated with sediment release. As such, no negative impacts to downstream resources are anticipated. Post construction water quality monitoring will be completed to ensure the stormwater management system is functioning as designed

The current ecological conditions as described are expected to persist and be present when the Project begins.

3.2 Alternative Method 1

The assessment of effects for Alternative Method 1 is described below for the environmental criteria and indicators of the Ecological Environment and is summarized in **Table 3-1**.

3.2.1 Terrestrial Ecosystems

3.2.1.1 Vegetation Communities and Species

Vegetation communities and species can be directly affected by a landfill expansion through removal and indirectly affected by leachate seeps, landfill gas production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact vegetation by hindering growth or causing death. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion

and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in temperatures and extreme weather which causes stress to vegetation, hinders growth, or causes death. Climate change may provide favourable growing conditions for vegetation species generally found further south.

No vegetation communities or species were identified in the footprint of the Expansion Landfill; therefore, no direct impacts to vegetation communities and species are anticipated. Multiple vegetation communities and species are present within the On-site and Off-site Study Areas as described in **Section 3.1.1**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to vegetation communities and species within the On-site and Off-site Study Areas are anticipated.

Indirect impacts to vegetation communities and species are not anticipated as Alternative Method 1 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production, and stormwater runoff. As described in **Section 1.1.1**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 1 scenario.

3.2.1.2 Wildlife and Wildlife Habitat

Wildlife and wildlife habitat can be directly affected by a landfill expansion through removal and indirectly by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g. erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact vegetation by hindering growth or causing death. This impacts wildlife by altering habitat and food sources, and polluting drinking water. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gas generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to wildlife, vegetation (wildlife habitat), alters seasonal behaviours and weather triggers, or causes death.

No vegetation communities were identified in the approved limit of the landfill; therefore, no wildlife habitat is present within the active landfill area and no direct impacts to wildlife and wildlife habitat is anticipated. Avifaunal scavengers were documented within the approved limit of the landfill. The continued use of the landfill beyond the approved design will prolong the attractiveness of the area for Gulls and other avifaunal scavengers. Such scavengers will continue to be managed following current protocols using deterrents.

Multiple different types of wildlife and wildlife habitat are present within the On-site and Off-site Study Areas as described in **Section 3.1.1**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to wildlife and wildlife habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to wildlife and wildlife habitat are also not anticipated as Alternative Method 1 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production, and stormwater runoff. As described in **Section 1.1.1**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 1 scenario.

It should be noted that there may be potential for indirect impacts to wildlife adjacent to the active landfill area. Alternative Method 1 has the greatest potential for increased off-site noise which could impact the wildlife within the woodland along the southern boundary of the Active Landfill. Noise can affect an animal's behavior and physiology. The Noise Effects Assessment report prepared by RWDI (2026) for this Project identified that Alternative Method 1 would potentially have the greatest off-site impacts as the CDR indicates landfilling will occur closest to the landfill extents. However, the Noise Effects Assessment Report (2026) concluded that no net effects for noise for Alternative Method 1 can be achieved by implementing mitigation measures at the identified Points of Reception (PORs), including restricting landfilling equipment types and quantities in specific areas of the landfill.

3.2.2 Aquatic Ecosystems

3.2.2.1 Aquatic Habitat

Aquatic habitat can be directly affected by a landfill expansion through removal and indirectly affected by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact aquatic vegetation by hindering growth or causing death. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation, increases water temperature, and causes drought or flooding.
No direct aquatic habitat features are located within the footprint of the Expansion Landfill, therefore, no direct impacts to aquatic habitat are anticipated.

Multiple watercourses that provide aquatic habitat are present in the On-site and Off-site Study Areas as described in **Section 3.2.1**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts

to aquatic habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to aquatic habitat, or downstream aquatic habitat features, are also not anticipated as Alternative Method 1 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production, and stormwater runoff. As described in **Section 1.1.1**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 1 scenario, as such no indirect impacts are anticipated to downstream aquatic habitat features.

3.2.2.2 Aquatic Biota

Aquatic biota can be directly affected by a landfill expansion through removal and indirectly by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact vegetation by hindering growth or causing death. This impacts aquatic biota by altering habitat and food sources, and also possibly by poisoning the aquatic biota directly. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation (aquatic and riparian habitat) and aquatic biota, increases water temperature, and causes drought or flooding, thereby changing habitat for aquatic biota.

No direct aquatic habitat features are located within the footprint of the Expansion Landfill, therefore, no direct impacts to aquatic biota are anticipated. Multiple watercourses that support aquatic biota are present in the On-site and Off-site Study Areas as described in **Section 3.1.2**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to aquatic habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to aquatic habitat, or downstream aquatic habitat features, are also not anticipated as Alternative Method 1 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production, and stormwater runoff. As described in **Section 1.1.1**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The results of surface runoff outflow modelling indicates that Alternative Method 1 will closely mirror the anticipated future baseline scenario, with the existing On-site stormwater management ponds possessing sufficient capacity to store the 100-year flows for Alternative Method 1 and address future stormwater requirements without further alteration or enlargement. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving

through the outlets. The 75% TSS removal rate achieved by the existing stormwater management systems minimize the risk of impacts to downstream aquatic habitat features resulting from surface runoff and sediment transfer, with the resulting stormwater flows meeting Provincial Water Quality Standards minimizing the risk of impacts to downstream aquatic resources.

No indirect impacts to downstream aquatic habitat features as a result of changes to stormwater runoff are anticipated.

3.2.3 Summary

A summary of the effects assessment of Alternative Method 1 is summarized below in **Table 3-1**.

Table 3-1. Net Effects Assessment – Alternative Method 1

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Terrestrial Ecosystems	Predicted effects on vegetation communities and species including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None
	Predicted effects on wildlife and wildlife habitat including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• Continued operation of landfill will prolong the attractiveness of the area for avifaunal scavengers.	• Continued implementation of Gull Management Plan using acoustic deterrent devices and a bird of prey.	• Minimal with identified mitigation measures.

Table 3-1. Net Effects Assessment – Alternative Method 1

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Aquatic Ecosystems	Predicted effects on aquatic habitat, including fish habitat	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None
	Predicted effects on aquatic biota including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas, and downstream aquatic habitat features • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None

3.3 Alternative Method 2

The assessment of effects for Alternative Method 2 is described below for the environmental criteria and indicators of the Ecological Environment and is summarized in **Table 3-2**.

3.3.1 Terrestrial Ecosystems

3.3.1.1 Vegetation Communities and Species

Vegetation communities and species can be directly affected by a landfill expansion through removal and indirectly affected by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact vegetation by hindering growth or causing death. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation, hinders growth, or causes death. Climate change may provide favourable growing conditions for vegetation species generally found further south.

No vegetation communities or species were identified in the footprint of the Expansion Landfill; therefore, no direct impacts to vegetation communities and species are anticipated. Multiple vegetation communities and species are present within the On-site and Off-site Study Areas as described in **Section 3.1.1**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to vegetation communities and species within the On-site and Off-site Study Areas are anticipated.

Indirect impacts to vegetation communities and species are not anticipated as Alternative Method 2 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production, and stormwater runoff. As described in **Section 1.1.2**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the on-site four stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 2 scenario.

3.3.1.2 Wildlife and Wildlife Habitat

Wildlife and wildlife habitat can be directly affected by a landfill expansion through removal and indirectly by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface

water with toxic pollutants that can impact vegetation by hindering growth or causing death. This impacts wildlife by altering habitat and food sources, and polluting drinking water. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to wildlife, vegetation (wildlife habitat), alters seasonal behaviours and weather triggers, or causes death.

No vegetation communities were identified in the approved limit of the landfill; therefore, no wildlife habitat is present within the active landfill area and no direct impacts to wildlife and wildlife habitat is anticipated. Avifaunal scavengers were documented within the approved limit of the landfill. The continued use of the landfill beyond the approved design will prolong the attractiveness of the area for Gulls and other avifaunal scavengers. Such scavengers will continue to be managed following current protocols using deterrents.

Multiple different types of wildlife and wildlife habitat are present within the On-site and Off-site Study Areas as described in **Section 3.1.1**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to wildlife and wildlife habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to wildlife and wildlife habitat are also not anticipated as Alternative Method 2 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production, and stormwater runoff. As described in **Section 1.1.2**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 2 scenario.

3.3.2 Aquatic Ecosystems

3.3.2.1 Aquatic Habitat

Aquatic habitat can be directly affected by a landfill expansion through removal and indirectly affected by leachate seeps, landfill gas production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact aquatic vegetation by hindering growth or causing death. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation, increases water temperature, and causes drought or flooding.

No direct aquatic habitat features are located within the footprint of the Expansion Landfill, therefore, no direct impacts to aquatic habitat are anticipated.

Multiple watercourses that provide aquatic habitat are present in the On-site and Off-site Study Areas as described in **Section 3.1.2**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to aquatic habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to aquatic habitat, or downstream aquatic habitat features, are also not anticipated as Alternative Method 2 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production and stormwater runoff. As described in **Section 1.1.2**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 2 scenario; as such, no indirect impacts are anticipated to downstream aquatic habitat features.

3.3.2.2 Aquatic Biota

Aquatic biota can be directly affected by a landfill expansion through removal and indirectly by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact vegetation by hindering growth or causing death. This impacts aquatic biota by altering habitat and food sources, and also possibly by poisoning the aquatic biota directly. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation (aquatic and riparian habitat) and aquatic biota, increases water temperature, and causes drought or flooding, thereby changing habitat for aquatic biota.

No direct aquatic habitat features watercourses are located within the footprint of the Expansion Landfill, therefore, no direct impacts to aquatic biota are anticipated.

Multiple watercourses that support aquatic biota are present in the On-site and Off-site Study Areas as described in **Section 3.1.2**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to aquatic habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to aquatic habitat, or downstream aquatic habitat features, are also not anticipated as Alternative Method 2 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production and stormwater runoff. As described in **Section 1.1.2**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The results of surface seeps outflow modelling indicates that Alternative Method 2 will

closely mirror the anticipated Future Baseline Conditions, with the existing on-site stormwater management ponds possessing sufficient capacity to store the 100-year flows from the Alternative Method 2 scenario and address future stormwater requirements without alteration or enlargement. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. The 75% TSS removal rate achieved by the existing stormwater management systems minimize the risk of impacts to downstream aquatic habitat features resulting from surface runoff and sediment transfer, with the resulting stormwater flows meeting Provincial Water Quality Standards minimizing the risk of impacts to downstream aquatic resources.

No indirect impacts to downstream aquatic habitat features as a result of changes to stormwater runoff are anticipated.

3.3.3 Summary

A summary of the effects assessment of Alternative Method 2 is summarized below in **Table 3-2**.

Table 3-2. Net Effects Assessment – Alternative Method 2

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Terrestrial Ecosystems	Predicted effects on vegetation communities and species including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None
	Predicted effects on wildlife and wildlife habitat including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• Continued operation of landfill will prolong the attractiveness of the area for avifaunal scavengers.	• Continued implementation of Gull Management Plan using acoustic deterrent devices and a bird of prey.	• Minimal with identified mitigation measures.

Table 3-2. Net Effects Assessment – Alternative Method 2

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Aquatic Ecosystems	Predicted effects on aquatic habitat, including fish habitat	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None
	Predicted effects on aquatic biota including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas, and downstream aquatic habitat features. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None

3.4 Alternative Method 3

The assessment of effects for Alternative Method 3 is described below for the environmental criteria and indicators of the Ecological Environment and is summarized in **Table 3-3**.

3.4.1 Terrestrial Ecosystems

3.4.1.1 Vegetation Communities and Species

Vegetation communities and species can be directly affected by a landfill expansion through removal and indirectly affected by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact vegetation by hindering growth or causing death. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation, hinders growth, or causes death. Climate change may provide favourable growing conditions for vegetation species generally found further south.

No vegetation communities or species were identified in the footprint of the Expansion Landfill; therefore, no direct impacts to vegetation communities and species are anticipated. Multiple vegetation communities and species are present within the On-site and Off-site Study Areas as described in **Section 3.1.1**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to vegetation communities and species within the On-site and Off-site Study Areas are anticipated.

Indirect impacts to vegetation communities and species are not anticipated as Alternative Method 1 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production, and stormwater runoff. As described in **Section 1.1.3**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 3 scenario.

3.4.1.2 Wildlife and Wildlife Habitat

Wildlife and wildlife habitat can be directly affected by a landfill expansion through removal and indirectly by leachate seeps, landfill gas production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface

water with toxic pollutants that can impact vegetation by hindering growth or causing death. This impacts wildlife by altering habitat and food sources, and polluting drinking water. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gas generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to wildlife, vegetation (wildlife habitat), alters seasonal behaviours and weather triggers, or causes death.

No vegetation communities were identified in the approved limit of the landfill; therefore, no wildlife habitat is present within the active landfill area and no direct impacts to wildlife and wildlife habitat is anticipated. Avifaunal scavengers were documented within the approved limit of the landfill. The continued use of the landfill beyond the approved design will prolong the attractiveness of the area for Gulls and other avifaunal scavengers. Such scavengers will continue to be managed following current protocols using deterrents.

Multiple different types of wildlife and wildlife habitat are present within the On-site and Off-site Study Areas as described in **Section 3.1.1**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to wildlife and wildlife habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to wildlife and wildlife habitat are also not anticipated as Alternative Method 3 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production and stormwater runoff. As described in **Section 1.1.3**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 3 scenario.

3.4.2 Aquatic Ecosystems

3.4.2.1 Aquatic Habitat

Aquatic habitat can be directly affected by a landfill expansion through removal and indirectly affected by leachate seeps, LFG production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact aquatic vegetation by hindering growth or causing death. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation, increases water temperature, and causes drought or flooding.

No direct aquatic habitat features are located within the footprint of the Expansion Landfill, therefore, no direct impacts to aquatic habitat are anticipated.

Multiple watercourses that provide aquatic habitat are present in the On-site and Off-site Study Areas as described in **Section 3.1.2**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to aquatic habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to aquatic habitat, or downstream aquatic habitat features, are also not anticipated as Alternative Method 3 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production and stormwater runoff. As described in **Section 1.1.3**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. Despite this, it was modelled that all of the four on-site stormwater management ponds have enough capacity to store the 100-year flows for the Alternative Method 3 scenario; as such, no indirect impacts are anticipated to downstream aquatic habitat features.

3.4.2.2 Aquatic Biota

Aquatic biota can be directly affected by a landfill expansion through removal and indirectly by leachate seeps, landfill gas production, increase in surface water quantity (i.e., flooding), and stormwater runoff (e.g., erosion and sedimentation). Leachate from landfills has the potential to contaminate groundwater and surface water with toxic pollutants that can impact vegetation by hindering growth or causing death. This impacts aquatic biota by altering habitat and food sources, and also possibly by poisoning the aquatic biota directly. The same impacts are true for stormwater runoff which can not only carry pollutants and contaminate water, but can also cause erosion and flooding. Gases generated from landfills contribute to the greenhouse effect and by proxy climate change. Climate change causes an increase in extreme weather which causes stress to vegetation (aquatic and riparian habitat) and aquatic biota, increases water temperature, and causes drought or flooding, thereby changing habitat for aquatic biota.

No direct aquatic habitat features are located within the footprint of the Expansion Landfill, therefore, no direct impacts to aquatic biota are anticipated.

Multiple watercourses that support aquatic biota are present in the On-site and Off-site Study Areas as described in **Section 3.1.2**. However, since no excavation for the Project will be conducted outside of the Expansion Landfill footprint, no direct impacts to aquatic habitat within the On-site and Off-site Study Areas are anticipated. Indirect impacts to aquatic habitat, or downstream aquatic habitat features, are also not anticipated as Alternative Method 3 is not expected to affect the functionality of the management systems in place for leachate seeps, LFG production and stormwater runoff. As described in **Section 1.1.3**, the expected infiltration rate of leachate will not change and leachate will continue to drain toward the designated withdrawal points. The results of surface runoff outflow modeling indicates that Alternative Method 3 will

closely mirror the anticipated Future Baseline Conditions, with the existing On-site stormwater management ponds possessing sufficient capacity to store the 100-year flows for the Alternative Method 3 scenario and address future stormwater requirements without further alteration or enlargement. The volume of stormwater runoff from the Expansion Landfill will not change, however, the timing of peak flows and the redistribution of catchment areas is expected to increase or decrease some of the peak flows leaving through the outlets. The 75% TSS removal rate achieved by the existing stormwater management systems minimize the risk of impacts to downstream aquatic habitat features resulting from surface runoff and sediment transfer, with the resulting stormwater flows meeting Provincial Water Quality Standards minimizing the risk of impacts to downstream aquatic resources.

No indirect impacts to downstream aquatic habitat features as a result of changes to stormwater runoff are anticipated.

3.4.3 Summary

A summary of the effects assessment of Alternative Method 3 is summarized below in **Table 3-3**.

Table 3-3. Net Effects Assessment – Alternative Method 3

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Terrestrial Ecosystems	Predicted effects on vegetation communities and species including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None
	Predicted effects on wildlife and wildlife habitat including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• Continued operation of landfill will prolong the attractiveness of the area for avifaunal scavengers.	• Continued implementation of Gull Management Plan using acoustic deterrent devices and a bird of prey.	• Minimal with identified mitigation measures.

Table 3-3. Net Effects Assessment – Alternative Method 3

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Aquatic Ecosystems	Predicted effects on aquatic habitat, including fish habitat	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None
	Predicted effects on aquatic biota including rare, threatened, or endangered species	Key Design Considerations: • Leachate seeps in the On-site and Off-site Study Areas. • Landfill gas production. • Increase in surface water quantity. • Stormwater runoff in the On-site and Off-site Study Areas, and downstream aquatic habitat features. • Noise mitigation will continue as per current operations. • Site development footprint will be within the approved Expansion Landfill footprint. • Landfill operations – bird management will continue as per current operations. Assumptions: • No changes to traffic patterns • No changes to typical equipment used • No changes to operating hours	• None	• None	• None

4 Comparative Evaluation of Net Effects and Identification of the Preferred Alternative

The comparative evaluation of the net effects of each alternative method and the identification of a Preferred Alternative are carried out in accordance with the methods described in **Section 2.2**. The three alternative methods are comparatively assessed and evaluated using the criteria and indicators to determine the Preferred Alternative. The differences in the potential environmental effects remaining following the implementation of potential mitigation/management measures (i.e., net effects) are used to identify and compare each alternative method. The comparative evaluation of the alternative methods for the Ecological Environment is provided in **Table 4-1**, below.

The ecological environmental effects assessment has determined there is no preferred alternative. All three alternatives do not impact any natural heritage features or functions directly. Any indirect impacts are being mitigated and management strategies currently in use at the TCEC will continue through the expansion of the landfill.

Table 4-1. Comparative Evaluation of the Net Effects of the Alternative Methods for the Ecological Environment

Evaluation Criteria	Indicator	Net Effects of Alternative Methods		
		Alternative Method 1	Alternative Method 2	Alternative Method 3
Terrestrial Ecosystems	Predicted effects on vegetation communities and species including rare, threatened, or endangered species	• None **No Substantial Difference**	• None **No Substantial Difference**	• None **No Substantial Difference**
	Predicted effects on wildlife and wildlife habitat including rare, threatened, or endangered species	• Prolonged attractiveness of the area for avifaunal scavengers for an additional 12 years, although overall use of landfill by avifaunal scavengers is low. **No Substantial Difference**	• Prolonged attractiveness of the area for avifaunal scavengers for an additional 12 years, although overall use of landfill by avifaunal scavengers is low. **No Substantial Difference**	• Prolonged attractiveness of the area for avifaunal scavengers for an additional 12 years, although overall use of landfill by avifaunal scavengers is low. **No Substantial Difference**
	Criteria Rating & Rationale	***There is no substantial difference between the Alternative Methods for Terrestrial Ecosystems.*** *No direct impacts to terrestrial ecosystems in the On-site and Off-site Study Areas are anticipated as no vegetation communities and species, wildlife or wildlife habitat (including rare, threatened or endangered species) were identified in the footprint of the Expansion Landfill. Continued operation of landfill will prolong the attractiveness of the area for avifaunal scavengers (potential effect), but with continued implementation of Gull Management Plan using acoustic deterrent devices and a bird of prey (mitigation), there will be minimal net effects. No indirect impacts to terrestrial ecosystems were identified in the On-site and Off-site Study Areas that are not being effectively managed through identified mitigation measures.*		
Aquatic Ecosystems	Predicted effects on aquatic habitat, including fish habitat	• None **No Substantial Difference**	• None **No Substantial Difference**	• None **No Substantial Difference**
	Predicted effects on aquatic biota including rare, threatened, or endangered species	• None **No Substantial Difference**	• None **No Substantial Difference**	• None **No Substantial Difference**

Table 4-1. Comparative Evaluation of the Net Effects of the Alternative Methods for the Ecological Environment

Evaluation Criteria	Indicator	Net Effects of Alternative Methods		
		Alternative Method 1	Alternative Method 2	Alternative Method 3
	Criteria Rating & Rationale	***There is no substantial difference between the Alternative Methods for Aquatic Ecosystems.*** *No direct impacts to aquatic ecosystems in the On-site and Off-site Study Areas are anticipated as no aquatic habitat or aquatic biota (including rare, threatened or endangered species) were identified in the footprint of the Expansion Landfill. No indirect impacts to aquatic ecosystems, or downstream aquatic habitat features, were identified in the On-site and Off-site Study Areas that are not being effectively managed through identified mitigation measures. No net effects on aquatic ecosystems are anticipated for any of the three Alternative Methods.*		
Preferred Alternative: There is no Preferred Alternative for the Ecological Environment.				

5 Effects Assessment of the Preferred Alternative

Based on the comparative evaluation of the net effects of the Alternative Methods conducted in **Section 4**, there is no substantial difference between Alternative Methods for the Ecological Environment and therefore, no Preferred Alternative is identified for the Ecological Environment. The effects of the Project are those identified for Alternative Methods 1, 2, and 3 in **Sections 3.2**, **3.3**, and **3.4** above, summarized as follows:

- No direct impacts to terrestrial ecosystems in the On-site and Off-site Study Areas are anticipated as no vegetation communities and species, wildlife or wildlife habitat (including rare, threatened or endangered species) were identified in the footprint of the Expansion Landfill.
- Only one indirect impact to terrestrial ecosystems, specifically wildlife, was identified in the On-Site and Off-site Study Areas. The continued operation of the landfill will prolong the attractiveness of the area for avifaunal scavengers. However, this can be effectively mitigated through the continued implementation of Gull Management Plan using acoustic deterrent devices and a bird of prey.
- No direct impacts to aquatic ecosystems in the On-site and Off-site Study Areas are anticipated as no aquatic habitat features or aquatic biota (including rare, threatened or endangered species) were identified in the footprint of the Expansion Landfill.
- No indirect impacts to aquatic ecosystems, or downstream aquatic habitat features, were identified in the On-site and Off-site Study Areas that are not being effectively managed through identified mitigation measures.

Due to the presence of adjacent habitat for SAR identified prior to the implementation of the *SCA*, an Information Gathering Form (IGF) was submitted to the MECP on November 20, 2025, regarding the assessment of the potential impacts of the Project on SAR protected under the *Endangered Species Act*, 2007 (*ESA*). The MECP Species at Risk Branch (SARB) determined that the conclusions that neither sections 9 nor 10 of the *ESA* will be contravened for SAR, and therefore authorization is not required, appear reasonable and valid with the following conditions:

- No vegetation/tree clearing is required;
- Project activities are restricted to the footprint of the existing landfill;
- Soil and sediment accumulation from project activities does not spill into adjacent habitats, particularly the FOD9-4 and CUW1 habitats; and
- Contamination into nearby water systems which may contain SAR is filtered or prevented from entering the system.

These conditions are addressed in the effects assessment presented in **Section 3**, above.

The SARB added that, if soil or aggregate material is stockpiled during Project activities, they recommend the installation of temporary reptile exclusion fencing around areas with recently disturbed ground or where soil and aggregate material have been stockpiled. This measure was recommended because Eastern Hog-nosed Snakes are known to utilize loose soil and aggregate for nesting and egg-laying, so temporary exclusion fencing would reduce the risk of accidental mortality of snakes and/or their nests by preventing Eastern Hog-nosed Snakes from accessing these areas, and preventing Project activities from contravening section 9 of the *ESA*.

As noted in **Section 2.1.3**, soil and aggregate material are currently stockpiled on-site. The current excess soil stockpile consists of native fill and is characterized as silty clay. Soil is added to the excess soil stockpile during the construction of each landfill cell, and soil will be removed from the excess soil stockpile to cap cells once they are full of waste materials. The entire site is fully fenced with 6' high wire-woven, paige wire fence. At present, no sediment and erosion control or wildlife exclusion fencing is installed around the site, or around any of the existing stockpiles.

Given the current conditions of the excess soil stockpile, it is not anticipated to be suitable for nesting or overwintering by Eastern Hog-nosed Snake. A site visit was conducted on April 9, 2026 to further review the conditions of existing stockpiles. All stockpiles were confirmed to have a high clay content and were not identified as being suitable for nesting or overwintering by Eastern Hog-nosed Snake. Based on the results of the site visit, NRSI concluded that wildlife exclusion fencing is not required. The MECP confirmed on May 29, 2026, that their comments have been addressed.

6 Comparison of the Preferred Alternative against the ‘Do Nothing’ Alternative

The effects of the Preferred Alternative are compared against the predicted effects of the currently approved Expansion Landfill based on similar environmental criteria and indicators, with the understanding that the criteria and indicators used in the current effects assessment may differ from those used for the effects assessment of the Expansion Landfill. The effects are compared against each other in terms of magnitude, extent, and duration below. The advantages and disadvantages of the Preferred Alternative compared to the ‘Do Nothing’ Alternative are identified.

6.1 Effects of the ‘Do Nothing’ Alternative

The TCEC landfill opened in 1972 and was approved for expansion in 2007. The Warwick Landfill Expansion Environmental Assessment (WM 2005) identified that the landfill would be restored once it was closed. The report recommended planting a

variety of locally indigenous trees and shrubs to increase forest cover and restore an east-west wildlife corridor. It also stated that in the long term, forest cover would be increased from original conditions through the leachate treatment Poplar plantation and aggressive vegetation and restoration plan proposed. The Environmental Screening Report (WM 2017) stated that diverting waste from the Petrolia landfill to the TCEC would reduce the lifespan of the landfill from 2047 to 2034. As such, the Active Landfill or 'Do Nothing' Alternative, would see the Landfill closed by 2034, at which time the restoration plan would be implemented. However, the CDR states that the Active Landfill will close by 2031 (WSP 2026).

The Environmental Impact Assessment completed in 2005 (WM 2005) for a previous expansion that is the current Active Landfill identified only minimal impacts to the natural environment following standard mitigation measures. The only permanent impact was the loss of a small portion of agricultural lands which was determined to not significantly impact the area's agricultural productivity or terrestrial ecosystems as this land was used for agricultural purposes and did not provide habitat for terrestrial or aquatic species.

In terms of the minimal impacts, the removal of a portion of fragmented woodlot was predicted to trigger the invasion of non-native species in addition to the loss of terrestrial habitat and two locally significant vegetation species (WM 2005). However, this was identified as temporary as the mitigation of this included replanting with native species as landfill operations proceed and also upon closure. In addition, spill responses and litter control measures were put in effect to further mitigate any impacts to terrestrial and aquatic ecosystems through contact with waste material. Furthermore, no significant impacts to surface or groundwater were anticipated given the hydraulic trap principle of site design and the surface water management practices proposed and no impacts to aquatic ecosystems were identified (WM 2005).

In 2017, an Environmental Screening Report prepared by WM for the currently approved Active Landfill did not identify any negative environmental effects on the natural environment. The project did not involve any changes to the landfill design, footprint or On-site landfill operations. The transportation of waste would continue along the approved haul routes. No negative impacts to terrestrial or aquatic ecosystems, including vegetation communities, wildlife, wildlife habitat, fish and aquatic habitat or rare, threatened, or endangered species were anticipated as none are present on site (WM 2017).

As identified in the Environmental Screening Report, no negative impacts to terrestrial or aquatic ecosystems, including vegetation communities, wildlife, wildlife habitat, fish and aquatic habitat (or downstream aquatic habitat features) or rare, threatened, or endangered species were anticipated for the current Active Landfill or the 'Do Nothing' Alternative if the Project does not happen (WM 2017). As long as the mitigation measures identified in the 2005 Environmental Impact Assessment continue, then no negative impacts to the ecological environment are anticipated.

6.2 Comparison of the Preferred Alternative against the 'Do Nothing' Alternative

There is no substantial difference between the alternative methods for the Ecological Environment and therefore, there is no Preferred Alternative. Compared to the 'Do Nothing' Alternative, the continued operation of the landfill through one of the proposed alternatives will prolong the attractiveness of the area to avifauna scavengers. It will also prolong the time for the landfill to be closed and the restoration plan to be implemented. The restoration of the capped landfill may include a native meadow community which in turn could provide habitat for wildlife (e.g., grassland birds, insects). The Warwick Landfill Expansion EA (WM 2005) states that the southern portion of the landfill could be planted with a variety of locally indigenous trees and shrubs once the landfill is closed, in order to increase forest cover and restore an east-west wildlife corridor link. The 2005 EA also references "an aggressive vegetation and restoration plan when the landfill is closed" (p. 6-236, WM 2005). If the landfill was not expanded, on-going disturbances through landfill operations (dust, noise, traffic on site) would cease earlier and thereby reduce such disturbances on wildlife earlier than if the landfill operations continued through one of the alternative methods.

However, given that the proposed expansion of the TCEC will prolong the life of an existing landfill that has been in operation for more than 50 years, the terrestrial and aquatic species and habitats surrounding the TCEC have become accustomed to these disturbances.

6.3 Advantages and Disadvantages of the Preferred Alternative

The differences in net effects between the Preferred Alternative (i.e., Alternative Methods 1, 2 and 3) and the 'Do Nothing Alternative' are used to determine the advantages and disadvantages of the Preferred Alternative. The advantages and disadvantages of the Preferred Alternative (i.e., Alternative Methods 1, 2 and 3) are listed in **Table 6-1**.

Table 6-1. Advantages and Disadvantages of the Preferred Alternative

Evaluation Criteria	Advantages	Disadvantages
Terrestrial Ecosystems	• The proposed landfill expansion is restricted to the approved limit of the landfill. There are no anticipated impacts to adjacent vegetation, wildlife and wildlife habitat.	• Prolong the attractiveness of the area to avifauna scavengers for an additional 12 years. • Prolong the time for the naturalization of the land above the landfill.

Table 6-1. Advantages and Disadvantages of the Preferred Alternative

Evaluation Criteria	Advantages	Disadvantages
Aquatic Ecosystems	• The proposed landfill expansion is restricted to the approved limit of the landfill. There are no anticipated impacts to direct aquatic habitat features or biota within both the On-site and Off-site Areas. • On-site surface water controls will mitigate the indirect risks posed to both direct and downstream aquatic habitat features, with no anticipated impacts. • The anticipated change in peak flows will have no impact to the aquatic ecosystems Off-site, or within downstream aquatic habitat features.	• None

7 Commitments and Monitoring

To confirm that the commitments related to the Ecological Environment are carried out, it is recommended that prior commitments to environmental mitigation and monitoring are continued. This includes commitments to manage leachate seeps in the On-site and Off-site Study Areas, LFG production, stormwater runoff in the On-site and Off-site Study Areas, as well as traffic, dust, and noise. It is also recommended that avifaunal scavengers continue to be managed through the implementation of the Gull Management Plan using acoustic deterrent devices as well as a bird of prey.

8 References

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