Walker Environmental Group

Southwestern Landfill Environmental Assessment

Volume I:
Environmental Assessment Report (Draft)

walker environmental

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Environmental Assessment Report

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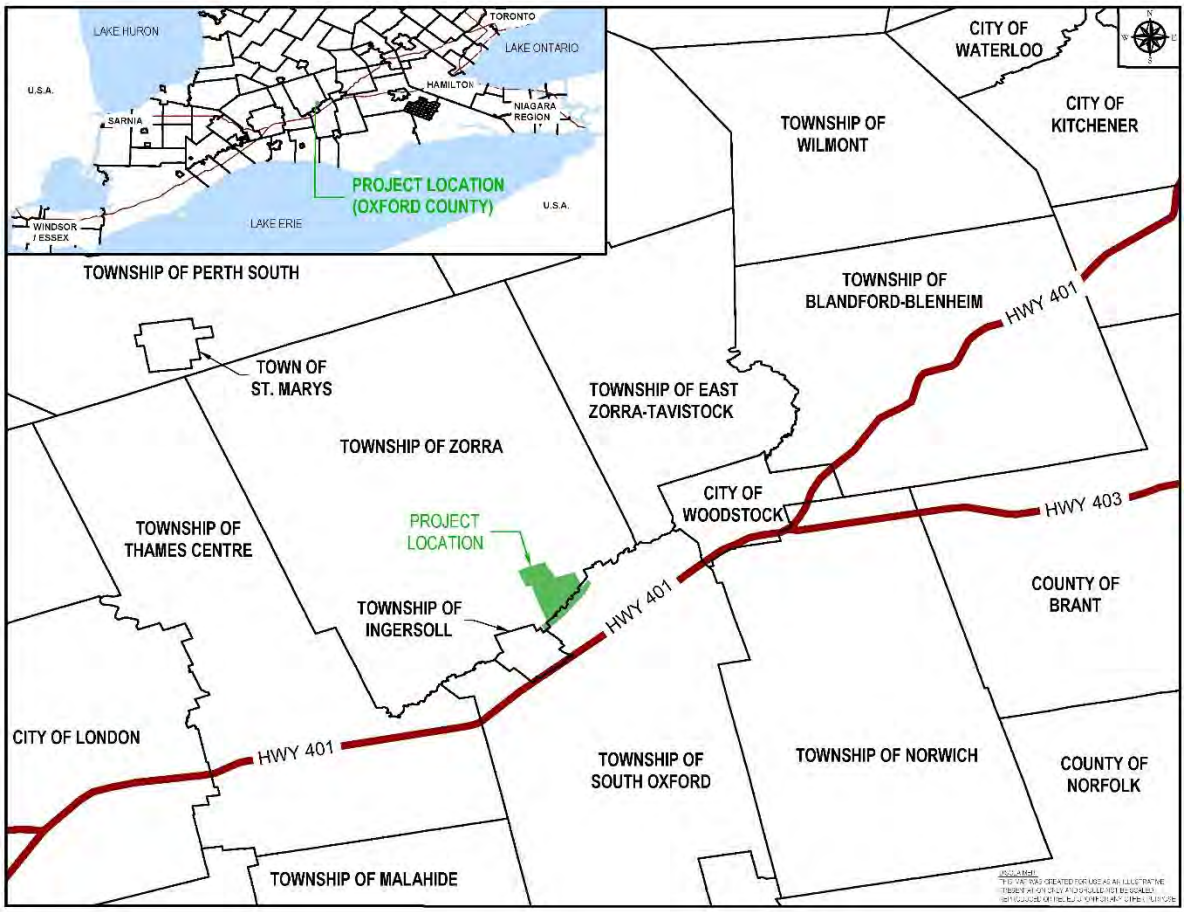
1. Introduction

An Environmental Assessment (EA) has been completed by Walker Environmental Group Inc. (Walker) under Ontario's *Environmental Assessment Act* (*Act*) for the following undertaking: '*provision of future landfill capacity at the Carmeuse Lime (Canada) Ltd. site in Oxford County for solid, non-hazardous waste generated in the Province of Ontario*'. The location is illustrated in **Figure 1-1**.

This document and its appendices together constitute the *Environmental Assessment* prepared and submitted by Walker in accordance with the requirements of sections 6.1(1) and 6.2(1) of the *Act*, and with the requirements set out in the *Approved Amended Terms of Reference* dated May 10, 2016 (**Appendix E**).

This EA also follows the guidance set out in the *Code of Practice – Preparing and Reviewing Environmental Assessments in Ontario* (Ministry of the Environment, 2014). The reader may wish to make reference to the *Code* for an explanation of the Province's EA process and requirements. For convenience, **Appendix A** to this report provides excerpts from the Code's *Glossary*, to assist with environmental assessment terms and concepts that may not be familiar to some readers.

Figure 1-1: Location Map



A series of technical studies have been prepared by independent experts retained by Walker. These studies are indexed and included in **Appendix F** to this EA report.

Extensive consultation was carried out during the course of preparing this EA with government and non-governmental agencies, Indigenous Communities, and interested members of the public. A summary of the consultation is included in **Section 10** of this report, and complete details are contained in **Appendix I.**

2. Identification of the Proponent

The proponent for this EA is Walker Environmental Group Inc. (a subsidiary of Walker Industries Holdings Limited, also referred to more generally as "WEG" or "Walker" in this document). The contact information for Walker is provided below.

Company:	Walker Environmental Group Inc.
Contact:	Darren Fry, A.Sc.T. Director, Strategic Growth
Mailing Address:	160 Carnegie Street Ingersoll, ON N5C 4A8
Phone:	1 (855) 392-5537
Email:	info@walkerea.com

Walker has the knowledge, experience and capability to undertake this EA. It operates numerous resource recovery and waste management facilities throughout Ontario, with its Head Office located in the Regional Municipality of Niagara. In Niagara, where Walker operated for over 130 years, it has established an integrated waste management campus for Ontario industrial, commercial and institutional (IC&I) customers as well as municipally managed wastes from the Regional Municipality of Niagara and other municipalities across Ontario. Walker provides a range of services including:

a) Landfill disposal capacity, currently at the South Landfill, which anchors and supports other parts of an integrated waste management campus.

b) Residential and small business recycling, yard waste and waste drop-off (in partnership with the Regional of Niagara).

c) Composting for residential organic waste (source separated organics) collected by the Region of Niagara and elsewhere in Ontario.

d) Resource recovery where waste wood is diverted from landfill to produce low carbon alternative fuels for Ontario's steel making industry, and shingles are diverted to make sustainable/alternative aggregate products.

e) Landfill gas collection and utilization where the gas is used to heat and power adjacent industries (a now shuttered papermill and more recently GM's Glendale Propulsion Plant) and to generate renewable electricity both for onsite use and to help power Ontario's grid.

f) Haulage for waste, organics and recyclables.

g) Municipal bio-solids stabilization and fertilizer manufacturing, in partnership with the Region of Niagara.

h) Waste and recyclable material(s) transfer which supports municipal waste diversion programs.

i) Post closure monitoring, maintenance and advisor services for closed municipal landfills.

3. Background & Purpose Statement

In its *Approved Amended Terms of Reference* Walker presented its business case for initiating this EA. In summary, key elements of the business case included:

- Recognition that residual (i.e., post-diversion) waste disposal capacity is, and will continue to be, a necessary component of a sustainable provincial waste management system for the foreseeable future.
- There is a dwindling supply of waste disposal sites and capacity in Ontario, with very little replacement capacity approved.
- Southern Ontario currently exports about 3 million tonnes of waste to the US for disposal annually, mainly as a result of insufficient waste disposal capacity within the Province.
- Ontario's waste disposal deficit is forecast to continue or grow over the next several decades even if aggressive provincial waste diversion goals are met.
- The forecasted waste disposal deficit creates an opportunity for a new regional landfill site in southern Ontario to primarily serve businesses and institutions in southern Ontario.
- Walker has the business interest, resources and expertise to develop another waste disposal facility, in addition to its current landfill in the Niagara Region.
- The site currently owned by Carmeuse Lime (Canada) Ltd. ("Carmeuse") for its quarrying and lime manufacturing operations in Oxford County was identified by Walker as potentially suitable based on its location, size, existing industrial use and infrastructure, and other positive attributes.
- Walker negotiated a contractual agreement with Carmeuse for the ownership and development of environmental businesses, including a landfill, on parts of this property.

Based on these, and other business considerations, the problem and opportunity related to this EA were stated as follows:

Problem Statement:

> *The Province of Ontario is projected to have a continuing shortfall of landfill capacity for the next several decades, especially for industrial, commercial and institutional wastes generated in the population centres of central and southwestern Ontario.*

Opportunity Statement:

> *Walker Environmental Group Inc. has the opportunity to develop new waste disposal capacity outside the Region of Niagara. This capacity can be developed concurrently with an existing industrial use on land located in Oxford County, Ontario.*

Walker's analysis of the problems and opportunities resulted in the following purpose statement for the Environmental Assessment:

> ***The provision of future landfill capacity at the Carmeuse Lime (Canada) Ltd. site in Oxford County for solid, non-hazardous waste generated in the Province of Ontario.***

This purpose statement has been confirmed through the EA planning process presented herein, and in consultation with government and non-governmental agencies, Indigenous Communities and interested members of the public.

4. Consistency with the Approved Amended Terms of Reference

As requisite under Section 6.1(1) of the *Act*, this EA has been prepared in accordance with the requirements set out in the *Approved Amended Terms of Reference* **(Appendix E)**.

Table B-1 in **Appendix B** contains a tabular summary of the *Approved Amended Terms of Reference* requirements, along with references to the corresponding location where each of these requirements is addressed in this EA. The table succinctly highlights how this EA has been prepared in accordance with the *Approved Amended Terms of Reference*.

This EA has been prepared following extensive consultation with interested parties, including government and non-governmental agencies, Indigenous Communities and interested members of the public, following the Consultation Plan set out in Section 10.2 of the *Approved Amended Terms of Reference*. The details for the comprehensive consultation program can be found in **Appendix I**.

Section 11 of the *Approved Amended Terms of Reference* allowed for minor adjustments intended to enhance the EA process without altering the overall scope or purpose of the EA, and in consultation with government and non-governmental agencies, Indigenous Communities and interested members of the public. **Table B-2** in **Appendix B** lists certain aspects of the *Approved Amended Terms of Reference* whereby Walker elected to adjust the scope of work during the preparation of the EA to accommodate new circumstances or information, within the overall framework of the *Approved Amended Terms of Reference*, along with the corresponding rationale. Note that most of the adjustments relate to additions to the consultation program.

5. EA Methodology

Draft EA Review Note:

This section (Section 5) is derived directly from the Approved Amended Terms of Reference and the previously published "Work Plan: Cumulative Effects Assessment in the Southwestern Landfill EA" (September 2017). It is provided here for the convenience of readers who were not involved at the earlier stages. The only exception is the study areas map included in Section 5.4, which was updated to reflect results from the studies.

The overall methodology for this EA was set out in the *Approved Amended Terms of Reference*, and was followed in the preparation of this EA. An overview of the key elements is provided here for the benefit of the reader.

5.1 Scope

This EA consists of two major areas of evaluation:

i. An evaluation of certain alternative methods[2] of carrying out the proposed undertaking (i.e., landfill), specifically:
   - Landfill footprint alternatives;
   - Landfill design alternatives;
   - Leachate treatment alternatives;
   - Landfill gas management alternatives; and
   - Haul route/site entrance alternatives.

ii. An assessment of the environmental effects of the proposed undertaking, incorporating the preferred alternatives in each of the above categories.

5.2 Evaluation Methodologies

Sections 8.1 and 8.2 of the *Approved Amended Terms of Reference* set out in detail the methodologies for the evaluation of the alternative methods and the proposed undertaking, respectively. Both are based on the requirements of Section 6.1 (2)(c) and (d) of the *Act* to assess:

- The environment potentially affected;
- The effects that will be caused on the environment;

[2] *Note that extensive evaluation completed during the course of developing the Approved Amended Terms of Reference concluded that there were no alternatives to the proposed undertaking that could reasonably be considered by Walker in this EA (see Section 7.1 of the Approved Amended Terms of Reference along with the associated supporting documents for further details).*

- The actions necessary to prevent, change, mitigate or remedy the effects on the environment; and
- An evaluation of the (net) advantages and disadvantages to the environment.

5.3 EA Criteria

In developing the criteria for this EA, WEG considered the potential effects of its proposed landfill based on the broad definition of the "*environment*" set out in Section 1.(1) of the *Environmental Assessment Act*:

a) Air, land or water;

b) Plant and animal life, including human life;

c) The social, economic and cultural conditions that influence the life of humans or a community;

d) Any building, structure, machine or other device or thing made by humans;

e) Any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities; or,

f) Any part or combination of the foregoing and the interrelationships between any two or more of them.

The resulting master list of EA criteria were developed and established in conjunction with the *Approved Amended Terms of Reference*, and are reproduced here in **Table 5-1**. Taken together, the criteria in **Table 5-1** are intended to fully encompass the range of potential effects that the proposed landfill could have on the environment. The criteria are organized into four broad groups, each of which reflects similar or related environmental effects:

Public Health and Safety:

- The potential for the proposed landfill to affect the health and safety of people within the study areas.

Social and Cultural:

- The potential for the proposed landfill to affect the quality of life of communities within the study areas.

Economics:

- The potential for the proposed landfill to affect the financial or economic interests of people and organizations within the study areas.

Natural Environment & Resources:

- The potential for the proposed landfill to affect the natural environment or the use of natural resources.

The *Definition/Rationale* column in **Table 5-1** indicates what each criterion means, and why it is relevant to include it in the environmental assessment.

Table 5-1: Environmental Assessment Criteria and Studies

☑ Study that will be primarily responsible for addressing criterion. (Many of the studies will provide key input to criteria that will be address through other impact assessment studies.)

	Criteria	Definition/ Rationale	Studies Addressing the Criteria													Study Areas			Duration	
			Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/Landscape	On-Site & Site Vicinity	Along the Haul Routes	Wider Area	Operational Period	Post-Closure Period
	Public Health & Safety																			
1	Explosive hazard due to combustible gas accumulation in confined spaces.	Gas produced within a waste disposal facility (e.g., methane) can move through the ground and accumulate in confined spaces (e.g., manholes, basements, etc.) on or immediately adjacent to the waste disposal facility. There is potential for the gas to combust, creating an explosion and fire hazard.							☑							✓			✓	✓
2	Effects due to exposure to air emissions.	Waste disposal facilities can produce gases containing contaminants that degrade air quality if they are emitted to the atmosphere. Other operations, such as leachate collection facilities, can also produce emissions that could degrade air quality in the vicinity of the site. Air quality in the vicinity of the site should meet regulated air quality standards in order to protect public health.		☑						☑						✓		✓	✓	✓
3	Effects due to fine particulate exposure.	Construction, operation, and truck haulage activities at a waste disposal facility can lead to increased levels of particulate (dust) in the air. Airbourne fine particulate is a health concern in certain size ranges exposure durations.		☑						☑						✓	✓		✓	
4	Effects due to contact with contaminated groundwater or surface water.	Contaminants associated with a waste disposal site have the potential to seep into the groundwater or surface water. This could pose a public health concern if it enters local drinking water supplies, or if it mixes with surface water.							☑	☑						✓			✓	✓
5	Flood hazard.	The construction of a waste disposal facility can disrupt natural surface water drainage patterns, causing a potential for increased flooding.							☑							✓			✓	✓
6	Disease transmission *via* insects or vermin.	Insects and vermin drawn to a waste disposal facility may have the potential to transmit diseases.					☑									✓			✓	✓

☑ Study that will be primarily responsible for addressing criterion. (Many of the studies will provide key input to criteria that will be address through other impact assessment studies.)

	Criteria	Definition/ Rationale	Studies Addressing the Criteria													Study Areas			Duration	
			Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/Landscape	On-Site & Site Vicinity	Along the Haul Routes	Wider Area	Operational Period	Post-Closure Period
Public Health & Safety (continued)																				
7	Potential for traffic collisions.	The risk of traffic collisions may increase along the haul routes to the waste disposal facility. This includes the risk to pedestrian, bicycle and farm machinery.												☑			✓		✓	
8	Aviation impacts due to bird interference.	Birds may be attracted to waste disposal facilities. This can pose a risk of bird strikes on aircraft in the vicinity of the site, especially during take-off and landing altitudes.					☑									✓			✓	
Social and Cultural																				
9	Displacement of residents from houses.	Any residents living on a future waste disposal site will have to relocate, which can cause inconvenience and stress to the residents.											☑			✓			✓	✓
10	Disruption to use and enjoyment of residential properties.	Potential nuisance effects associated with the waste disposal facility operation, or traffic moving to and from the waste disposal facility along the haul route, may disturb the daily activities and uses of residential properties. Disturbances could result from noise, dust, litter, odour, visibility, birds and traffic congestion.											☑			✓	✓		✓	✓
11	Disruption to use and enjoyment of public facilities and institutions.	Potential nuisance effects associated with waste disposal facility operations, or traffic moving to and from the waste disposal facility, may disturb the daily activities at community facilities. Disturbances could result from noise, dust, litter, odour, visibility, birds and traffic congestion.											☑			✓	✓		✓	
12	Disruption to local traffic networks.	Increased traffic volume resulting from a waste disposal facility could disturb the overall traffic flow along the haul routes, and effectively reduce the available road capacity.												☑			✓		✓	
13	Visual impact of the waste disposal facility.	Development and operation of a waste disposal facility can affect the visual appeal of a landscape.													☑	✓			✓	✓

☑ Study that will be primarily responsible for addressing criterion. (Many of the studies will provide key input to criteria that will be address through other impact assessment studies.)

	Criteria	Definition/ Rationale	Studies Addressing the Criteria: Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/Landscape	Study Areas: On-Site & Site Vicinity	Along the Haul Routes	Wider Area	Duration: Operational Period	Post-Closure Period
Social and Cultural (continued)																				
14	Nuisance associated with vermin.	Waste disposal facilities can attract vermin and birds, which can be a nuisance and lead to a decrease in property enjoyment by area residents. Vermin and birds can also be a nuisance to agricultural operations.											☑			✓			✓	
15	Displacement/disturbance of cultural/heritage resources.	Cultural resources (including heritage buildings, cemeteries and cultural landscapes) are an important component of human heritage. These non-renewable cultural resources may be displaced by the construction of a waste disposal facility. The use and enjoyment of cultural resources may also be disturbed by the ongoing operation and traffic. Disturbances could result from noise, dust, odour, visibility, birds, litter and traffic congestion.				☑										✓	✓		✓	✓
16	Effects on land resources, traditional activities or other interests of Aboriginal Communities.	Major new developments of any type may have positive or negative effects on the interests of Aboriginal Communities (i.e., businesses opportunities, joint ventures).											☑					✓	✓	✓
17	Displacement/destruction of archaeological resources.	Archaeological resources are non-renewable cultural resources that can be destroyed by the construction and operation of a waste disposal facility.			☑											✓			✓	
18	Level of public service provided by the waste disposal facility.	The presence of a waste disposal operation within a municipality can provide an increased level of public service (e.g., convenient access to waste disposal services) to local residents and businesses, as well as those in the broader community (ies).						☑										✓	✓	✓
19	Effects on other public services.	The presence of a waste disposal facility may have positive or negative spin-off effects on other public services in the community (e.g., leachate trucking, waste water treatment capacity, if there is discharge to the sewer system).						☑									✓	✓	✓	✓

☑ Study that will be primarily responsible for addressing criterion. (Many of the studies will provide key input to criteria that will be address through other impact assessment studies.)

	Criteria	Definition/ Rationale	Studies Addressing the Criteria: Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/Landscape	Study Areas: On-Site & Site Vicinity	Along the Haul Routes	Wider Area	Duration: Operational Period	Post-Closure Period
Social and Cultural (continued)																				
20	Changes to community character/cohesion.	Community character and cohesion refer to physical characteristics, social stability, attractiveness as a place to live and patterns of social interaction. A waste disposal facility may actually or perceptually interfere with these important community attributes.											☑			✓	✓	✓	✓	✓
21	Compatibility with municipal land use designations and official plans.	A waste disposal facility has the potential to affect the viability of present and future land uses, which may have an effect on planning decisions made in the surrounding community.									☑					✓		✓	✓	✓
Economics																				
22	Displacement/disruption of businesses or farms.	Any on-site businesses or farms would be displaced by a waste disposal facility, and there could be financial losses as a result of relocation. Some types of businesses located in the site vicinity or along the haul routes may suffer financial losses due to the potential nuisance effects or perceived effects associated with the operation of a waste disposal facility such as noise, litter, dust, odour, visibility, birds, vermin and traffic congestion.						☑								✓	✓		✓	
23	Property value impacts.	The establishment and operation of a waste disposal facility may adversely affect property values in the site vicinity or along the haul routes.						☑								✓	✓		✓	✓
24	Direct employment in waste disposal facility construction and operation.	A waste disposal facility may create new employment opportunities both in the construction and day-to-day operation.						☑										✓	✓	
25	Indirect employment in related industries and services.	A waste disposal facility has the potential to have impacts on employment opportunities in local firms supplying products or services directly, or as secondary suppliers.						☑										✓	✓	

☑ Study that will be primarily responsible for addressing criterion. (Many of the studies will provide key input to criteria that will be address through other impact assessment studies.)

	Criteria	Definition/ Rationale	Studies Addressing the Criteria													Study Areas			Duration	
			Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/Landscape	On-Site & Site Vicinity	Along the Haul Routes	Wider Area	Operational Period	Post-Closure Period
Economics (continued)																				
26	New business opportunities related directly to waste disposal facility construction and operation.	A large capital project, such as the construction and operation of a waste disposal facility, can create new opportunities for local businesses supplying products or services.						☑										✓	✓	
27	New business opportunities in related industries and services.	New opportunities may be created for local businesses, or as secondary suppliers to industries working for the waste disposal facility (e.g., restaurants, gas stations, machine shops, repair shops, welding shops, equipment rentals, etc.).						☑										✓	✓	
28	Public costs for indirect liabilities.	Some public services may have to be upgraded to accommodate the establishment and operation of a waste disposal facility (e.g., snow removal, sewer and water connections, etc.).						☑										✓	✓	✓
29	Effects on the municipal tax base.	A waste disposal facility has the potential to affect municipal tax revenues from the site it occupies.						☑										✓	✓	✓
30	Effect on the cost of service to customers.	The costs of constructing a waste disposal facility will affect the price of tipping fees to the site. This affects the cost of service to customers in Oxford County and the province.						☑										✓	✓	
31	Effects on the provincial/ federal tax base.	A waste disposal facility has the potential to affect provincial/federal tax revenues.						☑										✓	✓	✓
Natural Environment & Resources																				
32	Loss/displacement of surface water resources.	Construction of a waste disposal facility may cause the removal of all or part of a natural stream or pond.							☑							✓			✓	
33	Impact on the availability of groundwater supply to wells.	A waste disposal facility can impact the availability of groundwater supply if groundwater is pumped from aquifers or if recharge to aquifers is reduced.							☑							✓			✓	✓
34	Effects on stream baseflow quantity/quality.	The presence of a waste disposal facility has the potential to affect the quality or quantity of baseflow to surface water.							☑							✓			✓	✓

☑ Study that will be primarily responsible for addressing criterion. (Many of the studies will provide key input to criteria that will be address through other impact assessment studies.)

	Criteria	Definition/ Rationale	Studies Addressing the Criteria: Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/Landscape	Study Areas: On-Site & Site Vicinity	Along the Haul Routes	Wider Area	Duration: Operational Period	Post-Closure Period
Natural Environment & Resources (Continued)																				
35	Loss/disturbance of terrestrial ecosystems.	Terrestrial ecosystems refer to the land-based habitats connected through the vegetation cover; their protection and integration maintains and regulates ecological health. Waste disposal facility operations and/or traffic may remove or disturb the functioning of these systems.					☑									✓	✓		✓	
36	Loss/disturbance of aquatic ecosystems.	Aquatic ecosystems refer to the water-based habitats connected through the surface water; their protection and integration maintains and regulates ecological health. Waste disposal facility operations may remove or disturb the functioning of these systems.					☑									✓			✓	
37	Displacement of agricultural land.	The establishment of a waste disposal facility has the potential to displace existing or potential agricultural resources, including the loss of prime agricultural land.	☑													✓			✓	✓
38	Disruption of farm operations.	The establishment and operation of the waste disposal facility may affect agricultural crop or livestock production and related agriculture activities	☑													✓	✓		✓	✓
39	Sterilization of industrial mineral resources.	The establishment of a waste disposal facility may limit the opportunity to extract industrial mineral resources located beneath the site.									☑					✓			✓	✓
40	Displacement of forestry resources.	The establishment of a waste disposal facility may limit the opportunity to utilize forestry resources on or near the site.									☑					✓			✓	✓
41	Loss/disruption of recreational resources.	Waste disposal facility operations and traffic may displace/disrupt existing recreational resources in the area, which could adversely affect the community at large. Disturbances could result from noise, dust, odour, visibility, birds and traffic congestion. Recreational resources include naturalist and interpretive opportunities.											☑			✓	✓		✓	✓

Table 5-1 also identifies the discipline that had primary (lead) responsibility for addressing each criterion through their individual technical studies prepared in support of this EA (**Appendix F**). The lead expert was responsible for coordinating the input from other experts as well as providing information needed by other lead experts.

As an example, consider Criterion #10 – *Disruption to use and enjoyment of residential properties*. Although the Social expert had primary responsibility for reporting on this criterion, it relies on input from a variety of other experts including those studying noise, dust, odour, litter and traffic.

Indicators identify how the potential environmental effects will be gauged or measured for each criterion. Indicators were developed during the course of this EA in consultation with government agencies, Indigenous Communities and interested members of the public. The indicators are discussed and presented in subsequent sections of this EA Report in the context of the effects assessments.

5.4 Study Areas

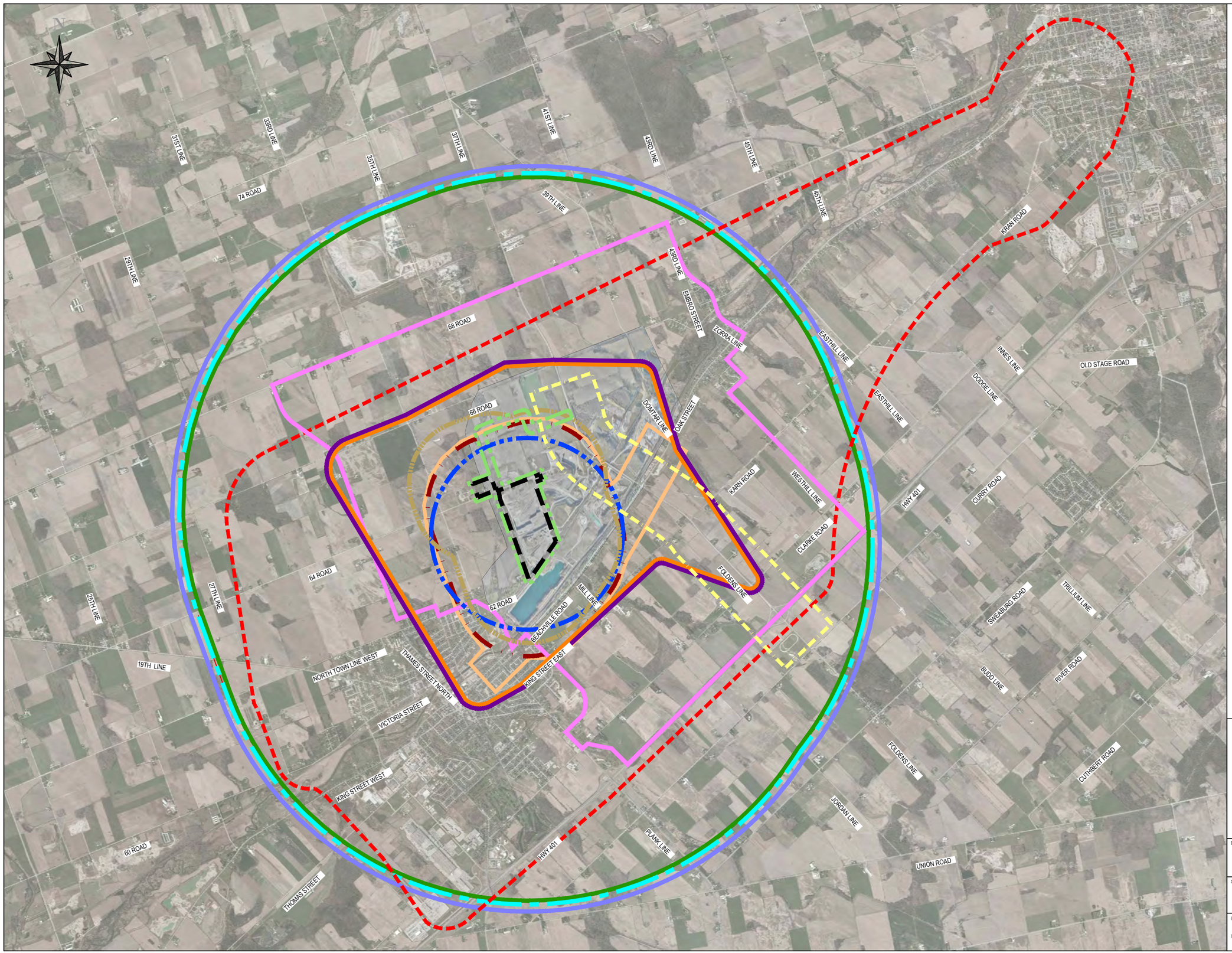
For the purposes of this EA, three general study areas were established in the *Approved Amended Terms of Reference*:

On-Site and in the Site Vicinity:	*On-site* includes the proposed waste disposal facility plus the associated buffer zones. *Site vicinity* is the area immediately adjacent to the waste disposal facility property that is directly affected by the on-site activities. Its size is variable depending on the particular criteria being addressed.
Along the Haul Routes:	The primary route along which the waste disposal facility truck traffic would move between a major provincial highway and the proposed waste disposal facility site entrance, plus the properties directly adjacent to these roads.
Wider Area:	The broader community, generally beyond the immediate site vicinity. Depending on the particular criteria this may include neighbourhoods, local municipalities, Oxford County, or the Province of Ontario.

Columns in **Table 5-1** indicate which of these three general study areas apply to each of the EA criteria.

Although these three general study areas were common across all of the studies, the boundaries were not necessarily identical for every study or criterion; each technical expert identified which of these study areas related to the specific effects being studied and the necessary study boundaries. This flexible approach to the study area boundaries extended throughout the course of the work – the study area boundaries were expanded or contracted as the work progressed to ensure that they adequately reflected the substantive effects of the proposed landfill.

As a result, the final study areas are most comprehensively described in each of the individual technical studies contained in **Appendix F** to this EA. For illustration purposes, though, **Figure 5-1** depicts several of the key *On-Site and in the Site Vicinity*, and *Along the Haul Routes* study areas. (Note: The *Wider Area* study area is not readily depicted on this map since it extends county- or province-wide for some criteria.)



LEGEND:

- PROPOSED LANDFILL SITE AREA
- ARCHEOLOGY AREA
- AIR QUALITY AREA
- LAND USE ASSESSMENT
- SOCIAL & ECONOMIC AREA
- TRAFFIC ASSESSMENT AREA
- ECOLOGY AREA
- CULTURAL HERITAGE AREA
- NOISE AND VIBRATION AREA
- VISUAL IMPACT ASSESSMENT AREA
- AGRICULTURE ASSESSMENT AREA
- HUMAN HEALTH
- GROUND WATER
- SURFACE WATER

NOTE:

REFER TO INDIVIDUAL TECHNICAL REPORTS FOR ADDITIONAL DETAILS ON STUDY AREAS

SOUTHWESTERN LANDFILL PROPOSAL

STUDY AREAS

NOTE: WIDER STUDY AREA NOT DEPICTED - IT EXTENDS REGIONALLY AND PROVINCIALLY

SCALE BAR:

0 1 2 Kilometers

DATE: 15JAN20

DRAWN BY: JThompson

DWG NUMBER: FIGURE 5-1

5.5 Study Durations

The duration (or time frames) in which potential environmental effects could occur was explicitly examined in this EA. Two key periods were evaluated:

Operational Period — The time during which the waste disposal facility is constructed, filled with waste, and capped. These activities are combined since they occur progressively (i.e., overlap) on a cell-by-cell basis, and they have a similar range of potential effects because of things like heavy equipment on site and active landfill operations.

Post-Closure Period — The time after the site is closed to waste receipt and final cover is applied. Activities are normally limited to operation of the leachate and gas control systems, routine property maintenance and monitoring, and thus have a more limited range of potential effects.

Note that in this EA, the *Operational Period* includes the landfill construction as well, since they will be concurrent (i.e., in most years new landfill cells will be under construction at the same time that waste is being placed in other cells).

Columns in **Table 5-1** indicate, for each of the EA criteria, which of these two study durations are applicable.

5.6 Cumulative Effects Assessment

This EA incorporates an assessment of cumulative effects. Cumulative effects assessment is neither explicitly required nor defined under the Ontario *Environmental Assessment Act*, nor is there any specific procedural guidance provided in the associated *Code of Practice*. However, the *Code* does note that the Ministry, under its *Statement of Environmental Values*, will consider cumulative effects on the environment in making decisions (p. 15) and, therefore, proponents are encouraged to provide such information to the Ministry when preparing an EA (p. 16). Furthermore, Amendment #12 to the *Approved Amended Terms of Reference* by the Minister directed Walker to indicate how it would consider cumulative effects in this EA through the development of, and consultation on, a cumulative effects work plan. The final work plan resulting from that process was issued for public review, and is included as **Appendix G** to this EA; following is a brief overview.

The methodology established for the assessment of the proposed undertaking in this EA, set out in Section 8.2 of the *Approved Amended Terms of Reference*, incorporates an assessment of cumulative effects. It was designed from the outset as a fully integrated methodology, as opposed to a separate study or an additional step in the EA process. In that way, the net environmental effects of the proposed undertaking are characterized in the context of their cumulative effects, not in isolation from other types of effects, or other concurrent activities.

Two types of cumulative effects examined in this EA are:

- The effects of the proposed landfill in combination with those from other sources (*multi-source assessment*); and

- The different types of effects that may act together on a single receptor (*multi-stressor assessment*).

The **multi-source assessment** is addressed in this EA by examining effects in combination with those of the environmental baseline conditions, which includes other activities within the same area that could contribute similar effects. For instance, noise generated at the proposed landfill will be compared to, and combined with, other baseline sources of noise in the same area such as the ongoing quarrying and lime processing plants, other industries, road traffic, rail traffic, *etc*.

In addition, this EA goes a step further and forecasts the future baseline conditions (i.e., continued and new development in the surrounding area), so that the future cumulative effects can also be considered. To continue the noise example above – what would the combined noise effects be from the landfill and other sources in ten years, when the landfill is half full? In twenty years when the landfill is almost full? Beyond that when the landfill is closed?

The **multi-stressor assessment** examines the situation where different types of effects act together on a single receptor. For instance, could the combined effects of some noise, dust, litter, odour, and traffic at a certain location result in a substantive effect, even though these effects might individually meet acceptable standards?

The criteria for this EA (**Table 5-1**) were designed from the outset to describe multi-stressor effects, i.e., the range of effects that could be experienced at receptors, notwithstanding the fact that they may cross over two or more study disciplines. As an example:

Criteria		Definition/Rationale
41	Loss/disruption of recreational resources.	Waste disposal facility operations and traffic may displace/disrupt existing recreational resources in the area, which could adversely affect the community at large. Disturbances could result from noise, dust, odour, visibility, birds and traffic congestion. Recreational resources include naturalist and interpretive opportunities.

Note in **Table 5-1** that the social, economic and health studies are broad integrators of the other studies, since the criteria assigned to them tend to be many of the multi-stressor variety. In particular, the social criteria for this EA are structured to address such cumulative effect factors as property enjoyment, community cohesion and community character.

6. Evaluation of Alternatives

Draft EA Review Note:

This section (Section 6) was previously published and distributed for consultation on January 3, 2017 titled "Alternative Methods Interim Report, Southwestern Landfill Proposal", following public workshops held in late 2016. Comments were received from government agencies, municipal peer review, interested members of the public and Indigenous Communities. Revisions have been incorporated into this section based on that input and are highlighted in the text.

6.1 Range of Alternatives

Section 7 of the *Approved Amended Terms of Reference* established the following range of candidate 'alternative methods' for carrying out the proposed undertaking to be evaluated further in this EA:

Table 6-1: Range of Alternative Methods to be Considered in the EA

'Alternative Methods' Candidates	Description	Rationale
Landfill Footprint	Different locations or configurations on the Carmeuse Lime (Canada) site where the landfill could be located and developed.	The Carmeuse landholdings in Oxford County are extensive; there may be one or more alternative locations on these properties where the proposed landfill could be developed.
Landfill Design Alternatives	Different landfill configurations (above ground, below ground or a combination) along with compatible liner designs (generic or site-specific, as *per* the Landfill Standards).	The size and shape of the existing quarry may offer several possible designs for the landfill and liner system that are capable of meeting the requirements of O. Reg. 232/98 (Landfill Standards).
Leachate Treatment Alternatives	Different ways of treating and disposing of landfill leachate, including sewer discharge and/or on-site treatment.	The location of this site in proximity to serviced urban lands and receiving streams may offer one or more feasible alternatives for the treatment of landfill leachate.
Landfill Gas Management Alternatives	Different ways of managing the landfill gas, including flaring, industrial fuel, and/or power generation.	The location of this site in proximity to industries and the power grid may present one or more feasible alternatives for management of the landfill gases.
Haul Route/Site Entrance Alternatives	Different ways for the waste to be transported to the site, including road routes/entrances from Highway 401 and/or rail haulage.	The location and configuration of this site in proximity to existing highways and two railways may offer one or more feasible alternatives for haul route(s) and entrance(s).

The *Approved Amended Terms of Reference* also specified that during the EA, Walker would establish and evaluate specific alternatives within each of these five categories, in consultation with government agencies, Indigenous Communities and interested members of the public.

6.2 Evaluation Methodology

Section 8.1 of the *Approved Amended Terms of Reference* specifies the following comparative evaluation methodology for the evaluation of each set of alternative methods in the EA:

1. Prepare a ***description*** of, and ***rationale*** for, the alternative methods.
    - *Develop a list of reasonable alternative methods within the overall categories listed in Section 7.2 of the Terms of Reference.*
    - *"Reasonable" alternatives will be based on the guidance provided in the Ministry's Code of Practice (p. 16-17).*
    - *Describe each of the alternatives in terms of its basic design and operations concept, in sufficient detail to permit the comparative evaluation and including the typical or normal mitigation measures that would be incorporated.*
    - *Prepare a rationale for each of the alternatives explaining why it is included in the evaluation.*

2. Evaluate the alternatives against the following feasibility screening criteria:
    a) Must be consistent with the stated purpose of the environmental assessment.
    b) Must be reasonably capable of approval pursuant to the statutes of Ontario and Canada.
    c) Must be technically feasible and proven technology
    d) Must be commercially viable.

    This initial analysis will result in the identification of a "short list" of remaining feasible alternatives for further evaluation, and the elimination of those alternatives which do not meet the requirements of the feasibility screening criteria.
    - *These screening criteria represent basic, minimum requirements for an alternative to be considered feasible for WEG to implement. They are a subset of the criteria presented in the Code of Practice (p. 16-17).*
    - *An alternative failing to pass any one of the feasibility screening criteria will be eliminated from further consideration; WEG does not propose to carry forward any alternatives that are not fundamentally feasible.*
    - *Document the evaluation and rationale for the screening.*

3. Evaluate each of the environmental assessment criteria listed in **Appendix B** [to the ToR] against the following screening criteria:
    a) must apply to, and be relevant to, the effects that might be caused by the short list of alternatives;

b) must allow for a meaningful differentiation in environmental effects between the short list of alternatives.

This analysis will result in the establishment of a "short list" of comparative evaluation criteria.

- *Prepare a set of tables listing each of the EA criteria, along with an analysis of whether each criterion applies to the comparison of these alternatives, and will differentiate the alternatives.*
- *Based on that analysis, indicate in the tables which criteria are screened out and which are retained for use in the comparative evaluation.*

4. Prepare a description of the ***environment potentially affected*** by each of the short list alternatives.
   - *Prepare a description of the environment potentially affected within each of the related study areas, including figures and maps where appropriate.*
   - *The environmental description will be related to the specific short-listed criteria retained for the evaluation (see Step 3).*

5. Develop comparative evaluation indicators for each of the short list of comparative evaluation criteria.
   - *For each criterion retained for the comparative evaluation, develop one or more indicators that can be used to measure or describe the net effects of the alternatives relative to one another.*
   - *For example (only): For the criterion "Disruption of Farm Operations", a comparison of different haul route alternatives could use the indicator "Number of field entrances along the haul route".*

6. Describe the ***net effects*** on the environment for each alternative relative to the other short list alternatives, taking into account reasonable ***mitigation*** methods.
   - *Prepare an evaluation matrix (table) listing the short-list of comparative evaluation criteria and indicators against the short-list of alternative methods.*
   - *For each criterion and indicator, and for each relevant study area and study duration, measure and/or describe the net effects on the environment for each alternative method, relative to the other alternatives.*
   - *Prepare a commentary on whether any further mitigation measures incorporated into the design and operations would significantly alter the relative net effects.*

7. Evaluate the ***advantages and disadvantages to the environment*** for each of the short list of alternatives, and prepare a rationale for the preferred alternative(s).
   - *Prepare a qualitative analysis summarizing and weighing the relative positive and negative net effects (advantages and disadvantages to the environment) for each of the alternative methods.*
   - *Document the rationale for the preferred alternative based on the balance of advantages and disadvantages to the environment.*

6.3 Landfill Footprint Alternatives

This section identifies and evaluates possible alternative locations where the proposed landfill could be located on the Carmeuse Lime (Canada) Ltd. landholdings at its Beachville operation, which are the subject lands for the purposes of this EA (**Figure 6-1**). The objective is to select a preferred footprint location for further, detailed study in the EA.

6.3.1 Rationale for the Footprint Alternatives

6.3.1.1 General Regulatory & Design Considerations

For the purposes of this section, "landfill footprint" refers to the combination of the following, as defined in Regulation 232/98:

- *waste fill area – area on the surface of the landfilling site beneath which or above which waste is disposed of by landfilling*; and
- *buffer area – that part of a landfilling site that is not waste fill area.*

Section 4.2 of the Landfill Standards under O. Reg. 232/98 notes that the buffer area "*provides space around the perimeter of the waste area in which various monitoring, maintenance and environmental control activities can take place*". Therefore, it is expected that many of the ancillary services required for the landfill would be located in the buffer area, although it is also possible that other related activities could occur outside of the buffer area – additional environmental monitoring or road sweeping would be typical examples.

Supporting Document No. 3, Attachment No. 3, p. 3 to the *Approved Amended Terms of Reference* included an estimate that the minimum landfill footprint size necessary for this site was 53 ha. Therefore, as shown in **Figure 6-2**, the Carmeuse property was sectioned into five major blocks of land of at least 53 ha in size[3], representing functionally different landfill footprint alternatives. Also shown for reference in **Figure 6-2**, Detail A, is a visual depiction of 53 ha, although not necessarily of the same shape that would suit every land parcel. It should be noted that the land within each of these blocks has similar characteristics or functions (as described below), but they are not necessarily all the same size and, in fact, some of them are potentially large enough to accommodate more than one possible landfill design configuration.

The following sections describe the resulting "long list" of potential landfill footprint alternatives.

6.3.1 Description of the Landfill Footprint Alternatives

6.3.1.1 Landfill Footprint Alternative 1: Greenfield/Future Quarry Lands

These are the portions of Carmeuse's landholdings that have not yet been significantly disturbed by quarry or lime manufacturing operations. As can be seen in **Figure 6-2**, they consist largely of farm fields, hedgerows and a few remnant woodlots. Most of these lands south of Line 66, both east and

[3] *i.e., excluding the small residential lots south of the Thames River and a railway right-of-way west of 35th Line Road.*

SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

FIGURE 6-1

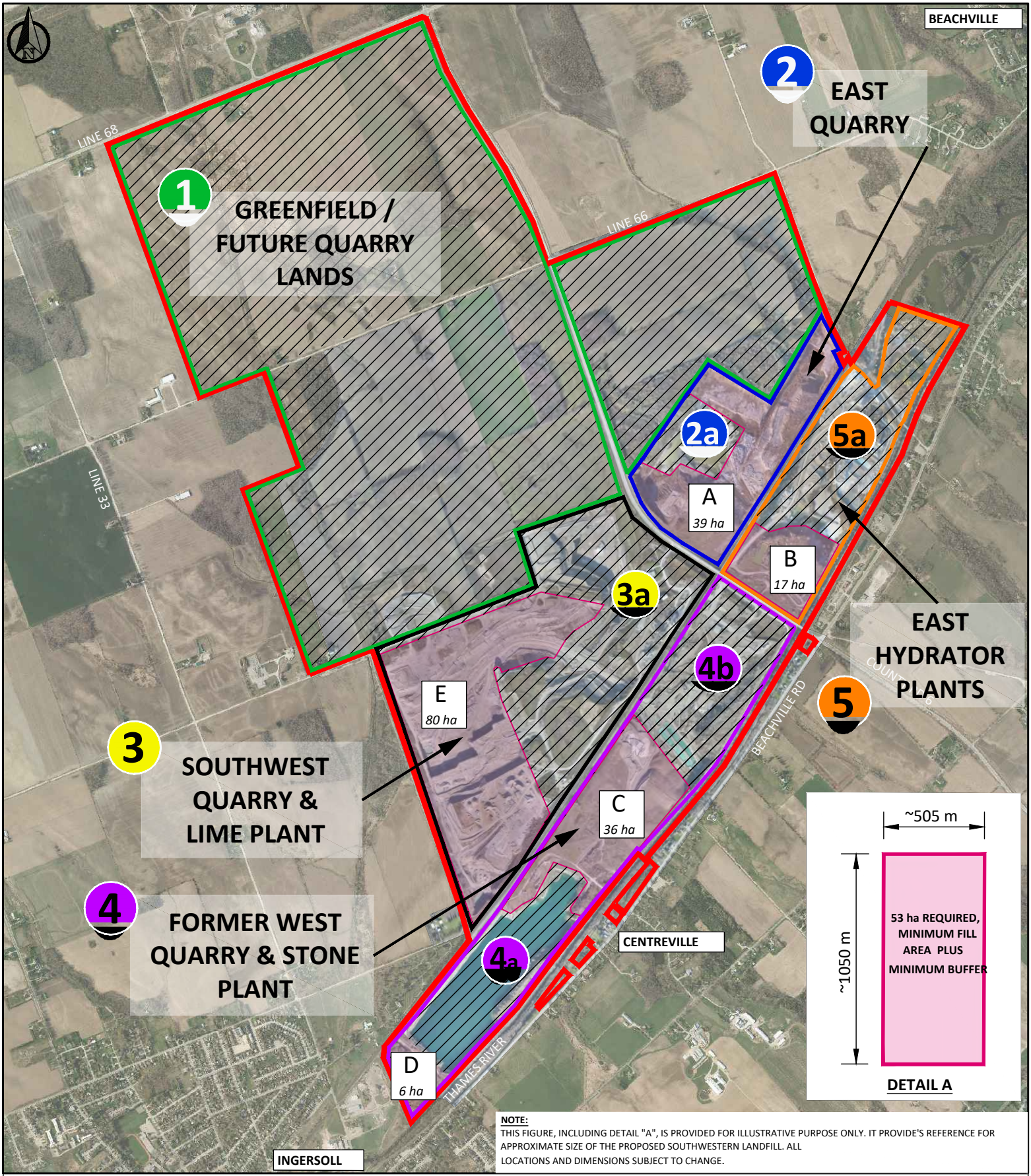
CARMEUSE LIME CANADA LTD BEACHVILLE OPERATIONS LANDHOLDINGS

LEGEND:

CARMEUSE LIME HOLDINGS

0 500 1000 Meters

walker environmental



SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

FIGURE 6-2

LANDFILL FOOTPRINT ALTERNATIVES & PHYSICAL CONSTRAINTS

LEGEND:

- CARMEUSE LIME LANDHOLDINGS
- CONSTRAINED AREAS
- UNCONSTRAINED AREAS

walker environmental

west of County Road 6, are currently licenced under the *Aggregate Resources Act* for quarrying[4]. The remaining portions are owned by Carmeuse for future limestone reserves.

6.3.1.2 Landfill Footprint Alternative 2: East Quarry

The East Quarry is a portion of Carmeuse's landholding where overburden stripping and limestone quarrying has taken place historically (under prior ownership of Domtar Canada), but is not recently or currently active. It is licenced under the *Aggregate Resources Act*, part of Licence No. 2130. Some parts of the East Quarry have been partially backfilled and progressively rehabilitated, while other faces of the quarry remain open and accessible for future continued quarry operations (**Figure 6-2**).

6.3.1.3 Landfill Footprint Alternative 3: Southwest Quarry & Lime Plant

The Southwest Quarry & Lime Plant area consists of the portion of Carmeuse's landholding where active quarry operations are now ongoing in parts of *Aggregate Resources Act* Licence Nos. 2129 & 2136. The lands represented here are in various stages of clearing, overburden stripping, quarrying, and progressive rehabilitation (backfilling), as is evident in **Figure 6-2**. Also included in the southeastern corner of this parcel of land is the lime processing plant and the main site office.

6.3.1.4 Landfill Footprint Alternative 4: Former West Quarry & Stone Plant

This alternative footprint option is bounded to the south by a channelized reach of the Thames River and Ontario Southland Railway right-of-way, and to the north by a double-track Canadian National rail line right-of-way[5] (see **Figure 6-2**).

The Former West Quarry is a portion of Carmeuse's landholding (part of *Aggregate Resources Act* Licence No. 2136) where overburden stripping and limestone quarrying took place historically and is now completed. Final rehabilitation is completed on this part of the property in accordance with recent approvals that will retain the flooded portion of the quarry, complimented by naturalization of the shoreline and areas to the east.

To the east of the Former West Quarry is a portion of *Aggregate Resources Act* Licence No. 2129 which currently houses the stone processing (pulverizing) plant, along with ancillary functions such as stockpiling, shipping, offices, etc.

6.3.1.5 Landfill Footprint Alternative 5: East Hydrator Plants

A lime hydrator plant, which includes two hydrators, occupies a portion of the Carmeuse property which was once quarried, then partially backfilled and rehabilitated. This property also hosts a maintenance shop and several storm water management ponds. The east end of the property has been re-naturalized with vegetation and trails.

[4] *Portions of ARA Licence Nos. 2129; 2130 & 2136 (Ministry of Natural Resources, Pits and Quarries Online database).*
[5] *Relocating the rail right-of-way is not considered feasible for a variety of reasons, including physical constraints and financial cost.*

6.3.2 Feasibility Screening

In accordance with the methodology prescribed in the *Approved Amended Terms of Reference*, the following feasibility screening criteria were applied to each of these candidate landfill footprint alternatives:

a) Must be consistent with the stated purpose of the environmental assessment.

b) Must be reasonably capable of approval pursuant to the statutes of Ontario and Canada.

c) Must be technically feasible and proven technology.

d) Must be commercially viable.

The objective of the initial screening is to eliminate alternatives from further consideration that are clearly not fundamentally feasible for Walker to carry forward for further analysis. That is, a "*fail*" on any one of these screening criteria will be based on sufficient information to be certain that the alternative is not feasible. Alternatives that are not screened out at this stage will be carried forward to the next step in the assessment for further, more detailed evaluation.

Table 6-2 below summarizes the results of the screening analysis for the five potential landfill footprint alternatives described above, while a further rationale for each alternative that is screened out follows in the sections below.

Table 6-2: Summary – Screening of Alternative Landfill Footprints

Feasibility Screening Criteria[6]	1. Greenfield/ Future Quarry Lands	2. East Quarry	3. Southwest Quarry & Lime Plant	4. Former West Quarry & Stone Plant	5. East Hydrator Plants
Consistent with the stated purpose of the environmental assessment.					
Reasonably capable of approval pursuant to the statutes of Ontario and Canada.	✘ Not consistent with PPS 2.5.2.	✘ Prohibited by EPA S.27(3).		✘ Prohibited by EPA S.27(3).	
Technically feasible and proven technology.					
Commercially viable.	✘ Sterilize high-value aggregate reserves/ resources.			✘ Cost prohibitive to relocate stone processing plant.	✘ Cost prohibitive to relocate hydrators & maintenance facilities.
Conclusion	**Not feasible - screen out from further consideration**	**Not feasible - screen out from further consideration**	**Potentially feasible – carry forward for further evaluation**	**Not feasible - screen out from further consideration**	**Not feasible - screen out from further consideration**

[6] *Approved Amended Terms of Reference,* p. 29; based on *Code of Practice, Preparing and Reviewing Terms of Reference for Environmental Assessments in Ontario , Ontario Ministry of the Environment, January 2014,* p. 32.

6.3.2.1 Screening Rationale - Landfill Footprint Alternative 1: Greenfield/Future Quarry Lands

All of the presently undisturbed lands owned by Carmeuse at this location are either limestone reserves already licenced for aggregate extraction (i.e., mainly south of Line 66), or future resources that are intended to be licenced (mainly north of Line 66).

These lands have been designated as "*Quarry Area*" in the County of Oxford Official Plan, described as follows in Section 3.4.1.2 of the Plan:

> *Lands designated on Schedules Z-1 and S-1, as Quarry Area are those lands associated with the high purity calcium limestone resource which may be proposed for quarry extraction during the lifespan of this Plan. Lands designated Quarry Area include the existing licensed areas as well as land which may be required for new licenses.*

The Official Plan notes that these policies and designations have been formulated with regard for the *Provincial Policy Statements (PPS)*. Section 2.5.2 of the *PPS* (2014) directs that the long-term supply of mineral aggregates should be protected for future use, and discourages land uses which would "sterilize" these resources from future extraction. A landfill site in this location would effectively sterilize the resources, since it is unlikely and unreasonable that a modern landfill, once constructed, would be excavated and relocated to a new location to permit quarrying beneath. It is also not feasible for the quarry owner to quarry the rock in this location in sufficient time for the proposed landfill to be built here (even if the mining plan were altered to start stripping this area immediately, the mining operation would progress more slowly than the need for landfill construction).

Section 2.5.2.5(b) of the PPS does allow an exception where "*the proposed land use or development serves a greater long-term public interest*". However, Walker believes that it would be unable to conclusively demonstrate that landfill footprint Option 1 is in the greater long-term public interest, as it specifically relates to PPS Section 2.5.2.5(b), given that:

- The high-purity calcium limestone at this location is a resource that is only accessible in limited locations in Ontario; and
- There is an opportunity to avoid sterilizing the resource by utilizing adjacent portions of the land where the high-purity calcium limestone has already been removed.

Even if the sterilization of the bedrock resources was allowed under the PPS and associated Official Plan policies, it would still not be commercially viable for the quarry owner to abandon licenced reserves or planned future resources, and/or to easily replace them with equivalent reserves of similar quality elsewhere, given the infrastructure and processing plant investment already in place at this location, coupled with the potential impacts of a new quarry location (e.g., displacing agricultural land elsewhere). Similarly, it would not be commercially viable for Walker to acquire the property from quarry owner at the combined cost of the land, plus the value of the un-extracted aggregate reserves, plus the cost of relocating the existing lime processing infrastructure.

For these reasons, the Greenfield/Future Quarry Lands are screened out from further consideration as a potential footprint location in this EA.

6.3.2.2 Screening Rationale - Landfill Footprint Alternative 2: East Quarry

Section 27. (3.1) of the *Environmental Protection Act* prohibits the establishment and operation of a waste disposal site where waste is deposited in a lake. Under the definitions in clause 3.2 of the same section, the body of water contained in the East Quarry (labeled as 2a in **Figure 6-2**) constitutes a "lake" for this purpose. The water body occupies the central floor of the quarry, leaving only about 39 ha of unconstrained land around the "lake", which is not sufficient to develop a landfill at this location.

Therefore, the East Quarry is screened out from further consideration as a potential footprint location in this EA since it is not reasonably capable of being approved as a landfill under Ontario statute.

It should also be noted that, although not used as a basis for screening, there are other significant constraints to this location. The quarry owner intends to continue mining here at some point in the future, progressing from the East Quarry into the licenced land to the immediate north. It may not be possible to design and construct a landfill of the proposed size in this quarry without using the entire quarry plus some of the surrounding land, which would likely prevent the quarry owner from carrying out its mining plan and sterilizing some of its aggregate reserves (i.e., they may have to start mining somewhat further north of the existing quarry to leave a buffer to the landfill).

6.3.2.3 Screening Rationale - Landfill Footprint Alternative 4: Former West Quarry & Stone Plant

Section 27. (3.1) of the *Environmental Protection Act* prohibits the establishment and operation of a waste disposal site where waste is deposited in a lake. Under the definitions in clause 3.2 of the same section, the body of water contained in the Former West Quarry (labeled 4a in **Figure 6-2**) constitutes a "lake" for this purpose. Therefore, the water-filled western half of this block of land is constrained from any further consideration as a potential footprint location.

It should also be noted that the quarry operator has recently amended its *Aggregate Resources Act* licence and site plans, in consultation with the (then) Ministry of the Environment & Climate Change, Ministry of Natural Resources and Forestry, and other agencies, to allow the water body to remain in this former quarry and be incorporated into its rehabilitation. As a result, there would be little merit at this point in considering draining the former quarry for landfill construction and operation even if it was permitted.

The eastern half of this block of land currently hosts the quarry operator's stone pulverizing plant and its ancillary infrastructure and offices (labeled as 4b in **Figure 6-2**). These represent a major capital investment for the quarry operator. For the immediate future these facilities are ideally situated for the quarry operations, and it would not be practical or commercially viable for the quarry operator to relocate all of this existing infrastructure elsewhere. Therefore, the east half of this block is also constrained from further consideration as a potential footprint location in this EA.

The balance of the unconstrained land between the former quarry and the plant amounts to approximately 36 ha, which is not large enough for the proposed landfill. Therefore, this landfill footprint alternative is screened out from further consideration in the EA.

6.3.2.4 Screening Rationale - Landfill Footprint Alternative 5: East Hydrator Plants

The quarry operator has advised that it is not economically or operationally feasible at this time to relocate the hydrator, maintenance shops, storm water management facilities and their associated infrastructure (labeled as 5a in **Figure 6-2**), and so this site is screened out since the remaining, unconstrained portion is not large enough for the proposed landfill at about 17 ha.

Regardless, it should also be noted that this entire block of land is only marginally large enough to meet the 53 ha minimum size requirement for a landfill set out in the *Approved Amended Terms of Reference*, and its long, rectangular shape would make its effective size too small in any event[7] given the limitations imposed by side slopes and other engineering requirements.

6.3.3 Preferred Landfill Footprint Alternative

Based on the screening assessment of possible alternative footprint locations on the quarry operator's property, as detailed in the previous sections, there is only one feasible landfill footprint that can reasonably be considered by Walker in this EA – the Southwest Quarry area. Although this area also contains some physical constraints (labeled 3a in **Figure 6-2**, and detailed further below), there is about 80 ha of unconstrained land available, which is of a sufficient size for the proposed landfill. Since this is the only feasible alternative remaining following the initial screening analysis, no comparative evaluation is necessary, and the Southwest Quarry Area will be carried forward as the preferred landfill footprint location for more detailed assessment in the EA.

6.3.4 Input from Stakeholder Consultation

During the development and assessment of the alternative methods, consultation was undertaken with Indigenous Communities, various interested members of the public and local government agencies, through the Community Liaison Committee as well as a series of public events consisting of an open house and workshops. The following is a brief summary of some of the key input received regarding the landfill footprint alternatives, and its influence on the assessment. More extensive details can be found in Section 10 of this document, and the associated consultation appendices.

Table 6-3: Summary of Stakeholder Input on Landfill Footprint Alternatives

Input	Considerations
Maximize distance from residences, town centres, and the Thames River.	A preferred footprint was selected that is substantially larger than the required waste fill area. This leaves some possibility at the design stage to further increase the buffer area along the southern boundary, and maximize the separation from Beachville Road and the Thames River.
Concern regarding potential impacts on groundwater or surface water.	The detailed studies to be carried out during the Impact Assessment phase of the EA will include ground and surface water. The potential for impacts will be reported, as well as plans for mitigation, monitoring and contingency.

[7] *The 53 ha minimum size is based on an idealized square shape, which is more volume efficient; see Supporting Document No.3, Attachment No.3 to the Approved Amended Terms of Reference.*

Input	Considerations
Potential for flooding of the landfill due to the location within the natural flood plain of the Thames River. (1937 flood as example.)	Walker confirmed that the preferred footprint is located outside of the 1937 Thames River Flood area (worst on record), and that further flood control systems have been implemented on the Thames since that time. Nevertheless, the potential for flooding (incorporating climate change projections) will be further evaluated as part of the detailed impact assessment and flood control measures will be incorporated into the design of the site, as required under the regulations and in consultation with the Upper Thames River Conservation Authority.
Reassess Greenfield/Future Quarry Lands designated as mineral resource (Option 1) for landfill development.	Walker reassessed its initial screening of the Greenfield/Future Quarry alternative and added further rationale and support regarding County mineral resource policies and the economic constraints, all of which was discussed with stakeholders.
First draft of the Landfill Footprint Alternatives map outlining the footprint was difficult to understand.	Walker amended the map to include key constraints and the minimum area required for the landfill. The updated map has been included here as **Figure 6-2**.

6.4 Landfill Design Alternatives

The previous section identified the Southwest Quarry Area as the preferred footprint location on the Carmeuse property for the proposed landfill. This section focuses on functionally different ways that a landfill could be designed and configured within the preferred footprint, with the objective of selecting a preferred design concept for further, detailed evaluation in the EA.

6.4.1 Rationale for the Landfill Design Alternatives

6.4.1.1 Physical Constraints

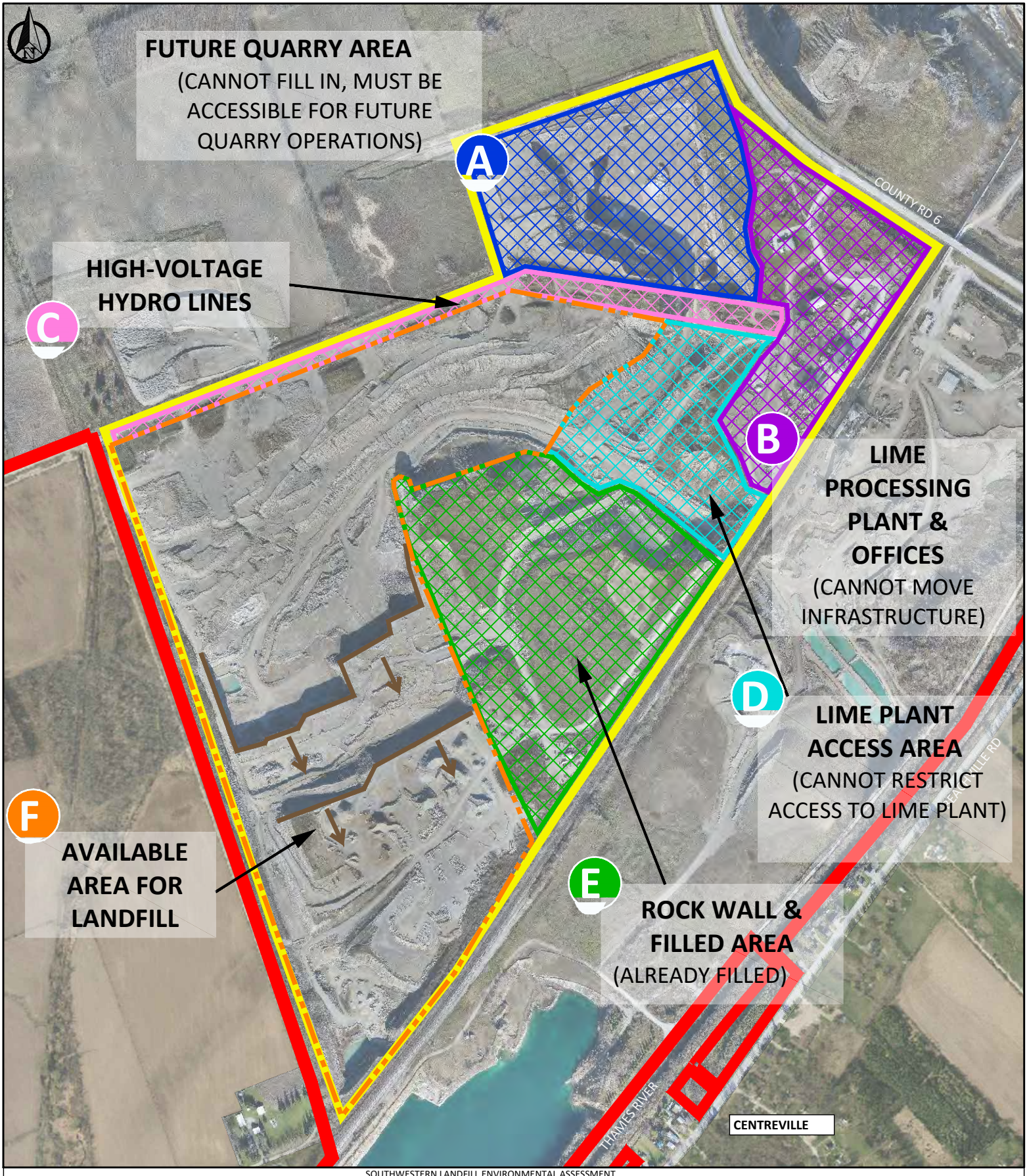
Within the Southwest Quarry Area footprint there are several physical constraints that must be accommodated when developing design concepts for the landfill. These are illustrated in **Figure 6-3** and discussed below.

Lime Processing Plant & Offices

As mentioned previously, the main office, lime processing plant, access roads and other related infrastructure in the eastern corner of this block of land (**Figure 6-3**, Area “B”) are existing and future constraints that must be avoided by the landfill development.

Fill and Rock Wall

There is an area along the central southern boundary of the Southwest Quarry Area where a rock “wall” was left behind during the historical mining operations and in accordance with quarry license limits at the time, to support rehabilitation of lands to the east (see **Figure 6-3**, Area “E”). The quarry operator



SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

FIGURE 6-3

SOUTHWEST QUARRY AREA FOOTPRINT PHYSICAL CONSTRAINTS

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LEGEND:

- CARMEUSE LIME LANDHOLDINGS
- ACTIVE QUARRY MINING DIRECTION
- AVAILABLE AREA FOR LANDFILL

0 250 500 Meters

requires that this rock wall be maintained in order to mine the current resource to the west. This rock "wall" would not be economically feasible for Walker to remove as it supports the rehabilitated lands to the east. It can serve as a stable berm against which the landfill can be constructed, otherwise Walker would have to re-build a berm in this area to support the landfill anyway.

Hydro Corridor

A high-voltage electricity (hydro) transmission corridor crosses the northern edge of the site (**Figure 6-3,** Area "C"). Since it is not feasible to relocate it, the quarry operator has instead quarried through a narrow gap between two towers (the "slot") in order to access their next phase of mining to the north. The rest of the corridor remains intact.

Future Quarry Area & Lime Plant Access

The quarry operator is continuing to quarry limestone from the southwestern portion of the Southwest Quarry Area. **Figure 6-3** shows the approximate location of the current quarry faces, which will continue to move southward over the next several years until the southern limit of this quarry licence is reached. In order to ensure that the landfill does not impinge on these mining operations, Walker will need to design the landfill such that it commences in the northwestern corner of the Southwest Quarry Area, and progresses south and east from there.

Then, mining will move into a new phase further north, the start of which is shown as the *Future Quarry Area* in **Figure 6-3** (Area "A"), and continue north and west from there, on the north side of the Line 64 road allowance. During these future mining operations, rock will be hauled back through the "slot" between the hydro corridors to the processing plant. As a result, the landfill cannot block this access route, marked Area "D" in **Figure 6-3**.

Summary – Available Area

Excluding all of these physical constraints, the remaining area in the Southwest Quarry Area footprint that is potentially available for landfilling is illustrated as Area "F" in **Figure 6-3**, amounting to approximately 80 ha.

6.4.1.2 Regulatory & Design Requirements

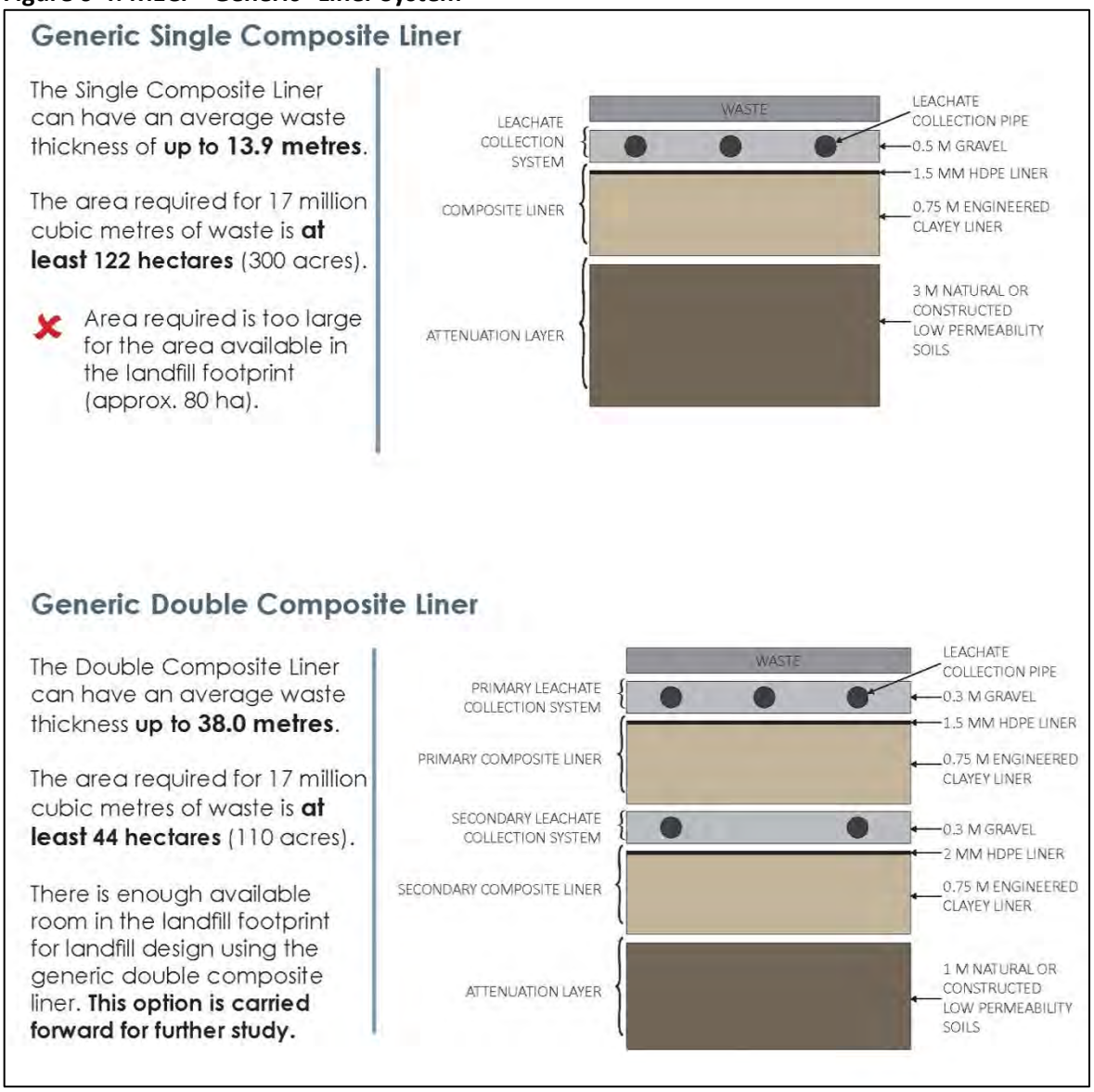
The configuration and design of the proposed landfill is dictated by the requirements of Ontario Regulation 232/98 under the *Environmental Protection Act*, and as described further in the "*Landfill Standards – A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites*" (Ministry of the Environment; 2012). The following are relevant aspects of the *Landfill Standards* that have been applied as rationale for the development of different landfill design alternatives in this EA.

Liner System

Section 4.5 of the Ministry's *Landfill Standards* sets out the requirements for groundwater protection and offers three options: a "generic" single composite liner, a "generic" double composite liner, or a site-specific design, along with the conditions for each to be used. Given the proposed size and setting for this landfill, Walker communicated throughout the development of the Terms of Reference (e.g.,

Section 5.2, p. 12) that it would adopt the Ministry's "generic" liner design standard. **Figure 6-4** illustrates the two "generic" liner designs.

Figure 6-4: MECP "Generic" Liner System



All liner systems, site-specific or "generic", must meet the same requirements for groundwater protection set out in Section 10 of O. Reg. 232/98. The advantage of adopting the Ministry's generic design for this site is that the Ministry has already assured in the *Landfill Standards* that their "generic" designs will meet this requirement and that it confers a very high standard of groundwater protection:

> "*To ensure the generic designs can be used within a broad range of hydrogeologic settings, the designs have been developed such that the Reasonable Use limits for groundwater protection will be met without reliance on contaminant attenuation in the landfill buffer area. … The advantage of using the generic designs is the added certainty they bring to the approval process*." (*Landfill Standards*, p. 26-27)

Therefore, since the proponent must take the responsibility for demonstrating the suitable performance for any site-specific design, it would only make practical sense where the same standard of performance could be met with an alternative design that was less costly than the "generic" design, and/or where the materials or construction suitability for the "generic" design were not available at the site. Based on Walker's construction and operational experience with the "generic" liner system at its South Landfill in Niagara Falls, the Ministry's "generic" liner system should also be well suited to this quarry setting (subject, of course, to demonstrating compliance with O. Reg. 232/98), so Walker decided not to pursue any potential cost savings that might be found through an alternative, site-specific design.

The generic single composite liner is designed to accommodate waste loading[8] between 98,500 m^3/ha and 139,000 m^3/ha, or an equivalent average waste thickness between 9.85 m and 13.9 m. At the proposed design capacity of about 17 million m^3 for this landfill, the single liner design would require 122 ha to 173 ha of land for the waste fill area alone, which substantially exceeds the total available area in the Active Quarry footprint (see **Figure 6-3**; approximately 80 ha). Therefore, the single liner is not feasible.

The generic double composite liner is designed to accommodate waste loading between 287,000 m^3/ha and 380,000 m^3/ha, or the equivalent average waste thickness of 28.7 to 38.0 m, requiring a waste fill area of 44 ha to 59 ha for the proposed 17 million m^3 of waste. The Active Quarry Area footprint is sufficiently large for this type of landfill. Therefore, the generic double composite liner is the basis for the design concept.

It is further noted that the generic double composite liner design was approved and is in use at Walker's South Landfill in Niagara Falls , in a very similar setting (i.e., a depleted limestone quarry). Therefore, Walker has extensive experience with its construction and operation.

Backfill & Side Slopes

Given the depth of the quarry (in the order of 60 m) relative to the average waste thickness discussed above (28.7 to 38 m), and the vertical rock faces in the quarry, a certain amount of backfilling and sloping of the quarry floor and walls will be required. Since approximately 25 to 30 m of overburden soils are required to be stripped during quarry operations to expose the limestone at this site, excess fill is available for this purpose. It is important to note that the amount and timing of the fill availability is also an important consideration that has been incorporated into the review of the alternative designs.

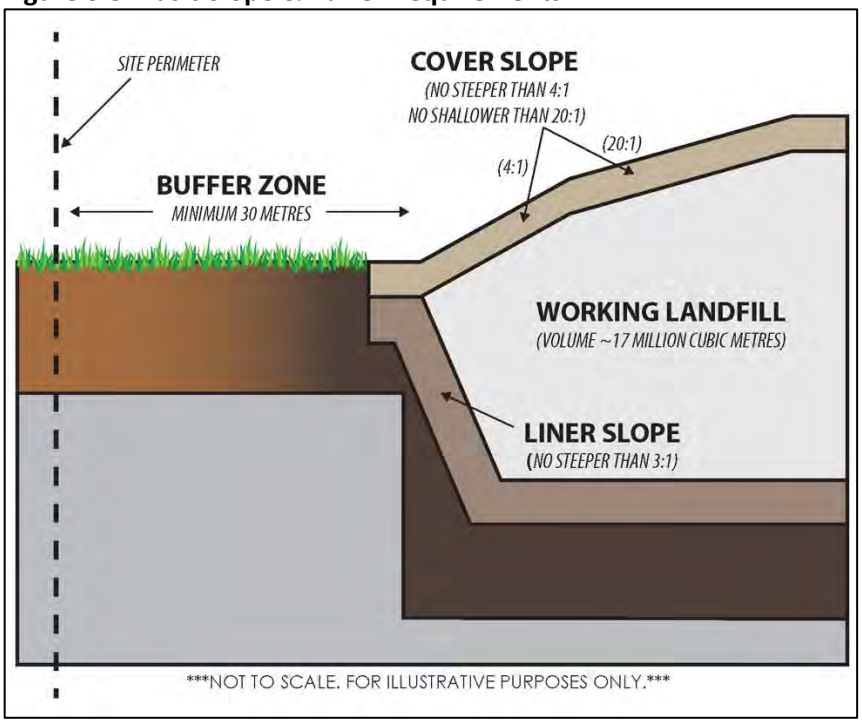
Figure 6-5 illustrates the following basic slope requirements:

- For stability, the liner is assumed to be constructed on slopes no steeper than 3:1 (horizontal:vertical).

- Above-ground final slopes no steeper than 4:1, and no shallower than 20:1 (to ensure adequate surface water drainage) have been assumed (*Landfill Standards*, Section 6.12.2).

[8] *Depending on the background concentration of chloride in the groundwater; see O. Reg. 232/98, s. 10.*

Figure 6-5: Basic Slope & Buffer Requirements



Buffer Area

As noted previously, a buffer area is required around the perimeter of the waste fill area for various monitoring, maintenance and environmental control activities. A 100 m wide buffer is specified, which may be reduced to 30 m wide if supported by a site-specific assessment demonstrating that there is sufficient space for landfill operations, facilities, and the control of environmental effects (O. Reg. 232/98 s.7). Walker has successful operational experience at its other sites with buffers varying from 30 m to more than 100 m.

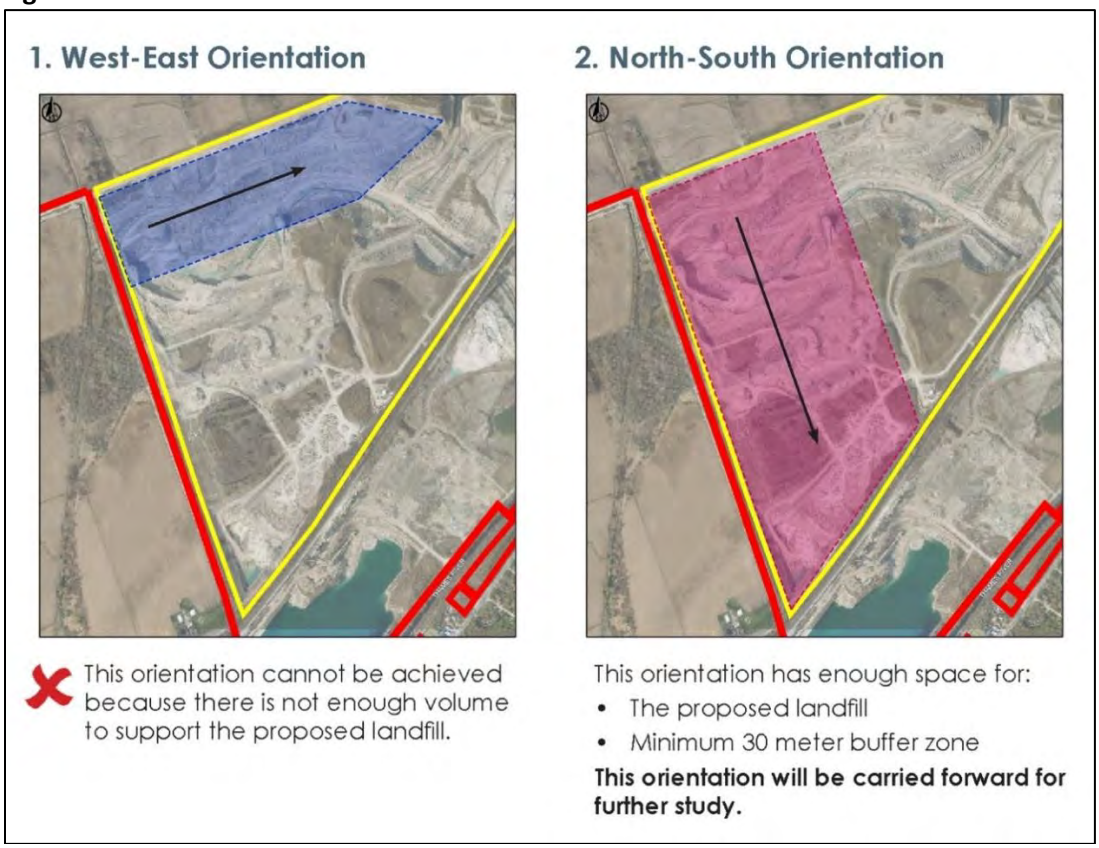
The Southwest Quarry Area footprint is sufficiently large to provide buffers of no less than 30 m (e.g., where physical conditions dictate, such as where quarry faces are already within 30 m of property boundaries), but wider in other areas where space and topography permit.

Landfill Orientation

As noted previously, the constraints of the ongoing quarry operations will require Walker to initiate landfilling in the northwestern corner of the Southwest Quarry Area footprint. From there, landfilling could conceivably proceed either from west-to-east or from north-to-south (**Figure 6-6**). Walker considered both possible landfill orientations, but concluded that the east-west orientation was not feasible because the available landfilling area narrows to the east around the buried rock wall and fill (see **Figure 6-3** delineating the physical constraints). Combined with the need for slopes both above and/or below ground, the actual waste volume realized in this northeastern section of the Southwest

Quarry Area footprint would be very minimal, and a strictly west-east orientation as shown in **Figure 6-6** would not meet the necessary waste volume required for the proposed landfill[9].

Figure 6-6: Landfill Orientation



6.4.1.3 Landfill Configurations

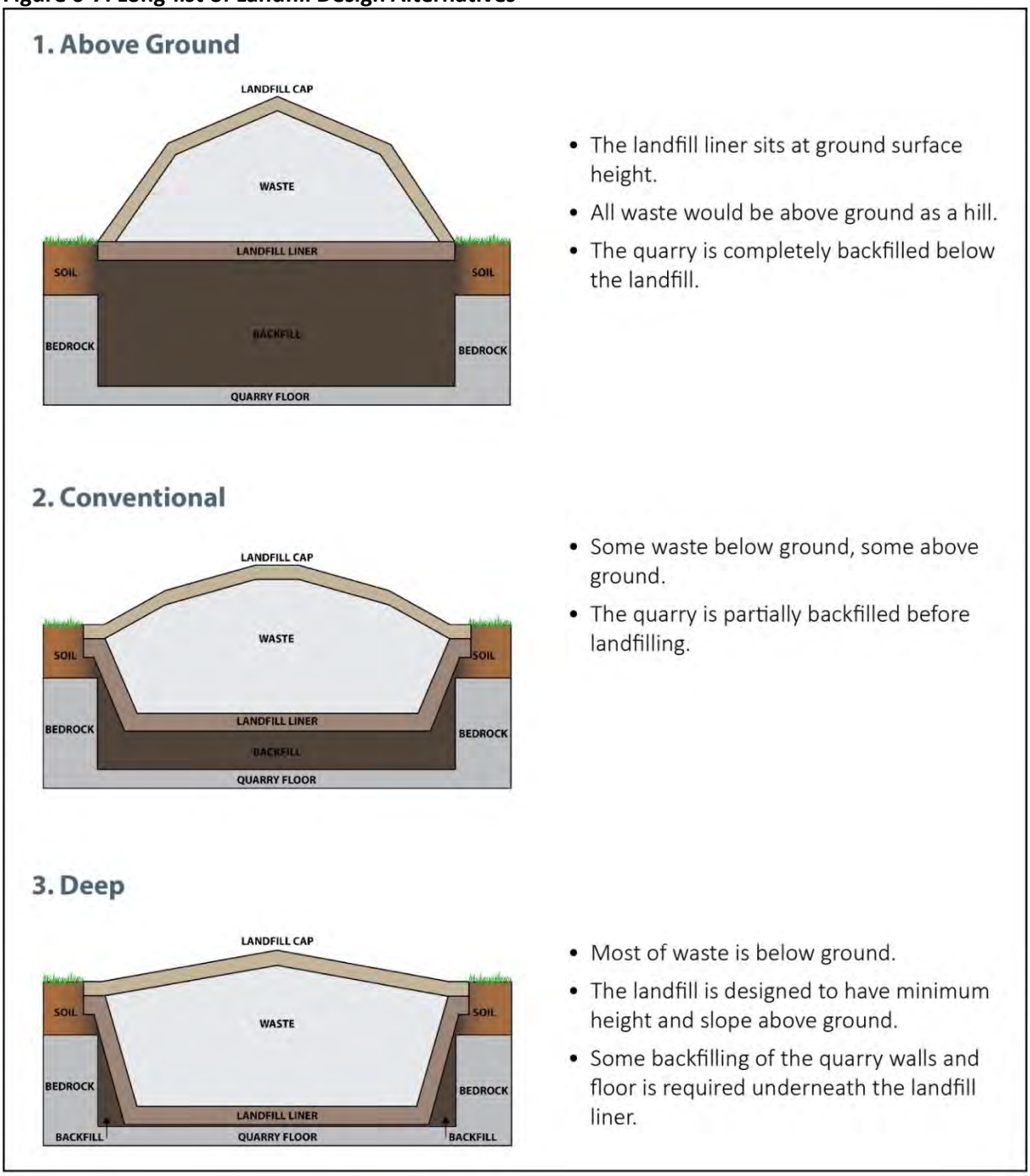
Landfills are typically designed in one of three basic configurations:

- *Above-Ground* - Waste is placed above the surrounding land elevation.
- *Conventional* - Waste is placed both above and below the surrounding land elevation.
- *Deep Entombed* - Waste is placed below the surrounding land elevation.

As the name implies, the conventional configuration is the most commonly used, while the other two tend to be used for more specialized applications (for instance, above-ground for interim waste storage, or deep entombed for disposal of radioactive or liquid waste). Following is a description of each of these "long list" of alternatives as they could be configured in the Southwest Quarry Area footprint, and as illustrated conceptually in **Figure 6-7**.

[9] *Walker also considered a hybrid "L" shaped design, but the added complexities of constructing the slopes and double generic liner around a corner was not deemed worthwhile provided the site could accommodate a linear design.*

Figure 6-7: Long-list of Landfill Design Alternatives



6.4.2 Description of the Landfill Design Alternatives

6.4.2.1 Above-Ground Design Alternative

In this alternative, the depleted quarry would be backfilled almost entirely back to original grade, leaving only sufficient depth for the construction of the generic double composite liner (and also allowing for

grading and sloping ensuring effective drainage within the leachate collection system). The waste would be placed on top of the liner at ground level, and then built upwards in the shape of a large hill. Preliminary estimates indicate that this alternative would have to rise to a peak height in the order of about 60 to 70 metres above grade, all at the steepest possible slopes (4:1), in order to achieve the necessary waste capacity.

6.4.2.2 Conventional Design Alternative

The conventional design alternative can be configured with a range of heights/depths depending on how much backfill is placed beneath the landfill (i.e., more backfill raises the landfill base, and correspondingly raises the landfill height above surrounding grade). As a result, there is some flexibility with this alternative to refine the height and depth during detailed engineering based on the actual amount of excess backfill that can be made available from quarry operator's stripping operations. Typically, though, conventional landfills of similar size rise to peak heights in the range of 20 to 40 m above grade; for example, the Walker South Landfill in Niagara Region is a conventional configuration with a peak height of about 30 m above grade and a depth of about 25 m below grade.

6.4.2.3 Deep Design Alternative

A truly "entombed" design, wherein the waste is isolated deep in the ground, is not a possibility for this site since the *Landfill Standards* require that the landfill cap permit a certain minimum amount of infiltration[10]. Therefore, the landfill cap has to be exposed to precipitation at the surface, and at the same time it needs to be designed with a minimum slope of 20:1 in order to ensure adequate storm water drainage offsite. Accordingly, adapting the deep design alternative to this site means keeping the landfill cap as low as possible within these parameters, while still burying most of the waste below the surrounding grade. On that basis, given that the Southwest Quarry Area is roughly 600 m across its narrowest dimension (east-to-west), and allowing for 20:1 minimum slopes, the landfill could be kept as low as about 15 m above grade at its peak.

6.4.3 Feasibility Screening

In accordance with the methodology prescribed in the *Approved Amended Terms of Reference*, the following feasibility screening criteria were applied to each of these candidate landfill design alternatives:

a) Must be consistent with the stated purpose of the environmental assessment.

b) Must be reasonably capable of approval pursuant to the statutes of Ontario and Canada.

c) Must be technically feasible and proven technology.

d) Must be commercially viable.

The objective of the initial screening is simply to eliminate alternatives from further consideration that are clearly not fundamentally feasible for Walker to carry forward. That is, a "*fail*" on <u>any</u> <u>one</u> of these screening criteria will be based on sufficient information to be certain that the alternative is not feasible.

[10] *To ensure that the waste is sufficiently leached out during the service life of the generic double composite liner system. (O. Reg. 232/98; s.10.(5)2.)*

Alternatives that are not screened out at this stage will be carried forward to the next step in the assessment for more detailed evaluation.

Table 6-4 below summarizes the results of the screening analysis for the three potential landfill design alternatives described above, while a further discussion and rationale for each alternative that is screened out follows in the sections below.

Table 6-4: Summary - Screening of the Alternative Landfill Design Concepts

Feasibility Screening Criteria	Above-Ground Design Alternative	Conventional Design Alternative	Deep Design Alternative
Consistent with the stated purpose of the environmental assessment.			
Reasonably capable of approval pursuant to the statutes of Ontario and Canada.			
Technically feasible and proven technology.	✘ Insufficient backfill and marginal volume.		
Commercially viable.	✘ Prohibitively high cost to import or excavate additional backfill.		
Conclusion	**Not feasible - screen out from further consideration.**	**Potentially feasible – carry forward for further evaluation.**	**Potentially feasible – carry forward for further evaluation.**

6.4.3.1 Screening Rationale - Above-Ground Landfill Design Alternative

The above-ground design alternative is not feasible at this site for a combination of technical and commercial reasons. Though theoretically capable of meeting the target waste capacity, in all practical reality the actual capacity would have to be substantially reduced at the design stage to reflect the engineering, construction and operational issues associated with waste placement at unsupported slopes this high and steep. At this preliminary stage it is fair to conclude that the true capacity of this design would either be inadequate, or marginal at best.

The quarry operator's forecasted mining and stripping operations indicate that they would not produce sufficient excess soil necessary to completely backfill the quarry to original grade within the construction period of the landfill. As a result, if this design were to be adopted, Walker would be required to import large volumes of additional backfill soil from an off-site source and/or advance the quarry operator's stripping operations far ahead of their need for limestone. The cost of either option is prohibitive, notwithstanding the other associated implications of the additional excavating and trucking.

For these reasons, the above-ground design alternative is screened out from further consideration in this EA.

6.4.4 Comparative Evaluation

Since there are two potentially feasible alternatives short-listed for the landfill design configuration at this site –Conventional or Deep – a comparative evaluation was conducted to weigh the relative merits of these two alternatives following the methodology set out in Section 8.1 of the *Approved Amended Terms of Reference*. The results are summarized below, and the evaluation tables are included in **Appendix C**.

6.4.4.1 Criteria & Indicator Selection

The full list of 41 EA Criteria established in the *Approved Amended Terms of Reference* was reviewed to select those which: (a) were relevant to this comparison of the two alternative design configurations, and (b) would differentiate between them (i.e., where the potential effects were not substantially the same for both alternatives). The results of this criteria screening and selection, and the rationale for each, are included in **Table C-1**, **Appendix C**. Then, for each of the selected criteria, indicators were developed which can be used as a measure or gauge the relative differences between the two alternative design configurations. These are also detailed in **Table C-1**, along with a listing of the major data sources where the relevant information was obtained.

6.4.4.2 Environment Potentially Affected

Section 6.1 of the *Approved Amended Terms of Reference* (**Appendix E**) contains a preliminary description of the environment potentially affected by the proposed landfill based on available secondary source data, maps, satellite imagery and field reconnaissance. This serves as a suitable general overview for the purposes of this comparative evaluation. The following elaborates on certain elements of that description as they relate specifically to the criteria and indicators selected for this comparative evaluation.

Residential Properties, Public Facilities & Institutions

Five of the selected criteria are related to the potential for particulate emissions, a range of nuisance effects (including noise, dust, litter, odour, visibility and birds), and any related property value effects. Therefore, the environment potentially affected for all of these are residential properties, public facilities and institutions, farms and businesses surrounding the landfill.

Guideline D-4 of the Ministry of the Environment, Conservation and Parks provides planning direction regarding residential and institutional land uses around landfill sites that can be used as a reference for the possible extent of the environment potentially affected by the design alternatives. Based on the Ministry's experience, the most significant effects from operating landfills can occur within 500 m (Section 5.3). For reference, then, individual properties and land uses within 500 m of the Southwest Quarry area were inventoried and mapped, as illustrated in **Figure 6-8**. However, since there are so few of these, the inventory shown in this figure was extended to a distance of about 1 km.

Agricultural Rehabilitation

In this instance, the criteria and indicators relate specifically to the relative potential for future agricultural rehabilitation on the completed landfill, so the environment potentially affected can be described as the final cover (cap) of the landfill, which at a minimum would include 0.6 m of cover

68 ROAD
2
41ST LINE
66 ROAD
ZORRA LINE
BEACHVILLE
37TH LINE
ENERQUEST SOLAR FARM
BARN ONLY
BARN ONLY
FIREWOOD SALES
BARN ONLY
1000 m BUFFER
500 m BUFFER
SINGLE LANE BRIDGE CROSSING
CROSSING REMOVED
DOMTAR LINE
VINE ST
OAK ST
WEST HILL LINE
CARMEUSE LIME LTD OPERATIONS
LEVEL CROSSING NO SIGNALS
CARMEUSE LIME LTD LANDS
BEACHVILLE MUSEUM
DERBY ENVIRONMENTAL & SEPTIC SERVICES
FARMER SCHOOL HOUSE
CARMEUSE LIME LTD OFFICE
B&D LANDSCAPING GARDEN CENTER
TRUCKING YARD & SHOP
OXFORD LANDSCAPE & SUPPLY
33RD LINE
HYDRO FACILITY
BOARDED HOUSE
POTENTIAL LANDFILL FOOTPRINT AREA
CARMEUSE LIME LTD OPERATIONS
BEACHVILLE RD
9
CARMEUSE LIME LTD LANDS
35TH LINE
THAMES RIVER
KARN RD
6
HIWAY PENTECOSTAL CHURCH
GORD PATTERSON WELDING
MILL LINE
CHURCH LINE
CENTENNIAL POND & CONSERVATION AREA
CARMEUSE LIME LTD LANDS
MECHANICS SHOP
MUNICIPAL WELL
CEMETERY
KILLEAN ACRES
HORSES
CENTREVILLE
PM HYDRAULICS
NORTH TOWN LINE E
OXFORD PUBLIC WORKS YARD
401
MCNESS & ZEHR TRANSPORT
RIVERSIDE MINI-MART & GARDEN CENTRE
WORKS YARD
BELL ST
THAMES ST
CANTERBURY ST
HARRIS ST
INGERSOLL
119
CLARK RD
CURRY RD
401

SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

FIGURE 6-8

SURROUNDING AREA MAP

0 250 500 Meters

walker environmental

LEGEND:

- CARMEUSE LANDS
- POTENTIAL LANDFILL FOOTPRINT RAIL
- ROADS
- ROADS
- PARCELS LIMITS
- ESTABLISHED LANE/GATE RESIDENCES
- FARM BUILDINGS
- COMMERCIAL BUSINESS
- CHURCH
- CEMETERY
- SCHOOL
- FIRE STATION
- OPP STATION
- MUNICIPAL/COUNTY BUILDING TRAIL
- CONSERVATION AREA

material, at least of 0.15 m of topsoil, and plentiful, vigorous vegetation suited to local conditions (O. Reg. 232/98; Section 29.(1)).

6.4.4.3 Mitigation

It is assumed here that, at a minimum, both of the design alternatives would be equipped and operated with standard mitigation measures typical of modern engineered landfills. With respect to the criteria selected for this comparative evaluation, these would include:

- A small working face that is covered daily to limit dust, odour, blowing litter, birds, pests, and visual impacts.
- Dust control watering and sweeping on internal and external haul routes to reduce particulate emissions at the source.
- A landfill gas collection system to reduce odours and greenhouse gas emissions.
- Litter fencing and collection to reduce blowing litter.
- Bird and pest control programs.
- Progressive capping and vegetation of completed cells to minimize visual impacts.

6.4.4.4 Net Effects Analysis

Table C-2 in **Appendix C** summarizes the comparative evaluation of the two design alternatives for each of the selected criteria and indicators. The table describes the relative differences in environmental effects for each of the selected criteria, and provides a rationale for the preferred alternative for each criterion, each group of criteria, and overall. In this case, the deep landfill design holds an advantage on every one of the applicable criteria, and criteria groups, relative to the conventional landfill design.

These analyses are not sensitive to any further mitigation. Although more intensive controls might be applied where the landfill reaches greater heights and exposures, the same degree of additional mitigation could be applied to both design configurations; therefore, the net effects would still be more pronounced when operating at greater heights. It is also worth noting that any additional mitigation that might be applied is also likely to be more effective for the deep design than the conventional design, given its lower peak height and the substantially reduced amount of time that the landfill operations would be above grade. For example, screening berms and/or trees located in the buffer zone around the perimeter of the landfill would be comparatively more effective for the deep landfill design at a peak height in the range of about 15 m above ground than for a conventional design at 20 to 40 m above ground, which would extend well above a typical tree or berm height.

6.4.5 Preferred Landfill Design Alternative

The key environmental advantages of the deep design configuration, relative to the conventional design alternative, can be summarized as follows:

- Its overall lower height reduces the exposure and duration of landfill construction and operation above ground surface. This will facilitate:
    - Reduced risk of fine particulate emissions.

  - Enhanced containment and/or control of dust (particulate), odour, noise, blowing litter, and birds.
  - Reduced visibility and visual impact in the surrounding community.
  - Reduced risk of any property value losses as a result of the above.
- It has shallower/flatter final cover slopes that would open up more opportunity for the landfill to be rehabilitated to agricultural and other uses after closure.

Therefore, based on the comparative evaluation detailed in the previous sections, the deep landfill design is carried forward as the preferred alternative for further, detailed assessment in the EA.

6.4.6 Input from Stakeholder Consultation

During the development and assessment of the alternative methods, consultation was undertaken with Indigenous Communities, various interested members of the public and local government agencies through the Community Liaison Committee as well as a series of public events consisting of an open house and workshops. The following is a brief summary of some of the key input received regarding the landfill design alternatives, and its influence on the assessment. More extensive details can be found in Section 10 of this document, and the associated consultation appendices.

Table 6-5: Summary of Stakeholder Consultation Input - Landfill Design Alternatives

Input	Considerations
Minimize impacts: odour, visual, birds, dust, litter blowing off-site.	Minimizing construction and operations occurring above ground level, which reduces the potential for these impacts, was reflected in the indicators, and assessed as one of the main advantages of the deep design alternative.
Effectiveness of the landfill liner to protect all water, including groundwater and the Thames River from contamination.	In its assessment of design alternatives, Walker selected the Ministry's generic double composite landfill liner design in order to provide full protection of the environment.
Maximize distance from residents.	Walker selected a preferred design alternative where the required waste fill area is slightly smaller than the available footprint area. This leaves some further possibility at the design stage to increase the buffer area along the southern boundary, and maximize the separation from residences along Beachville Road.
Concerns regarding impacts of adjacent blasting on landfill liner integrity.	Potential impacts to the landfill liner and other infrastructure will be studied as part of the Impact Assessment. Walker communicated that it has over 30 years of experience of designing, constructing and operating landfills adjacent to active quarry operations.
Concern regarding potential impacts resulting from building a landfill within fractured limestone with the potential for karst features.	The potential for impacts related to fractured bedrock will be studied as part of the Impact Assessment. As a response to community input, Walker has retained a karst expert to determine if karst conditions exist. Results will be reported, as well as plans for preventing and mitigating potential impacts.

Input	Considerations
Concern regarding lack of experience by Walker and throughout Canada in landfilling in a quarry as deep as the proposed location.	Walker carefully considered this issue but did not judge it to be a disadvantage of the deep design alternative in the comparative evaluation. The design and construction techniques used at Walker's landfills, which are developed in former quarries, in Niagara Falls (i.e., the East Landfill and the South Landfill) can be readily adapted to this site despite the deeper depth. The construction methods for either the deep or conventional designs in a quarry are essentially the same.
Elaborate on why the "generic" liner design option was selected instead of a site specific liner design.	Further explanation and support for the decision to adopt the Ministry's "generic" liner design has been added in Section 6.4.1.2.
Explain why a hybrid "L" shaped configuration was not considered.	Further detail has been added in Section 6.4.1.2 to explain that an "L" shaped configuration introduces complexities related to constructing the double composite liner around corners, therefore a linear configuration is preferred.

6.5 Leachate Treatment Alternatives

The Ministry's generic double composite liner design incorporates two leachate collection systems – primary and secondary – as a means of capturing, collecting and removing leachate from the landfill for treatment. The *Landfill Standards* also require a method for managing and disposing of any leachate collected at a landfill site (O. Reg. 232/98, Section 11.). This section considers the range of fundamentally different alternatives for leachate treatment, with the objective of selecting a preferred option for further evaluation in the EA.

6.5.1 Rationale for the Leachate Treatment Alternatives

Leachate generated within the landfill will be pumped out of the leachate collection layer(s) in the liner system for treatment and disposal.

The *Landfill Standards Guideline* (Section 4.7) notes that typical alternatives for leachate management include piping or haulage to an existing sewage treatment plant, or on-site treatment. Based on this guidance, combined with Walker's expertise in leachate management at numerous other sites, the following "long list" of alternatives was considered, and each is described further in the sections below:

- Pipe to a Municipal Wastewater Treatment Plant
- Haul to a Wastewater Treatment Plant
- On-Site Treatment Plant
- On-Site Evaporation Plant

The amount of leachate that will require treatment will vary from negligible in the first few months of landfill life, increasing gradually until the landfill is completely filled with waste. At that time the annual leachate production rate can be expected to level off or decline slightly, and then stay relatively

constant during the post closure period. For initial planning purposes, leachate production estimates prepared for the similarly sized Walker South Landfill of approximately 124,000 m^3/year, or an average of about 340 m^3/day, could be expected when the landfill is fully built out[11].

Common to all of these alternatives is the potential need for some form of pre-treatment of the leachate. In most cases this involves an equalization pond(s) or tank(s) where leachate is collected and held so that it can be fed into the treatment system at a steady rate (i.e., to even out the ebb and flow of leachate that is pumped out of the landfill). These may also provide for aeration or other pre-treatment processes. Lastly, the pond(s)/tank(s) can also serve as temporary storage when the treatment plant requires shut-down for maintenance or repair. For reference, at Walker's Niagara Falls landfills there are two equalization/aeration ponds servicing both the South Landfill and the East Landfill that occupy a combined area of about 1.1 ha.

6.5.2 Description of the Leachate Treatment Alternatives

6.5.2.1 Pipe to a Municipal Wastewater Treatment Plant Alternative

This alternative would involve the construction of a pipeline connecting to an existing sanitary sewer, through which leachate could be piped to the local municipal waste water treatment plant where the leachate would be co-treated with municipal sewage and other commercial and industrial wastewater discharges. Walker would pay the municipality for this service. This constitutes the most common method for treating both municipal and private leachate in Ontario; one example being Walker's East and South landfill sites in Niagara Falls.

In Oxford County, where this landfill is proposed, the County operates nine wastewater treatment plants along with the associated network of sanitary sewers. The nearest potential connection point to the sanitary sewer system is roughly 1 to 1.5 km to the west or southwest of the proposed landfill, feeding into the Ingersoll Wastewater Treatment Plant (WWTP) at 56 McKeand Street *via* the pumping station at 51 Carnegie Street. (The next closest systems would be Thamesford further west, or Woodstock to the northeast, both of which are likely beyond a reasonable distance for the construction of a single-use forcemain connection.)

The 2015 Annual Report for the Ingersoll WWTP indicates that it was effectively treating landfill leachate (from the County's Salford Landfill Site), that it met all of its effluent discharge quality limits, and that it operated within its design flow criteria (with average combined flows of only 63.4% of its design capacity) without any overflows or by-passes. Based on a leachate production estimate of about 340 m^3/day when the landfill is fully built out this would represent about 3% of the plant's current design capacity, and slightly less with the plant expansion and upgrades completed in 2017.

6.5.2.2 Haul to a Wastewater Treatment Plant Alternative

This alternative would involve loading the collected leachate into tanker trucks at the landfill site and hauling the leachate to a suitable off-site treatment plant, either municipally or privately operated.

[11] *Proposed Walker South Landfill Design and Operations Report; Gartner Lee Limited; September, 2006.*

Based on the estimated leachate quantities mentioned above, and assuming typical large tanker trucks with a capacity of about 26.5 m^3 (7,000 U.S. gallons) results in an average of about 13 truck loads *per* day at full landfill build out.

Again, the Ingersoll WWTP discussed above is the closest option and, according to its 2015 annual report, it is equipped to receive hauled wastewater. However, there are several other plants in Oxford County that could potentially receive hauled wastewater, along with municipal wastewater treatment plants in other surrounding municipalities outside of Oxford County. The next nearest wastewater treatment plants outside of Oxford County that appear to be suitable (i.e., size, capacity and location within proximity to the major provincial highway system) are located in either Brantford or London.

6.5.2.3 On-Site Treatment Plant Alternative

An on-site treatment plant could be constructed at the landfill. It would use a combination of physical, chemical and/or biological treatment processes designed for the specific quality and quantity of leachate produced at the site. Depending on the design of the process, the effluent from the plant can be treated sufficiently for direct off-site discharge to surface water, or it may pass through other on-site "polishing" steps before discharge such as holding ponds, sub-surface beds or wetlands. The treated effluent can also be put to other uses at the site such as dust suppression, "grey" water supply, irrigation, etc.

Examples of on-site leachate treatment plants already approved, built and operating at Ontario landfill sites include those at the City of Toronto's Green Lane Landfill (south of London), the Brooks Road Environmental Landfill (northeast of Cayuga), and the GFL Moose Creek Landfill (east of Ottawa).

6.5.2.4 On-Site Evaporation Plant Alternative

Leachate can be heated to produce water vapour (steam), either in a boiler or by injecting the leachate directly into a combustion flare. Most of the organic compounds in the leachate are volatilized in the steam (which may have to be further treated by high-temperature thermal oxidation to destroy trace organics before discharge into the air, in order to meet air emission standards), while about 5% of the leachate volume remains behind as a sludge or slurry that can either be deposited back into the landfill or shipped off-site for disposal (possibly to a hazardous waste facility, depending on its characteristics).

Large amounts of energy are necessary to run an evaporation plant, since leachate is a relatively dilute liquid composed primarily of water. Landfill gas can be used to power the evaporator, although it would likely have to be supplemented with other forms of energy such as natural gas (especially in the early years of the landfill when there is less gas being produced, and for some time after closure when the gas quantities are diminishing). At this site, there is also a possibility of employing waste heat from an adjacent lime kiln as a potential energy source for leachate evaporation.

There are several commercial manufacturers of wastewater evaporators that can be used or adapted for this purpose, though they tend to be smaller units than would be required for this landfill so several "modules" may have to be used. The evaporation plant would occupy a relatively small footprint at the site, but would have a tall stack emitting water vapour when operating.

There are some pilot-scale and small-scale examples of this method of leachate treatment in the U.S. Currently there are none approved or operating at any major landfill sites in Ontario.

6.5.3 Feasibility Screening

Table 6-6 below summarizes the results of the screening analysis for the four potential leachate management alternatives described above, while a further discussion and rationale for each alternative that is screened out follows in the sections below.

Table 6-6: Summary – Screening of the Alternative Leachate Treatment Methods

Feasibility Screening Criteria	Pipe to Municipal Wastewater Treatment Plant	Haul to Wastewater Treatment Plant	On-Site Treatment Plant	On-Site Evaporation Plant
Consistent with the stated purpose of the environmental assessment.				
Reasonably capable of approval pursuant to the statutes of Ontario and Canada.	✘ Not permitted under Oxford County by-law*.	✘ Not permitted under Oxford County by-law*.		
Technically feasible and proven technology.				✘ Not yet proven technology at this scale.
Commercially viable.		✘ Prohibitively high cost to haul outside of Oxford County.		
Conclusion	**Not feasible - screen out from further consideration.**	**Not feasible - screen out from further consideration.**	**Potentially feasible – carry forward for further evaluation.**	**Not feasible - screen out from further consideration.**

* Under the Ontario *Planning Act*.

6.5.3.1 Screening Rationale - Pipe to Municipal Wastewater Treatment Plant Alternative

On June 24, 2015, during the preparation of this EA, the County of Oxford passed an amendment to By-law No. 2719-87, Section 2.3, prohibiting the discharge of landfill leachate from any privately owned or operated facility into any sewer or combined sewer. Although Walker could make a request to the County to repeal the by-law, the specific issues and concerns noted in the accompanying staff reports clearly illustrate the County's position that it will not support the connection to, and treatment of, leachate at the County's municipal wastewater treatment plant. As a result of the by-law, Walker does not have any commitments or agreements in place with the County that would provide the required certainty to further evaluate this option in this EA[12]. Given the associated uncertainties noted above, this alternative must be screened out from any further evaluation.

[12] *Typically an agreement-in-principal (or similar) is structured at this stage in an EA as evidence that a third party is willing to provide leachate treatment.*

6.5.3.2 Screening Rationale - Haul to Wastewater Treatment Plant Alternative

On June 10, 2015, the County of Oxford passed By-law No. 5707-2015 prohibiting the acceptance of hauled leachate from privately owned and operated landfill sites at any County wastewater treatment plant. As discussed above, this effectively eliminates the alternative of hauling leachate from the proposed Southwestern Landfill to any municipal wastewater treatment facility in Oxford County.

As noted above, municipal and/or privately owned wastewater treatment plants exist outside of Oxford County that could be capable of treating leachate from the Southwestern Landfill. However, the haulage costs alone to the nearest facilities, in either Brantford or London areas, would be prohibitive and not commercially viable as a long-term alternative.

Therefore, haulage to an off-site wastewater treatment plant outside of Oxford County is not feasible, and is screened out of the EA as the primary method for leachate treatment. However, since it may otherwise be feasible and cost-effective on a short-term basis, it could be considered as a potential contingency plan.

6.5.3.3 Screening Rationale - On-Site Evaporation Plant Alternative

As noted above and to the best of Walker's knowledge, evaporative technologies have not been approved or used for full-scale leachate treatment in Ontario. Some pilot-scale tests in the U.S. suggest that the technology may be feasible (though plagued with some significant difficulties such as precipitate fouling, high maintenance costs, and unacceptable air emissions), but more research and testing is needed before this alternative could be deemed sufficiently proven at the scale required as the primary means of leachate treatment for the proposed Southwestern Landfill.

As a result, this alternative is screened out from further consideration in the EA.

6.5.4 Preferred Leachate Treatment Alternative

Based on the screening assessment detailed in the previous sections, there is only one feasible leachate treatment alternative that can reasonably be considered by Walker in this EA – an on-site treatment plant. Since this is the only feasible alternative remaining following the initial screening analysis, no comparative evaluation is necessary, and an on-site treatment plant is carried forward as the preferred leachate treatment method for more detailed assessment in the EA.

6.5.5 Input from Stakeholder Consultation

During the development and assessment of the alternative methods, consultation was undertaken with Indigenous Communities, various interested members of the public and local government agencies through the Community Liaison Committee as well as a series of public events consisting of an open house and workshops. The following is a brief summary of some of the key input received regarding the leachate treatment alternatives, and its influence on the assessment. More extensive details can be found in **Section 10** of this document, and the associated consultation appendices.

Table 6-7: Summary of Stakeholder Input – Alternative Leachate Treatment Methods

Input	Considerations
Leachate holding ponds need to be fully protective of the environment.	Walker agreed and this will be a key consideration when designing any holding ponds required for the leachate management system.
Potential future issues in event Walker abandons the site.	As part of post-EA approvals (Environmental Compliance Approval), Financial Assurance is required by the Ministry of Environment, Conservation & Parks (MECP). This is financial security (i.e., money or other acceptable forms of security) that is set aside for the Province to use in the event Walker cannot care for the site as required.
Leachate holding ponds should be designed to deter birds from landing and other animals from approaching. (Protection of birds/animals and protection of humans/livestock from disease carried by birds.)	Walker agreed and this will be a consideration when designing and operating holding ponds required for the leachate management system.
Concern regarding impact of treated water on Thames River Watershed (quantity, quality, ecology).	In establishing the feasibility of the on-site leachate treatment alternative, Walker confirmed that the treatment technologies currently available can achieve the most stringent discharge requirements that would be necessary. The specific treatment design and discharge requirements will be determined through the detailed assessment phase of the EA.
Risk of odour from leachate, particularly holding ponds	Walker acknowledged that leachate ponds are a potential odour source if not properly managed. This will be taken into consideration as the leachate management infrastructure and procedures are developed during the EA.

6.6 Landfill Gas Management Alternatives

This section identifies and evaluates possible alternatives for managing gas generated in the landfill. The objective is to select a preferred gas management method for further, detailed study in the EA.

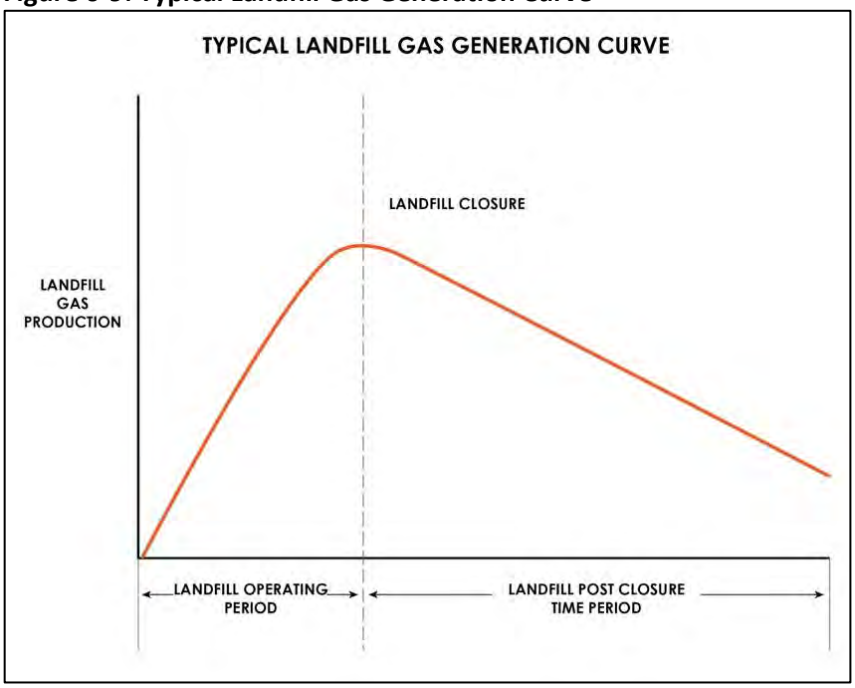
6.6.1 Rationale for the Landfill Gas Management Alternatives

Landfill gas is produced as waste biodegrades in a landfill. It consists mainly of methane and carbon dioxide in roughly equal proportions, along with trace amounts of other volatile organic and reduced sulphur compounds.

Landfill gas starts being generated soon after waste is placed in a landfill, and the generation rates typically build through the operational period as more waste is added. Gas generation generally peaks within a few years after the landfill is closed with all of its final cover in place, and then slowly declines over succeeding decades as the organic material in the landfill finishes decomposing (**Figure 6-9**). As a

conservative planning estimate, Walker's similarly sized South Landfill in Niagara was predicted to have a peak gas collection rate of up to about 17,000 m^3/h, at an 85% collection efficiency[13].

Figure 6-9: Typical Landfill Gas Generation Curve



Walker considered the following "long list" of potential landfill gas management alternatives, as described further in the sections below:

- Passive Venting
- Flaring
- Utilization

6.6.2 Description of the Landfill Gas Management Alternatives

6.6.2.1 Passive Venting Alternative

Passive venting releases the landfill gas into the atmosphere where it is dispersed. Where there is an intermediate or final cover on any areas of the landfill that could restrict the release of the gas, resulting in the build-up of excessive gas pressures in the landfill, then vent stacks or pipes can be installed through the cover to assist in the release of the gas. Passive venting has been historically employed as the primary means of landfill gas management at landfills in Ontario.

6.6.2.2 Flaring Alternative

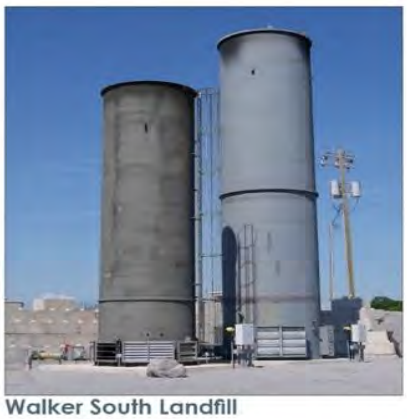
A landfill gas flare is a piece of equipment designed to combust (burn) landfill gases under controlled conditions. **Figure 6-10** shows the enclosed flares that are used at Walker's South and East Landfills in

[13] *Design and Operations Report, Landfill Gas Management, Proposed Walker South Landfill; Comcor Environmental, June 2006.*

Niagara, typical of what would be used at the Southwestern Landfill site. One flare will be needed initially, but they are modular so one or two more can be added, as required, to match the gas production rate. The flares are designed to operate at temperatures between 875 C to 950 C with a residence time (i.e., the length of time when the gas is in the flame) of 0.75 seconds, ensuring sufficiently complete combustion to meet air quality standards in the exhaust. There are automated monitoring and fail-safe systems in place.

Flaring of the landfill gas typically converts about 98% of the methane to biogenic carbon dioxide (i.e., the destruction efficiency) and consumes more than 99.9% the trace organic compounds. Estimates made for the similarly sized South Landfill in Niagara indicated that flaring of the landfill gas there at peak production rates of about 17,000 m^3/h would reduce greenhouse gas emissions by about 1.1 million tonnes *per* year (carbon dioxide equivalent), comparable to removing about 19,000 cars *per* year from the roads.

Figure 6-10: Examples of Landfill Gas Management Facilities



Walker South Landfill
- Landfill Gas Flares

Walker South Landfill - Landfill Gas Processing Facility

Walker's Moose Creek Energy
4.6 MW Electricity Generating Facility

Walker South Landfill - Landfill Gas Pipeline to
Nearby Industrial Energy Users

6.6.2.3 Utilization Alternative

This alternative involves various beneficial uses as a renewable energy source for the collected landfill gas, several examples of which are described below and illustrated in **Figure 6-10**.

Industrial Fuel (Direct Use)

Landfill gas can be pre-treated (to remove moisture and some impurities), compressed, and then used as a medium-BTU[14] industrial fuel in boilers, dryers or kilns, replacing natural gas or other non-renewable fuels. These are typically referred to as "direct use" projects as the landfill gas can be directly used as a fuel source with limited need for pre-processing of the gas. The end-user needs to have a sufficiently stable demand and be relatively close to the landfill (on the order of about 5 km) to justify the construction of a pipeline; in this case the adjacent coal/natural gas-powered lime manufacturing kiln would be a reasonable possibility, though some retrofitting would likely be required.

At the Walker's South Landfill in Niagara Falls, medium-BTU landfill gas was piped approximately 4 km *via* two dedicated pipelines owned by Enbridge Gas Distribution Inc. to a nearby paper mill where it is used in boilers to generate high-pressure steam for approximately 15 yrs. An additional new pipeline is being constructed in 2020 to delivered medium-BTU landfill gas approximately 4 km to the nearby GM Glendale Propulsion Plant to generate electricity and heat onsite.

Up to 1 million GJ/year (the equivalent of heating 10,000 Canadian homes *per* year) of processed medium-BTU landfill gas from Walker's Niagara landfills can be delivered to local industries, displacing fossil fuels, with the balance being combusted in the enclosed flares.

Electrical Power Generation

Landfill gas can also be used to generate electrical power to supply on-site electricity requirements and/or feed into the electrical grid. Typically, the landfill gas has to be pre-treated to a greater extent for power generation. Reciprocating piston engines coupled to a generator are most commonly used to convert landfill gas into electricity, although gas turbine engines or boilers coupled to steam turbines are also an option, though not as widely used. The electricity has to be passed through a transformer and other safety devices before connection to the power grid.

Walker has designed, constructed, owns and operates four landfill gas electrical generating plants in various locations across Ontario that together produce 120,000 MWh of electricity annually (equivalent to powering 11,000 Canadian homes *per* year).

Renewable Natural Gas

Emerging landfill gas processing technologies and markets are opening opportunities to clean and purify landfill gas to meet the requirements for injecting it into natural gas transmission or distribution pipelines. Commonly referred to as high-BTU or renewable natural gas (RNG), this technology is being supported in Ontario as the province transitions towards a low-carbon economy. The process involves the removal of moisture, oxygen, carbon dioxide, nitrogen, volatile organic compounds (VOC) and other

[14] *Because it contains only about 50% methane, it has about half the energy value of natural gas.*

non-methanogenic compounds so that the energy content is equivalent to natural gas, as undesirable gases noted previously are removed. The gas is then compressed and injected into the natural gas grid. It can also be further compressed and used as a transportation fuel for vehicles that are equipped to run on compressed natural gas (CNG).

There are two landfill gas based RNG projects in Canada, both in Quebec. These projects cannot currently compete financially against natural gas due its presently low commodity price, so it typically require subsidies or added value for its environmental benefits (i.e., these projects can create carbon offsets and renewable identification numbers (RINs)). However, as the cost of carbon becomes integrated into Ontario goods and services, RNG derived from landfill gas may become more viable.

6.6.3 Feasibility Screening

The following table summarizes the results of the screening analysis for the four potential landfill gas management alternatives described above, while a further discussion and rationale for each alternative that is screened out follows in the sections below.

Table 6-8: Summary - Screening of the Alternative Landfill Gas Management Methods

Feasibility Screening Criteria	Passive Venting	Flaring	Utilization
Consistent with the stated purpose of the environmental assessment.			
Reasonably capable of approval pursuant to the statutes of Ontario and Canada.	✘ Not permitted under O. Reg. 232/98.		
Technically feasible and proven technology.			
Commercially viable.			
Conclusion	**Not feasible - screen out from further consideration.**	**Potentially feasible – carry forward for further evaluation.**	**Potentially feasible – carry forward for further evaluation.**

6.6.3.1 Screening Rationale - Passive Venting

The *Landfill Standards* and other regulations now require that new, expanding and operating landfill sites with a total capacity greater than 1.5 million m^3 must have, at a minimum, a system for gas collection and flaring (burning) (O. Reg. 232/98, s. 15 and O. Reg. 347). As a result, and despite its long-standing use, passive landfill gas venting is no longer acceptable for large landfill sites in Ontario such as the proposed Southwestern Landfill. Therefore, passive venting is screened out from any further consideration in this EA.

6.6.4 Preferred Landfill Gas Management Alternative

Walker proposes to carry forward both flaring and utilization jointly as the preferred gas management alternative for further detailed study in the EA.

Based on the requirements of the *Landfill Standards* the proposed Southwestern Landfill must have a system for gas collection and burning/use (O. Reg. 232/98, s. 15 and O. Reg. 347); therefore, as the Southwestern Landfill is constructed it will be progressively equipped with the necessary piping and equipment to collect the landfill gas that is generated.

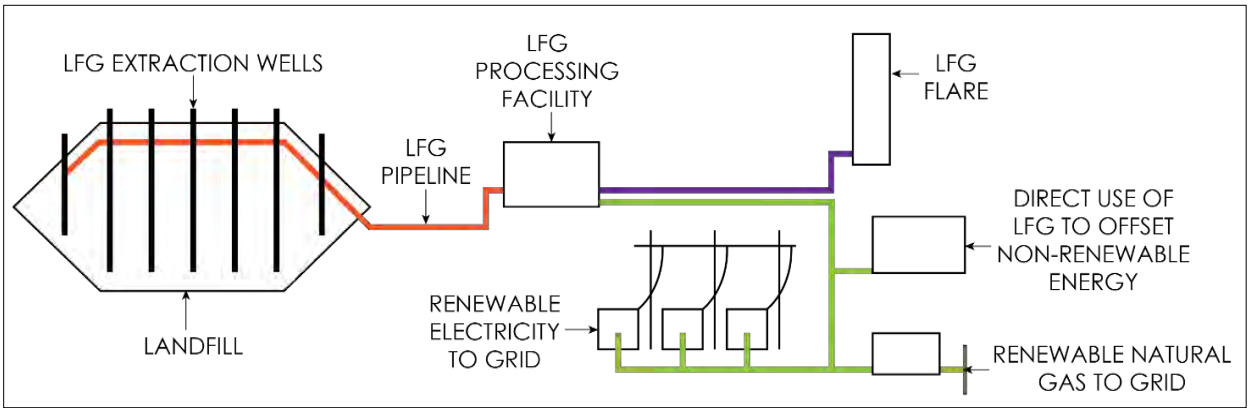
The U.S. EPA advises that a landfill gas energy facility will have the same, or lower, emissions compared to landfill flaring[15]. As a result, beneficial utilization of the landfill gas is widely accepted as an environmental priority in order to extract further energy value from this resource while offsetting fossil fuel usage and its attendant greenhouse gas emissions. It is also a core business for Walker.

However, a flaring system will be required at this site in addition to any gas utilization, for several reasons including:

- Landfill gas production will not reach commercially viable quantities until at least five years into the landfill operations; a flaring system will need to be operated until that time, as well during post-closure when gas production rates decline.
- A flaring system will be required on an ongoing basis as a back-up to utilization (e.g., low demand periods, maintenance shut-down, etc.).

Adopting both flaring and utilization jointly as the preferred gas management alternative for further detailed study in the EA will permit a full characterization of the environmental advantages and disadvantages of using flaring alone, or combined with utilization at a point in the future when gas production rates, economics, *etc*. warrant. (It should be noted that implementation of a landfill gas utilization system in the future will still be contingent on any further approvals (e.g., air emissions, *etc*.) necessary at that time). **Figure 6-11** schematically illustrates the combination of the preferred gas management alternatives.

Figure 6-11: Preferred Landfill Gas management Alternatives



[15] *U.S. EPA Landfill Methane Outreach Program, www.epa.gov*

6.6.5 Input from Stakeholder Consultation

During the development and assessment of the alternative methods, consultation was undertaken with Indigenous Communities, various interested members of the public and local government agencies through the Community Liaison Committee and a series of public events consisting of an open house and workshops. Following is a brief summary of some of the key input received regarding the landfill design alternatives, and its influence on the assessment. More extensive details can be found in Section 10 of this document, and the associated consultation appendices.

Table 6-9: Summary of Stakeholder Input - Gas Management Alternatives

Input	Considerations
Concern regarding safety of burning landfill gas (particularly methane component) and risk for fire or explosion.	In assessing the feasibility of the alternative methods, Walker ensured that the available technologies could be equipped with safety systems to prevent fire or explosion. It is noted in the text that the enclosed gas flares are equipped with automated monitoring and fail-safe systems.
Risk of odour from landfill gas management.	Walker communicated that one of the main purposes of managing landfill gas is to prevent odours. This will be taken into consideration as the landfill gas management system and procedures are developed. For example, in Niagara there is a full-time technician who “tunes” each landfill gas well every week for maximum performance and odour control.

6.7 Haul Route/Site Entrance Alternatives

Previous sections identified the preferred alternatives for footprint location, design, leachate treatment and landfill gas management. This section completes the examination of alternative methods, namely, the principal haul route and site entrance. The objective is to determine the preferred primary haul route and site entrance location, for further study in the EA. Based on community input during the Terms of Reference development, and given that there are existing railway lines directly adjacent to the proposed site, rail transportation is also considered here as an alternative to truck haulage.

6.7.1 Rationale for the Haul Route/Site Entrance Alternatives

It is expected that the majority of the waste shipped to the site will arrive in tractor-trailer loads from transfer stations that could potentially be located anywhere in southern Ontario (with the majority likely approaching from the greater Golden Horseshoe area to the east), or directly from some IC&I customers with larger, bulk sources of waste. Some loads could also arrive in smaller haulage trucks such as luggers or roll-off bins although these are likely to be limited to local customers. In either case, with the exception of customers in close proximity to the site, it can be assumed that all of the trucks will approach the site *via* Highway 401.

The development of haul route alternatives took into account the hierarchy of the road network:

1. Provincial highways.
2. County roads.
3. Local roads (i.e., all other township roads & town streets).

Provincial highways such as Highway 401 are constructed and operated for intra-provincial heavy truck transportation, so it can reasonably be assumed that the waste haulage trucks should travel on these highways to the greatest extent possible. The next priority is for the trucks to remain on County roads as much as possible, since these are also intended and designed for truck traffic within the County. Local roads were given the lowest priority for haul routes, though some are included here where necessary to complete any particular alternative (that is, just the final "leg" from a County road to the site).

Figure 6-12 shows the various interchanges along Highway 401 in the vicinity of the proposed site. Exit # 222 at County Road 6 is the closest. The next closest interchanges to the east are Exit # 230 at County Road 12 (Sweaburg Road) or Exit # 232 at County Road 59 (Norwich Avenue); these were discounted since the trucks would have to travel through built-up sections of Woodstock in order to access a suitable westbound County road. Similarly, the next interchanges to the west at Exit # 218 (County Road 119/Harris Street) or Exit # 216 (County Road 10/Culloden Road) were discounted since trucks would have to pass through built-up areas of Ingersoll to reach an eastbound County road to the site. Therefore, all of the truck haul routes in this evaluation are assumed to start from a common point at the County Road 6/Highway 401 interchange.

The haul routes are all assumed to terminate at a common landfill entrance at the northwestern corner of the proposed landfill footprint[16]. This is the only practical location for the entrance since the landfill will be starting in this area (as discussed in previous sections) and since an entrance anywhere else on the remainder of the site perimeter would interfere with the quarry operator's mining, hauling or processing operations.

Figure 6-13 illustrates the road network around the proposed landfill site, designating County and other local roads. The major rail lines are also shown. This was used as a basis for developing a "long list" of possible haul routes, each of which are diagrammed in **Figure 6-14**, and described further below.

6.7.2 Description of the Haul Route/Site Entrance Alternatives

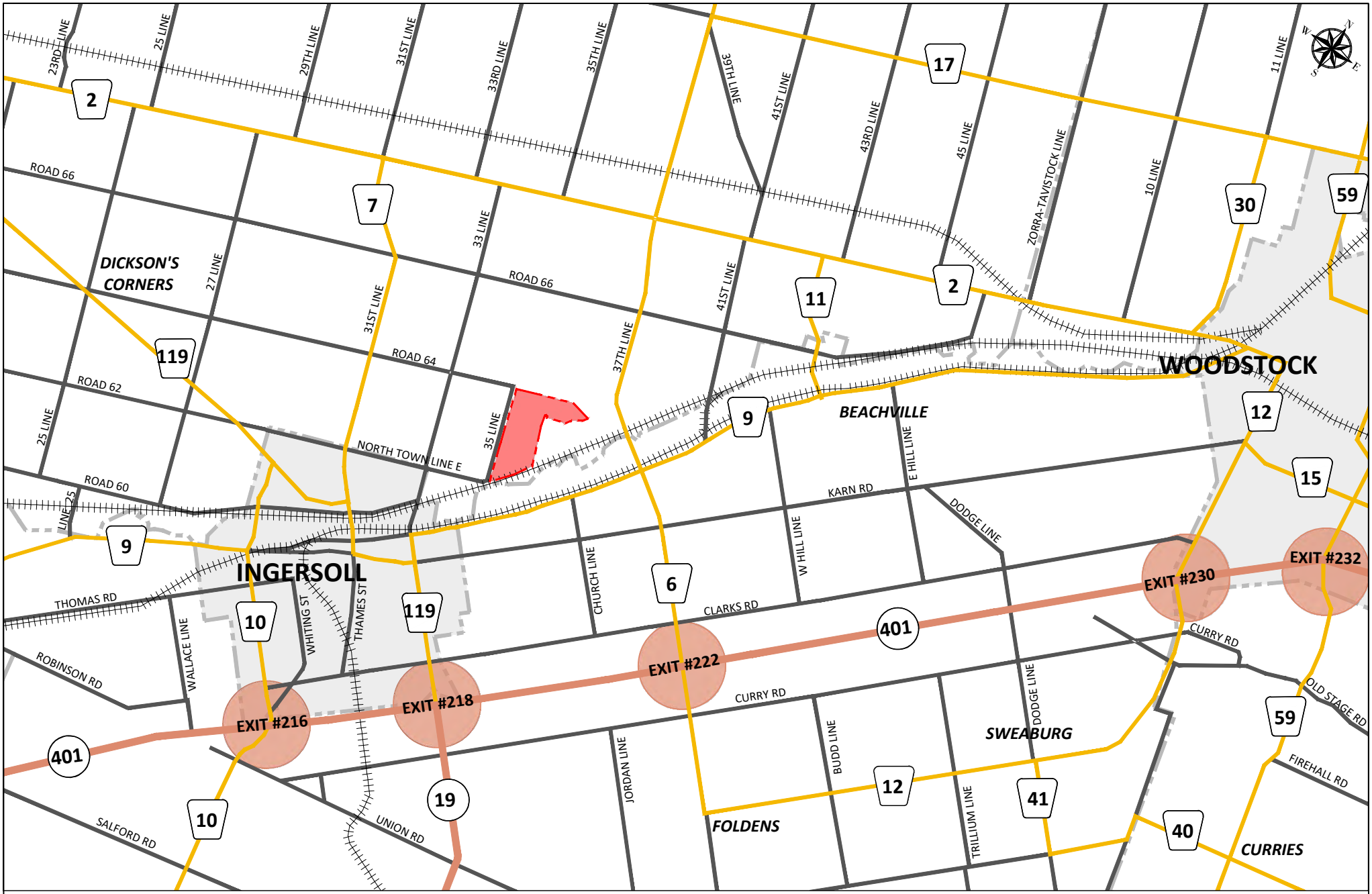
6.7.2.1 Rail Transportation Alternative

Two active railway lines are in close proximity to the proposed landfill site – Canadian National (immediately adjacent to the south) and Ontario Southland Railway (a bit further south, along the south bank of the Thames River). Neither railway company currently provides any waste haulage facilities or equipment, so these would have to be constructed or furnished by Walker.

Rail loading facilities (i.e., transloading facility) would have to be supplied at one or more locations central to customers, perhaps at an existing waste transfer station if there is nearby rail access (or conversely, a new transfer station(s) would have to be built at an existing rail yard). The waste could either be transferred from various customer waste trucks into custom rail cars for transport, and/or any large waste trailers could be loaded directly onto rail cars in an intermodal fashion[17]. Then the shipments would have to be scheduled and delivered under contract with the rail company to the site.

[16] *With the exact location and configuration to be developed later in the EA.*

[17] *An intermodal system would present some logistical challenges since customers would have to relinquish their trailers.*



SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

walker environmental

FIGURE 6-12
PROVINCIAL HIGHWAY INTERCHANGES

LEGEND:

- RAILWAYS
- MUNICIPAL BOUNDARY
- PROVINCIAL HIGHWAYS COUNTY
- ROADS
- LOCAL ROADS
- INTERCHANGES
- AREA OF LANDFILL ALTERNATIVES

SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

FIGURE 6-13
ROAD/RAIL INFRASTRUCTURE

0 1000 2000 Meters

LEGEND:
- RAILWAYS
- MUNICIPAL BOUNDARY
- PROVINCIAL HIGHWAYS
- COUNTY ROADS
- LOCAL ROADS
- AREA OF LANDFILL ALTERNATIVES

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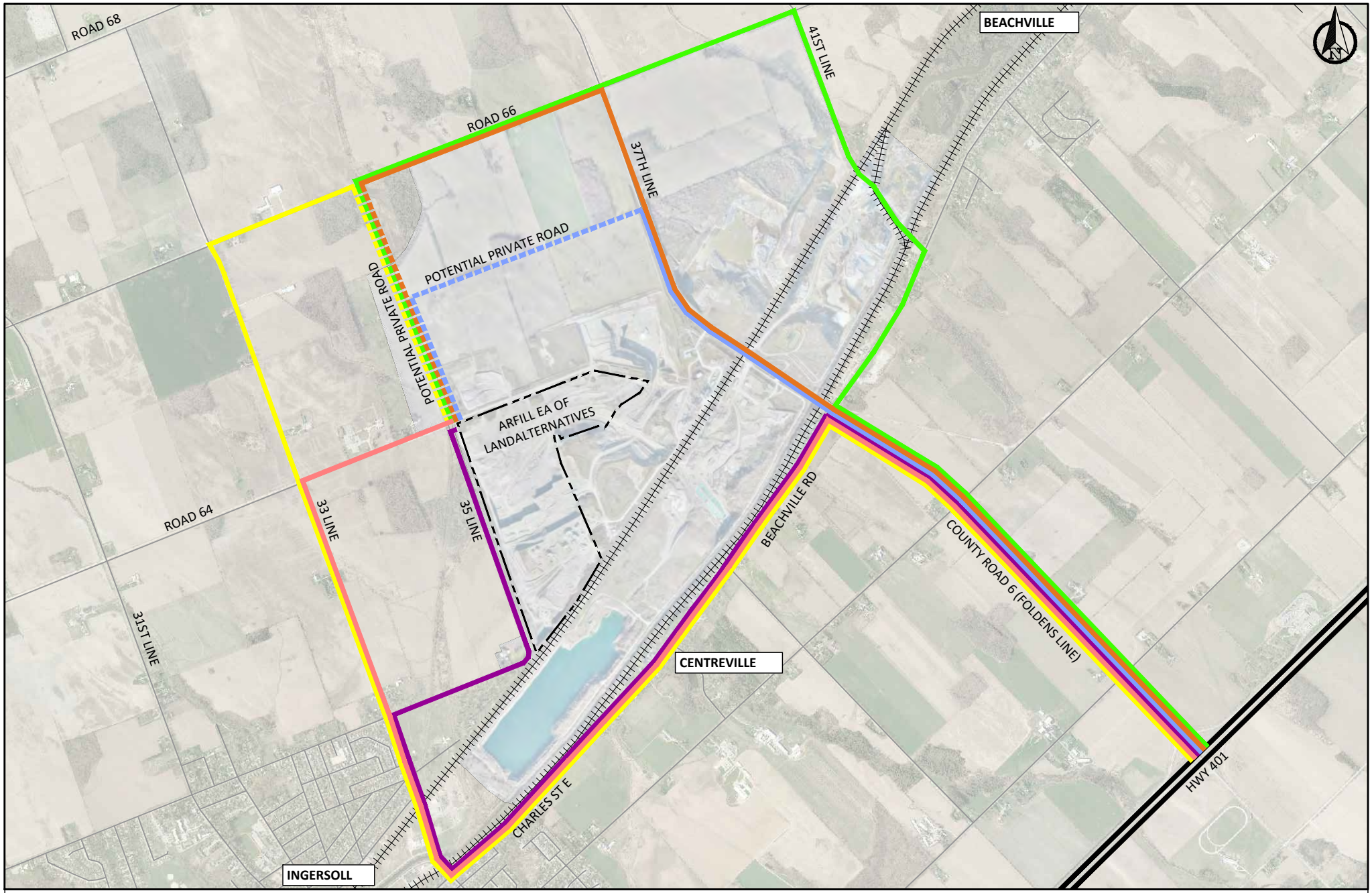

SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

FIGURE 6-14
"LONG LIST" OF POTENTIAL HAUL ROUTE ALTERNATIVES

0 500 1000 Meters

LEGEND:

RAIL LINE

AREA OF LANDFILL ALTERNATIVES

ROUTE 1 ROUTE 2 ROUTE 3 ROUTE 4 ROUTE 5 ROUTE 6

walker environmental

A rail spur would have to be constructed at the landfill site, either a new spur or an extension of an existing spur at the quarry operator's facility. A waste unloading facility would also have to be built to transfer the waste back into short-haul trucks for transport from the rail unloading station to the landfill working face (or trucks could be used to haul intermodal trailers to the working face).

However, with the diverse locations of Walker's current customers across southern Ontario, it would be impractical for all of the waste to flow through the rail-haul system (e.g., it would not make sense for Walker customers anywhere west of Kitchener, and especially local customers in and around Oxford County, to haul by truck to a rail-transfer facility in the GTA, then rail the waste back to Oxford County). Alternatively, if a transload facility were developed in the Hamilton area, any waste generated from areas over approximately 50 km further east or north, trucks would not haul to Hamilton to load on to rail; it would be more economical to haul directly to the proposed Southwestern Landfill. Presumably, therefore, the landfill would have to be equipped for dual-mode (i.e., rail and truck) waste receipt.

6.7.2.2 Haul Route Alternatives

The various alternative routes for truck haulage are shown in **Figure 6-14**. This figure also denotes the portions of each haul route that are on County roads (here only CR#6 Foldens Line and CR#9 Beachville Road), with the balance comprising local roads along with sections of new private roads that would have to be constructed.

Part of Alternative Haul Route #3 crosses the quarry operator's licenced future quarry land; the quarry operator has indicated its willingness to allow the construction of a new section of private haul route here provided it does not impinge upon its future quarry activities. Therefore, its location is still somewhat preliminary at this stage, as indicated by the dotted line in **Figure 6-14**, with the intent that it would be sited far enough north to remain outside of the quarry operation for the duration of the landfill operation, at which time it could be removed. Similarly the "Potential Private Road" running north-south would skirt the western border of the quarry operations, along a former railway line now owned by the quarry operator.

6.7.3 Feasibility Screening

In accordance with the methodology prescribed in the *Approved Amended Terms of Reference*, the following feasibility screening criteria were applied to each of these candidate haul route alternatives:

a) Must be consistent with the stated purpose of the environmental assessment.

b) Must be reasonably capable of approval pursuant to the statutes of Ontario and Canada.

c) Must be technically feasible and proven technology.

d) Must be commercially viable.

The objective of the initial screening is simply to eliminate alternatives from further consideration that are clearly not fundamentally feasible for Walker to carry forward. That is, a "*fail*" on any one of these screening criteria will be based on sufficient information to be certain that the alternative is not feasible. Alternatives that are not screened out at this stage will be carried forward to the next step in the assessment.

Table 6-10 summarizes the results of the screening analysis for the seven potential alternatives, while a further rationale for each alternative that was screened out follows in the sections below.

Table 6-10: Summary - Screening of the Alternative Haul Routes

Feasibility Screening Criteria	Rail Haul	Haul Route #1	Haul Route # 2	Haul Route # 3	Haul Route # 4	Haul Route # 5	Haul Route # 6
Consistent with the stated purpose of the environmental assessment.							
Reasonably capable of approval pursuant to the statutes of Ontario and Canada.							
Technically feasible and proven technology.							
Commercially viable.	✘ Cost prohibitive	✘ Cost prohibitive to re-construct bridge over CN tracks and Thames River					
Conclusion	**Not feasible - screen out from further consideration**	**Not feasible - screen out from further consideration**	**Potentially feasible – carry forward for further evaluation**	**Potentially feasible – carry forward for further evaluation**	**Potentially feasible – carry forward for further evaluation**	**Potentially feasible – carry forward for further evaluation**	**Potentially feasible – carry forward for further evaluation**

6.7.3.1 Screening Rationale - Rail Transportation

Rail haul systems (or "waste-by-rail") have been developed and used for some long-distance waste disposal projects in the U.S. and the U.K. Walker contacted and discussed the "waste-by-rail" scenario with the railway operators noted above and identified the following key issues:

- Waste-by-rail projects have been successful in other jurisdictions that haul over long distances (generally greater than 500 km). A recent example is New York City contracting waste disposal to an incinerator in Niagara Falls, NY, a distance of approximately 650 km.
- Projects under 500 km in distance are not commercially viable.
- There was one Ontario commercial waste-by-rail business established in 2008, called First Waste Transload, shipping from Toronto to U.S. landfills in Michigan and Ohio. The business operated for less than two years and is now defunct; it was not commercially viable.

Based on the above, the rail transportation alternative is not feasible for this site for commercial reasons. Transportation of goods by rail is typically viable only for shipments over longer distances (e.g., greater than 500 km). The estimated average distance of waste delivered to the proposed landfill would

be approximately 150 km. In addition, the haulage of waste to the proposed landfill by truck holds several advantages over rail haul such as flexibility, timing, existing infrastructure (i.e., transfer and road networks) and lastly, economics.

Walker would not control the haulage of waste to the proposed facility and if waste-by-rail infrastructure was developed, it would not be an economically competitive option when compared to haulage by truck, primarily due to the short haulage distance. Simply put, the cost to develop the required waste-by-rail infrastructure would result in transportation costs that would be significantly more than the costs for using the existing trucking infrastructure (i.e., transfer stations, waste transfer trucks), therefore the waste-by-rail infrastructure would not be used due to its higher cost.

For these reasons, rail transportation alternative is screened out from further consideration in this EA.

6.7.3.2 Screening Rationale - Haul Route # 1

This haul route alternative was screened out of the EA because it crosses two existing bridges, one across the Thames River and the other the CN Railway just north of Beachville Road. Inspection of these bridges revealed that heavy truck traffic is not permitted due to weight restrictions and they only permit single lane traffic. Total bridge replacements would be required to accommodate heavy truck traffic along this section of the haul route, assuming that both the municipality and railway would support and permit the reconstruction. The cost associated with these bridge replacements would be prohibitive.

As a result, Haul Route #1 is screened out from any further evaluation in the EA.

6.7.4 Comparative Evaluation

Since there are five potentially feasible alternative haul routes to the site, a comparative evaluation was conducted to weigh the relative merits of these five alternatives following the methodology set out in Section 8.1 of the *Approved Amended Terms of Reference*. The results are summarized below, and the evaluation tables are included in **Appendix C**.

6.7.4.1 Criteria & Indicator Selection

The full list of 41 EA Criteria established in the *Approved Amended Terms of Reference* was reviewed to select those which were relevant to a comparison of the five alternative haul routes, and which would differentiate between them (i.e., where the potential effects were not substantially the same for all alternatives). The results of this criteria screening and selection, and the rationale for each, is included in **Table C-3**, **Appendix C**. Then, for each of the selected criteria, indicators were developed which can be used as a measure or gauge of the relative differences between the five alternative haul routes. These are also detailed in **Table C-3**, along with a listing of the major data sources where the relevant information was obtained. The outcome is summarized below.

Note that because all of the alternative haul routes share a common section along County Road 6 (Folden's Line) between Highway 401 and Beachville Road, this section is excluded from this comparative evaluation (i.e., any effects in this section are the same for all of the alternatives)[18].

[18] *Only for the purposes of this comparative evaluation; potential effects in this section of the haul route are fully examined and characterized as part of the detailed impact assessment studies.*

6.7.4.2 Environment Potentially Affected

Section 6.1 of the *Approved Amended Terms of Reference* contains a preliminary description of the environment potentially affected by the proposed landfill based on available secondary source data, maps, satellite imagery and field reconnaissance. This serves as a suitable general overview for the purposes of this comparative evaluation. The following elaborates on certain elements of that description as they relate specifically to the criteria and indicators selected for this comparative evaluation. **Figure 6-8** in this report provides a map depicting the inventory of land uses and infrastructure features along each of the haul routes.

Road Types and Classifications

A number of the criteria and indicators in this comparative evaluation relate to the different types of roads; the candidate haul routes are composed of combinations of the following, as illustrated in **Figure 6-13** and **Figure 6-14**:

- *County Roads*, including CR#6 (Folden's Line) and CR#9 (Beachville Road).
- *Local Roads*, including 41st Line (Domtar Line), Road 62, Road 64, Road 66, 33rd Line (Pemberton Street) and 35th Line.
- *Former Railway Right-of-Way,* including the former rail bed owned by the quarry operator along its western property boundary.
- *New Private Roads*, consisting of new roadways that would be constructed across private property by agreement with the owner (in this case, the quarry operator).

Stop signs and railway crossings were also inventoried along each of the routes, as illustrated in **Figure 6-8**.

Property Uses

Some of the selected criteria are related to the potential for truck traffic to affect residential properties, public facilities, institutions, farms and businesses along the haul routes. These were inventoried and mapped along each route, as illustrated in **Figure 6-8**.

Special Traffic Types

Beachville Road is a designated bicycle route. Farm entrances were also inventoried and mapped as an indicator of farm vehicle use along each route; these are illustrated in **Figure 6-8**.

School bus travel paths exist along each of the haul routes. Each residence along the haul routes is a potential bus stop location. Individual residence pick up is provided for students along Beachville Road and County Road 6.

Recreational Resources

Any recreational resources along the haul routes were inventoried and mapped as shown in **Figure 6-8**.

6.7.4.3 Mitigation

It is assumed here that, at a minimum, standard management practices would be implemented for any of these haul routes, including:

- Traffic controls and signage to limit speeds, minimize the use of engine brakes and ensure adherence to the designated haul route.
- Dust control watering and sweeping to reduce mud tracking and dust on the roads.
- Litter collection to remove any fugitive litter.

6.7.4.4 Net Effects Analysis

Table C-4 in **Appendix C** summarizes the comparative evaluation of the five haul route alternatives for each of the selected criteria and indicators. The table describes the relative differences in environmental effects for each of the selected criteria, and provides a rationale for the preferred alternative for each criterion, each group of criteria, and overall. In this case, the preferred primary haul route is Haul Route Alternative #3, which runs north from Highway 401 along CR#6 (Folden's Line) to the site entrance, and then westward and southward along a new private road to be constructed across the licenced quarry lands (by agreement) to the landfill entrance. This alternative is preferred on every one of the selected criteria and, therefore, preferred overall.

These results are not sensitive to additional mitigation. Relocating all of the numerous property uses along any of these routes would not be feasible. Although some additional measures could certainly be taken to improve conditions for the movements of farm vehicles, bicycles and trail access points along some of the routes, these mitigation measures would not be sufficient to result in an overall preference for those routes. Therefore, Haul Route Alternative #3 would remain the preferred route regardless of any further mitigation measures that could be applied to any of the other routes.

6.7.5 Preferred Haul Route & Site Entrance Alternative

The preferred haul route to the site will exit Highway 401 to County Road 6, then north to the site entrance onto a new private road running west and then south across the quarry operator's future quarry lands, to a landfill entrance in the northwestern corner of the proposed landfill site.

The key environmental advantages of this preferred haul route/site entrance, relative to the other alternative haul routes examined in this assessment, can be summarized as follows:

- It is the shortest and most direct route to the site, with the fewest intersection crossings, rail crossings and turning movements.
- All of the public road sections are on County Roads, designed and designated for heavy truck traffic.
- It passes the fewest residences, farms, public institutions, recreational uses, or businesses.
- It passes the fewest farm field entrances, and therefore has the least potential to interfere with farm vehicles.
- It avoids truck traffic along the Beachville Road bicycle route.

6.7.6 Input from Stakeholder Consultation

During the development and assessment of the alternative methods, consultation was undertaken with Indigenous Communities, various interested members of the public and local government agencies through the Community Liaison Committee and a series of public events consisting of an open house and workshops. The following is a brief summary of some of the key input received regarding the haul route alternatives, and its influence on the assessment. More extensive details can be found in Section 10 of this document, and the associated consultation appendices.

Table 6-11: Summary of Stakeholder Input - Alternative Haul Routes

Input	Considerations
Preference for the shortest route using public roads (Route #3).	Length of route on public roads was taken into consideration and was an advantage of Route #3 (Preferred Alternative).
Beachville Road is not appropriate for a haul route due to the number of residents and official bike route designation.	Number of residents was used as a key indicator for several criteria. Walker also added bicycle routes as an indicator in the comparative evaluation following initial public consultation. Both of these factors were judged key disadvantages for Routes 4, 5 and 6 along Beachville Road.
Corner at Beachville Road and Pemberton St. is challenging for truck traffic.	Number of truck turns was applied as an indicator in the comparative evaluation, and was a disadvantage identified for Routes 4, 5 and 6 which include the Beachville/Pemberton turn.
Highway 401 Exit 222 (westbound) to County Road 6 is challenging and could post safety risks due to the service station off-ramp.	The exit from highway 401 to County Road 6 will be considered further during the EA. Walker's traffic experts will consult with the Ministry of Transportation (MTO) regarding Highway 401 and Exit 222.
Intersection at 4-way stop at County Road 6 and Beachville Road could present issues, including risk to public safety.	Travel through this intersection is common to all of the alternatives considered in this comparative evaluation. However, it will be studied by experts as part of the detailed Impact Assessment, including a traffic safety evaluation.
Recommendations for additional criteria and indicators for the comparative evaluation.	As a result of initial public consultation, Walker added the following additional indicators to the comparative evaluation: • Number and type of railroad crossings • Length of new road construction required (in regard to potential for archaeological resource displacement/ disruption) • Number of playgrounds along haul route
Recommend that standard noise mitigation include minimizing engine brake usage on haul routes	This was added to the standard mitigation assumptions.

6.8 Summary - Preferred Alternatives

The previous sections detailed the development and evaluation of a range of "alternative methods" in accordance with the scope and methodology set out in the *Approved Amended Terms of Reference.* In summary, based on the screening and evaluation, the following preferred alternatives were selected for further study and assessment in the EA.

Table 6-12: Summary of Preferred Alternative Methods

'Alternative Methods'	Description	Result: Preferred Method(s)
Landfill Footprint	Different locations or configurations on the Carmeuse Lime (Canada) site where the landfill could be located and developed.	The (currently) active quarry area further identified in **Figure 6-2**.
Landfill Design Alternatives	Different landfill configurations (above ground, below ground or a combination) along with compatible liner designs (generic or site-specific, as *per* the Landfill Standards).	A deep design configuration progressing in a north-to-south orientation, equipped with the Ministry's "generic" double composite liner system.
Leachate Treatment Alternatives	Different ways of treating and disposing of landfill leachate, including sewer discharge and/or on-site treatment.	An on-site leachate treatment plant.
Landfill Gas Management Alternatives	Different ways of managing the landfill gas, including flaring, industrial fuel, and/or power generation.	Enclosed flares, with the future development of industrial fuel utilization, renewable natural gas, and/or electricity generation when the gas production warrants.
Haul Route/Site Entrance Alternatives	Different ways for the waste to be transported to the site, including road routes/entrances from Highway 401 and/or rail haulage.	Truck haulage from Highway 401 north on County Road 6, west and south around the quarry operations to an entrance at the northwestern corner of the landfill.

7. Evaluation of the Proposed Undertaking

7.1 Evaluation Methodology

The evaluation of the proposed undertaking, incorporating the preferred alternatives, is to be carried out using a comprehensive impact assessment methodology as set out in the *Approved Amended Terms of Reference*, consisting of the following:

1. Develop a set of ***facility characteristics*** describing, in conceptual terms, the design and operating assumptions for the proposed undertaking, and incorporating a range of basic mitigation measures that will prevent and/or limit environmental impacts.
    - *Combine the preferred alternative methods for the proposed landfill into a design and operating concept, in sufficient detail to provide working assumptions for the impact assessment evaluation.*
    - *Include the typical or normal mitigation measures that would be incorporated into a landfill of this size and type.*
    - *Prepare a facility characteristics report including figures and plans, where appropriate. Include assumptions regarding all of the basic elements of landfill design and operations set out in O. Reg. 232/98 (the Landfill Standards).*

2. Describe the ***environment potentially affected*** by the proposed undertaking, including both the existing environment as well as the environment that would otherwise be likely to exist in the future without the proposed undertaking (i.e., the environmental baseline conditions, or the "*do nothing*" alternative).
    - *Select common reference periods or milestone dates for the environmental baseline conditions assessment (e.g., existing, start of construction, 10-year mark, closure, etc.).*
    - *Prepare a forecast of future land uses in the Site & Site Vicinity, and Along the Haul Routes, using data from municipal official plan documents, and in consultation with municipal planning staff, with specific assumptions regarding the reference periods.*
    - *Select common receptor points for the assessment of overlapping effects between study disciplines.*
    - *Within each study discipline, collect secondary source and field data to characterize the existing environmental baseline conditions.*
    - *Within each study discipline, forecast the future environmental baseline conditions at the reference periods, taking into considerations all of the forecast land uses except for the proposed landfill (i.e., the 'do nothing' alternative).*
    - *Consolidate and document the existing and future baseline conditions in order to characterize the environment potentially affected by the proposed landfill.*

3. Carry out an evaluation of the potential ***environmental effects*** of the proposed undertaking, using the environmental assessment criteria and studies described in Appendix B to the Terms of Reference.

    - *Prepare appropriate indicators for each of the EA criteria listed in Appendix B to the Terms of Reference.*
    - *Within each study discipline, carry out analyses to evaluate the potential effects of the proposed landfill facility on the environmental baseline conditions. Evaluate these against the criteria, indicators, study areas and study durations assigned to each respective study, incorporating input from other studies in order to assess any cumulative effects.*
    - *Prepare an overall matrix (tables) summarizing and characterizing (describing) the potential environmental effects of the proposed landfill for each of the criteria, indicators, study areas and study durations.*

4. Carry out an evaluation of any additional actions that may be necessary to ***prevent, change or mitigate environmental effects***, in order to identify the net effects, and incorporate those that are reasonable and feasible into the design and operations plan for the proposed undertaking.

    - *For any negative environmental effects that are identified in the analysis, carry out an assessment to determine if there are any further actions that could be reasonably be taken to reduce or eliminate the effect.*
    - *Incorporate any further feasible and reasonable mitigation measures into the design and operating concept for the landfill facility. Update the facility characteristics report accordingly.*
    - *Update the evaluation of environmental effects (i.e., Step 3 above), as necessary, to incorporate the additional mitigation measures.*
    - *Update the overall matrix (tables) to characterize the positive and negative net effects of the proposed landfill versus the environmental baseline conditions (i.e., the "do nothing" alternative) for each of the criteria, indicators study areas and study durations.*

5. Prepare a description and evaluation of the ***environmental advantages and disadvantages*** of the proposed undertaking, based on the net environmental effects that will result following mitigation.

    - *Prepare a descriptive analysis summarizing and weighing the relative positive and negative net effects (advantages and disadvantages to the environment) for the proposed undertaking.*
    - *Document the rationale for the proposed undertaking based on the balance of advantages and disadvantages to the environment.*
    - *Prepare a final description of the undertaking based on the revised design and operating concept referenced in Step 4, above.*
    - *Prepare appropriate monitoring and contingency plans.*

- *Prepare appropriate impact management plans.*
- *Document all of the above (including the evaluation of Alternative Methods) in an Environmental Assessment report suitable for submission to the Minister of the Environment for approval under the Environmental Assessment Act.*

(Note that the criteria, study areas, and study durations referenced above from Appendix B to the *Approved Amended Terms of Reference* were also presented previously in **Section 5** in this EA Report.)

7.2 Description of the Proposed Undertaking (Facility Characteristics Assumptions)

Section 5.2 of the *Approved Amended Terms of Reference* presented a preliminary description of the undertaking based on available information at that time (i.e., in advance of the EA studies documented herein). It went on to say that the description of the proposed undertaking would be refined, as necessary, as the EA planning process proceeded and that the EA would contain a detailed description of the undertaking.

This section describes the proposed design, construction and operations of the Southwestern Landfill. These facility characteristics combine the preferred alternative methods, incorporate standard or typical mitigation measures and include all of the required elements of landfill design and operations set out in O. Reg. 232/98 (and the associated *Landfill Standards*).

These facility characteristics have been prepared for the purposes of, and at the level of detail required for, the EA; further technical and engineering details will be provided in a *Design & Operations Report* to accompany Walker's subsequent application for an Environmental Compliance Approval (ECA) under the *Environmental Protection Act*.

7.2.1 Design

7.2.1.1 Location & Dimensions

The landfill is to be located on a portion of Carmeuse's landholdings at its Beachville Quarry Operations in the Township of Zorra, Oxford County. The total area of the landfilling site is approximately 81.6 hectares. The waste fill area within which waste will be deposited occupies approximately 59.3 ha of the site, while the balance of the site will be buffer area (**Figure 7-1**). The buffer area ranges from 30 to 150 m wide around the perimeter of the waste fill area, to be used for:

- Monitoring;
- Maintenance;
- Environmental controls;
- Vehicle access and internal traffic;
- Structures and buildings (offices, works, etc.); and
- Equipment parking and maintenance.

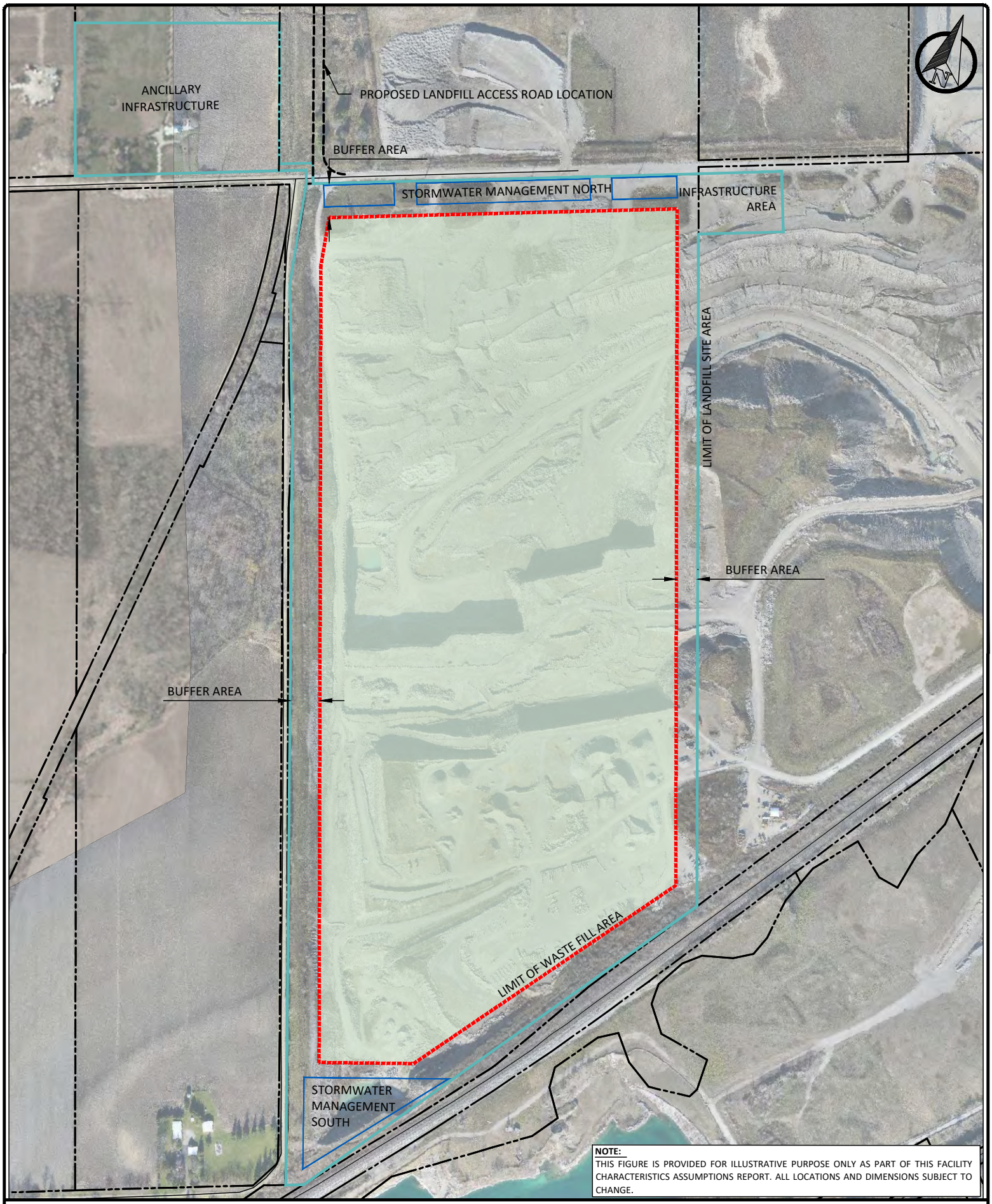

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FIGURE 7-1: SITE PLAN

0 100 200 Meters

LEGEND:

- PARCEL BOUNDARIES
- CN RAIL LINES
- LIMIT OF LANDFILLING SITE AREA
- LIMIT OF WASTE FILL AREA
- STORMWATER MANAGMENT AREA

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The total calculated capacity of waste and daily/intermediate cover is approximately 17.4 million m^3. The final contour plan (**Figure 7-2**) and cross-section drawings (**Figure 7-3**) illustrate the shape, height and depth of the proposed landfill.

The depth of the landfill ranges between about 30 to 40 m below surrounding ground level (including the liner system; see below), with below-ground slopes not steeper than 3:1 (horizontal:vertical). The height above surrounding ground surface is approximately 15 m at the highest point (including the final cover), with above-ground slopes not shallower than 20:1 (to ensure effective surface drainage), or steeper than 4:1 (to prevent erosion of the final cover).

These dimensions result in an average waste thickness of 29.3 m.

Note that more than 80% of the landfill volume is below ground level, consistent with the "deep" design configuration selected as the preferred alternative (see Section 6.4).

7.2.1.2 Site Development Stages

The landfill will be developed in four main stages (**Figure 7-4**).

- **Stage 1** will begin in the northwestern corner of the site and progress in a southerly direction. The capacity of Stage 1 is approximately 4,350,000 m^3 and would last about 5 years at maximum filling rates.
- **Stage 2** is in the northeastern corner of the site and progress in a southerly direction. The capacity of Stage 2 is approximately 4,350,000 m^3 and would last about 5 years at maximum filling rates.
- **Stage 3** is in the southwestern portion of the site. It will begin at the southern limit of Stage 1 and progress in a southerly direction. The capacity of Stage 3 is approximately 4,350,000 m^3 and would last about 5 years at maximum filling rates.
- **Stage 4** is in the southeastern portion of the site. It will begin at the southern limit of Stage 2 and progress in a southerly direction. The capacity of Stage 4 is approximately 4,350,000 m^3 and would last about 5 years at maximum filling rates.

Note that the four stages are approximately equal in volume despite not appearing equal in area in **Figure 7-4**; this is due to the effect of temporary and overlapping waste side slopes required during the operation of the landfill.

Each stage will consist of approximately five cells, each representing approximately one year of landfilling capacity. New landfill liner will be constructed cell-by-cell yearly, or as needed, to provide sufficient space for waste placement and landfill operations. All aspects of each new cell are connected to existing cells, and new stages to existing stages to result in one contiguous landfill liner system.

There will normally be one designated working area of approximately 2,000 m^2 in size for waste placement at any given time to ensure a compact operation. The average height of each daily "lift" or compacted layer of waste will be about 5.5 m.

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FIGURE 7-2: TOP OF COVER CONTOUR PLAN

0 200 400 Meters

LEGEND:
- PARCEL BOUNDARIES
- CN RAIL LINES
- LIMIT OF LANDFILLING SITE AREA
- LIMIT OF WASTE FILL AREA
- STORMWATER MANAGMENT AREA

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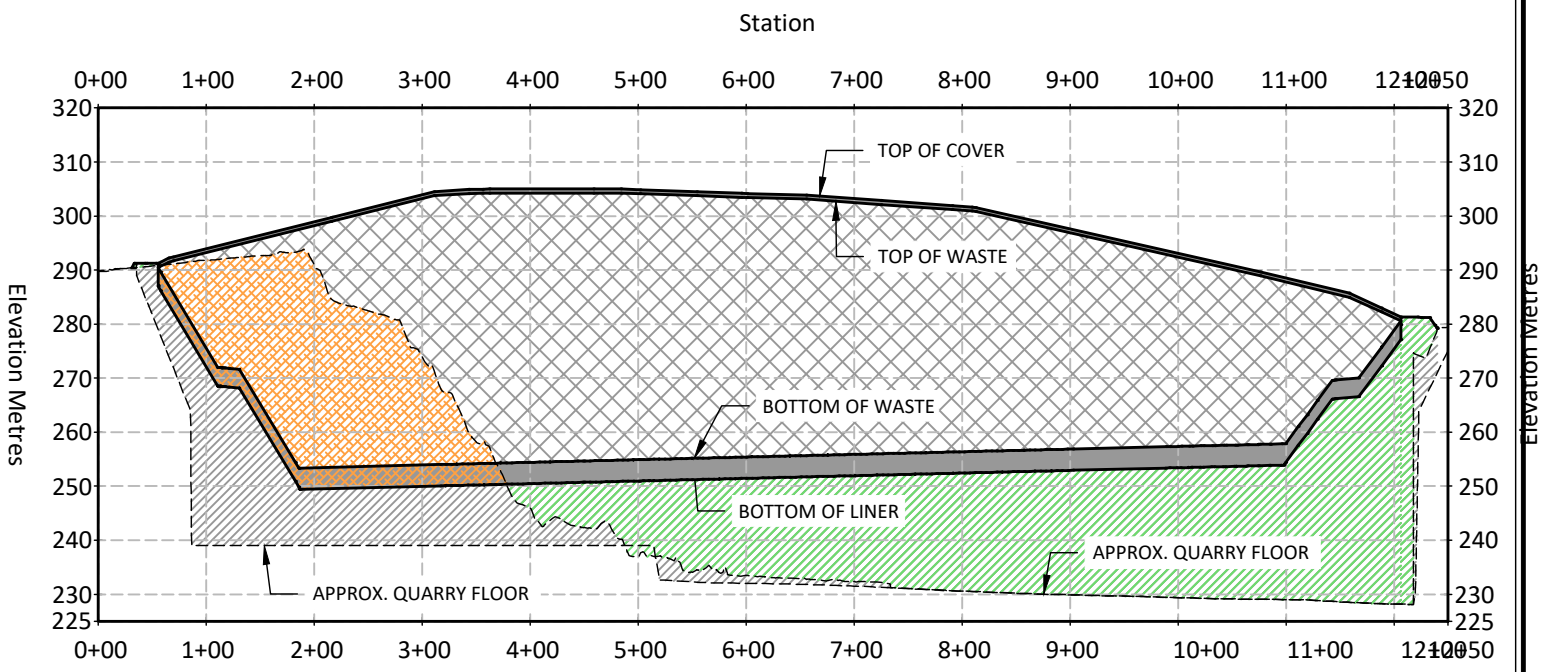
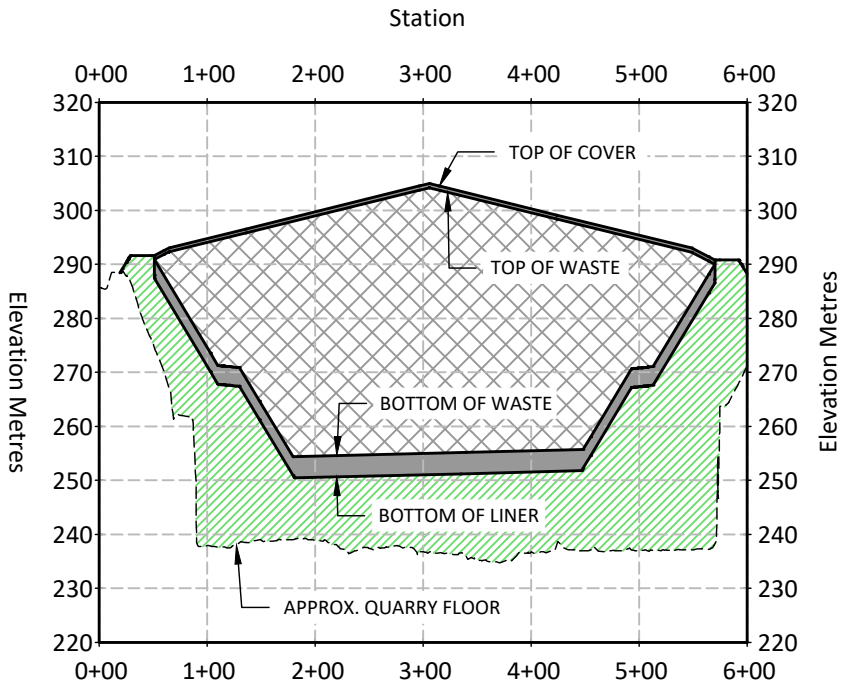


North - South Section View



West - East Section View

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FIGURE 7-3: SECTION VIEWS

LEGEND:
- APPROX. QUARRY FLOOR/WALLS
- PROPOSED GROUND STRUCTURAL
- FILL
- OVERBURDEN REMOVAL
- OVERBURDEN TO BE UNDISTURBED
- LINER
- WASTE

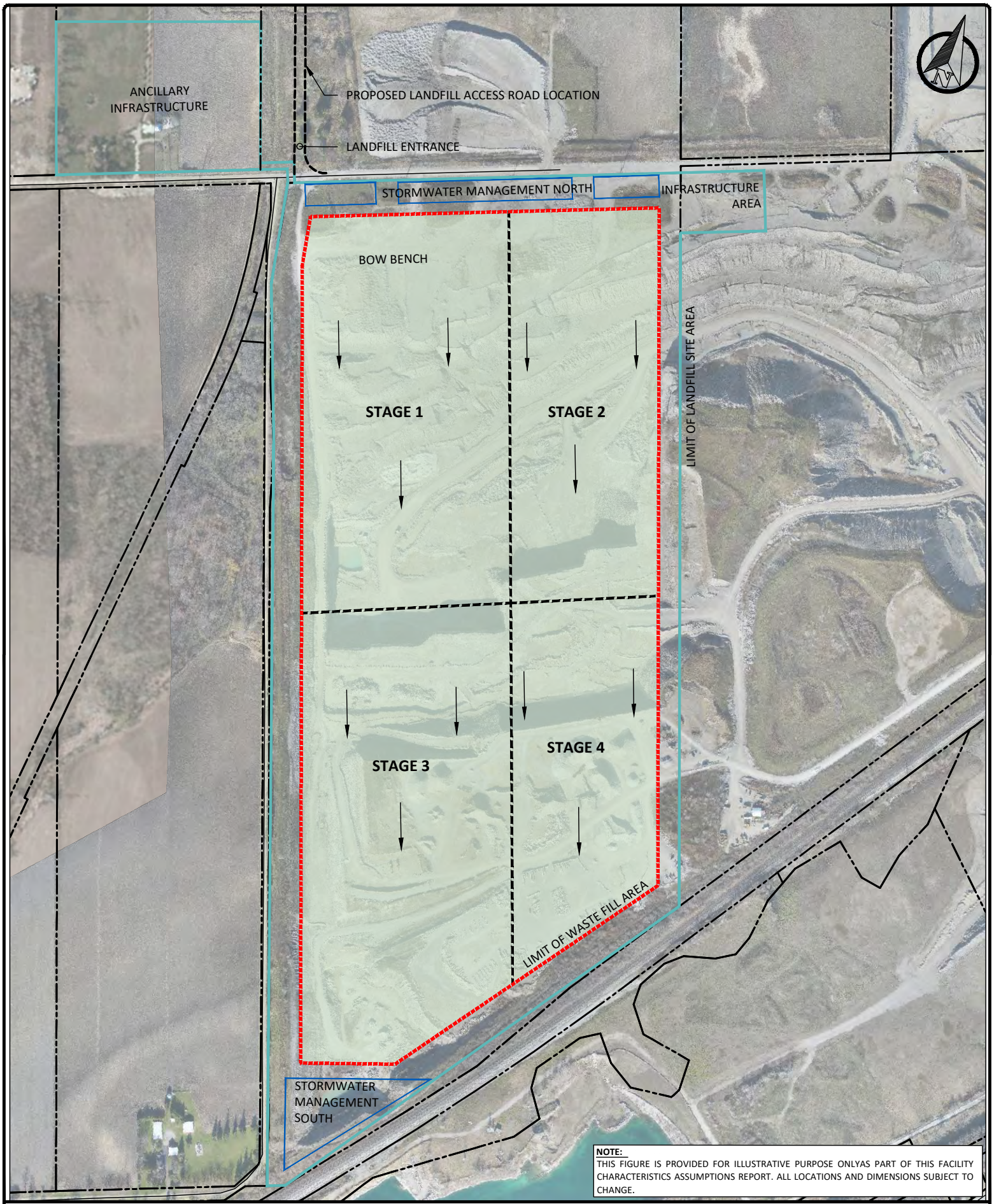

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FIGURE 7-4: LANDFILL STAGES

0 100 200 Meters

LEGEND:
- PARCEL BOUNDARIES
- DIRECTION OF LANDFILL DEVELOPMENT
- LIMIT OF LANDFILLING SITE AREA LIMIT
- OF WASTE FILL AREA STORMWATER
- MANAGMENT AREA LIMIT OF STAGES

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7.2.1.3 Primary Haul Route

The primary designated haul route for the majority of the site traffic will be from Exit #222 on Highway 401, north along County Road 6 and then west through the site entrance across a newly constructed landfill access road around the quarry to the landfill entrance in the northwestern corner of the site (**Figure 7-5**).

Secondary haul routes for local deliveries (if any) will follow the most appropriate County roads to the site entrance on County Road 6.

7.2.1.4 Internal Roads

From the landfill entrance, the primary internal access road will be located to provide access to the weigh scales located in the northwestern corner of the site (**Figure 7-6**). The site perimeter road will continue past the scale along the northern boundary and around the site. The site perimeter road will also be used for maintenance and operational purposes and for access to other landfill facilities such as landfill gas, leachate management and storm water systems.

Other internal roads will branch off from the main perimeter road into the landfill site, and will be constructed and relocated periodically as the landfill progresses through each stage.

7.2.1.5 Buildings, Structures and Supporting Infrastructure

Most buildings and structures will be located along the northern perimeter and northeast corner of the site within the buffer area (**Figure 7-6**), with the exception of the leachate treatment facility being located in the northwest corner. Buildings, structure and supporting infrastructure in this area will include (with approximate dimensions):

- Scalehouse (3 m x 15 m x 4 m high) & weigh scales;
- Site office (30 m x 20 m x 10 m high);
- Employee, guest and contractor parking lot;
- Leachate treatment facilities (see Section 7.2.1.9);
- Landfill gas management facilities (see Section 7.2.1.10);
- Maintenance shop (30 m x 20 m x 10 m high);
- Construction trailers, as required; and
- A fueling station for on-site equipment, meeting the requirements for a *Private Fuel Outlet* under the *Technical Safety & Standards Act, O. Reg. 217/01,* and the *Liquid Fuels Handling Code*.

7.2.1.6 Storm Water & Groundwater Management

During the construction of the landfill, clean precipitation and groundwater seepage on the undeveloped portions of the existing quarry floor (i.e., where no liner construction or waste placement activities have yet occurred) will be segregated from the active landfill areas using berms, ditches and sumps. This water will continue to be managed through the existing approved quarry de-watering systems.

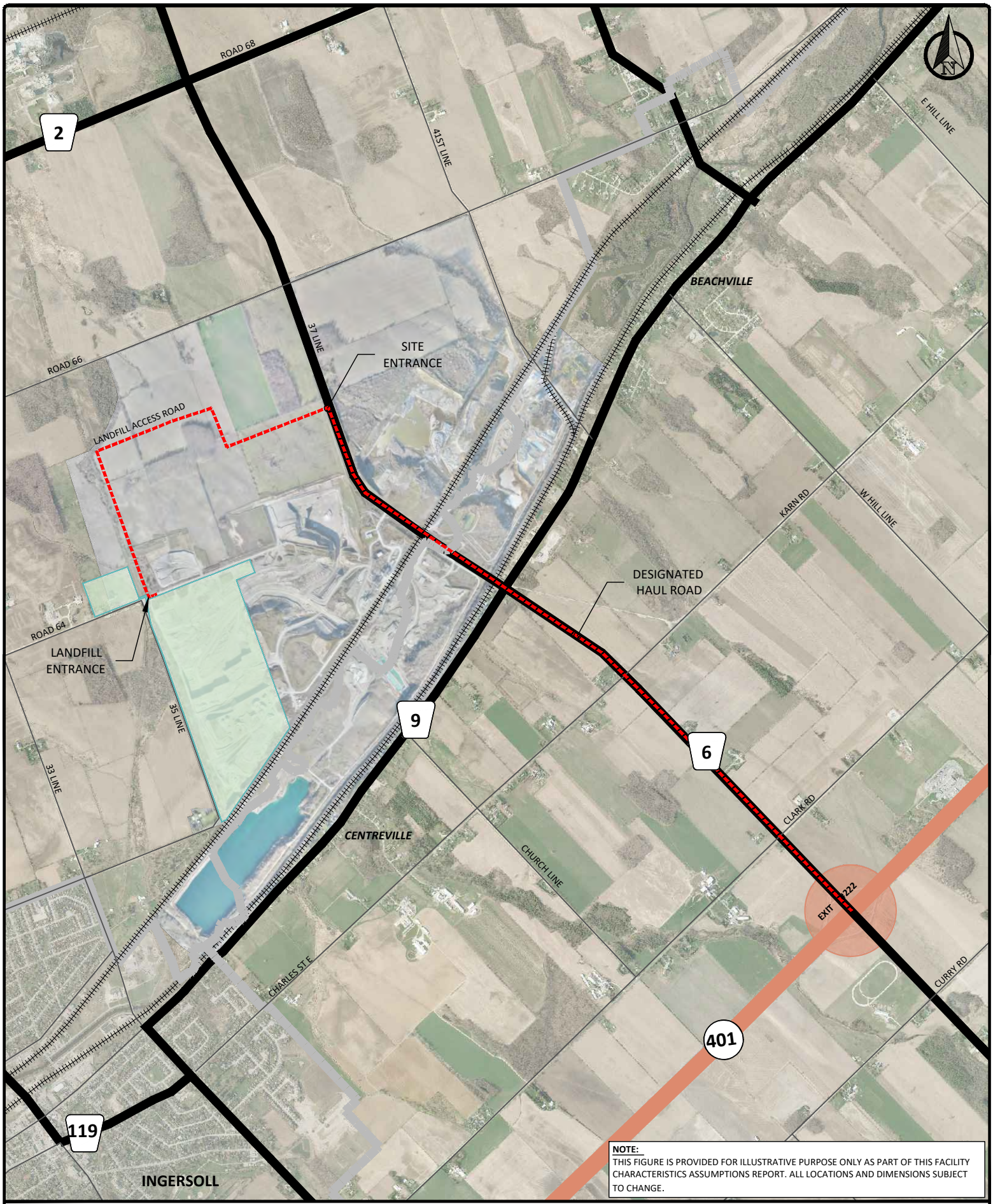

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FIGURE 7-5: HAUL ROUTE & SITE ENTRANCE

0 500 1000 Meters

LEGEND:
- PROPOSED SITE AREA
- RAILWAYS MUNICIPAL
- BOUNDARY
- PROVINCIAL HIGHWAYS
- COUNTY ROADS
- TOWNSHIP ROADS

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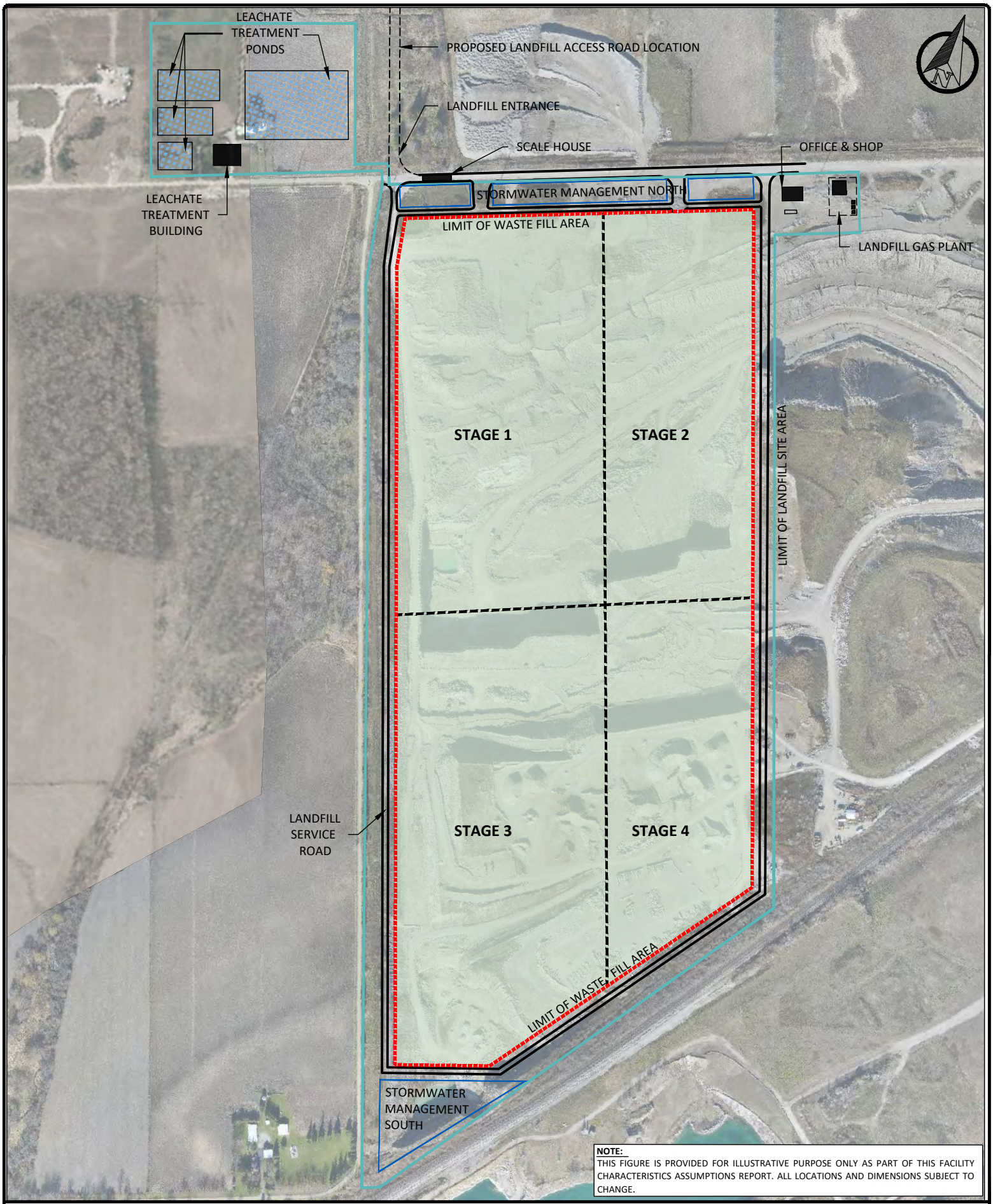

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FIGURE 7-6: SITE INFRASTRUCTURE & ROADS

0 100 200 Meters

LEGEND:
- PARCEL BOUNDARIES
- CN RAIL LINES
- LIMIT OF LANDFILLING SITE AREA
- LIMIT OF WASTE FILL AREA
- STORMWATER MANAGMENT
- AREA LIMIT OF STAGES

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During the operation of the landfill, any precipitation that comes into contact with the active working area or portions of the landfill that do not yet have final cover, will be considered as potentially contaminated (i.e., contact water). Berming, ditches, grading and other works will be used to contain contact water within the uncapped area of the landfill where it will be directed into the leachate collection system for treatment along with landfill leachate.

Precipitation in the perimeter areas of the landfill, including the buffer areas, will be directed *via* perimeter ditching to either one of two storm water management areas (**Figure 7-7**) for sediment removal, monitoring, analysis and eventual discharge. The north storm water management area will provide water quantity and quality control for the northern section of the landfill followed by discharge to the Patterson-Robbins Drain, while the south storm water management area will provide water quantity and quality control for the southern section of the landfill using an existing drainage system, formerly used for the quarry dewatering operations, that also discharges to the Patterson-Robbins Drain. As each phase of the landfill is completed and progressively capped with final cover and vegetation, storm water runoff (i.e., non-contact water) from these areas will be managed in the same way.

Storm water may be used on-site for dust watering or construction purposes, when needed.

7.2.1.7 Liner System

The landfill liner system will be a *Generic Design Option II - Double Liner* as *per* O. Reg. 292/98 and the *Landfill Standards*[19]; a design which is fully protective of groundwater for the entire contaminating lifespan of the landfill.

The liner system consists of the following key components, from top to bottom (**Figure 7-8**):

- A geotextile placed over the primary leachate collection system to filter out fine sediments in the leachate;
- A primary leachate collection system consisting of a 0.3 m thick layer of stones, with embedded perforated high density polyethylene (HDPE) pipes of minimum internal diameter of 150 mm;
- A geotextile that protects the underlying HDPE membrane;
- A 60 mil (1.5mm) thick HDPE geomembrane;
- A 0.75 m thick primary compacted clay liner;
- A geotextile placed over the secondary leachate collection system to act as a sediment filter;
- A secondary leachate collection system consisting of a 0.3 m thick layer of stones, with embedded perforated high density polyethylene (HDPE) pipes of minimum internal diameter of 150 mm;
- A geotextile and/or sand layer that protects the underlying HDPE membrane;

[19] *Note that the maximum waste loading for Generic Design Option II – Double Liner in O. Reg. 232/98 is dependent on chloride levels in the groundwater. The background chloride level for this site has been established through field testing as 10 mg/L which dictates a maximum waste loading of 295,500 m3/ha, corresponding to a maximum average waste thickness of 29.55 m – this design complies. (O. Reg. 232/98 s. 10.(5) & Table 5)*

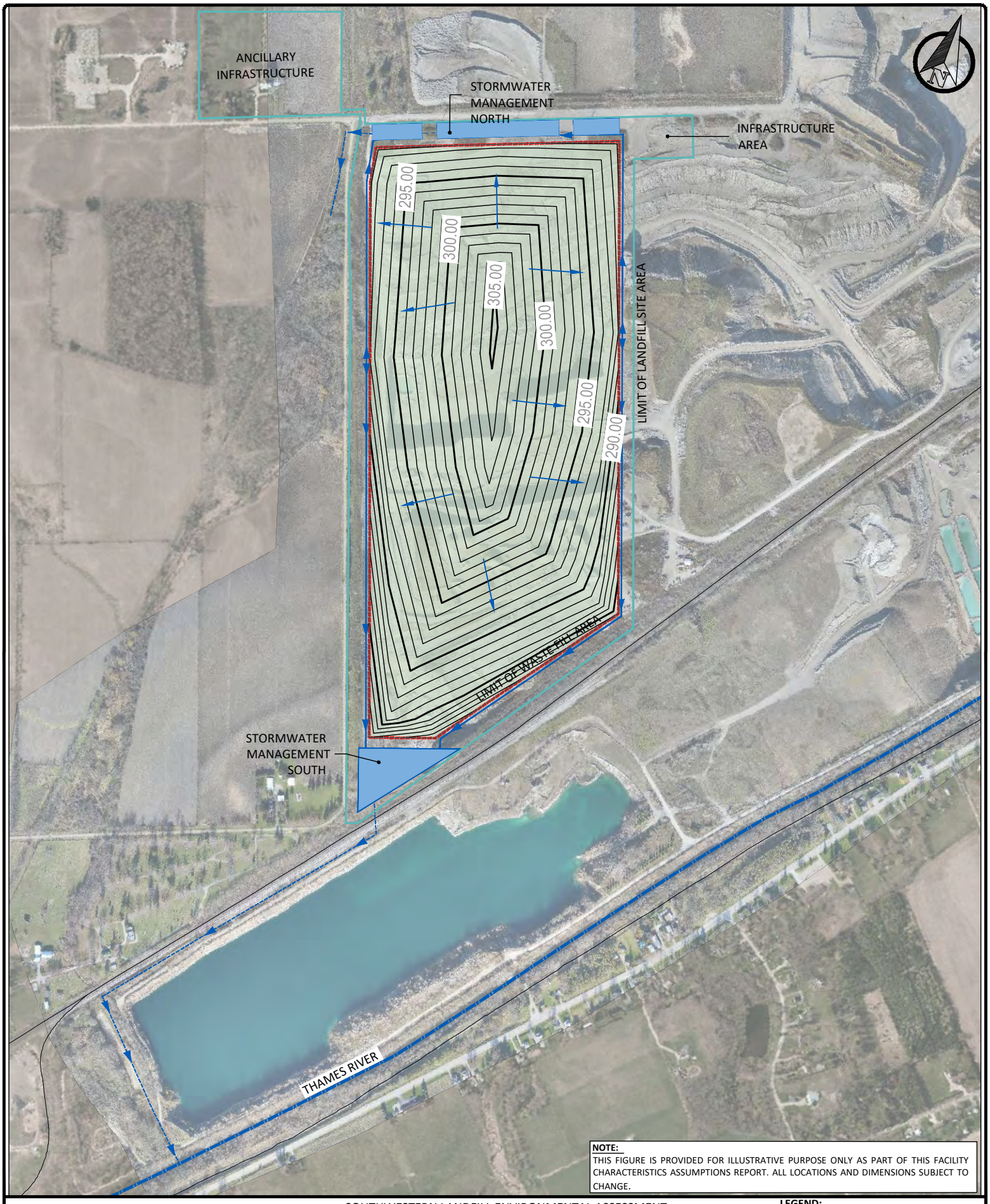

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FIGURE 7-7: STORMWATER PLAN

0 100 200 Meters

LEGEND:
- PARCEL BOUNDARIES
- CN RAIL LINES
- LIMIT OF LANDFILLING SITE AREA
- LIMIT OF WASTE FILL AREA
- STORMWATER MANAGMENT
- AREA THAMES RIVER

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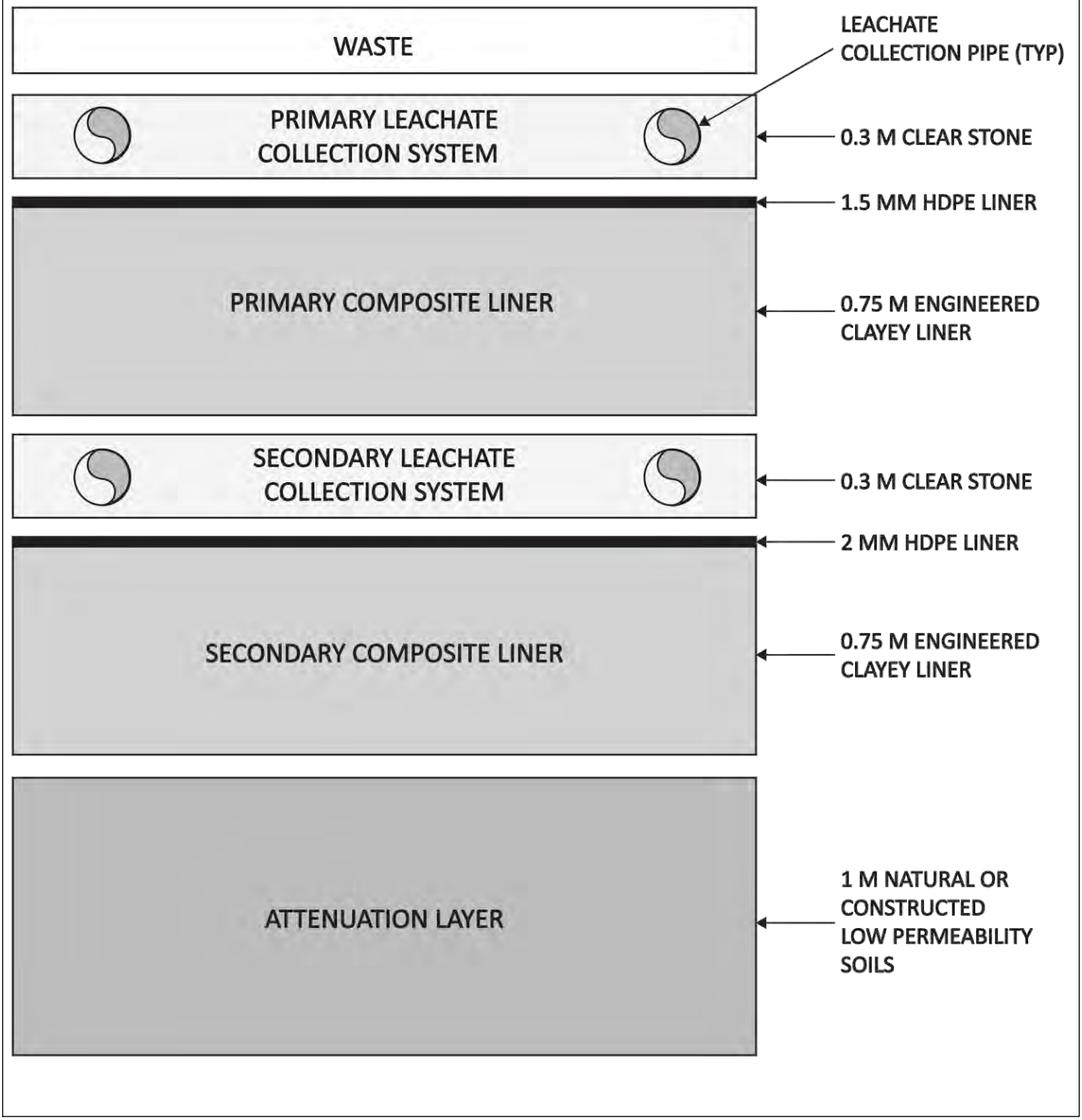


NOTE:
THIS FIGURE IS PROVIDED FOR ILLUSTRATIVE PURPOSE ONLY AS PART OF THIS FACILITY CHARACTERISTICS ASSUMPTIONS REPORT. ALL LOCATIONS AND DIMENSIONS SUBJECT TO CHANGE.

walker environmental

SOUTHWESTERN LANDFILL ENVIRONMENTAL ASSESSMENT

FIGURE 7-8: LANDFILL LINER SYSTEM

0 0.5 1 Meters

- A secondary 80 mil (5mm) thick HDPE geomembrane;
- A 0.75 m thick secondary compacted clay liner; and
- A 1 m thick constructed soil attenuation layer.

Below the liner system, compacted engineered backfill will be placed between the quarry floor and the bottom of the constructed attenuation layer that will range in thickness from 10 m to 25 m (see **Figure 7-3**). The structural backfill materials will be sourced from overburden soils stripped during the on-site and/or adjacent quarry operations. Clay liner material will be sourced from off-site locations with clay soils capable of meeting the compacted clay liner specifications set out in O. Reg. 232/98. Attenuation layer material will be sourced either from overburden strippings, if suitable, or imported from off-site sources if necessary. Fabricated materials including geomembrane, geotextiles, pipe and fittings will be imported to the site from various suppliers, as needed.

7.2.1.8 Final Cover

In accordance with the requirements of O. Reg. 232/98, final cover will consist of (from bottom to top):

- At least 0.6 m of soils that will permit a minimum infiltration rate of 0.15 m/year;
- At least 0.15 m of topsoil;
- Vegetation that will prevent wind and water erosion.

Materials used for final cover will be sourced from overburden soils stripped during the on-site and/or adjacent quarry operations or imported from off-site sources if necessary.

7.2.1.9 Leachate Management

Leachate will flow by gravity drainage through the gravel and pipes in the liner system (see **Figure 7-8**) to the low point at the northwestern corner of the waste fill area. Leachate production (including contact water) will increase gradually with each phase of the landfill. It will peak at full build-out, and decline and stabilize once the site has a fully installed final cover. The leachate generation rate is estimated at approximately 153,000 m^3/yr, or an average of about 419 m^3/day, at full build-out. However, this estimate has been factored up in the longer term to account for forecast climate change[20] as follows.[21]

Table 7-1: Estimated Leachate Generation Rates

Scenario	Estimated Average Annual Infiltration Rate (mm/year)	Estimated Volume (m^3/year)	Estimated Volume (m^3/day)
Base without Climate Change	258	153,000	419
2011-2040 with Climate Change	307	182,000	499
2041-2070 with Climate Change	343	203,000	556

[20] *per Ontario Ministry of Natural Resources and Forestry, Climate change projections for Ontario: An updated synthesis for policymakers and planners; see Section 7.3.3.2.*

[21] *Design and Operations Report; Golder Associates (in preparation). Note that these estimate all meet the O. Reg. 292/98 Generic Design Option II requirement for a minimum infiltration rate of 150 mm/yr.*

Scenario	Estimated Average Annual Infiltration Rate (mm/year)	Estimated Volume (m^3/year)	Estimated Volume (m^3/day)
2071-2100 with Climate Change	352	209,000	573

O. Reg. 232/98 specifies the following assumptions regarding source (raw leachate) concentrations for solid, non-hazardous waste, used in the development of the *Generic Design Option II - Double Liner*:

Table 7-2: Assumed Leachate Concentrations - Critical Contaminants

Contaminant	Leachate Concentration (mg/L)
Benzene	0.02
Cadmium	0.05
Chloride	1,500 to 2,500
Lead	0.6
1,4 Di-chlorobenzene	0.01
Dichloromethane	3.3
Toluene	1.0
Vinyl Chloride	0.055

The leachate will be pumped from the northwestern corner of the landfill *via* forcemain to a leachate aeration pond (approx. 3,200 m^2) located northwest of the landfill (**Figure 7-6**). Once aerated, the leachate will be pumped into a raw leachate holding pond (approx. 15,000 m^2) which will provide sufficient retention capacity to balance (even out) the flow of leachate while providing storage capacity for facility maintenance.

Following pre-treatment, the leachate will then be pumped into the leachate treatment building (approx. 1,200 m^2 x 10 m high) where a combination of physical, chemical, and biological process technologies will be applied to treat the leachate. For the purposes of designing the on-site leachate treatment facility, leachate is assumed to be high in concentrations of organic matter (BOD – Biological Oxygen Demand), ammonia, nitrogen, heavy metals, and chlorinated organic and inorganic salts, and low in total phosphorous (TP). The composition of landfill leachate also varies depending on the age of the landfill cells. The estimated range of leachate quality following initial treatment through pre-treatment ponds (i.e., at the inlet to the treatment plant) is provided below, and based on operational data from Walker's East and South landfills:

Table 7-3: Assumed Leachate Concentrations - Leachate Treatment

Parameter	Units	Design Minimum Inlet Quality	Design Maximum Inlet Quality
Biological Oxygen Demand (BOD)	mg/L	590	2000
Total Suspended Solids (TSS)	mg/L	40	350
Total Kjeldahl Nitrogen (TKN)	mg/L	130	250
Total Phosphorous (TP)	mg/L	0.3	3.5
Iron	mg/L	2	15
Zinc	mg/L	0	1
pH	pH	5	9

Following processing, the treated water from the leachate treatment plant will be stored in an effluent holding pond (approx. 2,000 m^2) in order to balance and regulate flow through a constructed wetland (approx. 4,100 m^2) for final water quality polishing. Lastly, the clean effluent will be discharged to the Patterson-Robbins Drain in proximity to the leachate treatment plant. Some of the treated water may also be utilized on-site (e.g., dust control watering, construction) where it can offset the need to use other sources of groundwater or surface water.

7.2.1.10 Gas Management

Landfill gas will start being generated several months after waste is placed in the landfill and increase through the operational period as waste is received at the site. The landfill gas generation rate is expected to peak within a few years after the landfill is closed with all of its final cover in place, and then slowly decline as the organic material in the landfill decomposes.

A series of horizontal and vertical wells, along with equipment (i.e. blowers), will provide a vacuum to the landfill to collect the landfill gas generated by the site. The landfill gas collection efficiency is estimated at about 85% of the total gas generation based on operational experience at Walker's South Landfill and other similarly designed landfills in the Province.

The landfill liner system will be extended to ground surface at the landfill perimeter, which provides a physical barrier to subsurface landfill gas migration out of the landfill. The operation of the landfill gas collection system will also act to reduce or eliminate positive gas pressure within the landfill and mitigate the potential for off-site subsurface landfill gas migration.

The landfill gas will be piped to the landfill gas plant in the northeastern corner of the site (**Figure 7-6**). A gas control building (approx. 15 m x 15 m x 5.25 m high) will house blowers and equipment, while the collected gas will be incinerated in fully enclosed flares approximately 4.2 m in diameter and 15.2 m high; one flare is needed initially, but up to three may be required over the life of the landfill to match the gas generation rate. The flares are designed to operate at temperatures between 875 °C to 950 °C with a minimum residence time of 0.75 seconds to ensure air quality standards are met in the exhaust. Automated monitoring and fail-safe systems will be incorporated. Flaring of the landfill gas typically converts about 98% of the methane to carbon dioxide (i.e., the destruction efficiency) and consumes more than 99.9% the trace organic compounds.

For the purposes of the EA, it is conservatively assumed that all of the collected landfill gas would be flared throughout the landfill gas generation period. However, as soon as gas quantities permit, possibly as early as the fifth operating year of the landfill, Walker intends to start utilizing the gas for beneficial purposes. Potential utilization projects could include:

- Direct-use as an industrial fuel at nearby industries (e.g., lime kiln);
- Fuel in reciprocating engines to generate renewable electricity; or
- Processing to meet natural gas pipeline specifications and injecting into nearby natural gas distribution or transmission pipelines.

These landfill gas utilization appliances (i.e., kilns, boilers, reciprocating engines) would have similar destruction efficiencies to the flares , so any impacts from utilization are expected to be equal to or less than those of flaring, while the utilization of landfill gas as a renewable energy source is anticipated to

have numerous positive impacts (i.e., displacement of non-renewable energy sources). Walker would be required to obtain any necessary approvals for gas utilization before implementation.

7.2.2 Construction

7.2.2.1 Initial Site Preparation

Site development will begin with grading and developing the infrastructure pad in the northern portion of the site, concurrent with the construction of the landfill access road from the site entrance at County Road 6 to the landfill entrance in the northwestern corner of the landfill. Both entrances will be secured and equipped with gates.

The working infrastructure and associated service connections will also be developed, which will include:

- Weigh scales;
- Internal haul roads;
- Offices & parking lots;
- Leachate treatment facilities;
- Landfill gas management facility and flares[22]; and
- Equipment parking & maintenance shops.

7.2.2.2 Cell Construction (Progressive)

The cells will be constructed sequentially as the landfill progresses. Each cell will be developed in a generally similar fashion[23], as follows.

Selected soils (obtained from the adjacent quarry overburden stripping operations) will have been hauled, placed and compacted on the former quarry floor to form the structural backfill below the liner system. These will be further graded, shaped and compacted, as necessary. The below-grade side slopes will be shaped to no steeper than 3:1 (horizontal:vertical).

Next, the liner system will be constructed on the completed structural fill. Necessary quantities of clay, crushed stone, geomembrane, geotextile, and piping will be hauled and stockpiled for use as needed for cell construction. The liner layers will be placed and constructed as *per Generic Design Option II - Double Liner,* O. Reg. 292/98 and the *Landfill Standards Guideline*, along with the supporting infrastructure for leachate collection (i.e., leachate headers, pumping stations, clean-outs, *etc*.).

As the waste layers are placed and compacted above the liner, the gas collection system will be installed within the waste as required, consisting of a series of gas collection headers, laterals, and vertical and/or horizontal extraction wells.

Intermediate cover will be applied in areas where landfilling has been temporarily discontinued for six (6) months or more.

[22] *May be deferred for several years until sufficient landfill gas is being produced.*
[23] *Exact requirements will vary from cell-to-cell.*

Lastly, when the cell is full and capable of maintaining final design contours, final cover will be applied. Following testing to confirm material suitability for final cap, selected soils will be hauled to the cell, placed, graded and compacted (if required). Final cap slopes will be shaped to no steeper than 4:1 (horizontal:vertical) and no shallower than 20:1.

7.2.3 Operations

7.2.3.1 Anticipated Start-up and Duration

Subject to the time required for approvals, construction is projected to commence in 2021, and landfilling to commence in approximately 2023. The site is estimated to receive waste for approximately 20 years, at the maximum rate of receipt and an in-place density of 1.0 tonnes/m^3. Actual site life could vary based on actual annual waste receipts and densities. Post-closure care and maintenance will continue after closure, until such time as no longer required.

7.2.3.2 Waste Acceptance

The site will accept up to 850,000 tonnes *per* year of solid, non-hazardous waste generated in the Province of Ontario plus daily and intermediate cover soils. Daily and intermediate cover soil requirements are expected to be up to 250,000 tonnes *per* year. Daily and intermediate cover materials may consist of soil or other approved alternative (non-waste) materials, or they may be selected from suitable waste materials approved for receipt at the landfill. Therefore, the total combined waste receipt may be up to 1,100,000 tonnes *per* year. Where daily and intermediate cover materials are sourced from suitable and approved waste materials, these materials will be included in annual waste receipt limitations set out by the site approvals.

The maximum daily waste receipt is proposed to be 10,000 tonnes *per* day.

Waste acceptance procedures will be adapted from those currently in use at Walker's South Landfill, including advance characterization and pre-approval of the waste, on-site waste weighing and inspection on arrival, and further inspection of the waste as it is unloaded at the landfill face. Protocols will also be in place for removing any rejected loads from the site.

7.2.3.3 Traffic Volumes

The majority of the waste shipped to the site is expected to arrive in tractor-trailers from transfer stations that could potentially be located anywhere in Ontario (with the majority likely approaching from the greater Golden Horseshoe to the east), or directly from some Industrial, Commercial and Institutional (IC&I) customers with bulk sources of waste. Some waste could also arrive in smaller haulage trucks such as luggers or roll-off bins though these are likely to be limited to local customers. There will also be traffic associated with other facility requirements such as construction materials, liner clay soils, and employees/contractors.

The average daily traffic volumes are estimated as follows:

Table 7-4: Average Daily Landfill Traffic Volumes

Required Service	Vehicle Type	Trips/Day[a]
Waste Import (Long-haul)	Walker Floor/Tipper – Tractor Trailer	79
Waste Import (Short-haul)	Lugger, Roll-off, Collection Truck	75
Soil Import (Long-haul)	Dump Trailer	21
Soil Import (Short-haul)	Triaxle	7
Liner Clay	End Dump – Tractor Trailer	7
Leachate Collection Stone	End Dump – Tractor Trailer	3
Misc. Construction Materials	Tractor Trailer	1
Misc. Construction Materials	Tandem Delivery Truck	1
Personnel	Pick-up Truck/Car	16

[a] *Round-trips; i.e., does not count arriving and leaving the facility as separate trips.*

Through direct communication and signage, Walker will advise customers regarding the designated haul route to the site and require that customers use this route to the fullest extent possible, otherwise warnings and/or bans will be issued according to Walker's existing operating policies. Walker will also advise any local customers to use only Regional roads to access the site, and actively discourage landfill truck traffic on any local roads around the site (aside from trucks that must make waste pick-ups on those streets).

7.2.3.4 Hours of Operation

The proposed waste receiving hours are Monday to Friday 7:00 a.m. to 5:00 p.m. and Saturday 7:00 a.m. to 1:00 p.m. Daily site preparation and closure activities may occur for up to one hour before and two hours after these times. The site will be closed on Sundays and statutory holidays.

7.2.3.5 Waste Placement

Waste trucks will be directed to off-load in the designated working area (active face). Daily working areas will generally be limited to no more than 2,000 m^2 in size in order to minimize the amount of waste exposed at any given time. Waste will be spread, graded and compacted with bulldozers and landfill compactors in layers generally no more than about 1 m thick. Special protocols will be in place for wastes that are identified through the waste acceptance procedure as especially dusty or odourous. Burning or scavenging will not be permitted.

7.2.3.6 Daily & Intermediate Cover

Daily cover will be applied following each day's landfilling operations to control potential nuisance effects, to facilitate vehicle access on the site, and to ensure an acceptable site appearance is maintained. Suitable solid, non-hazardous wastes will be segregated from the incoming waste streams for use as daily cover, otherwise suitable soil obtained from the adjacent quarry operations will be used. Approved alternative daily cover may also be used.

Intermediate cover will be applied to landfill areas where landfilling has or will be temporarily discontinued for six (6) months or more, consistent with O. Reg. 232/98. Soil suitable for the control of water and wind erosion will be used for intermediate cover (or other equivalent surface treatments that achieve the same purpose), obtained from suitable solid, non-hazardous waste soils that are segregated

from the incoming waste streams, or from soil available on-site or adjacent (i.e., quarry overburden stripping).

7.2.3.7 Nuisance Controls

The nuisance controls for the landfill operations will include the following measures:

- Road sweepers/flushers will be used regularly on internal paved roads, parking areas, and adjacent external roadways, as required, to remove dirt and dust.
- Internal unpaved roads will be watered when necessary to minimize dust emissions (except during freezing conditions when roadway ice would be a safety hazard; a suitable substitute may be used).
- Speed limits will be implemented on internal roads to limit dust generation.
- Permanent litter fencing will be erected at key locations around the site, and mobile litter fences will also be placed at the working areas to catch blowing litter.
- Litter collection will be regularly carried out on-site and in the vicinity of the site to remove any fugitive blowing litter.
- Birds of prey, noisemakers and other industry standard bird control methodologies will be used daily during operating hours to discourage birds from gathering and scavenging at the landfill.
- Pest control measures will be employed if any vermin are determined to be an issue.
- Odour control measures will include, but are not limited to, the adaptive application of a small working face, daily cover, and ongoing refinements to the operation of the gas collection and leachate treatment systems.
- Traffic control measures such as signage and traffic enforcement personnel may be employed to limit speed, minimize the use of engine brakes and ensure that trucks use the designated haul route.
- Regular inspections by landfill staff to observe and record any operational issues and corrective actions.
- A formal program for soliciting, recording and responding to public complaints and recording corrective actions.

7.2.3.8 Monitoring

Routine monitoring and reporting systems will be established including:

- Functional and operational equipment (pumps, flares, etc.);
- Leachate quantity and quality;
- Groundwater levels and quality;
- Surface water flows and quality;
- Treated leachate quantity and quality;
- Landfill gas collection and perimeter monitoring;

7.2.3.9 Personnel Requirements

The site is anticipated to typically require the following personnel for the landfill operations:

- 1 operator for each piece of heavy equipment (see below);
- 1-3 scale inspectors/scale operators;
- 1 road cleaning operator;
- 2 litter control technicians;
- 1 landfill superintendent;
- 1 landfill gas control/utilization plant operator;
- 1 leachate treatment plant operator;
- 1-2 bird control technicians; and
- Various subcontracted and temporary personnel as required for construction, operation, daily / intermediate cover supply and application, closure, and maintenance activities.

7.2.3.10 Equipment Requirements

The routine construction and operation activities at the site will typically involve the following heavy equipment (in addition to waste haulage trucks arriving at the site; see previous sections):

- 3 - 4 waste compactors;
- 1 excavator;
- 4 off-road haul trucks;
- 1 - 2 tippers (to empty waste trailers);
- 1 - 2 soil compactors;
- 1 bulldozer for landfill operations; and
- 1 bulldozer for maintaining inbound cover material.

Additional equipment will be required periodically during construction and closure phases which are expected to occur up to eight months per year.

7.2.3.11 Closure and Post-Closure Care

When the landfill reaches its full waste capacity, the site will be closed to any further waste delivery and the final cover will be completed over the remaining areas of the site. A closure report will be prepared in advance and submitted for Ministry approval detailing the closure and post-closure plans, in accordance with the requirements of O. Reg. 232/98.

Post-closure activities will then be limited to ongoing maintenance, monitoring, inspection, record-keeping and reporting, as well as continued operation of the leachate treatment plant, gas management plant, and storm water management systems.

At some point in the post-closure period, the access road across the quarry property will be decommissioned due to the quarry advancement. At that time access to the site for long-term care will be *via* an existing quarry access from Road 64 to the west.

The potential end uses assumed for the purposes of the environmental assessment studies include passive green space and agriculture. However, the landfill will be designed with sufficient flexibility to accommodate other potential end uses, to be determined near the time of closure and subject to any applicable regulatory approvals at that time.

7.2.4 Inspection, Maintenance & Record Keeping

Comprehensive inspection, maintenance and record keeping programs will be set out in the *Design & Operations Report*, and regulated under the site's *Environmental Compliance Approval*. Inspection and maintenance will include all of the major control systems for leachate, gas, groundwater, and storm water, as well as a variety of operational activities including:

- Repairs to fencing, gates or signage;
- Maintaining vegetation on the final cover or other landscaping;
- Repairing areas of significant erosion and addressing any related drainage issues;
- Removing litter;
- Repairing roads or structures;
- Tidying up work areas;
- Removing excess sediment, mud or dirt;
- Equipment repairs and maintenance; and
- Repairs to any monitoring equipment.

Records will be kept of all inspection and maintenance work, along with daily records of the construction and operation activities at the site. The records will also include any public complaints and actions taken to resolve those complaints.

7.2.5 Climate Change Adaptation

The proposed design and operation of the landfill site incorporates certain elements to add resilience to climate change and extreme weather events, as detailed in the *Design and Operations Report* (Golder; in preparation). For instance:

- The estimates for precipitation infiltration through the landfill cap and surface water run-off on the landfill cover have been factored to account for forecast climate change;
- The storm water management system has been sized to accommodate forecast climate change and/or sufficient space has been made available in the design for long-term modifications to allow for climate change adaptation; and
- The leachate treatment plant and leachate holding ponds have been designed to accommodate forecast climate change over the landfill operational period, and sufficient space has been

allocated for long-term expansion of the leachate treatment infrastructure to allow for climate change adaptation.

A number of the operational contingency plans proposed for the landfill site (see Section 8.2) also include measures to respond to immediate or short-term extreme weather events such as heavy snowfall or flooding.

The design and operations proposed for the Southwestern Landfill are sufficiently flexible to allow for periodic adjustments as weather patterns change over time. Walker currently receives a forecast three times daily from a professional service that outlines weather to be expected over the next 72 hours to assist in making adjustments to operations. In addition, Walker receives monthly bulletins (Browning World Climate Bulletin) that includes long term weather patterns and forecasts for all Walker locations throughout the province. Based on this information, Walker can adjust operations or improve infrastructure accordingly in a timely manner.

7.2.5.1 Background

In response to Amendment #9 to the *Approved Amended Terms of Reference*, Walker committed to examine in this EA whether there are further opportunities for the diversion of wastes from the proposed landfill.

The reader is directed to Section 7.1 of the *Approved Amended Terms of Reference* and, in particular, Supporting Document No. 3, Attachment No. 1 for a comprehensive description of the substantial investments that Walker had already made as of 2013 in waste diversion businesses and programs in the province. On that basis, Walker committed in the *Approved Amended Terms of Reference* to continue to pursue and implement further waste diversion programs separately from, and in addition to, the proposed Southwestern Landfill, as suitable business opportunities arose.

The following sections provide a summary of the further waste diversion assessment carried out as part of this EA; a full description is contained in **Appendix H**.

7.2.5.2 Further Diversion Opportunities

During the course of this EA, Walker gave further consideration to potential diversion opportunities for the types of solid, non-hazardous waste that would be disposed of at the proposed Southwestern Landfill, and concluded that in the immediate future, increased diversion is most effectively achieved at the source(s) and/or through Walker's existing waste diversion and resource recovery system, rather than at the proposed landfill site.

Walker's experience at its existing landfill site is that by the time mixed waste loads are delivered at the landfill they are too cross-contaminated to effectively and efficiently separate the various components that could be diverted. Even higher-value recyclable materials like paper and cardboard, for instance, are rarely clean enough to meet the strict requirements of the recycling end markets (both North American and International) after they have been mixed with other wastes. Therefore, Walker has primarily focused the development of its current waste diversion system, consisting of 25 individual facilities across the province, on source-separated waste streams.

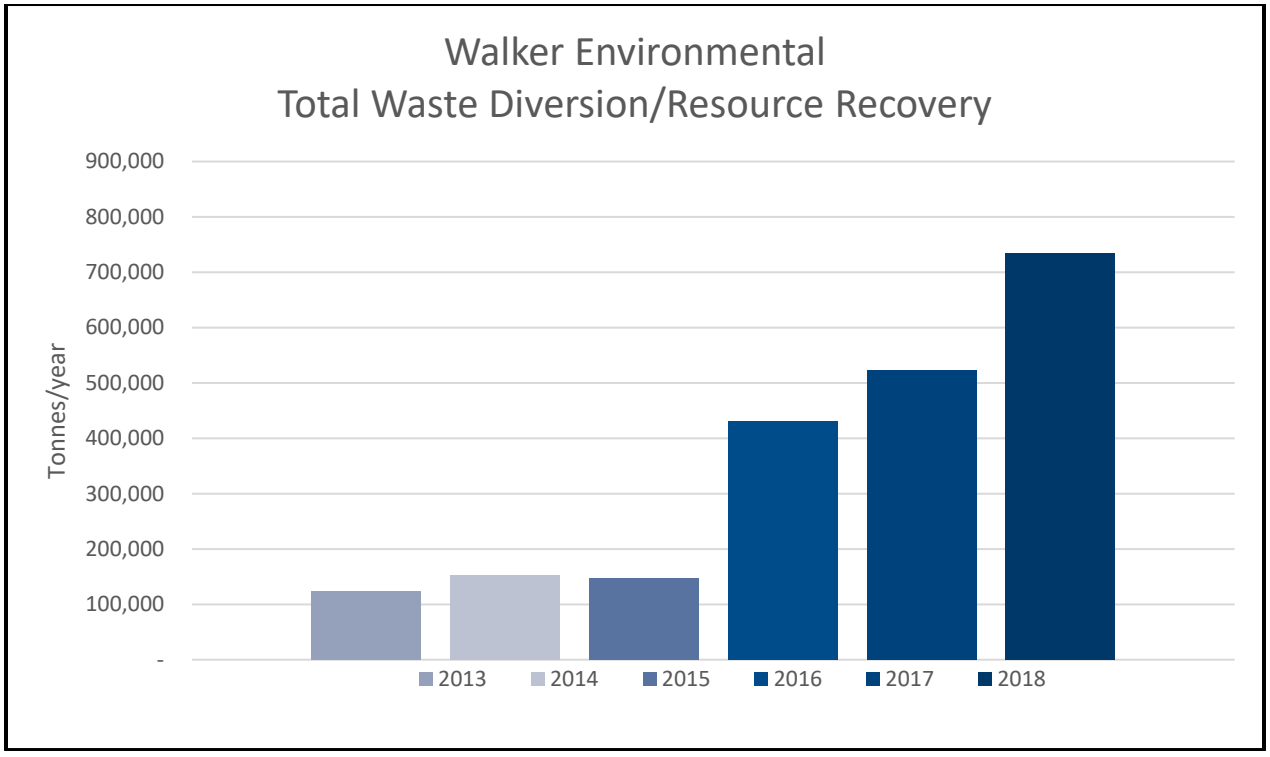
Note that while some of these waste diversion facilities are co-located at the same site as Walker's landfills in the Niagara Region (the "Niagara Falls/Thorold Resource Recovery/Waste Management Campus"), and benefit from shared infrastructure, they actually divert source-separated waste streams rather than mixed loads delivered for final disposal at the landfill. Walker intends to take a similar approach with the Southwestern Landfill. That is, as business opportunities arise and Walker continues to expand its overall waste diversion business, it may make sense at some point in the future for Walker to co-locate one or more of these facilities at the Southwestern Landfill.

Walker has built much of its system around source-separated organic waste diversion. This is consistent with the Province's recent report *Ontario's Food and Organic Waste Framework: Action Plan* which places a priority on organic waste source separation as the most significant opportunity to increase Ontario's waste diversion rate with the goal of reducing the need for new or expanded landfills.

7.2.5.3 Update - New Diversion Initiatives (Since 2013)

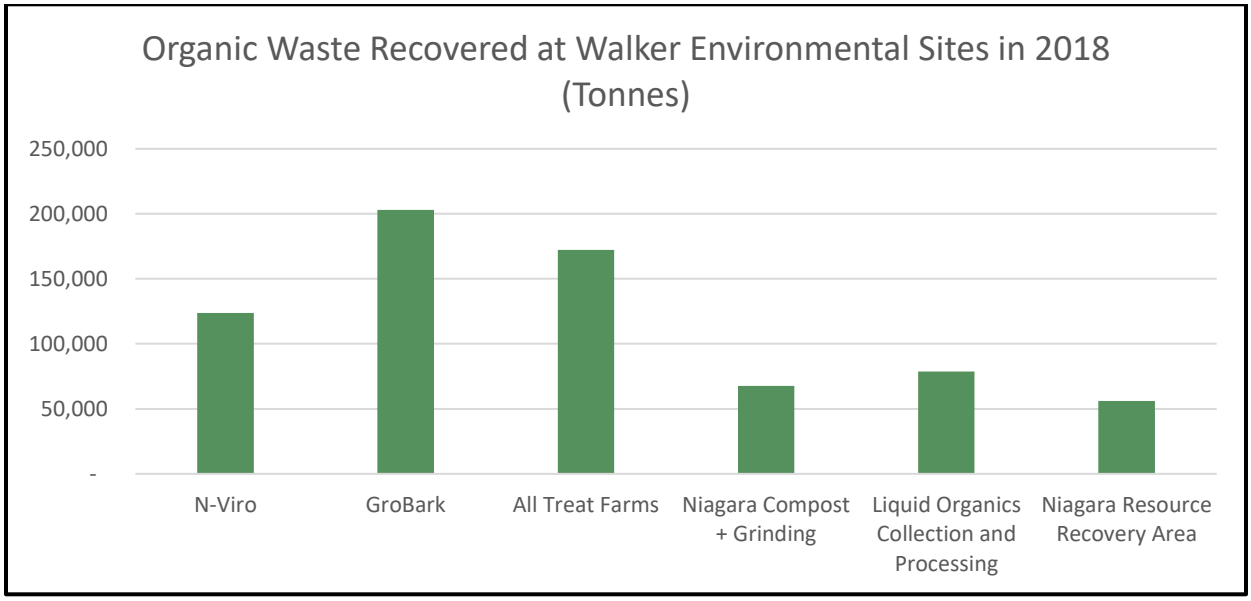
Based on substantial growth since 2013 (**Figure 7-9**) Walker is now one of Ontario's leading waste diversion and resource recovery companies. Its resource recovery businesses include: food waste composting, liquid organics collection and processing, municipal biosolids stabilization, waste wood processing, low-carbon alternative fuels and landfill gas utilization. In total, *Walker currently diverts **over 725,000 tonnes** of waste from landfill per year and produces sustainable end-products that are reintroduced to the market.*

Figure 7-9: Walker Environmental - Total Waste Diversion/Resource Recovery (2013-2018)



The majority (about 95%) of this waste diversion is organic waste, as illustrated in **Figure 7-10** below.

Figure 7-10: Organic Waste Recovered at Walker Environmental Major Facilities



The major growth areas since 2013 have included:

- **All Treat Farms** – Acquired in 2016 and located in Arthur, Ontario. Leaf, yard, and source separated organics composting, utilizing outdoor aerobic windrows and static pile methods, as well as the GORE® cover technology. The site has soil blending and packaging facilities, where finished product is sold to large box stores and garden centres across Ontario.
- **Gro-Bark** – Acquired in 2017 and headquartered in Caledon, Ontario with other facilities across the province. Soil blending, composting, mulch production and aged bark reclamation products for horticultural industries.
- **Walker Environmental Grease Recovery** – Industrial and commercial grease trap recovery from thousands of customers across the country. Fats, oils and grease (FOG) recovered from the grease traps is processed into feedstock for on-farm anaerobic digesters to boost biogas production.
- **N-Viro® Biosolids** – Acquired in 2014 with facilities across Ontario. Alkaline stabilization of municipal biosolids into agricultural fertilizer.
- **Recycled Asphalt Shingles Pavement** – Re-processing used shingles into recycled asphalt paving products.
- **Soil Blending** – At Niagara, producing topsoil and compost blends for landscaping uses.
- **Bio-carbon/Alternative Low Carbon Fuel Production** – Reprocessing wood waste, spent railway ties, etc. into alternative fuels for the steel, cement and greenhouse industries.
- **Agricultural Crop Production & Pollinator Habitat** – Crops for use as a cattle and livestock feed supplement and pollinator habitat successfully established on a closed section of the East Landfill, Niagara Falls.

- **Renewable Landfill Gas Energy** – Renewable energy recovery from private and municipality owned landfill sites across Ontario, including the generation equivalent to 14 MW of power annually.
- **Niagara Residential Waste Drop-Off Depot** – Enhancements to the public waste drop-off to increase material types for diversion in partnership with the Region of Niagara and a program to recover, repair and re-use toys and bicycles.

In addition to the above, there are a number of other significant initiatives in progress that can be expected to further increase Walker's overall diversion efforts in the near future:

- **General Motors Landfill Gas Supply** – A 4 km landfill gas pipeline to GM's Glendale Propulsion Plant to supply a 6.4 MW co-generation plant which will reduce net greenhouse gas emissions by about 77% making this plant GM's greenest Propulsion Plant in their global fleet.
- **Renewable Natural Gas** – Production of approximately 1 million GJ/yr of renewable natural gas from landfill gas collected from Walker's South and East landfills.
- **De-Packaging Trials** – Development of state-of-the-art equipment and processes to remove packaging and plastic contaminants from organic wastes to increase organics recovery.
- **Greenhouse Growing Medium Trials** – Development of a re-processing system for used greenhouse growing media that are currently landfilled.

Walker also carries out a wide variety of education, awareness and research initiatives related to waste diversion, such as:

- Educational tours of the Niagara Resource Recovery Campus for various industry groups, schools, community organizations and Indigenous Communities.
- Recycling and composting services and promotion at a number of First Nations events, such as Pow wows, across the province.
- School, college, university and industry presentations.
- Employee volunteering for community environmental events such as litter clean-up, etc.
- Policy support to all levels of government.
- Research and trials on compostable products.
- Funding and other support to college and university research projects related to waste diversion.

7.2.5.4 Support for Provincial Diversion Policies, Strategies & Objectives

Walker's waste diversion businesses and programs are consistent with, and supportive of, the Province's current objectives, as discussed below.

Ontario's Environment Plan – Preserving and Protecting our Environment for Future Generations.

Section 5 of this plan (2018) identifies five specific waste diversion objectives:

- Reduce the amount of waste going to landfills or becoming litter
- Increase opportunities for Ontarians to participate in efforts to reduce waste
- Increase opportunities to use technologies, such as thermal treatment, to recover valuable resources in waste
- Manage excess soil and hauled sewage
- Redevelop brownfield sites to better protect human health and the environment

Walker's waste diversion system, outlined above, contributes meaningfully to each of these objectives. Additionally, Walker facilitates the clean-up of brownfield sites through the safe disposal of waste soils requiring disposal at approved landfill sites, and in particular by using these excess waste soils wherever possible as cover material in order to preserve clean soil for other beneficial uses – a program that is also proposed for the Southwestern Landfill.

Strategy for a Waste-Free Ontario

Table 7-5 summarizes how Walker intends to support the relevant *Actions* in the provincial strategy (2017), in conjunction with the approval of the proposed Southwestern Landfill.

Table 7-5: Support for the Waste Free Ontario Action Items

Provincial Action Item	Walker Supporting Activities
Establish a registry and build data capacity to provide for evidence-based decisions.	• If requested, Walker will support the province on the design of the proposed waste registry and, specifically, advise on the types of data that can be collected from the IC&I waste sector. • Track and submit all data related to the Southwestern Landfill that is required for the proposed registry.
Amend the 3Rs regulations to increase resource recovery across all sectors.	• If asked, support the Province in the proposed IC&I waste sector diversion working group.
Ensure landfills are well planned and managed to minimize the need for them and reduce greenhouse gas emissions.	• Convert from landfill gas flaring to gas utilization at the proposed Southwestern Landfill as soon as it is technically and economically feasible, giving consideration to utilization methods that maximize the overall reduction of greenhouse gas emissions.
Establish promotion and education requirements to support public participation in resource recovery.	• Maintain membership in one or more local Chambers of Commerce in Oxford County and offer an annual update to its members on IC&I resource recovery requirements, opportunities and best practices. • Maintain membership in one or more regional or provincial waste management industry organizations and participate, where asked, in committees, meetings and conferences dealing with IC&I resource recovery requirements, opportunities and best practices. • Develop and maintain a website with specific information about IC&I resource recovery requirements, opportunities and best practices, with an emphasis on waste reduction and source separation, and actively promote this resource

Provincial Action Item	Walker Supporting Activities
	to its IC&I waste disposal customers. • If asked, participate in any committees established by the County of Oxford or its constituent municipalities regarding waste diversion. • Offer public tours of its various waste diversion and management businesses for educational purposes, as requested.
Implement an action plan to reduce the volume of food and organic waste going to landfill.	• If asked, participate in the provincial stakeholder working group on organic waste disposal reduction. • Continue to assess opportunities for further investment in organics recovery infrastructure in Ontario to help build the required processing capacity to support increased diversion of organics from landfill.
Implement an Excess Soil Management Framework to increase the reuse of excess soil, while protecting human health and the environment.	• Actively seek sources of contaminated soil requiring landfill disposal for use as daily or interim cover, in order to minimize the application of clean soils that can be preserved for other beneficial purposes. • Actively seek sources of excess (non-waste) soils for blending with Walker's various processed organic products to enhance their suitability for landscaping and horticultural businesses
Use green procurement practices to build market demands for recovered materials.	• Adapt and apply its existing Sustainable Procurement Policy to products and services acquired for the construction, operation and management of the proposed Southwestern Landfill, and continue to make the policy available to the public through its website.
Implement disposal bans to direct materials to end-markets.	• If and as the province institutes bans on landfilling specific materials, communicate these bans to its customers as soon as reasonably possible. • Prior to any implementation of a ban, continue to work with customers to identify opportunities for waste diversion/resource recovery opportunities. • Support product producers in developing materials that are more easily recovered at waste diversion (i.e. compostable packaging) facilities.

Food and Organic Waste Policy Statement

Section 6.8 of this Policy (2018) requires that: *Proponents of new or expanded waste management systems for disposal should consider resource recovery opportunities for food and organic waste.*

Section 1.1 of the Policy also sets out the *Ontario Food Recovery Hierarchy* consisting of the following steps (in order of importance):

i. ***Reduce:*** *prevent or reduce food and organic waste at the source.*

ii. ***Feed People:*** *safely rescue and redirect surplus food before it becomes waste.*

iii. ***Recover Resources:*** *recover food and organic waste to develop end-products for a beneficial use.*

The previous sections in this report (see also **Appendix H**) describe numerous initiatives that Walker has taken in an effort to prevent or ***reduce*** food and organic waste at the source, including education programs at community events, Indigenous events, schools and in its workplaces.

Also in this report, and in the previous 2013 report, Walker detailed the extensive organic ***resource recovery*** system that it has developed and operates, which has made Walker the largest organic waste processor in the province, processing approximately 725,000 tonnes in 2018. This system produces a range of products for beneficial use, including: compost, mulches, soil mixes, N-Rich® fertilizer, low-carbon and bio-carbon alternative fuels, and greenhouse growing medium. Continued research and investments are planned to expand the system to further increase organic resource recovery.

As a result, Walker believes that its organic waste recovery system is fully supportive of Ontario's *Food and Organic Waste Policy.*

7.2.6 Input from Stakeholder Consultation

The preliminary design and operations proposal for the site was developed and documented in a report prepared by Walker titled *Facility Characteristics Assumptions* (January, 2017; revised March 2017). Although this report was primarily intended to provide working assumptions for Walker's impact assessment team, it was made publically available for information to any interested parties through the project website. Several comments were received including those from a review by the Ministry of the Environment Approvals Branch and through discussions with members of the Community Liaison Committee at CLC meetings.

Table 7-6: Summary of Stakeholder Input - Facility Characteristics Assumptions

Input	Considerations
Concern for how climate change impacts, leading to dryer summers, might increase the amount of time the bed of Patterson-Robbins Drain is dry, which would result in less water flow to dilute the effluent discharged from the leachate treatment plant.	Walker confirmed through the surface water assessment that the Patterson-Robbins Drain does dry up in the summer, and therefore based the design of the leachate and stormwater treatment systems on the assumption that discharges from the site would have to meet "dry ditch" water quality standards. Climate change forecasts were factored into the surface water assessment.
Request for contingency plans in the event of climate change and other naturally occurring disasters for the leachate treatment plant.	Walker has included contingency and emergency response plans for the leachate treatment plant; these will be part of the application for an Environmental Compliance Approval (ECA) under the *Environmental Protection Act*.
Further details regarding the nature of the backfill material to be placed below the liner system.	Walker confirmed that the backfill materials will be sourced primarily from on-site quarry overburden stripping operations.

Input	Considerations
Concerns regarding the potential for differential settlement and associated stresses on the liner and leachate collection system.	Walker confirmed that the geotechnical assessment required under Ontario Regulation 232/98 would address differential settlement that could be associated with the engineered backfill and liner/leachate collection system. Further details will be presented in the Design and Operations Report submitted in conjunction with applications under the *Environmental Protection Act*.

7.3 Environment Potentially Affected by the Undertaking

Section 6.1 of the *Approved Amended Terms of Reference* presented a preliminary description of the environment that could potentially be affected by the undertaking, and committed that additional details would be gathered and/or developed during the EA process by technical experts in consultation with interested parties, including the local community and Indigenous Communities, and presented in this EA Report.

Appendix F to this EA contains the results of the numerous technical studies that were completed during the course of this EA by independent experts. Each of these studies contains a detailed description of the environment potentially affected by the undertaking, as it relates to that particular discipline (e.g., agriculture, air quality, cultural heritage, *etc*.) based on research supplemented, where necessary and appropriate, by field studies.

Each of the technical studies examined and inventoried the current or existing baseline environmental conditions in their (respective) study areas. However, environmental conditions are not static - even without the proposed landfill there will be changes in the environment due to both natural progression as well as ongoing human development. Therefore, each of the technical studies also prepared a forecast of the future environmental baseline conditions. These future environmental baseline conditions serve four main purposes in the EA:

- They fully describe the environment potentially affected by the proposed landfill over time.
- They represent the "do nothing" alternative, a requirement of the EA and the *Approved Amended Terms of Reference* – i.e., the environmental conditions that would exist at any point in time without the proposed landfill.
- They allow for the environmental effects of the proposed landfill to be compared and contrasted with those of the "do nothing" alternative in the same respective time frames. (It is convenient to think of the methodology as "time-matching" – comparing the effects of the proposed landfill at different points in time to the projected environmental conditions surrounding the site at the same points in time.)
- They contribute to the assessment of cumulative effects, as discussed previously in this report. Since the baseline conditions include all activities other than the proposed landfill, adding the effects of the landfill to the baseline means that effects from all possible sources are considered.

The assessment of future environmental baseline conditions was guided by certain common assumptions that were developed prior to undertaking the technical studies:

- Common reference periods or milestones for the operational life of the proposed landfill;
- Common receptor points around the landfill; and
- Common assumptions about the "do nothing" alternative.

The following sections first present the common assumptions noted above, followed by a brief overview of the existing and future environmental baseline conditions drawn from the technical studies complied in **Appendix F**.

7.3.1 Common Baseline Assumptions

7.3.1.1 Reference Periods/Milestones

The operational period of the landfill was further subdivided into the following reference periods or milestone dates. Where relevant, these were incorporated into the various technical studies to aid in the assessment of potential cumulative effects. Note that these dates are approximate only and depend on the length of time needed for approvals.

Start of Construction	Est. 2021	Just prior to the start of landfill construction and operation, represented by the existing baseline conditions.
Start of Landfilling	Est. 2023	The approximate time when the landfill would start receiving waste.
Mid-Point	Est. 2033	Approximately midway through the landfill construction and operation.
Closure	Est. 2043	At the earliest completion of the landfill construction and operation, representing the full size of the proposed landfill.

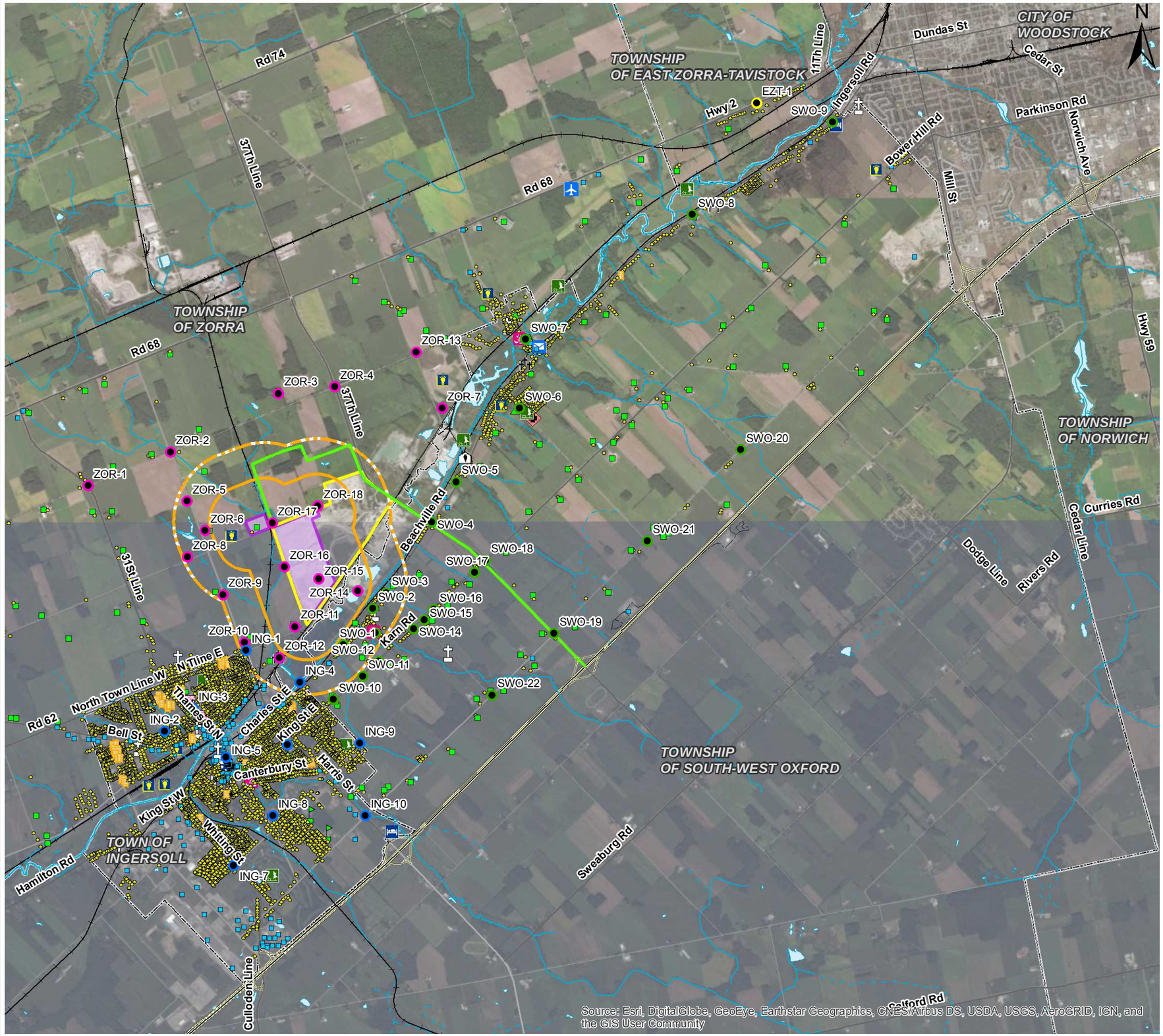
7.3.1.2 Common Receptor Points

Common receptor locations in proximity to the site were established collaboratively by the Walker study team and, where relevant, incorporated into the various technical studies to aid in the assessment of potential cumulative effects. These are illustrated in **Figure 7-11** and described in **Table 7-7**.

7.3.1.3 The "Do Nothing" Alternative

The "do nothing" alternative represents the scenario where the proposed Southwestern Landfill is not built, and it forms the baseline or benchmark against which the proposal is compared.

If the proposed Southwestern Landfill did not proceed, then the residual wastes that would have come to the proposed Southwestern Landfill would still be produced in the province, but would have to be disposed of somewhere else. As documented in the *Approved Amended Terms of Reference*, more than 3 million tonnes *per* year of excess waste is currently being exported primarily to landfills in Michigan, due mainly to a deficit of waste disposal capacity in Ontario that is forecast to continue well into the future. Given the location of the proposed Southwestern Landfill directly on the Highway 401 route to Michigan, Walker anticipates that the majority of the waste delivered to this site would be offsetting



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LEGEND

- Town of Ingersoll Receptor
- Township of East Zorra-Taverstock Receptor
- Township of South-West Oxford Receptor
- Township of Zorra Receptor
- Accomodation
- Aerodrome
- Business
- Cemetary
- Recreational Club
- Conservation Area
- Farm Buildings
- Fire Department
- House
- Civic Building/Sevices
- Library
- Multi-Residential
- Museum
- Place of Worship
- Post Office
- Recreation Area/Park
- School
- Utility
- Haul Route
- 500m from Proposed Landfill Site
- 1000m from Proposed Landfill Site
- Current Quarry Lime Plant Area
- Potential Landfill Footprint

Figure 7-11:
Common Receptors
(after SLR, 2020)

0 0.5 1 2 Kilometers

SCALE: 1:55,000
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 17N

NOTES

This map is for conceptual purposes only and should not be used for navigational purposes.

Basedata:

WALKER
ENVIRONMENTAL GROUP

WALKER ENVIRONMENTAL
SOUTHWESTERN LANDFILL
- SOCIAL ASSESSMENT

COMMON RECEPTORS

February 14, 2020	Rev **0.0**	Figure No.
Project No. 209.40528.00001		

SLR
global environmental solutions

Table 7-7: Common Receptor Locations

Receptor ID (See Map)	Description	Relevant Disciplines													Study Areas		
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/ Vibration	Social	Traffic	Visual/ Landscape	<500m	500 - 1000m	>1000m
Township of Zora																	
ZOR-1	Represents multiple residences and agricultural operations in the north-west portion of the site vicinity study area	✓	✓				✓		✓		✓	✓		✓			✓
ZOR-2	Represents multiple residences and agricultural operations north of the project site along a potential haul route	✓	✓				✓		✓		✓	✓	✓	✓			✓
ZOR-3	Represents one (1) residence and agricultural operation immediately north of the project site and along a potential haul route	✓	✓				✓		✓		✓	✓	✓	✓			✓
ZOR-4	Represents agricultural area along a potential haul route	✓	✓				✓		✓		✓	✓	✓	✓			✓
ZOR-5	Represent one (1) residence and agricultural operation within 1000m of project site, along a potential haul route	✓	✓				✓		✓		✓	✓	✓	✓		✓	
ZOR-6	Represents one (1) residence and agricultural operation within 1000m of the project site, along a potential haul route	✓	✓				✓		✓		✓	✓	✓	✓		✓	
ZOR-7	Represents a mixed use area (no residence) east of the project site (near solar farm) in the vicinity of Oxford Thames River Trail parking		✓			✓	✓		✓		✓	✓		✓			✓
ZOR-8	Represents agricultural area within 1000m immediately west of the project site	✓	✓				✓		✓		✓	✓		✓		✓	
ZOR-9	Represents multiple residences and agricultural operations within 1000m immediately west of the project site	✓	✓				✓		✓		✓	✓		✓		✓	
ZOR-10	Represents location of municipal groundwater well and agricultural operations within 1000m of the project site and along a potential haul route	✓	✓				✓	✓	✓		✓	✓	✓	✓		✓	
ZOR-11	Location of the nearest residence and agricultural operation to the project site, within 500m Also represents ecological receptor (cliff swallow colony and possible significant wildlife habitat).	✓	✓			✓	✓		✓		✓	✓		✓	✓		
ZOR-12	Location of the Ingersoll Rural Cemetery within 500m to 1000m of the project site and ecological receptors in the Quarry Lake.		✓			✓	✓		✓		✓	✓		✓		✓	
ZOR-13	Represents residential receptors and agricultural receptors.	✓										✓			✓	✓	
ZOR-14	Represents ecological receptor (grassland habitat, habitat for endangered and threatened species).					✓									✓		
ZOR-15	Represents ecological receptor (barn swallow colony, possible habitat for endangered and threatened species and colonial species).					✓									✓		
ZOR-16	Represents ecological receptor (woodland community where eastern woodpewee breed).					✓									✓		
ZOR-17	Represents ecological receptor (old watercourse channel, possible habitat for endangered and threatened species, and a tributary of the Thames River)					✓									✓		
ZOR-18	Represents ecological receptor (MAM/SA community with breeding amphibians and potential significant wildlife habitat).					✓									✓		

Receptor ID (See Map)	Description	Relevant Disciplines													Study Areas		
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/ Vibration	Social	Traffic	Visual/ Landscape	<500m	500 - 1000m	>1000m
Town of Ingersoll																	
ING-1	Represents residential neighbourhood in the north east portion of the Town of Ingersoll		✓				✓		✓		✓	✓		✓			✓
ING-2	Represents multiple residences, community features and businesses in north west Ingersoll in the vicinity of Laurie Hawkins P.S.		✓				✓		✓		✓	✓					✓
ING-3	Represents multiple residences, community features and businesses in the vicinity of Ingersoll District Collegiate Institute		✓				✓		✓		✓	✓					✓
ING-4	Represents Thames River at the surface water discharge location and multiple residences and businesses in the eastern most portions of Ingersoll		✓			✓	✓	✓	✓		✓	✓		✓			✓
ING-5	Represents multiple residences, community features and businesses in downtown Ingersoll and in the vicinity of Canterbury Folk Festival site		✓				✓		✓		✓	✓		✓			✓
ING-6	Represents multiple residences and community features in the vicinity of Royal Roads Public School (closest school to the project site)		✓				✓		✓		✓	✓		✓			✓
ING-7	Represents multiple residences and community features in the vicinity of Ingersoll Golf and Country Club in the south west portion of Ingersoll		✓				✓		✓		✓	✓					✓
ING-8	Represents multiple residences and community features in the vicinity of Alexandra Hospital in south central Ingersoll		✓				✓		✓		✓	✓					✓
ING-9	Represents multiple residences, community features, agricultural operations in the vicinity of Lorne Moon Park and on area of future residential development along Ingersoll town boundary	✓	✓				✓		✓	✓	✓	✓					✓
ING-10	Represents area of multiple residences and agricultural operations in the vicinity of the Ingersoll Cheese and Agricultural Museum and Elm Hurst Inn and Spa in south east Ingersoll	✓	✓				✓		✓		✓	✓					✓
ING-11	Represents an ecological receptor (Thames River Aquatic Habitat, habitat for fish species targeted by anglers).					✓											
Township of South-West Oxford																	
SWO-1	Represents multiple residences along Beachville Road within 1000m of the project site (closest residences south of the project site), and ecological receptors (great blue heron rookery, potential significant wildlife habitat)		✓			✓	✓		✓		✓	✓		✓		✓	
SWO-2	Represents multiple residences along Beachville Road within 1000m of the project site within the vicinity of Hi Way Pentecostal Church		✓				✓		✓		✓	✓		✓		✓	
SWO-3	Represents multiple residences and agricultural operations along Beachville Road within 1000m south east of the project site as well as ecological receptors along the Thames River (potential endangered and threatened species)	✓	✓			✓	✓		✓		✓	✓		✓		✓	
SWO-4	Represents multiple residential locations and businesses at the intersection of beachville road along a potential haul road (County Road 6)		✓				✓		✓		✓	✓	✓	✓			✓
SWO-5	Represents multiple residences and agricultural operations, east of the project site in vicinity of the Beachville District Museum and Oxford Thames River Trail parking	✓	✓			✓	✓		✓		✓	✓		✓			✓
SWO-6	Represents multiple residences and community features in the vicinity of Colombo Club of Oxford		✓				✓		✓		✓	✓		✓			✓
SWO-7	Represents multiple residences, businesses and community features in the community of Beachville and the Living Way Pentecostal Church		✓			✓	✓		✓		✓	✓					✓

Receptor ID (See Map)	Description	Relevant Disciplines													Study Areas		
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/ Vibration	Social	Traffic	Visual/ Landscape	<500m	500 - 1000m	>1000m
SWO-8	Represents multiple residences, agricultural operations, businesses and community features in the vicinity of St. Mary's Cemetery		✓				✓		✓		✓	✓					✓
SWO-9	Represents multiple residences and businesses at the eastern most portion of the site vicinity study area in the vicinity of the Westmount Motel		✓				✓		✓		✓	✓					✓
SWO-10	Represents multiple residences and agricultural operations along Karn Road	✓	✓				✓		✓		✓	✓		✓			✓
SWO-11	Represents multiple residences and agricultural operations along Karn Road	✓	✓				✓		✓		✓	✓		✓			✓
SWO-12	Represents multiple residences and agricultural operations along Karn Road	✓	✓				✓		✓		✓	✓		✓			✓
SWO-13	Represents multiple residences within 1000m of the project site, in the vicinity of the Centreville Pond and Conservation Area, and ecological receptors (basking area for snapping and painted turtle)		✓			✓	✓		✓		✓	✓		✓		✓	
SWO-14	Represents multiple residences and agricultural operations along Karn Road	✓	✓				✓		✓		✓	✓		✓			✓
SWO-15	Represents multiple residences and agricultural operations along Karn Road	✓	✓				✓		✓		✓	✓		✓			✓
SWO-16	Represents multiple residences and agricultural operations along Karn Road	✓	✓				✓		✓		✓	✓		✓			✓
SWO-17	Represents multiple residences and agricultural operations along Karn Road	✓	✓				✓		✓		✓	✓		✓			✓
SWO-18	Represents multiple residence and agricultural operations in the vicinity of the intersection of Karn Road and County Road 6 along a potential haul route	✓	✓				✓		✓		✓	✓	✓	✓			✓
SWO-19	Represents multiple residences, agricultural operations and businesses in the vicinity of the intersection of Clarke Road and County Road 6, along a potential haul route	✓	✓				✓		✓		✓	✓	✓	✓			✓
SWO-20	Represents multiple residences and agricultural operations in the vicinity of the intersection of Clarke Road and E Hill Line		✓				✓		✓		✓	✓					✓
SWO-21	West Hill Line and Clarke Road	✓										✓					
SWO-22	Church Line and Clarke Road	✓										✓					
Township of East Zorra-Taverstock																	
EZT-1	Represents multiple residences and agricultural operations in the vicinity of the intersection at Hwy 2 (Dundas Street) and 10 Line in the Township of East Zorra-Taverstock		✓				✓		✓		✓	✓					✓

Receptor >1000m away from project site
Receptor 500 - 1000m away from project site
Receptor <500m away from project site

wastes that would be otherwise directed to Michigan landfills. Therefore, it is reasonable to assume that the "do nothing" alternative would be represented by the disposal of similar amounts of waste at landfill(s) in the State of Michigan.

Strictly speaking, though, the *Environmental Assessment Act* applies only to the environment in Ontario, so no attempt has been made in this EA to enumerate the potential environmental effects of the "do nothing" case of landfilling the same wastes in Michigan[24]. However, it is worth noting that if the proposed Southwestern Landfill is not built then equivalent effects to many of those documented in this EA, both positive and negative, can be expected to occur in the State of Michigan instead of in Ontario.

7.3.2 Location & Land Uses

Technical Report Reference (Appendix F):
MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), 2020. *Land Use Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*.

7.3.2.1 Existing Baseline Conditions

The proposed landfill site is located in parts of Lots 14 and 15, Concessions II and III, Township of Zorra, Oxford County. The site is close to two other municipal boundaries - the Township of South-West Oxford is across the South Thames River to the southeast of the site, while the Town of Ingersoll boundary lies over a kilometre to the southwest (**Figure 7-12**).

Also shown in **Figure 7-12** are the land use designations taken from the municipal official plans, along with study area boundaries of 1 km and 5 km from the proposed landfill site, for reference.

The proposed landfill site itself is designated as a *Quarry Area* and *Limestone Resource*, within a portion of a larger, limestone quarrying operation with the same designation, to the south, north, and east. The land to the immediate north of the proposed landfill is still in agricultural use, but is licenced for future quarrying.

The land to the west and northwest of the site, as well as to the south across the Thames River, is designated for *Agricultural Reserve* and is mostly being farmed. There are *Rural Clusters* to the south and east along Beachville Road that are identified in the official plans.

More broadly, within a 5 km radius from the site, the land is mostly designated *Agricultural Reserve* and *Quarry Area*. The urban centres of the village of Beachville and the Town of Ingersoll are to the northeast and southwest, respectively, along with some *Open Space* along the Thames River Valley.

Figure 7-13 illustrates the licenced quarries in the vicinity of the proposed landfill site along with the current extent of the quarrying operations within these licences and areas that are already rehabilitated.

[24] *With the exception of greenhouse gas emissions, since climate change effects are global and would, therefore, also affect the environment in Ontario.*

Land Use Plan

County of Oxford Official Plan

Walker Environmental Group
Township of Zorra,
County of Oxford

ZORRA & SOUTHWEST OXFORD LAND USE PLAN LEGEND

- AGRICULTURAL RESERVE
- SETTLEMENT
- LINEAR RURAL CLUSTER
- OPEN SPACE
- ENVIRONMENTAL PROTECTION
- QUARRY AREA
- FUTURE URBAN GROWTH
- COUNTY LANDFILL SITE
- COUNTY BIOSOLID STORAGE FACILITY
- LIMESTONE RESOURCE
- RURAL CLUSTER
- FLOODLINE

INGERSOLL LAND USE PLAN LEGEND

- RESIDENTIAL
- CENTRAL BUSINESS DISTRICT
- ENTREPRENEURIAL DISTRICT
- SERVICE COMMERCIAL
- COMMUNITY FACILITY
- OPEN SPACE
- ENVIRONMENTAL PROTECTION
- INDUSTRIAL
- INDUSTRIAL SITE SPECIFIC POLICY AREA See Section 9.3.4.5.1
- SPECIFIC POLICY AREA See Section 9.2.4.4.1
- SPECIFIC POLICY AREA See Section 3.2.5.3.3
- 100 METER BUFFER
- FLOODLINE

LEGEND

- Subject Lands
- Municipal Boundary
- 1 km & 5 km Study Area

Figure 7-12:
Land Use Designations
(after MHBC, 2020)

Source: Township of Zorra Official Plan, Schedule Z-1 Land Use Plan
Town of Igersoll Official Plan, Schedule I-2 Residential Density Plan
Township of Southwest Oxford Official Plan, Schedule S-1 Land Use Plan

DATE:	February 5, 2020
SCALE	N.T.S.
JOB:	9811AG
DRN:	NZ/JB

north

K:\9811AG-WALKER ENVIRONMENTAL GROUP-LANDSCAPE TERMS OF REFERENCE\RPT\FIGURE 8 - LAND USE PLAN.DWG

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9
P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Walker Environmental Group

Oxford County Limestone Quarries

Baseline Conditions

LEGEND

- Licensed Boundary
- Additional Lands Owned or Controlled by Licensees, (Lafarge, Carmeuse & FWC)
- Municipal Boundary
- Railroad Line
- Oil Pipeline
- Active Quarry (with approximate active face locations)
- Inactive Reserves/Undisturbed Areas
- Non Extraction Areas (within Licensed Boundary, may include overburden stockpiles, plant facilities, etc.)
- Rehabilitated/Backfilled Areas (green = land, blue = water)
- Quarry Sump
- Processing Plants (P1) — see insert table on map for descriptions
- Entrance Exit (main operational access to public roads)
- Main External Haul Route (public roads)

Figure 7-13:
Existing Quarry Operations
(after MHBC, 2020)

Source: Ontario Basic Mapping, www.geographynetwork.ca/website/obm

DATE: September 2017

SCALE: 1:30,000

K:\811AE WALKER ENCIRONMENTAL GROUP - BASELINE CONDITIONS\RPT\OBM BASELINE CONDITIONS SEPTEMBER2017.DWG

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR, KITCHENER, ON, N2B 3X9 P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Processing Plant List

1. Portable Plant, sand & gravel
2. Permanent Lime Plant (operational)
3. Permanent Aggregate Plant (operational)
4. Permanent Cement Plant (currently not operational)
5. Permanent Aggregate Plant (operational, IKO Industries Ltd.)
6. Permanent Cement Plant (operational, Federal White Cement)
7. Portable Plant, crushed stone

The proposed landfill is to be located within a portion of the Carmeuse quarry, as shown in **Figure 7-12**. Generally speaking, the quarry operations strip off (excavate) about 25 m of overburden soils to expose the bedrock, and then blast and remove a further 25 m thickness of limestone bedrock which is used in the adjacent lime manufacturing facility. The northern portion of the proposed landfill site is already mined out and is being backfilled with overburden soil strippings from other parts of the quarry operations, while quarrying continues in the southern portion progressing in a southerly direction.

Further north, Lafarge also operates a limestone quarry (**Figure 7-12**). There is a cement plant on their site as well, but it is not currently active. To the northeast, Federal White Cement holds a quarry licence on its parcel of land, but quarrying has not yet begun there. However, they do operate a cement plant at the site using some of the limestone from the other nearby quarries.

7.3.2.2 Future Baseline Conditions ("Do Nothing" Alternative)

The County of Oxford is forecast to experience modest residential and employment growth throughout the expected 20-year operating life of the proposed landfill. Population growth is predicted to be strongest during the initial years, and then gradually slow down as a result of the County's aging population. Most of the employment growth is anticipated to be in automotive manufacturing, warehousing, transportation, and agribusiness, while the County's primary sectors (i.e., agricultural and resource-based employment) are forecast to experience minimal growth.

The City of Woodstock is expected to be the primary area for both residential and employment growth, while the Town of Ingersoll will infill currently vacant lands, located predominately in the south and southeast of the Town, towards Highway 401. In a twenty year timeframe, residential densities may increase to accommodate demand, and/or Ingersoll's urban boundary may have to expand to the east into South-West Oxford if more room is needed.

The surrounding Townships of Zorra and South-West Oxford, including the village of Beachville and the rural cluster of Centerville, are forecast to experience only minimal change and/or growth, mostly occurring by infill. These areas will remain relatively similar to current built conditions, with agriculture and existing quarries as the dominant land use.

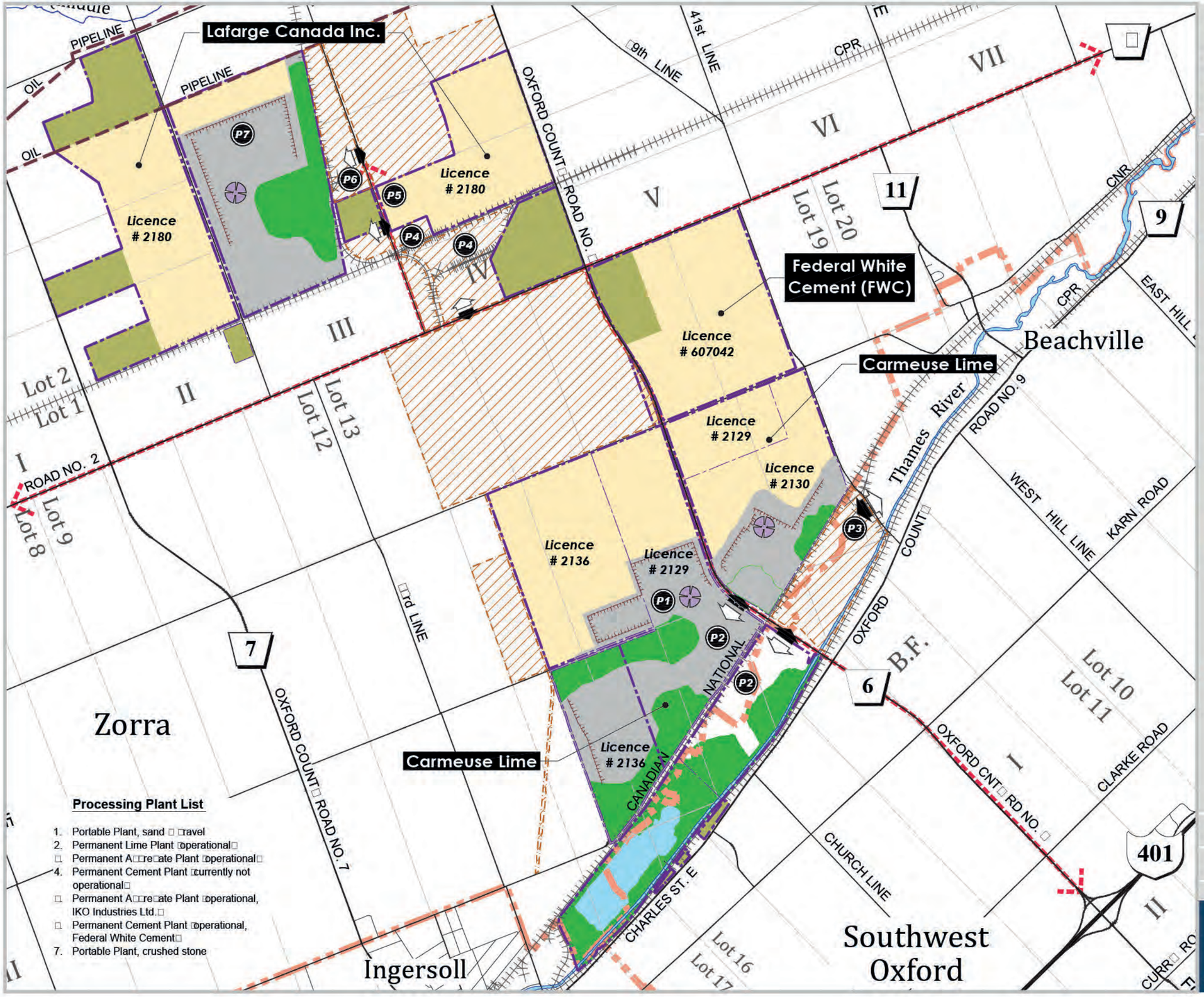
No major new residential and/or employment development is forecast within a 1 km radius of the site. The current agricultural activities in the areas around the site can be expected to continue in much the same fashion for the foreseeable future.

The main land use change in the site vicinity will be the gradual progression of the quarry operations, as illustrated in **Figure 7-14**. The Carmeuse quarry will continue mining to the south in its current location for another ten years or so. After the southern limit of this licence is reached, the quarrying will then move to the north of the proposed landfill location and continue to progress north and eventually east as well, on the east side of County Road 6. Altogether, considering lands already licenced as well as other lands already owned for future resources, quarrying can reasonably be assumed to continue for several hundred more years at this location. Carmeuse's lime manufacturing plant is expected to operate at about its current rate throughout this period. Lafarge's quarry further north of the site will continue to progress northward from its current mining location for at least several more decades, although it is assumed that the cement plant on the site will continue to remain inactive over this period. Conversely, it is also assumed that Federal White Cement will continue to operate its cement

Walker Environmental Group

Oxford County Limestone Quarries

Projected Conditions 2043



Processing Plant List

1. Portable Plant, sand □ □ravel
2. Permanent Lime Plant □operational□
3. Permanent A□□re□ate Plant □operational□
4. Permanent Cement Plant □currently not operational□
5. Permanent A□□re□ate Plant □operational, IKO Industries Ltd.□
6. Permanent Cement Plant □operational, Federal White Cement□
7. Portable Plant, crushed stone

LEGEND

- Licensed Boundary
- Additional Lands Owned or Controlled by Licensees, □Lafar□e, Carmeuse □ FWC□
- Municipal Boundary
- Railroad Line
- Oil Pipeline
- Active □uarry □with approximate active face locations□
- Inactive Reserves□Undisturbed Areas
- Non Extraction Areas □within Licensed Boundary, may include overburden stockpiles, plant facilities, etc.□
- Rehabilitated□Backfilled Areas □□reen □land, blue □water□
- □uarry Sump
- Processin□ Plants see insert table on map for descriptions
- Entrance Exit □main operational access to public roads□
- Main External Haul Route □public roads□

Figure 7-14:
Future Quarry Operations
(after MHBC, 2020)

Source: Ontario Basic Mappin□, www.□eo□raphynetwork.ca□website□obm

DATE: September 2017

SCALE: 1:□0,000

K:\9811AE WALKER EN□IRONMENTAL GROUP - BASELINE CONDITIONS\RPT\OBM BASELINE CONDITIONS SEPTEMBER2017.DWG

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

plant but not act on its quarry licence. All of the quarries can be assumed to continue at more-or-less their current rates of production for the purposes of this assessment.

7.3.3 Climate

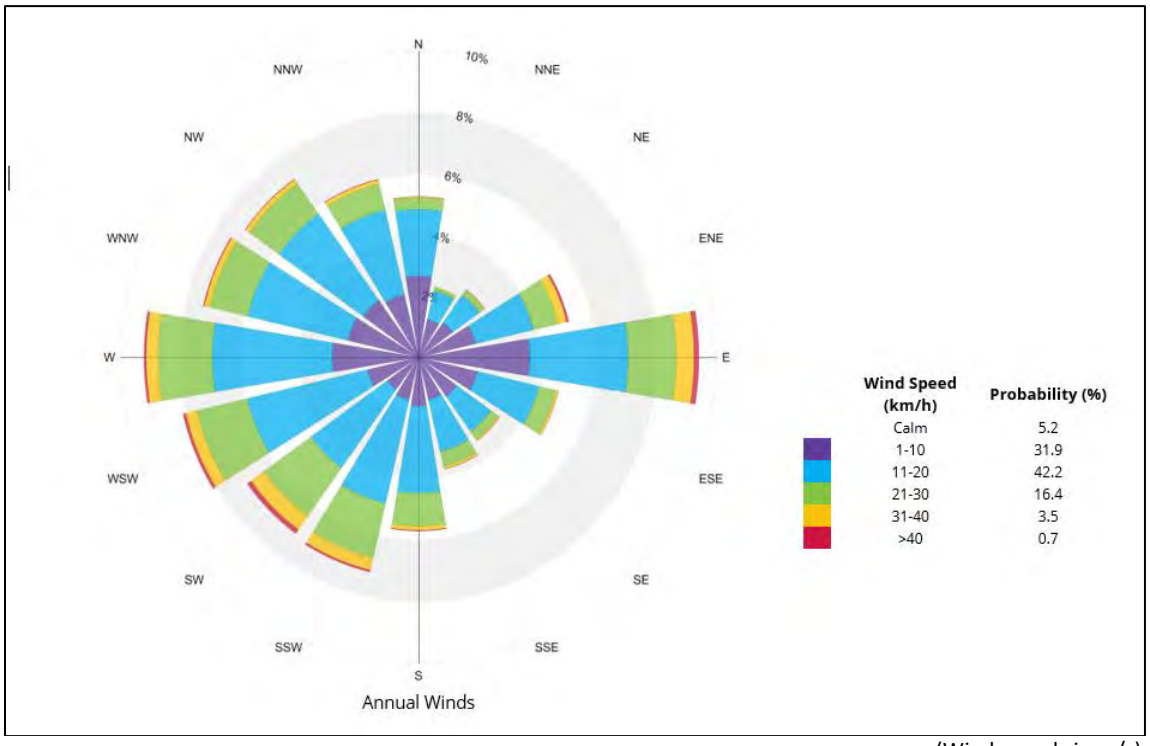
Technical Report Reference (Appendix F):
RWDI AIR Inc., 2020. *Air Quality Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

7.3.3.1 Existing Baseline Conditions

A five-year (2013-2017) local meteorological data set was developed by the MECP's Environmental Monitoring and Reporting Branch (EMRB) specifically for this study using surface meteorological data collected from Environment and Climate Change Canada's London Airport station, and upper air meteorological data from the U.S. National Weather Service's Detroit station.

Of particular importance to this assessment is wind direction. **Figure 7-15** shows a wind rose based on a 20-year record (1998-2018) recorded at London Airport. A wind rose shows the joint distribution of wind speed and wind direction. A lobe indicates the direction that the wind originated from and the percentage of time. A longer lobe means that wind direction occurred more frequently. The figure shows that high wind speeds in this area can be associated with any wind direction, but are most often associated with winds coming from westerly directions (SSW through NW) and also winds from the east. Winds blowing from the northeast and southeast are relatively weaker and less frequent, by comparison.

Figure 7-15: Wind Rose Diagram (London Airport, 1998-2018)



(Wind speeds in m/s)

7.3.3.2 Future Baseline Conditions ("Do Nothing" Alternative)

In the *Approved Amended Terms of Reference*, Minister's Amendment #14 sets out requirements to consider the effects of climate change in this EA. A set of common assumptions regarding the potential for climate change were established for the purpose of this EA, so that these could be reflected in the individual technical studies.

Data for these climate change assumptions are drawn from the following report:

McDermid, J., S. Fera and A. Hogg. 2015. *Climate change projections for Ontario: An updated synthesis for policymakers and planners.* Ontario Ministry of Natural Resources and Forestry (MNRF), Science and Research Branch, Peterborough, Ontario. Climate Change Research Report CCRR-44.

The Great Lakes Basin data were selected given that the proposed landfill site is located within that Basin.

The RCP 4.5 modelling data were adopted in each case, which reflects the medium stabilization scenario (i.e., aggravated climate driving forces are stabilized after 2100 with moderate global climate change mitigation).

The climate modelling periods in the MNRF source report can be correlated reasonably closely to the main study durations for this EA:

2011-2040 – Represents the estimated Operational Period of the proposed landfill. (The proposed 20-year lifespan of the landfill would run to approximately 2043.) During this climate modelling period, the landfill will be progressively constructed, filled with waste and capped, on a cell-by-cell basis.

2041-2070 - Represents the immediate Post-Closure Period of the proposed landfill. The site will be closed to waste receipt and final cover would be in place. Activities would generally be limited to routine site maintenance, monitoring and the operation of gas, surface water, and leachate controls.

2071-2100+ - Reflects the longer-term Post-Closure Period when leachate controls may still have to be operated within the leachate contaminating lifespan.

The following table summarizes the mean climate change (temperature and precipitation) assumptions to be adopted within each of the reference periods outlined for this EA.

Table 7-8: Mean Climate Change Assumptions

	Temperature (°C)			Precipitation (mm)		
	Annual	Summer	Winter	Annual	Summer	Winter
2011-2040	+2.3	+2.0	+2.2	+52.0	-2.7	+28.3
2041-2070	+3.9	+3.2	+4.5	+87.0	-2.5	+34.9
2071-2100+	+4.8	+4.1	+5.5	+89.0	-4.4	+46.8

7.3.4 Topography & Landscape

Technical Report Reference (Appendix F):
MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), 2020. *Visual Impact Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*.

7.3.4.1 Existing Baseline Conditions

The site lies in the physiographic region of southwest Ontario known as the Oxford till plain[25]. The surface soils consist of the Guelph loam deposit, underlain for the most part by rather substantial thicknesses of glacial till (e.g., typically up to about 30 m thick at the site, but thinning southwards into the Thames River valley).

The site lies at a surface elevation at or around 294 metres above sea level (mASL), except where quarrying has taken place; the quarry floor is presently around elevation 238 mASL. The land in the vicinity of the site (where it has not been quarried) slopes gently to the south and west, into the south branch of the Thames River valley which lies at an elevation of about 267 mASL at the river and receives surface water drainage from the adjacent lands.

The rural landscape in the area is generally characterized by gently sloping plains to low rolling hills dominated by agriculture. The Thames River Valley is the most prominent topographic feature in the area. In the immediate vicinity of the site, the quarries and related infrastructure, along with the railway lines and channelized reach of the Thames River to the south of the quarries, impart a highly disturbed, industrial character to the landscape.

Views of the quarries themselves are currently screened from most directions by topography and/or vegetation, some of which is used in conjunction with screening berms around the perimeter of the quarry site. Long-distance views into the quarries are available from a few locations, such as certain elevated points along Karn Road on the opposite bank of the Thames River valley to the south.

7.3.4.2 Future Baseline Conditions ("Do Nothing" Alternative)

The topography and landscape in the vicinity of the site would not be expected to undergo substantial change in the future, with the exception of the continued progression of the quarry operations (both new quarrying further north and east, as well as eventual backfilling and rehabilitation of existing quarries) over a period of many decades, as described previously.

7.3.5 Surface Water

Technical Report Reference (Appendix F):
Golder Associates Inc., 2020. *Surface Water Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*.

[25] *Chapman, L.J. and Putnam, D.F., 1984. The Physiography of Southern Ontario. Third Edition. Ontario Geological Survey.*

7.3.5.1 Existing Baseline Conditions

The site lies within the sub-catchment area of the Patterson-Robbins Drain which flows south between the proposed landfill and leachate treatment plant at the northwest corner of the site, and then into the South Branch of the Upper Thames River (**Figure7-16**) . The Thames flows southwesterly here; it has been straightened and channelized in this reach. The only other substantial water body within about 1 km of the site is a depleted quarry that has been allowed to fill with water to the south of the proposed landfill, which does not have any outlet.

However, the portion of the site that has already been quarried has been removed from the Patterson-Robbins Drain sub-catchment and instead its run-off is contained within the quarry and pumped out through an approved water management system that discharges directly into the Thames River.

Flow in all of the watercourses in the site vicinity varies seasonally with the amount of precipitation, with generally higher flows in the fall through spring and lower flows in the drier summer months. The annual average flow in the Patterson-Robbins drain where it crosses through the site is about 0.08 m^3/s, although in the summer it can dry up (no flow), while during major storms it could increase upwards to nearly 26 m^3/s (for the 1 in 100-year storm). Further downstream at the mouth of the Patterson-Robbins Drain, the flows are only slightly higher at an annual average of about 0.1 m^3/s and an estimated 100-year storm peak of 22 m^3/s. Flow in the Thames River is substantially higher in this vicinity at an annual average of about 7 m^3/s and a 100-year storm peak of as much as 400 m^3/s.

Water quality in the Patterson-Robbins Drain and the Thames River in this area is typical of run-off from agricultural land, with levels of fluoride, nitrite and total phosphorous among others, that exceed provincial water quality objectives.

7.3.5.2 Future Baseline Conditions ("Do Nothing" Alternative)

Flow and water quality conditions in the Patterson-Robbins Drain and the adjacent reach of the Thames River are not expected to change considerably in the future. Factoring in the effects of climate change, and despite ongoing expansion of the quarry that will gradually remove additional land from the Patterson-Robbins Drain catchment (and divert it directly to the Thames), average annual flows in the Patterson-Robbins Drain adjacent to the site are calculated to increase slightly to about 0.1 m^3/s. Similarly, flow in the Thames River is expected to also increase marginally over time. Peak storm flows in all of these watercourses can also be expected to increase somewhat in the future due to climate change effects.

Future water quality in the Patterson-Robbins Drain can also be expected to remain similar to current conditions, since the adjacent land uses are not anticipated to change substantially. Water quality in the Thames River is likewise expected to remain similar with the majority of the watershed continuing in agricultural use, or perhaps improve gradually with continuing efforts to enhance water quality throughout the watershed.

LEGEND

- COMMON RECEPTOR POINTS
- WATERCOURSE
- WATERBODY

Figure 7-16:
Surface Water Features
(after Golder, 2020)

DRAFT

0 500 1,000
1:22,000 Metres

NOTE(S)
1. TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORTS.

REFERENCE(S)
1. BASE DATA: MNRF LIO, 2017
2. IMAGERY: MICROSOFT BING © 2017 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS
3. KEY MAP: WORLD TOPOGRAPHIC MAP, ESRI, 2017
4. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
WALKER ENVIRONMENTAL GROUP INC.

PROJECT
SOUTHWESTERN LANDFILL

TITLE
COMMON RECEPTOR POINTS

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-11
DESIGNED	PR
PREPARED	PR
REVIEWED	CD
APPROVED	-

PROJECT NO. 1664706 CONTROL 0001 REV. 0

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0

Path: S:\Clients\Walker_Industries\Southwestern_Landfill\99_PROJ\1664706_Env_Services\40_PROD\0001_Hydrology\1664706-0001-GS-0001.mxd

7.3.6 Geology & Groundwater

Technical Report Reference (Appendix F):
Golder Associates Inc., 2020. *Groundwater Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*.

7.3.6.1 Existing Baseline Conditions

For reference, **Figure 7-17** is a schematic north-south cross section illustrating the geology and groundwater flow at the site and in the site vicinity.

The overburden soils at the site consist of a rather substantial thicknesses of Zorra (Tavistock) Till, which is typically about 25 m thick in the immediate vicinity of site, but thinning southwards towards the Thames River valley. This glacial till is generally silty in texture but can vary widely in places to include clay, sand, and gravel as well.

Regionally, there are as many as three permeable zones within the overburden soils that can serve as groundwater aquifers, where they are found:

- A shallow, generally unconfined, aquifer consisting of surficial sand and/or sand and gravel deposits. This shallow aquifer may be overlain in some locations by thin deposits of lower permeability material such as silt, clay or till.
- An intermediate depth, generally confined, overburden aquifer consisting of discontinuous layers or lenses of sands and/or gravels.
- A deeply buried, generally confined, overburden aquifer consisting of sands and/or gravels.

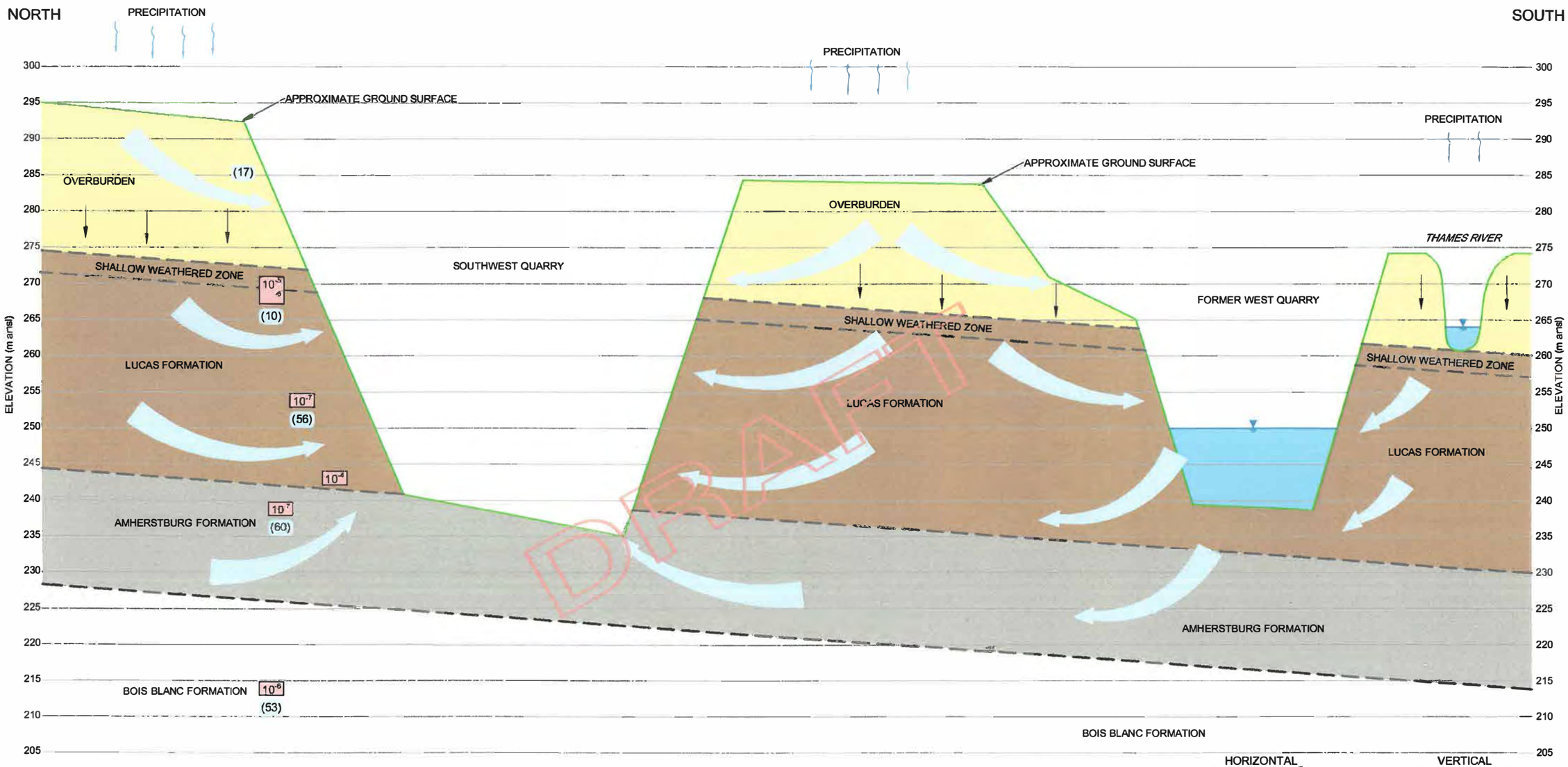
However, in the immediate vicinity of the proposed landfill site, only the shallow surficial aquifer was found to be present.

The underlying bedrock consists of the Lucas Formation limestone, which is up to about 30 m thick in the vicinity of the site. This rock is currently being quarried for lime production. (Note that a geological Area of Natural or Scientific Interest (ANSI) related to the exposure of the Lucas Formation limestone is located in the older, depleted quarry south of the site, although this will not be disturbed by the proposed landfill.)

The upper 10 m of the Lucas Formation is more permeable as a result of weathering and constitutes a regional groundwater aquifer (here called the Shallow Weathered Zone), one that is the principal source of water for the majority of private wells in the area.

Below the Lucas Formation lies the Amherstburg Formation limestone, which is about 15 m thick in the site vicinity. The Carmeuse quarry mines partially into this formation as well, and therefore it forms the floor of the quarry where the landfill is to be located.

The Bois Blanc Formation limestone is encountered next, about 40 m thick, which in turn sits on the deeper Bass Island dolomite.



HORIZONTAL SCALE IN METRES
0 100 200m
1:5,000

VERTICAL SCALE IN METRES
0 10 20m
1:500

LEGEND

PRECIPITATION — INFILTRATION

INFERRED GROUNDWATER FLOW

10^{-8} HYDRAULIC CONDUCTIVITY (K) VALUE IN (m/s) FROM HYDRAULIC TESTING

(59) AVERAGE DISSOLVED CHLORIDE CONCENTRATION IN GROUNDWATER (mg/L)

OVERBURDEN

LUCAS FORMATION

AMHERSTBURG FORMATION

REFERENCE

DRAWING BASED ON "Carmeuse Lime Beachville Topo 11-14-17.dwg" PROVIDED BY WALKER ENVIRONMENTAL.

NOTES

THIS DRAWING IS SCHEMATIC ONLY AND IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

PROJECT
HYDROGEOLOGICAL ASSESSMENT
SOUTHWEST LANDFILL
ZORRA TOWNSHIP, ONTARIO

TITLE
CONCEPTUAL HYDROGEOLOGICAL MODEL
Figure 7-17
Schematic Cross Section (after Golder, 2020)

GOLDER

PROJECT No.	1664706	FILE No. 1664706-2000-R0309-1
		SCALE AS SHOWN REV.
CADD	DH/AS/ZB Oct 7/19	
CHECK		

There is another regional groundwater aquifer located at about the contact between the Amherstburg and Bois Blanc formations. This one is a principal water bearing unit for industrial and commercial wells in the area. There are also two other aquifers that have been identified regionally, deeper in the Bois Blanc Formation; these are well below the base of the quarry.

The bedrock does not have any significant large-scale Karst effects (i.e., groundwater dissolving open voids or channels through the rock). Rather, the groundwater flows predictably through a regular network of small fractures in the rock.

The local groundwater is recharged by precipitation infiltrating down to the water table through the surface soils. The groundwater in the overburden then moves laterally though the soils following the land contours and/or downward into the underlying bedrock. Regional groundwater flow in the overburden and bedrock is generally in a southerly or southeasterly direction following the Thames River Valley. However, as illustrated in **Figure 7-17**, locally quarry dewatering (i.e., groundwater and precipitation pumped out of the quarry into the Thames River to provide a dry floor, under permits issued by the Province) acts like a large well drawing in groundwater from all sides, artificially depressing the water table and water levels in the surrounding aquifers. This is termed the zone of influence, or the "drawdown cone" (because in profile the shape of the groundwater levels around the quarry resemble a cone with the quarry floor at the lowest point). The influence extends out about 1 km from the edges of the quarry.

Ministry records identify 144 water supply wells within about 1 km of the proposed site; of these, only five are completed in the overburden while the remainder are completed in the bedrock. Most of the wells are for domestic and agricultural use, with only 13 listed as industrial, commercial or public/municipal use. Most of the records indicate fresh water quality, although a few in the bedrock were listed as sulphurous or mineralized. Groundwater sampling and testing at the site indicated that the groundwater in the overburden and the shallow weathered zone in the bedrock is a calcium-bicarbonate type typical of recharge in a limestone setting. Generally, though, the groundwater becomes more mineralized with depth.

The Town of Ingersoll has a piped, municipal water supply, extending to within about 1 km southwest of the proposed landfill site. It draws groundwater from several wells; the nearest to the site is Ingersoll Well 8 (Dunn's Well) located about 1 km west. Well 8 is a bedrock well about 125 m deep drawing water from the Lucas and Bois Blanc formations.

The recently completed Upper Thames Region source water protection study mapped portions of the proposed site as lying within a Significant Groundwater Recharge Area (SGRA), and also within a Highly Vulnerable Aquifer (HVA) area. However, none of the Wellhead Protection Areas (WHPA), the areas from which municipal wells draw their water, extend under the proposed landfill site. Instead, the nearest municipal well, Ingersoll Well 8, draws its water from the northwest.

Although the site is regionally mapped as SGRA and HVA, neither designation actually applies at the local scale. Quarry dewatering effectively captures any potential groundwater recharge at and in the vicinity of the quarry and pumps it into the Thames River, which in turn also limits the potential vulnerability of underlying aquifers.

7.3.6.2 Future Baseline Conditions ("Do Nothing" Alternative)

In the future, the main influence on the groundwater system in the site vicinity will continue to be from the quarry dewatering. The quarry will gradually expand to the north and east over a period of many decades. Therefore, the zone of influence, or drawdown cone, in the groundwater will also expand north and east, following the progress of the quarry.

Meanwhile, depleted sections of the quarry will be progressively rehabilitated in accordance with the approved licence and site plans. The rehabilitation plans call for backfilling (or partially backfilling) the quarry with excess overburden, leaving some lower areas where ponds would form. As the active quarry dewatering operations move north and east, some of the rehabilitated areas will become further from the quarry drawdown cone and the groundwater levels there will gradually recover.

Eventually, in hundreds of years (based on the amount of limestone resource on the Carmeuse properties), the quarrying will be finished and the entire site will be rehabilitated. At that time the dewatering system would be shut down and groundwater levels throughout the site vicinity would recover closer to ground surface and re-align with the regional groundwater flow patterns in the area.

7.3.7 Ecology

Technical Report Reference (Appendix F):
Beacon Environmental Ltd., 2020. *Ecological Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*.

7.3.7.1 Existing Baseline Conditions

The site is located in the Upper Thames River sub-watershed. The South Thames River (Thames) passes to the south of the site; it was historically straightened and channelized in this section. Although the Upper Thames sub-watershed is substantially affected by extensive agriculture and urban development, it nonetheless still exhibits significant biological diversity.

An agricultural drain to the west of the site, known as the Patterson-Robbins Drain (with an upstream branch known as the Caddy Drain), flows south and discharges into the Thames River. It is notable that there is a steep, culverted drop at the point of discharge at the Thames River, such that fish in the Thames River are unlikely able to migrate into the Patterson-Robbins Drain, except under high water levels (**Figure 7-18**).

The former West Quarry to the south of the site is now filled with water and has been rehabilitated by the quarry owners as *per* its approved licence. It is a closed water body with no direct connection to adjacent watercourses.

Figure 7-18: Patterson-Robbins Drain Outfall into Thames River

A comprehensive review of existing data was supplemented by field surveys through all seasons to determine the presence of both aquatic and terrestrial species and habitats on and around the site. Field work included: fish community inventories; fish habitat assessments; benthic invertebrate sampling; freshwater mussel surveys; vegetation mapping; breeding bird surveys; basking turtle surveys; insect surveys; wildlife surveys and observations; crow roost surveys; and bat surveys. Key findings are illustrated in **Figure 7-19** and discussed below.

No key natural heritage features or rare, endangered or threatened species were identified on the site proposed to be used for the landfill since it is, for the most part, an ongoing quarry operation.

However, a number of noteworthy features were found within the 120 m vicinity of the site including:

- Fish habitat within the Patterson-Robbins Drain;
- Woodlands west of the site, which may provide habitat for endangered bat species and roosting habitat for other bat species. These woodlands have also been identified as a “natural heritage feature that provides ecologically important services” in the Oxford Natural Heritage System Study;
- A meadow south of the site that provides habitat for the threatened Eastern Meadowlark;
- Swamp and marsh areas located to the northeast of the site that are amphibian breeding habitat; and
- Habitat for nesting Cliff Swallows along the northern wall of the former West Quarry.

Further afield, out to a distance of about 1 km from the site and along the proposed haul route, additional noteworthy natural heritage features are found:

Key Natural Heritage Features

Southwestern Landfill
Environmental Assessment

Legend

- Site
- South SWM Outfall
- Haul Routes (50 m)
- Site Vicinity (120 m)
- Wider Area (500 m)
- Wider Area (1,000 m)
- Watercourse
- Key Terrestrial Natural Heritage Features

Figure 7-19:
Key Natural Heritage Features
(after Beacon, 2020)

	Type
1	Habitat for Endangered Species (Endangered Bats) / SWH - Bat Maternity Roost Habitat / ONHSS Natural Feature That Provides Ecologically Important Services
2	SWH - Turtle Overwintering Habitat / SWH - Habitat for Species of Conservation Concern (Snapping Turtle)
3	SWH - Amphibian Breeding Habitat (Wetlands)
4	SWH - Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) - Great Blue Heron
5	Habitat for Endangered Species (Spiny Softshell Turtle) / SWH - Regional Movement Corridor
6	Habitat for Threatened Species (Eastern Meadowlark)
7	SWH - Colonially - Nesting Bird Breeding Habitat (Bank and Cliff) - Cliff Swallow
8	ONHSS Natural Feature That Provides Ecologically Important Services
9	ONHSS Natural Feature That Provides Ecologically Important Services

ONHSS = Oxford Natural Heritage System Study

BEACON ENVIRONMENTAL

Project: 217238
Last Revised: November 2019

Client: Walker Environmental Group

Prepared by: RA
Checked by: BH

DRAFT

N

1:17500

0 300 600 m

C:\Dropbox\Dropbox (Beacon)\All GIS Projects\2017\217238\Q Project Files\2018-11-13 Southwestern Landfill EA Terrestrial - 217238.qgz

- Fish habitat within the Patterson-Robbins Drain, Caddy Drain, Foldens Creek and the Thames River;
- Two woodlands located adjacent to the proposed Haul Route study areas, both of which have been identified as "natural heritage feature that provides ecologically important services" in the Oxford Natural Heritage System Study;
- A Great Blue Heron heronry on the south side of the former West Quarry that also contains cormorants and Turkey Vultures;
- A corridor along the Thames River for the movement of the endangered Spiny Softshell Turtle, as well as other aquatic, semi-aquatic and terrestrial wildlife; and
- Habitat for Snapping Turtle, a species of special concern, in the pond and wetlands within the Centreville Conservation Area and the Thames River.

All of the 18 fish species identified in the vicinity of the site are fairly common and secure species in Ontario (i.e., with a provincial status ranking of S4 or lower). No more than four species were identified at any location in the Patterson-Robbins/Caddy Drain, with Blacknose Dace and Creek Chub being the most prominent. It is a cool-water environment, with a fair amount of habitat disturbance throughout and evidence of pollution input in some locations that is reflective of an agricultural drain.

As expected, due to its size, more fish species are present in the Thames River with various darter species dominating a generally healthy cool to cool-warm water fish community. However, overall species diversity and aquatic water quality in this area is only fair or fair-to-poor.

The former West Quarry has relatively low quality aquatic habitat conditions and is isolated from adjacent watercourses, and therefore has low diversity; Rock Bass was the only species identified in the survey.

The vegetation in the site vicinity consists primarily of agricultural fields along with a mixture of cultural meadows, woodlots, thickets and hedgerows. There is a hardwood forest and a lowland deciduous forest to the west of the site. There are also some small marsh and swamp patches located to the northeast of the Site and associated with ditches and agricultural drains north of the site. All of the plant species in the study area are common and secure in southwestern Ontario (i.e., with a provincial rank of S4 or lower), and 37% of the species found are non-native. The Moist - Fresh Black Walnut Deciduous Forest Type (FOD7-4), located within the forest to the west of the site has an S2S3 ranking and is considered rare. No provincially endangered, threatened, special concern or rare species were found, nor were any regionally rare species.

Five frog and one toad species were recorded in the surrounding area, as were a number of turtles that were mainly concentrated in the Centreville Pond Conservation Area. A considerable variety of butterflies, dragonflies and damselflies were also recorded. Eastern Gartersnake was the only species of snake recorded.

Mammals found in the vicinity are common and typical of the rural agricultural environment ranging from larger species such as White-tailed Deer and Eastern Coyote to smaller rodents and bats.

About 55 breeding bird species were recorded in the vicinity of the site during breeding bird surveys. All are common and typical of rural environments, with a provincial rank no higher than S4 (apparently secure).

Large flocks of gulls and crows are known to occur in the region. The water body in the former West Quarry just to the south of the proposed landfill is a gull roost. Pittock Lake in Woodstock is also a roost for large flocks of gulls and crows. Observation of gulls, crows and starlings at the County of Oxford's Salford Landfill, which is located about 8.2 km to the south-southeast of the site, found that it attracts a substantial numbers of gulls in the fall, crows in the winter and starlings in the fall and winter. The number of crows found feeding at the Salford Landfill is only a small fraction of the overall population roosting in the Woodstock area, though.

7.3.7.2 Future Baseline Conditions ("Do Nothing" Alternative)

The natural heritage features and functions in the immediate vicinity of the site, and beyond, are expected to remain generally similar in the future, with the exception of features located within licensed extraction areas north of the Site, which will be gradually removed as the quarry advances.

7.3.8 Indigenous Land Uses

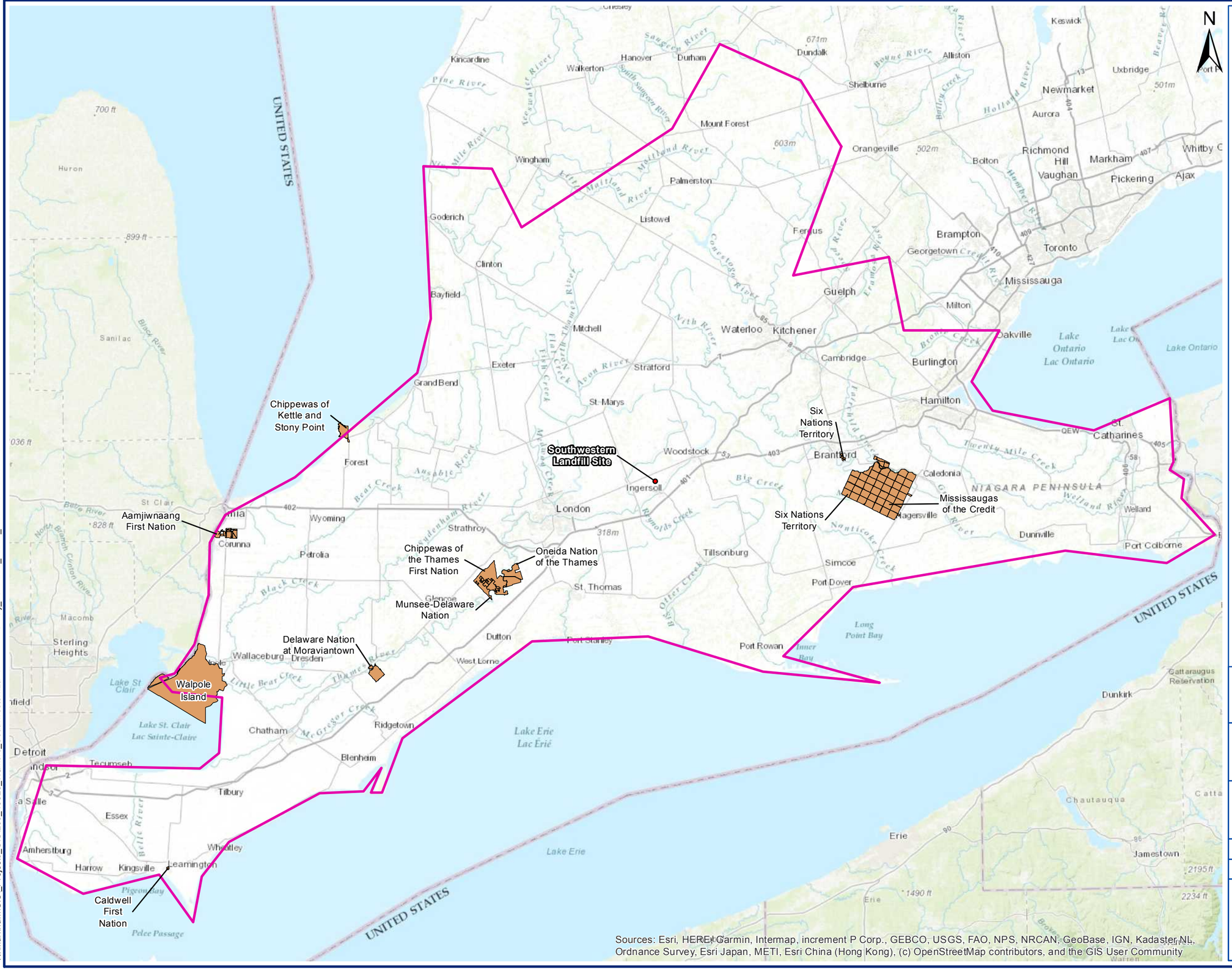
Technical Report Reference (Appendix F):
SLR Consulting Ltd., 2020. *Social Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*.

7.3.8.1 Existing Baseline Conditions

A number of Indigenous Communities have constitutionally protected Indigenous or Treaty Rights in the area (**Figure 7-20**):

- Aamjiwnaang First Nation
- Caldwell First Nation
- Chippewas of Kettle and Stoney Point First Nation
- Chippewas of the Thames First Nation
- Delaware Nation at Moraviantown
- Haudenosaunee Development Institute (HDI) (traditional government)
- Mississaugas of the Credit First Nation
- MNO Region 9 Métis
- Munsee-Delaware First Nation
- Oneida Nation of the Grand
- Six Nations of the Grand (elected government)
- Walpole Island First Nation

Members of these communities use certain lands in the general area for traditional activities such as hunting, harvesting and gathering. Others are engaged in commercial or non-commercial entrepreneurial businesses, either on or off the reserve, such as food services, retail stores, gas stations, farming and trades. Likewise, many work as employees for businesses or institutions either on or off the reserves. The Thames River has long been a focus of traditional hunting, harvesting and gathering,



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LEGEND

- Metis Nation of Ontario - Region 9
- Surveyed Reserve Boundary

Figure 7-20:
Metis and First Nations Lands
(after SLR, 2020)

0 10 20 40 Kilometers

SCALE: 1:1,050,000
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 17N

NOTES
This map is for conceptual purposes only and should not be used for navigational purposes.

Basedata:

WALKER
ENVIRONMENTAL GROUP

WALKER ENVIRONMENTAL
SOUTHWESTERN LANDFILL
- SOCIAL ASSESSMENT

**METIS AND
FIRST NATIONS LANDS**

February 10, 2020	Rev **0.0**	Figure No.
Project No. 209.40528.00001		

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although this may be waning somewhat as the quality and accessibility of the resources decline. In particular, Chippewa of the Thames community members reported that the Thames River in this area is used by themselves and other Indigenous communities for recreation, travel, gathering (plants and medicines), hunting, fishing and ceremony, where public access can be gained or where permission is granted through private property. The river also has cultural and spiritual significance beyond these physical activities.

7.3.8.2 Future Baseline Conditions ("Do Nothing" Alternative)

Any Indigenous land uses in the vicinity of the site would not be anticipated to change substantially in the future. The existing decline in traditional uses along the Thames River due to poorer water, wildlife and plant conditions that has been observed by some Indigenous Community members could continue, but may be slowed and/or reversed with ongoing watershed improvements coupled with the revitalization of traditional land uses within the Indigenous communities.

7.3.9 Cultural Heritage

Technical Report Reference (Appendix F):
MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), 2020. *Cultural Heritage Resource and Cultural Heritage Landscape Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*.

7.3.9.1 Existing Baseline Conditions

The area around the proposed site was settled by Europeans in the early 1800's, mostly on 81 ha (200 acre) land parcels that had been surveyed in the 1790's. Farming was (and continues to be) the major rural activity. However, as early as 1833, lime quarrying also began along the Thames River valley and has continued to the present day.

The settlements of Ingersoll, Beachville and Centreville were established around the same time, as was the small settlement of Dunn's Corners to the northwest.

There are no properties designated under the *Ontario Heritage Act* within 1 km of the proposed site. However, there is one property on the site, as well as four properties within 1 km, that have structures more than about 40 years old that were identified through field investigation:

On-Site:

- 643845 Rd 64
- Two-storey home with barn and contemporary garage.
- (Owned by Carmeuse and unoccupied; house since removed.)

Within 1 km:


(source: MHBC)

- 334789 33rd Line
- 1.5 storey c.1850's schoolhouse converted into a residential dwelling.


(source: MHBC)

- 334742 33rd Line
- Remnant farm complex, with historic house and newer outbuildings.


(source: MHBC)

- 623851 Rd 62/ North Townline East
- Farm complex consisting of 19th century farmhouse, silo, barns, and outbuildings.


(source: MHBC)

- 603806 Cemetery Lane
- Cemetery dating from mid-19th century, containing burial sites of many early settlers to Ingersoll and Beachville area.

The on-site landscape consists mainly of a quarry, along with some agricultural field to the northwest where the leachate treatment plant is proposed.

Most of the surrounding landscape within 1 km of the site, to the north and west is also agricultural field with a few vegetated hedgerows and drainage channels, along with some small remnant woodlots. To the east and south the existing landscape is mainly industrial consisting of quarry and related manufacturing operations, railway lines and Beachville Road. A channelized reach of the South Thames River also flows west here.

The cultural heritage resources and landscapes listed above were evaluated using guidance provided in *O. Reg. 9/06 Criteria for Determining Cultural Heritage Value or Interest* as well as the cultural heritage

provisions of the *Provincial Policy Statements*. None were determined to have important cultural heritage value or warrant conservation in accordance with those criteria.

The proposed haul route was investigated for known and potential cultural heritage resources. The proposed haul route is characterized by rural land uses, consisting of residential/agricultural and industrial uses, and presently carries a broad range of traffic types. The existing roads are also used as a haul route for the existing quarry operations in the area. No identified cultural heritage resources or cultural heritage landscapes are located along the proposed haul route.

7.3.9.2 Future Baseline Conditions ("Do Nothing" Alternative)

In the absence of the proposed landfill, the built heritage features would be expected to remain essentially the same as described above, as would the landscape within 1 km of the site and along the haul route. The most significant change to the landscape would be the progressive removal of the agricultural fields to the north of the site as the licenced quarry progresses in that direction, along with some continuing rehabilitation of the completed quarry areas to private green space.

7.3.10 Archaeology

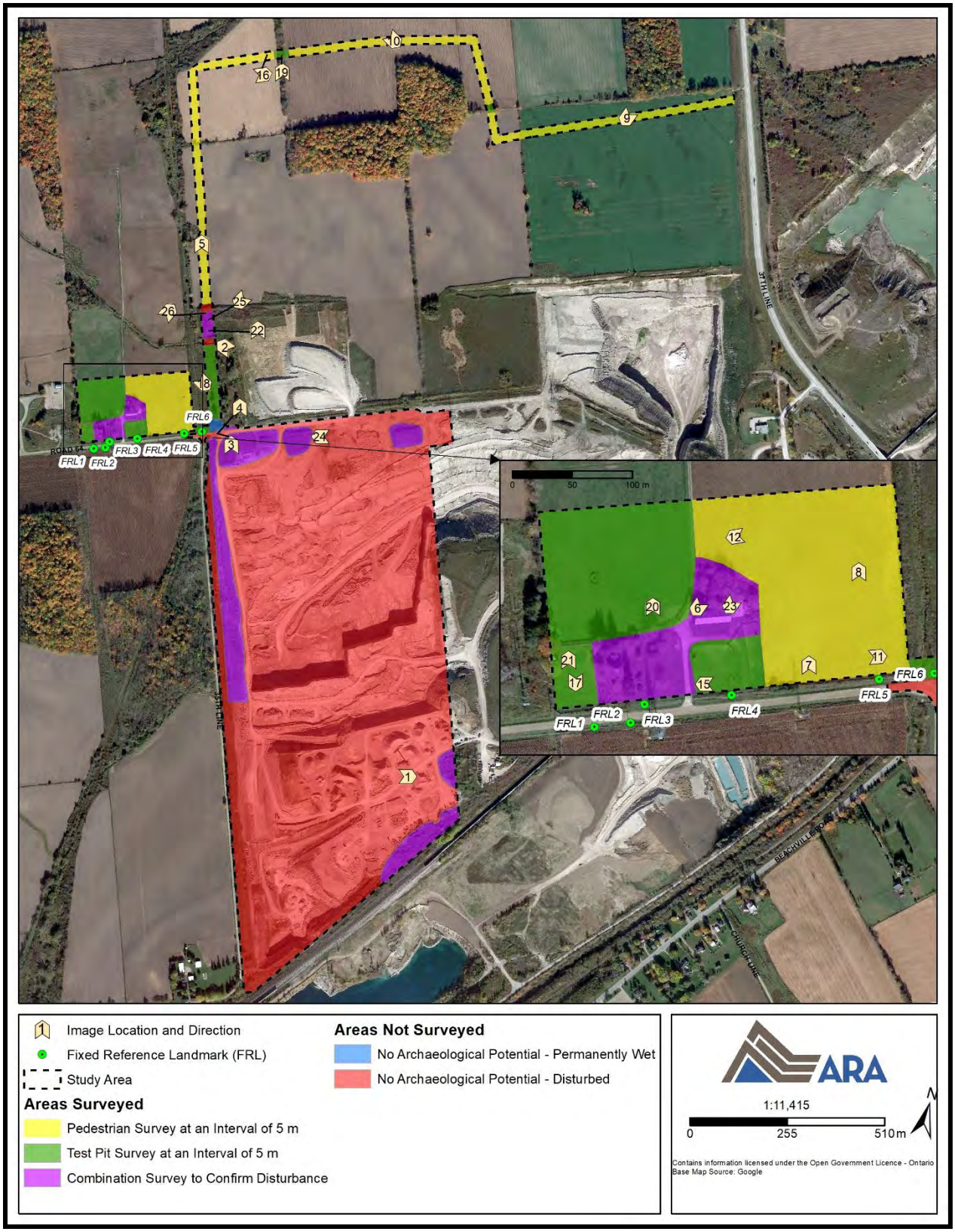
Technical Report Reference (Appendix F):
Archaeological Research Associates Ltd., 2020. *Stage 1 and 2 Archaeological Assessment Report , Southwestern Landfill Proposal Environmental Assessment*. August, 2019.

7.3.10.1 Existing Baseline Conditions

There are no registered or known archaeological sites previously recorded on the proposed landfill site or immediately adjacent. Stage 1 and Stage 2 archaeological assessments were carried out on site and along the newly proposed access route across the future quarry lands. Large portions of the site were determined to have no archaeological potential since they were either permanently wet, or have been previously disturbed through quarry excavation or other construction activity (**Figure 7-21**). The remaining areas with archaeological potential were further evaluated in the field by visual and/or test pit methods. Two sites with archaeological resources were found and further evaluated, both located in the northwestern portion of the site (where the leachate treatment facility is proposed) (**Figure 7-21**).

Site 1, located in a horse pasture, was found to contain a small deposit of burned animal remains, in an area of moderately disturbed soils. However, based on provincial criteria, the site was determined to have no important cultural heritage value and no further archaeological assessment is therefore required.

Site 2 is located in an agricultural field and contains a scatter of primarily Euro-Canadian artifacts (e.g., brick, pottery and other building materials and domestic items) with a minor Indigenous component (three chert fragments), all within an area of about 1.8 ha. The assemblage of artifacts suggests an occupation date from the mid- to late-19th century into the early 20th century, and likely represents the location of a previous farm dwelling on the site. In accordance with provincial guidance, then, this site has cultural value.



Map 8: Field Methods
(Produced under licence using ArcGIS® software by Esri, © Esri)

Figure 7-21:
Archaeology Surveys
(after ARA, 2020)

7.3.10.2 Future Baseline Conditions ("Do Nothing" Alternative)

Site 2 is located within an area that is not licenced for quarrying, so it is presumed that it would otherwise remain intact. The remainder of the site and the route for the new access road have no important archaeological resources.

7.3.11 Agriculture

Technical Report Reference (Appendix F):
Conna Consulting Inc., 2020. *Agricultural Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

7.3.11.1 Existing Baseline Conditions

The surrounding rural municipalities of Zorra and Southwest Oxford are dominantly agricultural and together contain nearly half of the farms in Oxford County. Common field crops (oilseed and grain) predominate, along with poultry operations, and cattle farms including an abundance of dairy operations. Beyond that, though in smaller numbers, there is significant diversification in other crops and livestock. The majority of the farms in the two municipalities are less than 160 ha (400 acres), although the effects of farm consolidation is increasingly evident in that there are a number of farm holdings in excess of 450 ha (1,100 acres). Corporations or partnerships make up more than half of farm ownership.

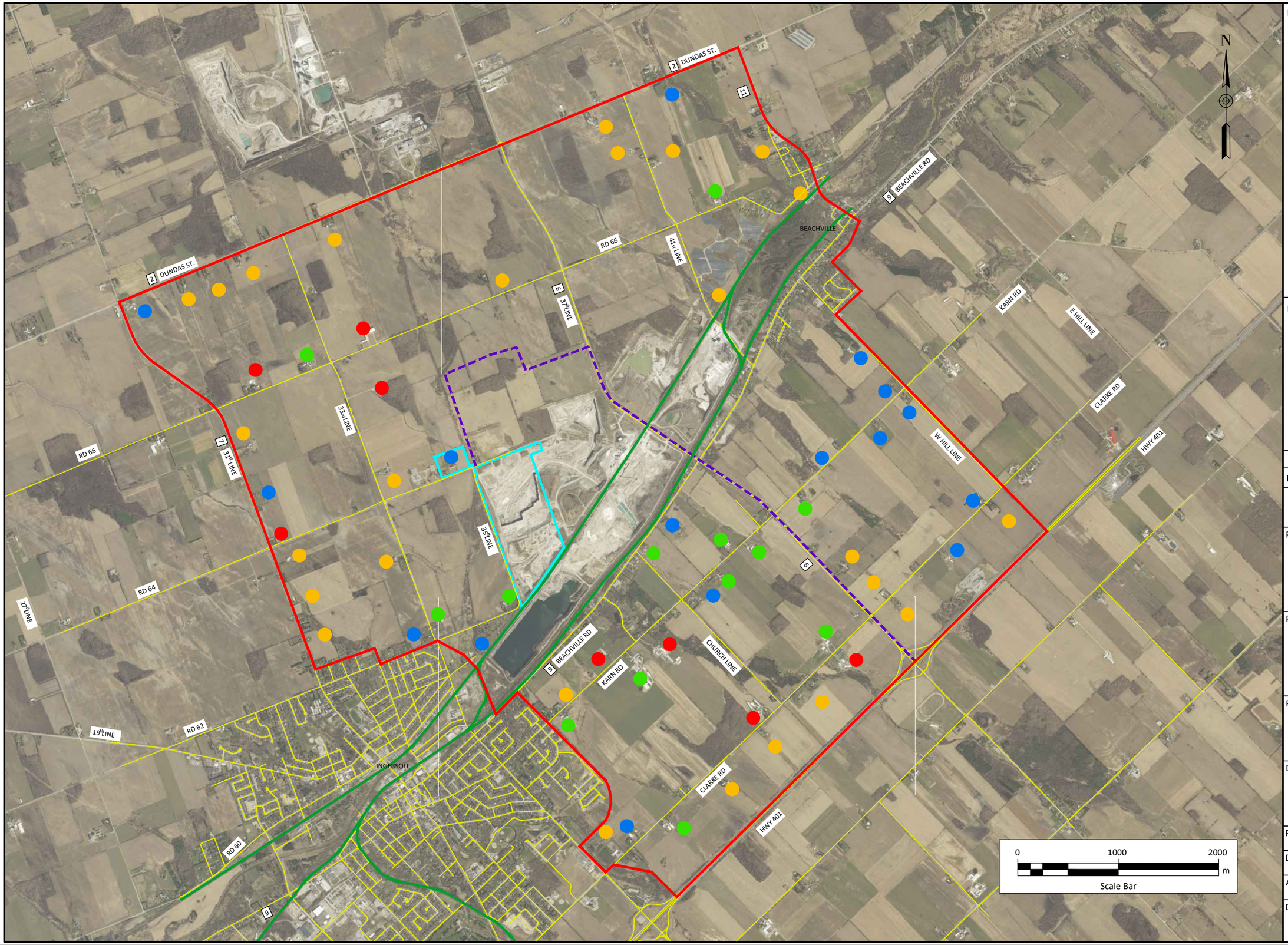
Figure 7-22 illustrates the inventory of farming operations on and around the proposed landfill site.

The majority of the proposed landfill site itself is currently in active use as a limestone quarry rather than agriculture. The exception is the small area to the northeast that is proposed to be used for the leachate treatment facilities; this is owned by the quarry operator but not licenced for quarrying. It is currently rented for field crops and horse boarding, although the farm house has recently been removed so there are no residents.

The site is physically separated from agricultural uses to the east by the lime quarrying and manufacturing operations, and the same to the south in addition to the Thames River valley, railways and residential development along Beachville Road. To the north for quite a distance the land is also owned by the quarry operator and rented for cash cropping until such time as the quarry progresses in this direction. Therefore, the only independent farming operations in proximity are to the west and northwest (**Figure 7-22**).

The nearest of these farms is to the immediate west across 35th Line. This farming operation is now retired although the fields remain in crop production. The nearest active farm facilities are on five farms within a distance of about 500 m to 1 km to the west, northwest and southeast. These include a specialty equestrian farm (Killean Acres) whose operation has mostly ceased and is for sale.

Along the proposed haul route on County Road 6 there are there are a number of large farm operations with land holdings located on both sides, along with two farm lanes and six field access points located between Clarke Road and Beachville Road, indicating that some farm machinery likely moves along



Legend

- Cattle and Sheep
- Swine and Poultry
- Horses
- Cash Crop / Storage /Mixed Use
- Study Area
- Haul Route
- Proposed Site Area
- CN Rail Lines
- Roads

Notes

Satellite images (GeoTIFF) obtained from Oxford County GLIMR interactive mapping site using 2015 aerial imagery layer.

Figure 7-22:
Farm Facilities
(after Conna, 2020)

No.	Date D/M/Y	Revision	By	App.
A	JAN 2020	Issued for Use	JT	JH

Prepared By

Prepared For

WALKER ENVIRONMENTAL GROUP

Project

SOUTHWESTERN LANDFILL

Drawing

FARM FACILITIES

Project No. C4012

Drawn JThompson	Date JAN 2020
Approved JHagarty	Scale 1:35,000
Drawing No.	Revision No. A

File Name: \\10.99.10.56\data\WEG\CAD & ENG\WWSL\967243- SWLF\Agricultural Assessment\C4012 Farm Facilities (A) 11JUN19.dwg Plotted: Feb 05, 2020 @ 3:55pm by Joseph

(and/or across) County Road 6 during the farming season. Another specialty agri-business of note south of the site on Clarke Road, just west of County Road 6, is the Leaping Deer Adventure Farm[26], run as a tourist attraction.

7.3.11.2 Future Baseline Conditions ("Do Nothing" Alternative)

Given the emphasis in the policies of the County and the local municipalities on protecting the prime agricultural land base, it can reasonably be expected that the existing farm operations in the site vicinity will remain in agricultural use for the foreseeable future, although the trend to consolidation and mechanization could result in shifts in the ownership and operations. Some increase in farm machinery movement along County Road 6 could result.

The land to the north of the proposed landfill will gradually be removed from rental cropping over a period of decades as the quarry expands. At the same time, the depleted sections of the quarry would be progressively rehabilitated. The approved site plans call for the quarry to be partially backfilled with overburden soils resulting in about 43 ha (58% of the site) of relatively level land (i.e., not including the areas where steep slopes or a lake would remain) that could have potential for agricultural use, although that use is not specifically assigned in the plans.

Climate change could also have some effect on farming operations in the vicinity, with higher temperatures resulting in more water demands for irrigation and livestock watering.

7.3.12 Social

Technical Report Reference (Appendix F):
SLR Consulting Ltd., 2020. *Social Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

7.3.12.1 Existing Baseline Conditions

The County of Oxford covers an area of over 2,000 km^2 and is composed of eight lower-tier municipalities. Oxford County has three major urban centres. The City of Woodstock is the main focal point in northern Oxford for employment, commerce, recreation and administration in the County. The Town of Tillsonburg fulfils similar roles for southern Oxford. The Town of Ingersoll is also a major centre of employment and commerce. The remaining municipalities are more rural in nature. Oxford County has developed a positive reputation with respect to its dairy industry that is promoted across Ontario and Canada. There is an industrial corridor focused on Highway 401 which bisects the County as well as several other industrial land uses including quarries, of which the Carmeuse quarry is the largest. A major rail corridor also bisects the County.

The land on which the landfill is proposed to be developed is located within the Township of Zorra. Other municipalities within the Site Vicinity Study Area are the Town of Ingersoll to the south-west, the Township of South-West Oxford to the south and the Township of East Zorra-Tavistock to the north-

[26] *It has since been reported that Leaping Deer Adventure Farm will close (sometime during 2020) due to lack of family members willing to continue the business.*

east. Within the Township of South-West Oxford are the two rural areas of Centerville and the Village of Beachville.

Oxford County and the Town of Ingersoll have experienced steady population growth of 14% since 1996, while the rural municipalities of Zorra and South-West Oxford have held steady or decreased slightly over the same period. The age distribution is similar amongst all three and typical of the Province overall. The population of the County is fairly stable and also reflects the provincial averages for mobility and migration, although the rural townships have slightly more stable populations. About half of the households in Oxford County, and in the municipalities around the site, consist of one or two persons, while around 10% are more than five persons - again similar to provincial averages. Single detached homes predominate and the majority are owned rather than rented.

About 10% of people surveyed in the County in 2017 are currently considering moving, for a wide variety of reasons. Closer to the site, 42% have considered moving in the past five years with more than half citing the proposed landfill as an important consideration.

There are only two residences within 500 m of the proposed landfill site, with a further 88 residences within 500 m to 1 km. There are also 27 residences along the primary haul route on County Road 6. Outdoor activities at these residences are quite varied and include entertaining, gardening, exercising and relaxation. About 7% of Ingersoll residents surveyed identified the proposed landfill as an issue that could affect their enjoyment of property, about 5% higher than the County average, while Zorra and South-West Oxford residents were more likely than average to be concerned about roads. The most important aspects supporting property enjoyment in the site vicinity were reported as: clean air, clean water, traffic safety, low odour and low noise.

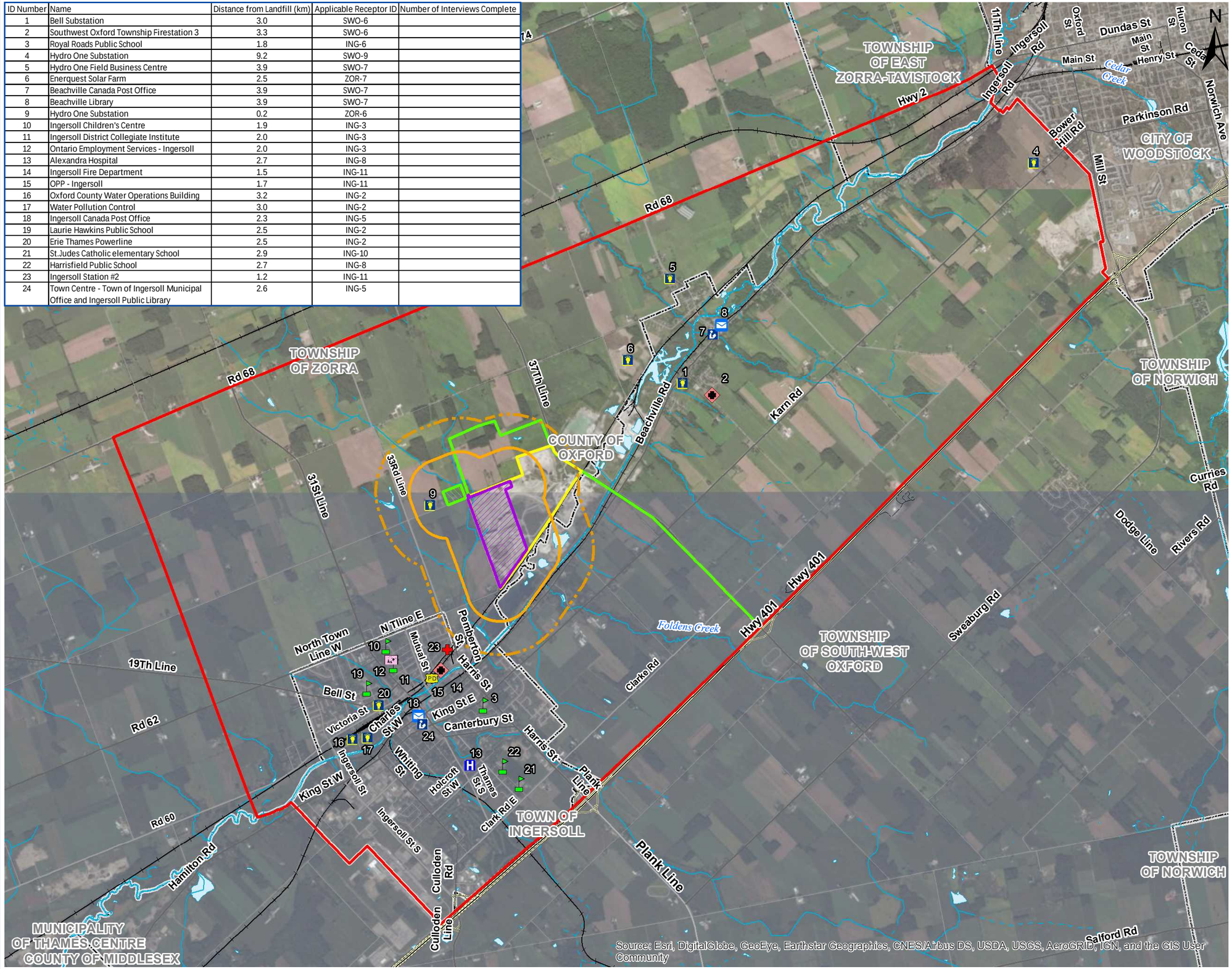
The only public facilities or institutions within 500 m of the proposed site are the Ingersoll Rural Cemetery and a Hydro One substation, but beyond that distance there are numerous others in the Town of Ingersoll and the villages of Beachville and Centreville. These include (**Figure 7-23**): schools, libraries, employment services, emergency services, a hospital/health unit, post offices and utilities. The Ingersoll Rural Cemetery is located 0.6 km from the proposed landfill site boundary and is jointly owned by the Town of Ingersoll and the Township of Zorra. The Ingersoll Rural Cemetery is the burial site for a number of Canadian war veterans and some of the area's original founding families.

Two recreational features were identified within 500 m of the site. One is an "unofficial"[27] trail following the former rail bed to the west and northwest of the site, while the other is an on-road section of Beachville Road south of the site which is promoted as part of one of the County's cycling routes by Tourism Oxford. Other recreational features further removed from the site include parks, playgrounds, sports fields, *etc*. as shown in **Figure 7-24**. The Town of Ingersoll maintains 60 ha of active and passive parkland within 21 parks, including baseball diamonds, soccer pitches, tennis courts, recreational trails, skateboard park, and splash pad at Victoria Park. Trail use is particularly popular, with support from several active trail groups. There are two official trails in Ingersoll, the John Lawson Park Trail and the Memorial Park Trail. The rural roads throughout the study area are used by residents and visitors for country drives and biking.

Residents in Oxford County describe their community character and cohesiveness in a generally positive.

[27] *"Unofficial" because it is actually private property, owned by the quarry operator in this vicinity.*

ID Number	Name	Distance from Landfill (km)	Applicable Receptor ID	Number of Interviews Complete
1	Bell Substation	3.0	SWO-6	
2	Southwest Oxford Township Firestation 3	3.3	SWO-6	
3	Royal Roads Public School	1.8	ING-6	
4	Hydro One Substation	9.2	SWO-9	
5	Hydro One Field Business Centre	3.9	SWO-7	
6	Enerquest Solar Farm	2.5	ZOR-7	
7	Beachville Canada Post Office	3.9	SWO-7	
8	Beachville Library	3.9	SWO-7	
9	Hydro One Substation	0.2	ZOR-6	
10	Ingersoll Children's Centre	1.9	ING-3	
11	Ingersoll District Collegiate Institute	2.0	ING-3	
12	Ontario Employment Services - Ingersoll	2.0	ING-3	
13	Alexandra Hospital	2.7	ING-8	
14	Ingersoll Fire Department	1.5	ING-11	
15	OPP - Ingersoll	1.7	ING-11	
16	Oxford County Water Operations Building	3.2	ING-2	
17	Water Pollution Control	3.0	ING-2	
18	Ingersoll Canada Post Office	2.3	ING-5	
19	Laurie Hawkins Public School	2.5	ING-2	
20	Erie Thames Powerline	2.5	ING-2	
21	St.Judes Catholic elementary School	2.9	ING-10	
22	Harrisfield Public School	2.7	ING-8	
23	Ingersoll Station #2	1.2	ING-11	
24	Town Centre - Town of Ingersoll Municipal Office and Ingersoll Public Library	2.6	ING-5	



LEGEND

- Site Vicinity Study Area
- Auxiliary Infrastructure
- Potential Landfill Footprint
- 500m from Proposed Landfill Site
- 1000m from Proposed Landfill Site
- Current Quarry Lime Plant Area
- Municipal Boundary
- Ambulance
- Fire Department
- Hospital/Clinic
- Civic Building/Sevices
- Library
- Police Department
- Post Office
- School
- Utility
- Haul Route
- Railway
- Intermittent Watercourse
- Permanent Watercourse
- Waterbodies

0 0.5 1 2 Kilometers

SCALE: 1:55,000
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 17N

NOTES

This map is for conceptual purposes only and should not be used for navigational purposes.

Basedata:

WALKER ENVIRONMENTAL GROUP
Figure 7-23:
Public Facilities and Institutions (after SLR, 2020)

WALKER ENVIRONMENTAL
SOUTHWESTERN LANDFILL
- SOCIAL ASSESSMENT

PUBLIC FACILITIES AND INSTITUTIONS

February 14, 2020	Rev **0.0**	Figure No. **11**
Project No. 209.40528.00000		

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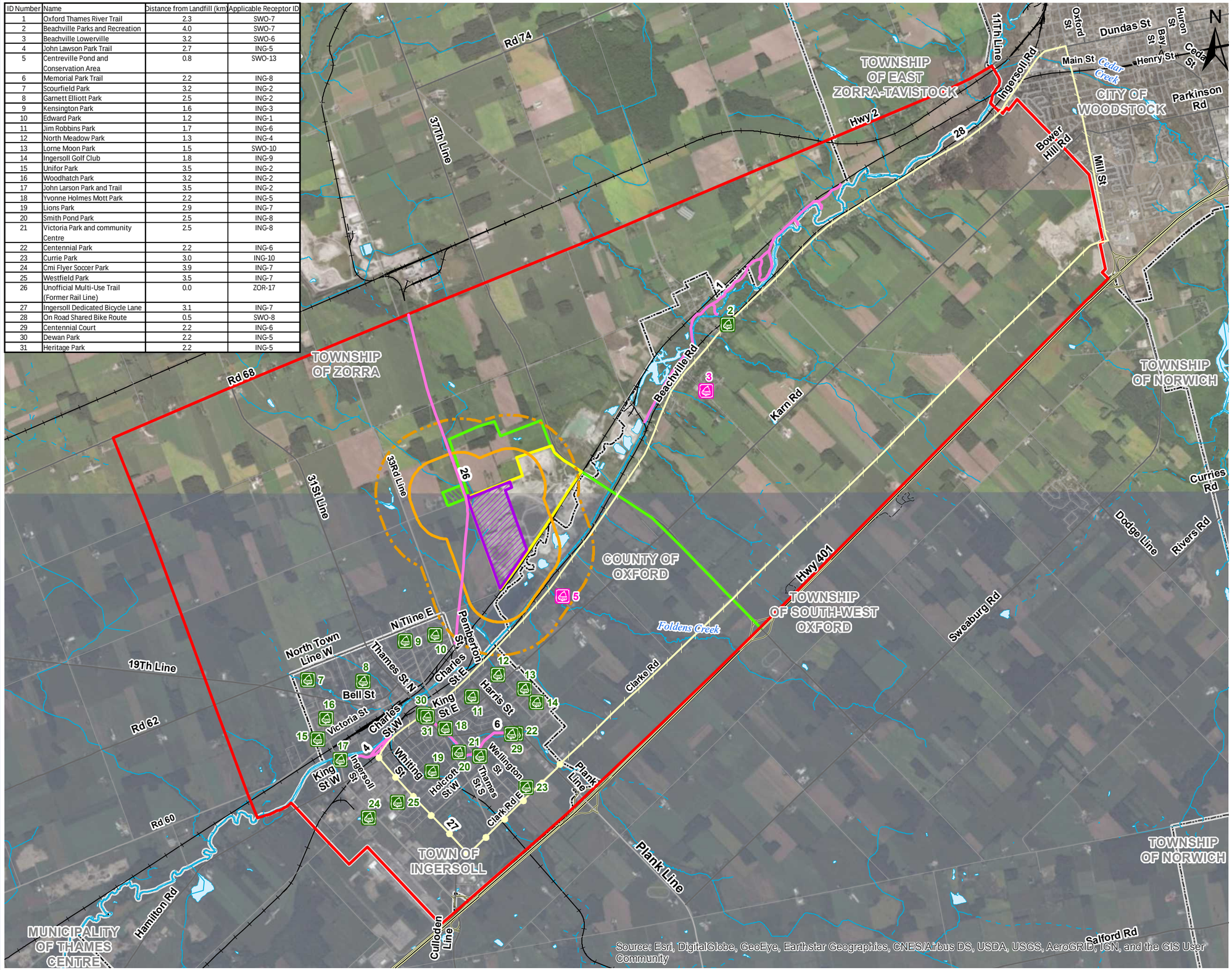
ID Number	Name	Distance from Landfill (km)	Applicable Receptor ID
1	Oxford Thames River Trail	2.3	SWO-7
2	Beachville Parks and Recreation	4.0	SWO-7
3	Beachville Lowerville	3.2	SWO-6
4	John Lawson Park Trail	2.7	ING-5
5	Centreville Pond and Conservation Area	0.8	SWO-13
6	Memorial Park Trail	2.2	ING-8
7	Scourfield Park	3.2	ING-2
8	Garnett Elliott Park	2.5	ING-2
9	Kensington Park	1.6	ING-3
10	Edward Park	1.2	ING-1
11	Jim Robbins Park	1.7	ING-6
12	North Meadow Park	1.3	ING-4
13	Lorne Moon Park	1.5	SWO-10
14	Ingersoll Golf Club	1.8	ING-9
15	Unifor Park	3.5	ING-2
16	Woodhatch Park	3.2	ING-2
17	John Larson Park and Trail	3.5	ING-2
18	Yvonne Holmes Mott Park	2.2	ING-5
19	Lions Park	2.9	ING-7
20	Smith Pond Park	2.5	ING-8
21	Victoria Park and community Centre	2.5	ING-8
22	Centennial Park	2.2	ING-6
23	Currie Park	3.0	ING-10
24	Cmi Flyer Soccer Park	3.9	ING-7
25	Westfield Park	3.5	ING-7
26	Unofficial Multi-Use Trail (Former Rail Line)	0.0	ZOR-17
27	Ingersoll Dedicated Bicycle Lane	3.1	ING-7
28	On Road Shared Bike Route	0.5	SWO-8
29	Centennial Court	2.2	ING-6
30	Dewan Park	2.2	ING-5
31	Heritage Park	2.2	ING-5



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LEGEND

- Site Vicinity Study Area
- Auxiliary Infrastructure
- Potential Landfill Footprint
- 500m from Proposed Landfill Site
- 1000m from Proposed Landfill Site
- Current Quarry Lime Plant Area
- Haul Route
- Park/Recreational Area
- Conservation Area
- Trail
- On Road Shared Bike Route
- Ingersoll Dedicated Bicycle Lane
- Railway
- Intermittent Watercourse
- Permanent Watercourse
- Waterbodies
- Municipal Boundary

0 0.5 1 2 Kilometers

SCALE: 1:55,000
WHEN PLOTTED CORRECTLY AT 11 x 17
NAD 1983 UTM Zone 17N

NOTES

This map is for conceptual purposes only and should not be used for navigational purposes.

Basedata:

WALKER ENVIRONMENTAL GROUP

Figure 7-24:
Recreational Resources (after SLR, 2020)

WALKER ENVIRONMENTAL
SOUTHWESTERN LANDFILL
- SOCIAL ASSESSMENT

RECREATIONAL RESOURCES

February 14, 2020	Rev **0.0**	Figure No.
Project No. 209.40528.00000		

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way, characterizing it as friendly, supportive and welcoming, with a peaceful "small town" feel and a spirit of volunteerism for community events. Among negative attributes, safety related to crime and drugs are the most common concerns. More businesses, stores and services are most often suggested as a way to improve the community. The majority (82%) of residents surveyed in the County reported their feeling of overall health and well-being as good to excellent, with access to good health care being the most important factor. About 16% reported the proposed landfill as the most important issue facing the community. Nevertheless, 95% of Oxford County residents are satisfied with living in their community.

7.3.12.2 Future Baseline Conditions ("Do Nothing" Alternative)

Though continued growth is forecast in the County, the current goals and aspirations that centre around engaging residents in community life, environmental stewardship, zero waste and providing opportunities for economic growth are likely to be sustained into the future. Similarly, the most valued characteristics will also remain: friendly, neighbourly, family-oriented communities; the peaceful, safe small-town character and cohesive social networks. Closer to the site, minimal change in social characteristics is expected since only limited residential growth is forecast (by minor infilling) and the rural population has been relatively stable. No new recreational or public facilities are being planned near the site either, apart from priority being given to a proposed paved trail along Beachville Road to the south of the site.

There is potential for the consolidation of recreational services on a multi-use recreational complex to take advantage of opportunities for efficiencies and service delivery. The scarcity of suitable sites within the Town's boundaries is a real and significant challenge in dealing with the issue. It is noteworthy that one of the two preferred sites for the multi-use recreational complex is 99 North Town Line East, which is approximately 1.5 km from the proposed landfill site boundary. Priority is also being given to a proposed paved trail along Beachville Road to the south of the site.

Population growth in the County will likely result in a gradual increase in traffic on the roads in the site vicinity over the next several decades, along with corresponding increases in traffic noise and dust, that may result in a greater degree and/or frequency of nuisance to those living along the major arteries such as County Road 6 and Beachville Road.

7.3.13 Economic

Technical Report Reference (Appendix F):
Keir Corp., 2020. *Economic and Financial Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

7.3.13.1 Existing Baseline Conditions

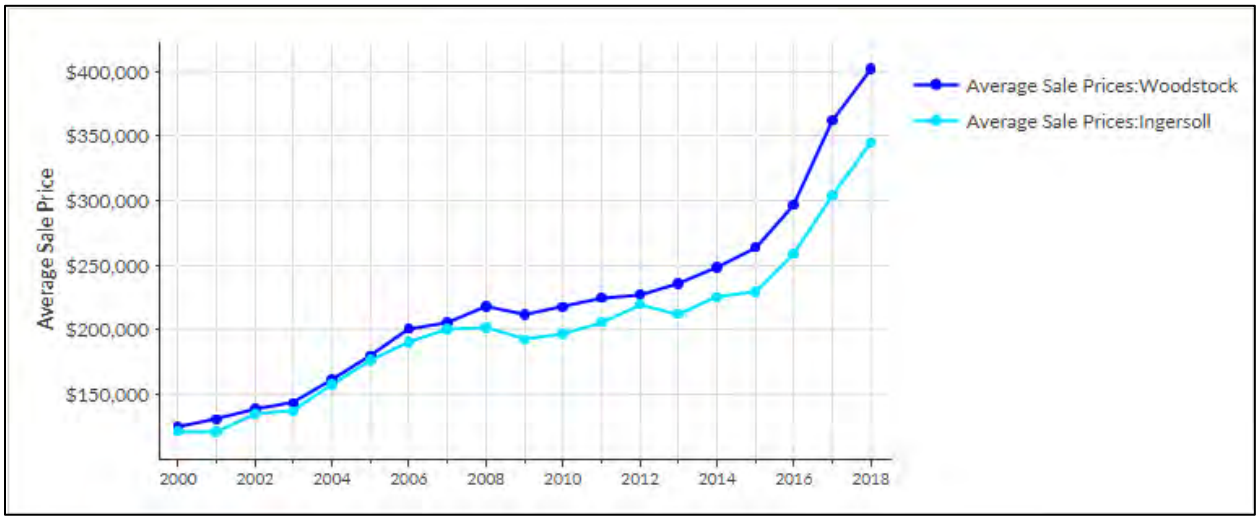
Carmeuse Lime (Canada) Ltd. is the only business located within 500 m of the site. There are four additional businesses currently located within 1 km of the site – one is a horse farm, two are related to machinery and one is a construction business. Beyond 1 km and out to 5 km distance there is a much larger number and variety of businesses, mainly within the urban boundary of Ingersoll.

Oxford County's overall economy is currently strong. Consequently, the labour market is tight with unemployment rates below the provincial average. In the rural municipalities of Zorra and South-West Oxford (and the County as a whole) the labour force is predominantly focused in the resource sector (agriculture, minerals), while in the urban centres of Woodstock and Ingersoll manufacturing and related services predominate. The fastest growing industries in Oxford County over the past ten years are manufacturing, waste management and remediation, accommodation and food services. About 70% of Oxford County's labour force both live and work in the County.

Farms are rapidly consolidating as family farms are bought up by larger agri-businesses that can invest in mechanization and automation to achieve economies of scale. Farm land prices in Oxford County are among the highest in the Province and have risen continuously since 2010.

In terms of housing, the Woodstock/Ingersoll area has been a strong seller's market in the last few years, with high demand and rapidly rising prices as illustrated in **Figure 7-25**.

Figure 7-25: Average Detached Home Sale Prices (2000 - 2018)



The finances of the County of Oxford and the local municipalities of Zorra, South-West Oxford and Ingersoll all appear to be in good condition.

7.3.13.2 Future Baseline Conditions ("Do Nothing" Alternative)

Overall, economic conditions in Oxford County are expected to remain relatively strong and experience continued growth in the coming decades.

A future expansion by Toyota in Woodstock, along with another in Cambridge, and a new Maple Leaf processing plant in London are indications that the supply of labour in Oxford County will continue to remain tight in the near term, with correspondingly low unemployment rates. Forecasts on behalf of the County estimate that employment will grow by more than 30% over the next 26 years across a diverse range of sectors. However, the most prevalent employment sectors in Oxford County such as manufacturing and resources are also among those most vulnerable to automation which could dampen the projected employment growth. Farm consolidation and automation is expected to continue over the next several decades as well, which will likely mean little growth in on-farm employment.

Data from the Municipal Property Assessment Corporation (MPAC) indicate that assessment values (and therefore property values) in all of the neighbourhoods surrounding the proposed landfill site have been rising, driven in large part by population increases resulting from employment growth and the in-migration of retirees moving out from the GTA. This trend can be expected to continue.

Municipal revenues and expenses can both be assumed to increase correspondingly in response to population and employment growth.

7.3.14 Transportation

Technical Report Reference (Appendix F):
HDR Corporation, 2020. *Traffic Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

7.3.14.1 Existing Baseline Conditions

County Road 6 (CR#6) between Highway 401 and the proposed landfill site is a paved two-lane arterial road with an extra passing lane southbound between Beachville Road and Karn Road, and also northbound near the Carmeuse truck entrance. It has adequate vertical and horizontal alignment for heavy truck traffic. The pavement was found to be in fair to good condition in this stretch, with the exception of a few potholes, and some rutting at the Beachville Road crossing.

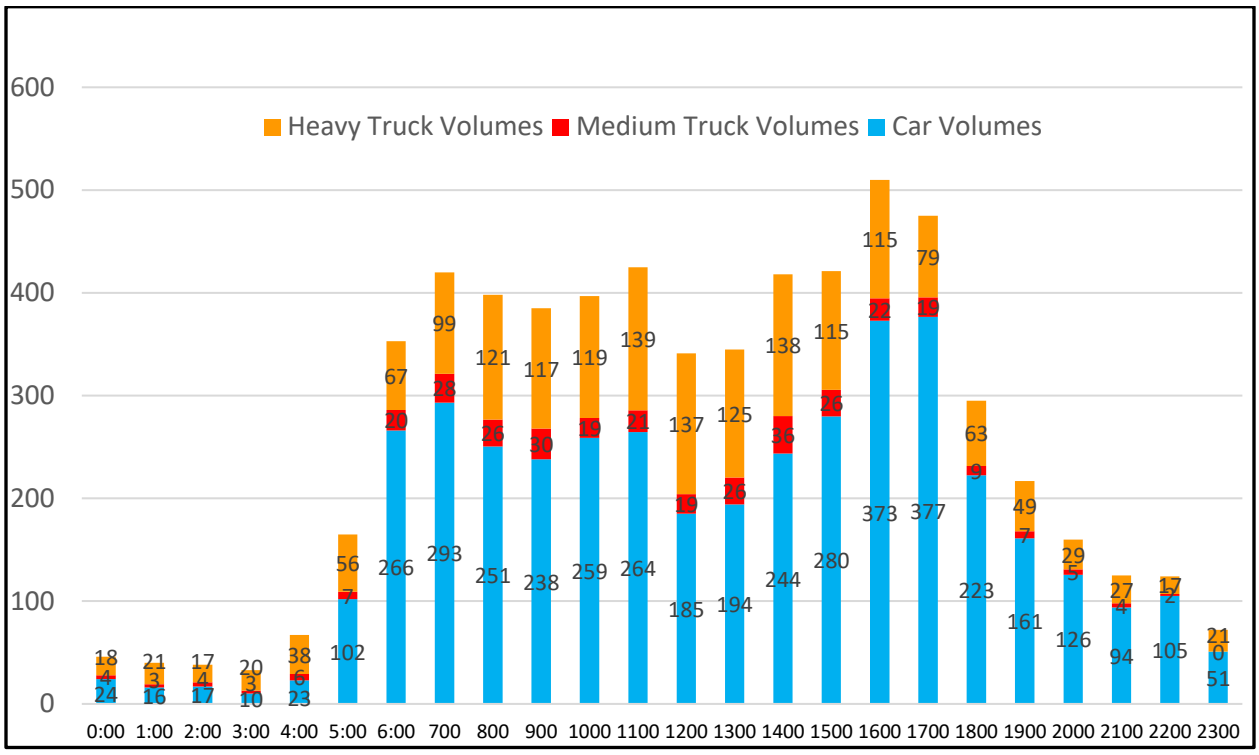
In addition there are two rail crossings just north of Beachville Road, one with an underpass (Canadian National) and the other at grade (Ontario Southland Railway). Ontario Southland Railway runs one or two trains *per* day through their crossing and there was found to be sufficient northbound queuing space between Beachville Road and the tracks for the maximum of three vehicles that were observed to wait for the train to cross. The train and traffic volumes at this crossing do not warrant a grade separation.

There are currently no formal trails or bicycle lanes on or crossing on CR#6. No pedestrians or cyclists were observed using CR#6 during the field work. Large farm vehicles were observed travelling along the shoulders of CR#6 although they were rarely impeding traffic flow. CR#6, along with each of the crossroads in the study area, also serve as local school bus routes.

The designated Emergency Detour Routes (EDR) for Highway 401 in this area are all to the south, and do not include CR#6 north of Highway 401, nor any of the crossroads in this stretch. Nevertheless, local residents have reported that some through traffic does use various routes north of Highway 401 when it is closed or congested. Data indicate that the EDR in this area were employed 32 times between 2013 and 2018 for various reasons including collisions, construction, weather, *etc*..

The average traffic volume on CR#6 is approximately 9,000 vehicles *per* day. Over the course of a day, about one-third of that is truck traffic. **Figure 7-26** is a graph illustrating the measured hourly distribution of cars, trucks and heavy trucks.

Figure 7-26: 2018 Hourly Vehicular Volumes on County Road 6



CR#6 and each of the three intersections along this stretch of CR#6 (Clarke Road, Karn Road and Beachville Road/County Road 9) currently fall within acceptable capacity and performance levels, with stable flow and low potential for congestion. Some sightline issues were noted at the intersections with Beachville Road (due to trees/vegetation) and Karn Road (trees/road curve). However, no sightline issues were found at any of the private residential or commercial entrances.

There were 53 reported vehicle collisions on CR#6 in the study area between 2014 and 2017. Of these, none were fatal, 14 resulted in injuries, and the remainder only involved property damage. More than half of the collisions were single-vehicle, and collisions predominantly occurred in the winter and in the afternoons/evenings. Most sections and intersections along CR#6 have lower collision rates than the provincial average, with the exception of the Beachville Road intersection, and the segment from Clarke Road to Highway 401, which are somewhat higher.

7.3.14.2 Future Baseline Conditions ("Do Nothing" Alternative)

Future traffic volumes over a 20-year period (excluding the proposed landfill) were projected to increase about 1% per year in accordance with the most recent average annual population and employment growth forecasts for Oxford County. The overall traffic patterns are expected to remain similar to today.

According to the County of Oxford 2009 and 2019 Transportation Master Plans, no substantial road improvements are planned or scheduled on County Road 6 or on the crossroads within the study area within this time frame; therefore, aside from ongoing maintenance and repair, the road network in the study area is assumed to remain as it is currently.

Oxford County is proposing new trails along both Karn Road and Beachville Road. Of these, only the Beachville Road trail has priority status; it will consist of a paved shoulder at the CR#6 crossing.

Even with the increased baseline traffic growth in the future, CR#6 and all of its intersections are forecast to continue to operate with sufficient capacity and level of service (i.e., stable flow and low potential for congestion). The only exception noted is at the eastbound off ramp approach from Highway 401 to CR#6, where modelling suggests a potential for a poorer level of service and higher degree of delay, although the resulting vehicle queues can be accommodated within the existing off-ramp.

7.3.15 Noise & Vibration

Technical Report Reference (Appendix F):
RWDI AIR Inc., 2020. *Noise and Vibration Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

7.3.15.1 Existing Baseline Conditions

Noise is present in the vicinity of this site from urban, industrial, rail, and farming activities, along with the associated road traffic. However, the quarry and related manufacturing operations meet provincial noise guidelines at all off-site receptor locations. Based on traffic counts, noise levels from road traffic in the area were also found to be within the provincial guidelines for ambient sound levels with one exception – the area around the intersection of Beachville Road and County Road 6.

Existing impulsive (sharp and almost instantaneous) sounds were measured to the south of the site near a heronry that might be sensitive to such sounds. They are produced by activities such as passing trains, train marshalling yard, quarry blasts, and other quarry operations. Not surprisingly, the environment in the vicinity of the site is characterized by a substantial amount of impulsive noise, typically with 29 to 59 impulses exceeding 65 decibels *per* day.

Similarly, there are a number of existing sources of vibration in the area, with the most notable including the blasting events at the local quarry operations, train marshalling yard, and trains passing on the two rail lines to the south of the site.

7.3.15.2 Future Baseline Conditions ("Do Nothing" Alternative)

Future baseline noise levels in the site vicinity can be expected to increase somewhat over time with population growth and corresponding traffic increases. However, as a conservative assumption the ambient traffic noise levels were assumed to remain the same as current.

The locations of the noise and vibration sources associated with the local quarry operations will gradually shift over the years as the extraction and rehabilitation progressively move.

7.3.16 Air Quality

Technical Report Reference (Appendix F):
RWDI AIR Inc., 2020. *Air Quality Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

7.3.16.1 Existing Baseline Conditions

Baseline monitoring in the vicinity of the site for a period of one year (representing all seasons) reveals that the air quality in this area reflects the predominant land uses, including urban development, agriculture and industry. It is also influenced by the proximity of major transportation corridors such as rail lines and Highway 401.

Despite these influences, the air quality generally remains within government standards and guidelines for a wide range of constituents, with a couple of notable exceptions. One is chloroform which exceeds its applicable criterion by about 20% on average, although it was only measured occasionally as spikes in the data; no existing source can be identified so the measurements may be anomalous. Another is benzo(a)pyrene (principally from vehicle exhaust/tailpipe emissions) where levels are about three times the applicable criterion[28].

Although certain odours are present from time-to-time in the vicinity of the site, for example from farming operations, no existing odours were identified that were similar in character to those from a landfill.

Particulates (dust) in the air were also monitored as part of this study, and assessed in conjunction with other available monitoring data from Ministry of the Environment, Conservation and Parks. Computer modelling was then used to calculate dust levels at other locations[29]. As with other air constituents, dust is generated in the vicinity of the site by a variety of activities with the primary source being traffic on the nearby roads, and, to a lesser degree, local quarry operations and farming. However, modelled airbourne particulate levels at off-site residential or public facility locations fall within government health standards for inhalable and respirable particle sizes (PM_{10} and $PM_{2.5}$, respectively). Similarly, based on the modelling, aesthetic/nuisance criteria for suspended dust and dust fall are also currently met at all off-site residential or public facility locations except along County Road 6, where visible (suspended) dust levels are calculated to be slightly higher on occasion.

7.3.16.2 Future Baseline Conditions ("Do Nothing" Alternative)

For the purposes of this assessment, the current air quality is assumed to continue in the future. Increases in air emissions due to forecast population growth and related development is expected to be offset by continuing improvements in emission controls.

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28 The background data for benzo(a)pyrene was obtained from National Air Pollution Surveillance (NAPS) Station 62601, Experimental Farm Simcoe, the closest station that has data for Benzo(a)pyrene. Although not in the immediate vicinity of the site, this station is located in a rural area generally representative of the site location.

29 It should be noted that these models use highly conservative assumptions that tend to over-predict dust levels; for instance, dust levels are calculated for the centre of a roadway rather than at adjacent residences, and dust levels reduce rapidly with distance.

Baseline levels of dust are predicted to increase somewhat in future years owing mainly to increasing background traffic levels in the area. Based on the modelling, the areas along Beachville Road and County Road 6 are calculated to experience PM_{10} and suspended (visible) particulate levels at or exceeding the provincial criteria on occasion.

7.3.17 Input from Stakeholder Consultation

During the evaluation of the environment potentially affected by the undertaking, specifically the findings regarding the existing environment as a result of the field studies, consultation was undertaken with Indigenous Communities, various interested members of the public and local government agencies through the Community Liaison Committee. The following is a brief summary of some of the key input received regarding the existing environment, and its influence on the assessment. More extensive details can be found in Section 10 of this document, and the associated consultation appendices.

Table 7-9: Summary of Stakeholder Input - Existing Conditions

Input	Considerations
Clarify how climate change will be taken into account if landfill impacts are modelled based on existing conditions. How will higher winds taken into consideration?	Walker ensured that climate change was factored into the impact assessment studies, and that the contingency plans for the landfill site included provision for high wind events.
Local species that have been identified in the area: • Trumpet swans and snow owls have been seen in the area; • Woodland voles have been seen at the Centreville Conservation Area; and • Peregrine Falcons are well documented in the area.	Walker's ecology experts were provided with this information and considered each of these species in their data collection and impact assessment.
Potential sources of elevated hydrogen sulphide concentrations in the background air monitoring data were suggested by community members: • Local cement manufacturing operations; and • Sulphur in fertilizer spread on local agricultural fields.	Walker directed its air quality experts to consider these along with any other potential background sources of hydrogen sulphide.
Concerns regarding narrow shoulders on the hill near the County Road 6/Beachville Road intersection. Concern about lack of safe place should a truck break down or need to pull over at the bottom of this hill.	Walker directed its traffic experts to examine this issue. The road shoulders were found to be in good condition during field visits. Standard shoulder widths of approximately 2.5 m were measured on both sides of County Road 6 and throughout the study area, consistent with the Road Network Assessment Report prepared by Oxford County.

Input	Considerations
Concern regarding the possibility of traffic back-up due to trains at the level crossing north of the County Road 6 and Beachville Road intersection.	Walker directed its traffic experts to further examine this issue. Additional video surveys were conducted and the queuing space was found to be adequate, especially given the low frequency of use for this train line.
Concern about planning for Highway 401 road closures, and particularly the observation of trucks passing through downtown Ingersoll.	Walker confirmed that the designated Emergency Detour Routes (EDR) for this area were all south of Highway 401. Walker also committed to develop contingency measures for highway closures that would direct landfill trucks onto the EDR or other options as reasonable.

7.4 Potential Effects, Mitigation & Net Effects

In this section of the report, the possible effects that the proposed landfill (as described in **Section 7.2**) would have on the environment (as described in **Section 7.3**) are examined. Where negative effects are identified, further mitigation measures are introduced; in other words, ways in which the design or operation of the site could be adjusted to reduce or eliminate these effects. Finally, the net effects are then described, taking into account the effectiveness of the mitigation measures.

The full range of potential effects that could be caused by a landfill are described by the EA Criteria approved for this assessment, listed previously in **Table 5-1**. The assessment of the potential effects, mitigation and net effects was therefore rigorously carried out on a criterion-by-criterion basis. **Appendix D** contains a series of tables that summarize those results for each individual EA criterion, while the actual analyses were produced by a team of technical experts whose individual reports are contained in **Appendix F**.

7.4.1 Built-in Mitigation Measures

To begin with, it is important to recognize that Walker's initial concept proposed for the landfill (see **Section 7.2**) already incorporates extensive mitigation measures, based on regulatory requirements, industry best practices, and Walker's experience with its Niagara landfills. Therefore, the "starting point" for the analyses of the potential effects of proposed landfill was based on an advanced design that already included considerable mitigation. Some of the most significant aspects of the built-in mitigation are summarized below.

Table 7-10: Built-in Mitigation Measures

Built-in Mitigation Measures	Purpose
Located in a depleted quarry.	Use of a "brownfield" site with existing industrial infrastructure minimizes the potential to displace or disturb natural, cultural, social or agricultural resources.
A minimum surface elevation (height).	Keeping more than 80% of the landfill operations below ground in the former quarry reduces exposure, thus minimizing visibility, noise, dust, and blowing litter.

Built-in Mitigation Measures	Purpose
A primary haul route on County Road 6 with direct access to Hwy 401.	Using a County road designated for truck traffic with a relatively short distance to Highway 401 means that the route is compatible with waste haulage trucks and there is less potential for disturbance to residents and businesses along the haul route.
Storm water management system.	Clean storm water will be segregated and collected, settled to remove sediment, and fed into the adjacent Patterson-Robbins Drain to maintain its flow and water quality, as well as in the Thames River further downstream. It will also be designed with sufficient capacity to manage major storm events and prevent flooding.
The *Generic Design Option II - Double Liner* (as *per* O. Reg. 292/98).	The Ministry of the Environment designed this double composite liner system to be fully protective of groundwater for the entire contaminating lifespan of the landfill. Extending the liner to the ground surface around the landfill perimeter will block landfill gas from escaping through the ground.
Leachate collection and treatment systems.	Leachate generated in the landfill will be pumped out and treated in an on-site treatment plant, which will ensure that it does not build up inside the landfill. The leachate will be treated to the point where the clean effluent will meet provincial water quality standards and can be discharged into the Patterson-Robbins Drain to maintain its flow and water quality.
Gas collection and flaring.	Collecting and flaring the gas generated in the landfill will protect air quality, reduce odours, reduce greenhouse gas emissions, and further mitigate the potential for subsurface gas migration.
Gas utilization.	When sufficient gas production occurs, the gas will be utilized as a renewable energy resource, which will further reduce greenhouse gas emissions in addition to the beneficial use of the energy.
Compact working area.	Having a small open working area of no more than about 2,000 m^2 in size at any given time, with the remainder of the landfill under cover, will help minimize odour, dust, blowing litter, birds, and visibility.
Daily cover application.	Covering the waste in the working area at the end of every day (or more frequently, if necessary) will help minimize odour, blowing litter, birds, and visibility.
Road cleaning and watering	Regular cleaning and/or watering of internal roads, will minimize dust and limit mud tracking onto public roads.
Speed limits.	Speed limits will be established on internal roads to limit dust generation.
Litter fencing.	Permanent litter fences will be placed at strategic locations. In addition, mobile fences will be moved when wind directions change, to further help prevent litter from blowing off site.
Litter collection.	Crews will regularly gather fugitive litter both on- and off-site to improve aesthetics and discourage bird scavenging.
Bird control.	Birds of prey, noisemakers and other industry standard bird control methods will be used daily during operating hours to discourage birds from gathering and scavenging at the landfill.
Pest control.	Pest control will be used if and when necessary to minimize vermin at the site and in the vicinity.
Public “hotline”.	A formal program will be in place to promptly investigate and respond to any public complaints regarding the landfill.
Monitoring & contingency plans.	Comprehensive monitoring, record-keeping and reporting programs will be instituted, enforced and reviewed through the Ministry’s *Environmental Compliance Approval* for the site. Contingency plans will be developed for implementation when and if necessary

Built-in Mitigation Measures	Purpose
Financial assurances.	Walker will be required to post and maintain secure financial assurances with the Province that would be sufficient for the Province to fully complete, close and maintain the site should the company be unable to do so.

7.4.2 Effects on Public Health & Safety

The risk of explosion due to gas from the landfill migrating underground into confined spaces is negligible at this site. The landfill gas collection system will remove 85% of the gas and maintain a negative internal gas pressure in the landfill. Furthermore, the landfill liner will be extended up to ground surface to provide a physical barrier to sub-surface gas escape. Lastly, there will also be wide buffer zones around the perimeter of the landfill where monitoring will take place to confirm that there is no gas migration.

The landfill gas collection and control system will effectively reduce air emissions from the landfill site as well. Modelling demonstrates that the air emissions from all landfill sources (and landfill traffic), would not exceed provincial air quality criteria at any off-site residence or public facility. Combined with air emissions from other sources both locally and regionally, the modelling also concludes that provincial air quality criteria at off-site residences and public facilities in the vicinity of the site would continue to be met with two exceptions: chloroform (not associated with nearby quarry and lime facility) and benzo(a)pyrene (a regional-scale tail-pipe emission). In both of these cases the provincial criteria are already exceeded in the baseline air quality, and emissions from the landfill would only be a comparatively minor contributor.

A predicted positive effect of the proposed landfill would be a substantial overall reduction in greenhouse gas emissions of approximately 4 to 5 million tonnes of CO_2e compared to landfilling the equivalent amount of waste in Michigan landfills. This is comparable to removing about 30,000 cars *per* year from the road for 50 years.

Some of the landfill construction and operations, including the landfill traffic, would entrain particulates (dust) in the air. Dust originating from the landfill and landfill traffic, on its own, would meet all provincial health criteria for inhalable (PM_{10}) and respirable ($PM_{2.5}$) particulate matter at off-site receptor locations. However, combined with dust from other background sources, primarily traffic and to a lesser degree quarry operations, cumulative dust modelling predicted[30] that provincial criteria could be exceeded at a number of off-site locations. As a result, Walker explored possibilities to further reduce its own contribution; the following additional dust mitigation was incorporated into the landfill design:

- Paving the access road into the site, with regular flushing/wet sweeping;
- Using selected low-dust materials for unpaved internal haul roads, with enhanced dust control watering.
- Further minimizing areas of bare soil exposed to wind erosion.

[30] *It is worth noting that the models used to predict particulate levels use a number of extremely conservative assumptions (e.g., worst-case meteorlogical conditions, maximum emissions, etc.) that tend to over-predict the potential effects. For example, particulate levels are calculated at the centre line of roadways where the maximum amount of dust is initially kicked up by vehicles, not at the actual residences.*

These enhanced dust control measures were added to the cumulative effects modelling, narrowing the net effects down to only two predicted exceedances:

- Around the intersection of Beachville Road and County Road 6, PM_{10} levels are predicted to slightly exceed standards on occasion, mainly as a result of future population and traffic growth. Here, though, the landfill represents less than 8% of the total and increases the frequency of exceedances by only once or twice over a five-year period.
- On Beachville Road south of the site, the concentrations of $PM_{2.5}$ are also predicted to exceed provincial criteria on occasion. In this instance the landfill represents less than 35% of the total and increases the frequency of exceedance by only one occurrence over a five-year period.

The adoption of the Ministry's *Generic Design Option II* double composite liner and leachate collection system would ensure that the leachate generated in the landfill is contained and collected for treatment. According to the *Landfill Standards*, this liner design is fully protective of groundwater quality beneath the site for as long as necessary:

> "*To ensure the generic designs can be used within a broad range of hydrogeologic settings, the designs have been developed such that the Reasonable Use limits for groundwater protection will be met without reliance on contaminant attenuation in the landfill buffer area. … The advantage of using the generic designs is the added certainty they bring to the approval process*." (p. 26-27)

This liner, coupled with the fact that any precipitation at the site that could come into contact with waste in the landfill will also be directed into the leachate treatment plant, would effectively prevent any contamination of off-site groundwater or surface water.

The storm water management system at the site will have sufficient capacity to ensure that the site would not be flooded, even during major regional storm events, and that there would be no increase in flooding hazard in the adjacent Patterson-Robbins Drain or the Thames River.

Without any active wildlife controls, organic wastes at the landfill could have the potential to attract large numbers of gulls, crows, and starlings to the site. For most of the airports in the region, the resulting risk of a serious bird strike on an aircraft has been assessed as negligible to very low, including air ambulance service, crop spraying planes and flights from local private (grass) air strips. The risk level at the Woodstock Airport is also expected to remain low, although the proposed landfill would increase the number of birds flying above the landfill which could in turn increase their exposure to a small number of training flights from Woodstock that might make low-level passes over the landfill site. Tillsonburg Airport is assessed at a moderate level of risk for bird strike hazard because it has more flight activity and the potential for small jet traffic, and because gulls fly over the area at low level from springtime roosts on Lake Erie to Salford Landfill and other feeding sites, including the proposed landfill. As a result of these potential incremental increases in bird strike risk, an Integrated Bird Management Program (IBMP) is recommended as a mitigation measure for the Southwestern Landfill:

- Minimizing the exposure of food waste in the working area of the landfill through more frequent covering, as required;
- Minimizing standing water and access to ponds;

- Using tall vegetation and other means to minimize bird loafing areas;
- Using a structured program of active bird controls and deterrents including sound sources, birds of prey and lethal control; and
- Regular communication with the Woodstock & Tillsonburg airports regarding bird observations, as required.

With the added mitigation of the IBMP at the landfill, the net effect is that overall bird strike risk is not expected to increase at any of the area airports.

The risk of disease transmission to humans from any vermin at the landfill is very unlikely in any event, but it is even further reduced with the modern landfill operations and pest controls that will be employed at this site. (Vermin issues have proven to be negligible at Walker's Niagara Region landfills.) In addition, the Integrated Bird Management Program mentioned above would further reduce bird populations on and around the site.

Walker's landfill traffic would only represent a very small proportion of the overall vehicular traffic on the primary haul route, CR#6 – it would amount to less than 3% of the average daily traffic volume and about 5% of the peak traffic volumes. As a result, the landfill would not have a material effect on overall traffic safety, especially when combined with the fact that CR#6 is designed and designated by the County for high volumes of inter-municipal and long distance traffic, and the haul route and intersections would continue to have sufficient capacity and good levels of service in the future to accommodate the landfill traffic. Nevertheless, the traffic expert did recommend the following additional mitigation measures to further improve traffic safety:

- Provision of truck queuing space along the access road (i.e., inside of the outer entrance gates from CR#6) to prevent early-morning queuing along the shoulder of CR#6.
- Extension of the second northbound lane on CR6 to permit safe passing of turning trucks.
- Installation of advance warning signs along CR6 where trucks would be turning.

With these measures in place, the net effect would be no substantially increased risk of traffic safety as a result of the landfill operation.

A human health risk assessment (HHRA) was also commissioned as part of this EA to examine the overall human health risks from all emission sources, and through all potential pathways including water, air, soil and food. The study concluded that none of the emissions from the proposed landfill or associated landfill traffic would result in any unacceptable short- or long-term health risks in the surrounding community (Intrinsik, 2020). Furthermore, none of the emissions from the landfill would provide a substantive contribution to short- or long-term cumulative air or soil concentrations in the surrounding area. In most cases, predicted emissions from the landfill in all stages of its lifespan were orders of magnitude below their corresponding regulatory health-based air quality benchmarks.

The health assessment also included a supplemental review of the predicted social and economic effects of the landfill (see sections below) and concluded that the economic benefits were likely to result in some positive health outcomes in the local and regional area, while any negative social effects were determined to have a low magnitude and low likelihood of related health effects, although some added stress may remain with certain individuals who already perceive the landfill negatively. The ongoing

community engagement and communication proposed for this site is endorsed as a means to help mitigate these effects. (Intrinsik, 2020).

7.4.3 Social & Cultural Effects

No residents would have to be displaced from their homes in order to construct or operate the proposed landfill. There was one former vacant residence owned by the quarry operator at the location of the proposed leachate treatment plant (in the northwest corner of the site), but this structure has recently been removed. Similarly, no public facilities, institutions or recreational resources would be displaced.

As noted above, Walker's landfill traffic would only be a small proportion of the overall traffic that will use CR#6. Combined with all of the other sources of traffic and allowing for future growth in Oxford County, CR#6 and all of its intersections would continue to operate with sufficient capacity and a good level of service (i.e., stable flow and low potential for congestion). The only exception noted is at the Highway 401 eastbound off ramp approach to CR#6 during the afternoon peak, where modelling suggests the potential for a poorer level of service and higher degree of delay, although very little of Walker's landfill traffic is expected to use this off ramp so the issues here are not specifically related to the proposed landfill.

As noted in the previous section, further mitigation has been incorporated into the landfill design to reduce dust emissions. With that in place, modelling suggests that the only residential locations where dust would exceed nuisance thresholds (i.e., visible dust in the air) are around the intersection of Beachville Road and CR#6 due mainly to road traffic, where visible dust is already experienced occasionally. Dust fall or accumulation is not expected to be an issue, though.

Landfill odours would be generally well controlled at this site, with modelling predicting that odours at most off-site residences within 5 km of the site would remain within the provincial guideline of 1 Odour Unit for less than 0.5% of the time, and a large number of these would detect the landfill odours very rarely or not at all. The exceptions are a few residents immediately west of the landfill site, mainly due to predicted odours from the leachate treatment ponds. Consequently, as further mitigation, the aeration and balancing ponds will incorporate floating covers (or equivalent surface area reductions/control technology) to reduce at least 60% of the exposed surface area of the leachate treatment lagoons. As a result, the odour emissions would meet government guidelines at all residential locations except the closest neighbour immediately to the southwest, where odours may exceed the guideline 0.9% of the time during certain stages of the landfill.

Noise from the landfill operations and traffic would not be an issue at off-site locations. Even combined with other baseline sources of noise, including the ongoing quarry operations, noise levels are modelled to meet provincial criteria at all of the representative receptor points in the site vicinity. The addition of landfill traffic on the haul route has been calculated to raise sound levels at residences along CR#6 by less than 0.1 decibels, which is considered negligible. One potential effect that has been identified through the noise assessment is an estimated increase of more than 3 decibels (i.e., a noticeable change in sound level) at the closest residence immediately southwest of the landfill during a portion of the Stage 3 landfill operation. As a result, a sound barrier will be added for further mitigation along the southern portion of the western landfill site perimeter prior to when Phase 3 operations reach surrounding ground elevations, to bring this location within provincial criteria.

The only other exception is the noise associated with the use of a bird control shotgun in certain, relatively small areas of the landfill that are at higher elevations and close to the southern boundary. However, this effect can be mitigated. The bird control shotgun would not be used in an exclusion zone near the southern boundary of the landfill (see **Figure 7-27**); rather, enhanced control with birds of prey and other means would be substituted in this area, as required.

The landfill operations are not expected to result in off-site vibration.

The majority of the residences in the vicinity of the site would have no view of the landfill as a result of existing topography, vegetation, buildings or other barriers, and the same is generally true for public spaces and public roadways around the site, aside from a few distant views. Only ten residential receptors were identified that could have potential views of the landfill site at certain stages of its operation, when above-ground (later) stages are being filled (in this design, most of the landfilling would occur below ground level). Of these, five are located greater than one kilometer from the site and, therefore, the occasional views of the landfill operations would be from a distance and would only form a relatively small portion of the observable landscape. Four other residences are located a little closer, within a range of 650 m to 1 km from the site; however, their views of the landfill operations are partially obscured by vegetation and other obstacles and would only be occasional. Also, in each of these cases it should be noted that the view of the site, whether quarry or landfill, would continue to be an industrial operation followed subsequently by rehabilitation, for similar periods of time.

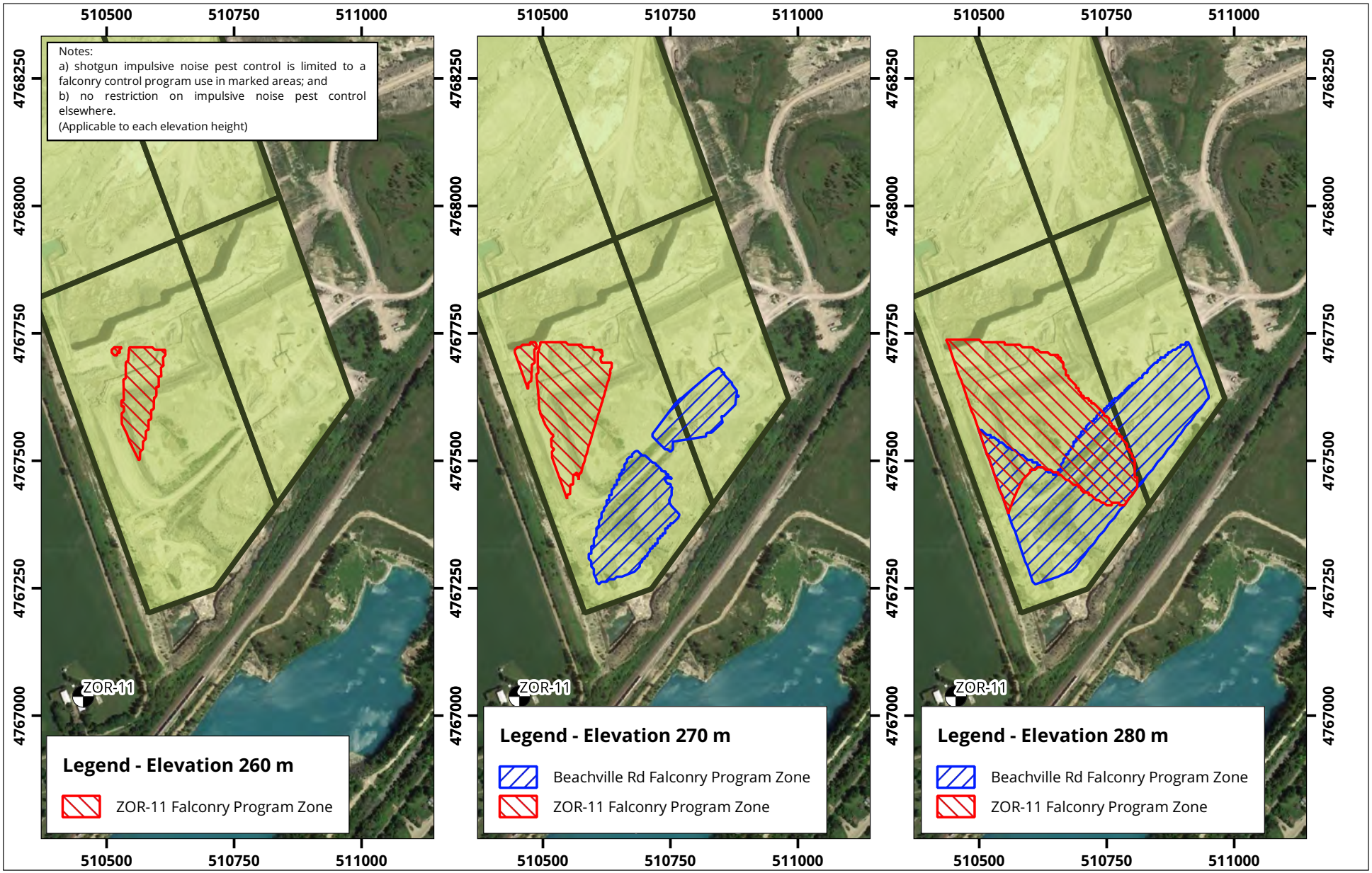
The nearest residence to the site, to the southwest, would have a relatively closer view of the upper stages of the landfill operations over the top of the existing berm (though partially screened by vegetation on the berm). This residence is considered to represent the only potentially substantive visual impact, especially considering that this residence cannot currently see the quarry operations over the existing berm. However, the noise barrier mentioned above will also be effective as mitigation to screen this view.

The relatively few residences along the primary haul route to the site on CR#6 are generally set back from the road and most have established vegetation screens towards the highway. As a result, there would be no additional visual impact from the truck traffic associated with the existing haul route (along CR#6 towards Highway #401). The proposed new access road located within the existing quarry lands would be visible from some receptors located to the north, however the views would be partially screened and distant (no receptor is closer than 500 m).

An inventory and assessment found no cultural heritage resources or landscapes in the vicinity of the site or along the haul route that would be removed or physically disturbed in order to construct and operate the proposed landfill site.

The construction of the leachate treatment facility in the northwestern corner of the site would disturb archaeological resources found at a 1.8 ha plot in an agricultural field containing primarily Euro-Canadian artifacts such as building materials and household items. It likely represents the location of a previous farm dwelling dating from the mid- to late-19th century into the early 20th century. These artifacts will need to be properly removed and preserved, through a Stage 3 Archeological Assessment prior to construction of the leachate treatment facility.

As noted above, the landfill operations are likely to result in, or add to, occasional nuisance effects from dust, odour, noise, and visibility in the vicinity of the site, generally within about 500 m or less. There is



Environmental Noise Study - Southwestern Landfill

Noise Based Falconry Control Program Zones at Elevations 260 m, 270 m, and 280 m
Applicable to SWLF Zones 3 and 4

Map Projection: NAD 83 UTM 17
Ingersoll, Ontario

True North

Project #: 1800160

Drawn by:	DJK	Figure:	
Approx. Scale:	1:10500		
Date Revised:	Jan 30, 2020		

Map Document: C:\DJK\Jobs - Sync\1800160 - BCB - WEG Southwestern Landfill\4. Analysis\20\QGIS\190508 - WEG SW Landfill.qgz

Figure 7-27:
Shotgun "Exclusion" Zones (after RWDI, 2020)

only one residence that is likely to be substantially affected - the closest residence to the southwest. The Ingersoll Rural Cemetery could also experience intermittent nuisance effects. The landfill traffic would add somewhat to the occasional nuisance that can be expected from visible dust along CR#6, in conjunction with increased background traffic levels in the future. As a result, some incremental loss of enjoyment could be experienced at these properties. Otherwise, beyond the immediate vicinity of the site, no physical disturbances would be experienced from the landfill operations that would have an adverse effect on the use and enjoyment of properties in the broader community. Coupled with the fact that the landfill would be a operated on a long-term industrial site, the overall character and cohesion of the community is not expected to be affected.

Notwithstanding the limited nature and range of effects that are predicted from the operation of this landfill, surveys undertaken as part of this EA suggest that some individuals may experience increased personal stress stemming from decreased satisfaction with community and a decreased sense of well-being and potential mistrust of Walker and provincial regulators during the initial years following provincial approval and the commencement of landfill operations. There is a risk that some would leave the community based on pre-determined concerns about the landfill. It is difficult to know how many would act on these intentions, but those who do are likely to be replaced by others who are more tolerant of local conditions, see fewer disadvantages to the presence of the landfill in their community or would realize a financial benefit from relocating to the area. Evidence from other sites, and Walker's own experience in Niagara Region, suggests that once landfills are in operation and establish a good track record, concerns among some people diminish. Nevertheless, it is reasonable to conclude that the controversy surrounding the proposal and approval of the landfill will have engendered some residual social impacts. Further mitigation measures are proposed that are intended to lessen these, and other, residual social effects:

- Formation of a Public Liaison Committee to exchange information and discuss concerns with local community members throughout the operating life of the landfill.
- Regular community updates regarding activities and performance of the landfill, in a publically accessible style and format to provide transparency and build trust.

Given the limited nature and range of physical disturbances that are anticipated to occur in the vicinity of the site, and that water quality and ecosystems in the Thames River valley would not be affected, it is not anticipated that there would be any effects on land uses or traditional activities of any Indigenous Communities. On the other hand, the landfill construction could open new opportunities for Indigenous employment or businesses. As a means of ensuring that Walker continues to assess and mitigate any issues related to Indigenous land uses on an ongoing basis, an Indigenous Liaison Committee is proposed.

In terms of public services in the community, the proposed landfill would provide convenient local disposal capacity to businesses in Oxford County that currently export waste to private regional landfills in other municipalities. The landfill would also provide an alternative/emergency disposal location for Oxford County municipal waste if the County's Salford Landfill could not be used for any reason. Together with the Salford Landfill, the Southwestern Landfill would allow the County of Oxford to provide sufficient in-County waste disposal capacity for both municipal and IC&I waste for at least 20 years, supporting the County's "*Future Oxford*" goals.

The use of the former quarry site for a landfill is seen as a strengthening of an existing industrial presence in the area. Although the leachate treatment plant is proposed to be placed on land that is

currently agricultural, it is directly between two designated industrial uses to the east (quarry) and west (hydro sub-station facility) and, therefore, compatible with both. Following closure, the landfill is proposed to be rehabilitated to private open space and/or agriculture, which is similar to the currently approved quarry rehabilitation plan and hence a consistent land use. As a result, the land use is deemed to be compatible, subject to further municipal approvals (see Section 11.2).

7.4.4 Economic Effects

The landfill would add substantially to Ontario's economy. Total economic output within the province is estimated to exceed $800 million, with $435 million in GDP, $222 million in labour income and the equivalent of nearly 3,000 man-years of full-time employment.

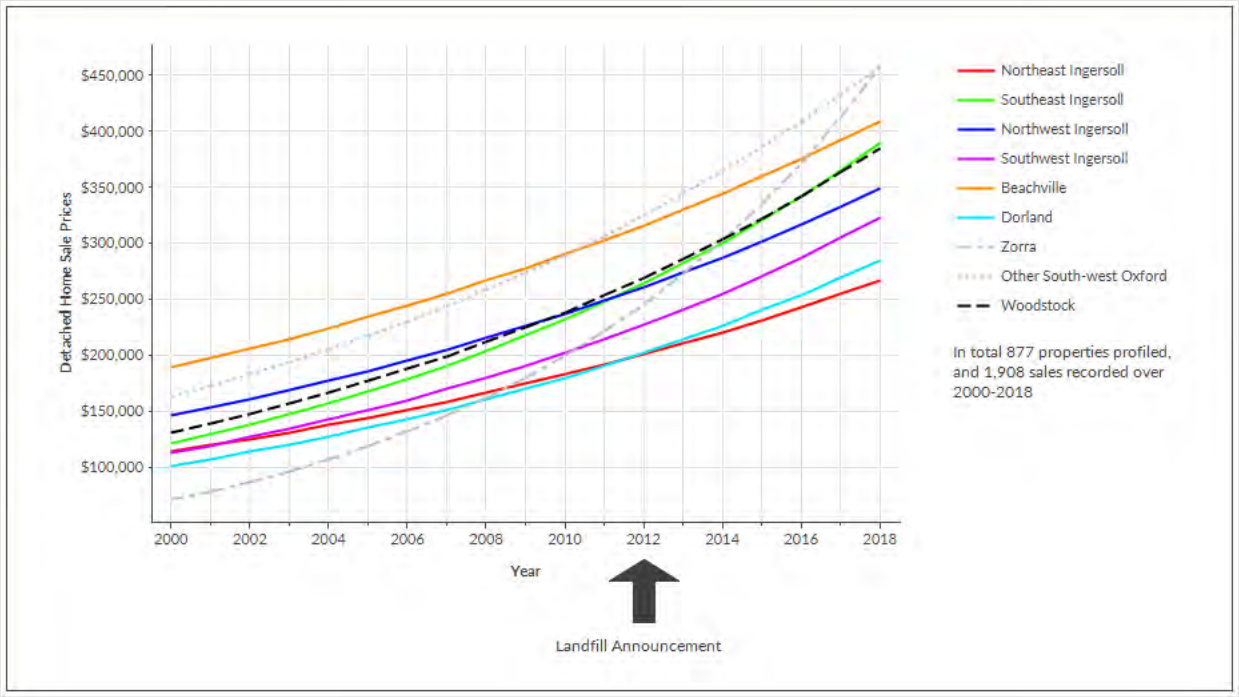
Most of this economic benefit would be experienced locally (within an approximate one hour drive from the project site); direct output from the project is calculated to be $381 million, with $208 million in GDP, $94 million in labour income, and the equivalent of 57 full time jobs *per* year. Furthermore, the indirect and induced output from the project in the same area would be an additional $263 million, with $141 million in GDP, $79 million in labour income, and the equivalent of 47 full time jobs *per* year.

The estimated expenditure of $148 million in capital plus $240 million in operating costs over the 20-year life of the project within a one-hour drive of the site, would spur the growth of existing or new businesses to provide direct supplies/services or related ones (e.g., parts, food, fuel, *etc*.).

Most industrial, commercial and institutional (IC&I) businesses in Oxford County contract their waste disposal to private-sector firms that export the waste to private regional landfills outside of the County. The Southwestern Landfill would provide convenient access to local disposal capacity, with potential savings to area businesses estimated in the range of $200,000 to $250,000 *per* year. Furthermore, the landfill supports the Provincial economy by retaining waste disposal expenditures within Ontario rather than in Michigan.

Literature and experience suggest that any property value effects are normally reflected immediately after the announcement and during the approval period of a controversial project, when public and media attention tends to be greatest. The proposed Southwestern Landfill has experienced this sort of attention with the Town of Ingersoll and local citizen groups continually voicing objections to the proposal since its announcement in 2012, with protest signs and gatherings along with associated media coverage. Home sale prices in Ingersoll demonstrated only a very slight (less than 4%) dip just after the initial project announcement in 2012, followed by full recovery within one year and a strong upward trend continuing through 2018, matching the same trends as other areas further removed from the site (**Figure 7-28**). As a result, it is concluded that the proposed landfill has had a very minor and temporary effect on property values in the surrounding areas to date.

Figure 7-28: Trendlines for Detached Home Sale Prices in the Local Study Area and Woodstock



On that basis, property values in the immediate vicinity of the site are not expected to be affected by the landfill during its operating period or after closure since:

- They have not exhibited any meaningful or lasting effects as a result of the highly negative publicity in the local community during the EA approvals period;
- The various studies completed as part of this Environmental Assessment have concluded that the site operations would not have substantial negative effects in the site vicinity and/or have proposed effective means to mitigate or manage any effects;
- The proposed landfill is on a site, and within an area, of long-time and continuing heavy industry where property values are already adjusted to this type of land use;
- The experience of several local realtors who reported that they have not seen a significant downturn in the local real estate market nor did they expect one in the future, and the findings of one agent who confirmed with realtors in the Niagara area that Walker's ongoing landfill operations there have had no demonstrable effect on the local real estate market.

Notwithstanding the above, the small number of closest properties (within 500 m) to the proposed landfill site may not be adequately represented in the data, and could be subject to occasional nuisance effects from the landfill, so it is considered prudent to mitigate any possible effects at these specific locations through the offer of a property value protection agreement. This would be a legal agreement which ensures that current owners of private residential or agricultural property within 500 m of the proposed landfill site receive fair market value should they decide to sell within the operating period of the landfill (i.e., equivalent to comparable properties in the area not adjacent to the landfill).

No new public services would be required to support the landfill, aside from electrical service. The traffic assessment noted that the addition of landfill trucks on CR#6 could increase/accelerate the

maintenance costs. However, this would be in proportion to Walker's traffic, which would represent a maximum of 5% of the overall traffic on that route.

Property taxes for the proposed landfill would be in the order of $77,000 *per* year. Over its life through associated direct, indirect and induced activities the landfill would also generate product and production taxes in the order of $12.8 million that would flow to municipalities across Ontario involved with these activities. Similarly, product and production taxes in the order of $7.1 million and $19.4 would respectively flow to the Federal and Provincial governments. Income taxes and CPP/EI contributions generated by job creation over the span of the project are estimated to total approximately $56.4 distributed accordingly: Federal Government $32.7 million, Provincial Government $13.6 million, and CCC/EI $10.1 million.

7.4.5 Effects on the Natural Environment & Resources

As a result of the proposed landfill being located in a mined-out quarry, no natural features such as watercourses, woodlands, wetlands etc. need to be removed, nor any natural resources such as mineral, agricultural, forestry, or recreational. Although the area where the leachate treatment plant is to be built would be taken out of agricultural use, that loss would eventually be more than offset by the larger amount of potential agricultural land available on the completed landfill (about 11 ha more, compared to the rehabilitated quarry). The small loss of agricultural land required for the new access road across the quarry property is only temporary, since this land will eventually be quarried.

Farming operations in the vicinity of the site are not expected to be disrupted to any extent by the proposed landfill operations, although the marginal increase in truck traffic on C#6 would continue to warrant appropriate caution by any farm vehicles moving along or crossing this route. One potential effect that was identified was any alteration to agricultural tile drains, drainage outlets or surface drainage features interrupted or disrupted within farmlands abutting the new access road or on the site of the leachate treatment plant. Walker is prepared to mitigate this by repairing or restoring any of these features disturbed during construction.

The water levels and water supply in area wells would not be affected, nor would any groundwater discharge into nearby streams. This is because the adjacent quarry dewatering operations artificially lower the groundwater levels beneath the site and in the immediate site vicinity so that the quarry floor is dry. The landfill would be perched above the (former) quarry floor on backfill, and isolated from the groundwater by its liner and, therefore, would have no influence on groundwater levels or flow. Even after the landfill is finished and closed, quarry dewatering to the immediate north will continue to control groundwater levels below the landfill for a very long time.

The landfill would not result in the removal of any aquatic habitat, nor would it result in any impacts on aquatic communities in any watercourses in the vicinity of the site. The discharges of storm water into the Patterson-Robbins Drain to the west of the site has some potential to degrade water quality relative to provincial and federal aquatic guidelines, but the water quality in this agricultural drain is already degraded in respect to most of these same parameters, so the fish and benthic communities here are already tolerant and/or acclimated to this type of water quality. This will be confirmed through ongoing monitoring during the site operations.

The proposed landfill and access road are to be situated in an area where there is an existing aggregate operation and agricultural fields. On this basis, the terrestrial ecosystems are generally limited to small

patches of isolated, early stage successional habitat such as meadows, thickets or hedgerows that are located along roads, fence lines and watercourses. As a result, the landfill construction and operations are not expected to have any effects on vegetation or wildlife surrounding the site (including the possible effects of dust fall on vegetation and noise on wildlife, which were specifically examined). In terms of noise, the wildlife in this area are already adapted to a noisy environment from industrial, railway and roadway sources, and the landfill would result in only a marginal increase. The bird-control shotgun exclusion zone recommended for noise mitigation (see Section 7.4.4) would also serve to minimize this noise source at the heronry south of the site.

Recreational facilities in the area are not anticipated to be affected by the landfill, apart from some occasional nuisance effects such as dust or noise on the unofficial[31] trail along the old rail bed west of the site.

7.4.6 Summary – Further Mitigation Measures

The following is a summary of the additional mitigation measures arising from the potential effects assessment, noted above. ***These are taken to amend or add to the description of the undertaking set out in Section 7.2.***

Table 7-11: Summary of Additional Mitigation Measures

Further Mitigation Measures	Purpose
Integrated Bird Management Plan (IBMP)	Reduce bird numbers at the landfill in order to minimize risk to local aviation and nuisance in the community. Key aspects to include: • Minimizing the exposure of food waste in the working area of the landfill through more frequent covering, as required; • Minimizing standing water and access to ponds; • Using tall vegetation and other means to minimize bird loafing areas; • Using a structured program of active bird controls and deterrents including sound sources, birds of prey and lethal controls (shotgun). • Regular communication with the Woodstock & Tillsonburg airports regarding bird observations, as required.
Shotgun exclusion area.	Lethal bird control using a shotgun will not be used in an exclusion zone near the southern boundary of the landfill (see **Figure 7-27**) in order to limit noise impacts south of the site. Enhanced control with birds of prey and other means will be substituted in this area, as required.
Truck queuing.	Any trucks arriving at the site prior to the 7:00 a.m. opening will be provided with queuing space along the landfill access road to the north of the site (see **Figure 7-5**) from 6:00 a.m., in order to prevent trucks from parking and idling along the shoulder of County Road 6.
Traffic signage.	Warning signs for truck turning will be placed on County Road 6 approaching the turn into the landfill to improve road safety.
Left turn lane.	The (existing) second northbound lane on County Road 6 will be extended past the landfill left turn to allow through traffic to pass and reduce the potential for traffic collisions.

[31] *On private property, owned by the quarry operator in this area.*

Further Mitigation Measures	Purpose
Property value protection agreements.	A legal agreement to ensure that current owners of private residential or agricultural property within 500 m of the proposed landfill site receive fair market value should they decide to sell within the operating period of the landfill (i.e., equivalent to comparable properties in the area not adjacent to the landfill).
Stage 3 archaeological assessment.	Archaeological "Site 2" (registered as AgHf-67), a 1.8 ha assemblage of primarily Euro-Canadian artifacts, will be subject to a Stage 3 site-specific assessment in accordance with provincial requirements prior to any disturbance of this area related to the construction of the leachate treatment facility for the landfill. Based on those findings, a Stage 4 mitigation plan will be developed and implemented, if warranted.
Additional dust controls.	To further reduce the landfill contribution to cumulative particulate emissions in the vicinity: • Paving the landfill access road into the site, with regular flushing/wet sweeping; • Using selected low-dust materials for unpaved internal haul roads, with enhanced dust control watering. • Further minimizing areas of bare soil exposed to wind erosion.
Covering the leachate treatment lagoons.	A cover (or equivalent surface area reduction or control technology) to reduce at least 60% of the exposed surface area of the leachate treatment lagoons to reduce odour emissions.
Noise/visual barrier.	A noise/visual barrier is required along the southern portion of the western landfill site perimeter when the Stage 3 operations begin.
Maintain agricultural drainage.	Repair or restore any agricultural tile drains, drainage outlets or surface drainage features interrupted or disrupted within farmlands abutting the new access road or at the site of the leachate treatment plant.

7.5 Impact Management Plan

Where potential effects of the proposed landfill cannot be directly mitigated (i.e., reduced or eliminated), Walker, in consultation with its team of subject experts, considered ways by which these effects could otherwise be managed, or, in some cases, where additional benefits could be offered to enhance positive effects.. The following sections describe the impact management/benefit measures being proposed. Note that the tables in **Appendix D** also summarize proposed impact management measures on a criterion-by-criterion basis.

(Note that monitoring, contingency plans and reporting are also elements of impact management; these are presented separately in later sections of this report).

7.5.1 County Road 6 Inspection Program

Walker proposes to work cooperatively with the County of Oxford and other major road users regarding the condition and maintenance of County Road 6. Specifically:

- Regular inspection/observation of the primary haul route on County Road 6 by Walker operations personnel to identify any road condition issues, in consultation with the County of Oxford Public Works Department.

- Mutually explore ways to further reduce roadway dust on County Road #6 (e.g., road cleaning) when traffic levels and dust generation warrant.

7.5.2 Public Liaison Committee

Following the issuance of all approvals necessary for the Southwestern Landfill, and before the placement of any waste at the site, Walker will establish a Southwestern Landfill Public Liaison Committee (PLC).

Walker will solicit expressions of interest through direct contact or other means with potential PLC candidates who are:

- Residents, farm owners and/or business owners within the immediate proximity of the landfill site; and
- Residents, farm owners and/or business owners adjacent to the primary haul route from Highway 401;

From the responses received, Walker will invite five to ten public members to join the PLC such that there is a good mixture of geographical representation and interests. If there is insufficient interest from these areas, then Walker may expand the invitation to other persons who may have expressed an interest.

Walker will also communicate directly with local government agencies including the Township of Zorra, the Town of Ingersoll, the Township of South-West Oxford, the County of Oxford, the district office of the Ministry of the Environment, Conservation and Parks and the Upper Thames River Conservation Authority to invite one representative of each agency to join the PLC.

The PLC will:

- Develop and maintain a Terms of Reference for the functioning of the PLC.
- Hold meetings at least annually.
- Receive and discuss the Annual Report.
- Receive and discuss any applications made by Walker to amend the approvals for the site.
- Receive and discuss other information requested from, or provided by, Walker regarding the design, operation, monitoring or closure of the landfill site.
- Bring forward for discussion and consideration by Walker any suggestions, issues or concerns that they may have, or may have heard in the community, regarding the landfill site.
- Provide input to Walker regarding the end-use of the landfill site following closure.

If at any time the PLC ceases to function for more than one calendar year due to lack of interest or participation by a quorum of its public members, then Walker will make its best effort in each of the following calendar years to re-form the PLC in the same manner as previously.

The PLC will continue throughout the operating life of the landfill and for at least two years following closure. At that time Walker may elect to continue with the PLC as is or in a modified form, following consultation with the PLC members.

7.5.3 Indigenous Liaison Committee

Following the issuance of all approvals necessary for the Southwestern Landfill, and before the placement of any waste at the site, Walker will establish a Southwestern Landfill Indigenous Liaison Committee (ILC).

The ILC will:

- Develop and maintain a Terms of Reference for the functioning of the ILC.
- Hold meetings at least annually.
- Receive and discuss the Annual Report.
- Receive and discuss any applications made by Walker to amend the approvals for the site.
- Receive and discuss other information requested from, or provided by, Walker regarding the design, operation, monitoring or closure of the landfill site.
- Bring forward for discussion and consideration by Walker any suggestions, issues or concerns that they may have, or may have heard in their respective communities, regarding the landfill site.
- Provide input to Walker regarding the end-use of the landfill site following closure.

If at any time the ILC ceases to function for more than one calendar year due to lack of interest or participation by a quorum of its members, then Walker will make its best effort in each of the following calendar years to re-form the ILC in the same manner as previously.

The ILC will continue throughout the operating life of the landfill and for at least two years following closure. At that time Walker may elect to continue with the ILC as is or in a modified form, following consultation with the ILC members.

7.5.4 Community Updates

As one means of addressing ongoing concerns in the community, Walker proposes to provide regular community updates during the construction and operation of the proposed landfill. These would be over-and-above its regulatory reporting requirements and convey information about the site in a community-plain language style. Walker will seek advice from its Public Liaison Committee on the matters of most interest to the community and opportunities to convey information.

7.5.5 Host Municipality Funding

If the Southwestern Landfill is approved, Walker intends to offer a host municipality funding program as a social and economic benefit.

7.5.6 Nearest Neighbour Compensation

If the Southwestern Landfill is approved, Walker will offer to negotiate an equitable compensation agreement with the closest residential neighbour to the site (ZOR-11), where studies conducted as part of this EA indicate that residual nuisance effects may be experienced on occasion during certain phases of the construction and operation of the landfill, including the construction of mitigation measures in this area (e.g., the installation of a visual/noise barrier).

7.5.7 Indigenous Peoples Hiring & Procurement Policies

Walker will establish corporate policies for the Southwestern Landfill giving preference to hiring Indigenous peoples, and procuring goods and services from Indigenous suppliers, wherever reasonable and practical.

7.5.8 Local Hiring & Procurement Policies

Walker will establish corporate policies for the Southwestern Landfill giving preference to local employees, goods and services wherever reasonable and practical in order to further enhance the economic benefits of the project to the County and area municipalities.

7.6 Input from Stakeholder Consultation

[*Note: This section to be completed in the final EA submission based on consultation on proposed mitigation measures carried out in conjunction with the issuance of this draft EA report*.]

7.7 Advantages & Disadvantages to the Environment (Net Effects)

The net effects of the proposed landfill, or the advantages and disadvantages to the environment in Ontario, are those that remain following the application of mitigation and impact management measures discussed in the previous sections. These were assessed in each of the related technical studies (**Appendix F**), and are summarized on a criterion-by-criterion basis in the tables contained in **Appendix D**. The following table further summarizes the outcome.

Table 7-12: Summary of Net Advantages & Disadvantages to the Environment

Net Advantages to the Environment	Net Disadvantages to the Environment
• Approximately 20 years of additional, secure waste disposal capacity in Ontario to support the province's businesses and municipalities, reduce Ontario's forecast waste disposal deficit, and reduce the risk to the province should the US border be closed to waste exports. • A net reduction in greenhouse gas emissions of approximately 6 to 8 million tonnes of CO_2e compared to landfilling the same waste in Michigan landfills. This is roughly equivalent to removing 30,000 cars *per* year from the road for 50	• Minor additional contributions to existing air quality exceedances of chloroform (source unknown but not from the Carmeuse facility) and benzo(a)pyrene (a regional-scale, tail-pipe emission) in the site vicinity. • A slight (less than 8%) increase in particulate levels (PM_{10}) around the intersection of Beachville Road and County Road 6, increasing exceedances of provincial criteria once or twice in every five-year period. • A 35% increase in $PM_{2.5}$ particulate levels on

Net Advantages to the Environment	Net Disadvantages to the Environment
years. • Emergency/alternative disposal capacity for Oxford County municipal waste, if required. • Sufficient in-County waste disposal capacity for both municipal and IC&I waste for at least 20 years, supporting the County's "*Future Oxford*" goals. • Total provincial economic output greater than $800 million, with $435 million in GDP, $222 million in labour income, and the equivalent nearly $3,000 person-years of full-time employment. • Local (within one-hour drive) total economic output of $643 million, with $349 million in GDP, $173 million in labour income, and the equivalent of 104 full-time jobs *per* year. • Growth in existing and new businesses to service and supply the estimated $148 million in capital plus $240 million in operating costs over the 20-year life of the project. • A potential savings of up to $250,000 *per* year to County of Oxford businesses that currently export their waste disposal. • Municipal tax revenues from related employment estimated at $12.8 million. • Provincial taxes estimated at $19.4 million plus $13.6 million from related employment. • Federal taxes estimated at $7.2 million plus $32.7 million from related employment. • A minor (about 11 ha) increase in potential agricultural land following closure (compared to the rehabilitated quarry). • Potential new opportunities for Indigenous employment or related businesses. • Establishment of a new company in the community that has a good track-record of community support and partnerships.	Beachville Road south of the site, increasing exceedances of provincial criteria by only one occurrence over a five-year period. • A frequency of odour detection slightly (0.4%) in excess of provincial guidelines at the (one) nearest residence to the southwest of the landfill during a portion of the Stage 3 operational period. • A slight increase in maintenance on County Road 6 due to additional truck traffic. • Occasional, partial or long-distance views of the landfill from a few locations around the site. • Occasional nuisance effects (dust or odour) at the closest residence to the southwest, at the County Road 6/Beachville Road intersection, at the Ingersoll Rural Cemetery and the "unofficial" railway trail west of the site could result in some incremental loss or enjoyment of these properties. • Some residents who may have pre-determined concerns about the landfill could decide to leave the community, while others may remain and re-assess based on the actual performance of the landfill. • A (temporary) displacement of rented fields for the new access road. The loss of approximately 6.3 ha of rented agricultural land for the leachate treatment facility.

These represent the advantages and disadvantages to the environment relative to the "do nothing" alternative; that is, compared to the environmental baseline conditions without the proposed landfill site. However, as noted previously, in this case the "do nothing" alternative does not consider the fact that without the Southwestern Landfill these wastes would still be disposed in another location, presumed to be mainly in Michigan. Therefore, in the "do nothing" case many of these same (or similar) environmental advantages and disadvantages could be expected to occur at and around landfill sites in Michigan instead.

8. Effects Monitoring, Reporting & Contingency Plans

As noted in the EA *Code of Practice* (Section 4.3.5, p. 36), effects monitoring "*consists of activities carried out by the proponent after approval of the undertaking to determine the environmental effects of the undertaking*". Effects monitoring programs and related contingency plans are regulated through *Environmental Compliance Approvals* under the *Environmental Protection Act*. (As distinct from compliance monitoring and reporting commitments under the *Environmental Assessment Act* approval, which are discussed later in Section 9 of this report.)

In this section, a framework for the proposed effects monitoring programs is presented. Note that the specific details of these monitoring programs will be provided in the *Design and Operations Report* that will be submitted as part of the applications for *Environmental Compliance Approvals* under the *Environmental Protection Act*.

8.1 Monitoring & Reporting Framework

8.1.1 Leachate

- Thrice-yearly representative measurements of the water levels (mounding) within the waste and within the primary and secondary leachate collection systems.
- Annual representative sampling from the primary and secondary leachate collection systems, analysed for the *Comprehensive List* of parameters (O. Reg 232/98, Schedule 5, Column 1).
- Semi-annual (two other occasions) representative sampling from the primary and secondary leachate collection systems, analysed for the *Indicator List* of parameters (O. Reg 232/98, Schedule 5, Column 2).
- Monthly volumes of leachate pumped from the landfill to the holding pond(s), and from the leachate holding pond(s) into the leachate treatment plant.

8.1.2 Surface Water

- Semi-annual (spring and fall) flow measurements, temperature measurements, sampling and testing, upstream and downstream of discharges from the leachate treatment plant, the groundwater dewatering system (if needed) and the storm water management system, for the *Comprehensive List* of parameters (O. Reg 232/98, Schedule 5, Column 3).
- Semi-annual (two other occasions) flow measurements, temperature measurements, sampling and testing, upstream and downstream of the discharges from the leachate treatment plant, the dewatering system and the storm water management system, for the *Indicator List* of parameters (O. Reg 232/98, Schedule 5, Column 4).
- Annual inspection of the receiving watercourses downstream of the landfill discharge points for signs of significantly increased erosion or flooding.
- Monthly volumes discharged to surface water from the leachate treatment plant, the groundwater dewatering system and the storm water management system.

8.1.3 Groundwater

- Augmentation of the existing monitoring network by four additional monitoring wells to the west and east of the existing monitoring wells.
- Seasonal water level measurements in each of the major hydrogeologic formations distributed sufficiently to confirm groundwater flow patterns (twice per year at a minimum).
- Annual representative sampling from each of the major hydrogeologic formations, upgradient and downgradient of the landfill, analysed for the Comprehensive List of parameters (O. Reg 232/98, Schedule 5, Column 1).
- Seasonal representative sampling from each of the major hydrogeologic formations, up gradient and down gradient of the landfill, analysed for the Indicator List of parameters (O. Reg 232/98, Schedule 5, Column 2).
- Subject to landowner permission, annual representative sampling from selected representative domestic water wells within the Groundwater Site Vicinity, analysed for the Indicator List of parameters (O. Reg 232/98, Schedule 5, Column 2), with the well owner provided with a copy of these results within 90 days of obtaining the sample.

8.1.4 Combustible Gas

- Seasonal combustible gas concentration measurements at a network of monitors around the landfill perimeter.

8.1.5 Fish & Benthic Communities

- Biennial monitoring of fish and benthic communities in the Patterson-Robbins Drain upstream and downstream of the leachate/stormwater effluent discharges.
- Analyses of the trends in fish and benthic community abundance, in conjunction with the surface water monitoring results.

8.1.6 Operations

The routine monitoring of the site operations would include:

- Daily monitoring of the leachate pump meter readings.
- Daily monitoring of water levels in the storm water ponds.
- Annual surveys to determine waste disposal quantities and remaining capacity.
- Daily monitoring and recording of waste receipts by type, hauler, time of arrival, and weight.
- Daily monitoring and recording of general location(s) on the site used for waste disposal.
- Daily monitoring and recording of fugitive litter and litter collection activities.
- Daily monitoring of dust and recording of dust control activities.
- Daily observations of vermin and bird activity at the landfill and the effectiveness of the wildlife control programs.

- Daily receipt and recording of any public complaints regarding the effects of the landfill, along with any measures taken to resolve the complaints.

8.1.7 Reporting

All of the above monitoring results will be included within the annual operations and post-closure reports submitted to the Ministry of the Environment, Conservation and Parks, and include:

- The monitoring data and any analyses of the data;
- An interpretation of the monitoring data relative to regulatory limits and/or the predicted environmental effects;
- The need to implement any contingency plans;
- A review of the adequacy of the monitoring programs and any recommendations for amendments to the monitoring programs.

Reporting shall be made available to interested Indigenous Communities, government agencies and the public.

8.2 Contingency Plans

The impact assessment presented in this EA is based on the normal or expected operation of the proposed landfill. However, there is also a need to have contingency plans and procedures in place to deal with emergency or upset conditions that can be anticipated. Or, as stated in the *Landfill Standards* (p. 47): "*A contingency plan is an organized set of procedures for identifying and reacting to an unexpected, but possible, occurrence*."

In many cases contingency plans are associated with a corresponding environmental monitoring program (see Section 8.1, above), and would be triggered by monitoring results that indicate an unexpected degree of impact beyond an established threshold ("trigger level"). However, other contingency plans may be associated with inspections and observations during the routine operation or post-closure maintenance of the site.

Contingency plans are regulated through *Environmental Compliance Approvals* under the *Environmental Protection Act*. In this section, a framework for the proposed contingency plans is presented; the specific details are developed and presented in the associated *Design and Operations Report*, and will be submitted as part of the applications for *Environmental Compliance Approvals* under the *Environmental Protection Act*.

Ontario Regulation 232/98 and the *Landfill Standards* specifically detail requirements for contingency plans related to: leachate impacts on groundwater or surface water, subsurface landfill gas migration, atmospheric landfill gas emissions, and financial assurances. These are outlined below, followed by a number of additional contingency measures that Walker proposes for the site operations.

8.2.1 Emergency Response

Walker maintains and routinely updates a comprehensive emergency response plan for all of its operations. Aspects addressed in the Emergency Response Plan include:

- Notification procedures and contacts;
- Medical injuries;
- Fire;
- Spill control and clean-up;
- Gas leaks;
- Natural disaster;
- Vehicle accidents (on- and off-site);
- Search and rescue;
- Evacuation;
- Record keeping and reporting; and
- Training and testing.

8.2.2 Leachate

Sections 12 and 27 of *Ontario Regulation 232/98*, and Section 4.8 of the *Landfill Standards*, detail the requirements for leachate contingency plans that are to be employed should leachate unexpectedly escape into the environment, either through a failure in the liner system or by any other means. Contingency plans are required for leachate impacts on either groundwater or surface water, as discussed below.

8.2.2.1 Groundwater Contingency Plans

If the groundwater monitoring program ever identified the potential for any unexpected leachate impacts in the groundwater beyond the property boundaries then contingency plans would be immediately implemented.

The Ministry would be notified and a detailed plan for the for the design, operation, maintenance, monitoring and reporting of the contingency system(s) would be prepared and submitted for approval, and implemented as soon as necessary.

Depending on the specific circumstances, the contingency plan could include one or more of the following components:

Leachate Purge Wells:

A series of wells could be installed into the waste and/or into the leachate collection system to pump out and remove leachate from within the landfill for treatment.

Quarry Floor Underdrain System:

The former quarry operations included drainage trenches and sumps on the quarry floor that were used for dewatering purposes. These will be preserved when the quarry floor is backfilled so that they can be used to capture any leachate migrating below the liner and through the backfill before it reaches the site boundary.

Groundwater Purge Wells:

> A series of wells can be drilled and pumped out at the perimeter of the landfill at whatever location(s) and depth(s) necessary to capture any leachate that migrates below the liner before it reaches the property boundary.

The feasibility of the groundwater contingency plans was evaluated in the accompanying *Groundwater Assessment Report* (Golder Associates; **Appendix F**).

Note that these contingency components are mutually supportive; each component is potentially capable of providing sufficient control with the others available as additional levels of contingency. Thus, there is considerable redundancy in the overall groundwater contingency plan.

8.2.2.2 Surface Water Contingency Plans

As part of regular maintenance and inspection, the landfill will be routinely inspected for signs of leachate seeps. If seeps are found, temporary controls will be set up immediately to contain and capture the leachate for treatment. An investigation will then be conducted to identify the cause of the seeps and remediation or long-term contingency measures will be developed and implemented accordingly.

If any surface water in the storm water collection system is determined through pre-release testing to be contaminated, then it will be retained in the pond and directed to the leachate treatment plant[32] for further treatment before discharge. Off-site discharge from the storm water management system will only resume once testing demonstrates that the water quality meets all applicable requirements.

8.2.3 Landfill Gas

8.2.3.1 Subsurface Landfill Gas Migration Contingency Plans

Section 14 of *Ontario Regulation 232/98*, and Section 4.10 of the *Landfill Standards*, detail the requirements of contingency plans related to the unexpected migration of combustible landfill gas through the subsurface. (Under normal operating conditions landfill gas will be contained by the liner and removed by the gas collection system.)

If any of the automated monitoring devices in the on-site buildings or enclosures signals the detection of combustible gas, then the contingency plan would involve immediate evacuation and ventilation, followed by the appropriate investigation and remedial measures.

Similarly, if methane gas readings any of the monitors around the landfill perimeter (i.e., in the buffer areas) indicate the presence of combustible gas in the subsurface, then any buildings or enclosed spaces in the vicinity will be equipped with automated combustible gas monitoring devices, and the cause will be investigated and remediated.

[32] *Or back into the landfill leachate collection system where it will be routed to the leachate treatment plant.*

8.2.3.2 Atmospheric Landfill Gas Emission Contingency Plans

Section 4.11 of the *Landfill Standards* notes the requirement for contingency provisions should the landfill gas management system encounter an unexpected system failure.

The landfill gas flare(s) will be designed with reserve capacity and critical spare parts and components will be retained in inventory at the site in order to minimize system repair time. Furthermore, the flare(s) will be retained throughout the life of the landfill to serve as a contingency once gas utilization begins.

Any failures related to the gas collection piping in the waste (e.g., breaks, blockages) can be identified and repaired expeditiously by repairing/replacing sections of pipe and, where appropriate, installing temporary by-pass piping. If the collection system is under-performing losing collection efficiency, then additional wells and laterals can be readily installed where needed.

8.2.4 Operational Contingencies

To a large extent, operational contingencies must be planned and implemented at the time the issue occurs based on the specific circumstances. The following are some of the operational issues that could possibly arise, and the types of responses that are feasible.

Table 8-1: Operational Contingencies

Scenario	Contingency Action(s)
Dust complaints	▪ Inspect the site for possible sources of excess landfill dust emissions. ▪ Increase the frequency of sweeper use and dust suppressants.
Flooding – clean storm water	▪ Use the full reserve capacity of the leachate holding ponds. ▪ Promote infiltration of surface runoff into the landfill. ▪ Provide additional storage capacity within the landfill (i.e.; raising temporary berms).
Flooding – potentially contaminated storm water	▪ Use the full reserve capacity of the leachate holding ponds. ▪ Manage the storm water as leachate by discharging the impacted water gradually into the landfill for treatment by the leachate treatment system.
Gulls, crows or starlings in excessive numbers	▪ Supplement the wildlife controls with additional pyrotechnic devices and/or frequencies. ▪ Lethal controls.
Haul route closure	▪ Communicate with active customers via e-mail or telephone messaging. ▪ Communicate with waste haulers using CB radios. ▪ Direct haulers of local waste to use alternate routes to access the site following the County road system.
Highway closure (e.g., 401)	▪ Communicate with active customers via e-mail or telephone messaging. ▪ Communicate with waste haulers using CB radios. ▪ Long distance haulers to use alternate routes to access the site following the provincial EDR system. ▪ Redirect trucks to other approved disposal sites if conditions warrant
Landfill fire	▪ Use on-site equipment and material to smother the fire. ▪ Supplement with water from the dust control tanker truck where appropriate and effective. ▪ Notification to MOE and County

Scenario	Contingency Action(s)
Landfill closure	▪ Communicate with active customers via phone/e-mail. ▪ Communicate with waste haulers using CB radios. ▪ Post signs at the entrances.
Leachate treatment plant shut-down	▪ Use full reserve capacity of the leachate holding ponds. ▪ If necessary, retain leachate in the landfill for additional temporary storage. ▪ Truck leachate to an alternative waste water treatment facility.
Leachate collection system failure	▪ Maintain spare pumps on site to permit immediate replacement of any pump failures. ▪ Activate standby pump if leachate pump in pump station fails. ▪ Install pump and collect leachate in the contingency pumping chamber if the leachate pump station fails. ▪ If necessary, retain leachate in the landfill for additional temporary storage while repairs are undertaken.
Leachate forcemain blockage or failure	▪ If necessary, retain leachate in the landfill for additional temporary storage while repairs are undertaken. ▪ Establish a temporary overland forcemain.
Leachate quantity greater than expected	▪ Adjust pump operation and/or install additional or larger pumps. ▪ Use the full reserve capacity of the leachate holding ponds and/or retain leachate within the landfill on a temporary basis. ▪ Increase leachate treatment plant capacity and/or holding pond capacity if necessary. ▪ If necessary, truck excess leachate to an alternative waste water treatment facility on a temporary basis.
Leachate quality worse than expected	▪ Temporarily retain any leachate that does not meet discharge requirements in the leachate holding ponds and/or in the landfill. ▪ Regularly examine trends in leachate monitoring data to anticipate any changes in leachate quality and revise the leachate treatment process as necessary. ▪ If necessary, truck excess leachate to an alternative waste water treatment facility on a temporary basis.
Litter or illegal dumping (off-site)	▪ Send work crews to remove litter/debris found (subject to access being granted if on private property). ▪ Place non-hazardous litter that is acceptable for receipt at the landfill in garbage bags and transport back to the landfill for recycling or disposal. ▪ For wastes that are not acceptable at the landfill, contact the Region of Oxford and/or Ministry of the Environment for appropriate response. ▪ Implement Walker *Litter Control* procedure.
Medical injuries	▪ Implement Walker *Emergency Response Plan* and *Health & Safety Standard Operating Procedures*, as required.
Odour Complaints	▪ Inspect the site for all possible sources of excess odour release and make appropriate repairs. ▪ Install additional gas collection, as reasonable; and/or ▪ Examine the sources of waste that may be causing the odours and change acceptance/handling procedures accordingly.
Pest infestation	▪ Retain a pest control expert(s) to prepare and implement an appropriate pest control program.
Power failure	▪ Provide a back-up generator for the scale house. ▪ Provide back-up generators for the leachate management system and landfill gas control system for extended power failures.
Spills	▪ Implement Walker *Emergency Response Plan* and *Spills Action Standard Operating Procedure*.
Unacceptable wastes	▪ Implement Walker's *Managing Unacceptable Waste Standard Operating Procedure*.

Scenario	Contingency Action(s)
Vehicle collisions	▪ Implement Walker *Emergency Response Plan* and *Health & Safety Standard Operating Procedures*, as required.
Weather extremes	▪ Implement Walker *Emergency Response Plan*. ▪ Temporarily suspend operations, if necessary.

8.2.5 Financial Assurance

Sections 17 and 18 of *Ontario Regulation 232/98*, and Section 5.0 of the *Landfill Standards* set out the mandatory regulatory requirements for private-sector landfill owners such as Walker to establish financial assurance funds, as well as the way that the fund is to be calculated and administered. As a result, throughout the entire operating and post-closure life of the proposed landfill the Province will have access to sufficient financial resources to carry out any contingency plans and/or the closure and post-closure care of the landfill should the owner not be able to fulfill these obligations.

9. EA Commitments, Compliance Monitoring & Reporting

In addition to the environmental effects monitoring and reporting that will be carried out under the *Environmental Compliance Approval* (see Section 8), Walker also proposes to carry out and report on its compliance with the commitments and approval conditions of this EA. As defined in the *Code of Practice*, compliance monitoring is "*an assessment of whether an undertaking has been constructed, implemented and/or operated in accordance with the commitments made in the environmental assessment and the conditions of the Environmental Assessment Act approval*".

9.1 EA Commitments

Table 9-1 provides a list of the commitments made by Walker in this EA, along with the associated actions and timing necessary to meet those commitments. Note that these commitments are related specifically to the Environmental Assessment; legal requirements that will be in force under other legislation and approvals (for example, design, operations, monitoring, maintenance and reporting associated with an *Environmental Compliance Approval*) are not included here.

Any additional commitments made by Walker subsequent to the release of this document, plus any conditions of approval added by the Minister, will be taken to amend these commitments.

9.2 EA Compliance Reporting

Walker proposes to prepare an EA Compliance Report annually following each year of landfill operations, and then additional reports five years and ten years following closure of the site to waste receipt.

Each report shall include:

- The status of the EA commitments, as set out in **Table 9-1**, including any additional commitments made by Walker subsequent to EA approval;
- A list of the conditions made by the Minister in association with the approval of the EA, and Walker's actions to meet those conditions;
- Any amendments made to the EA and/or the status of any amendments proposed to the EA, as set out in Section 12 (below); and
- Any recommendations for amendments to the EA compliance monitoring programs or reporting.

Reporting shall be made available to interested Indigenous Communities, government agencies and the public.

Table 9-1: List of EA Commitment

Section	EA Commitment	Compliance Monitoring	Schedule	Compliance Reporting
6.6.4	Prior to implementing any future landfill gas utilization, Walker will confirm that it will have the same, or lower, overall emissions than flaring.	Review and document overall emissions estimates for both alternatives.	In conjunction with applying for respective EPA approvals.	In the subsequent annual report to the MECP.
7.2.5.4	In support of *Ontario's Environment Plan* (2018), Walker will maximize the use of excess (waste) soils as landfill cover material in order to support brownfield redevelopment and preserve clean soils for other beneficial uses.	Weigh and record all loads of waste soils used for cover at the landfill and report the quantities annually.	Ongoing during the operational period of the landfill.	To be included in Annual Reports to the MECP.
7.2.5.4 **Table 7-5**	In support of the *Strategy for a Waste-Free Ontario*, Walker will carry out the supporting items identified in **Table 7-5**, as relevant and appropriate.	Review the *Supporting Activities* in **Table 7-5** at least annually and document activities and contributions undertaken.	Ongoing during the operational period of the landfill, as required.	Standard agenda item in annual PLC meetings.
7.4.1 **Table 7-10**	Walker will establish and communicate a formal program to promptly investigate and respond to any public complaints regarding the landfill.	Document all public complaints, investigations and responses.	Ongoing during the operational period of the landfill, as required.	To be included in Annual Reports to the MECP.
7.4.3 7.5.2	Walker will form a Public Liaison Committee (PLC) to exchange information and provide a forum for continued and ongoing dialogue with local community members throughout the operating life of the landfill.	Document the formation and activities of the PLC.	Meetings at least annually during the operating period of the landfill and for at least two years following closure. Walker will review annually with the members of the PLC the need for the committee.	Annually.
7.4.3 7.5.4	Walker will issue regular community updates regarding activities and performance of the landfill, in a publically accessible style and format. Walker will implement a follow-up public attitude study within 5 years of the commencement of landfill operations to examine potential changes in public attitudes attributable to the Southwestern Landfill Project.	Compile and archive all community updates. Document and report the public attitude study in the respective annual report.	Updates at least semi-annually, or more frequently as appropriate, during the operational period of the landfill. The public attitude study will occur within 5 years of the commencement of landfill operations.	To be included in Annual Reports to the MECP. The public attitude study will be documented and reported in the respective annual report.

Section	EA Commitment	Compliance Monitoring	Schedule	Compliance Reporting
7.4.3 7.5.3	Walker will form of an Indigenous Liaison Committee (ILC) to exchange information and provide a forum for continued and ongoing dialogue with Indigenous Community members throughout the operating life of the landfill.	Document the formation and activities of the ILC.	Meetings at least annually during the operating period of the landfill and for at least two years following closure. Walker will review annually with the members of the PLC the need for the committee.	Annually.
7.4.4	Walker will offer a property value protection agreement to current landowners within 500 m of the landfill site.	Document the offer.	The offer to be issued to the (then) current landowner following final approval of the landfill, but prior to the start of construction.	Document in the respective annual report, that property value protection has been offered to property owners within 500 m of the landfill site.
7.4.5 8.1.5	Walker will carry out fish and benthic community monitoring in the Patterson-Robbins Drain to confirm that species are tolerant of water quality.	• Biennial monitoring of fish and benthic communities in the Patterson-Robbins Drain upstream and downstream of the leachate effluent and stormwater discharge locations. • Analyses of the trends in fish and benthic community abundance, in conjunction with the surface water monitoring results.	Biennially during the operating life of the landfill, continuing until stable trends confirm no effects.	Biennially, in conjunction with surface water monitoring and reporting under the *Environmental Compliance Approvals*.
7.5.1	Walker will work cooperatively with the County of Oxford regarding the condition of County Road 6, including: • Regular inspection/observation of the primary haul route on County Road 6 by Walker operations personnel to identify any road condition issues, and discuss with the County of Oxford Public Works Department. • Mutually explore ways to further reduce roadway dust on County Road #6 (e.g., road	Document all communications and activities.	Ongoing during the operational period of the landfill, as required. Inspections by Walker to occur monthly.	Annually.

Section	EA Commitment	Compliance Monitoring	Schedule	Compliance Reporting
	cleaning) when traffic levels and dust generation warrant.			
7.5.5	Walker will offer host municipality funding.	Document the offer occurred.	The offers to be issued following final approval of the landfill, but prior to the start of construction.	Document the offer occurred.
7.5.6	Walker will offer to negotiate an equitable compensation agreement with the closest residential neighbour to the site (ZOR-11), where studies conducted as part of this EA indicate that residual nuisance effects may be experienced on occasion during the construction and operation of the landfill.	Document the offer occurred.	The offer to be issued to the (then) current landowner following final approval of the landfill, but prior to the start of construction.	Document the offer in the respective Annual Report.
7.5.7	Walker will establish corporate policies for the Southwestern Landfill giving preference to hiring Indigenous peoples and procuring goods and services from Indigenous suppliers, wherever reasonable and practical.	Document the policies and complete an annual review of employment and procurement.	Policies to be established following final approval of the landfill, but prior to the start of construction. Updates as required.	Standard agenda item in annual ILC meetings.
7.5.8	Walker will establish corporate policies for the Southwestern Landfill giving preference to local employees, goods and services wherever reasonable and practical in order to further enhance the economic benefits of the project to the County and area municipalities.	Document the policies and complete an annual review of employment and procurement.	Policies to be established following final approval of the landfill, but prior to the start of construction. Updates as required.	Standard agenda item in annual PLC meetings.
12	Walker shall follow the EA amendment procedure in Section 12 of the EA Report if there is any change to the proposed undertaking that would substantially affect the evaluation of the alternatives, or the evaluation of the environmental advantages and disadvantages to the environment, presented in this EA.	Review the undertaking at least annually, or more frequently as circumstances dictate, to determine whether or not it is being constructed and operated as proposed in this EA.	Ongoing during the operating period of the landfill.	To be included in Annual Reports to the MECP.

10. Consultation

Draft EA Review Note:

This section (Section 10) provides the details for the consultation program up-to the release of the Draft Environmental Assessment (EA) (March 2020). It will be revised and updated to include the following information at the submission of the Final EA:

- ***Consultation on Design & Mitigation***
- ***Consultation on the review of the draft EA***
- ***Comments received and how input was considered as part of the Final EA***
- ***Commitments for ongoing consultation***

10.1 Consultation Program

10.1.1 Requirements of the Terms of Reference

This section of the Environmental Assessment (EA) provides an overview of the consultation completed by Walker since the *Approved Amended Terms of Reference* dated May 10, 2016.

All consultation with interested parties including government and non-governmental agencies, Indigenous Communities, and interested members of the public was carried out in accordance with *Code of Practice – Preparing and Reviewing Environmental Assessments in Ontario* (Ministry of the Environment, 2014); and, as required by Section 5.1 of this EA *Act*.

As committed to in the *Approved Amended Terms of Reference*, the consultation program for this EA focused on:

- Continuing to build new contacts, maintain and deepen existing relationships, and foster open lines of communication;
- Expanding Walker's understanding of the community's concerns, priorities and values;
- Engaging, consulting and building relationships with Indigenous Communities,
- Providing opportunities for interested parties to receive information and provide feedback;
- Notifying and consulting appropriate government agencies and ministries at key decision points;
- Identifying concerns that might arise from the proposed Southwestern Landfill proposal;
- Focusing on addressing, and where possible, resolving public concerns; and
- Providing appropriate information that will enable the MECP to provide a fair and balanced decision.

In addition, the consultation program was designed to create two-way dialogue between Walker and interested parties and allowed multiple opportunities for Walker to receive input and feedback for consideration throughout the EA.

10.1.2 Summary of Consultation during the Environmental Assessment

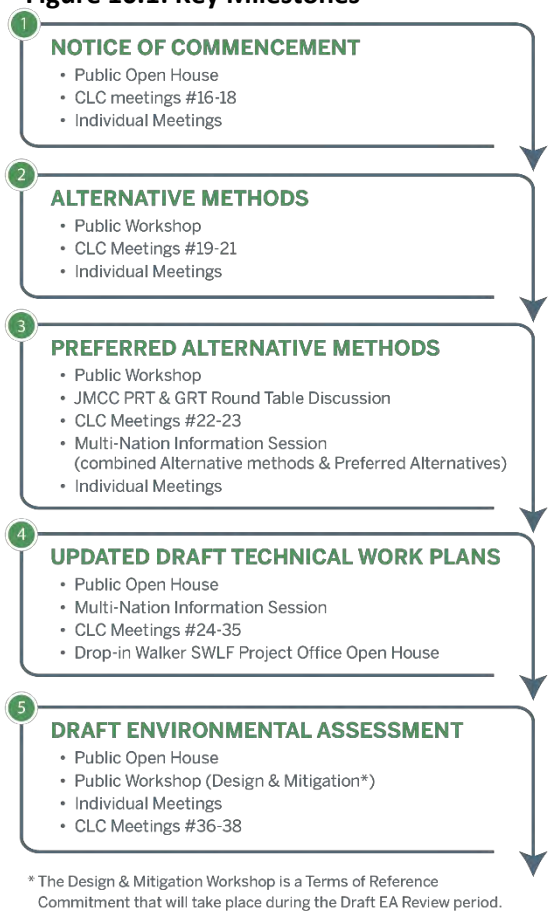
The following outlines where in this section the above mentioned elements are described in more detail:

- Key milestones for when consultation occurred was established during the *Approved Amended Terms of Reference* and is further summarized in **Figure 10.1** and **Section 10.2.**
- How each participant group: public stakeholders, Indigenous Communities, and agencies were consulted during this EA are summarized in **Section 10.3, Section 10.4, and Section 10.5** respectively.
- A summary of comments received by public stakeholders, Indigenous Communities, and agencies and how they were considered by Walker during this EA is included in **Section 10.6**.

"Early, open and respectful dialogue has been key to bringing both local community and Indigenous perspectives to the design of this project".

Darren Fry, SWLF EA Project Director
Walker Environmental

Figure 10.1: Key Milestones



* The Design & Mitigation Workshop is a Terms of Reference Commitment that will take place during the Draft EA Review period.

10.2 Ongoing Consultation Activities

During the EA, Walker continued to make use of and build on the established stakeholder management database of interested parties in the Southwestern Landfill proposal. These interested parties include members of the local community, municipal and provincial government agencies, the peer reviewers, non-government agencies, and Indigenous Communities.

To ensure stakeholders were engaged and informed, Walker undertook several consultation activities that lasted the duration of the EA. These activities included the development of easy-to-understand, plain language communications which increased the level of understanding of the project, the company, and the EA process. Specifically, ongoing consultation activities included:

- Local Site office located at 160 Carnegie Street, Ingersoll ON;
- Project Website (www.walkerea.com);
- Dedicated toll-free telephone line (1-855-392-5537) & email address (info@walkerea.com);
- Community Exchange Newsletter;
- Landfill Tours;

Staying Up-to-Date:

There are over 3,000 individuals included inour database because of their interest in the Project.

- Informational video;
- Media and Social Media (Facebook); and
- Project Notifications and Invitations to Consultation Events.

10.2.1 Project Office

As a 5th generation, family owned Ontario-based Company, Walker places a high value on investing in the communities where we operate. Opening a project office, approximately 1.5 km from the proposal, was critical to establishing local presence and availability in the community.

The office is staffed by Walker employees and open to the public five (5) days a week from 8 a.m. to 4 p.m. The office is a focal point for the project and serves as a local, accessible way for community members and interested parties to meet with the Project Team, ask questions, stay informed and provide input in-person.

In addition to visits to the project office from the public, Walker hosts a number of meetings at the office including regular Community Liaison Committee (CLC), expert reviewers, and a drop-in public event.

10.2.2 Project Website

The project website (www.walkerea.com) launched during the *Approved Amended Terms of Reference* and continues to be the go-to source of information about the project. The website includes detailed, accurate, and up-to-date information about the project, the EA process, the company, and consultation opportunities. There is also a comprehensive section dedicated to documentation associated with the project including CLC materials, Public Event materials, technical reports, etc.

Over 6,000 Ontario website visitors during the EA phase of the project.

In addition, stakeholders can submit comments directly through the project website and/or subscribe to receive project notifications directly to their email inbox.

10.2.3 Toll-Free Telephone Number & Email Address

A toll-free telephone number (1-855-392-5537) and project email addresses (info@walkerea.com) were maintained during the preparation of this EA as a means for individuals interested in the Southwestern Landfill proposal to get in contact with the a member of the Project Team.

10.2.4 Community Exchange Newsletter

The Community Exchange is an informational newsletter created by Walker to provide regular communications, information, and project updates to stakeholders. Nineteen Community Exchanges were distributed to the growing mailing list in both paper and electronic formats as well as published on the project website at regular intervals throughout the EA.

Copies of each Community Exchange newsletters are included in **Appendix I-1**.

10.2.5 Landfill Tours

Walker maintained an open invitation for interested individuals to tour the Walker Environmental Resource Recovery and Waste Management Campus in Niagara to learn more about how Walker constructs, operates, and manages modern landfills. The South Landfill in Niagara also serves as an example of a comparable landfill to the Southwestern Landfill proposal (i.e., similar design in a similar setting).

Specifically, Walker reached out on multiple occasions to the local municipalities to offer tours to Mayors, Council, and staff. Throughout this EA, Walker hosted nine tours to interested stakeholder groups. Further information including the tour materials is included in **Appendix I-2**.

10.2.6 Informational Video

In response to community interest in learning more about modern landfills, Walker created a video released in September 2016 about how today's landfills are built, operated, closed, and turned into something new again. The video, which has over 19,650 views, uses Walker's South Landfill in Niagara Falls to illustrate this information.

The video is available at www.walkerea.com/en/the-proposal/What-is-Being-Proposed.asp

10.2.7 Media & Social Media

Walker communicated with local media outlets to provide information and updates about the progress of this EA. Articles published in the local papers were primarily centered on public consultation events. In the case of a public consultation event, a journalist often attend or scheduled a follow up interview to report on the event objectives and outcomes.

In addition to traditional media, Walker recognized the importance of a project Facebook page as an additional outlet to share information about the Southwestern Landfill proposal. The Facebook page which was created in August 2018 has over 235 followers and 215 people who like the page. Visit the Walker Facebook Page here:

www.facebook.com/WEGSouthwesternLandfill

A copy of media articles about the SWLF EA since the *Approved Amended Terms of Reference* are included in **Appendix I-3**.

10.2.8 Project Notifications and Invitations to Consultation Events

With the *Notice of Approval for the Terms of Reference* in March 2016, a number of project notifications and invitations to public consultation events for the Southwestern Landfill EA were issued. **Table 10-1** provides a summary of these notifications.

Table 10-1: Distribution of Notifications

Notification	Distribution
Notice of Commencement (May 11, 2016)	• Advertised in Ingersoll Times (May 11 and 18, 2016) and Oxford Review (May 12 and, 19, 2016) • Posted the Notice on the project website on May 11, 2016 • Email and letter distribution to stakeholders including public, Indigenous Communities and government agencies during the week of May 9, 2016
Notice of Public Open House (September 1, 2016)	• Advertised in Ingersoll Times (August 17 and 24, 2016) and Oxford Review (August 18 and 25, 2016) • Posted event details on the project website on August 17, 2016 • Distributed the August 2016 Community Exchange with event details by mail and email to stakeholders on August 17, 2016 • Email distribution of notice to stakeholders including public, Indigenous Communities and government agencies during week of August 15, 2016
Notice of Public Workshop on Identification of Alternative Methods (October 13, 2016)	• Advertised in Ingersoll Times (September 28 and October 5, 2016) and Oxford Review (September 29 and October 6, 2016) • Posted event details and reference materials on project website on October 6, 2016 • Distributed September 2016 Community Exchange with event details by mail and email to stakeholders on September 26, 2016 • Email distribution of Notice to stakeholders including public, Indigenous Communities and government agencies during the week of September 26, 2016
Notice of Public Workshop on Preferred Alternatives **(November 16, 2019)**	• Advertised in Ingersoll Times (November 2 and 9, 2016), and Oxford Review (November 3 and 10, 2016) • Posted event details and reference materials to project website on November 6, 2016 • Distributed November 2016 Community Exchange by mail and email to stakeholders on November 2, 2016 • Email distribution of Notice to stakeholders including public, Indigenous Communities and government agencies during the week of October 31, 2016

Notification	Distribution
Notice of Public Open House on Updated Draft Work Plans **(April 19, 2017)**	• Advertised in Ingersoll Times (April 5 and 12, 2017) and Oxford Review (April 6 and 13, 2017) • Posted event details to project website on March 29, 2017 • Distributed March 2017 Community Exchange by mail and email to stakeholders on February 23, 2017 • Email distribution of notice to stakeholders including public, Indigenous Communities and government agencies during week of April 3, 2017
Notice of Drop-in Public Event **(November 28-30, 2017)**	• Advertised in Ingersoll Times (November 15 and 22, 2017) and Oxford Review (November 16 and 23, 2017) • Posted event details on project website on October 28, 2017 • Distributed Community Exchange by mail and email to stakeholders on November 1, 2017 • Email distribution of notice to stakeholders including public, Indigenous Communities and government agencies during week of November 13, 2017
Notice of Draft EA	• Advertised in the Woodstock Sentinel-Review and the Oxford Review the week of March 2, 2020 • Posted notice details on project website on during the week of March 2, 2020 • Distributed March 2020 Community Exchange by mail and email to stakeholders during the week of March 2, 2020 • Email and letter distribution to stakeholders including public, Indigenous Communities and government agencies during week of March 2, 2020 • Facebook posts throughout the month of March 2020

Copies of project notifications and consultation event invitations are included in **Appendix I-4**.

10.3 Public Stakeholders

10.3.1 Public Stakeholders Consulted

In addition to the requirements set out in the *Approved Amended Terms of Reference*, Walker continued to find new ways to reach a broad range of public stakeholders interested in the Southwestern Landfill proposal. Public stakeholders consulted during the development of this EA included:

- Adjacent property owners and near neighbours to the proposal;
- Residents, businesses, and community groups within 1 km of the proposal;
- Existing contacts on the stakeholder management database;
- Community Liaison Committee (CLC);
- Joint Municipal Coordinating Committee, representing the County and local municipalities;

- Local Municipal elected officials; and
- Local Provincial Member of Parliament

When public stakeholders interacted with project team members about the Southwestern Landfill proposal, the individual's contact details and interests in the project were recorded in the stakeholder management database. This facilitated new individuals interests and concerns to be recorded and for the individual to receive project updates and notifications of upcoming public events.

A list of public stakeholders is included in **Appendix I-5**.

10.3.2 Overview of Consultation with Public Stakeholders

In addition to the ongoing consultation activities listed in above in **Section 10.2,** the following summarizes the consultation activities with public stakeholders at key milestones of the Southwestern Landfill proposal.

- Public Open Houses & Workshops (**Section 10.3.3**)
- Presentations to Community Organizations (**Section 10.3.4**)
- Near Neighbour Door Knocking (**Section 10.3.5**)
- Individual Meetings, Emails, and Telephone Calls (**Section 10.3.6**)
- Community Liaison Committee (CLC) Meetings (**Section 10.3.7**)

10.3.3 Public Open Houses & Workshops

Walker held public events at key milestones of this EA as committed to during the *Approved Amended Terms of Reference.* In addition to these identified events, Walker held two (2) supplementary public events to ensure effective and meaningful consultation while keeping the public informed and engaged throughout the duration of the EA.

Public events were held in close proximity to the proposed site, either at the Beachville Colombo Club or at the Walker Ingersoll Office. The Colombo Club was selected as a preferred venue as a result of feedback received from community members for a venue that was accessible and in a location that was near the Southwestern Landfill proposal. The public events were held on weekdays often during the afternoon and evening to accommodate shift work schedules of local residents.

Over 280 people total participated at the five public consultation events held during the EA.

Depending on the nature of the topic being discussed, the format of the public event was either an informal drop-in open house or facilitated roundtable workshop. **Table 10-2** summarizes the details for the public events held during this EA.

Table 10-2: Summary of Public Events

Date	Type	Purpose
2016-09-01	Public Open House*	Opportunity to discuss and provide input on the following topics: • Update on the Southwestern Landfill proposal • Overview of this EA and upcoming key milestones • How modern landfills operate

Date	Type	Purpose
		• Ways public stakeholders can provide input on this EA • Invitation for a bus tour to Walker's Niagara Campus
2016-10-13	Workshop	Opportunity for Walker to present information about the project and to provide a forum (i.e. roundtable workshop) for constructive dialogue and meaningful input about the different options (i.e. Alternative Methods) for 5 key landfill components and on the application of the evaluation criteria: 1) Landfill footprint 2) Landfill design 3) Haul route & site entrance 4) Leachate management 5) Landfill gas management
2016-11-16	Workshop	Opportunity for Walker to present information about the Southwestern Landfill proposal and to provide a forum for constructive dialogue and meaningful input on the selected options (Preferred Alternatives) for the 5 key landfill components (see above).
2017-04-19	Public Open House	Opportunity for Walker to provide an update on the Southwestern Landfill EA, receive input, and answer questions and concerns from the public. Specifically, the following topics were discussed: • Review and discuss the updates to the technical work plans • Obtain input prior to the start of the technical studies • Learn more about how the technical studies will be carried out
2017-11-28 to 2017-11-30	Drop-in at Walker Ingersoll Office *	Opportunity for Walker to provide an update on the Southwestern Landfill EA, receive input, and answer questions and concerns from the public. Specifically, the following topics were discussed: • Overview of the current technical studies being completed • Find out what technical study activities community members might see happen on-site and in the surrounding community • Learn more about the SWLF EA proposal • Ask questions and provide input

Denotes public events that were held in addition to those committed to in the Approved Amended Terms of Reference (See **Appendix C: Table C-2).*

Copies of public event materials are included in **Appendix I-6**.

10.3.4 Presentations to Community Organizations

Where the opportunity presented itself, Walker made formal presentations to community groups to provide information about the project and the company, and to receive input and answer questions throughout this EA. Walker made the following presentations to interested community groups:

- Ontario Farmer Magazine: March 29, 2016

- Ingersoll District Chamber of Commerce: May 4, 2016
- Hi-Way Pentecostal Church Board of Directors: July 20, 2016
- Carmeuse Lime Staff Town Hall Meeting: March 30, 2017
- Oxford Federation of Agriculture (OCFA): April 6, 2017 & April 10, 2018
- Rural Oxford Economic Development: June 16, 2017

Copies of meeting materials are included in **Appendix I-6**.

10.3.5 Nearest Neighbour Door Knocking

Walker completed a nearest neighbour door knocking activity in July 2016. The objective of the door-knocking was to provide residents living closest to the proposed site the opportunity to be introduced to the Project Team, ask questions directly to the Walker, raise any concerns that they may have, and sign up for a tour to the Walker Niagara Campus.

The door knocking took place on July 21 and 28, 2016. Project team visited thirty-four (34) houses, spoke with fourteen (14) residents, left a letter behind at sixteen (16), and were unable to reach four (4) residences. The leave-behind letter included an invitation to contact the Project Team for a meeting or call at a more convenient time.

A copy of the leave behind material is included in **Appendix I-6**.

10.3.6 Individual Meetings, Emails, and Telephone Calls

As described in **Section 10.2**, Walker maintained a local project office, toll-free telephone number and dedicated public consultation team members to meet with and answer questions and concerns from public stakeholders interested in the project. Individual correspondence by phone, email, and in-person was the most common and accessible way for community members to speak with the Walker project team members.

All correspondence with public stakeholders was documented and tracked in the stakeholder management database. Copies of correspondence including written comments (i.e., letters) from public stakeholders and Walker's response (if required) is included in **Appendix I-7**.

10.3.7 Community Liaison Committee (CLC)

Established during the Terms of Reference phase of this EA, the Community Liaison Committee (CLC) continued to operate as one of many methods Walker used to obtain input from and disseminate information to interested members of the public. Members of the CLC participated in this EA in great detail and committed a significant amount of time to provide local input. The committee consisted of:

- Local citizen volunteers
- Local government agency staff (Oxford County, Ingersoll, South-West Oxford, Zorra)
- Upper Thames River Conservation Authority (UTRCA)
- Ministry of Environment, Conservation, and Parks (MECP)
- Independent EA Advisor
- Independent CLC Facilitator

- Walker Project Team representatives

As part of their mandate, the CLC:

- Provided Walker and its' technical experts with an understanding of the characteristics of the site and neighbouring communities
- Provided Walker with a better understanding of community interests, goals and aspirations, and social and economic development objectives
- Identified potential impacts, issues, concerns and opportunities that are important to the local community
- Suggested mitigation measures
- Suggested how public consultation efforts could be modified and/or changed to increase community participation and input at key milestones.

10.3.7.1 CLC Correspondence

Outside of CLC meetings, members of the CLC communicated with Walker team members by email, phone call, or in-person to ask questions, provide comments, or raise concerns throughout this EA. The CLC also submitted formal letters with comments at key milestones.

A copy of CLC correspondence and written comments (i.e., letters) and Walker's response (if required) is included in **Appendix I-8**.

10.3.7.2 CLC Meetings

CLC meetings were open to the public with seating provided for observers. Following each CLC meeting, meeting materials were posted on the project website.

Also in attendance at CLC meetings and for members of the CLC was an independent third-party EA Advisor, which was funded by Walker. This individual is a qualified expert in the requirements Ontario's *Environmental Assessment Act* and the process of undertaking EAs. Their role was to provide the CLC with independent advice on this EA.

Walker held an additional 16 CLC Meetings to the 6 meetings committed in Section 10.2 of the Terms of Reference.

Table 10-3 summarizes the purpose of the CLC meetings held during this EA; where it is a commitment, it is explicitly indicated.

Table 10-3: CLC Meeting Summary

Meeting #	Date	Purpose
16 (Part 1)*	2016-04-06	Reviewed and discussed the approval of the *Approved Amended Terms of Reference* as well as discussed the function of the CLC, reflecting on meetings during the *Terms of Reference* and recommendations on improvements.
16 (Part 2)*	2016-04-20	Continued to discuss the function of the CLC, including review of the CLC Charter.
17	2016-05-25	Reviewed and discussed the Notice of Commencement, estimated

Meeting #	Date	Purpose
		timeline, and public consultation commitments. ***Terms of Reference Commitment: "Notice of Commencement of this EA" (s.10.2)***
18*	2016-06-22	Reviewed and discussed: EA overview with estimated timeline, Community engagement methods and opportunities, screening method for the Evaluation of Alternative Methods
19	2016-07-27	Reviewed and discussed Alternative Methods for landfill footprint and landfill design. ***Terms of Reference Commitment: "Identification and Evaluation of Alternatives".***
20*	2016-08-24	Reviewed and discussed Alternative Methods for the haul route.
21*	2016-09-28	Reviewed and discussed Alternative Methods for leachate management and landfill gas management.
22	2016-10-26	Reviewed and discussed Preferred Alternatives, including five key topics: landfill footprint, landfill design, haul route, leachate management, and landfill gas management. ***CLC Commitment: in response to CLC comments on the August 29, 2013 Terms of Reference Submission "Identification of the Preferred Alternative".***
23*	2016-11-23	Reviewed and discussed Facility Characteristics Assumptions, Climate Change Assumptions, and Planning Assumptions that will be used to inform the studies of the proposed landfill. Feedback obtained on format/structure of CLC meetings in 2016 and suggested improvements for 2017 meetings.
24	2017-01-25	Reviewed and discussed Technical Work Plans for Traffic, Visual and Cumulative Effects. ***Terms of Reference Commitment: "Review of the Final Technical Work Plans".***
25*	2017-02-22	Reviewed and discussed Technical Work Plans for Groundwater/Surface Water, Ecology, and Cultural Heritage.
26*	2017-03-22	Reviewed and discussed Technical Work Plans for Social, Agriculture, Economic studies.
27*	2017-04-26	Reviewed and discussed of Technical Work Plans for Air Quality, Human Health Risk Assessment, Noise/Vibration, and Archaeology studies.
28*	2017-05-24	Reviewed and discussed of Technical Work Plans for Ecology and Cumulative Effects will be studied (revisited), as well as Facility Characteristics Assumptions (Revision 2).

Meeting #	Date	Purpose
29*	2017-09-20	Discussed the status of upcoming technical studies, including overview of scheduled fieldwork by season and revisions to CLC Charter to clarify roles.
30*	2017-11-22	Discussed results of CLC Annual Review Survey, details for finalization of the technical work plans, including key updates based on CLC and community input, and field work occurring and upcoming.
N/A*	2017-01-28	Interested CLC members attended a tour of the proposed site at Carmeuse Lime with Walker and Carmeuse Lime staff members answering questions throughout the tour.
31*	2018-02-21	Discussed ongoing technical studies and field work.
32*	2018-05-23	Discussed ongoing technical studies and field work and heard from CLC members experiences observing field work.
33*	2018-08-22	Presented and discussed Air Quality with an air quality analyst from the MECP and review upcoming CLC consultation activities. Reviewed and discussed Facility Characteristics Assumptions (Revision 2) with a focus on information about the current quarry sump and how it could be integrated into the Southwestern Landfill design (as a potential contingency measure), as requested at a previous meeting.
34	2018-11-28	Presented and discussed preliminary existing conditions for the ecology, economic, and air quality studies. ***Commitment: in response to CLC comments on the August 29, 2013 Terms of Reference Submission "Finalization of the baseline scenarios (minimum of 2 meetings)".***
35	2019-03-27	Reviewed and discussed preliminary existing conditions for the groundwater, surface water, traffic, social, and archaeology studies. ***Commitment: in response to CLC comments on the August 29, 2013 Terms of Reference Submission "Finalization of the baseline scenarios (minimum of 2 meetings)".***

* Denotes additional to meeting beyond the CLC Meeting commitments outlined in the *Approved Amended Terms of Reference*. Copies of the CLC Materials are included in **Appendix I-9**.

10.4 Indigenous Communities

10.4.1 Indigenous Communities Engaged and Consulted

Walker engaged and consulted Indigenous Communities on the Southwestern Landfill EA through information sessions, presentations, meetings with staff, Chief and Council, and tours of Walker's Niagara campus, and community members. The Indigenous Communities that were identified for engagement and consultation on the project was presented in the *Approved Amended Terms of Reference* and confirmed by the government of Ontario (the "Crown") in a letter on October 16, 2017.

Walker engaged and consulted with the following Indigenous Communities:

- Aamjiwnaang First Nation
- Caldwell First Nation
- Chippewas of Kettle and Stoney Point
- Chippewas of the Thames First Nation (COTTFN)
- Haudenosaunee Confederacy Chiefs Council
- Métis Nation of Ontario
- Mississaugas of the Credit First Nation
- Moravian of the Thames (Delaware Nation)
- Munsee-Delaware Nation and,
- Oneida of the Thames First Nation (Oneida)
- Six Nations of the Grand River as represented by the elected Chief and Council
- Walpole Island First Nation (WIFN)

With the exception of the Métis Nation of Ontario (MNO), all Indigenous Communities were engaged throughout this EA beginning with the announcement of the *Approved Amended Terms of Reference*. Consultation with MNO began in January 2018. As part of initial consultation with MNO, they were offered the opportunity to review information made previously available to other Indigenous Communities.

10.4.2 Overview of Engagement & Consultation with Indigenous Communities

Walker respects the unique rights and perspectives of Indigenous Communities. As such, communication, engagement and consultation and efforts during the Southwestern Landfill proposal focused on three key goals:

1. Build respectful relationships with community members, representatives and leaders by spending time learning about each other's history, goals, and vision for the future.
2. Support a constructive dialogue about the Southwestern Landfill EA by:
    - Providing clear, concise information about the project
    - Regular communication and providing opportunities for dialogue
    - Accurately documenting dialogue and action items
    - Participating in community-specific consultation processes
3. Carry out an EA in a way that respects the input, perspectives, and rights of Indigenous Communities.

With this in mind, Walker followed the unique consultation protocols of Indigenous Communities where they existed. Where no formal consultation protocol was available, Walker worked with the Indigenous Community to determine what methods of engagement and consultation worked best to for them.

The engagement and consultation activities took place in the form of:

- Distribution of Notices and information about consultation activities (**Section 10.4.3**)
- Review of Draft Reports (**Section 10.4.4**)
- Indigenous Communities Working Sessions (**Section 10.4.5**)
- Meetings, Presentations, and Tours (**Section 10.4.6**)
- Field Monitoring Activities (**Section 10.4.7**)

10.4.3 Distribution of Notices and Information about Consultation Activities

Coinciding with the project notifications published in local papers at key milestones, Walker distributed personalized letters and emails to Indigenous Communities including the Notice of *Approval of the Terms of Reference* (March 29, 2016), and Notice of Commencement (May 11, 2016). Walker also provided notice of and invitations to consultation events as described in **Section 10.2.8**.

Copies of the Notices is included in **Appendix I-4**.

10.4.4 Review of Draft Reports

Walker circulated draft reports to Indigenous Communities for their review and comment throughout the EA at key milestones. In addition, Walker funded a Peer Review (PR) completed by Neegan Burnside on behalf of Walpole Island First Nation at these same key milestones. Where the PR provided comments on draft reports, the comments were made available to other Indigenous Communities for their review. Walker received feedback that this approach to having a specific Indigenous PR was valuable.

A copy of the following draft reports were circulated for review and comment to the Indigenous Communities on the following dates:

- Draft Alternative Methods Report & Draft Facilities Characteristics Report – January 3, 2017
    - Comments on Updated Draft Work Plans received from Neegan Burnside (PR) on behalf of Walpole Island First Nation in July 2017
- Updated Draft Work Plans – April 10, 2017
    - Comments on Updated Draft Work Plans received from Neegan Burnside (PR) on behalf of Walpole Island First Nation on April 28, 2017

Copies of written comments (i.e., letters) from Indigenous Communities, including comments received from the PR and Walker's response (if required) are included in **Appendix I-10**.

10.4.5 Indigenous Communities Workshop Information Sessions

In response to feedback received from Indigenous Communities during the Terms of Reference phase, Walker continued to host multi-Nation information sessions at key consultation milestones of the EA. Staff or members from the Indigenous Communities were invited to attend and materials were provided in advance of the sessions. The two (2) multi-Nation information sessions, which were facilitated by an independent facilitator, were designed to provide an open format conducive to two-way dialogue.

The timing for each information session corresponded with public consultation activities and covered the same information, with additional details of specific interest to Indigenous Communities as requested (i.e., archaeological findings, natural environment findings, etc.).

Following each workshop, a workshop summary, including a question and answer table was circulated to the participants.

Table 10-4: Information Sessions with Indigenous Communities

Meeting Date	Workshop	Purpose of Meeting
2016-11-02	**Information Session #1:**	• Reconnect, introduce the project to new participants,

Meeting Date	Workshop	Purpose of Meeting
	Alternative Methods & Preferred Alternatives	and provide a Southwestern Landfill project status update • Discuss Alternative Methods Assessment & Preferred Alternatives for five key components of the proposed landfill • Next steps of this EA
2017-03-21	**Information Session #2:** Updated Draft Work Plans	• Reconnect, introduce the project to new participants and provide a Southwestern Landfill project status update • Discussed the Updated Draft Work Plans before finalization and beginning field studies • Next steps of this EA

Copies of the workshop sessions materials are included in **Appendix I-11**.

10.4.6 Meetings, Presentations, and Tours

In addition to the multi-Nation meetings, Walker met with individual Indigenous Communities for meetings, presentations, and tours throughout the preparation of this EA. These engagement activities provided the opportunity to learn from the Indigenous Communities about their unique rights and interests in the project, to provide updates about the project, to answer questions and concerns and receive input. In addition, Walker met to build long-term relationships with Indigenous Communities beyond the context of this EA.

The following table outlines the meetings, presentations and tours that were held with Indigenous Communities specifically for the purpose of the Southwestern Landfill EA.

Table 10-5: Indigenous People Meetings

Meeting Date	Indigenous Community	Purpose of Meeting
2016-04-07	Oneida Meeting	• Introductory meeting with a member of Oneida Council responsible for the environment portfolio. • Walker provided an update on the SWLF EA and next steps of the project. • The Councillor provided information about the governance structure of Oneida Nation on the Thames and advised on how Walker can engage Oneida in the SWLF EA.
2016-04-22	Caldwell First Nation Meeting	• Introductory meeting with the Chief. • Walker provided an update on the SWLF EA and answered questions about Walker as a company. • Discussed opportunities to engage Caldwell and their interest in the proposal.
2016-06-16	Aamjiwnaang First Nation	• Meeting with Walker, Shared Value Solutions (SVS) and Aamjiwnaag staff. • Walker provided an update on the SWLF EA

Meeting Date	Indigenous Community	Purpose of Meeting
		• Discussed opportunities for future engagement with Aamjiwnaag.
2016-06-20	MCFN	• Introductory meeting with MCFN staff. • Walker provided and overview of the Southwestern Landfill EA proposal and status. • Discussion about opportunities for engagement and consultation including field monitors during the technical studies and multi-nation working sessions.
2016-07-07	Caldwell First Nation Meeting	• Met with the Chief to provide an update on the SWLF EA. • Chief expressed preference for the group information sessions with other representatives from First Nations during the Terms of Reference. • Chief expressed key concerns for the proposal as potential impacts to the Thames River.
2016-08-24	COTTFN Meeting	• Meeting with COTTFN staff and community members. • Discussed the SWLF EA, provided an update on this EA, and discussed engagement/ consultation opportunities moving forward. • Answered questions about how the proposed landfill would operate and how potential impacts could be mitigated, particularly regarding water (Thames River) and odour.
2017-02-08	COTTFN Meeting	• Discussed the format and coordination of the Information Session #2 including catering and meeting agenda. • Discussed and confirmed key upcoming milestones including the review and comment period of the Updated Draft Work Plans.
2017-02-14	MCFN Meeting	• Meeting with MCFN Staff. • Discussed the status of the SWLF EA, upcoming FN Information Session #2, upcoming field work/studies, and MCFN-specific consultation requirements.
2017-10-20	MCFN Meeting	• Walker participated in the MCFN Job Fair event. • Walker provided an update of the Southwestern Landfill EA project, recent field work activities, and reviewed upcoming consultation opportunities with MCFN staff. • Answered questions about the Southwestern Landfill at the Job Fair.
2018-01-15	WIFN Meeting	• Walker provided an overview of the Southwestern Landfill proposal and the status of this EA. • Discussed the review of the comments on the Updated Draft Work Plans from the PR (Neegan Burnside), opportunities for field monitor participation during field work activities, and next steps in this EA.
2018-02-06	Oneida Tour	• Walker provided the Oneida Youth Environmental Committee with a tour of the Niagara Campus.

Meeting Date	Indigenous Community	Purpose of Meeting
		• The group discussed Walker's experience in constructing and operating landfills and composting (an area of interest for Oneida). • Walker answered questions asked about the Southwestern Landfill proposal.
2018-02-07	MNO Meeting	• Introductory meeting with the MNO to learn more about the Southwestern Landfill proposal • MNO provided details for their consultation protocol • Discussed opportunities to be engaged on the Southwestern Landfill proposal and upcoming key milestones.
2018-02-23	COTTFN Meeting	• Walker provided an overview of the Southwestern Landfill proposal and the status of this EA including remaining field work schedule, upcoming consultation opportunities. • Discussed the COTTFN consultation protocol, other Indigenous Communities involvement to-date, and field monitoring activities for the Archaeology assessment.
2018-03-08	MCFN Meeting	• Walker provided an update of the status of the Southwestern Landfill proposal including the technical field work being completed. • Discussed opportunities for MCFN to participate in archaeology field monitoring activities.
2018-04-24	Oneida Council Presentation	• Walker presented an overview and update of the status of the Southwestern Landfill proposal. • Oneida Council key areas of concern that were discussed included protection of groundwater and surface water, engagement and consultation with Oneida, and potential disruption to traditional medicines.
2018-04-30	COTTFN Meeting	• Walker provided an overview and update of the status of the Southwestern Landfill proposal. • Reviewed the upcoming field work and opportunities for COTTFN to send field monitors to accompany the archaeology consultant. • Discussed opportunity for multi-nation Indigenous Information Sessions at future key milestones of this EA.
2018-05-31	Six Nations Meeting	• Walker provided an update on the status of this EA including which technical studies were underway and opportunity for Six Nations field monitors to participate. • Walker answered questions about the details for how the liner will function to protect groundwater. • Six Nations indicated interest in participating in discussions about the end-use of the Southwestern Landfill when those conversations begin at a later date.
2018-06-15	WIFN	• Meeting with Walpole and Neegan Burnside to provide an

Meeting Date	Indigenous Community	Purpose of Meeting
		update on the project, answer questions about the ecology field studies and identify opportunities for field monitor participation. • Walker, Walpole, and Neegan Burnside toured the Southwestern Landfill proposal site.
2018-06-19	COTTFN Meeting	• Provided an overview and update on the status of the SWLF EA. • Learned more about and discuss the COTTFN Consultation Protocol. • Toured the Southwestern Landfill proposal site.
2018-08-15	HDI Meeting	• Provided an overview and update on the status of the SWLF EA. • Discussed upcoming fieldwork, specifically archeology.
2018-08-23	COTTFN Tour	• Approximately 20 people from COTTFN attended a bus tour of the Walker Niagara Campus, including councilors, staff, and other community members. • Walker made a presentation about the company and the project, answering questions throughout the tour. • Walker pointed out the similarities and differences between the South Landfill (seen on the tour) and the proposed Southwestern Landfill. • Participants expressed interest in groundwater and surface water monitoring, as their key concerns about the proposed Southwestern Landfill are regarding groundwater and surface water impacts.
2019-03-04	COTTFN Event	• Walker provided an update on the project to staff during a pre-event meeting. • Walker participated the COTTFN community open house and informed and answered questions about the SWLF proposal.
2019-04-03	COTTFN Training	• Walker attended and participated in an information session on the Wiindmaagewin consultation protocol of COTTFN.
2019-04-15	MNO Meeting	• Meeting with Region 9 Métis members and staff to Ingersoll project office. • Discussed the SWLF project and ways for MNO to be engaged.
2019-04-16	COTTFN Special Council Meeting	• Walker provided a presentation about the SWLF to council. • Answered questions about timelines, groundwater protection, and regulatory process.
2019-05-14 2019-05-15	COTTFN Tour to Moose Creek	• Walker and 5 COTTFN community members (4 staff members, 1 councilor) visited the GFL Landfill in Moose Creek to tour the landfill-gas-to-energy plant and leachate treatment facility. • The landfill-gas-to-energy plant has similarities to the prospective facility at the SWLF, and a similar design for leachate collection/treatment to the SWLF. • Discussed potential partnership opportunities between Walker and COTTFN Indigenous businesses.

Meeting Date	Indigenous Community	Purpose of Meeting
2019-05-23	MNO Meeting	• Follow- up meeting with Métis R9 Council to further discuss the next steps with MNO on the Southwestern Landfill proposal.
2019-06-13	Oneida Presentation	• Walker presented to Oneida Environment Committee. • Discussed the status of the Southwestern Landfill EA and upcoming opportunities for engagement, consultation and data collection for social assessment.
2019-06-20	Oneida Tour	• Tour of the Walker Niagara Campus. • Discussed the Southwestern Landfill proposal, similarities between the facilities and answered questions.
2019-07-19	MCFN DOCA Open House	• Open House event where proponents are invited to come set up a information booth. The event sees community members come out and learn about the projects DOCA is involved with.
2019-08-15	COTTFN Tour	• Tour of the Walker Niagara Campus • Discussed the Southwestern Landfill proposal, similarities between the facilities and answered questions.

Copies of the meeting and presentation materials are included in **Appendix I-11**.

10.4.7 Field Monitoring

In addition to the above mentioned engagement and consultation with Indigenous Communities during the preparation of this EA, Walker invited Indigenous field monitors, where there was interest, to participate in the technical field work being completed. Field monitors from Walpole (Neegan Burnside) COTTFN, MCFN, and HDI participated in one or more field monitoring activity including archaeology, ecology, surface water, aquatic survey, amphibian, and basking turtle survey field work.

10.5 Agencies

10.5.1 Agencies Consulted

The consultation initiated by Walker during the Terms of Reference phase with government agencies continued throughout this EA. The following agencies were consulted:

Provincial Agencies

- Ministry of the Environment, Conservation, and Parks (MECP)
- Ministry of Agriculture, Food & Rural Affairs (OMAFRA)
- Ministry of Natural Resources and Forestry (MNRF)
- Ministry of Tourism, Culture, and Sport (MTCS)
- Ministry of Transportation (MTO)
- Ontario Provincial Police (OPP)

Municipal Agencies

- Southwestern Public Health (formerly Oxford County Medical Officer of Health)

- Upper Thames River Conservation Authority (UTRCA)
- Township of Zorra
- Town of Ingersoll
- Township of Southwest Oxford (SWOX)
- Oxford County

Of these agencies, the County and local municipalities, the MECP, and the UTRCA expressed a greater interest and were more involved in the project.

10.5.1.1 Joint Municipal Coordinating Committee (JMCC)

The Joint Municipal Coordinating Committee (JMCC) is a committee that includes the Mayors (or designate representatives) and Chief Administrative Officers (CAOs) from local government, including: Township of Zorra, Town of Ingersoll, Township of Southwest Oxford and Oxford County.

The purpose of the JMCC is to represent the interests of the municipalities and conduct and independent, transparent and impartial peer review of the Terms of Reference and the Environmental Assessment for the Southwestern Landfill proposal.

Walker agreed to and has funded the JMCC's Peer Review Team (PRT) throughout this EA. At the request of the JMCC, Walker provided the PRT with tours of the proposed site and opportunities to observe field work (i.e., groundwater well drilling and installation). Walker has also provided the JMCC's PRT with the opportunity to review and comment at key milestones and key decisions during the EA (i.e. Alternative & Preferred Methods, Updated Technical Work Plans).

JMCC Peer Review Team (PRT)

The JMCC Peer Review Team (PRT) is the group of independent expert reviewers selected by the JMCC to examine and review the work conducted by the Walker team of experts for this EA. The PRT includes experts on a broad range of disciplines, including:

- Environmental Assessment process
- Economic Assessment
- Public Consultation
- Legal
- Social Assessment
- Land Use Planning
- Visual
- Air Quality
- Noise and Vibration
- Landfill Design
- Groundwater
- Surface Water
- Ecology
- Traffic
- Agriculture
- Human Health Risk Assessment
- Cultural Heritage

At key milestones, the PRT reviewed and provided comments on the technical information made available by Walker. The PRT then reported back to the JMCC, which submitted their comments for consideration by Walker for this EA.

Ingersoll Peer Review Team (Ingersoll PRT)

In early 2017, the Town of Ingersoll retained their own technical consultants to serve as a separate Ingersoll PRT comprised of experienced consultants in EA Process, Air Quality, Groundwater & Surface Water, Ecology, Economic, Human Health, Traffic, Landfill Design and Cumulative Effects to review the Walker EA.

Walker accommodated the Town of Ingersoll's PRT by providing them with the opportunity to review and provide comment input on the Alternative Methods, Facility Characteristics, and Updated Draft Work Plans for Walker's consideration.

In addition, the Ingersoll PRT Manager participated as an observer to the technical experts during the completion of certain fieldwork.

All comments received from and correspondence with the JMCC PRT and Ingersoll PRT to-date on this EA are included in **Appendix I-12**.

Ministry of Environment, Conservation, and Parks (MECP)

As the primary review and approval agency for the Southwestern Landfill EA, Walker regularly interacted with the MECP Project Officers by phone, email, and in-person as necessary. These interactions with the Project Officers provided the opportunity to give updates on the progress of the EA progress, advise of Walker's consultation activities and address any questions that arose.

All comments received from and correspondence with the MECP to-date on the Southwestern Landfill is included in **Appendix I-12**.

Upper Thames River Conservation Authority (UTRCA)

In addition to being a government review agency, the UTRCA participated on the Community Liaison Committee (CLC) as a resource to the members of the CLC. With a particular interest in this EA because of the Thames River watershed, the UTRCA provided input and information to Walker as well as answered questions by members of the community at CLC meetings.

All comments received from and correspondence with the UTRCA to-date on the Southwestern Landfill is included in **Appendix I-12**.

10.5.2 Overview of Consultation Activities with Agencies

Walker informed and consulted agencies throughout this EA through the following:

- Review of Draft Reports (**Section 10.5.3**)
- Individual & Round Table Group Meetings (**Section 10.5.4**)
- Local Area Elected Meetings & Municipal Council Presentations (**Section 10.5.5**)
- Written Correspondence and Telephone Calls (**Section 10.5.6**)

10.5.3 Review of Draft Reports

At key review and input milestones during this EA, Walker circulated draft reports to agencies for their review and comment. Providing draft reports for comment early and at key milestones allowed government agencies to state their interests and allowed Walker to consider this input prior to moving to the next stage of the EA process.

A copy of the following draft reports were circulated for review and comment to the following agencies:

Table 10-6: Review of Draft Reports

Date	Report	Agencies	Comments Received From
January 3, 2017	Alternative Methods Interim Report	• MECP • JMCC PRT • Ingersoll PRT • UTRCA	• MECP • JMCC PRT • Ingersoll PRT
	Facility Characteristics Assumptions Report	• MECP • JMCC PRT • Ingersoll PRT • UTRCA	• MECP • Ingersoll PRT
April 4, 2017	Update Draft Work Plans (12)	• JMCC PRT • Ingersoll PRT • Southwestern Public Health • UTRCA • MECP • MNRF • MTCS • MTO	• JMCC PRT: All work plans • Ingersoll PRT: Air Quality, Cumulative Effects, Ecology, Economic, Groundwater & Surface Water, Human Health, Traffic, Social • Southwestern Public Health Medical Officer: Human Health • UTRCA: Ecology, Groundwater & Surface Water • MECP: Air Quality, Ecology, Groundwater & Surface Water, Noise, and Human Health • MNRF: Ecology • MTCS: Cultural Heritage & Heritage Landscapes, Archaeology • MTO: Traffic Work Plan
March 2, 2020	Draft Environmental Assessment Report	• JMCC PRT • Ingersoll PRT • Southwestern Public Health • UTRCA • MECP • MNRF • MTCS • MTO • OPP • OMAFRA	• Will be included in the Final EA submission

Copies of written comments (i.e., letters) from government agencies and Walker's response (if required) are included in **Appendix I-12**.

10.5.4 Individual & Round Table Group Meetings

Individual and round table meetings with government agencies were held for a number of reasons including:

- Responding to an agency's request for a separate meeting;
- Clarifying an agency's comments;
- Providing answers to an agency's questions;
- Resolving an agency's concerns or outstanding issues; and
- Seeking an agency's direction.

Since the approval of the Terms of Reference in March 2016, Walker held a total of 25 individual meetings with government agencies. In addition, three (3) round table meetings were held with to bring multiple government agencies and peer review experts together to resolve questions and outstanding issues. A summary of the meetings held and their purpose is outlined in **Table 10.7**.

Table 10-7: Meetings with Government Agencies

Meeting Date	Name of Agency	Purpose of Meeting
2016-04-19	Joint Municipal Coordinating Committee (JMCC) & Peer Review Team (PRT) Coordinator	Discussed the upcoming EA, key community consultation milestones. In addition, discussed courtesy and advanced notice of public communications regarding the JMCC (per JMCC/Walker Agreement).
2016-04-28	MECP Conference Call	Discussed and confirmed how Walker will satisfy the Ministers Amendments of the *Approved Terms of Reference* and to review the comparative evaluation process for the alternative methods assessment and cumulative assessment process.
2016-05-24	MECP Conference Call	Discussed the Notice of Commencement and re-launch of the Community Liaison Committee (CLC) meetings.
2016-06-30	JMCC PRT Coordinator	Provided an overview of the status of the project and project schedule and discuss both the alternative methods assessment process and the cumulative effects assessment process.
2016-09-22	MECP Conference Call	Provided an update on the Southwestern Landfill proposal. Reviewed and discussed the approach for the Alternative Methods Evaluation.
2016-10-26	JMCC Representatives	Reviewed and discussed the objectives for the JMCC PRT, agreement for the PRT review, and request for additional review.
2016-11-24	Oxford County CAO	Provided an update on the Southwestern Landfill EA and answered questions about the project.
2017-01-17	JMCC	Reviewed and discussed Oxford County leachate by-law, the

Meeting Date	Name of Agency	Purpose of Meeting
	Representatives	alternative methods proposed scope of work for the PRT and next steps in this EA.
2017-03-07	MECP, UTRCA	Reviewed, discussed and answered questions about the Facility Characteristics Assumptions, the On-site Leachate Treatment Concepts. Discussed next steps and timing for the Updated Work Plans Review.
2017-03-29	JMCC PRT Coordinator	Provided an overview of the project schedule and key milestones and discussed the JMCC Peer Review comments on Alternative Methods.
2017-03-30	MECP Conference Call	Provided a status update of this EA, discussed and answered questions about the Alternative Methods Interim Reports government agency comments, finalization of the Work Plans and a consultation requirements.
2017-04-03	Ingersoll PRT	Reviewed and discussed the status of the Southwestern Landfill proposal, outlined key consultation milestones to-date and timing for Ingersoll PRT, including the review and timing of the Updated Draft Work Plans.
2017-05-19	MTO	Reviewed and discussed the status of the Southwestern Landfill EA and the Traffic Work Plan. Specifically, discussed the County Road 6 interchange/Highway Service Centre and EDR Routes.
2017-06-13	MECP Conference Call	Provided an update on the status of this EA, review and discuss outstanding comments on the Air Quality Work Plan.
2017-06-19	JMCC	Provided an update on the status of the Southwestern Landfill EA, discussed upcoming EA schedule and next steps for the JMCC.
2017-09-20	JMCC PRT, Ingersoll PRT & MECP (Air/Noise)	Round table meeting with multiple government agencies. Discussed and resolved outstanding comments received on the Air Quality and Noise & Vibration Work Plans.
2017-09-26	JMCC PRT, Ingersoll PRT & MECP (Groundwater/ Surface Water)	Round table meeting with multiple government agencies. Discussed and resolved outstanding comments received on the Groundwater and Surface Water Work Plans.
2017-10-23	MECP	Meeting with MECP hydrogeologist. Toured the proposed project site, observed the groundwater monitoring well installation, and answered questions. A CLC Member attended to observe the drilling activities.

Meeting Date	Name of Agency	Purpose of Meeting
2017-11-28	JMCC PRT, Ingersoll PRT, Southwestern Public Health & MECP	Round table meeting with multiple government agencies. Discussed and resolved outstanding comments received on the Human Health Work Plan and Supplementary Health Review.
2018-03-27	Ingersoll PRT	Toured the proposed landfill site with the Town of Ingersoll Mayor and members of the Ingersoll PRT. The tour was an opportunity to learn more about the SWLF EA, the proposed site details, and ask Walker questions directly about the project.
2018-08-24	MECP Conference Call	Provided an update on the status of this EA including the field work schedule, draft EA report, and final submission. Provided an update on the consultation activities including the *Approved Amended Terms of Reference* requirements, Indigenous Communities consultation, and recent meetings with local community and municipalities.
2018-10-29	Southwestern Public Health	Opportunity to learn more about the mandate for the Southwestern Public Health. Provided an update about the Southwestern Landfill proposal, and answered questions about the Human Health Risk Assessment and Supplementary Health Review.
2019-01-11	Ingersoll PRT	Provided an update on the status on this EA including upcoming the field work.
2019-04-08	MECP Conference Call	Provided an update on the status of this EA including the remaining field work schedule and anticipated release of the Draft SWLF EA Report in the coming months.
2019-06-11	Oxford County	Reviewed and discussed the County of Oxford Official Plan and provided an update on the Southwestern Landfill proposal including the timing for the release of the draft EA and opportunity for the County to provide input and feedback on the documentation.

10.5.5 Local Area Elected Meetings & Municipal Council Presentations

Walker met with elected officials and presented to Council to provide updates on the progress of the EA and to answer questions and concerns. In addition, meetings were planned and held with local ward councillors, mayors, and the Oxford MPP to keep them informed about the progress of the project and address any questions they had.

Formal presentations were made to the municipal councils to provide councillors with the opportunity to ask Walker questions directly, seek clarification on this EA, and learn more about upcoming

consultation opportunities. In total, Walker made five (5) presentations including three (3) to Zorra Township, one (1) to the Southwest-Oxford, and one (1) to the Township of Ingersoll.

Table 10-8: Local Elected Officials Meetings & Presentations

Meeting Date	Name of Official	Purpose of Meeting
2016-06-09	Mayor Lupton and Don McLeod, Township of Zorra CAO	Meeting to discuss EA and schedule, opportunities and preferred method for consultation with Zorra Township, and upcoming presentation to Zorra Council.
2016-08-09	Township of Zorra Council Presentation	Presentation to provide Council with an overview of Walker and the Southwestern Landfill, an update on the status of the project, upcoming consultation activities, and address questions.
2016-12-20	Oxford MPP Ernie Hardeman	Meeting to provide an update on the SWLF EA, discuss areas of concern within the community, and answer questions.
2017-10-17	Township of Zorra Council Presentation	Presentation to Council with an overview of Walker and the Southwestern Landfill, an update on the status of the project, upcoming consultation activities, and address questions from Council.
2017-11-03	Oxford MPP Ernie Hardeman	Meeting to provide an update on the SWLF EA, discuss topical areas of concern within the community, and answer questions.
2017-11-07	South-West Oxford Council Presentation	Presentation to Council with an overview of Walker and the Southwestern Landfill, an update on the status of the project, upcoming consultation activities, and address questions from Council.
2017-12-11	Town of Ingersoll Council Presentation	Presentation to Council with an overview of Walker and the Southwestern Landfill, an update on the status of the project, upcoming consultation activities, Ingersoll's participation in this EA, and address questions from Council.
2018-05-04	MPP Ernie Hardeman	Meeting to provide an update on the SWLF EA, discuss topical areas of concern within the community, and answer questions.
2019-05-01	Township of Zorra Council Presentation	Presentation to Council with an introduction to Walker and the Southwestern Landfill proposal (for new Council), an update on the status of the project, key upcoming dates pertaining to the release of the Draft EA Report, and address questions from Council.
2019-05-03	MPP Ernie Hardeman	Meeting to provide an update on the SWLF EA, discuss topical areas of concern within the community.

Copies of meeting summaries and presentation materials are included in **Appendix I-13**.

10.5.6 Written Correspondence and Telephone Calls

Written correspondence (email and/or letter) and telephone calls were commonly used by government agencies during the preparation of the Southwestern Landfill EA. Providing access to open-communication in these formats proved to be valuable forum for raising, discussing, and resolving issues, organizing meetings, and exchanging information. In addition to email and phone correspondence, government agencies submitted formal letter comments at key milestones to Walker for consideration in this EA.

Copies of written comments (i.e., letters) from government agencies and Walker's response (if required) are included in **Appendix I-12**.

10.6 Consideration of Comments Received from Stakeholders

In light of the numerous and varied consultation activities carried out by Walker with public stakeholders, Indigenous Communities, and government review agencies during the preparation of the EA, comments were received reflecting a number of inputs, questions, and concerns. In response, Walker considered these comments and attempted in good faith to resolve the input received.

With this in mind, the comments received and how they were considered during the preparation of the EA are summarized in a series of comment disposition tables by participant group in **Appendix I-14** in accordance with Section 4.3.7 of the *Ministry of the Environment's Code of Practice for Preparing and Reviewing Environmental Assessments in Ontario (January 2014)*:

Appendix I-14, Table 14.1 summarizes the comments received from public stakeholders' through correspondence (written and electronic), telephone calls, and meetings up until the release of the draft EA report and how they were considered by Walker (organized by topic).

Appendix I-14, Table 14.2 summarizes the comments received from members of the Community Liaison Committee (CLC) through correspondence (written and electronic), and meetings up until the release of the Draft EA and how they were considered by Walker (organized by meeting date).

Appendix I-14, Table 14.3 summarizes the comments received from Indigenous Communities through correspondence (written and electronic), telephone calls, and meetings up until the release of the Draft EA and how they were considered by Walker (organized by Indigenous Communities).

Appendix I-14, Table 14.4 summarizes the comments received from government agencies through correspondence (written and electronic), telephone calls, and meetings up until the release of the Draft EA and how they were considered by Walker (organized by agency).

In addition to the above mentioned Appendix tables and as presented throughout this EA document, highlights of comments received and how they were considered is presented in **Table 10-9**. The table is meant to represent a summary or highlight of comments received and is not intended to represent the complete comprehensive comments or inputs received by the various stakeholders during this EA.

Table 10-9: Highlights of Comments Received and How They Were Considered

Highlight of Comments Received	How Comment Was Considered
General Comments	
Concerns about the potential for groundwater contamination	Groundwater protection is a requirement for all landfills, and there are many protections proposed for the Southwestern Landfill, including the landfill liner as well as monitoring and contingency plans. There are also contingency funds (Financial Assurance) required by the Ministry of the Environment, Conservation, and Parks (MECP) to care for the site if Walker is unable to. Walker recognizes that this is a key concern for the community and looked for opportunities to continue dialogue about this subject throughout the Environmental Assessment.
Landfill Location	The process to select the Carmeuse property was documented in the Terms of Reference (ToR), approved by the MECP in March 2016. The process assessed other locations available to Walker. The MECP approval of the ToR means Walker can now assess locations and design options on the Carmeuse property to study and conduct a detailed impact assessment.
Waste Acceptance Process	Walker explained their experience and processes that are used to manage the receipt of waste at is currently operating South Landfill in Niagara. Due to the interest expressed, Walker looked for opportunities to more clearly explain the waste acceptance process including offering tours and creation of a video and other forms of educational materials.
Upgrades to Haul Route	If any upgrades to the roads along the dedicated haul route are required for the proposed landfill, Walker would be responsible for paying for these upgrades.
Site Expansion Once Approved	The current Environmental Assessment process is only applicable to this proposed non-hazardous, solid waste landfill, and a new EA would be needed for any addition or expansion or development of a new landfill.
Alternative Methods – Landfill Footprint	
Maximize distance from residences, town centres, and the Thames River.	A preferred footprint was selected that is somewhat larger than the required waste fill area. This leaves some possibility at the design stage to further increase the buffer area along the southern boundary, and maximize the separation from Beachville Road and the Thames River.
Concern regarding potential impacts on groundwater or surface water.	The detailed studies to be carried out during the Impact Assessment phase of this EA will include ground and surface water. The potential for impacts will be reported, as well as plans for mitigation, monitoring and

Highlight of Comments Received	How Comment Was Considered
	contingency.
Potential for flooding of the landfill due to the location within the natural flood plain of the Thames River. (1937 flood as example.)	Walker confirmed that the preferred footprint is located outside of the 1937 Thames River Flood (worst on record), and that further flood control systems have been implemented on the Thames since that time. Nevertheless, the potential for flooding (incorporating climate change projections) will be further evaluated as part of the detailed impact assessment and flood control measures will be incorporated into the design of the site, as required under the regulations and in consultation with the Upper Thames River Conservation Authority.
Reassess Greenfield/Future Quarry Lands designated as mineral resource (Option 1) for landfill development.	Walker reassessed its initial screening of the Greenfield/Future Quarry alternative and added further rationale and support regarding Provincial/County mineral resource policies and the economic constraints, all of which was discussed with stakeholders.
First draft of the Landfill Footprint Alternatives map outlining the footprint was difficult to understand.	Walker amended the map of alternative footprints to include key constraints and the minimum area required for the landfill as a result of feedback received during the public workshop.
Alternative Methods – Landfill Design	
Minimize impacts: odour, visual, birds, dust, litter blowing off-site.	Minimizing construction and operations occurring above ground level, which reduces the potential for these impacts, was reflected in the indicators, and assessed as one of the main advantages of the deep design alternative.
Effectiveness of the landfill liner to protect all water, including groundwater and the Thames River from contamination.	In its assessment of design alternatives, Walker selected the MECP generic double composite landfill liner which is designed to be fully protective of the environment in a broad range of hydrogelologic settings.
Maximize distance from residents.	A preferred footprint was selected that is somewhat larger than the required waste fill area. This leaves some possibility at the design stage to further increase the buffer area along the southern boundary, and maximize the separation from Beachville Road and the Thames River.
Concerns regarding impacts of adjacent blasting on landfill liner integrity.	Potential impacts to the landfill liner and other infrastructure will be studied as part of the approvals process. Walker communicated that it has over 30 years of experience of designing, constructing and operating landfills in former quarries and adjacent to active quarry operations.

Highlight of Comments Received	How Comment Was Considered
Concern regarding potential impacts resulting from building a landfill within fractured limestone with the potential for karst features.	The potential for impacts related to fractured bedrock will be studied as part of the Impact Assessment. As a response to community input, Walker retained a karst expert to determine if karst conditions exist. Results will be reported, as well as plans for preventing and mitigating potential impacts.
Concern regarding lack of experience by Walker and throughout Canada in landfilling in a quarry as deep as the proposed location.	Walker carefully considered this issue but did not judge it to be a disadvantage of the deep design alternative in the comparative evaluation. The landfill design and construction techniques used at Walker's quarries/landfills in Niagara Region can be readily adapted to this site despite the slightly deeper depth. The design and construction methods for either the deep or conventional designs in a quarry are generally similar.
Elaborate on why the "generic" liner design option was selected instead of a site specific liner design.	As a result of feedback received, Walker elaborated on why the "generic" liner design option was selected instead of a site specific liner design including details for how the Ministry's approval of the "generic" liner.
Explain why a hybrid "L" shaped configuration was not considered.	An explanation was added in this EA to explain that an "L" shaped configuration would not add significant volume due the narrow constraints while introducing complexities related to constructing the double composite liner around corners, therefore a linear configuration is preferred.
Alternative Methods – Leachate Treatment Methods	
Importance of the on-site leachate treatment to protect the Thames River Watershed (quantity, quality, ecology).	In establishing the feasibility of the on-site leachate treatment alternative, Walker confirmed that the treatment technologies currently available can achieve the most stringent discharge requirements.
Potential future issues in event Walker abandons site.	As part of post-EA approvals (Environmental Compliance Approval), Financial Assurance is required by the MECP. Financial Assurance is money, or equivalent security that is set aside for the MECP to use in the event Walker is not able to care for the site.
Leachate holding ponds should be designed to deter birds from landing and other animals from approaching.	As a result of this feedback, Walker included this in its Ecological Assessment for this EA.
Concern regarding impact of treated water on Thames River Watershed (quantity, quality, ecology).	In establishing the feasibility of the on-site leachate treatment alternative, Walker confirmed that the treatment technologies currently available can achieve the most stringent discharge requirements. The specific treatment design and discharge requirements will be determined through the other approvals (i.e.

Highlight of Comments Received	How Comment Was Considered
	EPA Approvals).
Risk of odour from leachate, particularly holding ponds	Walker acknowledged that leachate ponds are a potential odour source. This will be taken into consideration in the Air Quality Assessment for this EA.
Alternative Methods – Alternative Gas Management	
Concern regarding safety of burning landfill gas (particularly methane component) and risk for fire or explosion.	In assessing the feasibility of the alternative methods, Walker confirmed that available landfill gas control technologies exist and are operating at landfills across Ontario to prevent fire or explosion. It is noted that the enclosed gas flares are equipped with automated monitoring and fail-safe systems.
Risk of odour from landfill gas management.	Walker communicated that one of the main purposes of managing landfill gas is to prevent odours (in addition to controlling GHG's and mitigating the risk of fire/explosion). This will be taken into consideration as the landfill gas management system and procedures are developed. For example, at Walker's Niagara landfills, there are full-time technicians who "tune" the landfill gas wells to maximize performance and odour control.
Alternative Methods – Haul Routes	
Preference for the shortest route using public roads (Route 3).	Length of route on public roads was taken into consideration and was an advantage of Route 3 (Preferred Alternative).
Beachville Rd. is not appropriate for a haul route due to the number of residents and official bike route designation.	Number of residents was used as a key indicator for several criteria. Walker also added bicycle routes as an indicator in the comparative evaluation following initial public consultation. Both of these factors were judged key disadvantages for Routes 4, 5 and 6 along Beachville Road.
Corner at Beachville Rd. and Pemberton St. is challenging for truck traffic.	Number of truck turns was applied as an indicator in the comparative evaluation, and was a disadvantage identified for Routes 4, 5 and 6 which include the Beachville/Pemberton turn.
Highway 401 Exit 222 (westbound) to County Road 6 is challenging and could post safety risks due to the service station off-ramp.	The exit from highway 401 to County Road 6 will be considered further during this EA. Walker's traffic experts will consult with the Ministry of Transportation (MTO) regarding Highway 401 and Exit 222.

Highlight of Comments Received	How Comment Was Considered
Intersection at 4-way stop at County Road 6 and Beachville Rd. could present issues, including risk to public safety.	Travel through this intersection is common to all of the alternatives considered in this comparative evaluation. However, it will be studied by experts as part of the detailed Impact Assessment, including a traffic safety evaluation.
Recommendations for additional criteria and indicators for the comparative evaluation.	As a result of initial public consultation, Walker added the following additional indicators to the comparative evaluation: • Number and type of railroad crossings • Length of new road construction required (in regard to potential for archaeological resource displacement/disruption) • Number of playgrounds along haul route • The recommendation of a standard noise mitigation to include minimizing engine brake usage on haul routes was added.
Facility Characteristics	
Request to notify and consult Upper Thames River Conservation Authority (UTRCA) on the potential for impacts on aquatic animals in the area.	Walker consulted the UTRCA worked with the UTRCA for background information on species at risk for the ecology study.
Request for contingency plans in the event of climate change and other naturally occurring disasters for the Waste Water Treatment Plant (WWTP).	Walker will be developing contingency and emergency response plans for the landfill (including the WWTP) as part of the application for an Environmental Compliance Approval (ECA) under the Environmental Protection Act.
Existing Conditions	**Considerations**
Clarify how climate change will be taken into account if landfill impacts are modelled based on existing conditions. How will higher winds	Walker ensured that climate change effects will be factored into the impact assessment studies, which would include the potential for higher/more frequent wind.

Highlight of Comments Received	How Comment Was Considered
taken into consideration?	
Local species that have been identified in the area: • Tundra swans and snow owls have been seen in the area; • Woodland voles have been seen at the Centreville Conservation Area; and • Peregrine Falcons are well documented in the area.	Walker's ecology experts were provided with this information and considered each of these species in their data collection and impact assessment.
Potential sources of elevated hydrogen sulphide concentrations in the background air monitoring data were suggested by community members: • Local cement manufacturing operations; and • Sulphur in fertilizer spread on local agricultural fields.	Walker directed its air quality experts to consider these along with any other potential background sources of hydrogen sulphide.
Concerns regarding narrow shoulders on the hill near the County Road 6/Beachville Road intersection. Concern about lack of safe place should a truck break down or need to pull over at the bottom of this hill.	Walker directed its traffic experts to examine this issue. The road shoulders were found to be in good condition during field visits. Standard shoulder widths of approximately 2.5 m were measured on both sides of County Road 6 and throughout the study area, consistent with the Road Network Assessment Report prepared by Oxford County.
Concern regarding the possibility of traffic back-up due to trains at the level	Walker directed its traffic experts to further examine this issue. Additional video surveys were conducted and the queuing space was found to be adequate, especially given the low frequency of use for this train line.

Highlight of Comments Received	How Comment Was Considered
crossing north of the County Road 6 and Beachville Road intersection.	
Concern about planning for Highway 401 road closures, and particularly the observation of trucks passing through downtown Ingersoll.	Walker confirmed that the designated Emergency Detour Routes (EDR) for this area were all south of Highway 401. Walker also committed to develop contingency measures for highway closures that would direct landfill trucks onto the EDR as well as other options.

10.7 Review of the Draft EA Report

10.7.1 Availability for and Notification of the Draft EA Report

The Draft EA Report was made available for review by the public, agencies, and Indigenous Communities on March 2, 2020 for a 15 week review period prior to the formal submission of the final EA to the Ministry of the Environment, Conservation, and Parks (MECP) for a decision. All stakeholders interested in reviewing the EA Documentation are have been asked to provide comments to Walker on the Draft EA by June 15, 2020.

In addition, the Draft EA Report was made available on the project website (www.walkerea.com) as well as print copies at the following locations:

- MECP Environmental Assessment and Approvals Branch (Toronto)
- MECP London District Office
- County of Oxford Main Office
- Zorra Township Office
- Town of Southwest Oxford Office
- Town of Ingersoll Library
- Thamesford Library
- Walker Project Office

Notifications of the availability of the Draft EA Report for review was provided through a variety of means including:

- Mailed copy of the Draft EA in print and/or USB key to members of the CLC, Indigenous Communities, and review agencies on February 18, 2020
- Advertisement in the Woodstock Sentinel on February 18, 2020
- Posted on the project website (www.walkea.com), Facebook page (https://www.facebook.com/WEGSouthwesternLandfill/), and emailed to project subscribers on February 18, 2020
- Distribution of Draft EA Notice and Community Exchange to all addresses within 1 km as well as all addresses on mailing distribution list on February 18, 2020.

Walker has planned a number of consultation activities associated with the release of the Draft EA Report. These activities will be held during the review period and will be advertised and promoted across multiple channels to ensure that all individuals interested in reviewing and commenting on the Draft EA Report are provided the opportunity.

Finally, prior to submitting the Final EA to the Ministry, Walker will review and consider all comments received and will demonstrate what changed from the Draft to the Final EA Report.

11. Other Approvals Required

Based on the undertaking described herein, other approvals are required in order to fully implement the proposed Southwestern Landfill. In accordance with Section 12(2) of the Act, no other approvals with respect to the undertaking can be issued until the EA is approved by the Minister. Therefore, the additional approvals noted below can only be granted following EA approval. However, Walker has already carried out pre-consultation with some of the agencies responsible for these other approvals and may elect to submit all or parts of the applications for initial review (but not final approval) prior to approval of the EA.

11.1 Environmental Protection Act

11.1.1 Environmental Compliance Approval – Part V Waste Management

An *Environmental Compliance Approval* is required for a waste disposal site under Part V of the *Environmental Protection Act*. An application will be submitted for this approval to the Ministry of the Environment, Conservation and Parks, Environmental Assessment & Permissions Branch following the approval of the EA. The *Design & Operations Report* (Golder; in preparation) will be the key supporting document for this application.

11.1.2 Environmental Compliance Approval – Section 9 Air Discharges

An *Environmental Compliance Approval* is required for discharges to the air under Part II Section 9 of the *Environmental Protection Act*. In this instance, the landfill gas flares[33] are expected to have discharges to the air. Any noise sources will also be addressed in this approval, as required. An application(s) will be submitted for this approval to the Ministry of the Environment, Conservation and Parks, Environmental Assessment & Permissions Branch following the approval of the EA. The *Air Quality Assessment Report* (RWDI, 2020) prepared for this EA (**Appendix F**) and the *Design & Operations Report* (Golder Associates; in preparation), will be key supporting documents for this application(s).

11.1.3 Environmental Compliance Approval – Part V.0.1 Renewable Energy

An *Environmental Compliance Approval* may be required for the development of any landfill gas utilization projects under Part V.0.1 of the *Environmental Protection Act*. However, since Walker has proposed to begin gas utilization at a future date when landfill gas quantities and economics justify (see Section 7.2.1.10), any necessary applications will be prepared and submitted for this approval at that time.

11.2 Planning Act

Amendments will be required to the County of Oxford Official Plan, and to the Township of Zorra Zoning By-Law, in order to recognize the new use of the site for the purposes of a landfill. The County of Oxford planning staff was consulted at the outset of this EA to introduce the proposal, to confirm the relevant

[33] *In subsequent years discharges to the air from certain gas utilization activities may also require approval(s), but these will be addressed at the time of implementation.*

Planning Act requirements, and to explain Walker's intent that the studies prepared in support of this EA would also form the basis of the amendment applications under the *Planning Act* (i.e., coordinated documentation requirements, as recommended in the *Code of Practice*, Section 4.3.6).

Consequently, the *Land Use Assessment Report* (MHBC, 2020) contained in **Appendix F**, along with other related reports in the same appendix, will also be submitted to the County of Oxford in support of the Official Plan and Zoning amendment applications. This report recommends that the landfill be recognized as a permitted use under the existing industrial Official Plan and Zoning designations for the quarry, while the area to be used for the leachate treatment plant be re-zoned from agricultural to an agricultural-industrial zone.

A Consent will also be required to sever the parcel of land to be purchased by Walker for the landfill site, and will be processed together with the other approvals.

Finally, a site plan application will be required for the leachate treatment plant area, since industrial uses are subject to site plan control.

11.3 Ontario Water Resources Act

11.3.1 Environmental Compliance Approval – Section 53

An *Environmental Compliance Approval* is required for an industrial sewage works under Section 53 of the *Ontario Water Resources Act*. In this case, industrial sewage works would include the discharge of effluent from the leachate treatment plant as well as the discharge from the storm water management system(s). The leachate treatment plant approval will be required at the outset of the landfill operation, while the storm water management systems will not be constructed until some portions of the landfill are brought up to final grade and capped[34]. Applications will be submitted for these approvals to the Ministry of the Environment, Conservation and Parks, Environmental Assessment & Permissions Branch at the time they are required. The *Design & Operations Report* (Golder Associates, in preparation), will be a key supporting document for these applications.

11.3.2 Permit to Take Water – Section 34

A *Permit to Take Water* is required under Section 53 of the *Ontario Water Resources Act* for any taking of groundwater or surface water in excess of 50,000 litres *per* day. During the early years of the landfill construction, Carmeuse will still be dewatering this section of the quarry as they finish extracting to the southern limit; however, once that is finished Walker may need to continue dewatering for landfill construction purposes.

Furthermore, a water supply will be needed for dust watering and construction purposes (e.g., conditioning the clay for liner construction).

When and as necessary, Walker will apply to the Ministry of the Environment, Conservation and Parks, Environmental Assessment & Permissions Branch for a *Permit to Take Water* (along with an *Environmental Compliance Approval* for a new or modified discharge, if required).

[34] *Although some minor storm water management may be required in the buffer area from the outset.*

11.4 Conservation Authorities Act

As the final design of the leachate treatment plant and the new section of haul route across the quarry operator's property are developed, there may be a requirement to apply to the Upper Thames River Conservation Authority for a permit under O. Reg. 157/06 of the *Conservation Authorities Act* to carry out construction in, or alteration of, the Patterson-Robinson Drain. The *Groundwater/Surface Water Assessment Report*, the *Ecology Assessment Report* (in **Appendix F**) along with the *Design & Operations Report* (Golder Associates, in preparation), will all be used in support of this application.

11.5 Aggregate Resources Act

The majority of the proposed landfill site is currently within a portion of the licences issued to Carmeuse Lime (Canada) Ltd. under the *Aggregate Resources Act*, with the exception of the proposed leachate treatment plant to the northwest which is not licenced.

Following EA approval, Carmeuse will submit an application for major licence and site plan amendments to the Ministry of Natural Resources and Forestry to adopt the base grades of the landfill (i.e., the clean fill below the liner system) as the revised rehabilitation requirement, along with any other related changes to the licences (e.g., stockpiles for any excess fill, *etc*.).

Walker will purchase the landfill site lands from Carmeuse, who will continue to hold the *Aggregate Resources Act* licence and extract the remaining resources under an aggregate extraction agreement with Walker.

As portions of the site are fully extracted by Carmeuse and brought up to their base grades to fulfill the rehabilitation requirements, generally progressing from north-to-south, Carmeuse will submit minor amendment applications to the Ministry of Natural Resources and Forestry to progressively surrender the *Aggregate Resources Act* licence on those portions of the site so that Walker can begin landfill liner construction.

11.6 Ontario Heritage Act

The Ministry of Tourism, Culture and Sport (MTCS) was provided with copies of the report *Stage 1 and 2 Archaeological Assessment Report), Southwestern Landfill Proposal Environmental Assessment* prepared for this EA (**Appendix F**), as a condition of licencing under Part VI of the *Ontario Heritage Act*. Notice was received from MTCS dated October 23, 2019 that the report has been entered into the Public Register of Archaeological Reports.

The recommended Stage 3 site-specific assessment for archaeological "Site 2" (registered as AgHf-67) will be completed and approved under the *Ontario Heritage Act* prior to any disturbance of this area related to the construction of the leachate treatment facility for the landfill, as will a Stage 4 mitigation plan, if warranted.

11.7 Endangered Species Act

Surveys undertaken as part of this EA did not identify any endangered or threatened species on the site. However, should an endangered or threatened species, or their habitat, be identified in the future as

the construction and operation of the landfill progresses, then an appropriate authorization under the *Endangered Species Act* may be required.

11.8 Fish & Wildlife Conservation Act

Authorization may be required under the *Fish & Wildlife Conservation Act* if, during construction or operation, any wildlife must be dispersed or relocated.

12. Amending the EA

Should this EA be approved by the Minister under the *Environmental Assessment Act*, circumstances could subsequently arise where a change is necessary or beneficial to the proposed undertaking described in Section 7.2 of this document. The reasons could be many and varied, for example:

- An opportunity to further improve the design, construction procedures or operations arises at the detailed design stage or while the site is being operated;
- Landfill regulations change;
- Unanticipated issues arise during construction or operations;
- Monitoring, or public feedback, suggest that new or different types of mitigation would be useful; or
- New business opportunities arise that would affect how the landfill would be constructed, operated, or closed.

If the proposed undertaking detailed in Section 7.2 of this document was to be materially altered, the key question is whether the change would substantially affect the evaluation of the alternatives, or the evaluation of the environmental advantages and disadvantages to the environment, presented in this EA.

In order to permit ongoing flexibility to improve the undertaking, Walker proposes the following procedure for amending this EA, if and when necessary:

1. Walker shall, in association with each annual compliance monitoring report, undertake a review of the undertaking set out in Section 7.2 of this EA and confirm that the landfill is being constructed and operated accordingly.
2. If at any time Walker intends to construct or operate the landfill in a manner that is not consistent with the description of the undertaking set out in Section 7.2 of this EA (aside from implementing approved contingency measures in accordance with an *Environmental Compliance Approval*) then it shall initiate an EA Amendment Review as follows, in consultation with the Ministry of the Environment, Conservation and Parks, Environmental Assessment & Permissions Branch.
3. If the proposed change would itself require an environmental assessment under the *Environmental Assessment Act*, and particularly in accordance with the requirements of *O. Reg. 101/07*, then Walker shall obtain the necessary EA (and other) approvals before implementing the proposed change.
4. Otherwise, if the proposed change would significantly alter the range, evaluation and selection of alternative methods presented in this EA and/or add or increase any significant adverse net effects to the environment that are not otherwise offset by positive net effects to the environment, then as *per* Section 12 of the *Act*, Walker shall declare the change as a new undertaking subject to the *Environmental Assessment Act* and obtain the necessary EA (and other) approvals before implementing the proposed change.
5. Otherwise, if the proposed change would not significantly alter the range, evaluation and selection of alternative methods presented in this EA, but would add or increase significant

adverse net effects to the environment that are offset by positive net effects to the environment, then Walker shall proceed to amend its EA as follows:

a. Prepare an EA Amendment document that consists of:
    i. A description of, and rationale for, the proposed change to the undertaking;
    ii. Any new or altered mitigation or impact management measures proposed to reduce or eliminate any significant adverse effects to the environment resulting from the proposed change, and/or any additional monitoring that is appropriate;
    iii. The environmental advantages and disadvantages to the environment resulting from the proposed change;
    iv. Any additional approvals that are required to implement the proposed change;
    v. Any consultation that has been carried out in association with the proposed change;
    vi. Any other implications that the proposed change may have on the interests of any stakeholder; and
    vii. Any implications on Walker's ability to comply with the approved EA along with any associated Conditions imposed by the Minister.
b. Circulate the EA Amendment document to the Ministry of the Environment, Conservation and Parks, Environmental Assessment & Permissions Branch, the County of Oxford, and the Public Liaison Committee, for review and comment for a period of 30 calendar days. The document shall also be posted to the project website for public review and comment during the same period.
c. Submit to the Ministry of the Environment, Conservation and Parks, Environmental Assessment & Permissions Branch a copy of all comments received, responses to those comments, and a final EA Amendment document incorporating any associated revisions.
d. Upon receipt of approval of the EA Amendment document from the Director of the Environmental Assessment & Permissions Branch, Ministry of the Environment, Conservation and Parks, proceed to implement the proposed change subject to any additional Conditions imposed by the Director, and subject to obtaining any other approvals necessary.

6. If the proposed change would not significantly alter the range, evaluation and selection of alternative methods presented in this EA, nor would it add or increase any significant adverse net effects to the environment, then no EA amendment is required and Walker shall proceed with the change and document the change, and the rationale for the change, in its annual compliance monitoring report.

13. Application of the Ministry's Statement of Environmental Values

The Ministry of the Environment, Conservation and Parks has committed to consider the principals set out in its *Statement of Environmental Values* under the *Environmental Bill of Rights, 1993* when making environmentally significant decisions. The following sections provide a synopsis on how this EA addresses each of the principles in the Ministry's *Statement of Environmental Values*.

The Ministry adopts an ecosystem approach to environmental protection and resource management. This approach views the ecosystem as composed of air, land, water and living organisms, including humans, and the interactions among them.

This EA reflects an ecosystem approach through the adoption of the broad definition of "environment" contained in the *Environmental Assessment Act*, which includes air, land, water, and living organisms, including humans. The EA Criteria set out in the *Approved Amended Terms of Reference* not only encompass all of these aspects of the ecosystem, but also account for the interactions among them as explained in Section 5 of this document.

The Ministry considers the cumulative effects on the environment; the interdependence of air, land, water and living organisms; and the relationships among the environment, the economy and society.

This EA specifically evaluates cumulative effects on the environment, following the methodology presented in Section 5.6 of this document. The results of the cumulative effects assessment is explicitly described for each of the EA Criteria in Section 7.4.

The Ministry considers the effects of its decisions on current and future generations, consistent with sustainable development principles.

This EA explicitly evaluates the advantages and disadvantages to the environment (net effects) in relation to both the current and future environmental baseline (i.e., the "do nothing" alternative). This methodology is set out in the *Approved Amended Terms of Reference* and in Section 5 of this document, and the results are presented for each of the EA Criteria in this report.

The Ministry uses a precautionary, science-based approach in its decision-making to protect human health and the environment.

This EA is supported by a series of scientific studies prepared by qualified experts in their respective fields (see **Appendix F**), following work plans that were developed in consultation with corresponding experts under the direction of the Ministry, as well as a panel of experts retained by the Joint Municipal Coordinating Committee on behalf of the local municipalities. Wherever relevant and appropriate, provincial regulatory standards or guidelines have been used as indicators for the assessment to ensure that the findings are precautionary.

The Ministry's environmental protection strategy will place priority on preventing pollution and minimizing the creation of pollutants that can adversely affect the environment.

This EA will contribute to the prevention of pollution by ensuring that a portion of Ontario's residual, post-diversion waste is managed at a secure, engineered landfill designed with systems to contain, manage and treat leachate and gas that could potentially affect the environment.

The Ministry endeavours to have the perpetrator of pollution pay for the cost of clean up and rehabilitation consistent with the polluter pays principle.

This undertaking is designed to prevent environmental pollution, backed up with monitoring and contingency plans to identify and remediate any unexpected egress of pollution (see Section 8). Through the *Environmental Compliance Approval* under the *Environmental Protection Act*, Walker will have an obligation to carry out the monitoring, reporting and contingency plans and, furthermore, will be required to post and maintain financial assurances with the province sufficient to pay for these programs throughout the contaminating lifespan of the proposed landfill (see Section 11).

In the event that significant environmental harm is caused, the Ministry will work to ensure that the environment is rehabilitated to the extent feasible.

Through the *Environmental Compliance Approval* under the *Environmental Protection Act*, Walker will have an obligation to post and maintain financial assurances sufficient for the province to pay for any environmental remediation necessary throughout the contaminating lifespan of the proposed landfill, should Walker be unable to fulfill its obligations (see Section 11).

Planning and management for environmental protection should strive for continuous improvement and effectiveness through adaptive management.

There is an amendment procedure incorporated into this EA (see Section 12) which would allow for future improvements in the effectiveness of the landfill in conjunction with any associated amendments to the *Environmental Compliance Approval* under the *Environmental Protection Act* (or other necessary approvals). The proposed environmental monitoring programs are also adaptive in that each reporting cycle provides for recommendations regarding amendments to the monitoring programs for the approval of the Ministry.

The Ministry supports and promotes a range of tools that encourage environmental protection and sustainability (e.g. stewardship, outreach, education).

Walker has made a series of specific commitments to participate in, or undertake, ongoing stewardship, outreach and education programs related to the Ministry's *Waste-Free Ontario Strategy* (see Section 7.2.5).

The Ministry will encourage increased transparency, timely reporting and enhanced ongoing engagement with the public as part of environmental decision making.

Walker has proposed to continue its public engagement program with interested stakeholders throughout the operating life of the proposed landfill through the establishment of a Public Liaison Committee, and to make all of its EA compliance monitoring reports publically accessible (see Section 9).

14. Conclusion – Final Rationale for the Proposed Undertaking

In the *Approved Amended Terms of Reference*, Walker documented its business decision to proceed with this environmental assessment, based on its evaluation of the Ontario waste management marketplace that forecasts a substantial deficit of waste disposal capacity in the province, and on a commercial opportunity to lease industrial land from Carmeuse Lime (Canada) Ltd. in the County of Oxford. The reader is referred to the *Approved Amended Terms of Reference* and supporting documents for additional background.

The *Approved Amended Terms of Reference* contained a commitment to develop and present the final rationale for proceeding with the proposed undertaking in the EA based on an assessment of its advantages and disadvantages to the environment, in consultation with government agencies, Indigenous Communities and interested members of the public.

Therefore, based on the detailed evaluation of the proposed undertaking set out in this report, and subject to obtaining the other necessary approvals, it is concluded that the proposed undertaking can be carried out in an environmentally safe and acceptable manner, and that, on balance of the environmental advantages and disadvantages, this proposed undertaking would be consistent with the purpose of the *Environmental Assessment Act*, namely "*the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment.*"

15. References

15.1 Supporting Technical Reports

Archaeological Research Associates Ltd., 2020. *Stage 1 and 2 Archaeological Assessment Report , Southwestern Landfill Proposal Environmental Assessment*. August, 2019.

Beacon Environmental Ltd., 2020. *Ecological Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

Conna Consulting Inc., 2020. *Agricultural Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

GHD Group Pty Ltd., 2020. *Greenhouse Gas Quantification Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

Golder Associates Inc., 2020. *Groundwater Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

Golder Associates Inc., 2020. *Surface Water Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

HDR Corporation, 2020. *Traffic Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

Intrinsik Corp., 2020. *Human Health Risk Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

Keir Corp., 2020. *Economic and Financial Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), 2020. *Cultural Heritage Resource and Cultural Heritage Landscape Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), 2020. *Land Use Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), 2020. *Visual Impact Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

RWDI AIR Inc., 2020. *Air Quality Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

RWDI AIR Inc., 2020. *Noise and Vibration Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

SLR Consulting Ltd., 2020. *Social Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

Walker Environmental Group Inc., 2020. *Enhanced Waste Diversion Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

15.2 General References

Golder Associates Inc. (in preparation). *Design & Operations Report*, Southwestern Landfill.

Ministry of the Environment, 2012. *Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites*. January, 2012.

Ministry of the Environment, 2014. *Code of Practice, Preparing and Reviewing Terms of Reference for Environmental Assessments in Ontario*. January, 2014.

Ministry of the Environment, 2014. *Code of Practice, Preparing and Reviewing Environmental Assessments in Ontario*. January, 2014.

Ministry of the Environment, 2014. *Code of Practice, Consultation in Ontario's Environmental Assessments Process*. January, 2014.

Walker Environmental Group Inc., 2016. *Approved Amended Terms of Reference, Southwestern Landfill Environmental Assessment*. May 10, 2016.