

# VISUAL IMPACT **ASSESSMENT** REPORT (DRAFT)

Southwestern Landfill Proposal Environmental Assessment  
Township of Zorra

Date:

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# 1. Introduction

An Environmental Assessment (“EA”) is being prepared by Walker Environmental Group Inc. (“Walker”) under Ontario’s *Environmental Assessment Act* (“Act”) for the ‘*provision of future landfill capacity at the Carmeuse Lime (Canada) Ltd. (Carmeuse) site in Oxford County for solid, non-hazardous waste generated in the Province of Ontario*’.

This is one in a series of technical studies that have been completed by qualified experts to examine the potential effects of the proposed landfill site on the environment, all in accordance with the requirements set out in the *Approved Amended Terms of Reference* (“ToR”) dated May 10, 2016. This report accompanies and supports the *Environmental Assessment Report* prepared by Walker.

Note that Walker has carried out extensive consultation with government agencies, Aboriginal groups and interested members of the public regarding this study; details are provided separately in the EA report.

## 2. Purpose & Objectives

The **purpose** of this study is to complete a Visual Impact Assessment (VIA) of the landfill proposed by Walker.

The overall **objectives** of the study are listed below, in accordance with the requirements for the assessment of an undertaking as set out in Section 6.1(2)(c) of the *Environmental Assessment Act*, and as specifically detailed in Section 8.1 of the ToR:

- (a) 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.
- (b) Carry out an evaluation of the **environmental effects** of the proposed undertaking, using the relevant environmental assessment criteria set out in the ToR (see **Appendix B**).
- (c) Carry out an evaluation of any additional impact management actions that may be necessary to **prevent, change or mitigate any (negative) environmental effects**.
- (d) 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.
- (e) Prepare monitoring, contingency and impact management plans to **remedy the environmental effects** of the proposed undertaking.



The purpose of the Visual Impact Assessment is to assess visual resources (including landscape character, views from public roads, lands and private residences, heritage buildings, cemeteries and cultural landscapes) in various seasons, to determine and identify potential visual impacts that may occur due to the construction of a waste disposal facility and by the ongoing operation of the facility. Both operational and post-closure periods for the waste disposal facility were considered.

### 3. The Proposed Undertaking

The landfill proposed by Walker is described in detail in the *Environmental Assessment Report*. Following is a brief summary for the benefit of the reader, highlighting aspects of the proposal most relevant to this study.

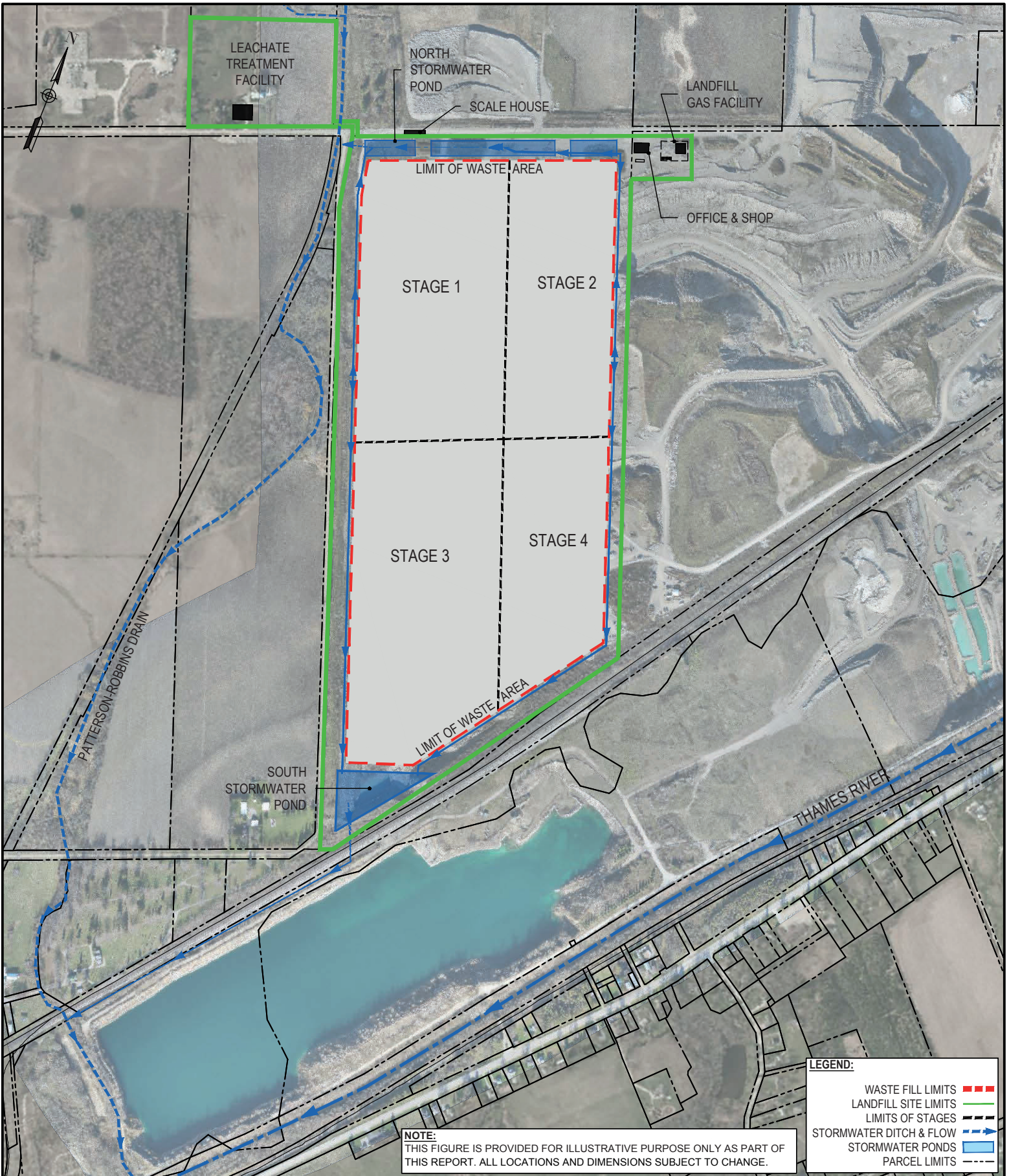
The landfill is to be located on a portion of Carmeuse's land holdings at its Beachville Quarry Operations in the Township of Zorra, Oxford County. Approximately 17.4 million m<sup>3</sup> of solid, non-hazardous waste and daily/intermediate cover will be deposited within a footprint of about 59 hectares. The balance of the of the 81.6 hectare site will be comprised of buffer areas for monitoring, maintenance, environmental controls and other necessary infrastructure. (see **Figure 1**).

Landfill construction will proceed progressively in a series of cells, generally from north-to-south (**Figure 1**). The former quarry floor will be backfilled to within about 30 to 40 metres below ground surface with engineered fill, and then a *Generic Design Option II – Double Liner* system (as specified by the Ministry of Environment, Conservation & Parks in the *Landfill Standards* under *O. Reg. 232/98*; see **Figure 2**) will be constructed across the bottom and up the sides of the landfill to contain and collect leachate (**Figure 3**). Up to 850,000 tonnes *per year* of solid, non-hazardous waste, and up to 250,000 tonnes per year of daily/intermediate cover soils<sup>1</sup> will be placed and compacted above the liner in a series of small working areas approximately 0.2 hectares in size at any given time, in order to minimize the exposed waste. Waste will be covered with soil, or other approved materials on a daily basis, and a final cap with vegetation will be applied when the landfill reaches its final height, which peaks at about 15 m above ground (**Figure 3**). A landfill gas collection system will also be installed as the landfill/cell development progresses.

Most of the supporting infrastructure for the landfill will be located in the buffer area along the northern site perimeter, including the leachate and gas treatment plants. Leachate collected from the liner system will be treated on-site and the clean effluent from the treatment plant will be discharged into the Patterson-Robbins Drain next to the treatment plant. Clean precipitation that has not come into contact with waste within the constructed sections of the landfill, will be segregated and treated in a stormwater management pond before being discharged from the site (**Figure 1**). Landfill gas will be

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<sup>1</sup> The daily/intermediate cover soil could consist of acceptable and suitable waste soils, and would be reported as waste, so the total reported waste receipts could be up to 1,100,000 tonnes per year.

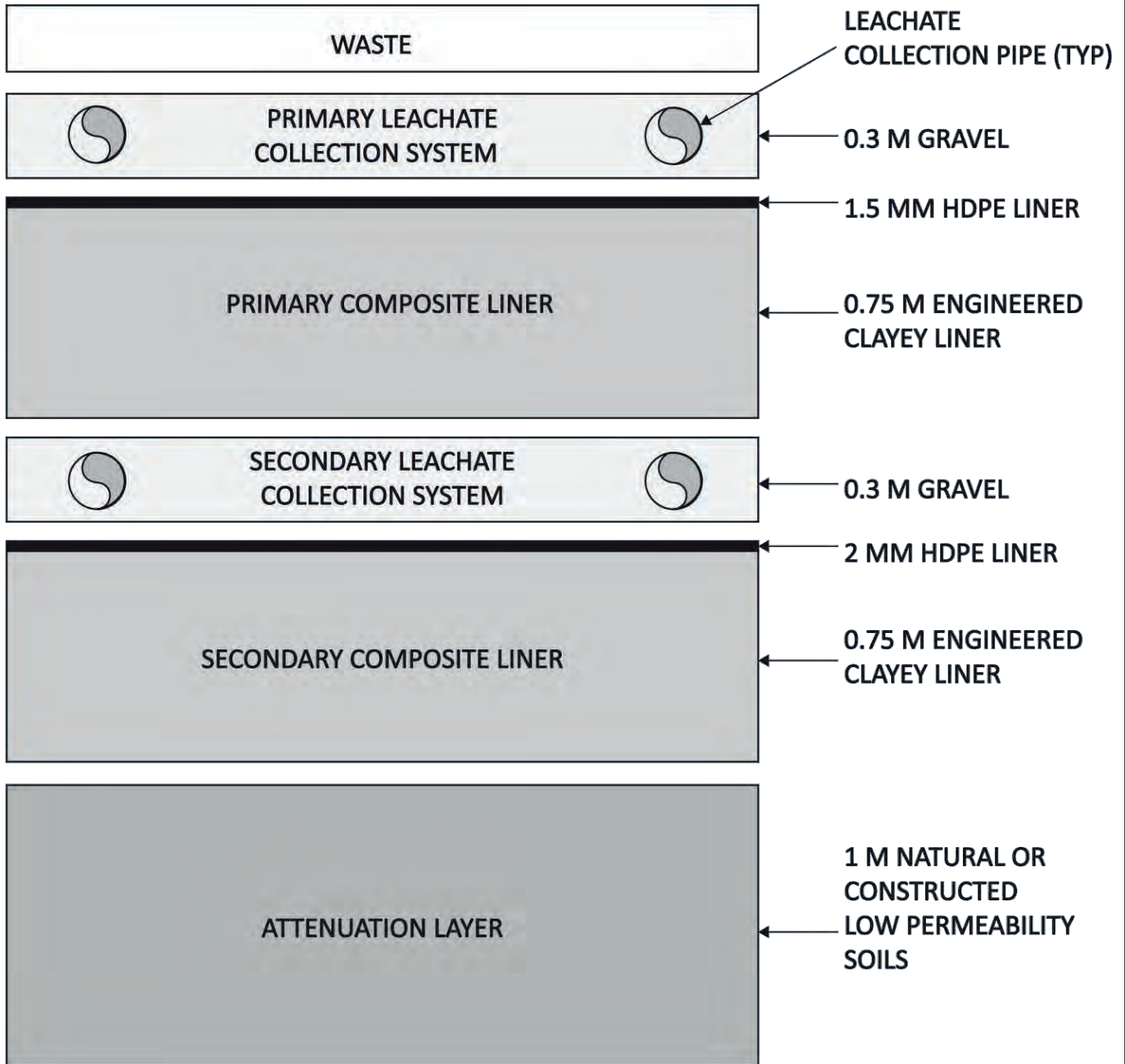


**NOTE:**  
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LEGEND:	
WASTE FILL LIMITS	---
LANDFILL SITE LIMITS	—
LIMITS OF STAGES	- - -
STORMWATER DITCH & FLOW	- - - ->
STORMWATER PONDS	■
PARCEL LIMITS	- - - -

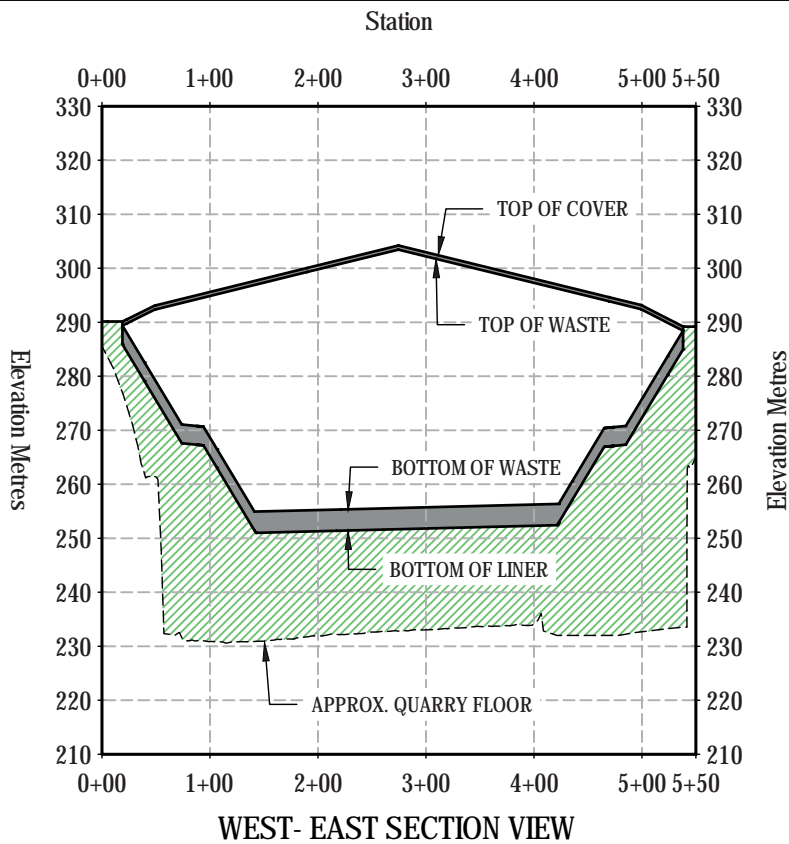
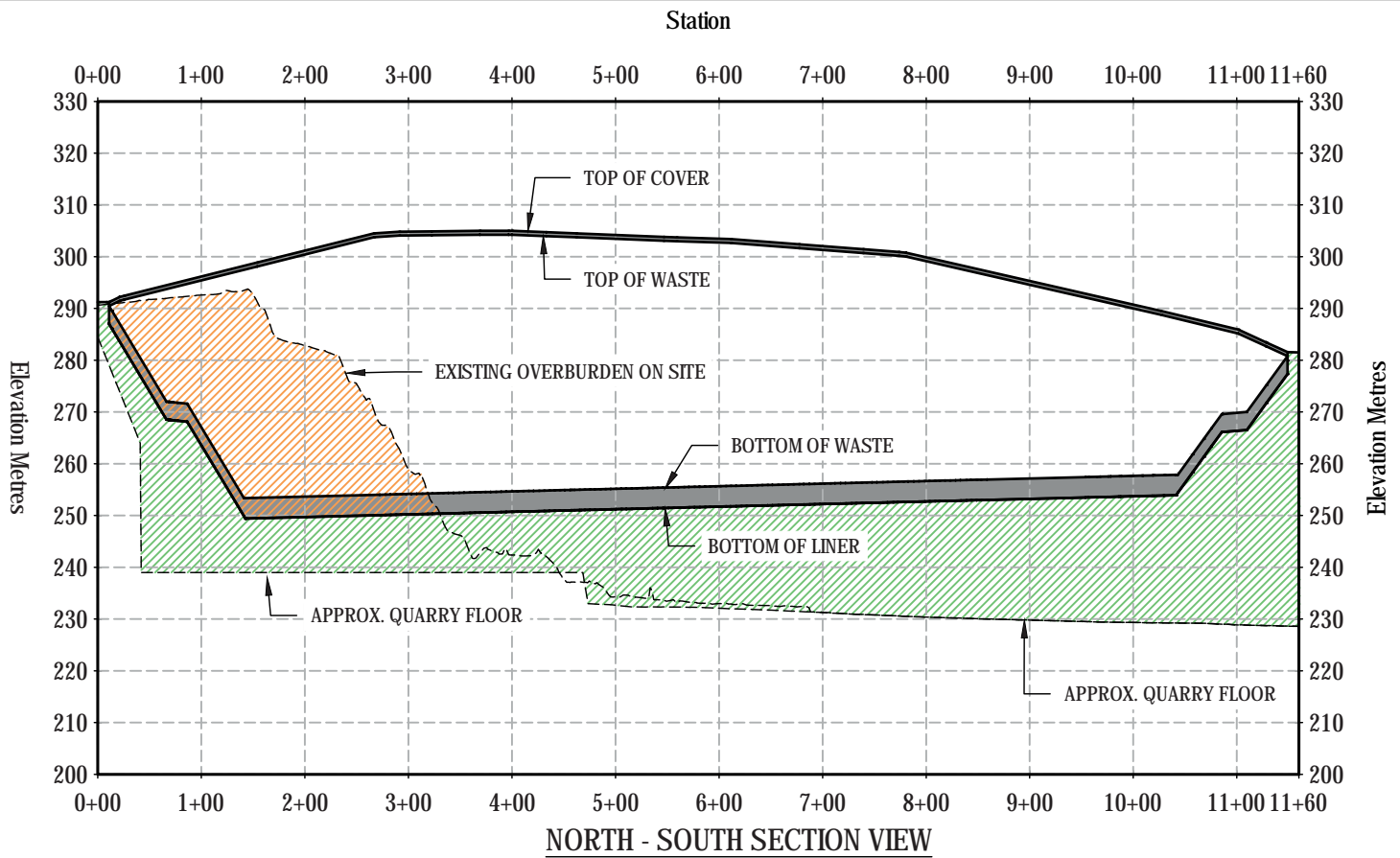
	Project	<b>SOUTHWESTERN LANDFILL</b>		Project No.	967243		Scale Bar	
	Drawing	<b>SITE PLAN</b>		Drawn	JThompson		Scale	Date (D.M.Y)
				Approved	DFry		1:10000	08JAN20
							Drawing No.	Revision No.
							<b>Figure 1</b>	<b>G</b>





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	Project	<b>SOUTHWESTERN LANDFILL</b>		Project No.	967243		Scale Bar		
	Drawing	<b>LANDFILL LINER SYSTEM</b>		Drawn	TTamburri	Scale	NTS	Date (D/M/Y)	7JAN19
				Approved	DFry	Drawing No.	<b>Figure 2</b>	Revision No.	<b>C</b>



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Owner



Project

**SOUTHWESTERN LANDFILL**

Project No.

967243

Scale Bar

Drawn

JThompson

Scale

Date (P.M.S)

Approved

DFry

NTS

07JAN20

Drawing

**SECTION VIEWS**

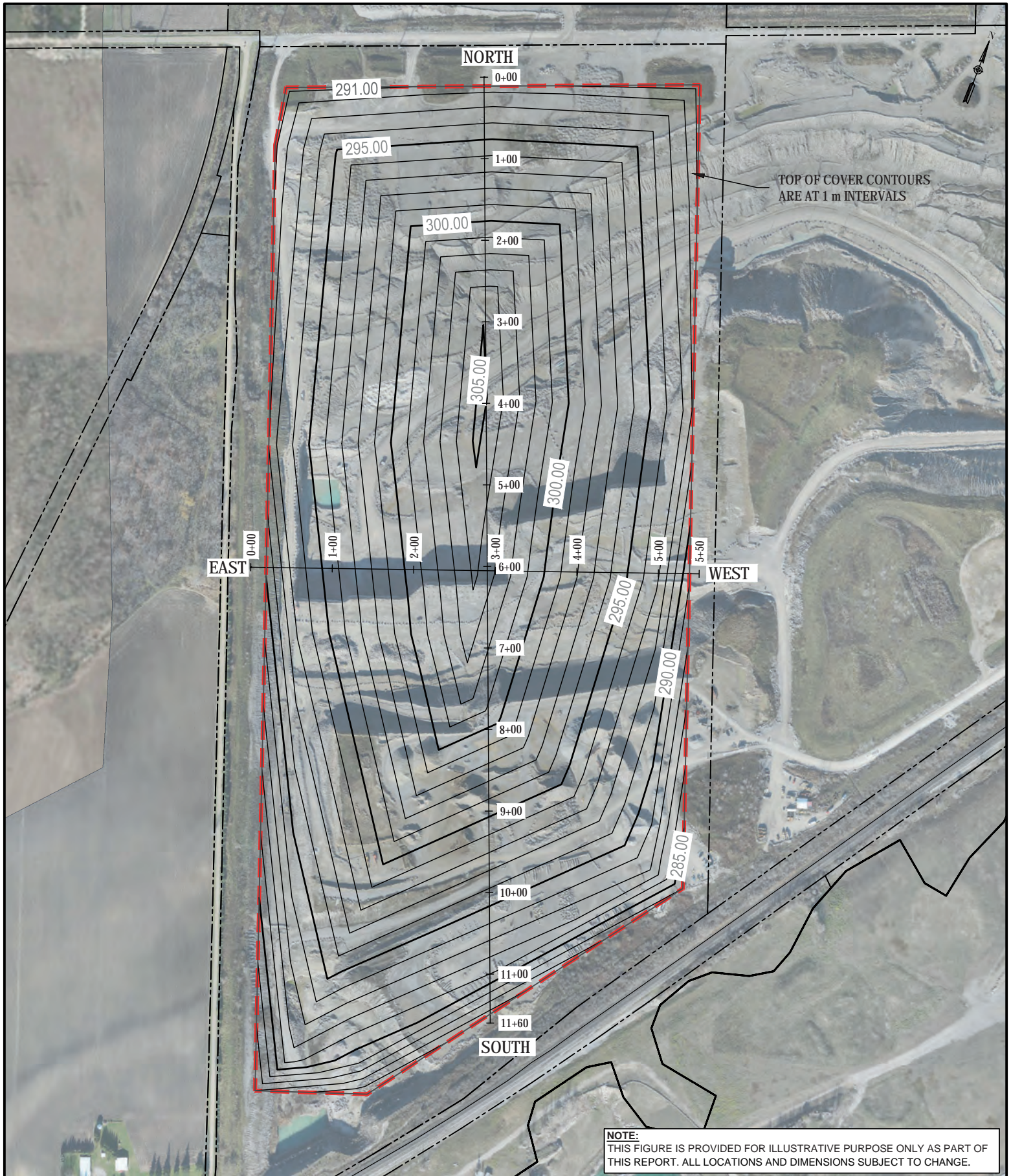
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Figure 3

Revision No.

**E**

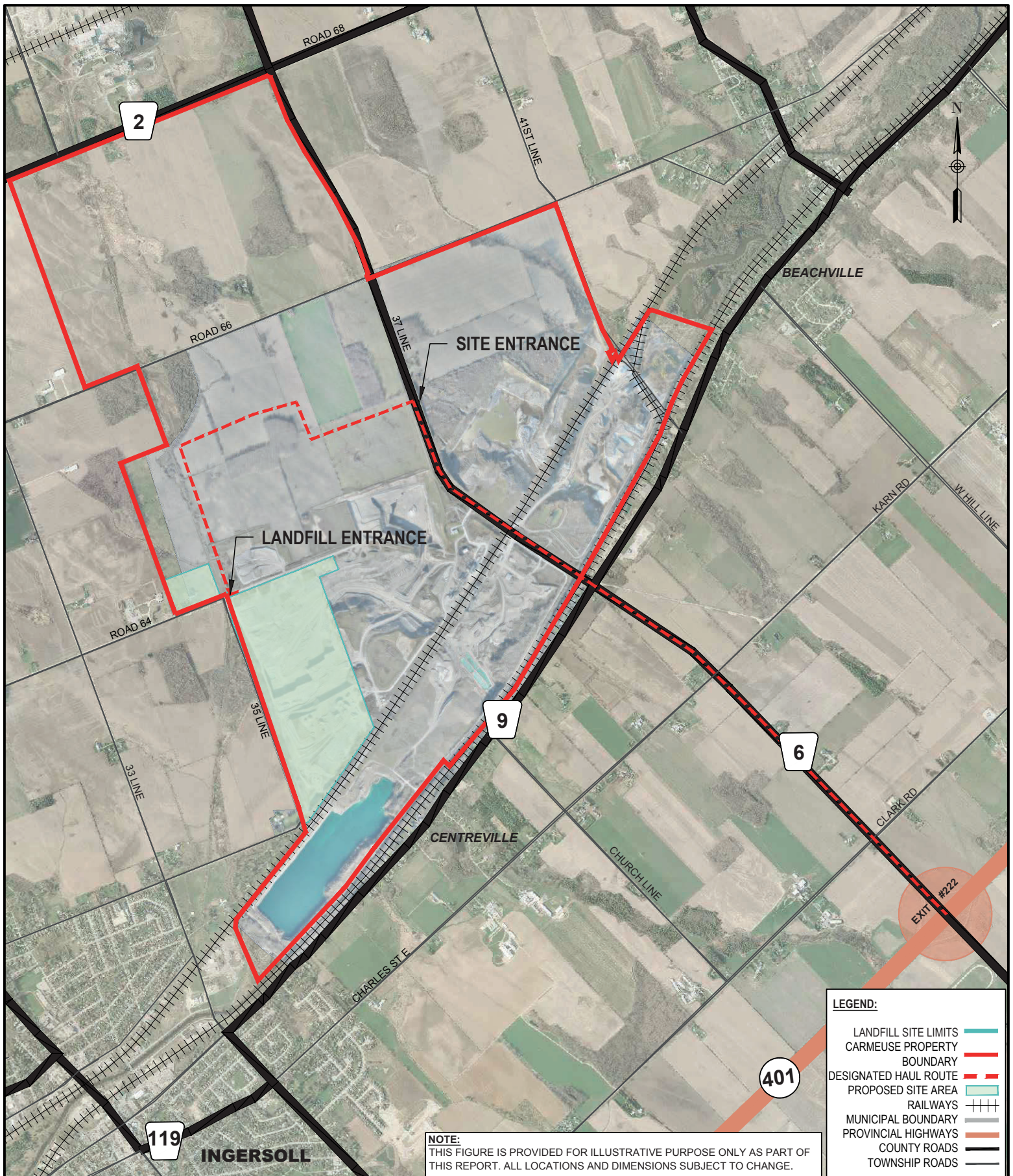




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 THIS REPORT. ALL LOCATIONS AND DIMENSIONS SUBJECT TO CHANGE.

Owner 	Project	<b>SOUTHWESTERN LANDFILL</b>		Project No.	967243	Scale Bar			
	Drawing	<b>PLAN VIEW TOP OF COVER</b>		Drawn	JThompson	Scale	NTS	Date (p. 18/19)	07JAN20
				Approved	DFry	Drawing No.	<b>Figure 4</b>	Revision No.	<b>E</b>





**NOTE:**  
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**LEGEND:**

- LANDFILL SITE LIMITS —
- CARMEUSE PROPERTY BOUNDARY —
- DESIGNATED HAUL ROUTE - - -
- PROPOSED SITE AREA □
- RAILWAYS + + + +
- MUNICIPAL BOUNDARY —
- PROVINCIAL HIGHWAYS —
- COUNTY ROADS —
- TOWNSHIP ROADS —



Owner: **walker environmental**

Project: **SOUTHWESTERN LANDFILL**

Drawing: **SITE LOCATION & HAUL ROUTE**

Project No. 967243

Scale Bar: 0 500 1000 Meters

Scale: 1:30000

Date: 08JAN20

Drawn: JThompson

Approved: DFry

Drawing No. **Figure 5**

Revision No. **E**







collected in a network of extraction wells and pipes. Initially the landfill gas will be flared (combusted), but when the quantities permit the gas will be beneficially utilized as a renewable fuel.

The site will be open for waste deliveries from 7:00 a.m. to 5:00 p.m. on weekdays and from 7:00 a.m. to 1:00 p.m. on Saturdays, but closed on Sundays and statutory holidays. On-site construction activities may start up to one hour before opening and continue up to two hours after closure. The primary designated haul route (i.e., for all waste trucks except deliveries from the local area) is from Highway 401 north along County Road #6, then west into the quarry property; trucks will then follow a newly constructed haul route across the quarry site to a landfill site entrance at the northwestern corner of the site (**Figure 5**). Vehicle traffic, including waste trucks as well as construction vehicles and staff, is expected to average approximately 210 trips *per day*.

Nuisance controls will include speed enforcement, regular haul road cleaning on internal and external paved areas, litter fencing and pick-up, odour control, and bird/pest management, with a public complaints reporting and response system.

There will be monitoring programs for leachate, groundwater, surface water, air emissions, gas, noise, and particulates (dust).

The landfill is anticipated to receive waste for approximately 20 years commencing in about 2023. After closure, maintenance and operation of the relevant environmental controls and monitoring will carry on during the post-closure period, until there is no further risk of environmental contamination. The end-use is assumed to be passive green space and/or agriculture, but the design is flexible to accommodate other potential end-uses at the time of closure.

## 4. Environmental Assessment Criteria & Indicators

The **environmental assessment criteria**, as approved in the ToR, are tabulated in **Appendix B**, Table B-1. In the table, check marks indicate which technical studies are assigned primary (“lead”) responsibility for assessing each of the criteria. Following are the EA criteria which are assigned to this study:

EA Criteria	Definition/Rationale	Issue(s) Raised through Public Consultation with Walker
Visual Impact of the waste disposal facility	Development and operation of a waste disposal facility can affect the visual appeal of a landscape.	Site Location Visual impact of the Site on surrounding private and recreational properties Visual impacts of truck traffic Seasonal change in views



Figure 7  
Aerial



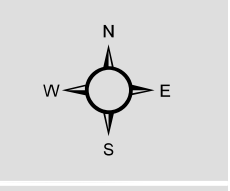
**Legend**

- Subject Lands
- Waste Fill Area
- 500 m Buffer
- 1000 m Buffer
- ◊ Flares (3)
- Municipal Boundary
- Visual Receptors
- Waterbody
- Wooded Area
- Highways
- Major Roads
- Minor Roads
- Railway

**Sources of Information**

- Contours derived from Digital Terrain Model (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date: April 5, 2019  
 File: 9811AG  
 Scale: 1:20,000  
 Drawn: JB



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Furthermore, the criteria for this EA were designed to be cross-disciplinary to permit an assessment of cumulative effects. Table B-2 in **Appendix B**, from the ToR, illustrates some (though not necessarily all) of the key interconnectivities between the studies. As a result, this study provides input/data to additional environmental criteria that will be addressed through studies conducted by other experts including (but not limited to):

Environmental Criteria	Primary Expert
Disruption to use and enjoyment of residential properties.	Social/Cultural
Disruption to use and enjoyment of public facilities and institutions.	Social/Cultural
Displacement/disturbance of cultural/heritage resources.	Cultural Heritage
Displacement/disruption of businesses or farms.	Economic/Financial
Property value impacts.	Economic/Financial
Loss/disruption of recreational resources.	Social/Cultural

The aspects related to visual impact that may be of interest to the above studies include visual impact and mitigation information, as well as the degree of change expected at various private and public properties in the areas surrounding the site. The conclusions related to visual impact may also help inform matters such as impacts on cultural heritage resources.

Typically the process of visual impact assessment takes into account the potential changes to physical elements within the landscape as well as the way in which people visually perceive the landscape. The landscape takes its character from a combination of elements, including landforms, land-use, vegetation cover, field patterns and boundaries, settlement patterns and types of buildings, roads, railways and rights of way. Landscapes vary considerably in both character and quality, and they are key components to the distinctiveness of any local area or region. The assessment of impacts on visual resources addresses changes in any of these components that would be caused by a proposed development.

The quality of views in any given area can make a significant contribution to ‘quality of life’ as humans experience the landscape as a visual phenomenon. In some areas, views can be important to the local economy. Visual impact assessment seeks to identify where the existing views, or their absence, would be altered by any proposed changes to the landscape and to assess the significance of those changes, taking into account the quality and extent of existing views, the number of people potentially affected and the manner of the change.

The analysis throughout the study process is concerned with that part of the environment which is defined in the *Environmental Assessment Act* which is defined in subsection 1 to include:

- (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,”

as well as,

(f) “any part or combination of the foregoing and the interrelationships between any two or more or them, in or of Ontario.”

**Indicators** identify how the potential environmental effects will be measured for each criterion. Landfill design and operations have the potential to affect visual resources in a number of ways. These include changes in views that would result from the loss of existing landscape components such as vegetation, the restriction of long distance views, changes to landscape character and the introduction of new features such as operations/construction activity, earthworks, structures, lighting and traffic.

## 5. Study Durations

Two main **study durations** (or time frames) for this proposed landfill have been identified in the ToR:

### *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 (e.g., there is heavy equipment active on the site).

### *Post-Closure Period*

The time after the site is closed to waste receipt. Activities are normally limited to operation of control systems, routine property maintenance and monitoring, and thus have a more limited range of potential effects.

The approved EA Criteria in Table B-1, **Appendix B** indicate the relevant study duration(s) associated with each of the criteria used in this assessment. For this visual impact assessment, the criteria “visual impact of the waste disposal facility” will consider both operational and post-closure periods. The post-closure period will consider the end land use of the site.

In addition, **common reference periods** or milestone dates were also defined for the operational period of the landfill:

<i>Start of Construction</i>	Est. 2020	Just prior to the start of landfill construction and operation, representing the existing baseline conditions.
<i>Mid-Point</i>	Est. 2030	Approximately midway through the landfill construction and operation.
<i>Closure</i>	Est. 2040	At the completion of the landfill construction and operation, representing the full operating size of the proposed landfill.

## 6. Study Areas

For the purposes of this EA, three general **study areas** were established in the ToR:

*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 will be variable and flexible in order to encompass the actual extent of the effects, but could consist of neighbouring properties as need be.

*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 primary 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. This study area can also be used for some of the general or indirect effects of a landfill that are not resulting from specific physical activities on the site.

The tables of approved EA Criteria in **Appendix B** indicate the relevant study duration(s) associated with each of the criteria in this assessment.

Although these three general study areas were common across all of the studies, their actual physical boundaries were not necessarily identical for every study or criterion; a flexible approach was used and the study area boundaries were adjusted as the work progressed to ensure that they adequately encompassed the significant effects of the proposed landfill.

For the purposes of this Visual Impact Assessment, the study areas based on the current understanding of the proposed site and experience with other similar facilities (landfills/quarries), is as follows:

*On-Site and in the Site Vicinity*      The on-site area includes land and property that contains the 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 on-site activities. The site vicinity includes any public road allowances and representative properties where views to the landfill / quarry property are available (i.e., the viewshed).

*Along the Haul Routes*      The haul route is the primary route along which waste disposal facility traffic moves to or from the waste disposal facility to a major provincial highway. Visual impacts may also occur along haul routes where road widening or intersection improvements are required. Potential visual effects of additional traffic on the road are included in the study. The predictions from the transportation study will be referenced, and aspects of interest may include the frequency and number of trucks anticipated. A system to rate change (such as high, medium, low) have been used to quantify impacts.

The proposed study areas for this assessment are illustrated on **Figures 6 & 7**. As noted above, the study area is intended to be flexible and may extend further beyond the site to include other features (e.g. it was noted the site is visible from certain locations along Karn Road).

**Common receptor points** were also selected collaboratively by the technical experts so that the potential overlapping or cumulative effects of the proposed landfill could be assessed at these common receptor points. The **common receptor points** used specific to this Visual Impact Assessment are noted below:

**Table 1: Common receptor points**

ID	Location	ID	Location
<b>Township of Zorra</b>			
ZOR-1	Intersection of 31 <sup>st</sup> Line and Rd 66	ZOR-7	Residence at 414774 41 <sup>st</sup> Line (Domtar Line)
ZOR-2	Intersection of 33 <sup>rd</sup> Line and Rd 66	ZOR-8	Residence at 643743 Road 64
ZOR-3	Residence at 663951 Rd 66	ZOR-9	Residence at 334647, 334652 and 334655 33 <sup>rd</sup> Line
ZOR-4	Intersection of 37 <sup>th</sup> Line and Rd 66	ZOR-10	Residence at 334578 33 <sup>rd</sup> Line

ZOR-5	Residence at 334789 33 <sup>rd</sup> Line	ZOR-11	Residence at 623851 Rd 62 / North Town
ZOR-6	Residence at 334742 33 <sup>rd</sup> Line	ZOR-12	Cemetery – 603806 Cemetery Ln.
<b>Town of Ingersoll</b>			
ING-1	Intersection of North Town Line E and Pemberton Street	ING-5	Intersection of Thames Road and Charles St. W
ING-4	On the river north of 209 County Road 9	ING-6	Royal Road Public School
<b>Township of South-West Oxford</b>			
SWO-1	Residence at 584052 Beachville Road	SWO-13	Centreville Pond and Conservation Area
SWO-2	Hi-Way Pentecostal Church (584118 Beachville Road)	SWO-14	Residences at 564120 and 564128 Karn Road
SWO-3	Residence at 584142 Beachville Road	SWO-15	Residences at 564146 Karn Road
SWO-4	Intersection of Beachville Road and 37th Line	SWO-16	Residences at 564162, 564164 and 564168 Karn Road
SWO-5	On Beachville Road approximately located in front of 584331 Beachville Road	SWO-17	Residence at 564226 Karn Road
SWO-10	Residence at 563977 Karn Road	SWO-18	Intersection of Karn Road and Foldens Line
SWO-11	Residence at 564028 Karn Road	SWO-19	Intersection of Clarke Road and Foldens Line
SWO-12	Residences at 564047, 564058, 564062 Karn Road		

Based on site reviews of the existing conditions, the **common receptor points** not included in the above table were determined to have **no views** of the proposed waste facility due to distance from the site or existing conditions (topography, vegetation, existing buildings, etc.) that obstruct the view. For reference, **Figure 7** to this report depicts the various receptor locations.

## 7. Methodology

The methodology used to complete the Visual Impact Assessment included undertaking the following:

1. A detailed review of background documentation information including air photographs and topographic mapping.
2. The collection of field data and on-site photography from key vantage points along public roadways during late fall/early winter and late winter/early spring.
3. Identification and review of residences, public roads that may be prone to visual impacts as a result of the proposed waste facility activities. Use of digital terrain modelling (DTM) tools was used as part of the site analysis.
4. Inventory and analysis of visual and landscape character.
5. Identification of potential visual impacts.
6. Recommendations of potential mitigation measures to be taken.
7. Preparation of a Visual Impact Assessment Report for submission to the relevant approval agencies.

Several areas were selected for the visual impact analysis due to the proximity to the subject lands and potential for views of the site. The view locations included public roads and residential and public properties within the Visual study areas. The report includes a photographic survey documenting key existing views of the site during leaf-off conditions, a description of the various potential views during the landfill operation and cross sections utilizing digital terrain modelling (DTM) showing relative elevations for selected receptor locations have been prepared.

In the case of receptor locations on roads or within the public realm, the information presented in this assessment is based on a stationary perspective that would be experienced by a person standing or walking along the selected road segment. For the residences noted within the combined study area, the elevation as well as the location and height of the houses (e.g. one- or two-story) were taken into account in determining significant views and potential impacts. This was supplemented with photos taken from public locations near the residences.

The visual impacts were assessed based on the post-operations landfill height (top of final cap: 305 masl) and 15m flare heights (ground elevation at 292 masl) provided by Walker Environmental. The proposed waste facility will have on-site waste receipt operations, landfill gas flares and landfill construction activities anticipated in phases during the operation. Cross sections at key vantage points

were completed to better understand the potential visual impacts and if any proposed mitigation using appropriate screening measures of landfill activities, could be recommended.

The visual impact analysis describes existing views and anticipated changes. Affected views have been given a no/low/medium/high change ranking generally described below:

- **No impact** – existing views of the site are non-existent or very limited. Changes on the site will not be noticeable to most observers.
- **Minor impact** – the anticipated change will occur on a portion of the site that is well screened from the view location and/or the proposed change is in the distance (background of the view).
- **Medium impact** – the anticipated change will occur on a visible or partially visible portion of the site in an area setback from the view location (middle of view).
- **High impact** – the anticipated change will be very noticeable as it will occur in the foreground on a portion of the site that is clearly visible from the viewpoint.

It is important to note that a high impact does not necessarily mean an unacceptable condition. For example, a view screened by a berm with landscaping may be a 'high impact' from the original condition, but is considered acceptable.

The process of Landscape Visual Impact Assessment takes into account potential changes to physical elements within the landscape as well as the way in which people visually perceive the landscape. The landscape takes its character from a combination of elements, including landforms, land-use, vegetation cover, field patterns and boundaries, settlement patterns and types of buildings, roads, railways and rights of way. Landscapes vary considerably in both character and quality, and they are key components of the distinctiveness of any local area or region. The assessment of impacts on landscape therefore addresses the changes in these components that would be caused by a proposed development.

Visual impact assessment seeks to identify where existing views would be altered by any proposed changes in the landscape, and to assess the significance of those changes, taking into account the quality and extent of existing views, the number of people affected and the nature of the change.

The sensitivity of a visual receptor is based on the viewer's familiarity with the scene, the activity or occupation that brings them into contact with the view and the nature of the view, whether full or glimpsed, near or distant. It is also determined by the importance of the receptor, the importance of the view, the perceived quality of the view and its ability to accommodate change.

Landscape quality is based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character of any one place.

Landscape value is based on the relative importance attached to a landscape (often as a basis for designation or recognition), which expresses national or local consensus, because of its quality, special



qualities including perceptual aspects such as scenic beauty, tranquility or wildness, cultural associations or other conservation issues.

**Table 2: Landscape and Visual Sensitivity Criteria**

Sensitivity	Landscape	Visual
<b>HIGH</b>	<p>Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically these would be:</p> <ul style="list-style-type: none"> <li>• Of high quality with distinctive elements and features making a positive contribution to character and sense of place</li> <li>• Likely to be designated</li> <li>• Areas of special recognized value through use, perception or historic and cultural associations</li> <li>• Likely to contain features that are rare and could not be replaced</li> </ul>	<ul style="list-style-type: none"> <li>• Residential properties with views towards the proposed development from the ground floor and second floor windows</li> <li>• Public Rights of Way or other recreational trails with open views of the proposed development</li> <li>• Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. parks, conservation areas, other publically available land etc.)</li> <li>• Highly valued views (e.g. From heritage assets, views featured in art and literature)</li> </ul>
<b>MODERATE</b>	<p>Landscapes by nature of their character would be able to partly accommodate change of the type proposed. Typically these would be:</p> <ul style="list-style-type: none"> <li>• Comprised of commonplace elements and features creating generally unremarkable character but with some sense of place</li> <li>• Locally designated, or their value may be expressed through non-statutory local publications</li> <li>• Containing some features of value through use, perception or historic and cultural associations</li> <li>• Likely to contain some features and elements that could not be replaced</li> </ul>	<ul style="list-style-type: none"> <li>• Residential properties with limited views due to partial obstruction towards the proposed development</li> <li>• Public Rights of Way or other recreational trails with restricted views of the proposed development</li> <li>• Outdoor workers</li> <li>• Users of passenger railways or waterways or users of designated tourist routes</li> <li>• Schools, cemeteries, or other institutional uses and their outdoor areas</li> </ul>
<b>LOW</b>	<p>Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically these would be:</p> <ul style="list-style-type: none"> <li>• Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place</li> </ul>	<ul style="list-style-type: none"> <li>• Residential properties with long distance views of the proposed development</li> <li>• Indoor workers</li> <li>• Users of main roads or passengers in public transport on main arterial routes</li> <li>• Users of freight railways</li> </ul>

	<ul style="list-style-type: none"> <li>• Not designated</li> <li>• Containing few, if any, features of value through use, perception or historic and cultural associations</li> <li>• Likely to contain few, if any, features and elements that could not be replaced</li> </ul>	<ul style="list-style-type: none"> <li>• Users of recreational facilities where the purpose of the recreation is not related to the view (e.g. sports facilities)</li> </ul>
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*Source: Adapted from A160/A180 Port of Immingham Improvement Environmental Statement: Appendix 8.1, North East Lincolnshire Council (NELC), UK.*

## 8. Data Collection

The objective of the visual impact assessment (VIA) is to describe changes to views and landscape and assess the visual impact of the proposed landfill, and provide recommendations for mitigation measures to minimize visual impacts.

The existing conditions (i.e. the view of the site) were documented (see section 9.2.1). In addition, changes over the duration of the project were projected based on the Aggregate Resources Act site plans and Carmeuse mining and rehabilitation plans, taking into account surrounding land uses and anticipated changes. This approach will facilitate comparison of the proposed facility to existing conditions and to anticipated future conditions over the duration of the project.

Potential viewsheds for the site have been identified, and representative common receptors and larger viewsheds (viewer locations) where the site and proposed landfill might be visible. A description and assessment of the anticipated change and degree of impact over the duration of the project has been included for each common receptor. Common receptors include private residential properties, farms and businesses near the site, and includes other public areas such as the cemetery, church and schools.

### 8.1 Background Data

Relevant background and base information was assembled utilizing:

- Topographic base data for the existing and proposed conditions;
- Aerial photography of the site and surrounding context;
- Land ownership mapping to identify public lands;
- County of Oxford Official Plan; and
- *Aggregate Resources Act* site plans.

In addition to the above, a description of the visual characteristics of the landscape and its general visual context was developed to assist in establishing background information.

## 8.2 Field Data

The first stage of the study included field work in order to identify viewpoints (viewpoints are places at which the view is taken, also known as “receptor points”) from where the site is visible and there is a potential for change as a result of the proposed landfill. These receptors were adapted based on input from key stakeholders and site visits.

Regular field visits, including site photography, were taken in late winter/early spring 2017 and 2018 during leaf-off conditions and during early fall 2017 during leaf-on conditions. Photos were taken throughout various seasons including the winter, to reflect the “worst case” visibility scenario (i.e., when leaves are off the trees).

During the field visits, baseline view conditions for the study area were recorded as a written and a photographic account to document the existing visual character. This was accomplished by travelling all community roads in the study area, and walking the site surroundings.

Photographs were taken from the locations of the common receptors. Key landmarks and important features on the landscape that screen views (e.g. woodlots or buildings) were identified within the study area (see **Figure 10**).

## 8.3 Digital Terrain Model (DTM) and Viewshed Mapping

A GIS program (ESRI ArcMap 10.5 with 3-D Analyst Tools) was utilized to prepare viewshed mapping and cross sections for key receptors. The software uses topographic information to identify portions of a surface that are visible from a specified location and elevation. Digital information was obtained from Land Information Ontario (LIO) in the form of a Digital Terrain Model (SWOOP 2015). This provides an accurate representation of the existing ground surface in the site and combined study areas. Other data layers (shape files) obtained from LIO included the Ontario Road Network, wooded areas and property boundaries. Base data was provided by Walker and imagery used was sourced from Oxford County 2015.

Walker provided MHBC information regarding the proposed landfill and waste facility in their Facility Characteristics Assumptions Report (dated March 3, 2019) and updated figures (dated January 2020)<sup>2</sup>. The information provided includes:

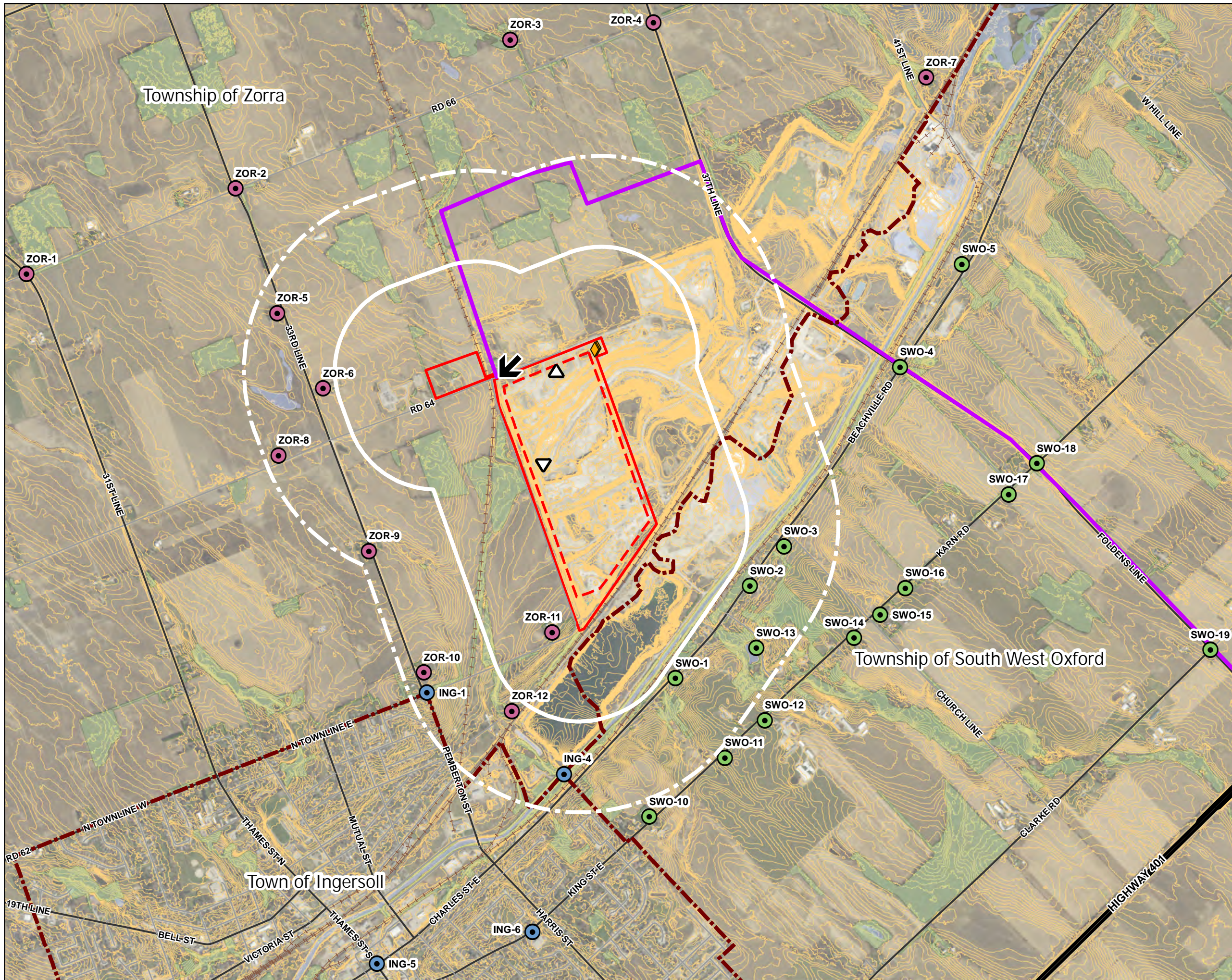
- Figure 1: Site Plan,
- Figure 2: Landfill Liner System,
- Figure 3: Section Views,

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<sup>2</sup> The updated Figure 1: Site Plan provided by Walker, now shows the location of the proposed Landfill Gas Facility shifted approximately 30m east of the original location that the DTM modelling was initially based on. This magnitude of change does not impact our report conclusions.



Figure 8  
Landscape Character



**Legend**

	Subject Lands		Designated Haul Route
	Waste Fill Area		1 m Contours
	500 m Buffer		Municipal Boundary
	1000 m Buffer		Highways
	Flares (3)		Major Roads
	Site Entrance		Minor Roads
	High Point		Railway
	Low Point		Waterbody
			Wooded Area

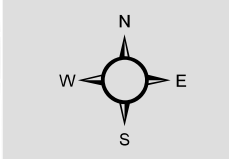
**Visual Receptors**

- Township of Zorra
- Town of Ingersoll
- Township of South West Oxford

**Sources of Information**

- Contours derived from Digital Terrain Model (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date:	April 9, 2019
File:	9811AG
Scale:	1:20,000
Drawn:	JB



Document Path: K:\9811AG-Walker Environmental Group-Landscape Terms of Reference\GIS\Map Documents\Landscape Character.mxd

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- Figure 4: Plan View Top of Cover,
- Figure 5: Site Location & Haul Route,
- Figure 6: Surrounding Area Map,
- Top of structure elevations for the Landfill Gas Control Facilities (building approximately 5.25 m height and flares at approximately 15.2 m height),
- Top of structure elevations for the Leachate Treatment Facility (building at approximately 10 m height)

Receptors that specifically represented key view locations from a visual perspective were determined by a combination of fieldwork and viewshed mapping, and were included with the other common receptors selected by the Consultant team. These viewpoints were selected to consider where the site and changes (as a result of the proposed facility) were visible, and if the extent of visibility was significant enough that there was potential for impact. The receptors analysed are shown in **Table 1**. Viewshed maps were developed, which included the majority of common receptors located within a 2 km radius of the proposed landfill facility. The viewsheds were generated with vegetation mode turned on (to simulate leaf-on conditions) and vegetation mode turned off (to simulate leaf-off conditions). It should be noted that there are some limitations to this technology, such as there is no differentiation for vegetation between coniferous and deciduous types in the modelling, so it may not be a true representation of leaf-off conditions. Additionally, buildings are not included in the modelling for the viewshed analysis, so some areas that may appear to be visible from the site, may actually be blocked from view. Photo documentation has been used to confirm results of the modelling for the visual assessment.

## **9. Environment Potentially Affected by the Undertaking**

Section 6.1(2)(c)(f) of the Act requires a “*description of the environment that will be affected or might reasonably be expected to be affected, directly or indirectly*”. Section 8.2 of the ToR describes the methodology by which the environment potentially affected by the proposed landfill is to be developed, notably including both the existing environment as well as the environment that would be expected to exist in the future without the proposed undertaking (i.e., the environmental baseline conditions, or the “*do nothing*” alternative).

### **9.1 Baseline Assumptions**

#### **9.1.1 Land Use Forecast**

A common set of assumptions were provided by MHBC Planning on behalf of Walker regarding the forecasted land uses in the area, so that this study could reflect any reasonably foreseeable changes in

the uses of the land on and around the proposed landfill site (including the expected ongoing operation of the quarries and lime plants in the vicinity of the site). These assumptions are detailed in Walker's *Environmental Assessment Report*, while a brief summary of the aspects relevant to this study follows. In order to guide the forecasting of future baseline conditions, MHBC Planning on behalf of Walker has provided a set of working assumptions regarding future land uses (including community growth, other industrial activities such as quarrying, etc.) at the site, in the surrounding area and in the broader community. This includes:

- Details of existing land use conditions in the surrounding area.
- Information regarding existing and projected conditions at nearby area aggregate extraction operations.
- Land use forecast and development trends.

In order to address cumulative effects, in accordance with the methodology set out in the *Approved Amended Terms of Reference*, this study compares the potential effects of the proposed landfill at its different stages of development to the forecast baseline conditions at that same period of time (i.e., the "do nothing" alternative).

## **9.1.2 Climate Change Forecast**

Another set of common assumptions that were established for the purpose of this EA is the potential for climate change, so that these could be considered in the individual studies of the potential effects of the proposed landfill. These assumptions are detailed in Walker's *Environmental Assessment Report* and basically adopt the guidance in the Ontario Ministry of Natural Resources and Forestry's *Climate change projections for Ontario: An updated synthesis for policymakers and planners*.

## **9.2 Environmental Baseline Conditions**

### **9.2.1 Existing Conditions / Landscape Character**

#### **9.2.1.1 Site Context and Land Use**

The subject lands are located within a rural area, just east of the Town of Ingersoll. The subject lands are 81.6 hectares (183 acres) in area with an approximate 1.4km frontage along 35th Line. The site is serviced with a primary entrance located on County Road #6. The proposed landfill site is located on lands used by Carmeuse Lime Quarry operations. The Carmeuse site consists of several bedrock quarries at various stages of development, along with a lime processing plant, Quarrying operations will remain functioning during landfill site development, and will continue to function after the landfill operations are complete.

Other lands owned by Carmeuse, generally to the north of the current quarries, remain in agricultural or rural uses. Some of this land is licensed for future extraction. Two major railway corridors pass by and through the southern portion of the site. The southern limit of the site is bordered by the south branch of the Thames River which has been historically straightened and channelized in this stretch.

The surrounding land uses that exist within the site vicinity (1 km) study area include licenced future quarry lands (presently farmland), non-farm residential uses, existing quarry operations, railway tracks (Canadian National Railway & Ontario Southland Railway), the rural cluster of Centreville, a cemetery (Ingersoll Rural Cemetery), agricultural uses, and hydro lines.

#### **9.2.1.2 Topography**

Much of the study area falls within the physiographic region known as the Oxford Till Plain, which covers more than 385,000 acres in Oxford County. It ranges from 1,000 – 1,200 feet above sea level (305 – 365 metres above sea level). Drumlins have formed on the till plain south of Woodstock, where the glacier passed over an existing moraine. The land is cut by valleys formed by glacial melt-water streams, now containing tributaries of the Thames River. At present, the streams are considerably smaller than the valleys that they occupy. The Till Plain contains primarily Guelph loam soil, a grey-brown luvisol that appears under maple and beech forest land. The Till Plain generally has good drainage medium-textured soil and gentle slopes, making it a good soil without a large amount of stones, well suited to agriculture.

The areas surrounding the subject lands mainly consists of gentle to moderately undulating agricultural lands with the lowest elevation being the south branch of the Thames River, located to the south of the site. The highest point of land within 5 kilometers of the site is located to the southeast, south of Highway 401 at an elevation of 321 masl.

The lowest area (outside the quarried lands) in terms of elevation within a 2km radius around the subject lands is the south branch of the Thames River at approximately 265 masl to 268 masl. The river and sections of forested sections along the slopes and edges of the river separates the residences along Beachville Road from the subject lands.

#### **9.2.1.3 Vegetation**

As the subject property is currently in use as an active quarry operation, there is no vegetation currently on the majority of the site. There are existing landscape screening areas in place around the periphery of the quarry operation, consisting of linear groupings of coniferous and deciduous trees and shrubs on the existing berm located along the west edge of the site. To the north and northwest of the site are various sized groupings of mixed woodlots and to the south, located between the Thames River and Beachville Road are long linear mixed deciduous and coniferous wooded areas.

The existing vegetation around the subject lands currently provides a significant amount of screening of views into the site. The woodlots located to the north of the subject lands on Carmeuse owned property, and tree lines within the right-of-way along the south side of Road 66 will provide screening for the proposed haul route located with Carmeuse-owned lands. The majority of the proposed haul

route located along County Road #6 is currently screened from view of existing residences by existing vegetation and tree lines.

## 9.2.2 Future Baseline Conditions

In the absence of the proposed Southwestern Landfill, future baseline conditions would include continued quarrying / industrial activities on the subject site and also within the study area and beyond. The activities would occur in accordance with the *Aggregate Resources Act* (ARA) Site Plans approved for the broader quarry area, which would include progressive extraction and then subsequent rehabilitation of the site over many decades. Properties with a view towards the active quarrying areas would continue to see the quarry operation, followed by the gradual backfilling of faces and then rehabilitation.

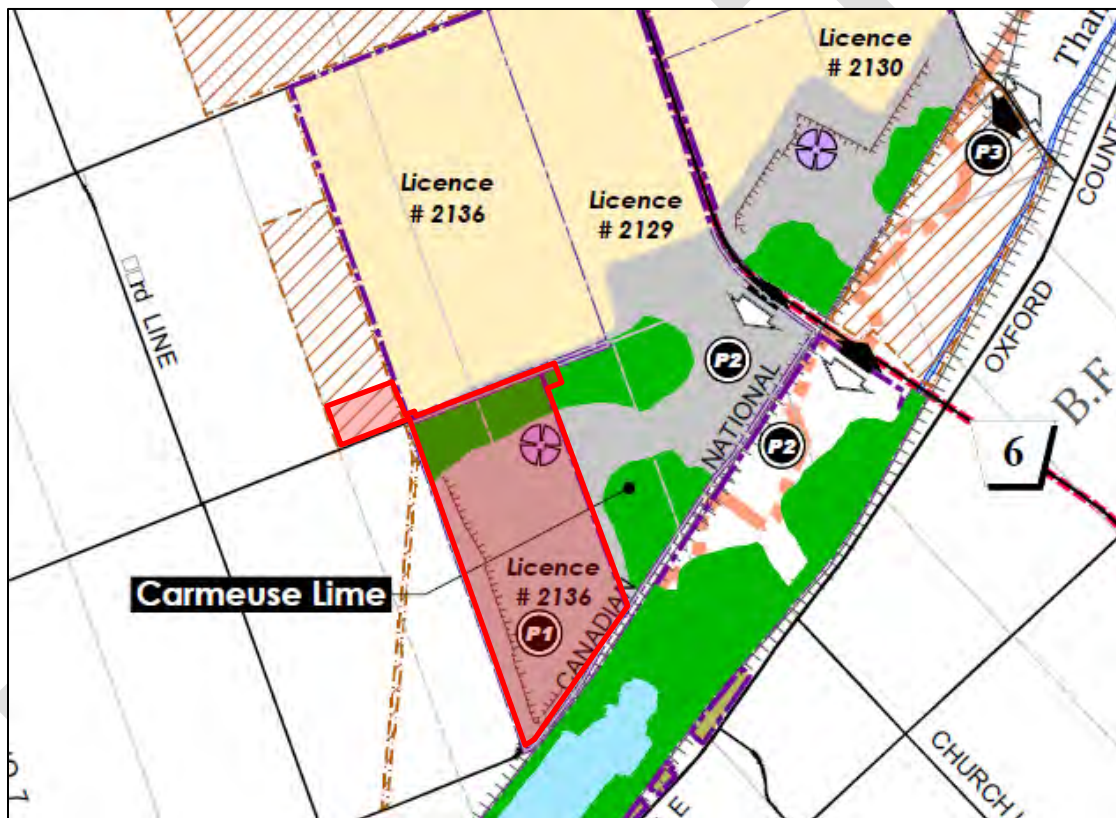


Figure 9 - Excerpt from Land Use Planning Forecast 2023 site conditions (proposed landfill shown in red) (source: MHBC)

The proposed Southwestern Landfill will result in changes to the rehabilitation plans for a portion of the Carmeuse Quarry. Rather than progressively filled with overburden and then rehabilitated, the site would be progressively filled with landfill materials and then rehabilitated. This would extend the timeline for rehabilitation efforts slightly. It is anticipated that quarrying will continue to progress as the proposed Southwestern Landfill is also operating. In the context of the proposed landfill, there are two periods of operation that are to be considered:

### *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 (e.g., there is heavy equipment active on the site).

*Post-Closure Period*

The time after the site is closed to waste receipt. Activities are normally limited to operation of control systems, routine property maintenance and monitoring, and thus have a more limited range of potential effects.

These two operational periods are to be considered in assessing the potential impacts of the proposed landfill operation.

DRAFT

## **10. Evaluation of the Visual Impacts**

### **10.1 Evaluation of Landscape Character**

#### **On-Site and in the Site Vicinity**

The existing landscape character of the on-site study area is defined by the presence of an existing quarry that has been in operation for many decades. Other than perimeter vegetation and berms, there is no vegetation on the site due to the previous and existing use as a quarry operation. The existing vegetation that exists surrounding the site was either pre-existing or added as part of the screening for a quarry operation at the time of commencement of quarry operations. The existing Thames River course was altered in the past to accommodate the extraction operations. The internal site area of the quarry operation consists of construction roads, a freight railway, extraction activities and lime processing plant.

Overall, this is a disturbed landscape of industrial character and is considered a low-value landscape in terms of visual landscape character (refer to **Table 2**).

#### **Along the Haul Routes**

The existing landscape character of the section of the proposed haul route along County Road #6 consists of existing berms and vegetation located adjacent to residential properties for screening of existing quarry truck route operations. Where there are no residences adjacent the haul route, there are open views to agricultural fields and existing woodlots.

The existing landscape character of the section of the proposed haul route to be located on lands owned by Carmeuse is located in an area approved for future quarry extraction. Currently, the landscape is used for agricultural purposes and consists of slightly undulating fields, existing woodlots and hedgerows and perimeter berms along County Road #6. The existing vegetation and berms located on the site is anticipated to remain in place until quarrying activities have progressed to this area.

Overall, the proposed haul route is considered low- to medium-value landscape as it is comprised of commonplace elements. The quarry activities are visible but in the long-distance view and there are little historic associations and few elements, if any, that could not be replaced.

### **10.2 Evaluation of Visual Sensitivity of Receptors**

In an evaluation of visual sensitivity of receptors views can be of either high, medium or low sensitivity. The majority of the visual receptors around the site were identified as low sensitivity. This was due to the fact that in most cases, the extreme viewing distance (greater than 1000 m) from the subject lands was determined to be too great to see much, if any detail or activity associated with the proposed operation. Some receptors were able to view only a small part of the overall view of the subject lands due to existing vegetation or existing buildings that blocked or framed views. In many cases, there was only a partial or screened view that was visible in leaf-off conditions (refer to **Table 3**).

**Table 3: View Quality**

Receptor ID	Elevation (masl)	Observer Height (m)	Type	Distance to Top of Cover	View Quality
ING-1	298.0	1.5	Intersection	980 m	Medium
ING-4	265.0	1.5	River	980 m	Medium
ING-5	272.0	1.5	Intersection	2.30 km	Low
ING-6	291.0	1.5	School	1.86 km	Low
SWO-1	276.5	1.5	1-Storey Residential	650 m	Medium
SWO-2	276.0	1.5	Church	659 m	Medium
SWO-3	279.8	1.5	1-Storey Residential	755 m	Medium
SWO-4	283.0	1.5	Intersection	1.61 km	Low
SWO-5	282.0	1.5	1-Storey Residential	2.15 km	Low
SWO-10	297.0	4.5	2-Storey Residential	1.28 km	Low
SWO-11	289.0	1.5	1-Storey Residential	1.16 km	Low
SWO-12	294.0	4.5	2-Storey Residential (3)	1.16 km	Low
SWO-13	280.0	1.5	Park	883 m	Medium
SWO-14	302.0	1.5	1-Storey Residential (2)	1.29 km	Low
SWO-15	301.0	4.5	2-Storey Residential	1.37 km	Low
SWO-16	301.0	1.5	1-Storey Residential	1.45 km	Low
SWO-17	305.0	1.5	1-Storey Residential	1.99 km	Low
SWO-18	306.0	1.5	Intersection	2.16 km	Low
SWO-19	308.0	1.5	Intersection	3.17 km	Low
ZOR-1	303.0	1.5	Intersection	2.70 km	Low
ZOR-2	294.0	1.5	Intersection	1.84 km	Low
ZOR-3	302.0	1.5	1-Storey Residential	1.77 km	Low
ZOR-4	306.0	1.5	Intersection	1.85 km	Low
ZOR-5	298.0	1.5	1-Storey Residential	1.32 km	Low
ZOR-6	299.0	4.5	2-Storey Residential	994 m	Medium
ZOR-7	280.0	1.5	1-Storey Residential	2.42 km	Low
ZOR-8	297.0	3	1.5-Storey Residential	1.28 km	Low
ZOR-9	297.5	4.5	2-Storey Residential (3)	989 m	Medium
ZOR-10	297.0	1.5	1-Storey Residential	940 m	Medium
ZOR-11	286.0	4.5	2-Storey Residential	237 m	Medium - High
ZOR-12	272.9	1.5	Cemetery	722 m	Medium

Those views that were categorized as medium-sensitivity were at a closer distance (650 – 1000 m) and had a greater overall view.

One receptor (ZOR-11) was considered of medium-high potential due to the close proximity to the subject lands (approximately 237 m) that could potentially have had negative impacts. However, the existing berms, vegetation, tree lines and accessory buildings at the rear of the property provide screening of the subject lands. Therefore, given the proximity to the subject site, this receptor could be highly sensitive to a change in view. However, the existing berms and vegetation moderate that sensitivity.

## 10.3 Evaluation of Views

### 10.3.1 Analysis of Views

#### Digital Terrain Mapping (DTM)

The DTM analysis was conducted in two steps: the viewshed analysis with Bare Earth Surface (see **Figure 10**) was completed first and then the viewshed analysis with Wooded Areas added to the surface was completed (**Figure 11**).

The bare surface analysis identifies all of the receptors that potentially have a view of the proposed landfill facility and/or the associated flares based on the elevation of the receptor to the subject site and intervening contours. The bare earth surface analysis is shown in **Figure 10** and summarized in **Table 4**. As shown in **Table 4**, the majority of receptors would have a view of the flares and/or the landfill in the bare earth surface condition (columns 5 and 8 in **Table 4**). When existing vegetation (e.g. woodlots, tree rows) is added to the surface (see **Figure 11**) only 10 receptors have a view of the proposed landfill and only four of those have a view of the flares (see columns 6 and 9 of **Table 4**). Detailed Viewshed analysis for each of the 10 receptors demonstrating the view is shown in **Figures 12 to 18**).

#### Site Photo Inventory and Analysis

Site visits and photo analysis of the views available from each receptor were completed following the DTM analysis. Review of the various common receptors during leaf-off conditions confirmed that even in leaf off conditions the potential views were mitigated or screened by vegetation. The photo analysis and site photo location map is included in **Appendix A**.

### 10.3.2 Potential Effects

#### Visual Impact on Residential Receptors

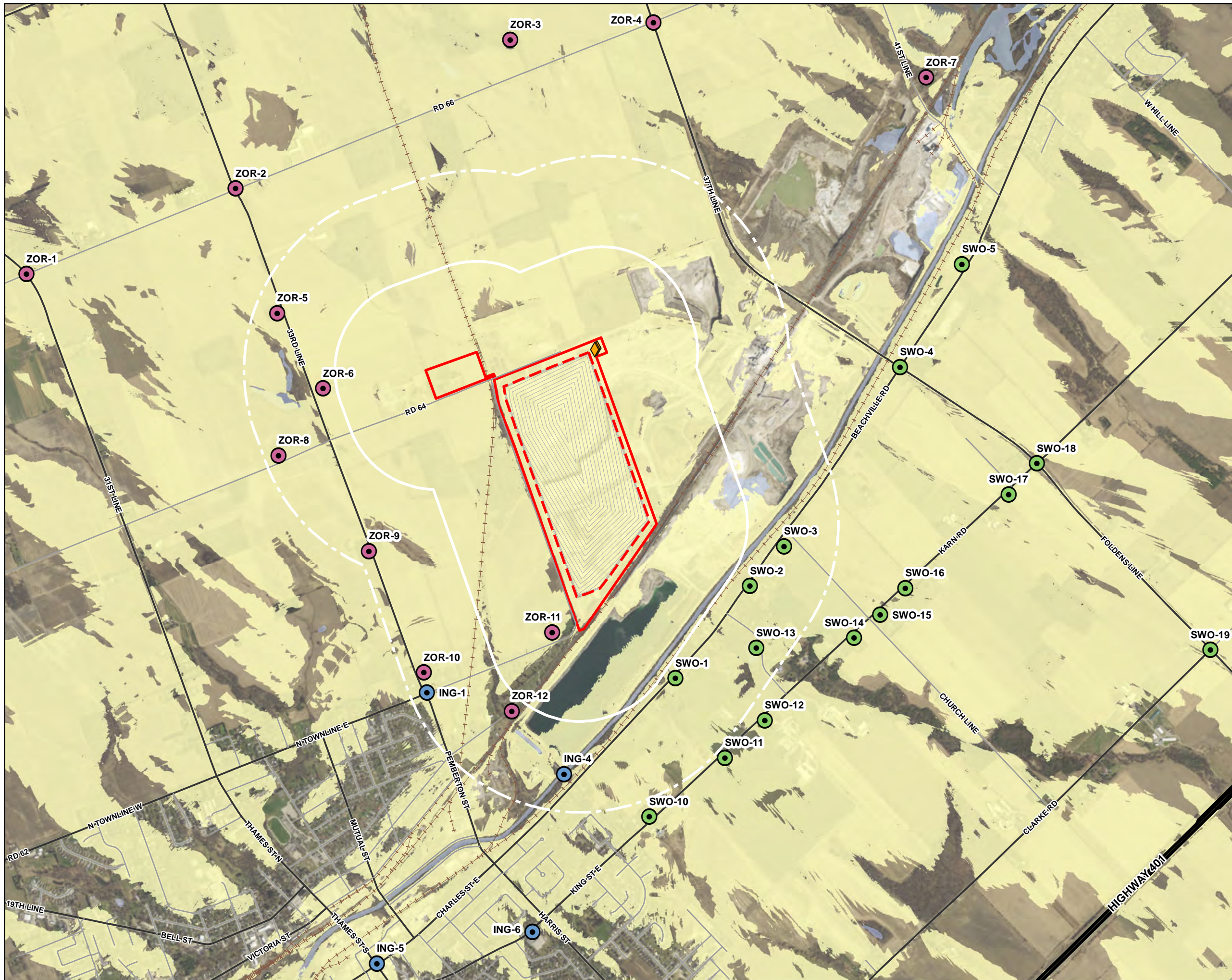
Ten residential receptors were identified as having potential views of the subject lands. All of the other common receptors are currently screened from the subject lands by existing topography, vegetation, buildings or other visual barriers, and therefore, the proposed development will have no visual impact

**Table 4: Analysis of Common Receptors**

Receptor ID	Elevation (masl)	Observer Height (m)	Type	Flares Visible (Bare-Earth Surface)	Flares Visible (Wooded-Area Surface)	Distance to Flares	Top of Cover Visible (Bare-Earth Surface)	Top of Cover Visible (Wooded-Area Surface)	Distance to Top of Cover
ING-1	298.0	1.5	Intersection	Yes	No	2.10 km	Yes	No	980 m
ING-4	265.0	1.5	River	No	No	2.34 km	No	No	980 m
ING-5	272.0	1.5	Intersection	No	No	3.59 km	Yes	No	2.30 km
ING-6	291.0	1.5	School	No	No	3.22 km	No	No	1.86 km
SWO-1	276.5	1.5	1-Storey Residential	Yes	No	1.87 km	Yes	Yes	650 m
SWO-2	276.0	1.5	Church	Yes	No	1.56 km	Yes	No	659 m
SWO-3	279.8	1.5	1-Storey Residential	Yes	No	1.50 km	Yes	No	755 m
SWO-4	283.0	1.5	Intersection	Yes	No	1.67 km	Yes	No	1.61 km
SWO-5	282.0	1.5	1-Storey Residential	Yes	No	2.06 km	Yes	No	2.15 km
SWO-10	297.0	4.5	2-Storey Residential	Yes	Yes	2.59 km	Yes	Yes	1.28 km
SWO-11	289.0	1.5	1-Storey Residential	Yes	No	2.36 km	Yes	No	1.16 km
SWO-12	294.0	4.5	2-Storey Residential (3)	Yes	No	2.24 km	Yes	Yes	1.16 km
SWO-13	280.0	1.5	Park	Yes	No	1.87 km	Yes	No	883 m
SWO-14	302.0	1.5	1-Storey Residential (2)	Yes	Yes	2.13 km	Yes	Yes	1.29 km
SWO-15	301.0	4.5	2-Storey Residential	Yes	No	2.14 km	Yes	Yes	1.37 km
SWO-16	301.0	1.5	1-Storey Residential	Yes	Yes	2.15 km	Yes	Yes	1.45 km
SWO-17	305.0	1.5	1-Storey Residential	Yes	No	2.41 km	Yes	No	1.99 km
SWO-18	306.0	1.5	Intersection	No	No	2.50 km	No	No	2.16 km
SWO-19	308.0	1.5	Intersection	Yes	No	3.76 km	Yes	No	3.17 km
ZOR-1	303.0	1.5	Intersection	No	No	3.15 km	Yes	No	2.70 km
ZOR-2	294.0	1.5	Intersection	Yes	No	2.16 km	Yes	No	1.84 km
ZOR-3	302.0	1.5	1-Storey Residential	Yes	No	1.76 km	Yes	No	1.77 km
ZOR-4	306.0	1.5	Intersection	Yes	No	1.82 km	Yes	No	1.85 km
ZOR-5	298.0	1.5	1-Storey Residential	Yes	No	1.76 km	Yes	No	1.32 km
ZOR-6	299.0	4.5	2-Storey Residential	Yes	No	1.55 km	Yes	Yes	994 m
ZOR-7	280.0	1.5	1-Storey Residential	No	No	2.35 km	No	No	2.42 km
ZOR-8	297.0	3	1.5-Storey Residential	Yes	No	1.83 km	Yes	No	1.28 km
ZOR-9	297.5	4.5	2-Storey Residential (3)	Yes	No	1.67 km	Yes	Yes	989 m
ZOR-10	297.0	1.5	1-Storey Residential	Yes	Yes	2.01 km	Yes	Yes	940 m
ZOR-11	286.0	4.5	2-Storey Residential	No	No	1.58 km	Yes	Yes	237 m
ZOR-12	272.9	1.5	Cemetery	No	No	2.04 km	No	No	722 m



**Figure 10**  
Viewshed Analysis  
Bare-Earth Surface



**Legend**

- Subject Lands
  - Waste Fill Area
  - 500 m Buffer
  - 1000 m Buffer
  - ◆ Flares (3)
  - Potential Viewshed
  - Waterbody
  - Highways
  - Major Roads
  - Minor Roads
  - Railway
- Visual Receptors**
- Township of Zorra
  - Town of Ingersoll
  - Township of South-West Oxford

**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 1.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis
- Projection: NAD 1983 UTM Zone 17N

**Sources of Information**

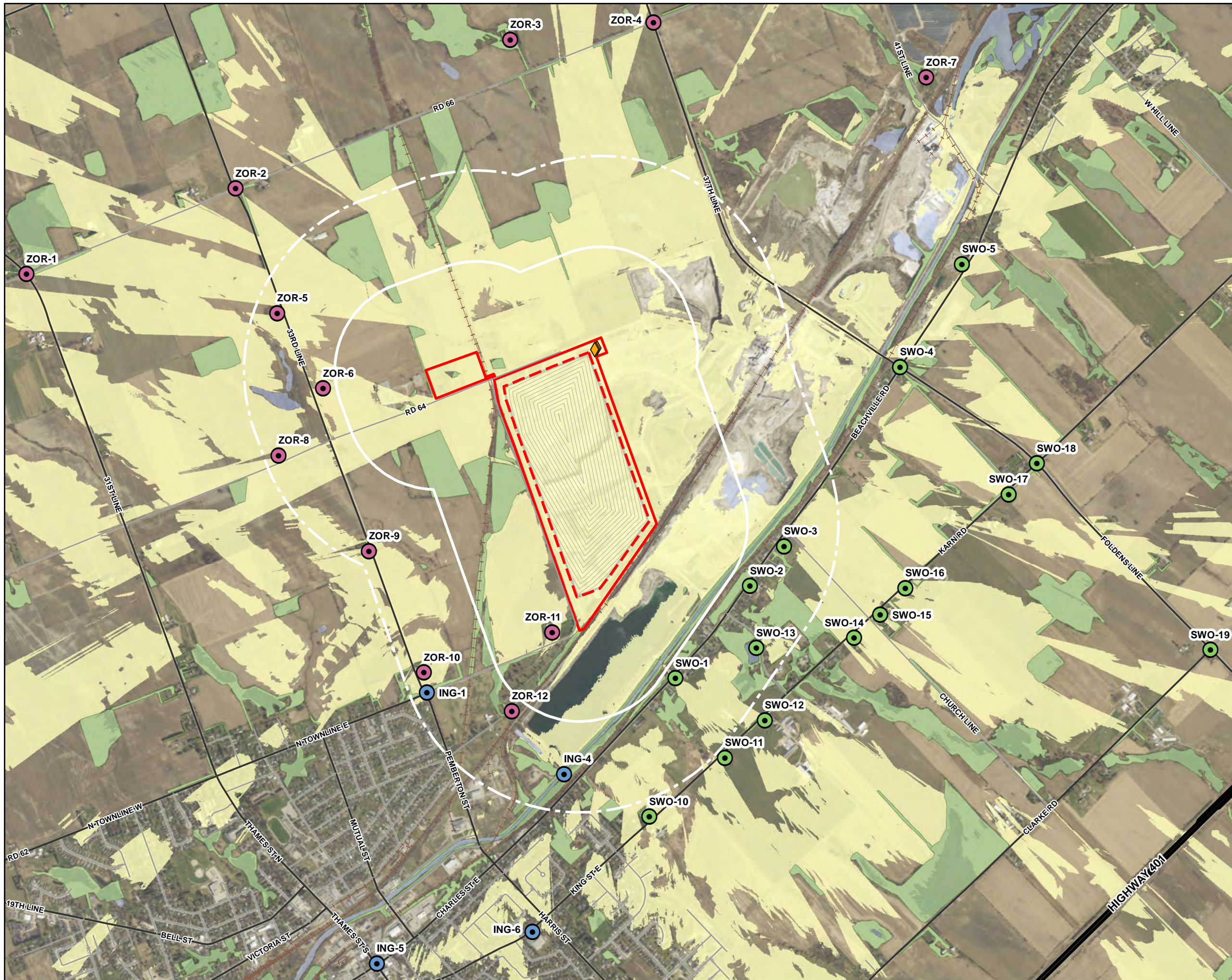
- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- Visual Impact Analysis conducted in ArcMap 10.6.1 with 3D Analyst Tools
- All measurements are in meters unless otherwise specified

Date: March 21, 2019	
File: 9811AG	
Scale: 1:20,000	
Drawn: JB	

Document Path: K:\9811AG-Walker Environmental Group-Landscape Terms of Reference\GIS\IA Map Documents\15 - Bare Earth.mxd



**Figure 11**  
Viewshed Analysis  
Surface with Wooded Area



**Legend**

- Subject Lands
- Waste Fill Area
- 500 m Buffer
- 1000 m Buffer
- ◆ Flares (3)
- Potential Viewshed
- Waterbody
- Wooded Area
- Highways
- Major Roads
- Minor Roads
- Railway

**Visual Receptors**

- Township of Zorra
- Town of Ingersoll
- Township of South-West Oxford

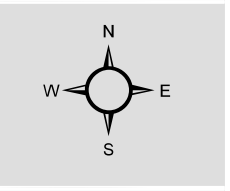
**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 1.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of most wooded areas: 15 m (variation with 10 m and 25 m)
- The curvature of the Earth has been accounted for in this analysis
- Projection: NAD 1983 UTM Zone 17N

**Sources of Information**

- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario (LIO))
- Base Data (Walker Environmental)
- Wooded area data based on data from LIO and enhanced through digitization of additional features
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- Visual Impact Analysis conducted in ArcMap 10.6.1 with 3D Analyst Tools
- All measurements are in meters unless otherwise specified

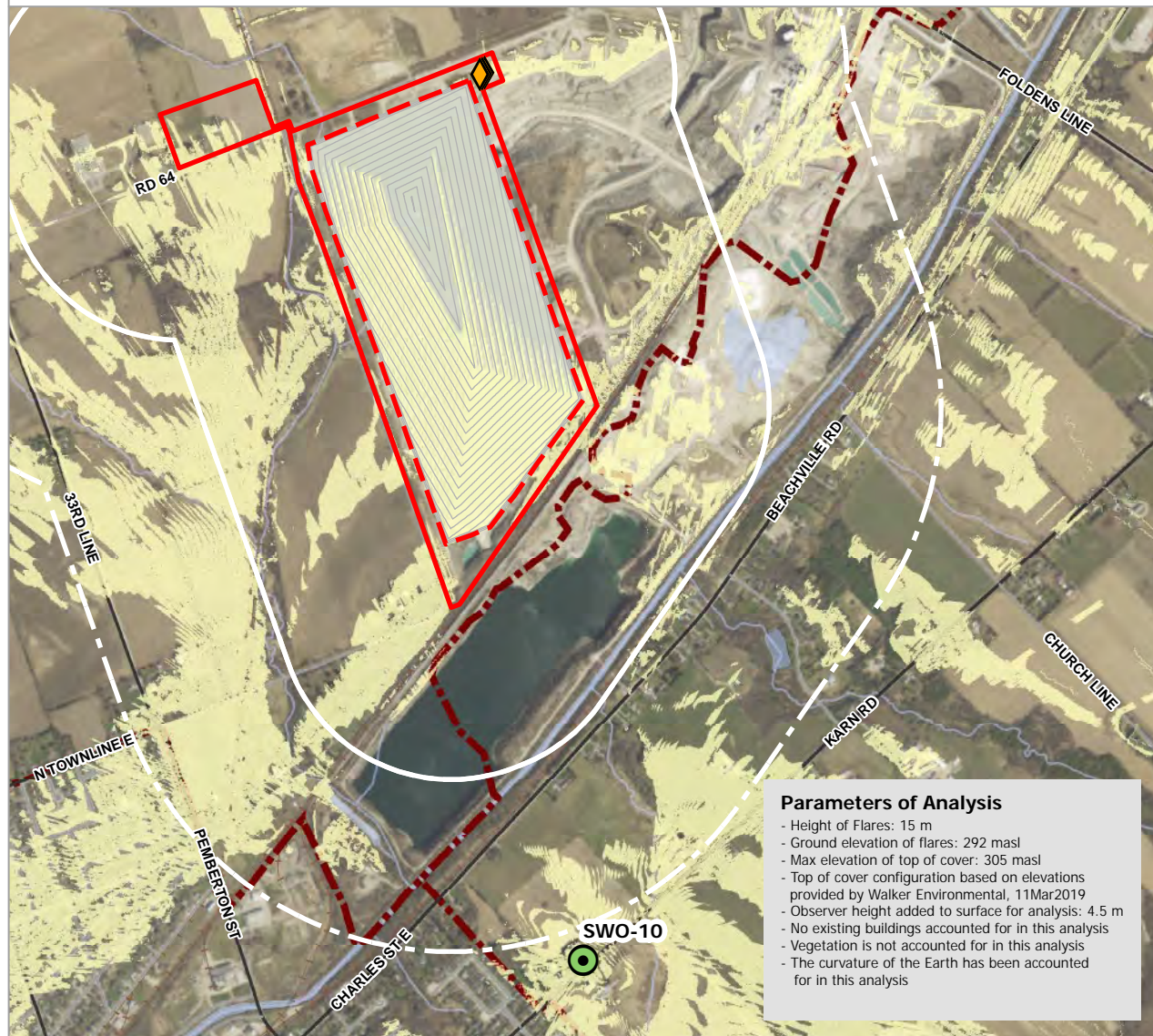
Date:	March 26, 2019
File:	9811AG
Scale:	1:20,000
Drawn:	JB



Document Path: K:\9811AG-Walker Environmental Group-Landscape Terms of Reference\GIS\Map Documents\15 - Tree.mxd



### Bare-Earth Surface



**Parameters of Analysis**

- Height of Flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis

### Surface with Wooded Area



**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of Flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of wooded areas: 15 m
- The curvature of the Earth has been accounted for in this analysis

Figure 12  
Detailed Viewshed Analysis  
Receptor SWO-10

#### Legend

- |                               |                    |
|-------------------------------|--------------------|
| Subject Lands                 | Waterbody          |
| Waste Fill Area               | Wooded Area        |
| 500 m Buffer                  | Highways           |
| 1000 m Buffer                 | Major Roads        |
| Flares (3)                    | Minor Roads        |
| Potential Viewshed            | Railway            |
| Visual Receptors              | Municipal Boundary |
| Township of South-West Oxford | Line of Sight      |

#### Receptor Analysis

Type: 2-Storey Residence  
 Receptor Elevation: 297 masl  
 Observer Elevation: 301.5 masl  
 Distance to Visible Waste Fill Area: 1.28 km  
 Distance to Flares: 2.59 km

#### Bare-Earth Surface

Waste Fill Area Visible  
 Flares Visible

#### Surface with Wooded Area

Waste Fill Area Visible  
 Flares Visible

#### Sources of Information

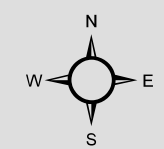
- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date: March 26, 2019

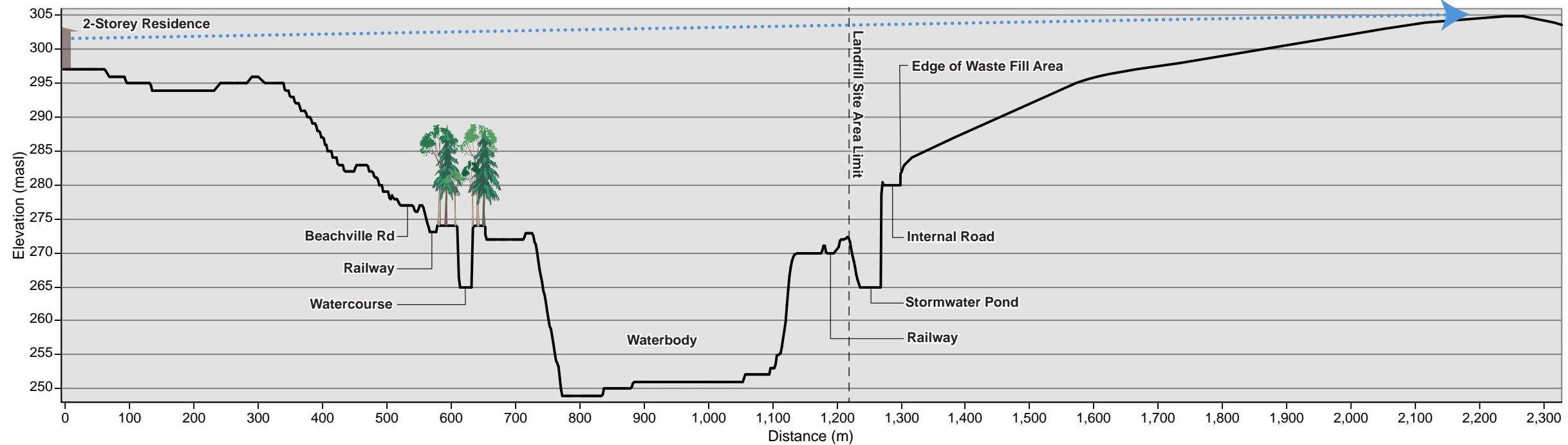
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Drawn: JB



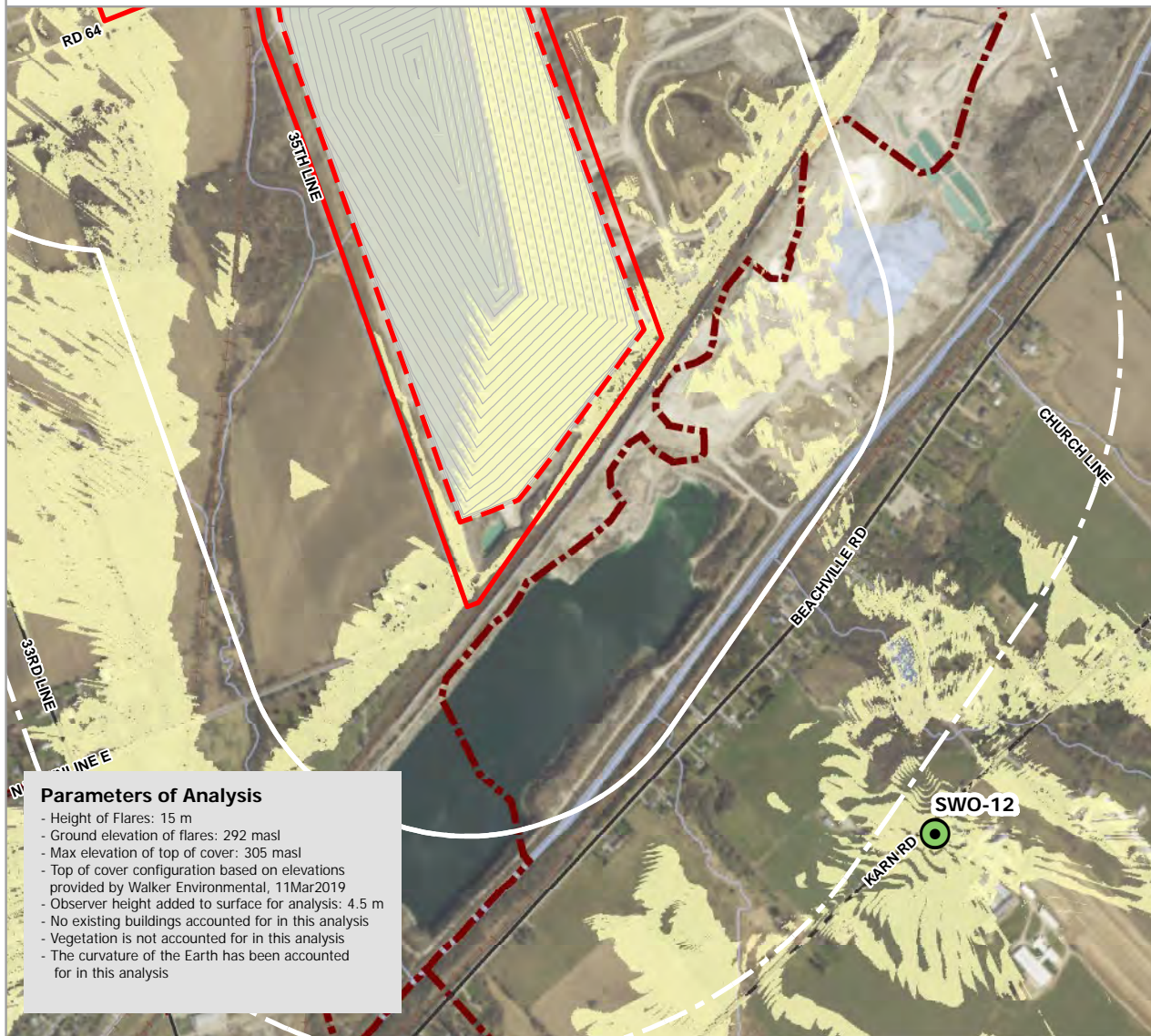
### Surface with Wooded Area Cross Section



Document Path: K:\9811AG-Walker Environmental Group-Landscape Terms of Reference\GIS\Map Documents\Detailed Analysis\Detailed Analysis - SWO-10.mxd



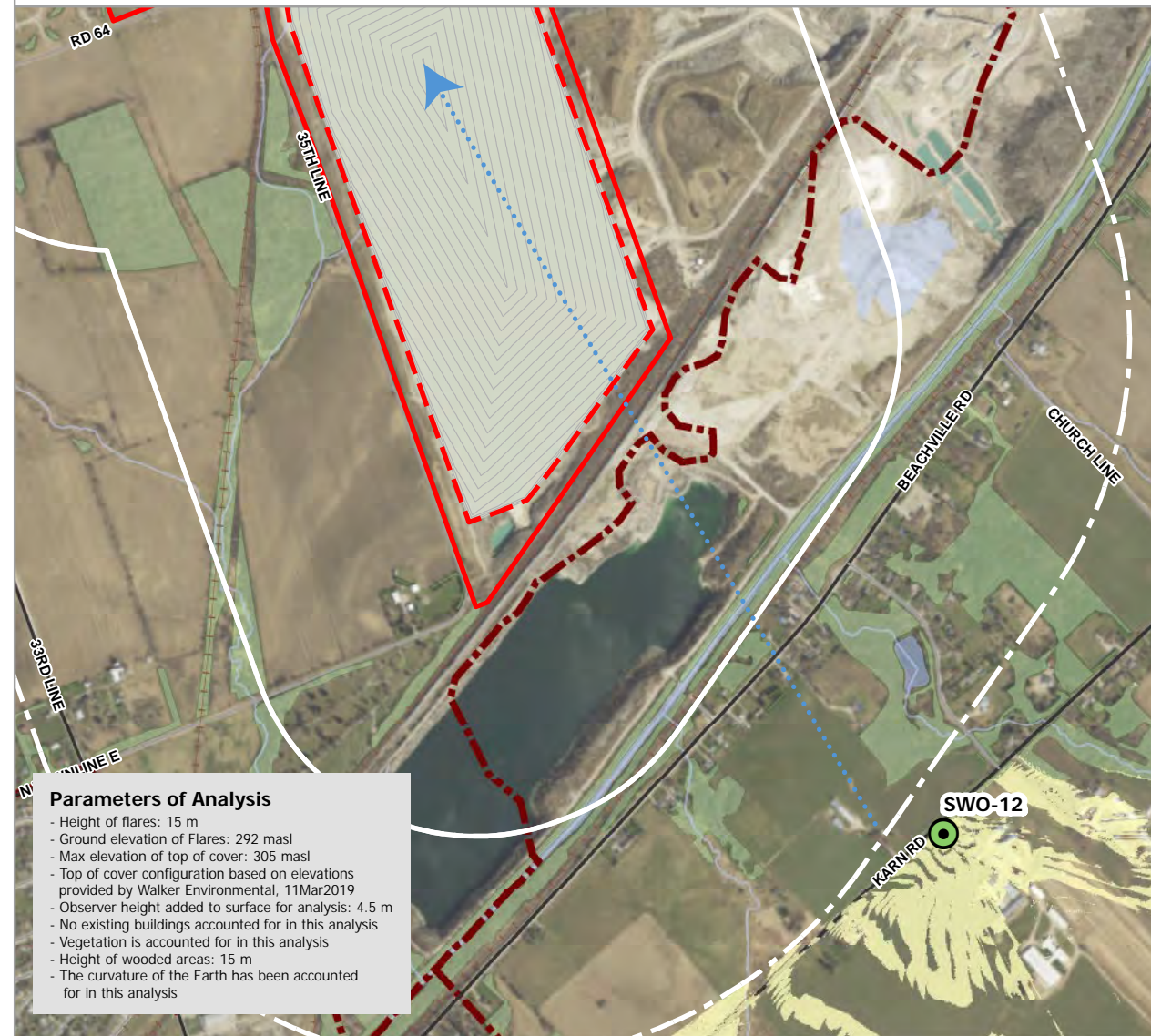
### Bare-Earth Surface



**Parameters of Analysis**

- Height of Flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis

### Surface with Wooded Area



**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of Flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of wooded areas: 15 m
- The curvature of the Earth has been accounted for in this analysis

Figure 13  
Detailed Viewshed Analysis  
Receptor SWO-12

#### Legend

- |                               |                    |
|-------------------------------|--------------------|
| Subject Lands                 | Waterbody          |
| Waste Fill Area               | Wooded Area        |
| 500 m Buffer                  | Highways           |
| 1000 m Buffer                 | Major Roads        |
| Flares (3)                    | Minor Roads        |
| Potential Viewshed            | Railway            |
| <b>Visual Receptors</b>       | Municipal Boundary |
| Township of South-West Oxford | Line of Sight      |

#### Receptor Analysis

Type: 2-Storey Residences (3)  
 Receptor Elevation: 294 masl  
 Observer Elevation: 298.5 masl  
 Distance to Visible Waste Fill Area: 1.16 km  
 Distance to Flares: 2.24 km

Bare-Earth Surface  
 Waste Fill Area Visible  
 Flares Visible

Surface with Wooded Area  
 Waste Fill Area Visible\*  
 Flares Not Visible

\*Visible from residence at 564047 Karn Road

#### Sources of Information

- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date: April 8, 2019

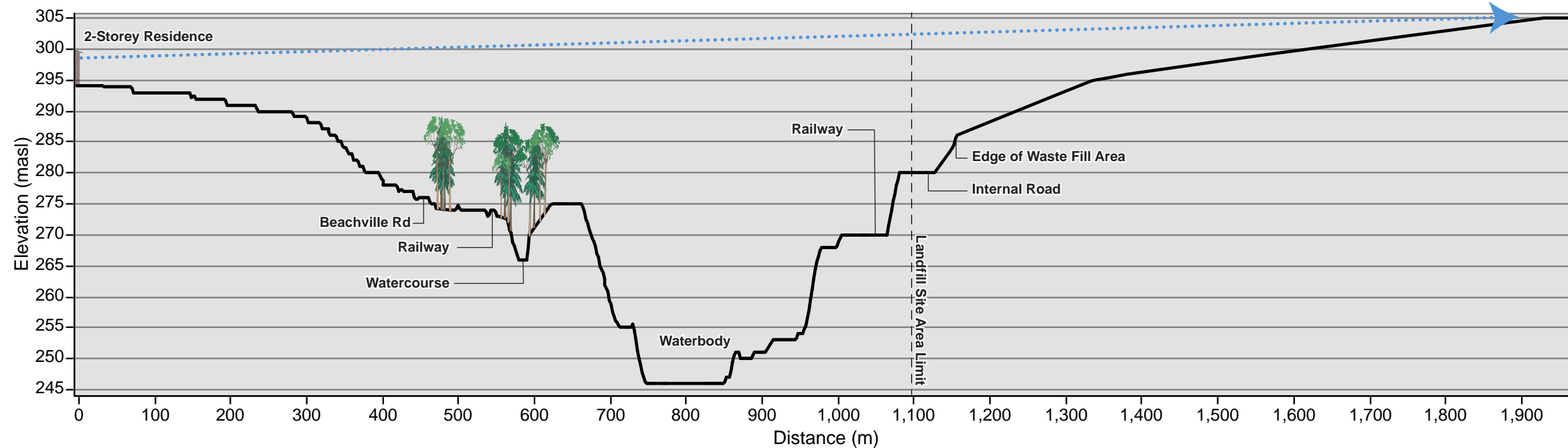
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Drawn: JB



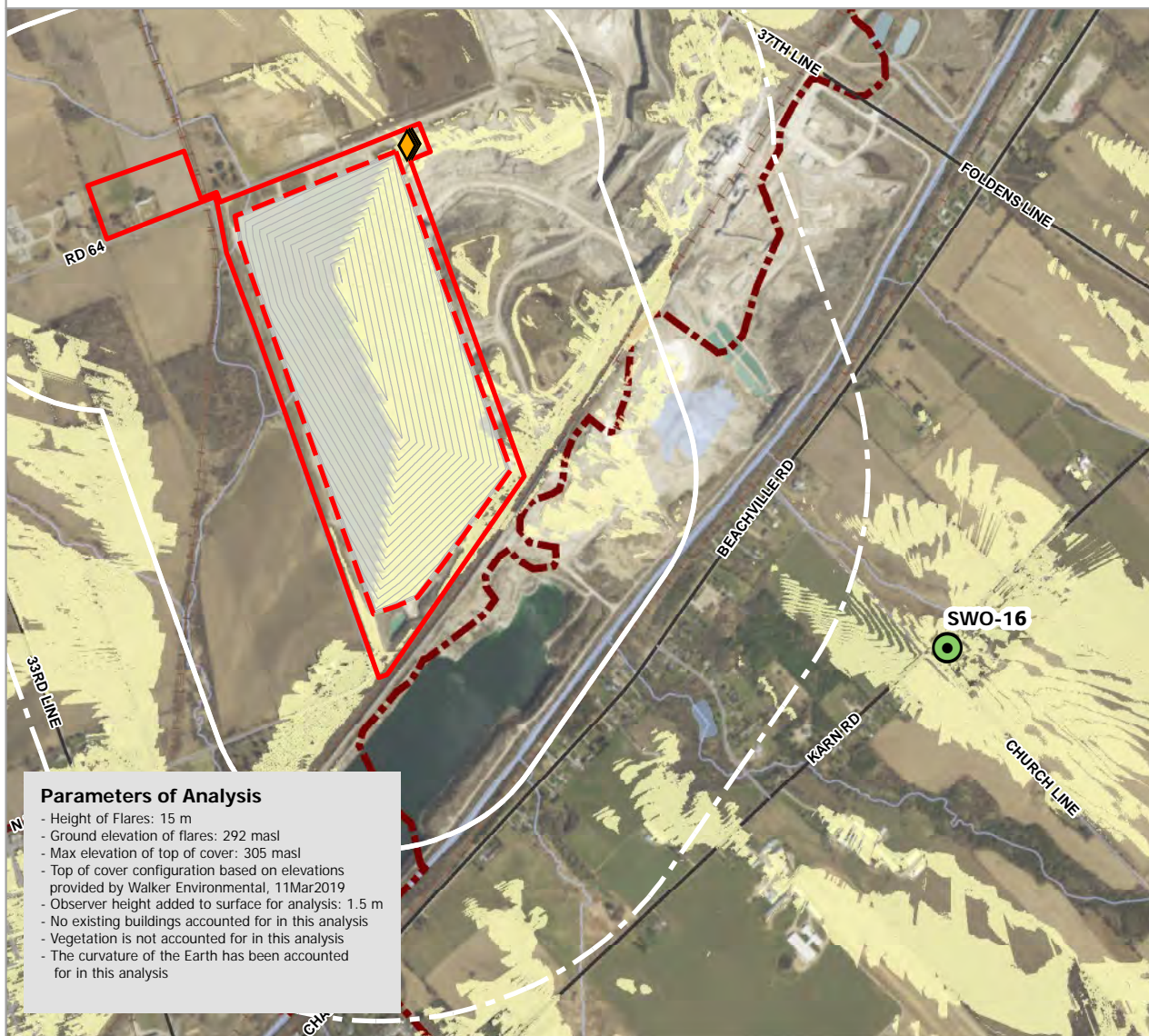
### Surface with Wooded Area Cross Section



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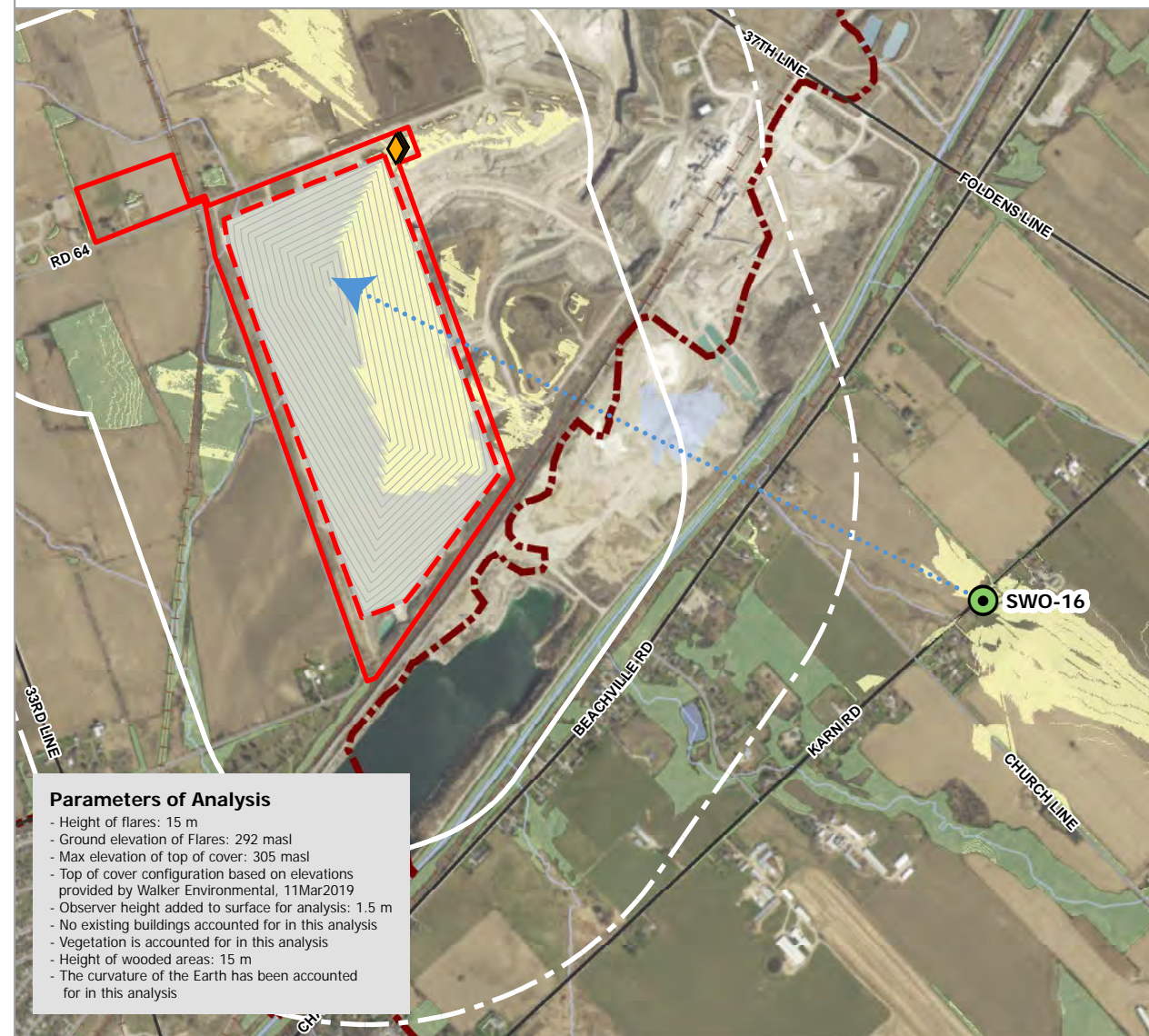
### Bare-Earth Surface



**Parameters of Analysis**

- Height of Flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 1.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis

### Surface with Wooded Area



**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of Flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 1.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of wooded areas: 15 m
- The curvature of the Earth has been accounted for in this analysis

**Figure 14**  
**Detailed Viewshed Analysis**  
 Receptor SWO-16  
 (Representative of SWO-14 and SWO-15)

#### Legend

- |                               |                    |
|-------------------------------|--------------------|
| Subject Lands                 | Waterbody          |
| Waste Fill Area               | Wooded Area        |
| 500 m Buffer                  | Highways           |
| 1000 m Buffer                 | Major Roads        |
| Flares (3)                    | Minor Roads        |
| Potential Viewshed            | Railway            |
| <b>Visual Receptors</b>       | Municipal Boundary |
| Township of South-West Oxford | Line of Sight      |

#### Receptor Analysis

Type: 1-Storey Residence  
 Receptor Elevation: 301 masl  
 Observer Elevation: 302.5 masl  
 Distance to Visible Waste Fill Area: 1.75 km  
 Distance to Flares: 2.15 km

#### Bare-Earth Surface

Waste Fill Area Visible  
 Flares Visible

#### Surface with Wooded Area

Waste Fill Area Visible  
 Flares Visible

#### Sources of Information

- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date: March 26, 2019

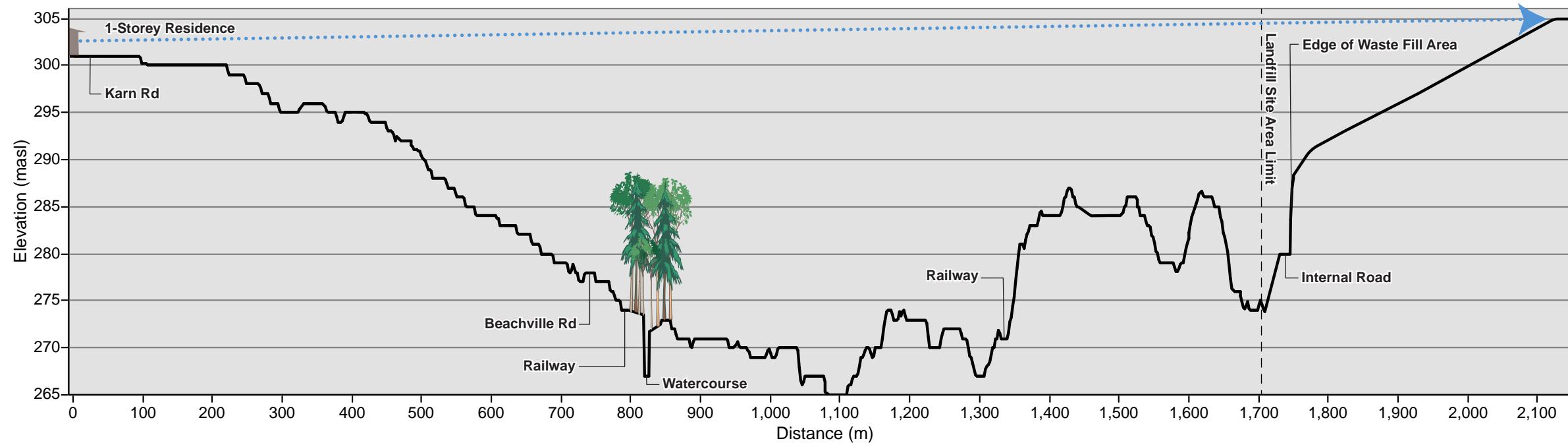
File: 9811AG

Scale: 1:15,000

Drawn: JB



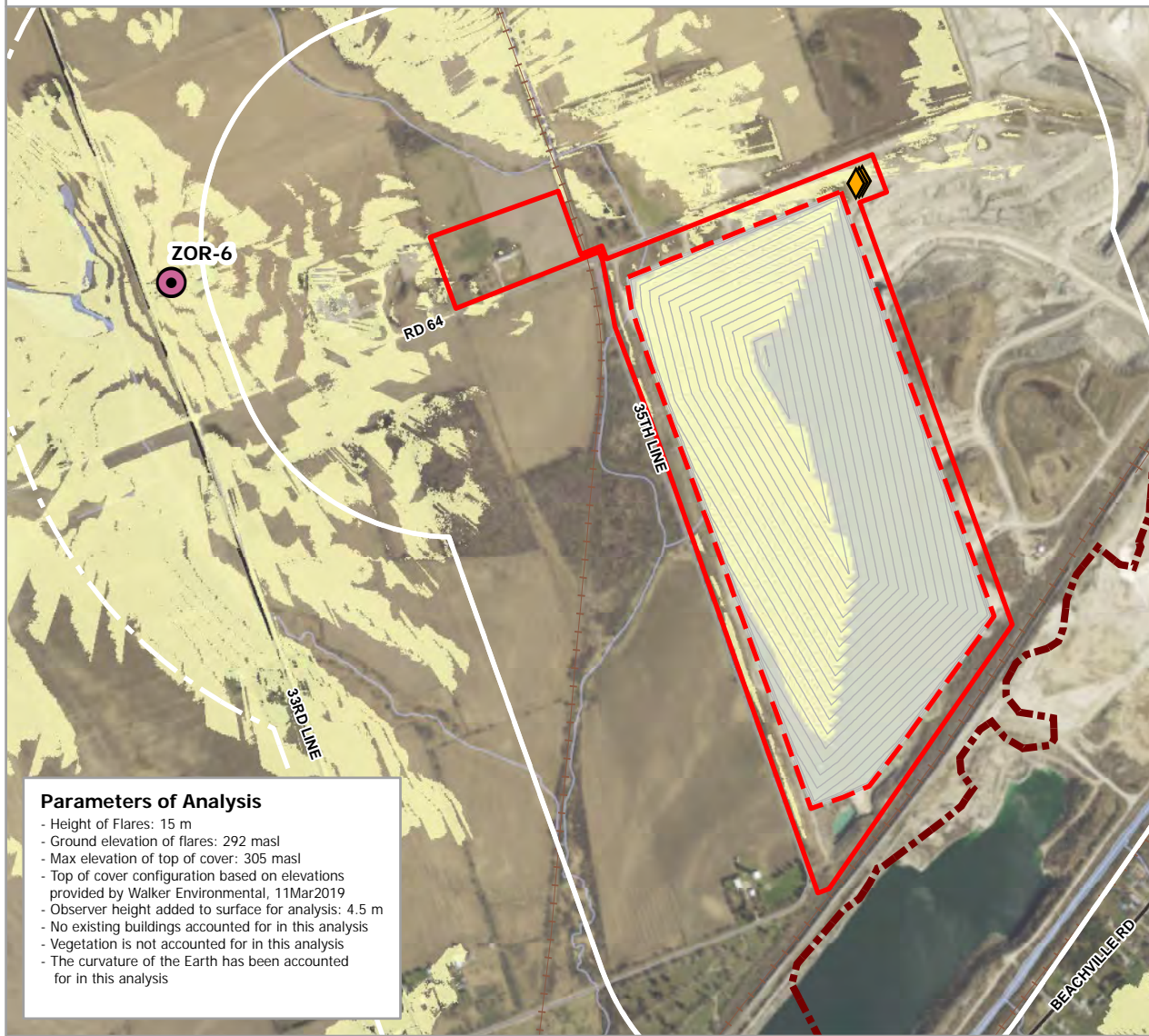
### Surface with Wooded Area Cross Section



Document Path: K:\9811AG-Walker Environmental Group-Landscape Terms of Reference\GIS\Map Documents\Detailed Analysis\Detailed Analysis - SWO-16.mxd



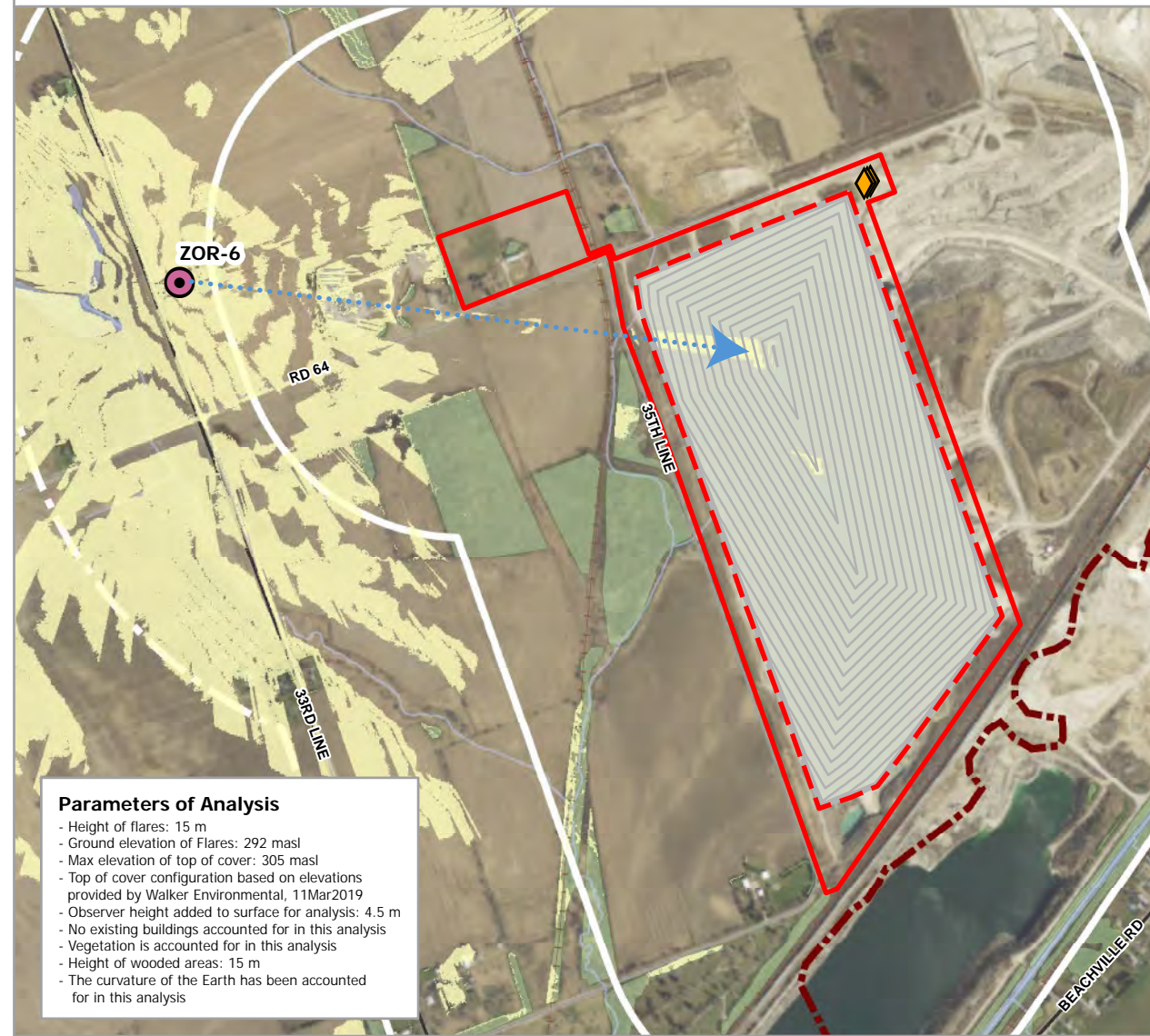
### Bare-Earth Surface



**Parameters of Analysis**

- Height of Flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis

### Surface with Wooded Area



**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of Flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of wooded areas: 15 m
- The curvature of the Earth has been accounted for in this analysis

Figure 15  
Detailed Viewshed Analysis  
Receptor ZOR-6

#### Legend

- |                    |                    |
|--------------------|--------------------|
| Subject Lands      | Waterbody          |
| Waste Fill Area    | Wooded Area        |
| 500 m Buffer       | Highways           |
| 1000 m Buffer      | Major Roads        |
| Flares (3)         | Minor Roads        |
| Potential Viewshed | Railway            |
| Visual Receptors   | Municipal Boundary |
| Township of Zorra  | Line of Sight      |

#### Receptor Analysis

Type: 2-Storey Residence  
 Receptor Elevation: 299 masl  
 Observer Elevation: 303.5 masl  
 Distance to Visible Waste Fill Area: 1.04 km  
 Distance to Flares: 1.55 km

#### Bare-Earth Surface

Waste Fill Area Visible  
 Flares Visible

#### Surface with Wooded Area

Waste Fill Area Visible\*  
 Flares Not Visible

\*Accessory buildings may screen views

#### Sources of Information

- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date: March 25, 2019

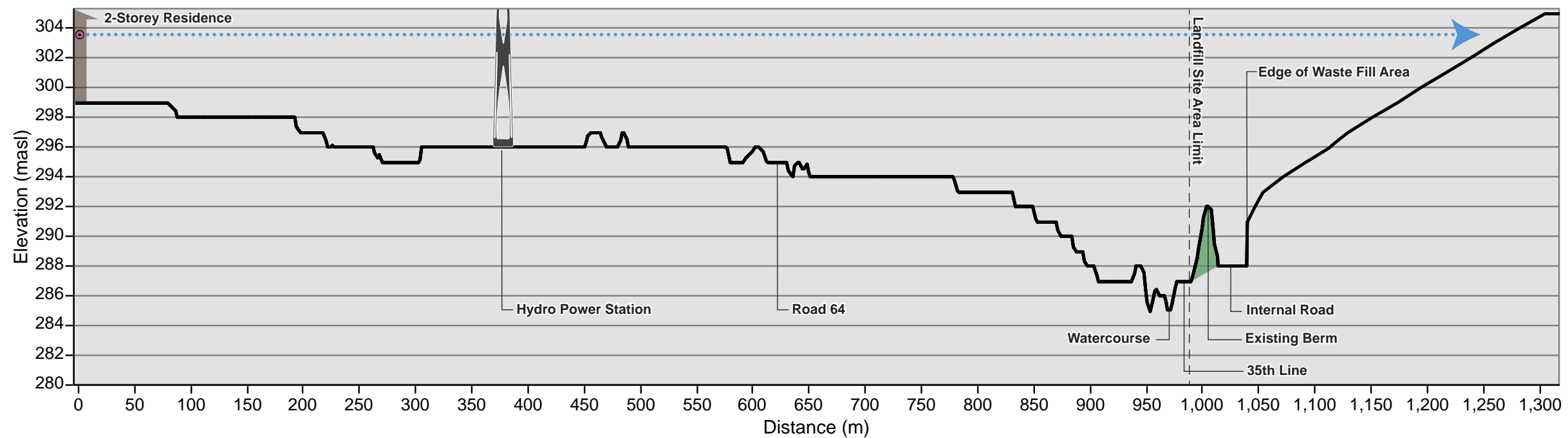
File: 9811AG

Scale: 1:15,000

Drawn: JB



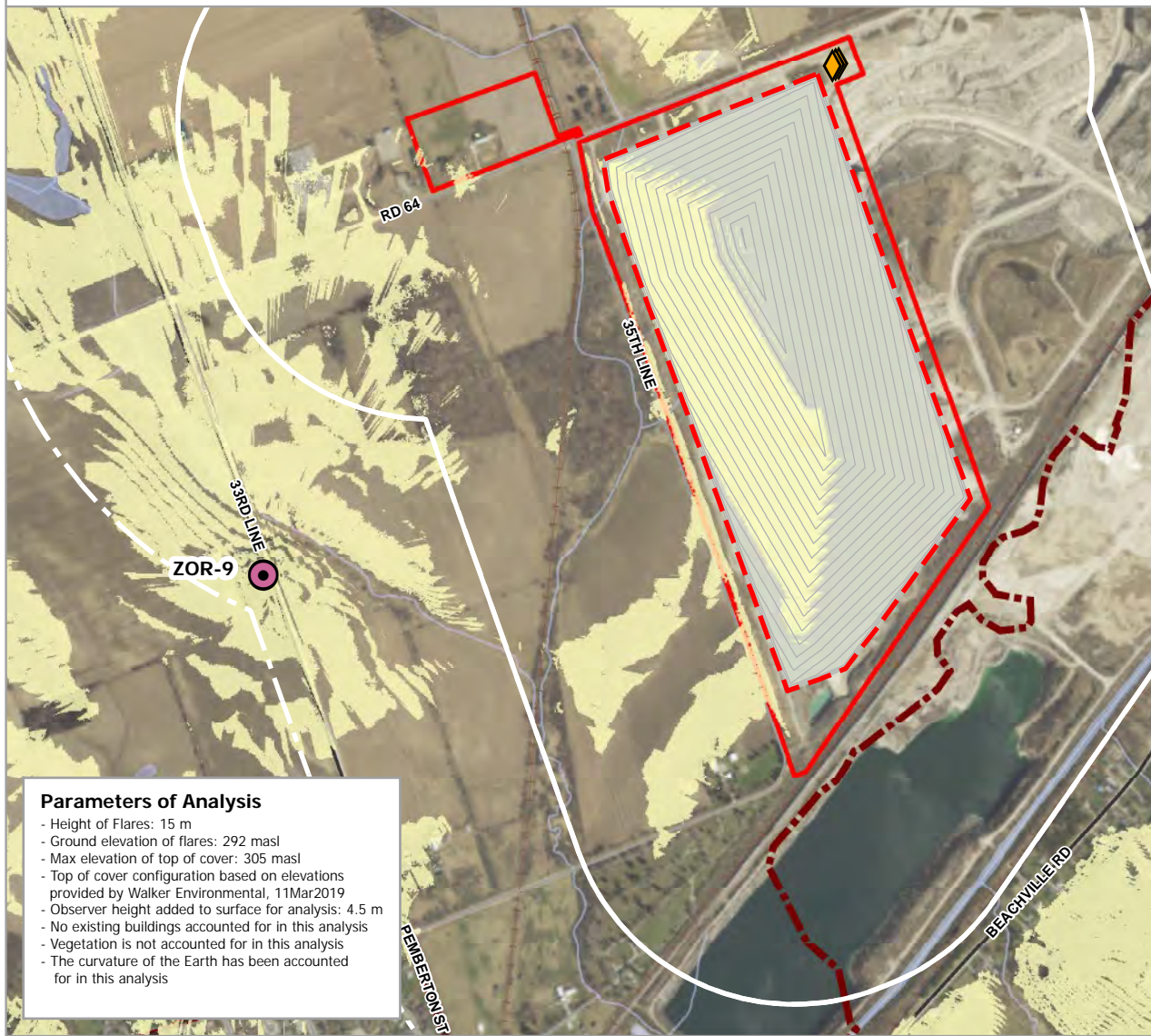
### Surface with Wooded Area Cross Section



Document Path: K:\9811AG-Walker Environmental-Group-Landscape Terms of Reference\GIS\Map Documents\Detailed Analysis\Detailed Analysis - ZOR-6.mxd



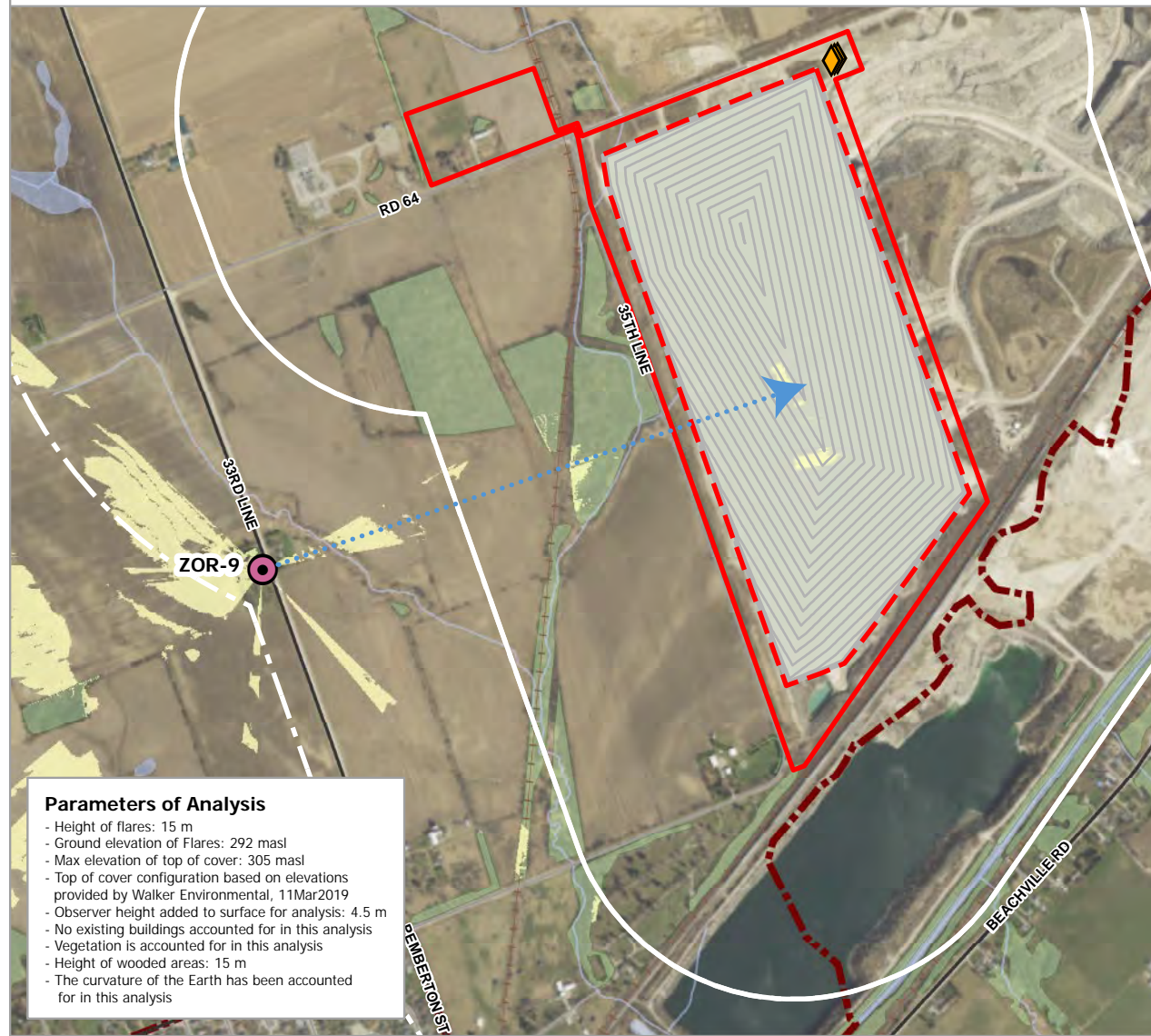
### Bare-Earth Surface



**Parameters of Analysis**

- Height of Flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis

### Surface with Wooded Area



**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of Flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of wooded areas: 15 m
- The curvature of the Earth has been accounted for in this analysis

Figure 16  
Detailed Viewshed Analysis  
Receptor ZOR-9

#### Legend

- Subject Lands
- Waste Fill Area
- 500 m Buffer
- 1000 m Buffer
- ◆ Flares (3)
- Potential Viewshed
- Visual Receptors
- Township of Zorra
- Waterbody
- Wooded Area
- Highways
- Major Roads
- Minor Roads
- Railway
- Municipal Boundary
- Line of Sight

#### Receptor Analysis

Type: 2-Storey Residence  
 Receptor Elevation: 297.5 masl  
 Observer Elevation: 302 masl  
 Distance to Visible Waste Fill Area: 1.01 km  
 Distance to Flares: 1.67 km

#### Bare-Earth Surface

Waste Fill Area Visible  
 Flares Visible

#### Surface with Wooded Area

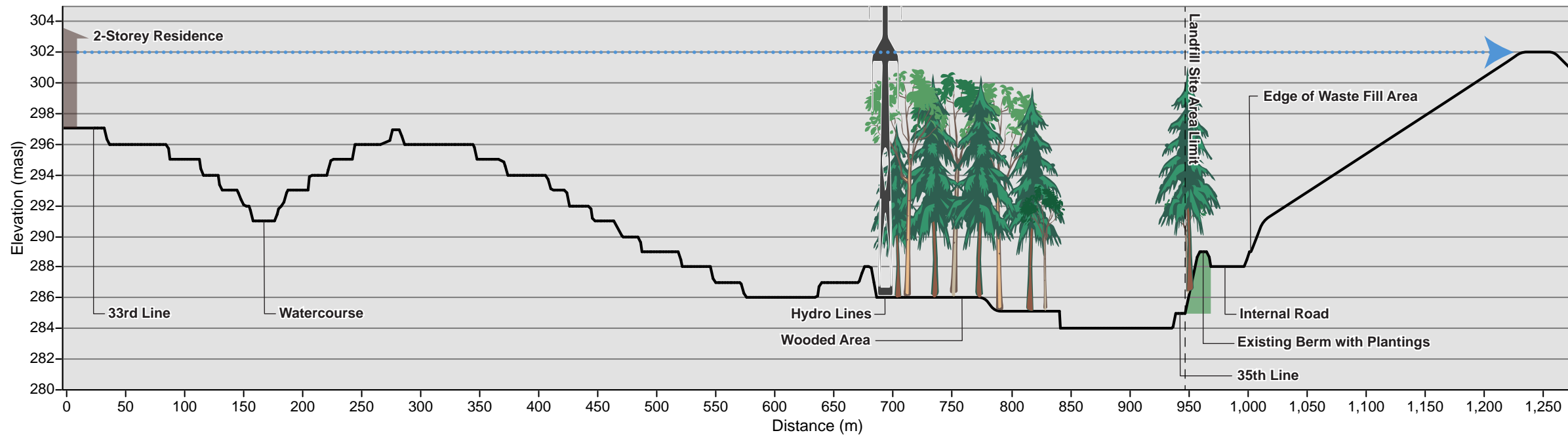
Waste Fill Area Visible\*  
 Flares Not Visible

\*Visible from 334647 & 334652 33rd Line

#### Sources of Information

- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

### Surface with Wooded Area Cross Section



Date: March 25, 2019

File: 9811AG

Scale: 1:15,000

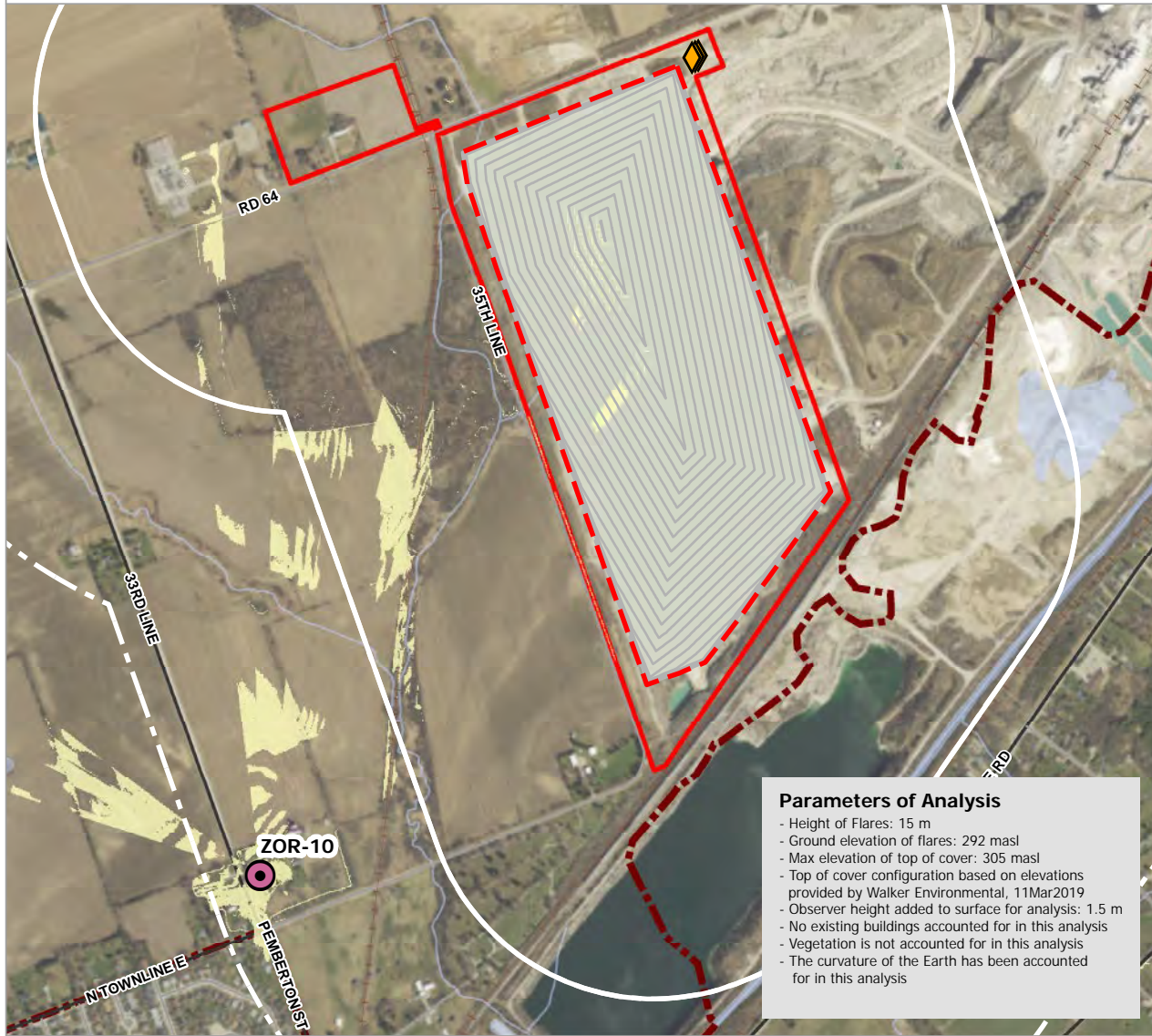
Drawn: JB



Document Path: K:\9811AG-Walker Environmental-Group-Landscape Terms of Reference\GIS\Map Documents\Detailed Analysis\Detailed Analysis - ZOR-9.mxd



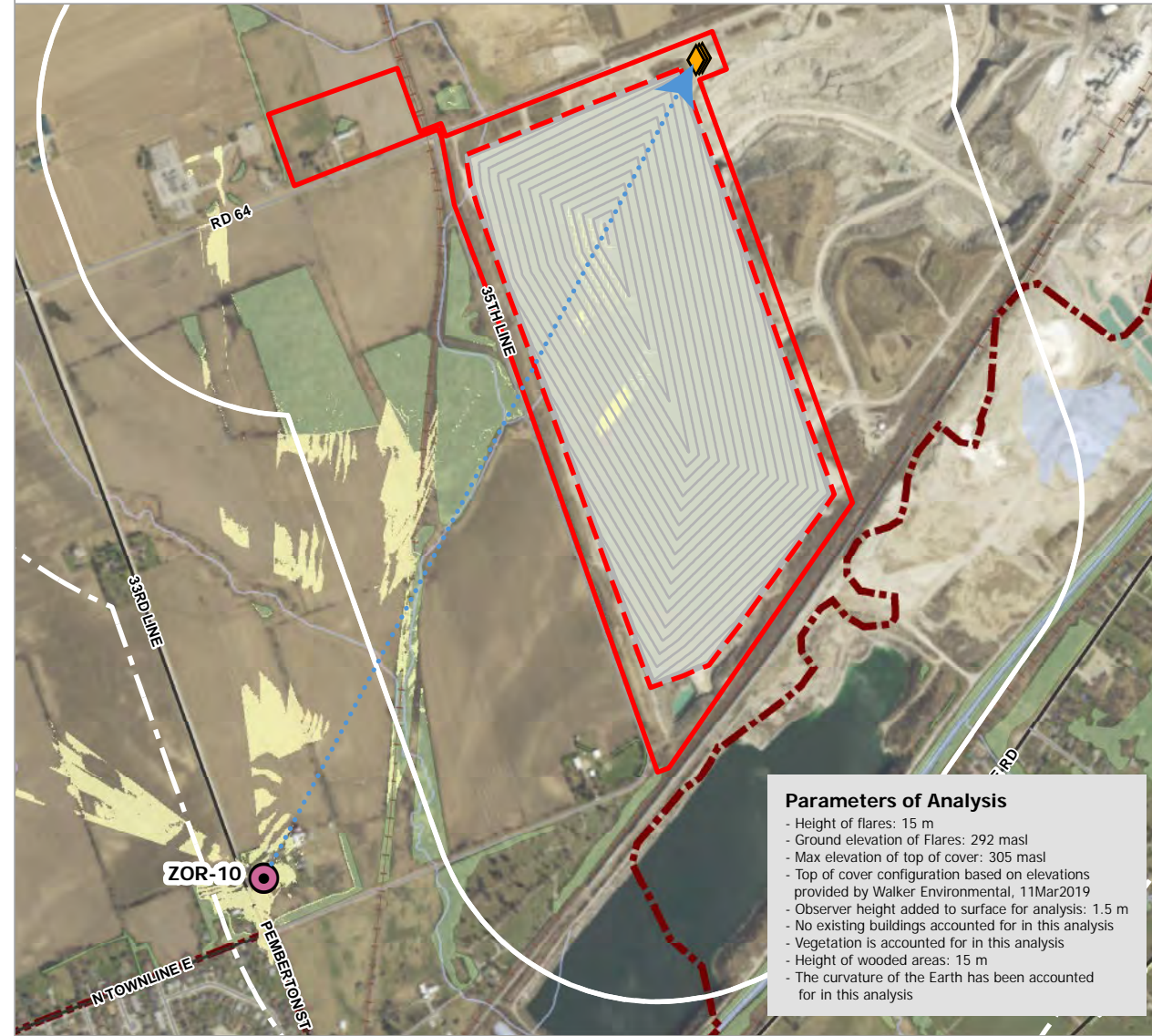
### Bare-Earth Surface



**Parameters of Analysis**

- Height of Flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 1.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis

### Surface with Wooded Area



**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of Flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 1.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of wooded areas: 15 m
- The curvature of the Earth has been accounted for in this analysis

Figure 17  
Detailed Viewshed Analysis  
Receptor ZOR-10

#### Legend

- |                    |                    |
|--------------------|--------------------|
| Subject Lands      | Waterbody          |
| Waste Fill Area    | Wooded Area        |
| 500 m Buffer       | Highways           |
| 1000 m Buffer      | Major Roads        |
| Flares (3)         | Minor Roads        |
| Potential Viewshed | Railway            |
| Visual Receptors   | Municipal Boundary |
| Township of Zorra  | Line of Sight      |

#### Receptor Analysis

Type: 1-Storey Residence  
 Receptor Elevation: 297 masl  
 Observer Elevation: 298.5 masl  
 Distance to Visible Waste Fill Area: 1.21 km  
 Distance to Flares: 2.01 km

#### Bare-Earth Surface

Waste Fill Area Visible  
 Flares Visible

#### Surface with Wooded Area

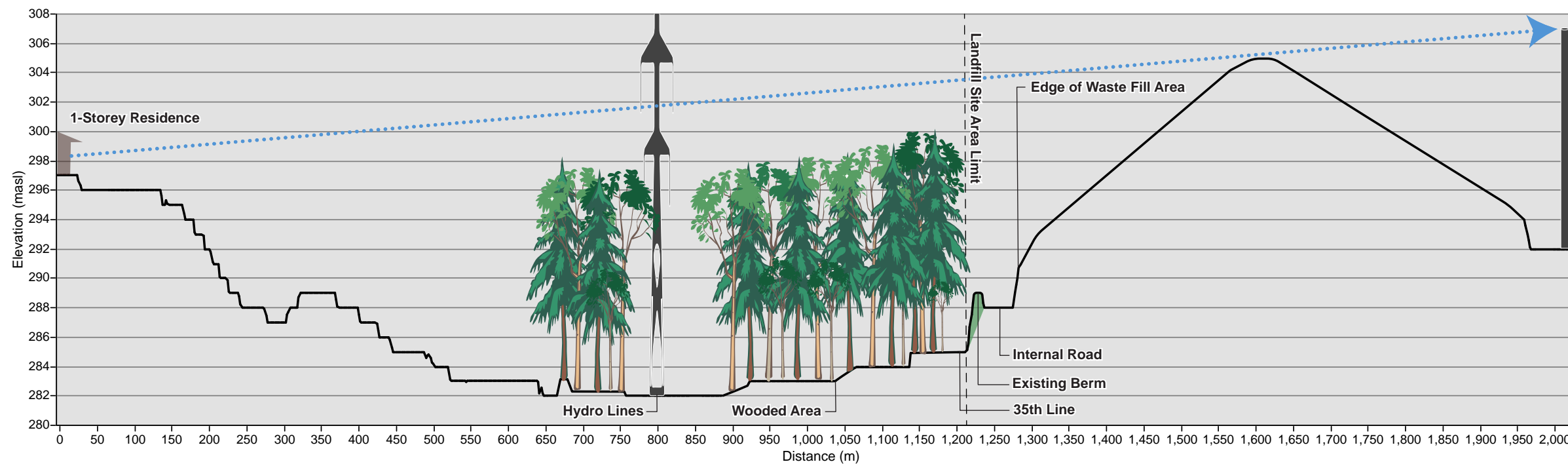
Waste Fill Area Visible\*  
 Flares Visible

\*Accessory buildings may partially screen views

#### Sources of Information

- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

### Surface with Wooded Area Cross Section



Date: March 25, 2019

File: 9811AG

Scale: 1:15,000

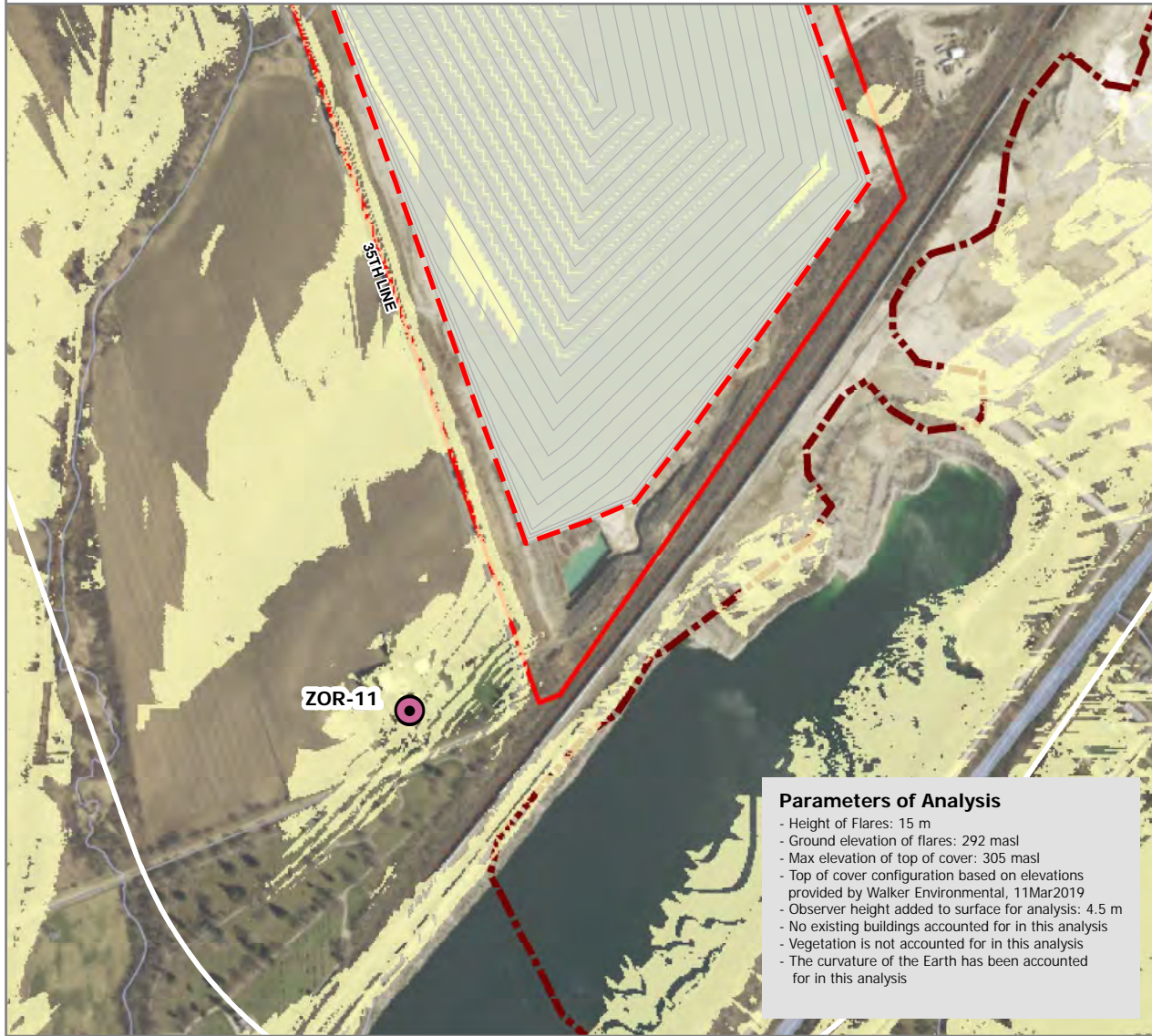
Drawn: JB



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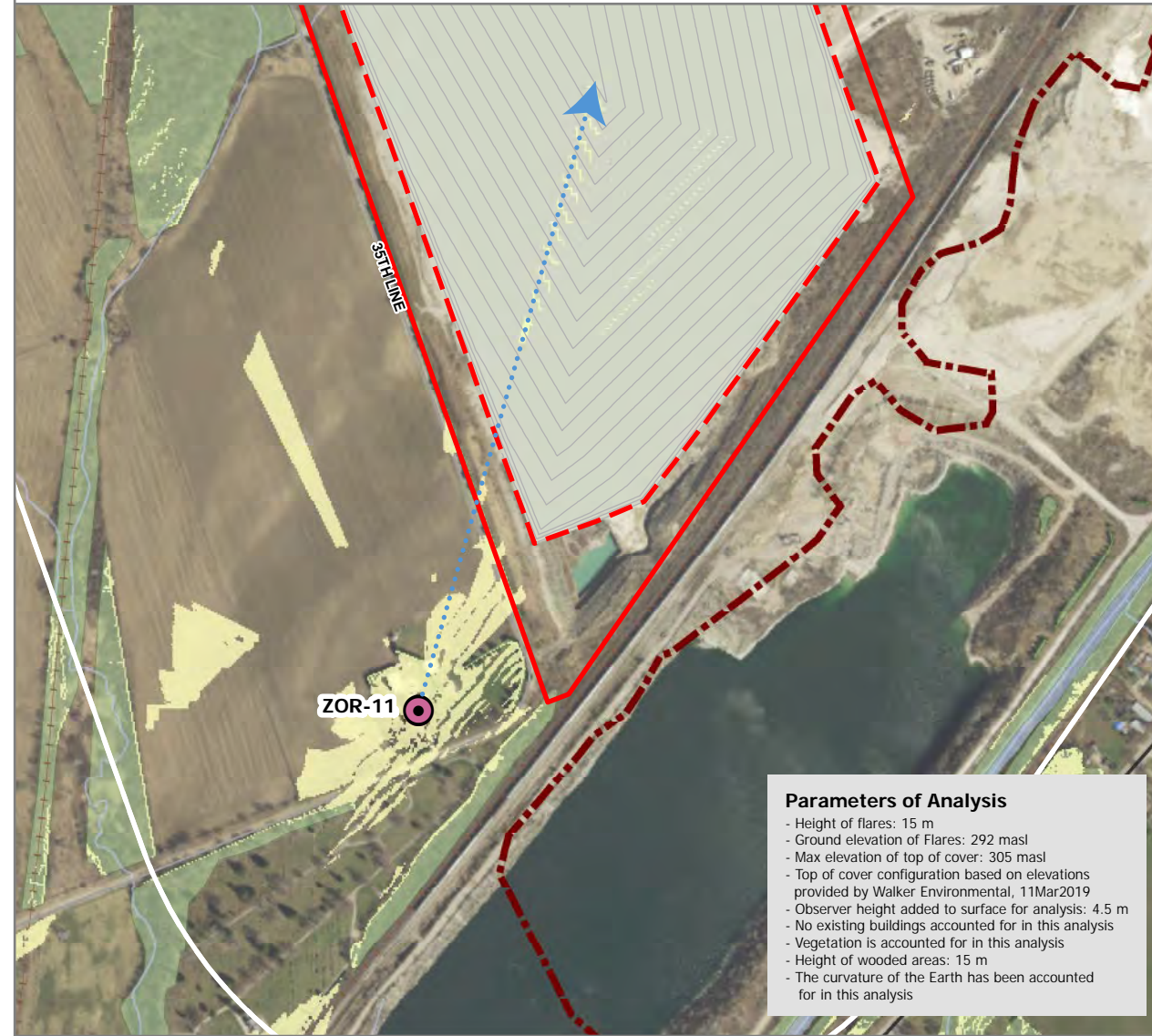
### Bare-Earth Surface



**Parameters of Analysis**

- Height of Flares: 15 m
- Ground elevation of flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is not accounted for in this analysis
- The curvature of the Earth has been accounted for in this analysis

### Surface with Wooded Area



**Parameters of Analysis**

- Height of flares: 15 m
- Ground elevation of Flares: 292 masl
- Max elevation of top of cover: 305 masl
- Top of cover configuration based on elevations provided by Walker Environmental, 11Mar2019
- Observer height added to surface for analysis: 4.5 m
- No existing buildings accounted for in this analysis
- Vegetation is accounted for in this analysis
- Height of wooded areas: 15 m
- The curvature of the Earth has been accounted for in this analysis

Figure 18  
Detailed Viewshed Analysis  
Receptor ZOR-11

#### Legend

- |                         |                    |
|-------------------------|--------------------|
| Subject Lands           | Waterbody          |
| Waste Fill Area         | Wooded Area        |
| 500 m Buffer            | Highways           |
| 1000 m Buffer           | Major Roads        |
| Flares (3)              | Minor Roads        |
| Potential Viewshed      | Railway            |
| <b>Visual Receptors</b> | Municipal Boundary |
| Township of Zorra       | Line of Sight      |

#### Receptor Analysis

Type: 2-Storey Residence  
 Receptor Elevation: 286 masl  
 Observer Elevation: 290.5 masl  
 Distance to Waste Fill Area: 237 m  
 Distance to Flares: 1.58 km

#### Bare-Earth Surface

Waste Fill Area Visible  
 Flares Not Visible

#### Surface with Wooded Area

Waste Fill Area Visible\*  
 Flares Not Visible

\*Accessory buildings screen view

#### Sources of Information

- Digital Terrain Model used for viewshed analysis (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date: April 8, 2019

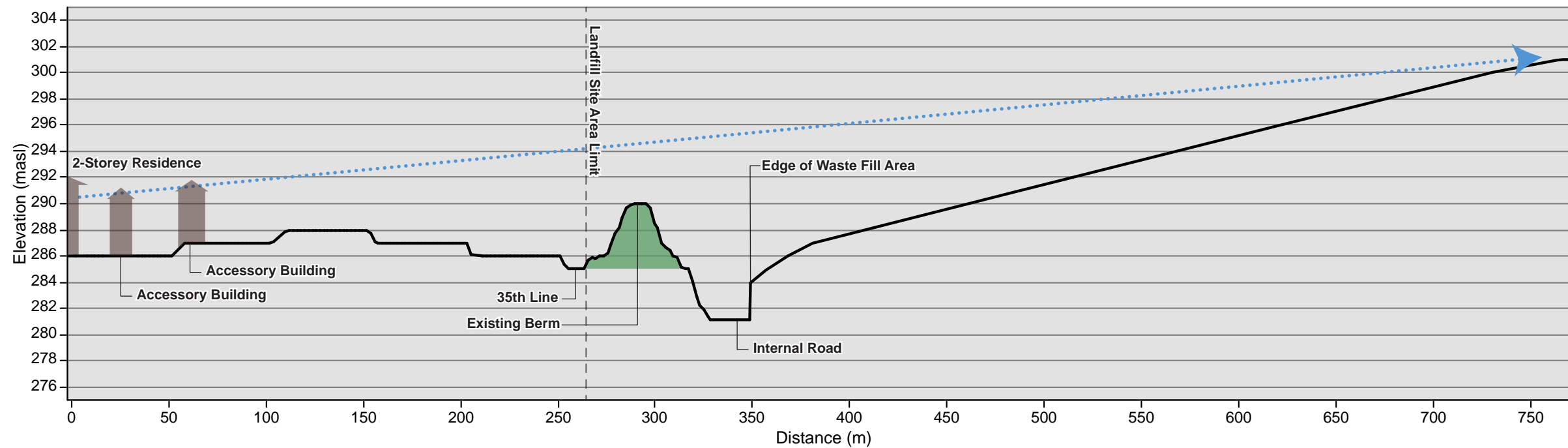
File: 9811AG

Scale: 1:8,000

Drawn: JB



### Surface with Wooded Area Cross Section



Document Path: K:\9811AG-Walker Environmental-Group-Landscape Terms of Reference\GIS\Map Documents\Detailed Analysis\Detailed Analysis - ZOR-11.mxd



**Table 5: Summary of Impacts**

Receptor ID	Elevation (masl)	Observer Height (m)	Type	Distance to Flares	Distance to Top of Cover	View Quality	Landscape Quality	Visual Impact	Comment	Potential Mitigation
SWO-1	276.5	1.5	1-Storey Residential	1.87 km	650 m	Medium	Low	No Significant Impact	Only a very small partial view is available due to screening by vegetation even in the leaf off condition. Flares are not visible.	None required
SWO-10	297.0	4.5	2-Storey Residential	2.59 km	1.28 km	Low	Low	No Significant Impact	The landfill is visible but in the distance and makes up only a small part of the long view. Flares are visible but very distant.	None required
SWO-12	294.0	4.5	2-Storey Residential (3)	2.24 km	1.16 km	Low	Low	No Significant Impact	The landfill is visible but in the distance and makes up only a small part of the long view. Flares are not visible.	None required
SWO-14	302.0	1.5	1-Storey Residential (2)	2.13 km	1.29 km	Low	Low	No Significant Impact	The landfill is visible but in the distance and makes up only a small part of the long view. Flares are visible but very distant.	None required
SWO-15	301.0	4.5	2-Storey Residential	2.14 km	1.37 km	Low	Low	No Significant Impact	The landfill is visible but in the distance and makes up only a small part of the long view. Flares are not visible.	None required
SWO-16	301.0	1.5	1-Storey Residential	2.15 km	1.45 km	Low	Low	No Significant Impact	The landfill is visible but in the distance and makes up only a small part of the long view. Flares are not visible.	None required
ZOR-6	299.0	4.5	2-Storey Residential	1.55 km	994 m	Medium	Low	No Significant Impact	Only a partial view is available. Full view is screened by the hydro facility in the foreground. Flares are not visible.	None required
ZOR-9	297.5	4.5	2-Storey Residential (3)	1.67 km	989 m	Medium	Low	No Significant Impact	Screened by vegetation in all seasons. The top of the landfill may be visible from second storey windows. Flares are not visible.	None required
ZOR-10	297.0	1.5	1-Storey Residential	2.01 km	940 m	Medium	Low	Minor Impact	The top portion of the landfill would be visible above vegetation and slightly visible through the vegetation in leaf off conditions. Flares are visible but very distant.	Additional vegetation or tall berm would minimize or negate any impacts
ZOR-11	286.0	4.5	2-Storey Residential	1.58 km	237 m	Medium - High	Low	Minor Impact	Landfill is visible above the existing berm. However, view is moderated by accessory buildings and trees. Flares are not visible.	Additional vegetation or tall berm would minimize or negate any impacts



on the majority of the receptors. For the 10 receptors that have views of the proposed development, the analysis concludes that there will be no significant visual impact on eight receptors and a minor impact on two receptors (see **Table 5**).

The receptors at SWO-10, SWO-12, SWO-14, SWO-15 and SWO-16 are all located more than 1.0 km from the subject site. Therefore, views of the proposed development are distant and form only part of the background view. The proposed development will not result in any negative visual impact.

Receptors at SWO-1, ZOR-6 and ZOR-9 are within 1 km of the site (650 m to 989 m). Given the proximity to the site, these receptors are considered to have medium sensitivity to changes in views. However, the view of the subject site from all three of these receptors is minimized by vegetation or other obstruction. The proposed development will not result in negative visual impacts for these receptors.

The receptor at ZOR-10 may experience very minor visual impacts since the top portion of the proposed development would be visible above the existing vegetation and partially visible through the vegetation during leaf off conditions. The receptor is located 940 m from the subject site and only a portion of the proposed development will be visible. Therefore, only minor visual impacts are expected.

The receptor at ZOR-11 is the closest receptor to the subject lands (approx. 237 m). There is an existing berm that provides a visual barrier to the existing quarry. Based on the DTM analysis, the proposed development will be visible above the existing berm. This view is mitigated by existing trees and buildings on the receptor lands. There will be minor negative impact to views when the proposed development is in operation. Adding vegetation to the existing berm in this location would potentially screen the view and minimize or negate any visual impacts. A new berm exclusive of vegetation (tree planting) would be sufficient for visual screening, provided it is installed at a minimum height of 10 metres in height. If a new berm is installed (possibly as part of noise mitigation requirement) it is recommended that naturalization plantings be added to the lower portion of the new berm for aesthetics.

#### **Visual Impact on Public Roadway Receptors**

The subject lands are generally well-screened from view locations on public roadways to the west, north, east and south with limited distant framed views into the site along Karn Road and 33<sup>rd</sup> Line. This is primarily due to topography, existing woodlots and vegetation which provide an appropriate and adequate screen for the majority of the proposed landfill operations. Views into the subject lands from Beachville Road are limited and generally screened by existing vegetation, woodlots, tree lines and existing topography. There are no visual impacts on the receptors associated with public roadways, churches, cemeteries or other public spaces.

#### **Visual Impact of Haul Route**

The proposed new section of haul route will be visible from some of the receptors located to the north of the subject lands. However, the road will be in the middle ground and distant view (no receptor is closer than 500 m) and existing topography and vegetation limit the views to partial views of the haul



route. Given that the haul route constitutes a minor change to the landscape and that only partial, distant views are available, there is no negative visual impact associated with the onsite haul route.

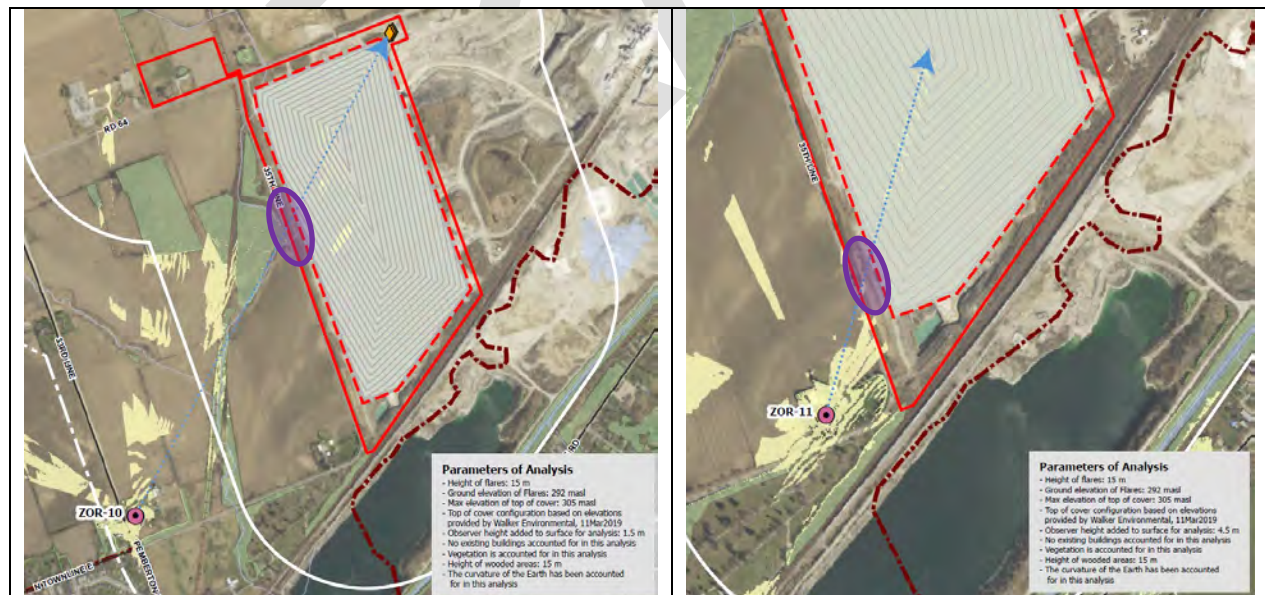
Regarding the broader haul route (along County Road #6 towards Highway #401), these road sections are currently used as haul routes for existing quarrying operations as well as a truck route. There are no improvements to existing roads are required in order to accommodate the proposed landfill haul route. There is no negative visual impact associated with adding additional trucks to the existing haul route.

### 10.3.3 Potential for Cumulative Effects

There is no potential for cumulative or overlapping effects from the waste facility or future site activities. Most effects related to visual impacts only occur during the operational period of the facility, and would cease once the operation is complete. The vegetated landform will remain post-operation, with some equipment (e.g. landfill gas collection, leachate treatment) remaining in operation.

### 10.3.4 Additional Mitigation Recommendations

Given the results of the above review, there are minor impacts predicted to two receptors (ZOR-10 and ZOR-11). These impacts can be mitigated successfully with plantings to occur on the existing vegetated berm located along the western edge of the existing quarry operation. Locations are shown below in **Figures 19 and 20**.



Figures 21 & 22: ZOR-10 and ZOR-11 proposed mitigation planting locations (shown in purple) (source: MHBC)

Proposed tree planting should occur prior to Phase 1 to ensure the longest timeframe for growth during the operations is achieved. Trees are to be installed at 5 to 10 m on centre spacing, depending on



species, in groupings and any plantings are to be randomly spaced and staggered to appear more natural, where possible. The layout of the planting mitigation is to be provided on a plan, with details to ensure proper installation and location for plantings. A mix of coniferous and deciduous planting is recommended. Understory plantings are recommended to complement the natural vegetation occurring adjacent to the subject lands and should be spaced according to species anticipated growth. All vegetation is to be selected for hardiness, wind, drought and salt tolerance. Where appropriate, native species that complement the existing surroundings are to be utilized wherever possible or practical.

If a new berm is required to mitigate other factors, such as noise impacts, trees may not be required, as the berm may provide sufficient visual screening if it is tall enough, however, it is recommended that some low plantings be added to the new berm for aesthetics and naturalization .

Any existing trees that are impacted due to the addition of a new, taller berm, should be replaced to ensure the overall visual character of the area is maintained.

No additional required mitigation measures identified during the post-closure period.

### **10.3.5 Net Effects**

There are no additional mitigation recommendations that are required post –closure of the waste facility. With the implementation of the recommended mitigation measures for ZOR-10 and ZOR-11 to screen views, there are no net effects of the proposed operation.

### **10.3.6 Summary**

The purpose of the Visual Impact Assessment is to assess the existing visual landscape and determine if any visual impacts may occur due to the construction of a waste disposal facility and by the ongoing operation of the facility. View impact has been defined as any potential change made to the existing landscape character or views of the subject lands and surrounding area by the proposed use of the subject lands for a waste disposal facility. High impact suggests noticeable change, therefore requiring mitigation measures to minimize potential visual impacts.

The proposed waste management facility is to be located within an existing quarry. As such, the existing landscape is industrial in nature due to its long term function as a quarry and little vegetation or natural features exist on the site. The establishment of the haul route to the north of the subject site is on lands that have higher landscape value; however, the lands are approved for future quarrying activities and haul route will introduce a very minor change to that landscape. The broader haul route to Highway #401 is currently used as a haul route for existing quarry operations in the area and also functions as a truck route. No negative visual impacts are associated with the haul route.



The location, topography and existing conditions around the majority of the subject lands are conducive to an effectively screened landfill operation. Within the surrounding lands is a former licensed quarry, agricultural fields, rural homes, the Town of Ingersoll, Thames River valley, Ingersoll Rural Cemetery, and groupings of a mixture of mature coniferous and deciduous vegetation and woodlots situated around the perimeter of the site. There are few residences in the vicinity of the subject site with completely unobstructed views of the proposed landfill operations.

Because of topography, existing vegetation, and the distance of the receptor points from the proposed development, the visual impacts are limited to minor impacts for receptors ZOR-10 and ZOR-11. These impacts are proposed to be mitigated by additional trees and vegetation, as recommended above.

Should a berm/barrier be required in this location for mitigation of noise impacts, provided the height is sufficient for visual screening, then tree planting would not be required. Tree planting would only be required for restoration of existing trees removed (to allow for the new berm/barrier) as well as for naturalization and aesthetics. Some vegetative plantings for naturalization of the new berm is recommended.

For all other receptors the proposed development is either screened from view or where a view is available it is either only a partial view or a distant view (or sometimes both). Therefore, there are no significant visual impacts to these receptors as a result of the proposed development.

In compliance with County of Oxford's Official Plan, it is our professional opinion that any potential visual impacts created by the proposed waste facility operation will be minimal and where impacts have been identified, can be minimized due to the suggested mitigation measures and there will be no unacceptable visual impacts or risks associated with mitigation or any remaining significant impacts after mitigation measures are in place.



# **11. Monitoring, Contingency & Impact Management Recommendations**

## **11.1 Monitoring & Contingency Plans**

To ensure survival and positive growth rate, any tree or vegetative screening recommended as mitigation (as shown on **Figures 19 & 20**), is to be maintained and managed appropriately so that it remains an effective visual screen over time. Allowance of natural succession to occur is encouraged, in keeping with restoration objectives.

During the first year of operations, it is recommended that any mitigation measures that require tree planting, the planted trees and vegetative restoration areas are watered and monitored until established. After the first year, it is recommended that the trees are inspected twice each year. Once in spring after leaf break, and once in fall prior to leaf drop, to ensure any trees which are in poor condition at the time, are fertilized, watered and monitored, as needed, to improve their health and vigor. In extreme cases, it may be necessary for a horticultural expert to observe the trees for any signs of disease or infestation, and provide specific recommendations in order to retain as many trees as possible.

If any of the planted trees die, they should be replaced yearly, preferably in spring or late summer. With annual maintenance and monitoring, the trees will have the best chance of survival, and overall, it is anticipated that the need for tree replacements during the life of the operation will be reduced.

## **11.2 Impact Management**

None required.



## 12. References

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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, Science and Research Branch, Peterborough, Ontario. Climate Change Research Report CCRR-44.

Ontario Ministry of the Environment, January 2012. *Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites*.

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Walker Environmental Group Inc., 2016. *Approved Amended Terms of Reference, Southwestern Landfill Proposal Environmental Assessment*. May, 2016.

Walker Environmental Group Inc., 2020. *Environmental Assessment Report (Draft), Southwestern Landfill Proposal Environmental Assessment*. January, 2020.

### Figures and Tables

Base data provided by Walker Environmental

Imagery: Oxford County 2015

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**Appendix A**  
**Annotated Photo Record**

DRAFT





### Site Photo Locations

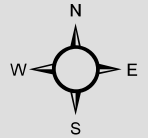
#### Legend

- Subject Lands
- Waste Fill Area
- 500 m Buffer
- 1000 m Buffer
- ◆ Flares (3)
- Municipal Boundary
- Waterbody
- Wooded Area
- Highways
- Major Roads
- Minor Roads
- Railway
- 17 Photo Number and Location

#### Sources of Information

- Contours derived from Digital Terrain Model (SWOOP 2015 Land Information Ontario)
- Base Data (Walker Environmental)
- Imagery: Oxford County 2015
- Contains information licensed under the Open Government License - Ontario
- All measurements are in meters unless otherwise specified
- Projection: NAD 1983 UTM Zone 17N

Date: July 12, 2019  
 File: 9811AG  
 Scale: 1:20,000  
 Drawn: JB



Document Path: K:\9811AG-Walker Environmental Group-Landscape Terms of Reference\GIS\Map Documents\Site Photo Locations.mxd



## Walker Environmental – Southwest Landfill

### Site Photo Inventory

Photo record from April 27<sup>th</sup>, 2017 and May 1<sup>st</sup>, 8<sup>th</sup>, & 11<sup>th</sup>, 2018 site visits

Prepared by MHBC Planning

The following provides a photo record of key potential views of the proposed landfill development, as well as recommendations if further assessment or proposed mitigation is required.

#### ZOR-1

#### View from Intersection of 31<sup>st</sup> Line and Road 66 (UTM: 507552, 4768980)



Source: MHBC site visit, May 2018

**Notes:** This view location from the intersection of 31<sup>st</sup> Line and Road 66 was identified in various view scenarios. Due to intermediary vegetation and distance it is not possible to view the proposed development.

**Recommendation:** No view potential - further assessment from this location is not required.



**ZOR-2**

**View from Intersection of 33<sup>rd</sup> Line and Road 66**

**(UTM: 508703, 4769450)**



Source: MHBC site visit, May 2018

**Notes:** Due to intermediary vegetation and distance it is not possible to view the proposed development even in leaf off conditions.

**Recommendation:** No view potential - further assessment from this location is not required.



**ZOR-3**

**View from Residence at 663951 Road 66**

**(UTM: 510216, 4770270)**



Source: MHBC site visit, May 2018

**Notes:** Due to intermediary vegetation and distance it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ZOR-4**

**View from Intersection of 37<sup>th</sup> Line and Road 66**

**(UTM: 511004, 4770360)**



Source: MHBC site visit, May 2018

**Notes:** Due to intermediary vegetation and distance it is not possible to view the proposed development.

**Recommendation:** No view potential - further assessment from this location is not required.



**ZOR-5**

**View from Residence at 334789 33<sup>rd</sup> Line**

**(UTM: 508931, 4768760)**



Source: MHBC site visit, May 2018

**Notes:** Due to intermediary vegetation and distance it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ZOR-6**

**View from Residence at 334742 33<sup>rd</sup> Line**

**(Photo Location #25, (UTM: 509185, 4768350))**



Source: MHBC site visit, May 2018

**Notes:** A partial view of the development is available. Full view is screened by the vegetation and hydro facility in the foreground.

**Recommendation:** Minor view potential – further assessment from this location is not required.



**ZOR-7**

**View from Residence at 414774 41<sup>st</sup> Line**

**(UTM: 512505, 4770060)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ZOR-8**

**View from Residence at 643743 Road 64**

**(Photo Location #27, (UTM: 508940, 4767980))**



Source: MHBC site visit, May 2018

**Notes:** Due to intermediary vegetation and distance it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ZOR-9**

**View from Residence at 334647, 334652 and 334655 33<sup>rd</sup> Line**  
**(UTM: 509437, 4767450)**



Source: MHBC site visit, May 2018

**Notes:** A partial view of the development is available. Full view is screened by the vegetation in the middle ground.

**Recommendation:** Minor view potential – further assessment from this location is not required.



**ZOR-10**

**View from Residence at 334578 33<sup>rd</sup> Line**

**(Photo Location #29, (UTM: 509739, 4766780))**



Source: MHBC site visit, May 2018

**Notes:** A partial view of the development is available above the existing vegetation.

**Recommendation:** Minor view potential – further assessment from this location is not required.



**ZOR-11**

**View from Residence at 623851 Rd 62/ North Town Line**

**(UTM: 510446, 4767010)**



Source: MHBC site visit, April 25<sup>th</sup>, 2017

**Notes:** A partial view of the development is available. Full view is screened by the vegetation

**Recommendation:** Medium view potential – further assessment from this location is not required. Impacts can be mitigated by additional vegetation.



**ZOR-12**

**View from Cemetery 603806**

**(UTM:510224, 4766570)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ING-1**

**View from Intersection of North Town Line E and Pemberton Street**

**(Photo Location #1, (UTM: 509757, 4766670))**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ING-2**

**View from Laurie Hawkins Public School**

**(UTM: 509757, 4766670)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ING-3**

**View from Ingersoll District Collegiate Institute**

**(UTM: 510512, 4766230)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ING-4**

**View from the river north of 209 County Road 9**

**(UTM: 509480, 4765180)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ING-5**

**View from Intersection of Thames Road and Charles St. W**

**(UTM: 508623, 4765540)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and existing buildings it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**ING-6**

**View from Royal Road Public School**

**(UTM: 510337, 4765360)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and existing buildings and vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-1**

**View from Residence at 584052 Beachville Road**

**(UTM: 511124, 4766750)**



Source: MHBC site visit, May 2018

**Notes:** Existing vegetation limits the view of the proposed development to only the area of the laneway.

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-2**

**View from Hi-Way Pentecostal Church (581448 Beachville Road)**

**(UTM: 511535, 4767260)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and existing vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-3**

**View from Residence at 584142 Beachville Road**

**(UTM: 511722, 4767480)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-4**

**View from Intersection of Beachville Road and 37<sup>th</sup> Line**

**(UTM: 512361, 4768470)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and existing buildings and vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-5**

**View from Property 584331 Beachville Road**

**(UTM: 512702, 4769030)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography, existing buildings and distance it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-6**

**View from Intersection of W Hill Line and Spruce Road**

**(UTM: 513588, 4770070)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-10**

**View from Residence at 563977 Karn Road**

**(UTM: 510980, 4765990)**



Source: MHBC site visit, May 2018

**Notes:** Partial distant view the proposed development is available.

**Recommendation:** Minor view potential - further assessment from this location is not required.



**SWO-11**

**View from Residence at 564028 Karn Road**

**(UTM: 511396, 4766310)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-12**

**View from Residences at 564047, 564058, 564062 Karn Road**

**(UTM: 511616, 4766520)**



Source: MHBC site visit, May 2018

**Notes:** Partial distant view the proposed development is available.

**Recommendation:** Minor view potential - further assessment from this location is not required.



**SWO-13**

**View from Centerville Pond and Conservation Area**

**(UTM: 511570, 4766920)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-14**

**View from Residences at 564120 and 564128 Karn Road**

**(UTM: 512109, 4766980)**



Source: MHBC site visit, May 2018

**Notes:** Partial distant view the proposed development is available.

**Recommendation:** Minor view potential - further assessment from this location is not required.



**SWO-15**

**View from Residence at 564146 Karn Road**

**(UTM: 512251, 4767100)**



Source: MHBC site visit, May 2018

**Notes:** Partial distant view the proposed development is available.

**Recommendation:** Minor view potential - further assessment from this location is not required.



**SWO-16**

**View from Residences at 564162, 564164, and 564168 Karn Road**

**(UTM: 512389, 4767250)**



Source: MHBC site visit, May 2018

**Notes:** Partial distant view the proposed development is available.

**Recommendation:** Minor view potential - further assessment from this location is not required.



**SWO-17**

**View from Residences at 564226 Karn Road**

**(UTM: 512958, 4767760)**



Source: MHBC site visit, May 2018

**Notes:** Due to distance and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-18**

**View from Intersection of Karn Road and Foldens Line (County Road #6)**

**(UTM: 513114, 4767940)**



Source: MHBC site visit, May 2018

**Notes:** Due to topography it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**SWO-19**

**View from Intersection of Clarke Road and Foldens Line (County Road #6)**

**(UTM: 514069, 4766910)**



Source: MHBC site visit, May 2018

**Notes:** Due to distance and intermediary vegetation it is not possible to view the proposed development

**Recommendation:** No view potential - further assessment from this location is not required.



**Appendix B**  
**Environmental Assessment Criteria and Studies**  
**(from the Approved Amended Terms of Reference)**

DRAFT



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
<b>Public Health &amp; Safety</b>																			
1	Explosive hazard due to combustible gas accumulation in confined spaces.						<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Effects due to exposure to air emissions.		<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Effects due to fine particulate exposure.		<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
4	Effects due to contact with contaminated groundwater or surface water.						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Flood hazard.						<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	Disease transmission <i>via</i> insects or vermin.				<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Public Health &amp; Safety (continued)</b>																			
7	Potential for traffic collisions.											<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	



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
8	Aviation impacts due to bird interference.					<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>	
<b>Social and Cultural</b>																			
9	Displacement of residents from houses.													<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	Disruption to use and enjoyment of residential properties.													<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11	Disruption to use and enjoyment of public facilities and institutions.													<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
12	Disruption to local traffic networks.														<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
13	Visual impact of the waste disposal facility.																	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
14	Nuisance associated with vermin.													<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Study that will be primarily responsible for addressing criterion.

**Note:** 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
<b>Social and Cultural (continued)</b>																			
20	Changes to community character/cohesion.										<input checked="" type="checkbox"/>								
21	Compatibility with municipal land use designations and official plans.									<input checked="" type="checkbox"/>									
<b>Economics</b>																			
22	Displacement/disruption of businesses or farms.										<input checked="" type="checkbox"/>								
23	Property value impacts.										<input checked="" type="checkbox"/>								
24	Direct employment in waste disposal facility construction and operation.										<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>		
25	Indirect employment in related industries and services.										<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>		

Study that will be primarily responsible for addressing criterion.

**Note:** 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
<b>Economics (continued)</b>																			
26	New business opportunities related directly to waste disposal facility construction and operation.																	✓	✓
27	New business opportunities in related industries and services.																	✓	✓
28	Public costs for indirect liabilities.																	✓	✓
29	Effects on the municipal tax base.																	✓	✓
30	Effect on the cost of service to customers.																	✓	✓
31	Effects on the provincial/ federal tax base.																	✓	✓
<b>Natural Environment &amp; Resources</b>																			
32	Loss/displacement of surface water resources.																	✓	✓
33	Impact on the availability of groundwater supply to wells.																	✓	✓
34	Effects on stream baseflow quantity/quality.																	✓	✓

Study that will be primarily responsible for addressing criterion.

**Note:** Many of the studies will provide key input to criteria that will be address through other impact assessment studies.





