Walker Environmental Group

Southwestern Landfill Environmental Assessment

Volume I:
Environmental Assessment Report (Draft)

Executive Summary

walker environmental

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Executive Summary

I. Introduction

This report documents the Environmental Assessment (EA) for the proposed Southwestern Landfill under Ontario's *Environmental Assessment Act*. The appendices to the EA include a series of supporting studies prepared by independent technical experts. The appendices also include the details of the extensive consultation carried out during the course of preparing this EA with government and non-governmental agencies, Indigenous Communities, and interested members of the public.

II. Identification of the Proponent

Walker Environmental Group Inc. ("Walker") is an experienced and capable resource recovery and waste management company based in Niagara Falls, Ontario. Its numerous facilities and services in the province, and across Canada, include landfills, resource recovery, composting, liquid organics recovery, landfill gas utilization, bio-solids management, haulage and waste transfer stations.

Walker's waste diversion businesses have grown considerably in the past several years. The company now diverts more than 725,000 tonnes of waste from landfill disposal each year, and produces a range of sustainable end-products that are reintroduced into the market, from facilities located across the province. Most of this growth has been in the recovery of organic waste, consistent with Ontario's current objectives.

III. Background & Purpose Statement

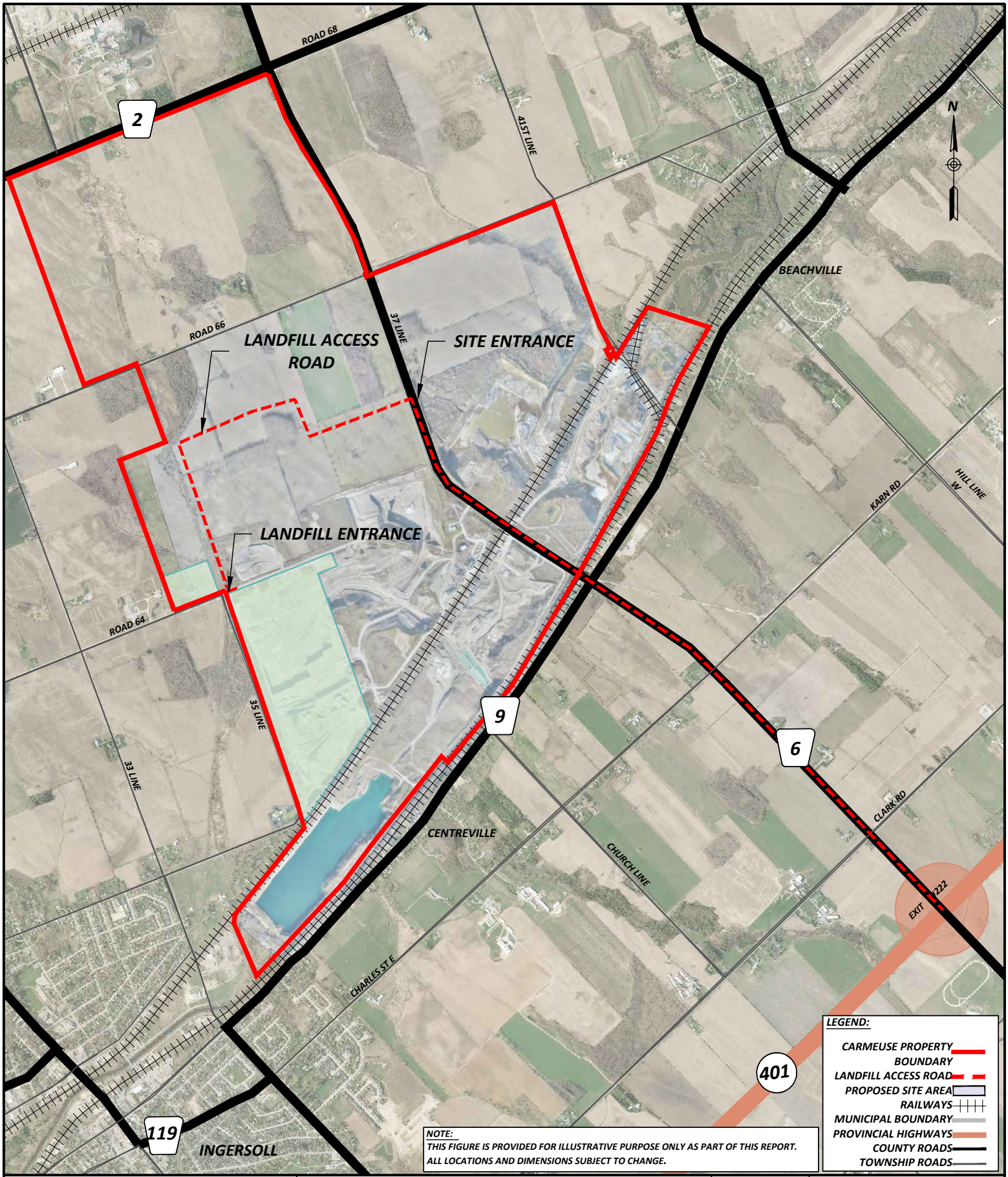
Ontario is facing a substantial shortage of waste disposal capacity in the province over the next several decades, even if aggressive levels of waste diversion can be achieved. As a result, large quantities of the province's waste will continue to be exported to the United States. Walker identified an opportunity to offset a portion of this provincial disposal deficit through the development of new landfill capacity at an existing industrial (quarry and lime processing) site in Oxford County, Ontario (**Figure i**). With this in mind, the purpose of this EA is: "*The provision of future landfill capacity at the Carmeuse Lime (Canada) Ltd. site in Oxford County for solid, non-hazardous waste generated in the Province of Ontario.*"

IV. Consistency with the Approved Amended Terms of Reference

This EA follows the detailed requirements set out in the *Approved Amended Terms of Reference*, as authorized by the Minister of the Environment and Climate Change on March 17, 2016. The only substantive deviation from these requirements relates mainly to an increase in the number of consultation activities from the original consultation program outlined for government and non-governmental agencies, Indigenous Communities and interested members of the public.

V. EA Methodology

The EA methodology also follows the detailed requirements set out in the *Approved Amended Terms of Reference*. There are two major phases of the EA methodology:



Owner: walker environmental	Project: SOUTHWESTERN LANDFILL	Project No.: 967243	Scale Bar: 0 500 1000 Meters	
		Drawn: JThompson	Scale: 1:30000	Date (D-M-Y): 14JAN20
	Drawing: SITE LOCATION & HAUL ROUTE	Approved: DFry	Drawing No.: Figure i	Revision No.: B

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i. An evaluation of the "alternative methods", in this case the different design alternatives for the proposed landfill; and
ii. A detailed assessment of the environmental effects of the preferred landfill design.

In each case, the key aspects of the evaluation were:

- The environment that could potentially be affected;
- The effects that would be caused on the environment;
- The actions necessary to prevent, change, mitigate or remedy the effects on the environment; and
- An evaluation of the (net) advantages and disadvantages to the environment.

A set of 41 approved criteria were used for the evaluation, comprehensively representing the broad range of potential effects on both the natural and human environment. These criteria addressed both the construction/operational duration of the proposed landfill, as well as the post-closure period. The associated study areas variously included the site, the site vicinity, the areas along the haul route, and the wider regional setting, as relevant. The study area boundaries were not rigid; they were adapted to suit each study and adjusted when necessary based on the study findings. Lastly, this EA was designed to incorporate an assessment of cumulative effects, examining how the effects of the proposed landfill could combine with those of other activities in the same area, as well as the possibility of different types of effects acting together.

VI. Evaluation of Alternatives

A series of alternative methods, or options, were developed and evaluated for the design of the proposed landfill site, and preferred alternatives were selected in each case, as summarized below:

Range of Alternative Methods Evaluated in the EA

'Alternative Methods'	Description	Result: Preferred Method(s)
Landfill Footprint	Different locations or configurations on the Carmeuse Lime (Canada) site where the landfill could be located and developed.	The (currently) active Southwest Quarry area.
Landfill Design Alternatives	Different landfill configurations (above ground, below ground or a combination) along with compatible liner designs (generic or site-specific, as *per* the Landfill Standards).	A deep design configuration progressing in a north-to-south orientation, equipped with the Ministry's "generic" double composite liner system.
Leachate Treatment Alternatives	Different ways of treating and disposing of landfill leachate, including sewer discharge and/or on-site treatment.	An on-site leachate treatment plant.
Landfill Gas Management Alternatives	Different ways of managing the landfill gas, including flaring, industrial fuel, and/or power generation.	Enclosed flares, with the future development of industrial fuel utilization, renewable natural gas, and/or electricity generation when the gas production warrants.

'Alternative Methods'	Description	Result: Preferred Method(s)
Haul Route/Site Entrance Alternatives	Different ways for the waste to be transported to the site, including road routes/entrances from Highway 401 and/or rail haulage.	Truck haulage from Highway 401 north on County Road 6, west and south around the current quarry operations to a landfill entrance at the northwestern corner of the landfill.

The details for the five (5) preferred alternative methods are illustrated in Figures i, ii, and iii. Specifically, the preferred haul route is illustrated in **Figure i**, while the preferred landfill footprint and the proposed locations for the leachate and gas management facilities are shown in **Figure ii**. Finally, the landfill design configuration and the liner system are illustrated in **Figure iii**.

VII. Evaluation of the Proposed Undertaking

After selecting the preferred design alternatives (above), the second phase of the EA evaluated the potential effects of the proposed landfill on the environment, based on the 41 criteria approved for this EA.

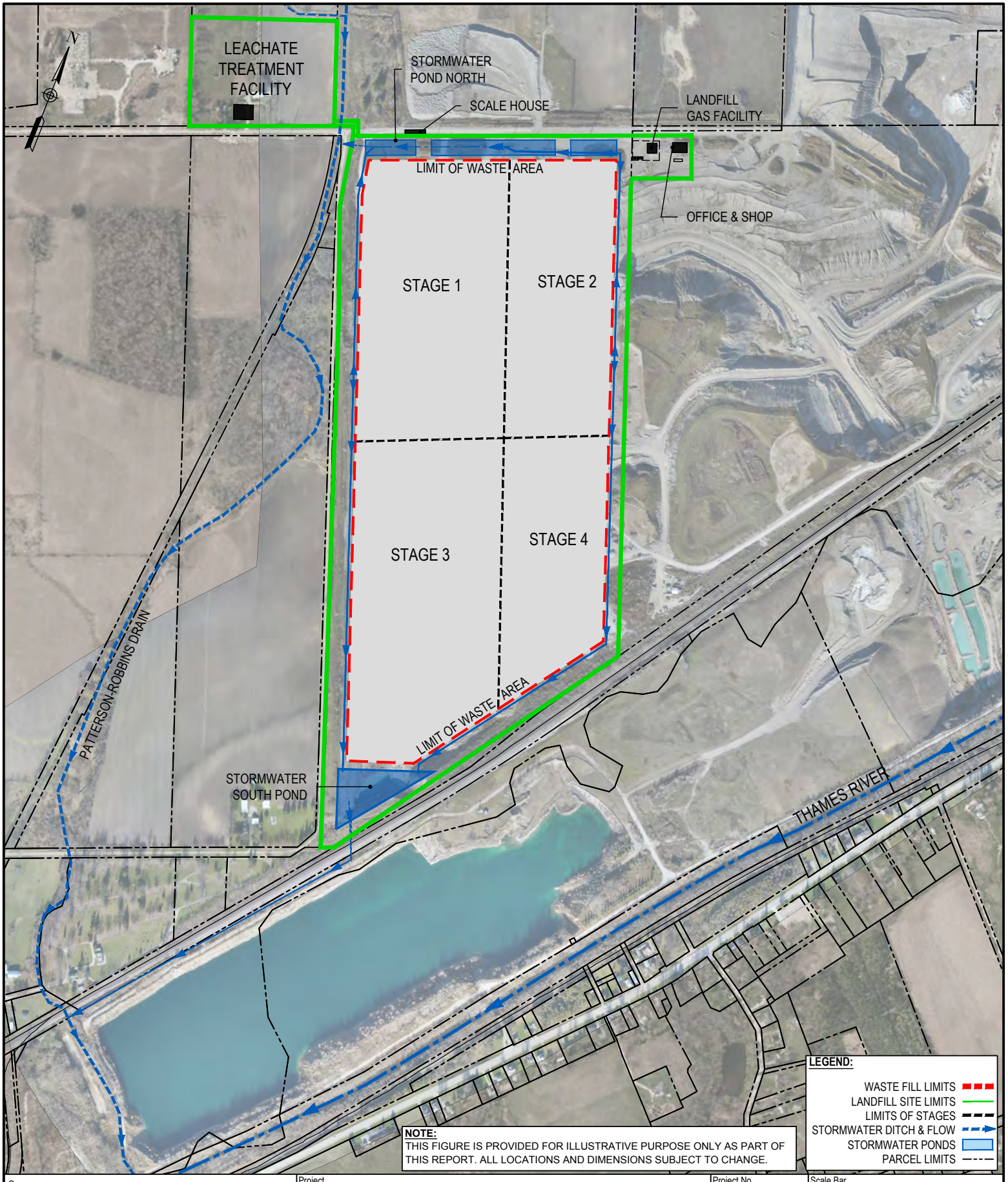
Description of the Proposed Landfill

The design and operations of the proposed landfill are based on the comprehensive regulatory requirements set out in Ontario Regulation 232/98 (and the associated *Landfill Standards*).

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

Landfill construction will proceed progressively in a series of cells, generally from north-to-south. First, the former quarry floor will be filled to within about 30 to 40 metres of ground surface with engineered backfill, 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 iii**) will be constructed across the bottom and up the sides of the landfill to contain and collect leachate. 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[1] will then be placed and compacted above the liner in a series of small

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



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	Drawing: SITE PLAN	Approved: DFry	Drawing No.: Figure ii	Revision No.: A

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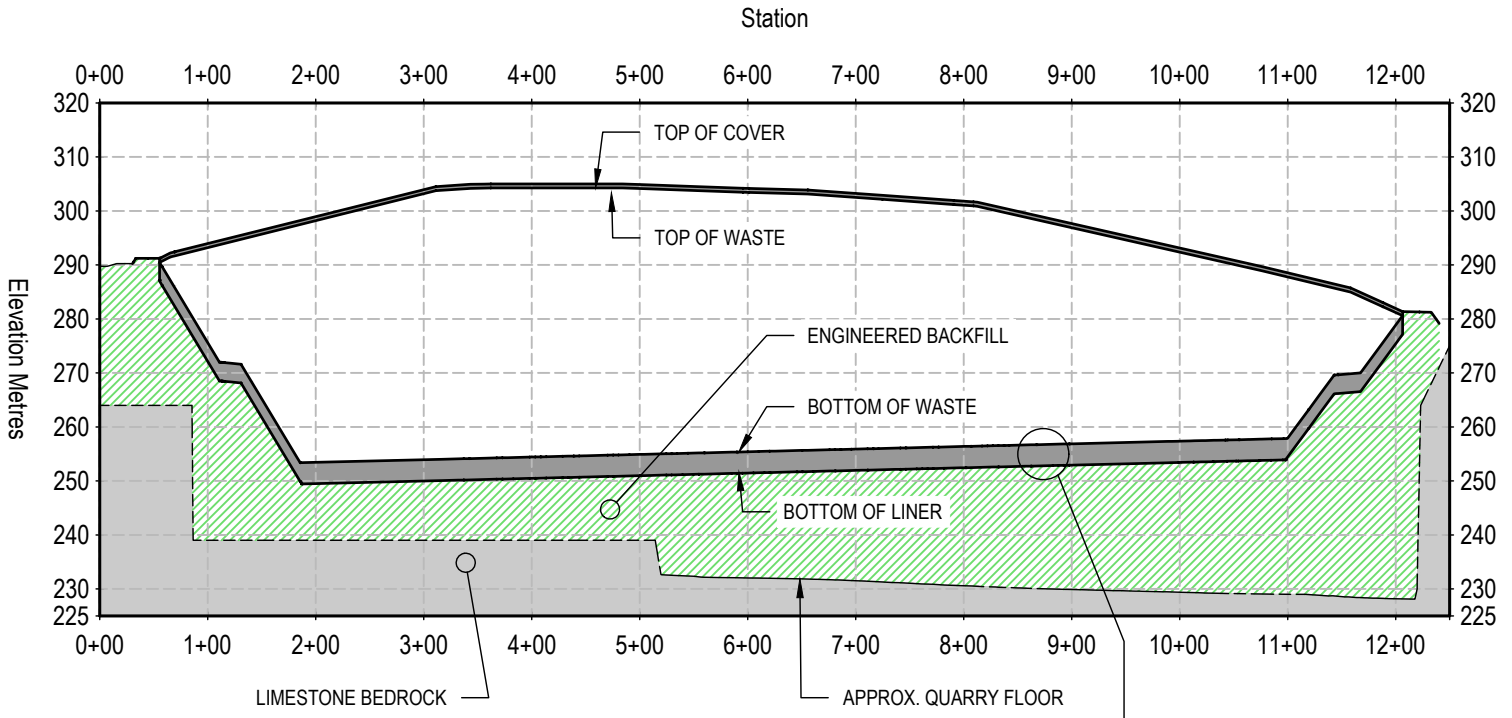
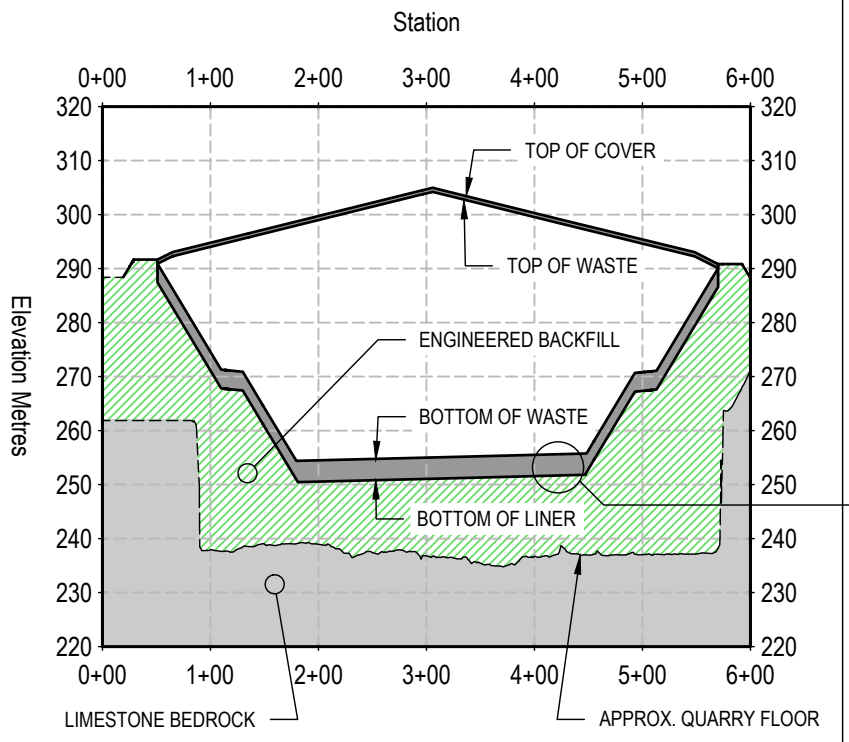
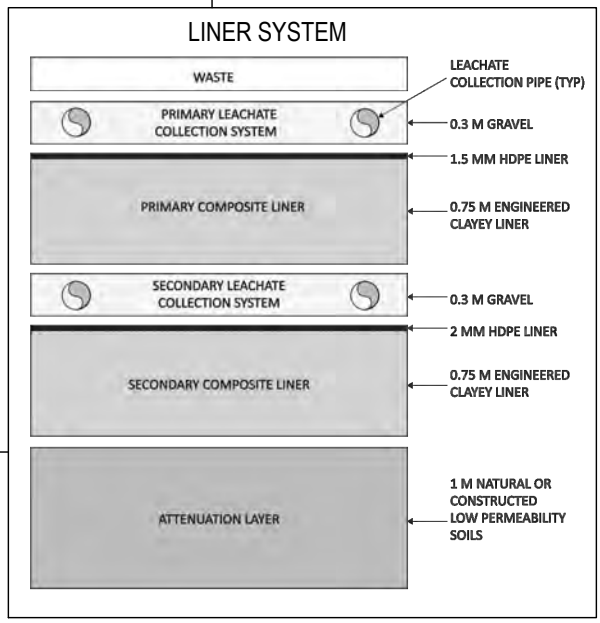


North - South Section View



West - East Section View



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

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working areas no more than 0.2 ha in size at any given time, in order to minimize the exposed waste. Waste will be covered daily, and a final cover with vegetation will be applied when the landfill reaches its full height, which peaks at about 15 m above ground (**Figure iii**). A landfill gas collection system will also be installed as the landfill 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 (**Figure ii**). 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 and groundwater that has not come into contact with waste will be segregated and treated in either one of two stormwater management ponds before being discharged from the site. Landfill gas will be 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 operational 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, if any) is from Highway 401 north along County Road 6 to the site entrance, then west along a newly constructed landfill access road around the quarry to a landfill entrance at the northwestern corner of the site (**Figure i**). 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, litter fencing and pick-up, and bird management, with a public complaints reporting and response program.

The *Environmental Compliance Approval* for the site will establish the required programs for inspection, maintenance, record keeping, monitoring and contingency plans. It will also specify the amount of the financial assurance that Walker must maintain with the province – sufficient dedicated funds available to the Province to fully manage the site should Walker be unable to do so, either during operations or after closure.

The landfill is anticipated to receive waste for approximately 20 years commencing 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.

Climate change resilience and adaptation has been built into the design in a number of ways; for instance, the sizing of the leachate and stormwater management systems. The design and operations are also sufficiently flexible to allow for periodic adjustments as weather patterns change over time.

Walker will continue to divert waste from landfill disposal through its extensive waste diversion/resource recovery facilities that are strategically located across the province. Walker is committed to pursuing and implementing further expansion of its waste diversion system as suitable business opportunities arise. It may become feasible and advantageous at some point in the future to co-locate new facilities at the proposed Southwestern Landfill, particularly if they support further waste diversion initiatives in Oxford County; if so, separate approvals would be sought at that time.

The Environment Potentially Affected

Walker commissioned independent technical studies on all aspects of the environment. These studies characterized the environment that could be affected by the proposed landfill – both the existing environment as well as the expected future environmental conditions (i.e., the "*do nothing*" alternative that is the baseline for comparison in this EA). A brief synopsis follows.

Location & Land Use

The site consists of a portion of a larger industrial complex of quarries and lime manufacturing bordering railway lines and the South Thames River (Thames River) to the south. These quarries will continue to expand gradually to the north and east over many decades. Beyond that, the land is mainly agricultural, with the rural residential cluster of Centreville to the south, the village of Beachville to the northeast, and the Town of Ingersoll to the southwest (**Figure i**). Only minimal residential growth is forecast within about 1 km of the site over the next twenty years, while Ingersoll's main area of growth is expected to be to the south and southeast, towards Highway 401.

Climate

A detailed five-year meteorological data set was developed for this study. Winds are of particular relevance. High wind speeds in this area can be associated with any wind direction, but are most often associated with winds coming from westerly directions (SSW through NW) and also winds from the east. Winds blowing from the northeast and southeast are relatively weaker and less frequent, by comparison.

Climate change is also considered in the assessment, and assumptions from the Ontario Ministry of Natural Resources and Forestry were adopted.

Cultural Heritage

None of the structures or landscapes on-site or within 1 km of the site were determined to have significant cultural heritage value or warrant conservation in accordance with provincial criteria. Likewise, no important archaeological resources were found on the site or along the proposed new access road, with the exception of a 1.8 ha plot of primarily Euro-Canadian artifacts located in the area of the proposed leachate treatment facility, likely remnants of a mid- to late-19th century to early 20th century farm house.

Indigenous Land Uses

Twelve Indigenous Communities have constitutionally protected Indigenous or Treaty Rights in the area. Members of these communities use certain lands in the general area for traditional activities. The Thames River in particular has long been a focus of traditional hunting, harvesting and gathering, and it also has cultural and spiritual significance.

Surface Water

The site lies within the (natural) sub-catchment of the Patterson-Robbins Drain which flows south into the Thames River (**Figure ii**). Flow in this agricultural drain ranges from dry in the summer up to an estimated 20 m^3/s for a 100-year storm. The flow here, and in the Thames, can be expected to increase

marginally over time with climate change. The water quality is typical of an agricultural drain and does not currently meet provincial water quality objectives for some parameters.

However, where the site has been quarried, the quarry dewatering operation pumps precipitation, along with groundwater seepage, off the quarry floor through an approved water management system, and eventually out to the Thames River.

Geology & Groundwater

The geology of the site consists of more than 20 m of glacial till soils lying on top of a series of limestone beds extending down nearly 100 m further. The quarry operations remove the glacial till and then extract about 25 m into the limestone.

Regionally, groundwater flows to the south and southeast following the Thames River Valley. Locally though, the quarry dewatering draws groundwater inward and into the quarry from about 1 km in all directions.

The main groundwater aquifer found in the vicinity of the site is in the upper 10 m of the limestone; most of the private residential water wells in the vicinity draw their water from this aquifer. There is another, deeper aquifer at about 65 m depth where some industrial and commercial wells in the area draw their water. Ingersoll is serviced with piped, municipal water supply. The nearest municipal well is Ingersoll Well 8 (Dunn's Well) about 1 km southwest of the proposed landfill site. It is 125 m deep and draws its water from the northwest, away from the site.

Ecology

There are no important natural heritage features or rare, endangered or threatened species on the site proposed to be used for the landfill since it is mainly an ongoing quarry operation. The aquatic, vegetative and wildlife species and habitats in the surrounding vicinity are for the most part common and typical of rural agricultural settings.

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

- Fish habitat within the Patterson-Robbins Drain;
- Woodlands west of the site, which may provide habitat for endangered bat species and roosting habitat for other bat species;
- A meadow south of the site that provides habitat for the threatened Eastern Meadowlark;
- Swamp and marsh areas located to the northeast of the site that are amphibian breeding habitat; and
- Habitat for nesting Cliff Swallows along the northern wall of the former West Quarry, where a colony was previously found.

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

- Fish habitat within the Patterson-Robbins Drain, Caddy Drain, Foldens Creek and the South Thames River;

- Woodlands to the north;
- A Great Blue Heron heronry on the south side of the former West Quarry that also contains Cormorants and Turkey Vultures;
- A corridor along the Thames River for the movement of the endangered Spiny Softshell Turtle, as well as other aquatic, semi-aquatic and terrestrial wildlife;
- Habitat for Snapping Turtle, a species of special concern, in the pond and wetlands within the Centreville Conservation Area and the Thames River.

Agriculture

Zorra and Southwest Oxford are primarily agricultural, with field crops and cattle farming predominating. Although the landfill itself would occupy a depleted quarry, and there are future quarry lands to the north (currently being rented out for cropping), there are farms bordering the site to the west and northwest. The closest, to the immediate west, is a retired farm operation with fields that are still being cropped. There are five operational farms within 500 m to 1 km further west and northwest. There are also a number of farms bordering the haul route on County Road 6, including two farm lanes and six field access points, indicating that some farm machinery does move along this route. The farming activity in the vicinity of the site is expected to remain generally similar in the foreseeable future, aside from the rented fields to the north which will be gradually removed from rental cropping over a period of decades as the quarry operations progress.

Social

There are only two residences within 500 m of the proposed landfill site, with a further 88 residences within 500 m to 1 km. There are also 27 residences along the primary haul route on County Road 6.

The only public facilities or institutions within 500 m of the proposed site are the Ingersoll Rural Cemetery and a Hydro One substation, but beyond that distance there are numerous others in the Town of Ingersoll and the villages of Beachville and Centreville. These include schools, libraries, employment services, emergency services, a hospital/health unit, post offices and utilities.

Two recreational features were identified within 500 m of the site. One is an “unofficial” trail (on private property owned by the quarry operator) following the former rail bed to the west and northwest of the site, while the other is an on-road cycling route on Beachville Road. Other recreational features further removed from the site include parks, playgrounds, sports fields, *etc*. Trail use is particularly popular in the area, with support from several active trail groups.

Residents in Oxford County describe their community character and cohesiveness in a generally positive way, characterizing it as friendly, supportive and welcoming, with a peaceful “small town” feel and a spirit of volunteerism for community events; 95% of Oxford County residents are satisfied with living in their community. These characteristics are expected to be sustained even as the County continues to grow.

Economy

Carmeuse Lime (Canada) Ltd. is the only business located within 500 m of the site. There are five additional businesses currently located within 1 km of the site and a much larger number and variety of businesses beyond that, mainly within the urban boundary of Ingersoll.

Oxford County's economy is relatively strong with a high demand for labour. The rural municipalities of Zorra and South-West Oxford rely on agriculture and mineral resources as their staple employers, while manufacturing and services are more prominent in urban centres like Ingersoll. Farms are consolidating rapidly, a trend that is likely to continue.

The price of farm land is rising and is among the highest in the Province. House prices have also risen sharply in the last few years in a strong sellers market.

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

Indications are that the County's population and economy will continue to grow steadily over the next several decades, with corresponding strength in employment, housing demand and municipal revenues and expenses. However, growth is likely to be more limited in the rural agricultural and resource sectors due to continuing consolidation and automation.

Transportation

County Road 6, the proposed primary haul route from Highway 401 to the site, is a paved, two-lane arterial road suitable for heavy truck traffic. It has adequate capacity and service levels (i.e., stable flow and low potential for congestion) to accommodate the average of about 9,000 vehicles *per* day that use the road (of which about one-third are trucks), as well as the expected growth in traffic over the next 20 years.

Noise

Noise is present in the vicinity of this site from urban, industrial and farming activities, along with the associated road traffic. Existing noise levels in the site vicinity generally meet provincial guidelines with one notable exception – traffic noise in the area around the intersection of Beachville Road and County Road 6.

There is a substantial amount of impulsive (sharp and almost instantaneous) noise in the vicinity of the site due to activities such as passing trains and quarry operations. Measurements taken to the south of the site revealed 29 to 59 impulses exceeding 65 decibels on a typical day.

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

Air Quality

Air quality in this area reflects the predominant land uses, including urban development, agriculture and industry. It generally remains within government standards and guidelines for a wide range of constituents, with only a couple of notable exceptions. One is benzo(a)pyrene (a tailpipe emission) where levels are about three times the applicable criterion, mainly influenced by the proximity of major transportation corridors such as rail lines and Highway 401. The other is chloroform which exceeds its applicable criterion by about 20% on average; the source is unknown (it is not related to the nearby quarry and lime manufacturing operations).

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

Dust is generated in the vicinity of the site by a variety of activities including traffic on the roads, the local quarry operations, and farming. However, airbourne particulate levels at off-site locations are within government health standards for inhalable and respirable particle sizes (PM_{10} and $PM_{2.5}$, respectively). Similarly, aesthetic/nuisance criteria for suspended dust and dust fall are also currently met at all off-site locations except around the intersection of Beachville Road and County Road 6, where visible (suspended) dust levels are slightly higher on occasion, which is largely attributable to traffic.

Potential Effects, Mitigation & Net Effects

The various technical studies also evaluated the range of potential effects that the proposed landfill could have on the environment, as represented by the 41 criteria approved for this EA. The results are summarized criterion-by-criterion in **Appendix D** to the EA.

A considerable amount of mitigation was incorporated into the initial proposal for the landfill; this served as a starting point for the effects assessment.

Built-in Mitigation Measures

Built-in Mitigation Measures	Purpose
Located in a depleted quarry.	Use of a "brownfield" site with existing industrial infrastructure minimizes the potential to displace or disturb natural, cultural, social or agricultural resources.
A minimum surface elevation (height).	Keeping more than 80% of the landfill operations below ground in the former quarry reduces exposure, thus minimizing visibility, noise, dust, and blowing litter.
A primary haul route on County Road 6 with direct access to Hwy 401.	Using a County road designated for truck traffic with a relatively short distance to Highway 401 means that the route is compatible with waste haulage trucks and there is less potential for disturbance to residents and businesses along the haul route.
Storm water management system.	Clean storm water will be segregated and collected, settled to remove sediment, and fed into the adjacent Patterson-Robbins Drain to maintain its flow and water quality, as well as in the Thames River further downstream. It will also be designed with sufficient capacity to manage major storm events and prevent flooding.
The *Generic Design Option II - Double Liner* (as *per* O. Reg. 292/98).	The Ministry of the Environment designed this double composite liner system to be fully protective of groundwater for the entire contaminating lifespan of the landfill. Extending the liner to the ground surface around the landfill perimeter will block landfill gas from escaping through the ground.

Built-in Mitigation Measures	Purpose
Leachate collection and treatment systems.	Leachate generated in the landfill will be pumped out and treated in an on-site treatment plant, which will ensure that it does not build up inside the landfill. The leachate will be treated to the point where the clean effluent will meet provincial water quality standards and can be discharged into the Patterson-Robbins Drain to maintain its flow and water quality.
Gas collection and flaring.	Collecting and flaring the gas generated in the landfill will protect air quality, reduce odours, reduce greenhouse gas emissions, and further mitigate the potential for subsurface gas migration.
Gas utilization.	When sufficient gas production occurs, the gas will be utilized as a renewable energy resource, which will further reduce greenhouse gas emissions in addition to the beneficial use of the energy.
Compact working area.	Having a small open working area of no more than about 2,000 m^2 in size at any given time, with the remainder of the landfill under cover, will help minimize odour, dust, blowing litter, birds, and visibility.
Daily cover application.	Covering the waste in the working area at the end of every day (or more frequently, if necessary) will help minimize odour, blowing litter, birds, and visibility.
Road cleaning and watering	Regular cleaning and/or watering of internal roads, will minimize dust and limit mud tracking onto public roads.
Speed limits.	Speed limits will be established on internal roads to limit dust generation.
Litter fencing.	Permanent litter fences will be placed at strategic locations. In addition, mobile fences will be moved when wind directions change, to further help prevent litter from blowing off site.
Litter collection.	Crews will regularly gather fugitive litter both on- and off-site to improve aesthetics and discourage bird scavenging.
Bird control.	Birds of prey, noisemakers and other industry standard bird control methods will be used daily during operating hours to discourage birds from gathering and scavenging at the landfill.
Pest control.	Pest control will be used if and when necessary to minimize vermin at the site and in the vicinity.
Public “hotline”.	A formal program will be in place to promptly investigate and respond to any public complaints regarding the landfill.
Monitoring & contingency plans.	Comprehensive monitoring, record-keeping and reporting programs will be instituted, enforced and reviewed through the Ministry’s *Environmental Compliance Approval* for the site. Contingency plans will be developed for implementation when and if necessary
Financial assurances.	Walker will be required to post and maintain secure financial assurances with the Province that would be sufficient for the Province to fully complete, close and maintain the site should the company be unable to do so.

Following is an overview of some of the key findings from the potential effects assessment, along with additional mitigation measures that are incorporated to further reduce or eliminate any negative effects, and the net effects (advantages and disadvantages to the environment).

Public Health & Safety Effects:

- Air emissions from the landfill site will not exceed provincial air quality standards at any off-site residence or public facility. As a result, the landfill emissions will not be a material contributor to any cumulative air quality effects from other baseline sources.
- Particulate (dust) emissions from the landfill and landfill traffic on their own will not exceed provincial criteria at any off-site residence, but will add to exceedances when combined with

other sources (primarily traffic sources). Enhanced dust controls are proposed for the landfill to further minimize its contribution.

- The project will result in a substantial reduction in greenhouse gas emissions (6 to 8 million tonnes CO_2e) compared to landfilling the equivalent amount of waste in Michigan landfills, equivalent to removing about 30,000 cars *per* year from the road for 50 years.
- The Ministry's *Generic Design Option II* double composite liner and leachate collection system will ensure that the leachate generated in the landfill is contained and collected for treatment, preventing leachate from impacting off-site groundwater or surface water.
- Extending the liner system up to ground surface on all sides will also contain landfill gas and, along with the operation of the landfill gas collection system, will prevent combustible gas from migrating from the site below the ground.
- The storm water management system will prevent flooding on-site and ensure that there is no increased flood risk off-site.
- Birds attracted to the landfill could pose a slightly increased risk to any low-level flights over the landfill, and possibly add somewhat to the number of birds flying over the Tillsonburg Airport. An Integrated Bird Management Program has been developed to mitigate this risk.
- Vermin will be well controlled and there is negligible risk of disease transmission to humans.
- County Road 6 can safely accommodate the incremental increase in traffic to and from the landfill site while maintaining stable traffic flow and a low potential for congestion. As an added measure of safety, additional mitigation will include truck queuing space on-site, and a left turn lane on CR#6 for landfill trucks along with warning signs.
- A human health risk assessment has confirmed that none of the emissions from the proposed landfill or its traffic, though the air, water and/or soil, would result in any unacceptable short- or long-term health risks to the community.
- The health assessment also concluded that the economic benefits were likely to result in some positive health outcomes in the local and regional area, while any negative social effects were determined to have a low magnitude and low likelihood of related health effects, aside from certain individuals who may continue to perceive the landfill negatively. The ongoing community engagement and communication proposed for this site is endorsed as a means to help mitigate these effects.

Social & Cultural Effects:

- No residents need to be displaced for the landfill development.
- The landfill traffic would add marginally to the visible dust nuisances experienced occasionally around the intersection of Beachville Road and County Road 6, although dust fall and accumulation is not expected to be an issue.
- With additional mitigation consisting of odour covers on the leachate treatment pond surface, detectable landfill odours are predicted to meet provincial guidelines of less than 0.5% of the time at all off-site residences with the exception of the nearest resident to the southwest (where detectable odours may occur 0.9% of the time).
- Noise from the landfill site is calculated to meet provincial guidelines at all off-site locations, even when combined with other noise sources in the area. The increase in noise levels from landfill traffic along the County Road 6 haul route will be negligible. The only exception is one adjacent residence to the southwest where noise during the later stages of the landfill's operation would exceed guidelines and a noise barrier is required for further mitigation at that time.

- Potential noise impacts from bird control shotguns used in certain locations of the site will be mitigated by using other enhanced bird control methods in these areas.
- Vibration from the landfill construction and operation will not be an issue.
- Owing to the deep design configuration and relatively low height of the landfill, the site will not be visible from most residences, public spaces and public roadways in the vicinity. There will be a few residences with long-distance and/or occasional views of the site during certain operational stages. One residence, closest to the site to the southwest, would have a close (though partially screened) view of the final stages of the landfill construction; however, the noise barrier noted above and/or trees will mitigate this view.
- Residences along the County Road 6 haul route are set fairly far from the road with tree screens that limit views of the passing traffic. All have good sight lines to County Road 6 traffic when entering and exiting their driveways.
- No important cultural heritage resources or landscapes need to be removed or disturbed.
- Leachate treatment plant construction will disturb the primarily Euro-Canadian archaeological artifacts of a former farm house; these artifacts will be removed and preserved prior to construction.
- The occasional nuisance effects within about 500 m of the landfill, or along the CR#6 haul route, could result in some incremental reduction in the use of enjoyment of these properties.
- The overall character and cohesion of the community is not expected to be affected; the landfill is a continued industrial use on a larger, long-term industrial property.
- The controversy surrounding the proposal and approval of the landfill will have engendered some residual social impacts with certain individuals or groups, while the concerns of others will diminish once the landfill is in operation and establishes a good track-record. A Public Liaison Committee and regular community updates are proposed to help mitigate concerns as early as possible.
- Indigenous traditional land uses are not expected to be affected given the limited and localized range of effects associated with the landfill. The Thames River will not be affected.
- The landfill will provide a convenient local disposal option for Oxford County businesses (and residents, if needed) and thereby support the County's "*Future Oxford*" goals.

Economic Effects:

- Total economic output of the project in the province will exceed $800 million, with $435 million in GDP, $222 million in labour income and the equivalent of nearly 3,000 person-years of full-time employment.
- More locally, direct economic output within about a one hour drive of the site is estimated at $380 million with $208 million in GDP, $94 million in labour income, and the equivalent of 57 full time jobs *per* year.
- Indirect and induced output in the same area would be an additional $263 million, with $141 million in GDP, $79 million in labour income, and the equivalent of 47 full time jobs *per* year.
- Potential savings to area businesses is estimated in the range of $200,000 to $250,000 *per* year due to the availability of a local disposal option.
- Property values in the vicinity of the site have continued to appreciate despite the negative publicity regarding the proposed landfill. No effect is forecast on property values during landfill operation or closure. Nevertheless, property value protection is recommended within 500 m of the landfill as a further precaution.
- No new public services are required.
- Some additional wear on County Road 6 (in proportion to Walker's traffic, about 5%).

- Property taxes in the order of about $77,000 *per* year, plus direct and induced taxes to all levels of government totalling nearly $100 million per year.

Effects on the Natural Environment & Resources:

- Water supply to area wells will not be affected by the landfill; water levels in the vicinity are already controlled by quarry dewatering which will isolate the landfill construction and operation from the groundwater.
- With the proposed landfill being located in a mined-out quarry, no natural features such as watercourses, woodlands, wetlands *etc*. need to be removed, nor any natural resources such as mineral, agricultural, forestry, or recreational.
- A slight overall gain in potential agricultural land, compared to the rehabilitated quarry.
- No disruption to farm operations in the vicinity, although continued caution will be required for farm equipment moving along or across the haul route on County Road 6. Walker proposes to mitigate any disruption to tile drains, drainage outlets or other drainage features during landfill related construction.
- No effects to terrestrial or aquatic ecosystems in the vicinity of the site.

Advantages & Disadvantages to the Environment (Net Effects)

With the implementation of the additional mitigation and impact management measures, the following summarizes the positive and negative effects on the environment that will result from the proposed landfill site.

Summary of Net Advantages & Disadvantages to the Environment

Net Advantages to the Environment	Net Disadvantages to the Environment
• Approximately 20 years of additional, secure waste disposal capacity in Ontario to support the province's businesses and municipalities, reduce Ontario's forecast waste disposal deficit, and reduce the risk to the province should the US border be closed to waste exports. • A net reduction in greenhouse gas emissions of approximately 6 to 8 million tonnes of CO_2e compared to landfilling the same waste in Michigan landfills. This is roughly equivalent to removing 30,000 cars *per* year from the road for 50 years. • Emergency/alternative disposal capacity for Oxford County municipal waste, if required. • Sufficient in-County waste disposal capacity for both municipal and IC&I waste for at least 20 years, supporting the County's "*Future Oxford*" goals. • Total provincial economic output greater than $800 million, with $435 million in GDP, $222 million in labour income, and the equivalent nearly $3,000 person-years of full-time employment.	• Minor additional contributions to existing air quality exceedances of chloroform (source unknown but not from the Carmeuse facility) and benzo(a)pyrene (a regional-scale, tail-pipe emission) in the site vicinity. • A slight (less than 8%) increase in particulate levels (PM_{10}) around the intersection of Beachville Road and County Road 6, increasing exceedances of provincial criteria once or twice in every five-year period. • A 35% increase in $PM_{2.5}$ particulate levels on Beachville Road south of the site, increasing exceedances of provincial criteria by only one occurrence over a five-year period. • A frequency of odour detection slightly (0.4%) in excess of provincial guidelines at the (one) nearest residence to the southwest of the landfill during a portion of the Stage 3 operational period. • A slight increase in maintenance on County Road 6 due to additional truck traffic. • Occasional, partial or long-distance views of the landfill from a few locations around the site.

Net Advantages to the Environment	Net Disadvantages to the Environment
• Local (within one-hour drive) total economic output of $643 million, with $349 million in GDP, $173 million in labour income, and the equivalent of 104 full-time jobs *per* year. • Growth in existing and new businesses to service and supply the estimated $148 million in capital plus $240 million in operating costs over the 20-year life of the project. • A potential savings of up to $250,000 *per* year to County of Oxford businesses that currently export their waste disposal. • Municipal tax revenues from related employment estimated at $12.8 million. • Provincial taxes estimated at $19.4 million plus $13.6 million from related employment. • Federal taxes estimated at $7.2 million plus $32.7 million from related employment. • A minor (about 11 ha) increase in potential agricultural land following closure (compared to the rehabilitated quarry). • Potential new opportunities for Indigenous employment or related businesses. • Establishment of a new company in the community that has a good track-record of community support and partnerships.	• Occasional nuisance effects (dust or odour) at the closest residence to the southwest, at the County Road 6/Beachville Road intersection, at the Ingersoll Rural Cemetery and the "unofficial" railway trail west of the site could result in some incremental loss or enjoyment of these properties. • Some residents who may have pre-determined concerns about the landfill could decide to leave the community, while others may remain and re-assess based on the actual performance of the landfill. • A (temporary) displacement of rented fields for the new access road. The loss of approximately 6.3 ha of rented agricultural land for the leachate treatment facility.

Impact Management Measures

In the few instances where potential effects cannot be directly mitigated (prevented or reduced) as noted in in the table above, Walker developed other ways by which they could be managed or other benefits that could be offered. These include:

- An inspection program for County Road 6, in cooperation with the County of Oxford, along with further dust control if and when needed.
- A Public Liaison Committee (PLC) to meet at least annually and review the site operations and monitoring results, and to raise any community suggestions or concerns.
- An Indigenous Liaison Committee (ILC), to meet at least annually and review the site operations and monitoring results, and to raise any community suggestions or concerns.
- Providing regular community updates during the construction and operation of the landfill.
- Offering host municipality funding.
- Offering compensation to the nearest neighbours, within 500 m of the site, for any residual nuisance effects.
- Local hiring and procurement policies.
- Indigenous employment, contracting and procurement policies.

VIII. Effects Monitoring, Reporting & Contingency Plans

Comprehensive monitoring programs will be in place for this site and regulated through the *Environmental Compliance Approvals*. These will include routine monitoring for:

- Leachate quality and quantities;
- Surface water quality and quantities;
- Groundwater levels and quality;
- Subsurface combustible gas concentrations;
- Fish and benthic communities in the Patterson-Robbins Drain; and
- Various operational activities such as waste quantities, equipment operations, blowing litter, birds, public concerns, *etc*.

All of these monitoring results will be compiled in an annual report to the Ministry of Environment, Conservation & Parks for the public record.

A set of contingency plans will also be developed under the *Environmental Compliance Approvals* to establish procedures for reacting to unplanned occurrences. These will include emergency response plans (e.g., fire, medical, natural disaster, *etc*.) as well as a wide range of operational contingencies for such issues as flooding, haul route or highway closures, leachate or gas management system upsets, power failures, spills, weather extremes, *etc*.

Of particular importance are contingency plans to deal with any potential leachate escape that would be identified through the groundwater and surface water monitoring programs. In the event of a potential surface water issue, any contaminated water would be retained on-site and processed though the leachate treatment plant prior to discharge in order to meet provincial water quality objectives. Repairs would be made to eliminate the source (e.g., repair the landfill cover to prevent a surface seepage).

A multi-layered contingency plan is proposed for groundwater protection. Although highly unlikely, if monitoring ever identified unexpected leachate escape through the liner system, one or more of the following would be employed, as the specific circumstances warranted:

Leachate Purge Wells:

A series of wells could be installed into the waste and/or into the leachate collection system to pump out and remove leachate from within the landfill for treatment.

Quarry Floor Underdrain System:

The former quarry operations included drainage trenches and sumps on the quarry floor that were used for dewatering purposes. These will be preserved and enhanced when the landfill is developed and quarry floor is backfilled so that they can be used to create an inward groundwater flow to capture any leachate migrating below the liner and through the backfill, before it reaches the site boundary.

Groundwater Purge Wells:

> A series of wells can be installed at the perimeter of the landfill at whatever location(s) and depth(s) necessary to collect groundwater and capture any leachate that migrates below the liner, before it reaches the property boundary.

The financial assurances that Walker will be legally required to post for the landfill will ensure that the Province will have sufficient financial resources available to carry out any contingency plans and/or the closure and post-closure care of the landfill should Walker not be able to fulfill these obligations.

IX. EA Commitments, Compliance Monitoring & Reporting

This EA includes a number of commitments, and others may be added as conditions of the EA approval; Walker proposes to prepare an EA Compliance Report annually following each year of landfill operations, and then additional reports five years and ten years following closure of the site, in order to confirm compliance with these commitments to the Ministry of Environment, Conservation & Parks and for the public record.

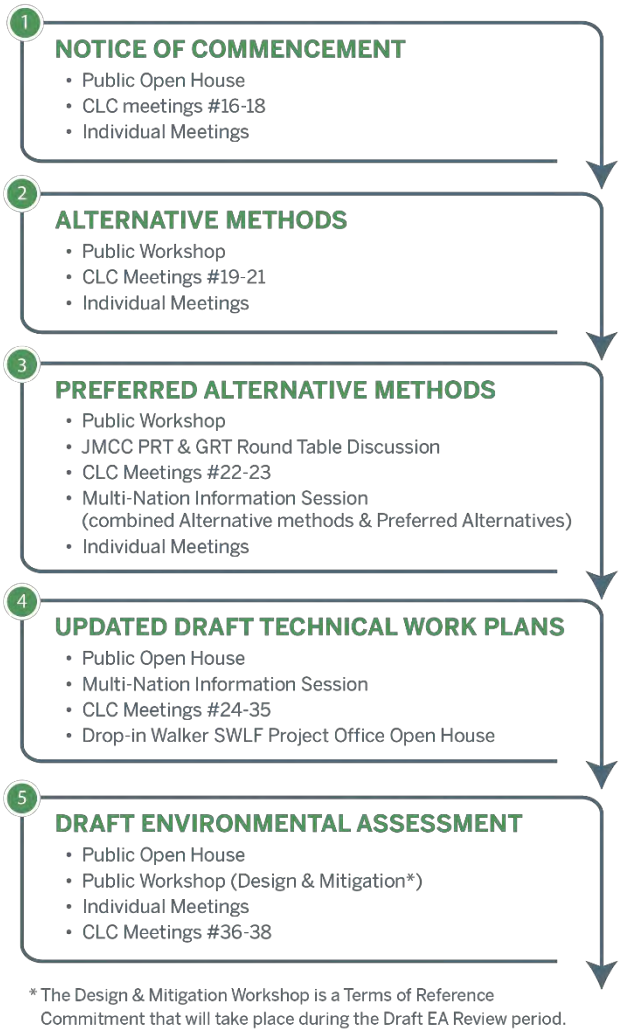
X. Consultation

Consultation with interested members of the public, Indigenous Communities, government and non-governmental agencies was a critical component to the preparation of this EA. As such, Walker undertook a comprehensive consultation program as committed to in the *Approved Amended Terms of Reference* and in accordance with the MECP's Code of Practice for *Preparing and Reviewing Environmental Assessments in Ontario* (January 2014).

As committed to in the *Approved Amended Terms of Reference*, the consultation program for this EA included:

- Continuing to build new contacts, maintain and deepen existing relationships, and foster open lines of communication;
- Expanding Walker's understanding of the community's concerns, priorities and values;
- Providing opportunities for interested parties to receive information and provide feedback;
- Notifying and consulting appropriate municipalities, government agencies and ministries at key decision points;
- Identifying concerns that might arise from the proposed Southwestern Landfill proposal;

Figure iv: Key Milestones



- Focusing on addressing, and where possible, resolving public concerns; and
- Providing appropriate information that will enable the MECP to provide a fair and balanced decision.

Walker used a variety of consultation methods to engage all stakeholder groups and Indigenous Communities. The comprehensive consultation program provided multiple opportunities for each group to be involved and provide input during the preparation of the EA. Walker sought and obtained input at key milestones prior to moving forward with each step of the EA process. A summary of the consultation activities undertaken at these key milestones is provided in **Figure iv**.

From input received, disposition tables were compiled to document the issues and concerns raised and how Walker considered them as part of the EA. A highlight of some of the more common concerns raised in preparation of the EA included:

- Groundwater protection;
- Nuisances such as odour, traffic, noise, blowing litter, and visual impacts;
- Property value;
- Waste acceptance process; and
- Haul route safety and potential upgrades needed.

XI. Other Approvals Required

If Walker is successful in obtaining approval of this EA, then a number of additional approvals will (or may be) required for the proposed landfill, including:

- An *Environmental Compliance Approval* for a waste disposal site under Part V of the *Environmental Protection Act*.
- An *Environmental Compliance Approval* for discharges to the air under Part II Section 9 of the *Environmental Protection Act*.
- Amendments to the County of Oxford Official Plan and to the Township of Zorra Zoning By-Law designation in order to recognize the new use of the site for the purposes of a landfill, as well as a Consent to sever the property required for the landfill and a site plan application for the leachate treatment plant.
- An *Environmental Compliance Approval* under Section 53 of the *Ontario Water Resources Act* to discharge effluent from the leachate treatment plant and the storm water management system(s).
- A *Permit to Take Water* under Section 53 of the *Ontario Water Resources Act* for water needed for landfill construction or operational (e.g., dust watering) purposes.
- A permit under O. Reg. 157/06 of the *Conservation Authorities Act* to carry out construction in, or alteration of, the Patterson-Robbins Drain for the leachate treatment plant and storm water pond discharges.
- Licence and site plan amendments under the *Aggregate Resources Act* to adopt the base grades of the landfill (i.e., the clean fill below the liner system) as the revised rehabilitation requirement, along with any other related changes to the licences (e.g., stockpiles for any excess fill, *etc*.).
- Clearance under the *Ontario Heritage Act* for the Stage 3 site-specific archaeological assessment.

XII. Amending the EA

Should it be approved, Walker has proposed a process for amending this EA if it becomes necessary in the future. This amendment process reflects the nature of the change, ranging from simply documenting amendments that have no significant implications for the conclusions of this EA in the annual EA Compliance Report, to initiating a new EA for amendments that require approval under the *Environmental Assessment Act* and *O. Reg. 101/07*.

XIII. Application of the Ministry's Statement of Environmental Values

The Ministry of the Environment, Conservation and Parks has committed to consider the principals set out in its *Statement of Environmental Values* under the *Environmental Bill of Rights, 1993* when making environmentally significant decisions. Walker has documented how this EA addresses each of the principles in the Ministry's *Statement of Environmental Values*.

XIV. Conclusion – Final Rationale for the Proposed Undertaking

Based on the detailed evaluation of the proposed undertaking set out in this report, and subject to obtaining the other necessary approvals, it is concluded that the proposed undertaking can be carried out in an environmentally safe and acceptable manner, and that, on balance of the environmental advantages and disadvantages, this proposed undertaking would be consistent with the purpose of the *Environmental Assessment Act*, namely "*the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment.*"