City of Sault Ste. Marie

Sault Ste. Marie Solid Waste Management Environmental Assessment

Final

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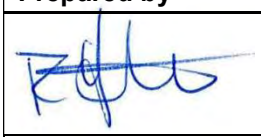		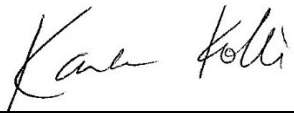
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		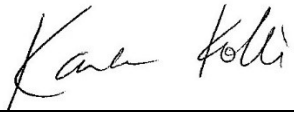
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Revision History

Rev #	Revision Date	Revised By:	Revision Description
0	May, 2017	R. Talvitie, P.Eng.	Draft EA issued for MECP review
1	June, 2023	R. Talvitie, P.Eng.	Draft Final EA issued for City of SSM review
2	January, 2024	R. Talvitie, P.Eng.	Final EA

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

This Environmental Assessment (EA) has been completed by the City of Sault Ste. Marie for the proposed expansion of its municipal landfill site located north of Fifth Line East and west of Kings Highway 17. The City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success.

The current landfill is approved to accept solid non-hazardous residential, industrial, commercial and institutional (IC&I), and construction and demolition (C&D) waste, and biosolids. This includes waste generated by the City's operations. No changes to the types of waste are proposed.

The current service area for the site includes the City of Sault Ste. Marie, Prince Township and Batchewana First Nation's Rankin Reserve. There is no change proposed to the service area.

The proposed expansion will provide an additional disposal capacity of approximately 1.78 million tonnes of waste over a planning period of 25 years. The fill area will be expanded from its current 25.8 ha to a total footprint of 43.6 ha all accommodated within existing City-owned lands. The proposed expansion includes a lateral expansion to the north and west and landfill mining of a portion of the site.

The Ministry of Environment, Conservation and Parks approved the EA Terms of Reference for this proposed expansion in (September, 2005). The Terms of Reference are appended at the end of the report. This EA has been prepared in accordance with this Terms of Reference.

Population and Waste Quantity Projections

The service area (i.e. the City of Sault Ste. Marie, Prince Township and Rankin Reserve) population in the 2016 census year was 75,040. Based on recent population projections completed by the City of Sault Ste. Marie, it is anticipated that the permanent population in the service area will increase to 92,487 by 2049. Future waste disposal projections have been developed using the forecasted population projections together with the following factors:

- residential waste generation rate = 450 kg/person/year;
- residential waste diversion rate ranging from 30% to 50% which includes provisions to address the requirements of the Food and Organic Waste Policy Statement (FOWPS);
- IC&I waste disposal factor = 600 kg/person/year which reflects residual, post diversion waste;
- municipal biosolids generation rate = 135 kg/person/year;
- all municipal biosolids will be diverted commencing in 2025.

Based on the forgoing the composition of waste to be managed in Sault Ste. Marie consists of 38% residential, 51% IC&I and 11% biosolids and Sault Ste. Marie requires approximately 1.78 million tonnes of additional capacity to 2049.

Description of the Existing Environment

The existing landfill site is located within the municipal boundary of Sault Ste. Marie but outside of the existing urban settlement area. The site and vicinity is identified as rural in the City's Official Plan and existing land uses around the site generally include, single family residences on large lots, gravel pit operations, precast concrete products manufacturing operations and a campground. The area surrounding the site is also heavily forested. The existing site is serviced with municipal water and wastewater. The municipal potable water distribution system extends to the landfill site north along Old

Goulais Bay Road and then east along Fifth Line to the site. Municipal water is presently not available along Fifth Line east of the site.

The site is immediately south of a bedrock ridge in an area of sand and gravel which was deposited by meltwaters flowing south from glacier ice on the Gros Cap Highland. Maximum overburden thickness approaches 36 m below the existing landfill. On-site, a groundwater divide is located along the western portion of the existing landfill area. Groundwater flows both southeast and southwest from this divide. The shallow groundwater flow to the south-southeast discharges to Canon Creek with ultimate discharge estimated to be into the Root River south of the property boundary.

The existing landfill site and proposed expansion are not within a wellhead protection area as identified by the Source Protection Plan (SPP), but the site is located with a Significant Groundwater Recharge (SGRA) area. The SPP recognizes municipal waste disposal sites as potential threats to sources of drinking water and identifies policy tools to address drinking water threats. As such the site is carefully managed in accordance with Official Plan policies designed to protect this resource.

Alternatives to the Undertaking

The “alternatives to” that were considered in the EA are as follows:

- Increased Waste Diversion;
- Incineration and High Heat Processes;
- Landfill;
- Export of Waste Outside the Service Area; and/or
- Do-Nothing.

The identification and evaluation of “alternatives to” was carried out at a general level. Specific locations and technologies for these alternatives were not included. Evaluation criteria and indicators initially established in the approved EA Terms of Reference were refined based on comments received from MECP. A working paper including the proposed criteria was released in June 2007. A public input session was held on June 26, 2007 in Sault Ste. Marie and on August 9, 2007 in Garden River First Nation.

The evaluation concluded the following:

- The do-nothing alternative has no advantages for any of the criteria considered.
- The export alternative has few advantages when compared to the other alternatives and there are limited, if any, suitable disposal sites proximal to the service area.
- Increased waste diversion is considered to be a preferred method of managing Sault Ste. Marie’s waste.
- Landfill is equal to or preferred over incineration/high heat processes with its key advantages including the extensive experience the City has with landfilling, the flexibility of a landfill to address changes in the waste stream, the ability of landfill to accommodate the full waste stream and the lower cost.

It was determined that the preferred way for Sault Ste. Marie to manage its solid waste is a combination of increased diversion and landfill.

Alternative Methods

The main objective of the "alternatives methods" evaluation was to find an environmentally suitable location for the development of the additional landfill capacity that is needed. The Ontario EA Act requires the consideration of a reasonable range of alternatives. Alternative methods were developed and evaluated in two steps:

- Step 1 considered the feasibility of establishing a new landfill site. While a new site is theoretically within the ability of the City of Sault Ste. Marie to implement, a new site was not considered to be practical given the limited location options demonstrated through past work undertaken by the City. In addition, the hydrogeological understanding of the existing site gained over decades of monitoring results, demonstrates that this site is very predictable compared to a new site where the groundwater movement is less well known.
- Step 2 considered different ways to expand the existing landfill site. Four expansion options were developed based on the existing site characteristics and the area available to expand. The preferred geometric expansion option sees the existing site expand to the west and north. Landfill mining was also considered, and it was concluded that the long term benefits to groundwater associated with landfill mining were worth the short term, primarily odour related, potential effects.

Description of the Proposed Facility

It is proposed to expand the existing landfill by an additional disposal capacity of 1.78 million tonnes of waste (including disposal capacity associated with mining). The proposed expansion will consist of north and west horizontal expansions. The existing site has an existing fill area of 25.8 hectares. The horizontal expansion will add a waste footprint of 17.8 hectares, for a total footprint of 43.6 hectares. The landfill height would remain at 310 m ASL. In addition to the horizontal expansion an area of the existing footprint will also be mined.

The proposed mining area of 3.4 hectares is included in the existing 25.8 hectares of waste fill. The mining location was selected to enhance groundwater conditions in the western portion of the existing site and off-site. A landfill mining pilot will be completed to assist in defining best practices for operations and odour management. A site-specific health and safety plan will also be prepared prior to commencement of mining operations and will be implemented during mining operations.

The expansion footprint including the mined area will include an engineered liner and leachate collection system. Leachate will be transported via the municipal sewer to the City's sewage treatment plant.

The existing landfill gas collection system will be progressively expanded as the proposed landfill expansion reaches approved final contours. Landfill gas will continue to be flared. As landfills represent a source of greenhouse gas emissions, the City of Sault Ste. Marie has and will continue to look at opportunities to utilize this gas to create energy. The decision to move forward with energy production will be based in part on the business case.

Potential Net Effects

Over the course of the EA, the environmental components have been examined in accordance with the EA Act. Section 7 provides an overview of the environmental components considered, proposed mitigation and an assessment of the effects of the preferred disposal alternative. The City has owned and successfully operated this site for 30+ years during which the City has adopted an approach of continual improvements. This philosophy has contributed to the success which is evidenced by the modest number

of historical complaints from area property owners. Furthermore, the proposed expansion incorporates operational and site development enhancements to further build on the historical success.

Biology - Typically, the adverse effects from landfill expansion on vegetation and wildlife are most evident during the site preparation and construction phase of development with some potential for removal resulting from landfill construction or disturbance resulting from noise during operation. While there is some removal of vegetation required, it is expected that the proposed expansion will lead to a minimal residual effect on local wildlife habitat.

Hydrogeology – Although the existing site is an engineered landfill with leachate management consisting of a horizontal groundwater collector adjacent to the south and south-eastern limits of the existing disposal footprint and a series of purge wells adjacent to the western boundary, the site does not currently include a liner system. The conceptual design of the landfill expansion addresses mitigation of potential groundwater impacts from the proposed expansion fill area as well as the western portion of the existing fill area (i.e. the area west of the groundwater divide). The design for the expansion and the landfill mining area involves the construction of engineered cells with a full underdrain leachate collection system and composite liner system. Based on the anticipated leachate generation for the site and the contaminant transport model the site is predicted to meet appropriate criteria. With the landfill mining of the western portion of the site and the addition of an engineered liner and leachate collection system for the new fill area there is an anticipated overall improvement in groundwater protection. However, during its review of the DRAFT EA the Ministry identified concerns regarding groundwater quality along the western boundary. Given those concerns, the City proactively initiated discussions with property owners adjacent to the western property boundary with the objective of extending the site's CAZ further west (Note: the acquisition of additional buffer lands was originally identified as a contingency in the DRAFT EA submission). To date, the City has successfully acquired three properties and is proceeding with expropriation of a fourth and final property adjacent to the western CAZ property boundary. Over several years the City has now acquired eight (8) properties adjacent to the landfill site to enhance its buffer lands along Fifth Line. The acquisitions are summarized in the EA report.

Surface Water - From a water quantity perspective, there are negligible impacts since peak flows from the site are significantly smaller than those of the receiving watercourse and the peak flow from the landfill does not coincide with peak flows in the receiving watercourses. There is no mitigation proposed for water quantity as the impact is insignificant. From a water quality perspective the proposed expansion could result in potential impacts due to accidental spills or leachate seeps to the surface and/or increases in Total Suspended Solids (TSS) concentration due to runoff from the internal gravelled access roadways or site erosion. On-site stormwater management (SWM) will be achieved through the existing/proposed system of ditches, culverts, and new SWM ponds. The proposed new SWM ponds will be designed for 80% TSS removal and three will have emergency flow control systems at their outlet to store contaminated or potentially contaminated runoff.

Atmospheric – The operation of the expanded site is anticipated to closely match the ongoing operations at the existing site. Considering air quality from the proposed expansion together with background air quality, using a worst-case operational scenario, it was determined that the Site's potential impact to cumulative air quality is expected to be minimal and the contribution to the ambient air quality is likely dominated by background concentrations. The predicted concentrations are below their respective criteria for each indicator compound and the assessment demonstrates that the site is predicted to comply with O. Reg. 419/05 through the development of the preferred alternative.

Archaeology - A Stage 1 and 2 archaeological assessment was carried out for the proposed expansion and no archaeological resources were found. Although no further archaeological assessment of the property is required should undocumented archaeological resources be uncovered during landfill construction, alteration of the site will cease immediately, and a licensed archaeologist will be contacted.

Social - The focus of input received from area property owners was on odour, noise, traffic, water quality, litter and community information. The City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success. The City also recognizes that there is potential for nuisance impacts from site development and operations and has adopted a policy of continual improvements. Two-way communication with area residents is achieved through an Environmental Monitoring committee. The analysis concludes that there will not be significant effects on the socio-economic environment relative to current levels provided the mitigation detailed herein and in other related reports are implemented. Appropriate mitigation and monitoring plans will be adopted to ensure that issues are not exacerbated by landfill construction or operations (refer also to the planned odour mitigation strategy).

Planned Land-use - There are approximately 14 properties located within the site's existing "area of influence". The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500m of the perimeter of the fill area which is designated the "area of influence". The majority of the uses within the existing area of influence are sensitive, meaning they are more likely to be impacted by nuisance impacts from landfill operations (eg. single family residential). The proposed expansion will result in an additional 12 properties within the area of influence of the expanded site, 8 of which are considered sensitive. Studies were completed to assess the level of impact and develop appropriate mitigation. Although some adverse effects are anticipated with the proposed landfill expansion, the detailed studies concluded that no significant net adverse effects are anticipated with the implementation of the proposed mitigating measures. These conclusions are also supported through 30+ years of successful operating experience at the site. Monitoring activities are also proposed to ensure predicted effects are not exceeded. The City has over time acquired properties in the vicinity of the site and rezoning of these properties will be completed following receipt of EA Act approval. The City will consider the acquisition of additional properties at market value, within the site vicinity area as they become available. This will continue to be implemented on a long-term basis to further enhance mitigation of nuisance impacts. Furthermore, any future development of vacant properties or redevelopment of existing developed properties that require City Planning Division approval will include consideration of Ministry Guideline D1 and D4. The City is currently developing a new Official Plan. As per Provincial Policy Statement requirements the revised Official Plan will include land use compatibility policies for a variety of situations including the landfill site. It is proposed to include, within the Land Use Schedule, a 500m influence area around the expanded disposal footprint. The development of new sensitive uses within the influence area will be subject to Ministry Guideline D-4.

Visual – The assessment concluded that the preferred expansion at completion will not interfere, obscure, or compete with any nearby man-made or natural landmarks, nor will it significantly alter the existing vistas present within the study area. The expansion is visible from small sections of Fifth Line East at the Hydro Easement crossover and existing residential property located adjacent to the southwest edge of the site. The expansion of the landfill form also requires the removal of approximately 6.5 ha of existing woodlot. Mitigation includes the introduction of, vegetation treatments at strategic locations between the west side of the preferred landfill site and Fifth Line East to screen sporadic views from the road right-of-way, reforestation plots, incorporating similar species at a quantity that will compensate for the loss of existing vegetation and native grass /wildflower mixture as vegetative cap on top of completed landform.

Noise – The operation of the expanded site is anticipated to closely match the ongoing operations at the existing site. An assessment of potential noise impact at the nearby receptors was undertaken through acoustic modelling, considering worst-case noise emission scenarios. Maximum 1-hour sound level equivalent values were predicted at all relevant receptors and compared against applicable regulatory noise criterion for daytime (the landfill site operates during daytime hours only). Due to the conservative assumptions in the analysis, such as worst-case operations for each activity occurring simultaneously, it is expected that sound exposures will in reality be lower than the reasonable worst-case values predicted in this report. The results indicate that for the worst-case operational scenario, the predicted receptor sound levels will be below the MECP's landfill daytime criterion of 55 dBA for all the nearby noise receptors.

Odour - Since the proposed expansion does not change daily waste acceptance rate of the Site, or how waste deposition is conducted in the landfill, the odour profile of the Site's operations is expected to remain the same. The Site's existing odour management program will continue to effectively manage odour impacts associated with typical landfilling activities. The proposed landfill mining activities which are expected to occur over a period of approximately two years have the potential for greater odour. In order to mitigate the potential for landfill mining to generate odour impacts, an Odour Management Plan (OMP) supplement will be developed specifically for this activity to support the site OMP. A pilot study is proposed to guide the development of the OMP.

Businesses - The focus of input received from area business owners was related to odour, noise, traffic, bear activity and road maintenance. Many of the businesses near the site are industrial in nature and include precast concrete fabrication and aggregate extraction. There is however a campground located south of the site which benefits from a significant treed buffer on the landfill site and on the campground property. The City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success. The City also recognizes that there is potential for nuisance impacts from site development and operations and has adopted a policy of continual improvements. Two-way communication with area property owners is achieved through an Environmental Monitoring committee. The analysis concludes that there will not be significant effects on the socio-economic environment relative to current levels provided the mitigation detailed herein and in other related reports are implemented. Appropriate mitigation and monitoring plans will be adopted to ensure that issues are not exacerbated by landfill construction or operations.

Transportation - The proposed landfill expansion is not expected to have any significant impacts on the transportation infrastructure/networks. Traffic volumes are forecast to remain within normal historical ranges. Several mitigation measures have already been implemented or are proposed. The posted speed limit along Highway 17 on the approaches to the Fifth Line intersection was reduced from 80 km/h to 70 km/h and vegetation was removed and signage relocated or removed within the right-of-way adjacent to Fifth Line to maximize sight lines. A detailed review of the intersection to assess the existing mitigation and identify possible signage enhancements is also proposed prior to initiating the expansion. The City will also consider improvements to geometrics on the north and south approaches to this intersection in conjunction with the next capital improvement project along this stretch of Highway. Future monitoring includes completing traffic counts and reviewing the accident history at five-year intervals, undertaking regular road condition assessments and managing vegetation in the right-of-way at Fifth Line to maintain maximum sight lines.

A thorough assessment of potential impacts on the transportation network was completed considering both existing and anticipated future vehicular, pedestrian and cyclist activity. Although there are no adverse net

effects anticipated a monitoring program has been developed to identify potential impacts that were not foreseen and could develop in the future.

Monitoring, Reporting and Commitments

Ongoing monitoring is proposed for this site including monitoring of ground water, residential well water, surface water, landfill gas, landfill mining and transportation. The City has and will continue to operate a complaint procedure with the goal of continual improvement in its nuisance management and mitigation.

Contingency measures are included in Section 8 to be prepared for and reacting to unexpected situations. Section 8 also outlines the commitments that the City has made through this EA which will form the framework for monitoring compliance with the EA during the design, construction, operation and closure of the proposed expansion.

Public and Agency Consultation

Consultation with the public, Aboriginal Communities, agencies and other stakeholders was ongoing throughout the environmental assessment process. A variety of consultation events and activities were used. The consultation events were designed to optimize engagement of the potentially interested persons in the progress of the environmental assessment. The principle goals of the consultation process include:

- Engage the public, stakeholders and Aboriginal Communities in the consultation process;
- Provide sufficient information in a user-friendly format;
- Provide opportunities for input before decisions are made;
- Be flexible to meet the needs of the all participants when undertaking consultation;
- Be responsive – listening to comments, giving them careful consideration, making changes where appropriate and providing rationale when no change is made.

The process was successful in soliciting input and feedback which is summarized in Section 9 of this report. The EA addresses the input and comments received and there are no outstanding items to be addressed.

Conclusions

It is important to understand and recognize the City has successfully owned and operated this site for 30+ years. Throughout that tenure the City has endeavoured to continually improve site operations to minimize nuisance impacts. Through those historical efforts coupled with significant proposed additional future enhancements including lining and leachate collection for all new cells, mining, lining and leachate collection for a portion of the existing fill area, construction of a biosolids and source separated organics (SSO) processing facility with odour control to remove biosolids and SSO from the working face, ongoing acquisitions to increase buffer lands and suitable contingency measures and monitoring programs, the proposed expansion is expected to operate effectively without any significant effects on the environment.

1.0 INTRODUCTION

1.1 Purpose of this Environmental Assessment

The City of Sault Ste. Marie is developing a Solid Waste Management Plan to determine the preferred way to address the waste management needs within the existing service area, consisting of the City of Sault Ste. Marie, Prince Township and Batchewana First Nation's Rankin Reserve, for a period extending an additional 25 years beyond the service life of the existing landfill site (i.e. extending to approximately 2049). The Solid Waste Management Plan will include opportunities for both waste diversion and waste disposal.

The City continues to investigate ways to divert waste from disposal by promoting and developing programs that support the 3Rs hierarchy of reduce, reuse and recycle (see Section 1.5).

The City has implemented and/or promoted/supported programs to divert typical "blue box" (i.e. containers and fibres) recyclables for single-family homes, multi-family homes and small businesses, electronic waste, styrofoam, used tires, leaf and yard waste, clean wood and brush, Christmas trees, metals including white goods and appliances, propane tanks, batteries, household items, construction and renovation materials, and municipal hazardous waste. The City has complemented these programs with waste set out limits and landfill bans to encourage residents to divert waste.

1.2 The EA Terms of Reference

The purpose of the Terms of Reference is to set the scope and describe the process that will be undertaken to address the problem of diminishing disposal capacity at the existing site.

In the Spring of 2005, an Environmental Assessment (EA) Terms of Reference (ToR) was prepared documenting the planning process to obtain EA approval for the disposal component of the Solid Waste Management Plan. The EA ToR was approved by the Ministry of the Environment, Conservation and Parks (MECP) in September, 2005. This EA report documents the EA that was undertaken based on the approved ToR. The ToR is appended to this report and precedes the appendices.

The following table outlines the requirements set out in the Terms of Reference.

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Requirement	ToR Section	How the item was addressed in the EA
The undertaking will address non-hazardous residential, industrial, commercial and institutional, construction and demolition and biosolids wastes.	3.0	Section 6.1 explains that the proposed expansion is assumed to continue current approved practice (i.e. no changes in waste types) and accept solid non-hazardous residential, industrial, commercial and institutional (IC&I), and construction and demolition (C&D) waste, and biosolids.
Information on diversion potential will be revisited to assist in defining the additional disposal capacity required.	3.0	Section 2.0 of the EA confirms waste quantities and addresses historical and future diversion activities within the City. It highlights the significant proposed increase in the residential waste diversion rate.

Requirement	ToR Section	How the item was addressed in the EA
The EA will consider the following "Alternatives to": increased waste diversion; incineration and high heat processes; landfill; export of waste outside the service area; and do nothing.	4.1	Section 4.0 considers these alternatives.
An inventory of the environmental conditions within the Service Area will be undertaken as part of the EA.	5.0	Section 3.0 of the EA documents the existing environment within the service area and an inventory of the existing environment within the vicinity of the landfill site to be expanded is detailed in the individual impact assessment reports (Appendices D to N).
Environmental components to be examined in the EA will represent the full definition of the environment in the EA Act.	5.3	The description of existing conditions (Section 3.0), the evaluation of alternative methods (Section 5.0) and the determination of effects (Section 7.0) consider the natural, socio-cultural and economic environments.
The comparison of alternatives and assessment of effects will consider both short and long-term impacts.	5.3	Criteria to evaluate alternatives (Section. 5.0) and assess impacts (Section 7.0) of the preferred alternative consider construction (short term), operations and post closure (long term) impacts.
Discussions with the public and First Nations will occur on whether there is a difference in relative importance for the criteria.	6.3.1	Extensive engagement with Indigenous Communities, Stakeholders and the public was undertaken as documented in Section 9.0.
The EA will consider a reasonable range of alternative methods and a qualitative evaluation method is proposed.	6.3.2	Section 5.0 describes the alternative methods considered and the evaluation of these alternatives.
The impact assessment will consider construction, operation and post-closure periods.	6.3.3	These phases of landfill development were included in the impact assessment (Section 7.0).

1.3 The Proposed Undertaking

The undertaking described in this document is an expansion of the Sault Ste. Marie Landfill footprint located at 402 Fifth Line East (refer to **Figure 1.1**). The service area will be the same as the existing landfill, (i.e. the City of Sault Ste. Marie, Prince Township and Batchewana First Nation's Rankin Reserve). The expansion will have a disposal capacity of 3.17 million m³ of waste and daily/intermediate cover (i.e. 1.78 million tonnes of waste). It is forecasted that waste will be landfilled at a maximum rate of approximately 76,000 tonnes annually. The expanded site is expected to last until approximately 2049.

The landfill will only accept non-hazardous solid residential, industrial, commercial and institutional (IC&I), and construction and demolition (C&D) waste, and biosolids.

The proposed project includes an expansion of the disposal boundaries to the north and west and no increase in the height of the waste (i.e. no vertical expansion). Landfill mining is also proposed within the western portion of the existing disposal footprint to facilitate the construction of a liner to enhance environmental management at the site. The mining process involves excavation of waste within the existing disposal footprint, removing fines and recyclables, transferring the residual waste to a new lined cell and lining the mined area to accommodate future waste disposal. The City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success. The planned expansion will be accommodated within existing City-owned lands.

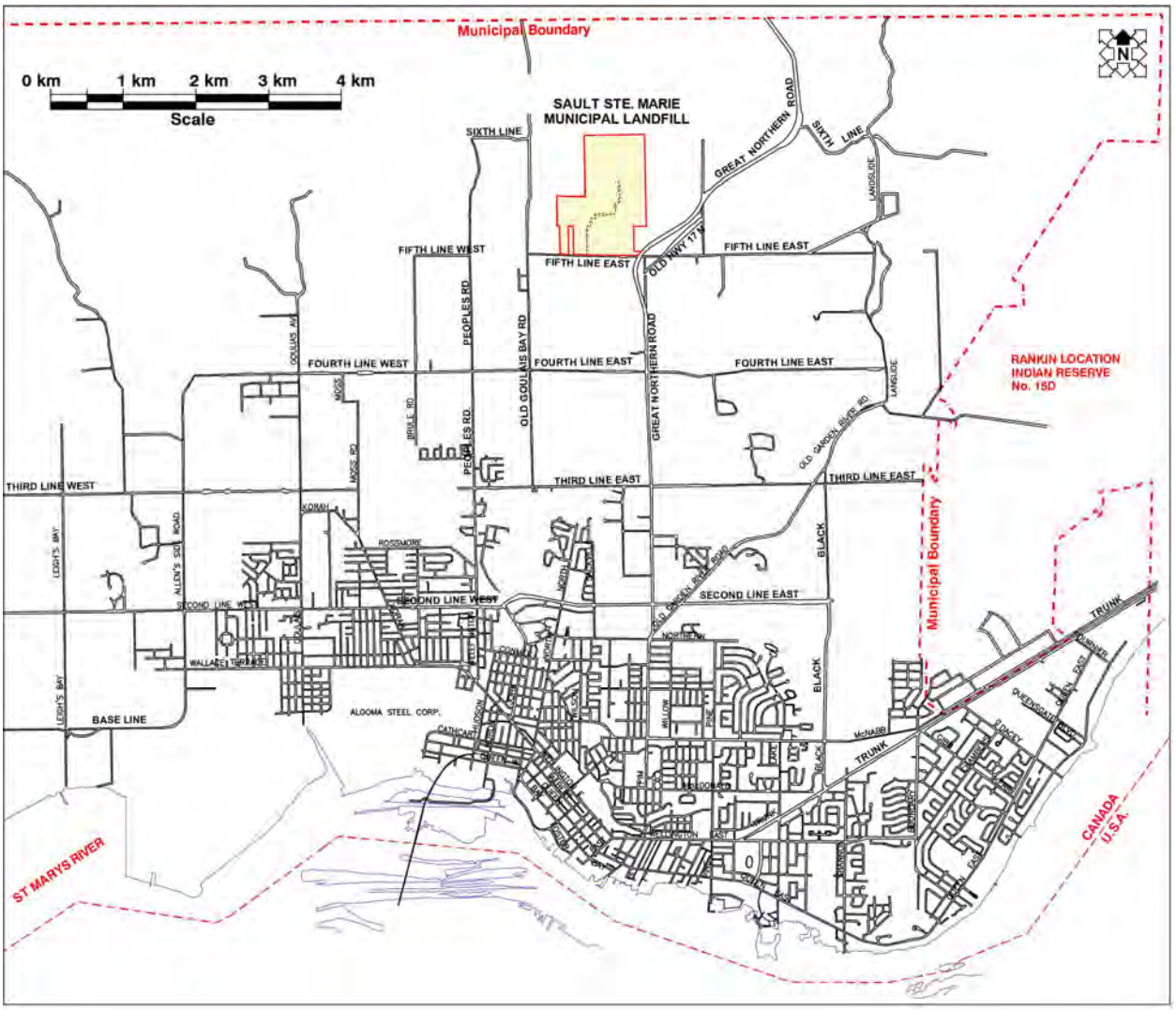


Figure 1.1 – City of Sault Ste. Marie Municipal Landfill Key Plan

The expanded landfill will have a fill area of approximately 43.6 ha within an approximate overall site area of 151 ha[1]. The maximum elevation of the fill area will be 310 metres above sea level (masl) (i.e. the same

[1] The City has added a number of properties to expand the site's buffer lands. A boundary survey will be undertaken at the time of the ECA application to confirm the overall site area.

as the existing waste mound). The expansion will include a liner, a leachate collection system, a stormwater management system, landfill gas collection system and associated monitoring and contingency plans.

1.4 Background

In September 2000, the City initiated a Solid Waste Management planning process to provide direction on all aspects of solid waste management. The plan was completed in the following four phases:

- Phase 1: Identification of a Preferred Waste Diversion System;
- Phase 2: Identification of a Preferred Waste Disposal System;
- Phase 3: Development of a Business and Implementation Plan; and
- Phase 4: Development of an Environmental Assessment Act Terms of Reference.

The reports prepared in these phases provide significant details regarding the background on the existing and future waste management system in the City. Public input was solicited in each phase. The phases are summarized below.

Phase 1 identified a need for expansion of the City of Sault Ste. Marie waste diversion programs and is documented in the *Alternative Waste Diversion/Collection Systems Options Report* (June 2001). Many of the recommendations have now been implemented and as a result, the City has increased its residential diversion rate from approximately 9% in 1999 to 30+% in 2004. The diversion rate has remained stable in the 30% range throughout the period from 2004 to present.

In addition, the City received funding through the Green Municipal Enabling Fund (GMEF) to undertake a feasibility study on co-composting residential organics, leaf and yard waste and municipal biosolids. The *Co-composting Pilot Study* report was finalized in February 2004 and updated in 2017 to consider the most recent changes to Ontario's composting regulations.

Phase 2 of the study was completed in July 2002 with the release of the *Waste Collection and Disposal Report*. In this phase, it was recognized that with the limited disposal capacity remaining in the City's landfill, additional disposal capacity would be required in the future despite the significant efforts to enhance diversion. Within the report a number of disposal alternatives were explored and evaluated and public input was obtained. This work was revisited and confirmed through the "Alternatives To" evaluation completed as part of this study.

Phase 3 of the study was completed in February 2003 with the release of the *Business and Implementation Plan*. This plan outlines the costs of expanded waste diversion programs and waste disposal and explores options to recover those costs. The result of this report was that Council approved the implementation of a partial pay-as-you-throw program with residential bag/container limits, bag fees, and increased gate and tipping fees at the landfill site. The City is committed to undertaking periodic updates to the Business and Implementation Plan to ensure it reflects program changes and adequate funds are budgeted to meet future requirements. An update was completed and presented to Council in 2019 which resulted in Council approved tipping fee and gate fee increases of 10%.

Phase 4 resulted in the preparation of an *Environmental Assessment Terms of Reference* (July 2005), a required first step in the preparation of a Waste Management Environmental Assessment.

The Phase 1 and Phase 3 reports are included as Appendices to the Public Consultation Report in Appendix O.

The City subsequently initiated this Waste Management EA in 2006.

1.5 Overview of the City's Waste Management System

The population serviced through the City's waste management system is approximately 73,368 residents[2] (Note: the population has remained relatively stable since 2011). Waste management services for this population include a combination of waste diversion programs and disposal facilities. Waste is currently disposed in the City landfill site located north of Fifth Line East and west of Kings Highway 17 at civic address 402 Fifth Line East. The City completed a Waste Quantities Report (June 2010) which documents historical waste quantities and predicts future residual waste disposal quantities. The historical and projected waste quantities presented in that report have been updated in this EA document to consider historical quantities for the period from 2010 through 2018 and population projections developed by Dillon Consulting on behalf the City in 2018 (refer to Section 2.0). In addition, a Site Development and Operations Report is prepared annually for the existing landfill site and the site life is projected to extend to approximately 2024 based on the 2021 report and assuming all locally generated IC&I waste is received at the site.

The City has been very diligent to promote, develop and enhance waste diversion programs and services that support the 3Rs hierarchy: reduce, reuse and recycle and has complemented these programs and services with by-laws to encourage residents to divert waste. In addition to the system changes the City also established a position for a Waste Diversion Supervisor in 2001. The role of the Waste Diversion Supervisor is to promote and manage waste diversion programs within the Municipality and where appropriate implement new diversion ideas.

An overview of the City's principle waste diversion programs is provided below.

- The City offers an extensive curbside recycling program which services approximately 26,137 single family households[3]. In addition, the program services approximately 8,348 multi-residential units[3] Recyclables are separated, by residents, into "containers" and "fibres" and set out curbside with their waste for collection on a weekly basis. The management and operation of the curbside recyclables program is scheduled to change from a Municipal responsibility to a Producer responsibility in 2023 under Ontario's Individual Producer Responsibility (IPR) regulatory framework as defined in the Resource Recovery and Circular Economy Act (MECP, 2016), where producers are responsible for managing the waste generated from their products and packaging to reduce waste, encourage innovation, and lower costs for Municipalities. This change will impact the Municipality's ability to influence the future curbside diversion rate.

[2] Stats Canada Census Profile, 2016 Census of Population, City of Sault Ste. Marie.
[3] 2021 RPRA Datacall, City of Sault Ste. Marie.

- It is estimated that approximately 12,100[2] backyard composters have been distributed to residents in years past. The City also collects curbside leaf and yard waste bi-weekly throughout the growing season (i.e. late April to early November) and operates a self-haul leaf and yard waste depot at the landfill site . The City composts this feedstock in open windrows at the landfill site on Fifth Line. The final compost is used on City projects by the City's Parks Division.

- The City has banned leaf and yard waste and old corrugated cardboard (OCC) from the landfill.

- The City has also established a permanent Household Hazardous Waste Depot (HHW) at City Landfill site. The facility was moved in 2016 from its former location in the City's Public Works yard on Industrial Park Crescent to the landfill. The move was made to provide a "one stop location" for all waste management needs including recyclables, household hazardous waste and residual waste. The facility has been operational since 2001 and has been effective in diverting HHW generated within Sault Ste. Marie and surrounding areas. The management and operation of the HHW program also transitioned to a Producer responsibility model in October 2021 under Ontario's IPR regulatory framework as defined in the Resource Recovery and Circular Economy Act (MECP, 2016), where producers are responsible for managing the waste generated from their products and packaging to reduce waste, encourage innovation, and lower costs for Municipalities. The City continues to own and operate the facility under the IPR framework.

- The City has implemented a staged reduction in residential waste set out limits. The City introduced a 4 bag/container limit on January 1, 2004 which was reduced to 3 bags/containers on May 1, 2004 and 2 bags/containers on January 1, 2005. Waste collection was subsequently transitioned to 246 litre rollout carts in July, 2019. Further changes are required circa 2025 to accommodate the separate collection of Source Separated Organics (SSO). It is anticipated that waste set out using the 246 litre rollout carts will be reduced from weekly to bi-weekly collection in conjunction with the rollout of the SSO program.

- The tipping fee and gate fee at the landfill have been increased over time from $27.50/tonne and $2/visit to the current rates of $77/tonne and $11/visit respectively. In 2006 the City also reduced the permissible weight associated with the gate fee from 500 kg to 300 kg. These changes also assist in encouraging waste diversion which carries little or no cost for residents.

- Separation and diversion of recyclable containers and fibres, clean wood waste and brush, white goods, metals, propane tanks, tires, WEEE and batteries is also completed at the City's landfill drop-off.

In addition to these programs, the City has been leading active campaigns to reduce the amount of plastic waste that residents generate with initiatives such as a plastic shopping bags campaign which educated residents to reduce the number of plastic bags generated and encouraged shopping with reusable bags. The City also provided a discounted beverage price to patrons that brought their own refillable cups to some of its venues within the City.

Further to these initiatives, the City is moving forward with the implementation of a single-use plastics ban in support of the federal government's proposed Single-Use Plastics Prohibition Regulations (December, 2021) which identifies various categories of single-use plastics and would prohibit their manufacture, import and sale in Canada. Single-use plastics are plastic items used only once before they are thrown away or recycled and include items such plastic bags, straws, coffee stir sticks, soda and water bottles and food

packaging. Feedback on this initiative was sought from residents and businesses in the form of two on-line surveys and a virtual open house session. The City is implementing a single-use plastics ban in a staged manner in 2022 and 2023 with a ban on plastic checkout bags in November 2022 and a ban on plastic cutlery, straws and food service ware in February 2023.

The City has also taken a proactive role to lead by example through its own corporate waste reduction and recycling activities. Specific corporate initiatives developed and undertaken by the City have included:

- Super Sorters – Twenty-seven Super Sorter Three-In-One recycling bins were purchased and distributed throughout City arenas, recreational facilities and major parks/marinas. In support of this initiative, the Public Works Sign Shop assisted in a custom designed sign for the front of the bins to educate patrons regarding proper diversion/disposal of materials. Promotional events were also conducted at the time of the launch to gain public support and encourage their use.

- Waste Reduction Week – The City has promoted Waste Reduction Week where City staff were encouraged to bring in unwanted electronics to facilitate proper management. A proclamation was made to help support community awareness of the event.

- 20-Minute Makeover – The City has hosted the 20-Minute Makeover where local residents are encouraged to spend 20 minutes, typically on earth day, to clean up their property. The City has averaged over 500 participants each year during this initiative. This promotes City beautification and brings awareness to the negative impacts of littering.

- Green Days/Kids Being Green – This campaign was completed by City summer students who brought awareness to the importance of recycling.

- Battery and Ink Cartridge Recycling – Battery and ink cartridge recycling stations were located at City Hall to collect disposable and rechargeable batteries and used ink cartridges from across the corporation for recycling.

The City strongly encourages the business sector to comply with recycling mandates. The City initiated a fluorescent light program that targets local businesses and the public to drop off bulbs at the Household Hazardous Waste Depot so they can be safely managed and transported to a recycling facility.

There are also a number of public and private sector initiatives in the community that are supported and encouraged by the City as described in the following paragraphs.

In an effort to reuse waste, the City promotes Habitat for Humanity's ReStore where residents and businesses can donate or purchase new and used household items and building materials such as windows, doors, paint, lumber, tools and lighting fixtures. Other private sector initiatives that support reuse include the local Value Village retail store and Canadian Diabetes Association which accepts used clothing and household items.

The City supports the efforts of Clean North which is a citizen based environmental group that promotes environmental protection through various programs and initiatives focused on reduction, reuse and recycling. Programs include an annual Christmas tree chipping event and freecycle days to promote reuse of unwanted items.

Through the City based programs, approximately 10,109 tonnes[4] of residential material was diverted from disposal in 2021. This represents a residential diversion rate of 30.2%[3].

The City has also completed a Biosolids Management Study. The objective of the study was to review alternative biosolids management strategies and develop a sustainable and effective strategy that reduces the impact on the City's landfill, more effectively manages nuisance odours, has wide public support, is cost effective and environmentally responsible. The Notice of Completion was published in May, 2015 and the City is now moving forward with its implementation which will effectively divert approximately 10,000 tonnes of biosolids which is currently being landfilled.

As the Biosolids project has moved forward the Province has introduced, amongst other related documents, the Food and Organic Waste Policy Statement (April, 2018) which includes a mandate for the City of Sault Ste. Marie to initiate a residential curbside organics collection program by 2025 (refer also to Section 2.3.1). In response to this Provincial Policy mandate, the City has proactively initiated modifications to the planned biosolids management facility to also accept and process 5,000 wet tonnes of source separated organics annually. The biosolids/SSO processing facility is scheduled to become operational by 2025 or 2026.

1.6 City's Waste Supply Agreement with Elementa

In 2007, the EA work was deferred to allow a private waste-to-energy vendor, Elementa Group (Elementa) to develop and demonstrate a pilot scale facility within the City. The EA deferral was requested and approved by City Council to gain a better understanding of the role waste-to-energy may play in the City's future waste management strategy. Elementa built and tested a pilot steam reformation plant that converts municipal solid waste into a char and synthetic gas that can be used to generate electricity. The pilot testing was completed from 2007 to 2009 and at the conclusion of the testing, the City entered into a waste supply agreement to process a minimum 12,500 tonnes of residual waste per year commencing in 2011.

There were a number of delays and amendments to the timelines in the agreement between the City and Elementa. The most recent amendment, completed in May, 2015, included a construction start date that shall not extend beyond May 1, 2016 and an initial waste supply date of July 1, 2017. The May 1, 2016 construction start date was not achieved.

In December 2015, the City was advised that Elementa Group Inc. was in receivership proceedings. On June 13, 2016 Council indicated that formal notice should be provided to Elementa Group Inc. that the Waste Supply and Reformation Agreement between the two parties is terminated.

Given the risks associated with the Elementa project, it was assumed throughout this entire EA process, that all residual waste will be managed through the solutions contemplated within this EA (i.e. Elementa will not process any of the City's residual waste). It was recognized that if the Elementa project was to be implemented and reached partial or full capacity, there would continue to be a need to manage residual solid non-hazardous waste from the Elementa facility and residual waste that could not be processed by Elementa due to capacity constraints. It was recognized that the Elementa project would not impact the need for additional disposal capacity but may impact the capacity needed. Based on the conservative assumptions made in 2010, as noted above, the Elementa bankruptcy does not impact this EA.

[4] 2021 RPRA Datacall, City of Sault Ste. Marie

1.7 Residual Wastes to be Managed

A report entitled *Waste Quantity Projections and Existing Environmental Profile* was prepared in June, 2010. The report estimated the future waste quantities requiring disposal within the service area. The estimation of waste quantities takes into consideration population projections, residential waste generation and diversion rates, IC&I disposal rates and disposal requirements for municipal biosolids generated at wastewater pollution control plants. These quantities were subsequently updated to include historical waste quantities from 2010 through 2018 together with updated population projections developed by Dillon Consulting on behalf of the City of Sault Ste. Marie in 2018. **Table 1.1** shows the estimated quantity of waste, by sector, that requires disposal in 2022 and 2049.

Table 1.1: Waste Requiring Disposal

	Residential (tonnes per year)	IC&I (tonnes per year)	Biosolids[1] (tonnes per year)	TOTAL (tonnes per year)
2022	23,864	45,922	10,332	80,118
2049	20,514	55,492	0	76,006

Notes: 1. It is assumed that all municipal biosolids will be 100% diverted commencing in 2025.

Based on the projections over the planning period, the City of Sault Ste. Marie requires additional disposal capacity of approximately 1.78 million tonnes.

1.8 EA Planning Process

1.8.1 EA Activities

The EA planning process for this undertaking is described in the EA Terms of Reference included at the end of this report and prior to the appendices. It is a phased sequence of activities as outlined below. Public, agency and Aboriginal Communities consultation was carried out throughout the project. The consultation program is discussed further in Section 9.0.

Description of the Problem/Opportunity – The description and purpose of the undertaking is described in this EA in Section 1.0. This activity included preparing waste quantity estimates for the City based on available population projections and per capita waste generation rates and waste disposal rates (discussed in Section 2.0). The waste quantities expected to be disposed of at the landfill were estimated and used to determine the approximate size of facility required and the potential effects on the environment.

Profile Existing Conditions – A general profile of the natural, socio-cultural, transportation and economic conditions within the service area was prepared as part of the EA in Section 3.0.

The purpose of this exercise was to establish a general knowledge of the baseline conditions within the service area. A draft report titled “Waste Quantity Projections and Existing Environment Profile”, June 2010, was prepared and posted on the City’s website. The contents of that report have generally been incoporated into this EA document with some updates.

A more detailed inventory and assesment of the environmental conditions in close proximity to the landfill site is incoporated in the impact assessment reports that were completed for the preferred solution and method.

Alternatives To – Alternative ways to manage waste were identified and evaluated. Alternatives considered included: do-nothing, increased diversion, incineration and high heat processes, export and landfill. Public input was obtained on the alternatives through a workshop in June 2007. The advantages and disadvantages of all the "alternatives to" were considered and a combination of diversion and landfill was identified as preferred. This decision and the process undertaken to reach it was documented in the report "Solid Waste Management Plan Environmental Assessment – Alternatives to the Undertaking", June 2010. In June 2010, a Public Information Centre was held where the key elements of the report were presented and feedback was received. The "alternatives to" process and evaluations are included in Section 4.0 of this document.

Alternative Methods – New landfill capacity requires EA approval and alternative methods of landfilling were identified and evaluated in two steps. As a first step, the City considered the advantages and disadvantages of landfill expansion versus development of a new landfill site. As part of the first step, consideration was given to the feasibility of establishing a new greenfield site. The City had previously completed planning work in the late 1980's which included a search for a new greenfield site. That previous planning work was leveraged in assessing the feasibility of a new site within this EA. Public input was obtained on a landfill expansion versus development of a new site through a workshop held in April 2011. It was determined that expanding the existing landfill was preferred. This decision and the process undertaken to reach it were documented in the report "Alternative Methods – Step 1 (Landfill Expansion versus Development of a New Landfill Site)", April 2011, updated December 2014.

Step 2 involved the collection of data and evaluation of four alternatives to expand the site footprint. Data was collected on the four site expansion alternatives and presented in the "Alternative Methods – Step 2 (Identification and Comparison of Expansion Options)", February 2012 report. This information was subsequently presented to the public for review at a Public Information Session in March 2012. As part of this step, landfill mining was also considered. Once a preferred footprint expansion was determined, an evaluation of that expansion with and without landfill mining was undertaken. This information was also presented in the February 2012 report and at the March 2012 Public Information Session. Using the data collected together with public input, the alternative expansion options were comparatively evaluated and the West and North Expansion B (Option 3) with landfill mining was identified as the preferred option.

The "alternative methods" process and evaluations are included in Section 5.0 of this document.

Description of the Preferred Project and Net Effects Assessment – A conceptual design for the West and North Expansion B option was prepared and assessed. Mitigation to minimize or eliminate negative effects was proposed and net effects (i.e. effects remaining after mitigation) identified. Any changes to the design to mitigate potential effects were incorporated. The conceptual facility design and the results of the net effects assessment were discussed at a Public Information Session conducted on February 9, 2016. This is discussed in Sections 6.0 and 7.0 of this document.

The City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success. The planned expansion will be accommodated within existing City-owned lands.

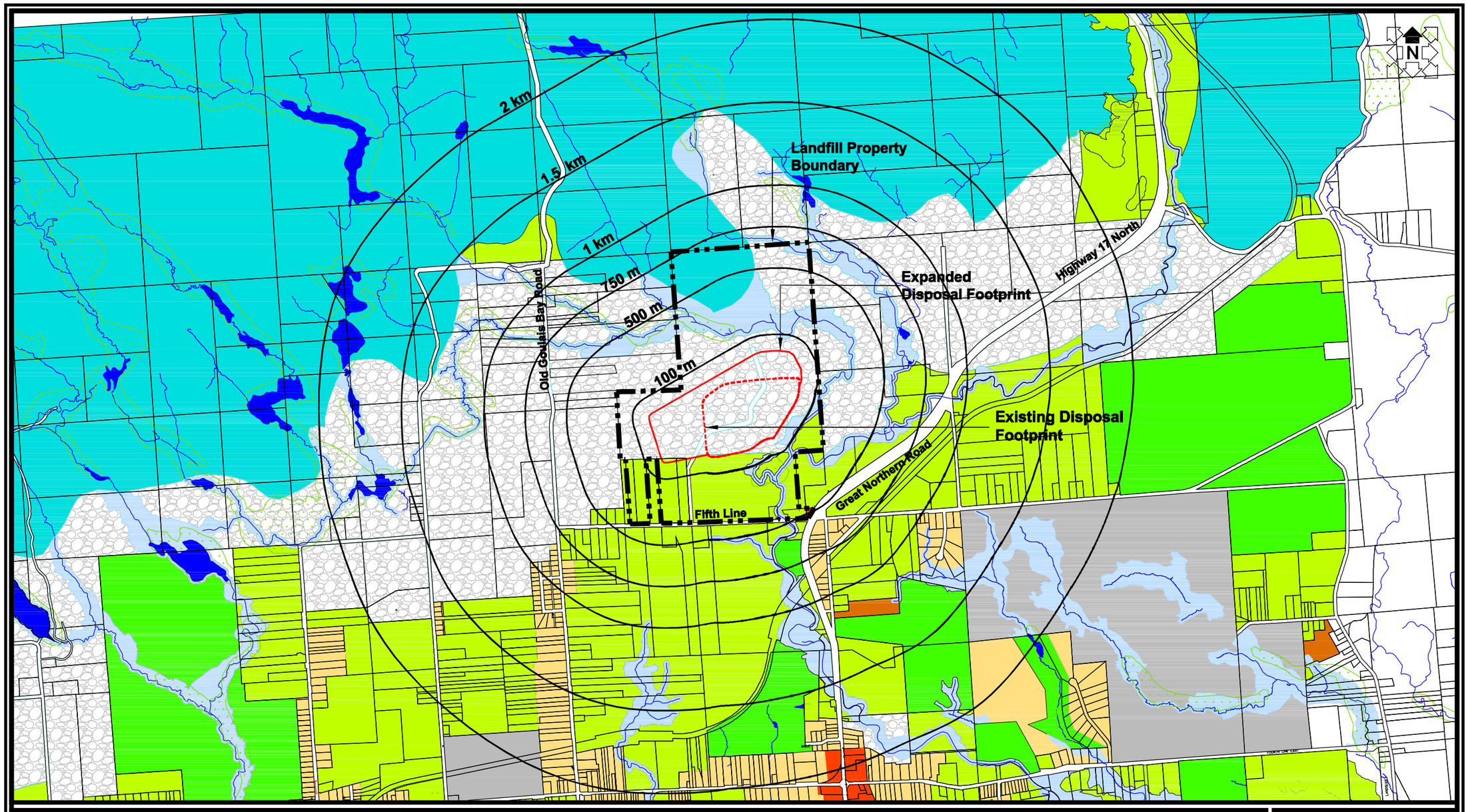
Impact Management Strategy – An Impact Management Strategy was prepared to guide the development and operation of the landfill expansion. The strategy included the recommended mitigation measures, monitoring and contingency measures, and a community relations plan. This is discussed in Section 8.0 of this document.

Documentation and Approvals – The EA planning process as well as the decisions made throughout this EA have been documented in a series of reports throughout the process. At each key point in the process, these reports were made available to the public, agencies and Aboriginal Communities through the project webpage on the City's website and in some cases, a hardcopy was delivered to the Community stakeholder. This EA document represents a compilation of all previous reports. A DRAFT EA document was circulated in May 2017 for agency and public input. Significant input was received from the MECP and has been incorporated in this FINAL document. This document is being submitted to the Ministry of the Environment and Climate Change (MECP) for formal approval.

1.8.2 Service and Study Areas

The service area for this EA includes the City of Sault Ste. Marie, Prince Township, and Batchewana First Nation's Rankin Reserve. In order to assess the potential effects of alternative methods, discipline specific study area(s) have been identified as described below and shown in **Figure 1.2**:

- On-site study area – This is the land that will be required for the new on-site fill area.
- Off-site study area or site vicinitiy study area – This study area is used to define areas within which impacts may typically be experienced from landfill development or operational activities. This area is discipline specific, lies outside of the landfill footprint and typically extends a distance of 500 m to 2 km beyond the expanded fill area boundary. **Table 1.2** lists the discipline specific study areas and rationale.



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THE CORPORATION OF THE CITY OF SAULT STE. MARIE CANADA

- Rural Precambrian Uplands
- Rural Area Zone; RAhp
- Rural Aggregate Extraction Zone
- Institutional Zone
- Parks and Recreation Zone
- Mobile Home Residential Zone
- Highway Zone
- Estate Residential
- Environmental Management

SAULT STE. MARIE MUNICIPAL LANDFILL SITE

DISCIPLINE SPECIFIC STUDY AREAS FOR IMPACT ASSESSMENT

Project 60117627
June 2023

Figure 1.2

Table 1.2: Summary of Discipline Specific Study Areas

Discipline	On-Site*	Off-Site	Comment
Archaeology	✓	Within the City-owned landfill property. (Note: following the completion of the Archaeological Assessment the City has acquired additional buffer lands. These buffer lands will not be disturbed or developed through the planned expansion)	All land disturbances and disruptions are confined to the existing City-owned site.
Atmospheric	✓	Approximate 10 km by 10 km grid.	This area was selected based on defining an area around the Site that may experience potential impacts of the Site operations and also defining a boundary that would allow for consideration of the City of Sault Ste. Marie (i.e. capture potential impacts to nearest major population centre, if applicable).
Biology	✓	100 m from proposed expansion.	It is generally assumed that the natural features that most commonly occur in this region of Ontario would not be impacted by the proposed expansion if they were located outside of this 100 m setback.
Socio-Economic	NA	1000 m and 2000 m from proposed expansion.	Ministry Guideline D-4 prescribes the specific area of influence that applies for a landfill site and is used to confirm whether a potential compatibility concern exists with proposed changes in land use. D-4 specifies restrictions and controls on land use that the Ministry wishes to see implemented in the vicinity of landfills in order to protect the health, safety, convenience and welfare of residents near the facility. The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500m of the perimeter of the fill area. For the purposes of this proposal we have conservatively considered a one kilometre radius to be the principal area of potential socio-economic impacts. The area between the one and two kilometre radii has also been included to further characterize the area surrounding the zone of potential impacts.

Discipline	On-Site*	Off-Site	Comment
Hydrogeology	✓	Within the City owned landfill property.	The study area focuses on the present property owned by the City of Sault Ste. Marie for the landfill. The study area is interpreted in the context of the regional geology and hydrogeology. The objective is to meet groundwater quality criteria at the property boundary.
Noise	✓	1000 m from proposed expansion.	Noise receptors included the nearest receptors in various directions from the site.
Planned Land Use	✓	500m and 1000m from proposed expansion.	The on-site study area has been considered to address the area that will be impacted by the disposal footprint. The area within 500m of the disposal footprint coincides with the area of influence of a landfill site as prescribed in Ministry Guideline D-4. The area between 500m and 1000m of the proposed disposal footprint has been included to generally characterize the surrounding land uses outside the area of influence.
Surface Water	✓	Within the City owned landfill property.	The study focuses on the present City-owned landfill property. The objective is to meet surface water quality criteria prior to discharging from the site.
Transportation	NA	Approximately 750 m from proposed expansion.	The “site vicinity study area” extends along Fifth Line to Old Goulais Bay Road to the west and Highway 17 north to the east. The site vicinity study area includes the Fifth Line intersections with Highway 17 north and Old Goulais Bay Road. In addition, historical traffic volumes have been characterized outside of the site vicinity study area to provide an understanding of the area surrounding the landfill site.
Visual	NA	Within 500 m and 1500 m of the proposed expansion.	Ministry Guideline D-4 prescribes the specific area of influence that applies for a landfill site and is used to confirm whether a potential compatibility concern exists with proposed changes in land use. D-4 specifies restrictions and controls on land use that the Ministry wishes to see implemented in the vicinity of landfills in order to protect the health, safety, convenience and welfare of residents near the facility. The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500 m of the perimeter of

Discipline	On-Site*	Off-Site	Comment
			the fill area. For the purposes of this proposal, we have conservatively considered a 1.5 kilometre radius to be the principal area of potential visual impacts. More specifically we have characterized potential visual impacts in relation to the following two areas: **Site-Vicinity** - the lands in the vicinity of the Preferred Alternative Landfill Expansion, extending about 500 metres in all directions from the edge of the preferred landfill expansion; and, **Regional** - the lands within approximately 1.5 kilometres of the Preferred Alternative Landfill Expansion.

* On-site = land required for the existing and new fill areas.

The impact assessment of the preferred alternative has been carried out based on the above noted study areas.

1.8.3 Planning Period

For the purpose of this EA, the planning period was considered to extend to 2049 (i.e. 25 years from the time the exisitng site is expected to reach capacity). The actual site life is dependent on waste generation rates, the success of waste diversion programs and actual growth in the study area.

1.9 Consultation Program

Consultation played an important role in the EA process for this project. The consultation program was first developed as part of the EA Terms of Reference. The intent of the program was to provide opportunity for input from the public, stakeholders, Aboriginal Communities, and agencies at key points in the process. Efforts were made to provide information to the community to keep them informed, provide opportunity for people to obtain additional information and/or get their questions answered, and provide opportunity for discussion and exchange of information with the project team. The program was designed to be flexible to meet the needs of a variety of stakeholders.

Consultation on this project has included:

- Newsletters;
- Newspaper notices/advertisements;
- Media releases;
- Project Web page;
- Working papers at key points for public review and comment;
- Workshops;
- Public Information Sessions;
- Engagement with Aboriginal communities including Batchewana First Nations, Garden River First Nations, Metis Nation of Ontario and Missanabie Cree;
- Ongoing stakeholder liaison via phone, email, letter;
- Agency meetings; and

- Reports and televised presentations to Council.

Details on the consultation program and input received are provided in Section 9.0. The input received is also discussed for each key step within the chapters of this document.

1.10 The Study Team

The City assembled a multi-disciplinary study team to undertake the preparation of this EA. The project was managed by AECOM and many of the EA activities were jointly shared with Dillon Consulting Limited. Study Team members and their project responsibilities are shown in **Table 1.3**.

Table 1.3: The Study Team

Study Team Members	Project Responsibilities
AECOM	• Overall project management; • Transportation assessment; • Socio-economic assessment; • Surface water assessment; • Planned land use assessment; • Visual assessment; • Geotechnical investigation and recommendations; • Waste quantities; • Design and operations input; and • Public and agency consultation.
Dillon Consulting Limited	• EA planning process; • Ground water assessment; • Biological assessment; • Air quality assessment; • Noise assessment; • Design and operations; and • Public and agency consultation.
Woodland Heritage Services Limited	• Archaeology and heritage assessment.

2.0 WASTE QUANTITIES PROJECTIONS

In order to determine the future waste quantities requiring disposal within the service area, a number of factors have to be taken into consideration including:

- Population projections;
- Waste generation rates or waste disposal rates; and
- Waste diversion rates.

The population projections are used in conjunction with waste disposal or waste generation rates to determine the quantity of waste to be managed by the City in future years.

In 2010, the City of Sault Ste. Marie issued the *Waste Quantity Projections and Existing Environmental Profile* report. That report provided information on population projections, waste generation rates and diversion rates used in order to estimate future waste quantities. Projections were completed for residential, Industrial, Commercial and Institutional (IC&I), and biosolids wastes. The report was used as a basis for further analyses of waste quantities included in this report which includes consideration of more recent data over the period from 2010 to 2018 and recently released Provincial policies and/or discussion and guidance documents. The following sections provide details of the waste quantity projections that have been incorporated into the project planning.

2.1 Population Projections

The City's population peaked in the early 1980's and remained relatively stable in the range of 80,000 to 83,000 for a period of approximately 15 years. The population was generally in decline from the mid 1990's until the early 2000's and **has remained relatively stable since that time (i.e. population has remained within the range of 73,368 to 75,140 from 2001 to 2016)**. The historical decline in population is largely attributable to industry downsizing and its ripple effect in the service and retail sectors. The City completed numerous waste management studies in the early 2000's which remain relevant today based on the consistent population and employment trends throughout the past 20 years.

In 2008 the City's Planning Department developed population and household projections in conjunction with its review of the City's Official Plan. City staff noted that the City's population is aging and there are not enough workers to fill future job vacancies created by retirements. This will create an opportunity for potential growth provided the municipality is able to attract migrants to fill job vacancies[5]. The report concluded that a modest population increase would occur from 2006 to 2026 and reach 81,500 in 2026. These projections were incorporated in the 2010 *Waste Quantity Projections and Existing Environmental Profile* report.

Most recently, in 2018, the City Planning Division commissioned a further update to its population projections. For the purpose of this EA, the 2016 population was obtained from census data, and projected populations for 2016 to 2036 were obtained from The City of Sault Ste. Marie Population, Housing and Employment Projections – Commercial and Industrial Land Needs Analysis Report completed by Dillon Consulting (refer to **Appendix A**). The report noted that "like all other Communities across Canada, the City of Sault Ste. Marie's Baby Boomers stand out. The retiring Boomers will need to be replaced in the workforce. Annual flows of positive net in-migration will result in a growing population overall for the City."

For the remainder of the planning period, beyond 2036, a modest population growth rate of 0.64% per annum (i.e. an extrapolation of the 2016 to 2036 average growth rate from the 2018 report) was applied for the period from 2036 to 2049. The population projections are included in **Table 2.1**.

The existing and proposed service area also includes Batchewana First Nation's Rankin Reserve and Prince Township which include small populations in comparison to the City of Sault Ste. Marie. The estimated historical populations for each of these communities together with future population projections

[5] Planning Division Report dated 2008 09 22 – Official Plan Review 2008 – Part 1 Population and Household Projections.

are also included in **Table 2.1**. Based on these projections, it is anticipated that the population within the service area will increase to 92,487 by 2049.

Table 2.1: Service Area (City of Sault Ste. Marie, Prince Township & Rankin Reserve) Population Projections

	2006	2011	2016	2021	2026	2031	2036	2041	2046	2049
Sault Ste. Marie	74948[1]	75140[1]	73368[1]	74527[2]	75686[2]	79931[2]	83270[2]	85969[3]	88755[3]	90470[3]
Prince Township	971[1]	1031[1]	1010[1]	1021[4]	1032[4]	1043[4]	1054[4]	1065[4]	1076[4]	1083[4]
Rankin Reserve	566[1]	623[5]	662[5]	722[5]	883[5]	894[4]	905[4]	916[4]	927[4]	934[4]
Total (Service Area)	76485	76794	75040	76270	77601	81868	85229	87950	90758	92487

Notes:
1. Census Data.
2. The City of Sault Ste. Marie Population, Housing and Employment Projections – Commercial and Industrial Land Needs Analysis Report – September 2018 .
3. Extrapolated from The City of Sault Ste. Marie Population, Housing and Employment Projections – Commercial and Industrial Land Needs Analysis Report – September 2018.
4. Estimated 1 new household per year with an occupancy of 2.2 persons.
5. Provided by Batchewana First Nations.

2.2 Waste Generation/Disposal Rates

Three distinct waste streams are managed in whole or in part by the City of Sault Ste. Marie and include:

- Residential - wastes generated by people in their home environment.
- Industrial, Commercial and Institutional (IC&I) – wastes generated by people in work/business and institutional environments.
- Municipal Biosolids – wastes generated at wastewater pollution control plants.

Population projections are used in conjunction with waste generation rates or waste disposal rates to determine the quantity of wastes to be managed by the City in future years. “Waste generation rate” is defined as the quantity of waste that is generated by the average person within the service area on an annual basis and is expressed as kilograms or tonnes per person per year and includes diverted and disposed wastes. “Waste disposal rate” is defined as the quantity of waste that is disposed of by the average person within the service area on an annual basis and is expressed as kilograms or tonnes per person per year and it the residual waste post diversion.

In estimating the quantities of waste to be managed by the City in future years, waste generation rates have been applied for the “residential” and “municipal biosolids” waste streams and a waste disposal rate has been applied for the IC&I waste stream. Wastes diverted within the IC&I sector are mandated through Provincial Regulation and enforced by Provincial officers. IC&I diverted wastes are not controlled by the municipality and are managed almost entirely by the private sector. There is very limited information available to quantify diverted IC&I wastes. The application of a waste disposal rate for the IC&I sector reflects the wastes that have historically been managed by the City at its landfill over the period from 2003 through 2012 inclusive. Commencing in 2013 and continuing to present day, some of the IC&I waste generated within the service area has been disposed of in a commercial Northern Michigan landfill. The City understands that the quantity of “exported” IC&I waste will vary over time based on numerous factors

including available reserve capacity in the northern Michigan landfill, travel costs, tipping fees, exchange rates, border controls, travel delays, etc. The City also understands and recognizes the sensitivities of the international border crossing and the importance of planning for the entire "local" IC&I waste stream.

The waste generation rate or waste disposal rate associated with each stream is discussed in greater detail in each of the following subsections. In each case the most relevant ten years of historical data has been used in projecting future waste quantities.

2.2.1 Residential Waste Generation

The "residential" waste stream is characterized by the wastes that are generated in our home environment. The total estimated quantity of residential waste managed by the City of Sault Ste. Marie between 2009 and 2018 is summarized in **Table 2.2.**

Table 2.2: Residential Waste Generation Rate

Description	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	10Yr Avg.	5Yr Avg.
Residential Waste Managed (Tonnes)	33770	33410	32260	35460	32380	30710	30980	33170	32050	33290	32748	32040
Population*	75063	75102	75140	74786	74431	74077	73722	73368	73600	73832	74312	73720
Kg/person/year	450	445	429	474	435	415	420	452	435	451	441	435

* Table reflects City of Sault Ste. Marie residents only.
Data obtained from City of Sault Ste. Marie Datacall Reporting.

The per capita residential waste generation rate over the 10 year period 2009-2018 has ranged from 415 to 474 kg/person/year with 10 year and 5 year averages of 441 and 435 kg/person/year, respectively.

For the purpose of projecting the residential waste quantities, a waste generation rate of 450 kg/person/year has been used. It is 2% above the City of Sault Ste. Marie 10 year average and 3% higher than the most recent 5-year average. This moderately conservative approach is appropriate for planning purposes. This waste generation rate represents approximately 38.1% of the waste stream to be managed by the City.

2.2.2 IC&I Waste Disposal Rate

The IC&I waste stream is characterized by wastes that are generated in our work/business and institutional (eg. schools, churches, etc.) environments. Much like most municipalities, waste management in the IC&I sector within Sault Ste. Marie and surrounding area is not a municipal responsibility. Management of waste in the IC&I sector must be initiated by each individual property/business owner ("owner"). The owner is responsible for contacting and contracting with a private sector waste collection contractor who typically provides the owner with waste and in some cases recycling collection containers on their property and subsequently undertakes regular collection of these wastes at a frequency determined by the owner's specific needs. In some cases, "blue box" recyclables and other wastes (eg. wood waste, metals, organics) are separated at source. In other cases, collected waste is sorted by the collection contractor to remove marketable materials (eg. wood, other C&D waste, metals, etc.) prior to delivering the residual waste to a disposal site. Through this approach some level of diversion is regularly occurring in the IC&I sector (i.e.

separated at source or separated by the collection Contractor) and the **IC&I waste received at the City of Sault Ste. Marie landfill is the remaining residual waste following upstream diversion efforts**.

Although there are several programs and facilities available within Sault Ste. Marie and the surrounding area to accommodate and encourage diversion in the IC&I sector, the Municipality has limited ability to mandate or enforce diversion in this sector. Ultimately diversion in the IC&I sector is mandated through provincial regulations and enforced by Provincial officers. The City and the commercial waste collection contractors have historically and will continue to educate and encourage diversion in the IC&I sector.

It is believed that most of the residual IC&I waste generated within the service area was accommodated at the City landfill during the period 2003 to 2012. As noted previously portions of the IC&I waste have been and continue to be exported to a commercial disposal facility located approximately 25 – 30km south in the northern Michigan community of Dafter. There are no other large commercial disposal facilities in northern Ontario that could accept this waste and exporting waste across the international border is not a reliable long-term solution.

Therefore the 10-year period from 2003 to 2012 provides the most relevant data for projecting future IC&I waste quantities. The quantities from 2003 to 2012 continue to be relevant as the City's population and employment levels have remained stable throughout the entire period spanning 2003 to 2018 (refer to **Table 2.1**). The total quantity of IC&I waste disposed of within the City of Sault Ste. Marie landfill between 2003 and 2012 is summarized in **Table 2.3**.

Table 2.3 IC&I Waste Disposal Rate

Description	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	10Yr Avg.	5Yr Avg.
IC&I Waste Disposed (tonnes)	43338	58170	39067	31610	30930	63714	33754	45539	41238	35071	42243	43863
Population*	74719	74795	74872	74948	74986	75025	75063	75102	75140	74786	74944	75023
Kg/person/year	580	778	522	422	412	849	450	606	549	469	564	585

* Table reflects City of Sault Ste. Marie residents only.

The per capita IC&I waste disposal rate over the ten-year period 2003-2012 has ranged from 412 to 849 kg/person/year with 10 year and 5 year averages of 564 and 585 kg/person/year, respectively.

As is evident from the data included in **Table 2.3**, there is the potential for considerable volatility in the quantities and types of IC&I waste to be disposed of at a City of Sault Ste. Marie disposal facility. Recognizing the variability in the quantities of IC&I waste that will be managed by the City, a reasonable contingency is required in the IC&I waste disposal rate. Therefore, the waste disposal rate to be used for projecting the IC&I waste stream is 600 kg/person/year. The proposed 600 kg/person/year was exceeded in three of the ten analysis years included in **Table 2.3** and is approximately 6% higher than the ten-year average and 2.5% higher than the five-year average. These modest contingencies are reasonable given the significant variability demonstrated over the ten-year analysis period. This waste disposal rate represents approximately 50.5% of the waste stream to be managed by the City.

2.2.3 Municipal Biosolids Waste Generation

Municipal biosolids are currently being generated within the service area at wastewater pollution control plants. This material is also commonly referred to as sewage sludge. The total quantity of municipal biosolids managed by the City of Sault Ste. Marie between 2009 and 2018 is summarized in **Table 2.4**. These municipal biosolids are generated at the two City of Sault Ste. Marie water pollution control plants.

Table 2.4 Municipal Biosolids Waste Generation Rate

Description	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	10Yr Avg.	5Yr Avg.
Biosolids Waste Generated (tonnes)	10257	10215	10144	9687	9415	10533	10029	9430	9560	9487	9876	9808
Population*	75063	75102	75140	74786	74431	74077	73722	73368	73600	73832	74312	73720
Kg/person/year	137	136	135	130	126	142	136	129	130	128	133	133

* Table reflects City of Sault Ste. Marie residents only.

The per capita biosolids generation rate over the ten-year period 2009-2018 has ranged from 126 to 142 kg/person/year with 10 year and 5-year averages of 133 and 133 kg/person/year, respectively.

Based on the limited historical variability no significant contingency is required. For the purpose of projecting the biosolids waste quantities, a biosolids generation rate of 135 kg/person/year has been used. This waste generation rate represents approximately 11.4% of the waste stream to be managed by the City.

2.3 Waste Diversion Rates

The wastes that are generated within the service area are either diverted or disposed. This section addresses the waste diversion rates that have been achieved historically and projects future waste diversion rates. As with waste generation/disposal rates, diversion rates for the three streams have to be identified separately. Each is discussed in greater detail in the following subsections.

2.3.1 Residential Waste Diversion Rate

Over time, different waste diversion goals and objectives have been identified by the Provincial government. Although various waste management guidance documents and program changes have been implemented over time, the common theme has been, and continues to be, for Municipalities to reduce disposal through enhanced 3R's initiatives. The Provincial government has also recognized that consideration must be given to size, location, cost factors and economies of scale.

Most recently the Provincial government passed the Waste-Free Ontario Act (WFOA) (2016) which also included the passage of the Resource Recovery and Circular Economy Act (RRCEA) (2016) and Waste Diversion Transition Act (WDTA) (2016). This legislation provides a resource recovery and waste reduction road map for Ontario with a pronounced shift to Extended Producer Responsibility (EPR).

RRCEA is focused on converting end of life materials to a resource rather than waste while WDTA is intended to provide a smooth transition from existing to new waste diversion programs.

Several policy, discussion and guidance documents have also been produced to support the above noted legislation including the Made in Ontario Environment Plan (MOEP) (2018), Reducing Litter and Waste in Our Communities (RLWOC) (2019) and Food and Organic Waste Policy Statement (FOWPS) (2018).

The MOEP is an overview of Ontario's commitment to address climate change, protecting its air, lakes and rivers, reducing litter and waste in its communities, keeping its land and soil clean and conserving land and greenspace through a number of action initiatives. The plan endeavours to foster a province wide commitment to protecting the environment and take decisive action on climate change.

The RLWOC is a discussion paper which addresses the waste reduction initiatives outlined in the MOEP. It identifies the following waste diversion targets; 30 percent diversion by 2020; 50 percent diversion by 2030; and 80 percent diversion by 2050. A number of proposed initiatives are addressed in the discussion paper in order to meet these targets, several of which may involve Municipal consultation and/or participation including:

- Harmonizing the list of materials accepted in Blue Box programs across the province;
- Transitioning the existing Blue Box Program to full producer responsibility (Sault Ste. Marie is scheduled to transition in 2023);
- Designating new materials that are currently not covered under any provincial diversion programs (i.e., small and large appliances, power tools, rechargeable batteries, fluorescent bulbs and tubes, mattresses, carpets, clothing and other textiles, furniture and other bulky items);
- Develop guidance to increase diversion participation in multi-residential buildings;
- Reducing the amount of food and organic waste sent to landfill;
- Reducing plastic waste being sent to landfill; and
- Managing compostable products and packaging.

The FOWPS also addresses some of the waste reduction initiatives outlined in the MOEP and focuses on limiting the amount of food and organic waste that is disposed of in Ontario's waste disposal sites. The Province wants to achieve this by implementing the Ontario Food Recovery Hierarchy which consists of preventing or reducing food and organic waste at the source, safely rescuing and redirecting surplus food before it becomes waste and recovering food and organic waste to develop end-products for beneficial use.

The Policy Statement also establishes a number of municipal waste reduction and resource recovery targets. For example, Northern Ontario Municipalities such as the City of Sault Ste. Marie that service a population greater than 50,000 and have a population density greater than 300 persons per square kilometer and who do not currently have an existing food and organic waste collection program are expected to target 50% waste reduction and resource recovery of food and organic waste generated by residential households by 2025. Municipalities are expected to achieve this target through waste reduction and resource recovery efforts of the following waste types:

- Food waste;
- Organic waste resulting from food preparation;
- Soiled paper;
- Leaf and yard waste;
- Seasonal outdoor wastes; and
- Flowers and houseplants.

Municipalities are also encouraged to include the following waste types in their waste reduction and recovery efforts:

- Personal hygiene wastes;
- Sanitary products;
- Shredded paper;
- Additional paper fibre products;
- Compostable products and packaging; and
- Pet food and wastes.

The principal impact of this Policy is that the City will be mandated to provide curbside collection of food and organic waste to single family dwellings with the expectation that they will achieve a 50% waste reduction and resource recovery of food and organic waste by 2025.

Historically there has been and there continues to be a provincial focus on reducing disposal quantities through 3R's initiatives.

To this end, the City of Sault Ste. Marie has completed a significant level of study relating to waste diversion in the City of Sault Ste. Marie. This has included the Current Waste Management System Summary (September 2000), a Residential Waste Composition Study (March 2001), the Organic Waste Diversion Report (April 2001), the Alternative Waste Diversion/Collection System Options Report (June 2001), the Co-composting Pilot Study (February 2004) and the Biosolids Management Study (May 2015).

The City has been very proactive with waste diversion since 2001 and is currently meeting the 2020 provincial diversion target of 30%. Through a focused effort to enhance diversion, the residential waste diversion rate increased from 9% in 1999 to 30+% in 2004. It has generally remained in the 30% range since that time and the City remains committed to cost effectively enhancing diversion efforts over time. There are however challenges associated with the City's northern climate, relatively isolated location and limited ability to partner with other municipalities to achieve economies of scale. A full description of the City's diversion programs is included in Section 1.5.

Based on various studies completed in Canada, Ontario and Sault Ste. Marie, including two local waste audits, it is estimated that organics, including leaf and yard waste and food waste, make up approximately 40% of the residential curbside waste stream. In addition, according to annual Landfill Site Development and Operations reports approximately 2/3 of residential waste generated in Sault Ste Marie is setout curbside with the remainder being self hauled to landfill.

In order to achieve higher levels of residential diversion, the current organics collection program consisting of the collection of leaf and yard waste throughout the growing season would have to be expanded to year-round weekly collection of kitchen wastes and other organics. Recognizing that organic materials represent a significant proportion of the overall waste stream, the City completed an *Organics Diversion Report (April 2001)* and a *Co-composting Pilot Study (February 2004)*. The conclusions included in the Co-composting Pilot Study are summarized below:

- It is recommended that the City implement an enhanced leaf and yard waste program in 2004. This program would consist of curbside collection every other week between April and November. **The City implemented this recommendation many years ago**.

- It is recommended that the City not compost other residential and IC&I organics at this time. The rationale for the recommendation was that with the relatively small quantity of feedstock, the material would have to be composted outdoors to be cost effective. With the colder climate, snow loads and odour concerns, outdoor composting would be a challenge. Given its location the City is unable to cost effectively partner with other Municipalities to establish a Regional processing facility. The City will however continue to evaluate the costs and benefits of establishing a source separated organics program in the future and will also continue to monitor and comply with Provincial program requirements. **Based on the terms of the FOWPS, the City is mandated to provide curbside collection of food and organic waste to single family dwellings with the expectation that they will achieve a 50% waste reduction and resource recovery of food and organic waste by 2025. Therefore, appropriate provisions and commitments have been incorporated into this EA to respect those requirements.**

- It is recommended that the City not compost municipal biosolids at this time. The rationale for the recommendation was that the City's biosolids do not meet the feedstock restrictions and cannot meet the unrestricted use guidelines included in the compost guidelines. The City subsequently completed a Biosolids Management Study. Through that study, alternatives were developed and evaluated to divert biosolids from disposal. **The City is proceeding with the design and construction of a biosolids processing facility which is scheduled to be operational by 2025 or 2026 (refer to Section 2.3.3).**

As noted above, the City is committed to aggressively increasing diversion beyond 30% and will continue to assess other additions/enhancements over time provided they can be achieved practically and cost efficiently, are approved by Council or are provincially mandated. As a number of the programs transition to extended producer responsibilities the Municipality will have limited, if any, control of the level of diversion achieved.

For the purposes of this study it has been assumed that the future residential waste diversion rate will continue to remain in the 30% range from 2019 to 2024 and increase to 50% in 2025 in conjunction with the commencement of a curbside residential food and organic waste collection program as mandated through the current FOWPS.

Historically, the City has also encouraged other innovative waste management approaches. In 2007, the City granted permission to The Elementa Group (Elementa) to construct a pilot-scale steam reformation plant that converts municipal solid waste into a char and synthetic gas (syngas). Testing of the technology, with limited quantities of municipal solid waste, was completed over a three year period from 2007 to 2009. The syngas was burned in a flare and testing of the emissions was completed with favourable results.

Late in 2009, the City of Sault Ste. Marie endorsed a contract with Elementa for the supply of a minimum 12,500 metric tonnes of municipal solid waste for a minimum period of 10 years commencing in 2011. The contract would assist the City in managing its problem of diminishing solid waste disposal capacity. Elementa also planned to source waste from outside Sault Ste. Marie to allow full utilization of the proposed plant capacity.

Ultimately the relationship with Elementa came to and end in December 2015, when the Elementa Group Inc. entered into receivership proceedings. The failure of the Elementa relationship supports the need to manage all residual waste generated within the service area through this undertaking.

2.3.2 IC&I Waste Diversion Rate

Diversion programs in the IC&I sector are mandated through Provincial regulations and enforced by Provincial officers. For the purposes of this study, a specific target IC&I waste diversion rate has not been identified as it is not possible to accurately quantify the wastes that are being generated and managed within this sector. However, success is currently being achieved in the diversion of wastes in the IC&I sector in Sault Ste. Marie through separation at source or through separation by collection Contractors. These successes are largely driven by market conditions for wastes and provincial policy. Although it is anticipated that the present diversion levels can be sustained and enhanced, it is prudent to make some allowances for fluctuations in IC&I disposal quantities in the future (refer to Section 2.2.2). The proposed **waste disposal rate** presented in Section 2.2.2 reflects **the post diversion quantities (i.e., residual waste only)** that the City has historically managed at its landfill.

2.3.3 Municipal Biosolids Waste Diversion Rate

The City is committed to diverting municipal biosolids from disposal and has completed a Municipal Biosolids Management Study. Alkaline stabilization and composting were identified as the preferred processing alternatives and the City is now proceeding with the implementation phase of this project with facility start-up planned for 2025.

Given the City's commitment to diverting municipal biosolids an aggressive approach has been taken within the context of this EA. It has been assumed that all of the municipal biosolids will be diverted from disposal commencing in 2025 (i.e. biosolids diversion rate = 100%).

2.4 Waste Requiring Disposal

The Table included in **Appendix A** summarizes waste generation, diversion and disposal projections for the period from 2021 to 2049. Based on the projections, the City of Sault Ste. Marie requires additional disposal capacity of approximately 1.78 million tonnes to 2049.

2.5 Summary

The following conclusions are provided for this section:

- It is anticipated that the permanent population in the service area (i.e.: the City of Sault Ste. Marie, Prince Township and Rankin Reserve) will increase to 94,487 by 2049;
- A residential waste generation rate of 450 kg/person/year is used in the waste projections;
- A residential waste diversion rate ranging from 30% to 50% is used in the waste projections for the period 2021 to 2049;
- The residential waste quantity projections include provisions to address the requirements of the FOWPS;
- An IC&I waste disposal factor of 600 kg/person/year is used in the waste projections which reflects residual, post diversion waste;
- A municipal biosolids generation rate of 135 kg/person/year is used in the waste projections;
- It is assumed all municipal biosolids will be diverted commencing in 2025;
- The composition of waste to be managed in Sault Ste. Marie consists of 38.1% residential, 50.5% IC&I and 11.4% biosolids; and
- Sault Ste. Marie requires approximately 1.78 million tonnes of additional capacity to 2049.

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT (SERVICE AREA)

A general inventory of the existing conditions within the **service area** (i.e. City of Sault Ste. Marie, Prince Township, and Batchewana First Nation's Rankin Reserve) has been included in the following subsections to provide some context for the areas serviced by the proposed undertaking. The data has been collected from available secondary source information and the sources used have been included in Section 11 (References) at the end of the report. Detailed information addressing the existing environment within the on and off-site study areas (i.e. proximal to the landfill site) is included in the discipline specific technical reports.

3.1 Natural Environment

The service area includes the City of Sault Ste. Marie, Prince Township, and Batchewana First Nation's Rankin Reserve. The service area is characterized by St. Marys River valley area to the south and the Precambrian Uplands to the north. The shoreline defines the southerly limits of the communities, while the southerly boundary of the Precambrian Uplands defines the northerly limit of urban expansion. Within the service area there are a number of rivers and streams with a southerly flow to the St. Marys River. There are a number of wetlands and forested areas that provide habitat for a variety of flora and fauna.

The Algonquin and Nipissing lowland plateaus created by various prehistoric lake levels define the form of the community. The lowland plateaus have two levels with the first extending from the river level to several metres above the river level and the second being approximately 30m higher. The northern edge or the upper plateau contains significant aggregate deposits. The area of the aggregate deposits functions as the recharge area for a groundwater aquifer. The groundwater aquifer is the primary source of drinking water for rural areas and supplies a portion of the municipal water supply capacity. The remainder of the municipal water supply capacity is sourced from Lake Superior. The rocky uplands area has the potential for the development of recreational opportunities as well as mineral and forestry resource extraction.

This Chapter addresses the broader service area and the potential natural environment net effects in the vicinity of the site are addressed in more detail in Section 7.2.

3.1.1 Geology / Hydrogeology / Soils

The northern portion of the service area, known as the Precambrian Uplands, is characterized by a rocky, rugged terrain with very shallow overburden overlaying Precambrian granites. The southern portion of the service area consists of the Algonquin and Nipissing lowland plateaus created by prehistoric lake levels. The plateaus are relatively flat areas located between the St. Marys River and the Precambrian Shield. The interface between these plateaus and the upland area contains significant prehistoric sand and gravel beach deposits. These deposits form the main recharge area for a groundwater aquifer which flows under the plateau areas. Streams and rivers originating in the uplands are fed by rainfall and spring melt. These streams and rivers recharge the groundwater aquifer due to infiltration through the sand and gravel deposits at the base of the Precambrian Uplands.

The bedrock formations within the service area consist primarily of Precambrian granite and Cambrian sandstone. These bedrock formations typically define the lower limit of the aquifer. The main aquifer is located within the layers of till, sand and gravel directly above the bedrock. A large portion of the plateau area between the St. Mary's River and the sand and gravel areas abutting the uplands has a layer of

glaciolacustrine clay. This clay layer helps to protect the aquifer by limiting any downward migration of pollutants. The upper strata of overburden consisting of sand, gravel or alluvium deposits provide for the recharge and discharge of the aquifer. General stratigraphic units within the service area are summarized in **Table 3.1**.

Table 3.1 General Stratigraphy

Type of Formation	Description	Comments
Overburden	Recent alluvium	Mainly found along and within the streambeds
	Glaciolacustrine beach sands and gravel	Along and adjacent to the slopes of the Precambrian uplands
	Glaciolacustrine shallow water sand	Discontinuous
	Glaciolacustrine deep water clay	Extensive over large part of the low lands surrounding the City of Sault Ste Marie, provides protection to the underlying aquifer
	Sand and gravel	Principal aquifer
	Till	Discontinuous
Bedrock	Cambrian sandstone	Bedrock aquifer, generally contiguous to overlying sand and gravel aquifer
	Precambrian granite	Upper fractured and weathered portions may provide limited groundwater source

Source: Sault Ste. Marie Groundwater Management and Protection Study (Burnside 2003)

This Chapter addresses the broader service area and the potential hydrogeological net effects within and adjacent to the landfill site are addressed in Section 7.2.2 and Appendix E.

3.1.2 Surface Water

The service area is located within the St. Mary's River watershed. While there are only four small lakes within the area there are a large number of small ponds. There are seven main water courses that flow through the area. The tributaries, creeks and rivers have their source in the Precambrian Uplands and flow in a southerly direction to the St. Mary's River. The four lakes include; Walls Lake and Prince Lake in Prince Township, and Allard Lake and Nettleton Lake in Sault Ste. Marie. The seven major watercourses include; the Big and Little Carp Creeks, the East and West Davignon Creeks, Bennett Creek, Root River and Crystal Creek.

The quality of surface water in the area is generally good. Prince Lake is the only lake in the area that is extensively developed with both seasonal and year-round residences.

There are very few uses within the service area that use surface water for domestic purposes. These would be found in the Prince Lake area where some residences take water from the lake. In addition, the occasional older residence along the upper St. Mary's River may depend on river water for domestic usage. A portion of the City water supply capacity for the serviced urban area comes from a surface water intake located in Lake Superior at Gros Cap in Prince Township.

This Chapter addresses the broader service area and the potential surface water net effects within and adjacent to the landfill site is addressed in Section 7.2.3 and Appendix F.

3.1.3 Climate

The service area is located along the eastern end of Lake Superior thus it is on the windward side of the Lake. The service area is located in the western part of the Sudbury climatic region. The growing season is longer relative to most of Northern Ontario. However, the lack of heat units significantly limits the growing of crops such as corn[6]. Climatic data for the area is summarized in **Table 3.2**.

Table 3.2 Climate Data

Description	Value
Average annual temperature [1]	4.7º C
Average maximum July daily temperature [1]	24.2º C
Average minimum January daily temperature [1]	-14.8º C
Average maximum January daily temperature [1]	-5.0º C
Average minimum annual temperature [1]	-0.6 º C
Average maximum annual temperature [1]	10 º C
Mean date last day of frost in spring [2]	May 31
Mean date first day of frost in fall [2]	Sept. 18
Mean annual corn heat units [2]	2,000
Average Annual rainfall [1]	897.7 mm
Average Annual snowfall [1]	320.7 cm
Average wind speed [1]	12.4 km/hr

Source 1 - Weatherbase.com (Sault Ste. Marie)
2 – The Climate of Northern Ontario (L.J. Chapman and M.K. Thomas, 1968)

3.1.4 Biology

Vegetation, wildlife and fisheries within the service area are generally characterized within the following subsections. This Chapter addresses the broader service area and the potential biological net effects within and adjacent to the landfill site are specifically addressed in Section 7.2.1 and Appendix D.

3.1.4.1 Vegetation

The service area is within the Algoma section of the Great Lakes/St. Lawrence Forest Region. This district is characterized as having sugar maple and yellow birch as the dominant tolerant hardwood species within the Precambrian Uplands (source: Hills Eco Regions (Hills, 1957)). Areas south of the uplands are characterized by agricultural and urban disturbances and have species such as white birch, aspen, and pin cherry forest stands. The Algonquin and Nipissing lowland plateaus have soils suitable for hay crops and pastureland.

Red maple is found in many forest stands. Elm trees are also found in the area however the occurrences of elm are less frequent due to Dutch elm disease. Red pine is found in drier soils primarily in the western portion of the service area near the airport. White cedar can be found on moist organic soils and some upland sites. Black spruce and tamarack can be found in lowland sites. Alder thickets are common along water courses.

While there are some forest stands south of the Precambrian Uplands, they have limited commercial value. Woodlands cover approximately 40% of the City (source: Sault Ste. Marie Official Plan). Their location along

[6] The Climate of Northern Ontario (L.J. Chapman and M.K. Thomas, 1968)

water courses, ravines, and on slope lands makes them a valuable community resource. These stands provide habitat and corridors for wildlife, shade for fish habitat, stabilize soils mitigating erosion, and provide aesthetic relief within the urban setting.

There are two known provincially significant wetlands; one located at the mouths of the Carp Rivers, and the second larger wetland located to the northwest of the airport.

3.1.4.2 Wildlife

Wildlife in the service area is typical of that found in the Great Lakes/St. Lawrence Region surrounding urban centers. Moose, the largest animal species, and black bear are found in the Precambrian Uplands. White-tailed deer are found in the forested portions of the plateau lands south of the Uplands. Species with extensive territorial ranges such as fisher, marten, gray wolf, bobcat, and lynx may also be present within the service area, however, such sightings become rarer with urban expansion.

Common small mammals such as snowshoe hare, eastern gray and red squirrels, chipmunks, beaver, muskrat, porcupine, red fox, raccoon and skunk are also found throughout the service area.

The area forest stands are home to many species of birds. A majority of these bird species are migratory, and are only present during the spring, summer and fall months when they nest and breed and raise their young. Migratory birds can fall into two main groups: short distance migrants, or those birds that only migrate as far south as the United States; and long-distance migrants, or those birds that spend their winters in tropical climates. Short distance migrants include such species as American robins, great blue herons, bald eagles, American crows, winter wrens, and several types of sparrows. Long-distance migrants include peregrine falcons, warblers, ruby–throated hummingbirds, and swallows.

Some bird species have adapted ways to survive the long winter months. These year-long residents of the boreal forest include nuthatches, chickadees, common ravens, and several species of owls.

3.1.4.3 Fisheries

The service area abuts Lake Superior to the west and the St. Mary's River to the south. Both bodies of water are important fish habitat for recreational sport and commercial fish species such as lake trout, rainbow trout, brook trout, pacific salmon, Atlantic salmon, lake whitefish, lake sturgeon, yellow walleye, northern pike, small and large mouth bass, and yellow perch. While the creeks and streams provide habitat for cold-water fish such as brook trout they are not extensively used for recreational fishing.

3.2 Social – Cultural Environment

The service area has a long history of prehistoric and historic settlement. The jurisdictional boundaries include the City of Sault Ste. Marie, the Township of Prince and Batchewana First Nation's Rankin Reserve.

3.2.1 Archaeological / Cultural

The service area has been inhabited since the time the glaciers retreated some 10,000 years ago. They left behind the landscape and contours that characterize the service area. The melt waters created a spillway for Lake Minong, the forerunner of Lake Superior. At the location of present-day Sault Ste. Marie, the drainage outlet formed the old, raised cobble and gravel beaches at the southern edge of the Precambrian Uplands. It is on these beaches, 45 metres higher than the present level of Lake Superior, that the first signs of human habitation appear. As the water levels receded, the lands along the St. Mary's River provided

resources and an effective means of transportation for early inhabitants. The rapids and the abundance of fish in the river provided a plentiful food source that attracted and sustained Aboriginal settlement of the area which has enjoyed continued human occupation for 4,000 years.

The early French explorers called the Ojibwe people in the area “Saulteurs” (People of the Rapids). In the 1600’s the river was part of the trading and exploration route west in search of a route to the Orient and of commerce for the fur trade. In addition to the fur trade, the search for copper deposits and the abundant supply of timber contributed to European settlement of the area. The ease in rafting large volumes of logs down the Lake Superior shoreline made Sault Ste. Marie a center for the area’s lumber industry.

The growth of the City as an industrial center began in earnest with the arrival of Francis H. Clergue and the Canadian Pacific Railway in the 1890’s. The formation of steel works and an electric power generating station transformed Sault Ste. Marie from a wilderness outpost to an industrial center.

The Sault Ste. Marie Official Plan includes cultural and heritage specific policies. Schedule E – “Archaeological Resources” highlights areas within the City that may have archaeological potential. In addition, the Ministry of Heritage, Sport, Tourism, and Culture Industries maintains a confidential list of all registered archaeological sites in the area. These resources were referenced for site specific evaluations completed within the context of this EA.

This Chapter addresses the broader service area and the potential archaeological/cultural resource net effects within the landfill site is addressed in Section 7.3.1 and Appendix H.

3.2.2 Social

Based on 2016 census data, the population in Sault Ste. Marie is 73,368 and there is an estimated 34,818 households . The population has remained relatively stable for many years (i.e., 2001 population = 74,566, 2006 population = 74,948, 2011 population = 75,140). The most recent household projections developed by Dillon Consulting in Association with Metro Economics for the City of Sault Ste. Marie include new housing starts ranging from 97 to 312 households per year with an average of 197 for the period extending to 2036. The number of households in the Township of Prince and the Rankin Reserve will, like the population, remain relatively stable throughout the timeline. A projected gain of one household per year would be a reasonable estimate of growth for these areas.

Further details pertaining to population projections is included in Section 2.1.

3.2.3 Official Plans and Policy Documents

The service area contains three local governing bodies, two have set-out growth strategies within their planning and growth policy documents. The City of Sault Ste. Marie and the Township of Prince have adopted Official Plans. The Rankin Reserve does not have a similar document.

The Township of Prince Official Plan was updated and approved in January 2012. Its growth policies reflect its rural setting. Development criteria maintains the character of existing development, protects the natural and social environment, and is sensitive to the financial well being of the municipal government. The Township sets out policies to guide development in a variety of land use types.

While there are no existing waste disposal sites within the Township boundary, the Municipal Servicing Network section of the Official Plan notes that garbage is collected via curbside collection and is disposed of in the Sault Ste. Marie landfill. It also references the Waste Management EA and notes that resulting impacts to existing waste management practices will be reviewed by the Township and any amendments will be incorporated into the Official Plan once the study is completed. The Official Plan also highlights that the principles of "reduce, reuse, and recycle" will be encouraged and practiced wherever feasible.

The City of Sault Ste. Marie Official Plan was adopted in 1996. A major update was approved in July of 2005 (Amendment No. 100). Amendment No. 100 implemented many of the recommendations of the Sault Ste. Marie Groundwater Management and Protection Study (Burnside 2003). It should be noted that the City of Sault Ste. Marie is in the process of completing an Official Plan review through a 'Shape the Sault' initiative in anticipation of establishing a new Official Plan. The review process began in 2019 and a Draft Official Plan was issued in April 2022.

The Official Plan policies impact how land can be used in areas sensitive to development such as:

a) Groundwater recharge area;
b) Aggregate deposits;
c) Wildlife habitat;
d) Alluvial and lacustrine clay soils;
e) Fish habitat;
f) Precambrian uplands;
g) Great Lakes and tributary flood lines;
h) Wetlands;
i) Conservation Authority fill regulated areas;
j) Wellhead protection zones; and
k) Rural areas.

The above noted areas are illustrated in Schedules A, B and C of the Sault Ste. Marie Official Plan and are included in **Appendix B** of this report.

There is no mention of a landfill or waste disposal site as a permitted use within any of the Official Plan land use policies or within the designations as illustrated in Schedule C – Land Use. Any new waste disposal site or expansion of the boundaries of the existing landfill site will require an amendment to the Official Plan.

The Municipal Services section of the Sault Ste. Marie Official Plan includes the following policies with respect to the existing landfill and waste disposal and diversion:

S.2 The existing sanitary landfill site has a projected capacity sufficient to meet the needs of the municipality within the timeframe of this Official Plan. Identification of a new site may be required within the period of the Plan

S.3 The city shall encourage the development of recycling programs and operations which divert solid waste from the landfill site.

As previously noted, the City is currently developing a new Official Plan. As per Provincial Policy Statement requirements, the revised Official Plan will include land use compatibility policies for a variety of situations including the landfill site. It is proposed to designate the current landfill holdings as 'Waste Management' in the revised Official Plan. Furthermore, it is proposed to include, within the Land Use Schedule, a 500 m

influence area around the expanded disposal footprint. The development of new sensitive uses within the influence area will be subject to Ministry Guideline D-4 (refer to Section 7.3.3 and Appendix J for further details).

3.2.4 Land Use

The major concentration of developed land is located within the Urban Service Line which occupies approximately 53 square kilometres. Rankin Reserve, Prince Township and the rural area of the city occupy approximately 271 square kilometres.

The existing waste disposal site is serviced with municipal water and wastewater services but is generally located outside of the urban service line.

The land-use patterns within the City are illustrated in Schedule C of the Sault Ste. Marie Official Plan which is included in **Appendix B.**

This Chapter addresses the broader service area and the potential land use net effects in the vicinity of the landfill site are addressed in Section 7.3.3 and Appendix J.

3.2.5 Transportation

The service area is well connected to the rest of North America. It is located at the midpoint of the Trans-Canada Highway and is connected to the United States Interstate Highway network via the International Bridge and Interstate 75. Rail connections exist to the north, south and east. The Sault Ste. Marie Airport is serviced by Air Canada Jazz, Porter Airlines and Bearskin Airlines offering flights to southern and northern Ontario destinations. In addition, the service area abuts the Sault Locks which afford a navigable connection between Lake Superior and Lake Huron on the St. Lawrence Seaway.

Within the City of Sault Ste. Marie there are approximately 550 km of roads[7]. The major street network is shown in Schedule D of the Sault Ste. Marie Official Plan which is included in **Appendix B**.

This Chapter addresses the broader service area and the potential transportation and traffic net effects in the vicinity of the landfill site are addressed in Section 7.4.2 and Appendix N.

3.2.6 Municipal Servicing Network

Waste Management System

The City provides a combination of waste diversion and waste disposal services and facilities. An overview of the services provided is included in Section 1.5.

Sanitary / Storm Sewers

The urban land uses within the service area are served by a system of sanitary and storm water sewers. Sanitary sewage flows to two secondary treatment plants. The West End Wastewater Treatment Plant located at the corner of Allen's Side Road and Base Line has a design capacity of 20 ML (megalitres) per day. The East End Wastewater Treatment Plant has a design capacity of 36 ML per day. Over the years

[7] Sault Ste. Marie Transportation Master Plan Final Report, HDR Corporation, January 2015.

the municipality has eliminated combined sanitary and storm sewers. Some inflows and infiltration of storm water into the sanitary system still occurs during significant rainfall events and as a result of spring melt. To address this, the city constructed a 12,000 cubic metre and a 700 cubic metre combined sewage overflow tank at Bellevue Park and the Pim Street sewage pump station respectively. The "holding" tanks temporarily store wastewater during spring melt or significant rainfall events mitigating overflows within the collection system.

In addition to the communal sanitary sewage system, wastewater is managed through private, on-site systems in the rural areas.

A survey conducted for the Sault Ste. Marie Groundwater Management Study (2003) found approximately 1,350 individual septic systems in the unserviced rural area.

Domestic Water

The municipal domestic water supply has two primary sources; a water intake located in Lake Superior at Gros Cap and the groundwater aquifer via four municipal wells at three locations in the City.

In addition to the potable water provided through the communal system, it is estimated that there are approximately 1,960 individual wells in the service area[8].

3.2.7 Economics

Sault Ste. Marie has made a name for itself in steel making. Algoma Steel is the City's largest employer with approximately 2,900 employees[9]. Tenaris Algoma Tubes which produces seamless steel tubes, typically employs approximately 400 persons locally. The steel making industry has been challenged by economic cycles for many years.

Some of the other more significant contributors to the local economy are addressed in the following subsections and the economic conditions within the vicinity of the landfill site is addressed in Section 7.4.1 and Appendix I.

3.2.7.1 Tourism and Recreation

Tourism and recreation opportunities in the area include sport fishing and water sports along the St. Mary's River, Lake Huron and Lake Superior, hiking on the Voyager Trail, snowmobiling, cross-country and downhill snow skiing in winter months, and golf. In addition, tourist and recreation activities such as hunting, fishing, skiing, and eco-tourism in surrounding areas contribute to the local economy and employment in the accommodation, food, and retail industries.

3.2.7.2 Forestry

There are large forest stands within the Precambrian Uplands area comprising primarily hardwoods such as sugar maple. The large boreal forest to the north of the service area contributes to the local economy through the supply of wood-based resources to small local mills.

[8] Sault Ste. Marie Region Conservation Authority (SSMRCA) from MECP Well Records.
[9] "Corporate Profile", Algoma Steel Inc., www.algoma.com (May 29, 2022).

In addition, the area provides support services to the forestry industry such as equipment sales and service, forest management offices, and homes for those employed in harvesting activities. Sault Ste. Marie is also home to federal and provincially funded laboratories dedicated to scientific research geared toward sustainable forestry.

3.2.7.3 Agriculture

Based on 2021 census data there are 24 farms within the study area. These farms are generally smaller in size and include mainly crop production.

Sixteen farms were reported as being under 10 acres, seven farms are 10 to 69 acres, and one farm is 70 to 129 acres in size[10].

Crop production included vegetables and melons at two farms, fruit and tree nuts at two farms, hay was reported at three farms, and one farm had miscellaneous crop production. In addition, the study area encompasses eight nursery and tree farms[11].

A number of different types of livestock were also reported in the 2021 census. Two farms were classified as beef cattle ranching and farming, two were reported as hog and pig farming, two farms were identified as apiculture, one was engaged in animal combination farming with several different livestock, and one was classified as other miscellaneous animal production[12].

3.2.7.4 Mineral Resources

The most significant mineral resource in the study area is the aggregate (sand and gravel) deposits located at the southern edge of the Precambrian Uplands. There is also a potential for the quarrying of blast rock or bedrock aggregate in the Precambrian Upland area. The aggregate extracted from the numerous licensed pits and quarries are necessary for development of the urban area.

The Primary Aggregate Area is illustrated in Schedule A of the Sault Ste. Marie Official Plan (refer to **Appendix B**).

There are no mines operating in the service area. However, mineral deposits of copper, zinc, and lead were mined in the early 1800's. Two old mining trenches can be found in Prince Township. One on the bluffs above Lake Superior north of Jackson Island and the other in the Precambrian Shield north of Marshall Drive. A third old trench can be found in Sault Ste. Marie north of the intersection of Connor Road and Sixth Line.

3.3 Existing Landfill

The municipal landfill site, located at 402 Fifth Line East, was originally developed, owned and operated by Cherokee Disposals and Construction Ltd. in the early 1960's. An Environmental Assessment (EA) was

[10] Statistics Canada 2021 Census of Agriculture, Table 32-10-0232-01 Farms Classified by Total Farm Area, City of Sault Ste. Marie
[11] Statistics Canada 2021 Census of Agriculture, Table 32-10-0231-01 Farms Classified by Farm Type, City of Sault Ste. Marie
[12] Statistics Canada 2021 Census of Agriculture, Table 32-10-0231-01 Farms Classified by Farm Type, City of Sault Ste. Marie

undertaken by the City in 1983/1984 to evaluate alternative means of providing long-term waste management for the City, Township of Prince and Batchewana First Nation's Rankin Reserve. The recommended undertaking was the expansion of the Cherokee Landfill Site which would give the site additional waste disposal capacity for approximately 20 years. The assessment was approved and a Provisional Certificate of Approval No. A560102, now known as an Environmental Compliance Approval (ECA), was issued March 2, 1989 for the use and operation of 44.6[13] Ha waste disposal site (landfilling) within a total site area of 83.6 Ha. The landfill was purchased by the City in 1989 and is currently licenced to accept domestic, commercial, non-hazardous solid industrial waste and processed organic waste. In July 2009, the ECA was amended to include a 23.2 Ha Contaminant Attenuation Zone (CAZ) adjacent to the western boundary. The City has acquired other contiguous properties over time to expand the overall site which now consists of an approximate overall site area of 151 Ha.

The ECA is supported by a Design and Operations Report (Cherokee Landfill Site, M.M. Dillon Limited, 1990) that was prepared to detail the site development, operation program and contingency program to mitigate unacceptable off-site leachate migration. Annual Site Development and Operations and Monitoring reports are submitted to the MECP to fulfill requirements of the ECA.

An overall site plan is included as **Figure 3.1**. The key site features included on the site plan are as follows:

- public access road;
- inbound and outbound weigh scales;
- scale house;
- administration building;
- maintenance garage;
- Household Hazardous Waste (HHW) Depot;
- Waste Electronic and Electrical Equipment (WEEE) drop off-area adjacent to the HHW;
- internal access roads throughout the disposal area;
- wood waste drop-off area west of the public drop-off;
- compost processing area north of the disposal footprint;
- public waste drop-off with designated areas for:
    - solid municipal waste;
    - metals;
    - tires;
    - shingles, construction and demolition materials;
    - WEEE (waste electrical and electronic equipment);
    - batteries and propane tanks; and
    - "blue box" recyclables;
- surplus materials stockpiles;
- earth borrow area;
- purge wells (adjacent to the western boundary of the disposal footprint);
- gravity leachate collection system (adjacent to the southern and south-eastern boundary of the disposal footprint);
- groundwater monitoring wells (refer to Section 7.2.2 and Appendix E for monitoring well locations);
- active landfill gas wells and associated piping network;
- blower station and central flare for the active landfill gas system;

[13] Throughout this EA the existing fill area is noted as 25.8 ha. This 25.8 ha reflects the total historical waste disposal area inclusive of Cherokee disposal operations prior to City ownership. Although the approved area is 44.6 Ha the actual area used to date is 25.8 Ha.

- leachate pump station; and
- storm water management ponds.

The site provides a “one-stop shop” that caters to a full range of waste management needs for residents and businesses within the service area.

The City procures a security contractor to perform daily off-hour inspections of the site and there is a security presence at the Public Drop Off during regular operating hours.

Earth Borrow Area

Stormwater Management Pond

Cover Stockpile Area

compost pad

Wood Waste Drop-off Area

Concrete pads for cardboard/paper roll off bins

Concrete bunker for construction and demolition waste

Canopies for batteries, propane tanks and recyclable containers

Tire drop-off Area

Public Drop Off

Maintenance Garage

Weigh Scales, Scale House and Administartion Bldg.

Household Hazardous Waste Depot

Blower Station

Leachate Collector

pump station

ROOT RIVER

Hydro Corridor

Cobb Road

AECOM

AECOM Canada Ltd.
523 Wellinton Street East, Sault Ste. Marie Ontario, Canada
P6A2M4 T705.942.2612 F705.942.3642

Legend:

- pw-6 — Purge Wells
- M5 — Methane Gas Monitor
- 62 — Monitoring Well and Id Number
- F4 — Landfill gas wells and Piping
- Leachate Collector
- Internal Road Network

Note: Aerial photo taken Oct 4, 2010

Sault Ste. Marie Municipal Landfill Site

SITE PLAN

Proj. Manager: – RT	Drawn By: JT	Figure No. 3.1
Scale: 1:4000	Checked By: RT	
Date Issued: – May, 2017	Project No: 60395	
Location: figure 1siteplan.dwg	File Name: G:\60395 –	

4.0 ALTERNATIVES TO THE UNDERTAKING

"Alternatives To" are practical options to address the need for additional waste disposal capacity for the City.

In June 2007 the City of Sault Ste. Marie issued a draft "Alternatives To" Working Paper as part of the EA process. That working paper described the "alternatives to" being considered for Sault Ste. Marie, the data collected for each alternative and the criteria that would be used to evaluate them. Input was obtained from government agencies, the general public, Aboriginal Communities and other stakeholders on the different alternatives for managing the City's municipal solid waste.

In the summer of 2010, it was decided that the optimal waste management alternative for the City was increased 3Rs (Reduce, Reuse, Recycle) and landfilling of residual waste. This was documented in the June 2010 report entitled "*Solid Waste Management Environmental Assessment – Alternatives to the Undertaking"*.

A high heat process was also included in the City's waste management plan through the City's contractual relationship with a private sector energy-from-waste proponent, The Elementa Group (Elementa). There were a number of delays and amendments to the timelines in the agreement between the City and Elementa.

In December 2015, the City was advised that Elementa Group Inc. was in receivership proceedings. On June 13, 2016 Council indicated that formal notice should be provided to Elementa Group Inc. that the Waste Supply and Reformation Agreement between the two parties is terminated. For the purposes of the "alternatives to" and "alternative methods" considered within the context of this EA, it was assumed that all waste will have to be managed by the City through the solutions contemplated within this EA (i.e. no waste will be processed in a private sector waste-to-energy facility). Therefore, the bankruptcy of the Elementa Group does not impact this EA.

This chapter describes the "alternatives to" considered and the evaluation process to come to the above determination.

4.1 "Alternatives To" The Undertaking

The alternatives identified to address diminishing waste disposal capacity in Sault Ste. Marie were presented in the EA TOR approved by the MECP in September 2005. The "alternatives to" that were considered in the EA are as follows:

- Increased Waste Diversion;
- Incineration and High Heat Processes;
- Landfill;
- Export of Waste Outside the Service Area; and/or
- Do-Nothing.

The following sections describe each "alternative to" option.

4.1.1 Increased Waste Diversion

The City has been very diligent to promote, develop and enhance waste diversion programs and services that support the 3Rs hierarchy: reduce, reuse and recycle and has complemented these programs and services with by-laws to encourage residents to divert waste. The "increased waste diversion" alternative focusses on increasing the diversion of specific waste streams that the City manages/controls now and in the future. This section briefly summarizes existing diversion programs (Note: refer to Section 1.5 for a detailed description of these programs), current status of waste diversion, relevant provincial goals and objectives, specific actions the City plans to take to enhance future waste diversion and the estimated future residential diversion rate.

The City's current robust waste diversion system includes initiatives to reduce waste (i.e. plastic bags campaign, local "second hand" retailers and charities, reusable coffee cups); weekly collection of recyclables; self-haul leaf and yard waste depot; bi-weekly curbside collection of leaf and yard waste throughout the growing season; leaf and yard waste composting facility; ; a household hazardous waste depot; special events staged by Clean North; landfill bans; and segregation and recycling of metals, batteries, white goods, tires, and clean wood and brush at the landfill. In addition, the City reduced residential waste set out limits to 2 bags/containers per week per household in 2006. Tags for additional waste bags or containers must be purchased.

The City is also moving forward in 2022 with the implementation of a single-use plastics ban in support of the federal government's proposed Single-Use Plastics Prohibition Regulations (December, 2021) which identifies various categories of single-use plastics and would prohibit their manufacture, import and sale in Canada. Single-use plastics are plastic items used only once before they are thrown away or recycled and include items such plastic bags, straws, coffee stir sticks, soda and water bottles and food packaging.

Through focused efforts to enhance diversion, the residential waste diversion rate increased from 9% in 1999 to 30+% in 2004. It has generally remained in the 30+% range since that time and is currently meeting the 2020 provincial diversion target of 30%.

Although, different waste diversion goals and objectives have been identified historically by the Provincial government, the common theme has been, and continues to be, for Municipalities to reduce disposal through enhanced 3R's initiatives. The Provincial government has also recognized that consideration must be given to size, location, cost factors and economies of scale.

Most recently the Provincial government passed the Waste-Free Ontario Act (WFOA) (2016) which also included the passage of the Resource Recovery and Circular Economy Act (RRCEA) (2016) and Waste Diversion Transition Act (WDTA) (2016). This legislation provides a resource recovery and waste reduction road map for Ontario with a pronounced shift to Extended Producer Responsibility (EPR). Importantly, the shift to EPR will reduce the City's ability to manage or control the diversion of specific waste streams that will soon be controlled by the waste producers.

RRCEA is focused on converting end of life materials to a resource rather than waste while WDTA is intended to provide a smooth transition from existing to new producer-controlled waste diversion programs.

Several policy, discussion and guidance documents have also been produced to support the above noted legislation including the Strategy for a Waste Free Ontario (SWFO) (2017), the Made in Ontario

Environment Plan (MOEP) (2018), Reducing Litter and Waste in Our Communities (RLWOC) (2019) and Food and Organic Waste Policy Statement (FOWPS) (2018).

The SWFO highlights Ontario's vision for a circular economy and goals of zero-waste with zero greenhouse gas emissions from the waste sector. The circular economy is touted as a system in which products are never discarded, but reused, recycled and reintroduced into new products.

The MOEP is an overview of Ontario's commitment to address climate change, protecting its air, lakes and rivers, reducing litter and waste in its communities, keeping its land and soil clean and conserving land and greenspace through several action initiatives. The plan endeavours to foster a province wide commitment to protecting the environment and take decisive action on climate change.

The RLWOC is a discussion paper which addresses the waste reduction initiatives outlined in the SWFO and MOEP. It identifies the following waste diversion targets; 30 percent diversion by 2020; 50 percent diversion by 2030; and 80 percent diversion by 2050. Proposed initiatives are addressed in the discussion paper in order to meet these targets, several of which may involve municipal consultation and/or participation including:

- Harmonizing the list of materials accepted in Blue Box programs across the province;
- Transitioning the existing Blue Box Program to full producer responsibility (Sault Ste. Marie is scheduled to transition in 2023);
- Designating new materials that are currently not covered under any provincial diversion programs (i.e. small and large appliances, power tools, rechargeable batteries, fluorescent bulbs and tubes, mattresses, carpets, clothing and other textiles, furniture and other bulky items);
- Develop guidance to increase diversion participation in multi-residential buildings;
- Reducing the amount of food and organic waste sent to landfill;
- Reducing plastic waste being sent to landfill; and
- Managing compostable products and packaging.

The FOWPS also addresses some of the waste reduction initiatives outlined in the SWFO and MOEP and focuses on limiting the amount of food and organic waste that is disposed of in Ontario's waste disposal sites. The Province wants to achieve this by implementing the Ontario Food Recovery Hierarchy which consists of preventing or reducing food and organic waste at the source, safely rescuing and redirecting surplus food before it becomes waste and recovering food and organic waste to develop end-products for beneficial use.

The Policy Statement also establishes several municipal waste reduction and resource recovery targets. For example, Northern Ontario Municipalities, such as the City of Sault Ste. Marie, that service a population greater than 50,000 and have a population density greater than 300 persons per square kilometer and who do not currently have an existing food and organic waste collection program are expected to target 50% waste reduction and resource recovery of food and organic waste generated by residential households by 2025. Municipalities are expected to achieve this target through waste reduction and resource recovery efforts of the following waste types:

- food waste;
- organic waste resulting from food preparation;
- soiled paper;
- leaf and yard waste

- seasonal outdoor wastes; and
- flowers and houseplants.

Municipalities are also encouraged to include the following waste types in their waste reduction and recovery efforts:

- personal hygiene wastes;
- sanitary products;
- shredded paper;
- additional paper fibre products;
- compostable products and packaging; and
- pet food and wastes.

The principal impact of this Policy is that the City will be mandated to provide curbside collection of food and organic waste to single family dwellings with the expectation that they will achieve a 50% waste reduction and resource recovery of food and organic waste by 2025.

Historically there has been and there continues to be a municipal and provincial focus on reducing disposal quantities through 3R's initiatives. Despite the historical success in diverting waste in Sault Ste. Marie there continues to be opportunities for further improvements and this "alternative to" addresses specific measurable improvements to reduce the future reliance on disposal.

As noted earlier in this section the WDTA provides a resource recovery and waste reduction road map for Ontario with a pronounced shift to Extended Producer Responsibility (EPR). The impact of this legislation will be that the City of Sault Ste. Marie will have limited ability to significantly influence diversion goals and achievements for those waste streams that fall under the legislation. For the purpose of this EA it has been assumed that modest improvements in recycling programs will be achieved over time through enhanced capture efficiency and introduction of new materials. The specific improvements to be achieved have not been independently quantified due to the fluid nature of recycling programs at this time.

The principle waste stream that the City will continue to manage and control that offers the most significant opportunity for future enhanced waste diversion is the organic waste stream.

Recognizing that organic materials represent a significant proportion of the overall waste stream, the City completed a *Co-composting Pilot Study (February 2004)* which was later updated in August, 2017. The update was initiated, in part, to recognize provincial regulatory changes that had been implemented to address compost quality changes which provide enhanced flexibility to manage biosolids. Relevant conclusions included in the original and updated Co-composting Pilot Study are summarized below:

- Initially (i.e. 2004) it was recommended that the City should not compost municipal biosolids. The rationale for the recommendation was that the City's biosolids did not meet the feedstock restrictions and could not meet the unrestricted use guidelines included in the compost guidelines in effect at the time. The compost guidelines were subsequently amended in 2012 and the revised Ontario Compost Quality Standards identify three qualities of finished compost (AA, A and B): Category AA which does not contain septage, sewage biosolids, or pulp and paper biosolids; category "A" compost where sewage biosolids must be restricted to 25% or less; and Category B which can contain more than 25% sewage biosolids and requires Ministry approval for use of the end product.

- Based on subsequent sampling and analysis, the biosolids from both of the City's wastewater treatment plants meet the feedstock quality requirements and are suitable for use in producing compost. The quality of the biosolids is suitable to produce at least a "B" category compost and may be suitable for producing category "A" compost.
- The City also completed a Biosolids Management Study in 2015 and through that study, alternatives were developed and evaluated to divert biosolids from disposal. **The City is proceeding with the design and construction of a biosolids composting facility with the objective of diverting all biosolids from disposal by 2025.**
- Initially (i.e. 2004) it was recommended that the City should not collect and compost SSO. The rationale for the recommendation was that with the relatively small quantity of feedstock, the material would have to be composted outdoors to be cost effective. With the colder climate, snow loads and odour concerns, outdoor composting would be very challenging. For comparison purposes, the lifecycle cost for indoor tunnel composting was estimated to be approximately $175 - $195/tonne (2017 $'s). This compares with the estimated cost of landfilling organic waste at $80 - $90/tonne.
- The new Waste-Free Ontario Act aims to eliminate waste and greenhouse gas emissions from the waste sector primarily by shifting the end-of-life management back to producers and by creating an Organic Action Plan. The FOWPS was developed to support the Organic Action Plan and focuses on limiting the amount of food and organic waste that is disposed of in Ontario's waste disposal sites. **Based on the directives included in the FOWPS the City has initiated steps to increase the capacity of the Biosolids composting facility to process SSO within the same facility.**

Although outside of its mandate, the City is also continuing to work with the MECP, local service providers and the Industrial, Commercial and Institutional (IC&I) sector to encourage further diversion of IC&I waste from landfill. Extensive diversion is currently being achieved in the IC&I sector, when considering all sources of waste (e.g. forestry industry waste, construction and demolition waste, etc.), but is largely driven by market conditions for waste materials and by provincial policy and enforcement. The City will continue to encourage waste diversion efforts in this sector with the goal to sustain or improve current levels of diversion.

In summary the enhanced diversion alternative includes the following elements:

- Increased capture efficiency in the curbside recycling program through enhanced public education and other initiatives – responsibility will largely reside with waste producers but the City will support these efforts;
- Collection of additional materials in the curbside or other recycling programs as dictated by Provincial regulation and/or market conditions – responsibility will largely reside with waste producers, but the City will support these efforts;
- Processing, for beneficial use, all biosolids generated at the City's two wastewater treatment plants;
- Collection and processing, for beneficial use, residential source separated organics; and
- Encouraging and supporting diversion in the IC&I sector.

Through the enhancements noted above the City's residential diversion rate is expected to increase from approximately 30% to 50% by 2025 or 2026 and the biosolids diversion rate is expected to increase from 0% (i.e. currently being landfilled) to 100% by 2025. It is noted that even with aggressive diversion including the significant enhancements discussed in this section, disposal capacity is still required now and for the

foreseeable future.

The approximate cost for increased diversion will vary depending on the diversion initiative. Public education for example will cost less to implement compared to a full scale biosolids and SSO processing facility.

The cost for increased diversion would be in the range of $45 to $170 per tonne[14].

[14] The cost ranges presented in Section 4 of the EA were developed in 2010 and represent the values used at the time the evaluation of “Alternatives to the Undertaking” was completed. The relative cost ranges remain applicable in the current environment and the evaluation would not be impacted if they are converted to present day values.

4.1.2 Incineration and High Heat Processes

Incineration (combustion) and high heat processes (gasification, pyrolysis) include technologies where the organic materials in the waste stream are converted to thermal energy, carbon dioxide (CO2) and water. Depending on the specific nature of the incineration/high heat processes, typical input materials can include mixed waste from curbside collection; or refuse derived fuel (RDF) consisting of the combustible fraction of the waste stream separated through mechanical and/or biological treatment processes.

Incineration (combustion) operates in either a single stage or two-stage process, and the exhaust gases from combustion are cleaned prior to being emitted to the atmosphere.
Combustion processes operate in an excess air, oxidizing environment and they are exothermic requiring little to no external energy once combustion has been initiated. Both gasification and pyrolysis technologies are considered high heat processes that convert hydrocarbons in the waste stream into a synthetic gas (syngas) within an oxygen starved (or in some cases an oxygen free) environment, which is normally followed by thermal oxidation of the synthetic gas. The principle difference between conventional incineration and gasification or pyrolysis is that with conventional incineration technologies, exhaust gases are cleaned up after combustion while with gasification technologies, the syngas is often cleaned up prior to its combustion.

The Elementa Pilot Project
In 2007, The Elementa Group (Elementa) constructed a pilot-scale steam reformation plant that converts municipal solid waste into a char and synthetic gas (syngas). Testing of the technology, with limited quantities of municipal solid waste, was completed over a three-year period from 2007 to 2009. The syngas was burned in a flare and testing of the emissions was completed with favourable results.

Late in 2009, the City of Sault Ste. Marie endorsed a contract with Elementa for the supply of a minimum 12,500 metric tonnes of municipal solid waste for a minimum period of 10 years commencing in 2011. The contract would assist the City in managing its problem of diminishing solid waste disposal capacity.

It was recognized that based on the original proposed design capacity provided to the City, the Elementa Plant would be unable to process all waste currently being managed at the Fifth Line landfill site. Furthermore, the Elementa process would generate some residual waste that would require landfilling. The City also recognized that with any new waste management technology, in its infancy, there are risks associated with its implementation. The City intended to mitigate these risks by ensuring an alternative means would be available for the disposal of residual waste. It was assumed that all residual wastes would require management by the City (i.e. no waste will be processed by Elementa). In the event that Elementa was partially or fully successful, it was recognized that the quantity managed by the City would be reduced accordingly.

Subsequently there were a number of delays and amendments to the timelines in the agreement between the City and Elementa. In December 2015, the City was advised that Elementa Group Inc. was in receivership proceedings. In June, 2016 Council indicated that formal notice should be provided to Elementa Group Inc. that the Waste Supply and Reformation Agreement between the two parties is terminated. Based on the conservative assumptions made in 2010 (i.e. assumed all waste would have to be managed through the alternatives being developed in this EA), the bankruptcy of Elementa does not impact this EA.

Single-Stage Mass Burn: This is a well-established technology that is commonly used in Europe in the United States. This technology was selected for the Durham-York facility that has been constructed and became operational in 2015. Generally, each mass burn combustion chamber can process in the order of 150 to 800 tonnes of waste per day based on the design.

Two-Stage Combustion: The Emerald Energy From Waste Inc. (formerly known as Algonquin Power) facility located in Brampton that combusts waste is an example of a modular two-stage combustion facility. Typically, these facilities have lower capital costs, are less energy efficient and have a shorter operating lifespan compared to single stage mass burn technology discussed above. New two-stage combustion facilities have not been developed as much in recent years.

The approximate net cost of conventional combustion processes at the scale required for Sault Ste. Marie would be in the range of $110 to $190 per tonne.

High Heat Processes (Gasification and/or Pyrolysis) involve the thermal conversion of solid organic materials into a gaseous constituent (syngas), a solid char residue, and in the case of pyrolysis, possibly a liquid fuel constituent. The processes differ from combustion in that they operate under a limited (or no) oxygen reducing environment (as opposed to an excess air, oxidizing environment) and they are endothermic (i.e., require external energy). This external energy is either provided by allowing a very limited amount of the volatiles in the feedstock to combust in a reactor (gasification), or heat is added from external sources in the absence of oxygen (pyrolysis). The effect is the same: volatiles in the feedstock are converted to syngas, which may be used for a variety of purposes, such as fuel or chemical feedstock.

The approximate net cost of high heat processes is expected to be the same or higher than conventional combustion. This is because the process usually requires waste pre-processing, which is complex and costly; a high degree of process control, especially when employing high heat plasma technology; and syngas clean up. Combined, these components make gasification and pyrolysis fairly complex systems.

Air emissions released from incineration arise from the compounds present in the waste stream and are formed as a normal part of the combustion process. Emissions can also be expected, in the case of gasification/pyrolysis, when the syngas is subsequently combusted to produce electrical and/or thermal energy. Modern thermal processing facilities employ air pollution control systems and syngas clean-up processes to reduce air emissions that are released.

The MECP has addressed air emissions from thermal facilities in Ontario in Guideline A-7. Guideline A-7 sets air emission limits for particulate matter, acid gases, metals and dioxins/furans and establishes requirements for their control, monitoring and air pollution control system performance testing. Although the emissions criteria specified in Guideline A-7 are very stringent and comparable with the latest regulations governing emissions from facilities in the United States and Europe, the MECP expects that air emissions for new facilities will be significantly below limits in Guideline A-7.

4.1.3 Landfill

Currently, waste from Sault Ste Marie, Prince Township and Batchewana First Nation's Rankin Reserve is disposed of at the Municipal Landfill located at 402 Fifth Line East (**Figure 3.1**). This site was originally developed in the 1960's by Cherokee Construction and acquired by the City in 1989. The site is operated by the City of Sault Ste Marie.

The existing site is licensed for the use and operation of a 44.6 ha (110.2 acre) fill area within a total site area of 83.6 ha (206.4 acres). In July 2009, the ECA was amended to include a 23.2 ha CAZ adjacent to the western boundary. The City has acquired other contiguous properties over time to expand the overall site which now consists of an approximate overall site area of 151 ha. The site is licenced to accept domestic, commercial, non-hazardous industrial waste and processed organic waste. Over a ten-year

period from 2010 to 2019 annual waste received at the site has ranged from approximately 55,000 tonnes to 108,000 tonnes and annual landfilled waste has ranged from approximately 38,000 to 63,000 tonnes. Landfilled wastes continue to be in this range beyond 2019. The low end of landfilled waste occurred during periods when significant quantities of local IC&I waste was exported to a landfill in northern Michigan. Materials received at the site that were not landfilled consisted of clean or non-hazardous contaminated soil materials that were used as cover or stockpiled for future use as cover or materials that were diverted from the site.

The site is an engineered landfill site which includes collection of leachate and landfill gas. Leachate is collected at the south, east and west sides of the site via collection pipes and a series of purge wells. The leachate is pumped to the City's sanitary sewer system for treatment at the West End Water Pollution Control Plant (WEWPCP). The annual volume of leachate managed was approximately 430,000 m³ (i.e.13.6 L/s) in 2021. The estimated increase in leachate to be treated with the proposed expansion is in the range of 1.5 to 2.5 L/s and the leachate will consume approximately 7% of the overall plant capacity. The capacity of the plant was most recently assessed in 2022 and there is adequate capacity to meet the projected 2038 flows inclusive of the leachate. Furthermore, the landfill pump station has reached the end of is theoretical service life and the City, through its asset management planning initiatives is currently undertaking a preliminary design study to assess and identify necessary equipment replacements and or upgrades. The study is considering current and future flows and will address equipment capacity and contingency planning including consideration of standby power. Preliminary findings are that the pumps and station piping components require replacement due to age and the existing forcemain capacity is adequate to accommodate existing and future flows. The City plans to implement the study recommendations in 2024-2025.

An active landfill gas collection and flaring system became operational in 2011. The collected gas is burned in a central enclosed flare. The collection system is designed to be systematically expanded as portions of the fill area approach final contours. There may be an opportunity to use the collected gas for energy generation in the future subject to available incentives to support the business case.

In December 1990, the City prepared a Design and Operations Report which included a plan for landfill development including final contours for the completed facility. Each year a Site Development and Operations Report is prepared to track landfill development and confirm remaining capacity in the landfill. The 2021 Site Development and Operations Report shows approximately 388,000 m³ of disposal capacity (refuse and daily cover) remaining as of December 31, 2021. The site life is projected to extend to 2026 based on recent disposal trends which reflects a significant level of IC&I waste being exported to a northern Michigan landfill. However, the site life may only extend to 2024 if locally generated IC&I waste returns to the local landfill.

This "alternative to" involves creating new landfill disposal capacity for the City's waste through either the expansion of the existing landfill site or the development of a new landfill site. Landfill expansion typically involves adding more waste on top of an existing waste fill area (vertical expansion) or increasing the size of the area where waste is deposited (horizontal expansion). A new landfill could be a natural attenuation site (relying on natural protection) or an engineered site with a leachate collection system. In recent years, the majority of applications for larger new or expanded landfills have included engineered facilities therefore the EA assumed this in the evaluations.

Landfill mining was also considered as a method of landfill expansion. This involves the excavation of the existing fill areas, the on-site processing of the excavated material to separate the material into different

streams and recover material that can be used. Typically, the excavated landfill material can be separated into three streams: soil (from cover material), metals or other recyclables and residual waste. The processing of the excavated wastes typically involves a combination of shredding, screens and magnets. Metals can then be recycled, and soils used for future landfill cover. Residual materials can be landfilled or used as fuel for energy-from-waste facilities. The quantity of soils recovered can range significantly and the quantity of metals or other materials that can be recovered depends on what has been landfilled and the extent of degradation. The City undertook a pilot landfill mining project at the existing landfill site and the soil quantity recovered during this time represented approximately 60% of the volume. The cost of a full-scale landfill mining operation could be in the range of $35 to $45/tonne. Odours can often be a significant concern during landfill mining operations. The extent of odours would largely be a function of the waste age and waste types that are excavated. Organic type wastes could generate foul odours.

Modern landfilling is a highly engineered method of disposing of solid wastes on land in a manner that minimizes environmental effects. Landfills are designed, built and operated to minimize impacts on groundwater, surface water and air quality, and must meet strict provincial standards. An engineered landfill would typically include a liner, leachate management system and a landfill gas management system. Landfill gas could be burned to create electricity (green power). The recovery of energy may be cost efficient based on the projected disposal capacity requirements; however, a revenue neutral position has been assumed in the economic analysis of this alternative. Landfills once closed, are covered with soil and vegetated. They are monitored, not only throughout their operating life, but also for decades after closure to ensure environmental protection is sustained.

Although a landfill is designed to fit into the local landscape as much as possible, there are still potential effects to neighbours such as noise, dust, odours, visual intrusion and various forms of traffic. To minimize these effects, mitigation measures are put in place such as compacting and covering waste with soil to control odour, litter and pests; maintenance of access routes to reduce safety concerns; and visual screening.

Landfills are a flexible waste management alternative in that any changes to the waste stream as a result of increased 3Rs, or population fluctuation will not have a serious impact on the operation of the landfill, only the length of time that it will last. They also provide a means of managing solid residual wastes that are generated or cannot be input into high heat or incineration processes.

The capital and operating costs of landfilling can vary depending on a number of factors including landfill size, the level of engineered features used, and the number of landfills in a system. Compared to incinerators and high heat processes, landfills require lower upfront capital costs and have lower operating costs. Tipping fees and gate fees, or the cost charged to those wishing to dispose of waste at the landfill, are intended to cover, in whole or in part, all facility costs. The 2021 tipping fee at the Sault Ste. Marie landfill was $77/tonne. The City also has a gate fee of $11.00 per vehicle for residential waste loads less than 300 kg and commercial waste loads less than 145 kg.

4.1.4 Export of Waste Outside of Service Area

The export of industrial, commercial and institutional (IC&I) waste to a disposal facility outside of the municipality in which it was generated has been occurring for a number of years in Ontario. Some of the IC&I sector waste from Sault Ste. Marie is currently disposed in northern Michigan. The quantity of waste currently being disposed of in Michigan is unknown but has increased in recent years. In Fiscal Year 2019,

approximately 3.2 million tons of Canadian waste was disposed of in Michigan landfills[15]. However, not all Ontario generated exported waste goes to the United States. Some is transported to private sector landfill sites in Ontario.

The export of waste generally requires a transfer station(s) in the municipality in which the waste is generated. The waste is loaded on large transport vehicles to be taken to the final disposal site. The disposal site must be certified to accept the waste and meet all environmental standards and regulations in the jurisdiction where the site is located.

Transfer stations can result in noise, dust and truck related impacts on local roads. The significance of these impacts depends on the location of the transfer station(s) and its proximity to sensitive community uses or natural environment features.

The added environmental effects of export versus local disposal include operations at the transfer station(s), fuel consumption and air emissions of haulage, wear and tear on roads, disruption effects to local residents and users of the haul routes.

There is also an economic impact from the added cost of operating a transfer station and hauling waste. Disposal costs remain whether provided locally or remotely. The cost of export also depends on tipping fees and travel distance. Waste exporters would typically have to negotiate tipping fees which are usually dependent upon the term of the contract and disposal quantities. Longer term contracts and increased waste quantities typically result in lower per tonne costs for disposal. The approximate cost of export is expected to be in the range of $85 to $105 per tonne. This estimate has been developed based on a $75 per tonne tipping fee combined with the construction and operation of a transfer station and a waste haul within a one-hour travel distance.

4.1.5 Do Nothing

This alternative identifies what would happen if Sault Ste. Marie did nothing to respond to its future waste disposal needs.

Based on the 2021 Site Development Report there is approximately 388,000 m³ of disposal capacity (refuse and daily cover) remaining as of December 31, 2021. The site life is projected to extend to 2026 based on recent disposal trends which reflects a significant level of IC&I waste being exported to a northern Michigan landfill. However, the site life may only extend to 2024 if locally generated IC&I waste returns to the local landfill. The “do-nothing” alternative would mean that by the mid 2020’s the City of Sault Ste. Marie landfill would be at capacity and the City would no longer be able to fulfil their mandate to provide residential waste disposal services.

4.2 “Alternatives To” Evaluation

The identification and evaluation of “alternatives to” was carried out at a general level. Specific locations and technologies for these alternatives were not included.

[15] Michigan Department of Environment, Great Lakes, and Energy, Materials Management Division Solid Waste Section, Report of Solid Waste Landfilled in Michigan October 1, 2018 – September 30, 2019, (February 14, 2020).

4.2.1 Evaluation Criteria and Approach

Table 4.1 presents the criteria and indicators[16] used for the evaluation of "alternatives to". The criteria were included in the approved EA Terms of Reference. A working paper including the proposed criteria was released in June 2007. A public input session was held on June 26, 2007 in Sault Ste. Marie and an open house was held on August 9, 2007 in Garden River First Nation. Consultation carried out in this phase is discussed in Section 9.0 of this document.

To evaluate the "Alternatives To", each of the alternatives were described based on the evaluation criteria noted in **Table 4.1**. This information was presented in the working paper and discussed at the public input sessions. No changes were made to the descriptions as a result of the input received at the sessions.

Using the descriptions created, the alternatives were ranked from most preferred (rank of first) to least preferred (rank of fifth) for each of the criteria. The rankings by criterion were then assessed to determine an overall preferred alternative. At the public input session and open house noted above, participants were asked to provide their input on the relative importance of the evaluation criteria. A variety of opinions were received with no clarity on relative importance; subsequently it was determined that the criteria should be considered equally important in this evaluation.

[16] It is noted that indicators and data sources were added to this table in response to comments from MECP. This information was not included in the Terms of Reference or as part of consultation.

Table 4.1 Evaluation Criteria – "Alternatives To" Evaluation

Criterion	Indicator	Definition	Data Source
Compliance with Regulations and Policies	Ability to meet the requirements of the *Waste-Free Act*, the *Environmental Assessment Act*, and the *Environmental Protection Act*.	Addresses the ability of the "alternative to" to meet all applicable regulations and policies that affect the planning, design, construction, operation and decommissioning of the alternative.	*Waste-Free Ontario Act* (2016) *Environmental Assessment Act* (1990). Preparing and Reviewing Environmental Assessments in Ontario Code of Practice (2014) *Environmental Protection Act* (1990).
Environmental Acceptability	Ability of the alternative to be designed to minimize nuisance impacts, air quality impacts, and impacts to water. Likelihood that potential impacts can be mitigated and opportunity for benefits.	Addresses the potential for environmental effects associated with the alternative and the ability of the "alternative to" to be approved as an environmentally acceptable option. It represents both natural environment and social/cultural considerations.	Proposed facility characteristics.
Ability of City to Implement the Alternative	Extent to which City has existing infrastructure and experience.	Considers whether the City has the ability and mandate to implement the alternative.	Existing City infrastructure and experience.
Flexibility of the System	Ability to manage changing waste streams.	Considers whether the alternative could respond to changes in the waste stream that could come about as a result of such things as increased diversion, changes in the economy and product packaging or fluctuations in waste quantities and types.	Proposed facility characteristics.
Capability of Managing Waste Quantities and Qualities	Ability to manage projected quantity and type of waste.	Considers whether the alternative could handle the identified waste stream.	Waste type and quantity Proposed facility characteristics.
Proven Technical Capability	Extent to which the alternative has been proven to be effective at managing municipal waste.	Considers whether the alternative has been proven through approval of similar facilities and years of successful operating experience in Ontario and other jurisdictions.	Proposed facility characteristics including consideration of operating history elsewhere.
Economic/Cost	Estimated construction and operating costs.	Considers the lifecycle cost of the alternative.	Cost estimates.

4.2.2 "Alternatives To" Description and Ranking by Criterion

The following describes the evaluation of alternatives based on the evaluation criteria noted in **Table 4.1**. **Table 4.2** (at the end of the chapter) provides a discussion on the comparative ranking for each alternative. The rankings are also provided in the table.

4.2.2.1 Compliance with Regulations and Policies

This criterion is intended to address the ability of each of the alternatives to meet applicable regulations and policies that affect the planning, design, construction, operation and decommissioning of the alternative including the *Waste-Free Ontario Act*, *Environmental Assessment Act* and Codes of Practice and the *Environmental Protection Act*.

The alternative, *increased waste diversion*, would not require Environmental Assessment Act approval and is very well aligned with the objectives of the Waste-Free Ontario Act. Typically, *incineration/high heat processes and landfill* can be developed to meet Environmental Assessment Act requirements. For the alternative, *export,* it is noted that the disposal facility would have to meet all applicable regulatory requirements in the jurisdiction that it resides. Also relevant to the *export* alternative is that the Province entered into an agreement with Michigan to eliminate residential waste export as of December 31, 2010.

Landfills, *incinerators/high heat processes* and *diversion* facilities (recycling or composting plants) all require Environmental Compliance Approvals (ECA) from the MECP to operate. These ECAs ensure that facilities meet the requirements of EPA.

In March 2007 Ontario Regulation 101/07, Waste Management Projects, under the Environmental Assessment Act was enacted. This regulation identifies projects that:

- Are subject to individual EAs. The types of facilities that are subject to individual EAs include landfills greater than 100,000 m^3 and thermal facilities that do not recover energy;
- Have predictable environmental effects that can be readily mitigated and thus are exempt from individual EAs if they fulfill an ***Environmental Screening Process***. The types of facilities that fall into this category include thermal facilities with energy recovery, industrial facilities that use more than 100 tonnes/day of waste as fuel and small-scale landfills or landfill expansions of less than 100,000 m^3; and
- Are exempt from all EA requirements. The types of facilities that are exempt from all EA requirements include processing and transfer facilities where less than 1,000 tonnes per day of material is sent to final disposal.

Based on experience in Sault Ste. Marie and in other Ontario municipalities, applicable Environmental Assessment Act (EAA) and EPA approvals can be obtained. It is also anticipated that technical approvals for incineration/high heat processes may be more involved and time consuming given the limited experience with these types of facilities in Ontario.

The alternatives *increased waste diversion*, *incineration/high heat processes, and landfill* were all ranked as preferred or first for this criterion. *Export* would only be undertaken if it were to a facility approved in the jurisdiction where it is located. It is also noted that the province ceased residential waste export to Michigan as of December 31, 2010. Export is ranked as fourth for this criterion.

The *do-nothing* alternative does not require the construction or operation of any facility; however, *the do-nothing* alternative would lead to closure of the municipal landfill and would not meet the City's mandate to provide waste disposal services. Thus, the *do-nothing* alternative is considered least preferred (ranked fifth) for this criterion.

4.2.2.2 Environmental Acceptability

This criterion compares the alternatives based on their potential for environmental effects. A broad definition of "environment" is included in the EAA which encompasses both the natural environment (e.g. potential for loss of habitat, impact on air quality, impact on surface and ground water, etc.) and the social environment (e.g. potential for negative impacts on people, communities or businesses).

Increased waste diversion, *landfill*, *incineration/high heat processes* and *export* can all be environmentally acceptable but have the potential to result in natural and social impacts such as air quality effects, surface and ground water effects, noise, dust, odour and truck traffic. The extent of impact depends on the location of the facility and its proximity to sensitive receptors or natural features.

The potential impacts associated with each alternative are discussed in greater detail in the following paragraphs and a ranking for the criterion "Environmental Acceptability" is provided.

- *Increased waste diversion* promotes environmental protection and conservation. There is some potential for impacts at diversion facilities (recycling or composting) including noise, dust, odour and truck traffic. The effects can typically be mitigated and the extent of impact depends on facility location. Typically, the potential environmental effects associated with a diversion facility are considered less significant than the potential effects associated with a landfill or incineration/high heat process facility. This alternative is ranked as preferred (first) for the criterion "Environmental Acceptability".

- *Incineration/high heat process* facilities are typically highly engineered with scrubbers and bag filters and other air pollution control devices to reduce potential impacts on air quality. There is some potential for residual effects resulting from incinerators/high heat processes including noise, air quality impacts, odour and truck traffic. Most of the effects can typically be mitigated and the extent of impact depends on facility location. The remaining solid residues must still be landfilled; a small portion of which must go to a hazardous waste facility. An environmental benefit of incineration/high heat processes is that electricity and/or heat can be generated from processing the waste. Although more electricity can be generated compared to a landfill, incineration/high heat processes is ranked second, equal with landfill for this criterion.

- A highly engineered *landfill* with a liner and leachate collection system minimizes impacts on ground and surface water, and the regular use of cover material and the collection of landfill gas reduces odours. There is some potential for residual effects resulting from landfill including water quality effects, noise, dust, odour and truck traffic. Most of the effects can typically be mitigated and the extent of impact depends on facility location. As an example the City's existing landfill has been operating successfully for 30+ years with a modest number of annual complaints related to nuisance impacts. An environmental benefit of landfill is that landfill gas can be used to generate

electricity; however, the amount of electricity generated is smaller compared to incineration/high heat processes. For this criterion, landfill is ranked second.

- The *export* alternative has similar potential effects as landfill or incineration/high heat processes. The added environmental effects include air emissions from haul trucks, disruption of local residents and users of haul roads. Other potential impacts may include noise, dust, and odours associated with transfer station(s). Most of the effects can typically be mitigated and the extent of impact depends on facility location. Export is ranked fourth compared to the other alternatives for this criterion because it not only includes disposal facility effects, but also transfer station and waste haul effects.

- The *do-nothing* alternative does not handle the projected waste stream, thus it is not considered environmentally acceptable and is ranked as least preferred (fifth).

4.2.2.3 Ability of City to Implement the Alternative

This criterion compares the alternatives based on the City's ability and mandate to implement them. Providing waste management and disposal services is mandated to municipalities under the *Municipal Act*, thus the alternatives *increased diversion*, *landfill*, *incineration/high heat processes* and *export* are all within the City of Sault Ste. Marie mandate to provide to residents. In addition, the City is regulated to provide waste diversion under the EPA.

This criterion also addresses the City's ability to implement the alternatives as follows:

- The City has significant experience with both *increased waste diversion* and *landfill* and both are ranked as preferred (first). The City has no experience in the area of *incineration/high heat processes*. It is recognized that this experience can be obtained, however there will be a learning curve for the organization.

- Generally, given that many *incineration/high heat processes* are proprietary, such facilities would generally be implemented by the private sector under a design/build/operate scenario often with the facility also being owned by the private sector and the municipality paying a tipping fee under contract. Pilot or demonstration scale facilities such as the former Elementa facility in Sault Ste. Marie (Section 1.6) offer an opportunity for both the private sector and municipalities to determine the success of the approach prior to investing significant resources in *high heat processes*. *Incineration/high heat processes* is ranked as third for this criterion.

- Regarding *export*, the City also has minimal experience and will have limited control over pricing or the security of contracts over the long-term. It is also noted that the Province ceased residential waste export to Michigan as of December 31, 2010, removing this as an alternative that the City could implement. There are limited waste disposal facilities within a reasonable travel distance of Sault Ste. Marie that would be able to accept the volume of waste from the service area. Of the 31 large landfills in Ontario the only ones in the north include Sault Ste Marie, Thunder Bay (approximately 700 km away), Timmins (approximately 550 km away), Sudbury (approximately 300 km away) and North Bay (approximately 430 km away). Therefore, the City's ability to implement this alternative is considered limited and thus it is ranked as fourth.

- The *do-nothing* alternative does not fulfil the legal mandate of the City to provide waste disposal services and is ranked fifth for this criterion.

4.2.2.4 Flexibility of the System

This criterion compares the alternatives based on how well they could respond to changes in the waste stream that could come about as a result of such things as increased diversion, regulatory changes (i.e. ban on landfilling organics), changes in the economy or fluctuations in waste quantities and types.

- *Increased waste diversion* increases flexibility in the overall waste management system and can potentially extend the life or reduce the size of any disposal facility it is combined with (i.e. landfill, incineration/high heat processes). It is anticipated that government policy regarding waste management will continue to favour waste reduction, as demonstrated by the Waste-Free Ontario Act (2016). It is also noted that public expectation regarding diversion continues to increase. As diversion markets are continually growing and shifting, this alternative is well suited to adapt to changes in the types and quantity of waste being produced. Diversion is ranked as second for the criterion “Flexibility of the System”.

- *Incineration/high heat processes* require a stable waste quality and quantity as a feedstock to maximize return on the investment in the process. Incinerators/high heat processes should be sized to address both current and future quantities of waste that could reliably be available. For example, they can be sized based on assumptions that high diversion rates can be achieved. Incinerators/high heat processes can also be developed using a modular approach to accommodate the potential for less or more waste. Incinerator facilities are less flexible to changes in the waste stream and to changes in governmental policies and regulations in that more time and/or investment is required to adapt to changes. Once in place, technological changes to the facilities are costly. For this reason, facilities are typically designed to manage only the most reliable and dependable waste streams (i.e., residential waste). For Sault Ste. Marie this means that an estimated 20,000 to 24,000 tonnes of waste is reliably available for incineration/high heat processes. Thus, this alternative may not be flexible enough to accommodate the fluctuations in waste from the IC&I sector which is important to the economic well-being of the City. As an example, some of the IC&I waste in Sault Ste. Marie is currently being exported to a landfill in northern Michigan. Incineration/high heat processes are considered to be less flexible than landfill and increased waste diversion and is ranked third.

- *Landfill* is a flexible disposal method that can respond to increases, decreases or changes in the waste stream. Waste stream changes will simply result in a shorter or longer landfill lifespan. Based on the assumption that government policy regarding waste management is expected to continue to favour a reduction in waste disposal, a landfill is adaptable to the resulting decrease in disposal need. Landfill is ranked as first or preferred for the criterion “Flexibility of the System”.

- *Export* of waste is reliant on the availability of financially feasible destinations, unrestricted export regulations/legislation, and trade agreements and thus can be unpredictable. Waste export contracts can also have limited flexibility for changing waste disposal quantities. Export is ranked third for this criterion when compared to the other alternatives.

- There is no flexibility possible with the *do-nothing* alternative, thus it is ranked as least preferred (fifth).

4.2.2.5 Capability of Managing Waste Quantities and Qualities

This criterion compares alternatives based on whether they can manage the quantity and quality of the identified waste stream (municipal solid waste).

- The *increased waste diversion* alternative alone cannot meet all the waste management needs of the City. In recent years the City of Sault Ste. Marie diverted approximately 30% of its residential waste from landfill. Even more aggressive diversion is not capable of handling the entire waste stream. Diversion is not a viable stand-alone alternative and thus is ranked as fourth for this criterion. A disposal alternative is required in conjunction with increased diversion in order to meet all the waste management needs of the City.

- *Incineration/high heat processes* are not capable of managing the entire post-diversion waste stream. A portion of the post-diversion waste stream (estimated to be 25% to 35%) may not be suitable for incineration or high heat processes and would continue to be landfilled. Furthermore, IC&I waste is not typically included in the design of incineration/high heat facilities as it is not considered to represent a reliable feedstock (i.e., the IC&I sector typically minimizes their disposal costs and may elect to dispose of their waste elsewhere). In addition, the solid residue (approximately 30% by weight and 10% by volume of the processed waste) produced as a by-product of incineration/high heat processes must also be disposed in a landfill. Incineration/high heat processes can however, manage more of the waste stream than diversion and thus is ranked as second.

- A *landfill* can handle the entire post-diversion waste stream and is considered preferred (ranked first) for the criterion “Capability of Managing Waste Quantities and Qualities”.

- *Exporting* waste can manage the identified post diversion waste stream and thus is preferred over diversion and incineration/high heat processes. However, export may not always be reliable as the City is dependent on the availability of economic disposal capacity and as noted previously there are limited disposal sites in Ontario within reasonable travel distance of Sault Ste. Marie. For any export scenario, the City is not in control of decisions made by the receiving disposal facility regarding willingness and costs to accept waste over the long term. The City is also not in control of potential political decisions related to the transport of waste across the border. Thus, this alternative is ranked as second.

- The *do-nothing* alternative is not capable of managing the identified waste quantities and thus is ranked as least preferred (fifth).

4.2.2.6 Proven Technical Capability

This criterion compares alternatives based on years of successful operating experience in Ontario and other jurisdictions.

The alternatives *increased waste diversion*, *landfill* and *export* are proven technologies with significant experience both within Sault Ste. Marie and other Ontario jurisdictions. As noted under the previous criteria, diversion is capable of managing specific waste streams e.g., bluebox recyclables and organics, but not the entire waste stream.

Traditional *incineration* (conventional combustion) is also a proven technical capability in Ontario. *High heat processes,* however, are still in the pilot and demonstration stages in Canada and are not currently in full scale operation anywhere in Ontario. It is anticipated (based on proposed facilities and pilots) that within a few years there may be more experience in North America with high heat processes. Thus, it is noted that the evaluation for this criterion generally assumes incineration rather than high heat processes.

Therefore, all above noted alternatives are considered to generally be proven and ranked first in the evaluation.

The *do-nothing* alternative has no proven technical capability to manage the waste and is ranked fifth.

4.2.2.7 Economic/Cost

This criterion compares the lifecycle cost of the alternatives. The costs of the alternatives under consideration range from $45 to at least $190 per tonne. All costs are presented as ranges to reflect the fact that the cost is dependent on a number of variables.

The cost for *increased waste diversion*, $45 to $170 per tonne, includes the estimated costs to add source separated organics to the existing waste diversion program, to expand the material types collected, and to increase the quantity of materials currently collected in the residential recycling program. These costs were developed based on operating experience with existing waste diversion facilities. This alternative is ranked first for this criterion.

Based on procurement processes for the design/build/operate scenario, it is estimated that the cost for *incineration/high heat processes* will be in the range of $110 to $190 per tonne for a suitably sized facility for Sault Ste. Marie. This estimate is net of any revenues from the sale of electricity. This alternative is the most expensive and is ranked fourth.

User fees at the existing Sault Ste. Marie Landfill consist of a gate fee ($11 in 2021) for waste loads of up to 300 kg for residential customers and 145 kg for commercial customers, and a $77/tonne tipping fee (2021) applies to all waste beyond the threshold weights. A present value analysis was also completed to identify a suitable tipping fee to plan, design, develop, operate, close and monitor a new 2.0 million tonne disposal facility. The analysis identified a tipping fee in the range of $70 to $80/tonne should be adequate to cover the lifecycle costs of a new facility. This cost range has been adopted by the City which could reflect expansion of an existing site or development of a new site. The cost of landfill assumes a revenue neutral position relating to the sale of electricity. *Landfill* is ranked first for the “Economic/Cost” criterion.

Export to another facility, includes the tipping fee cost[17] as well as transfer station and haul costs. A range of $85 to $105 per tonne has been developed for the export alternative. This cost range was developed

[17] For the purpose of establishing a cost for export, it was assumed the material would be exported to a landfill facility.

using the same approach as landfill with the transfer station and haul costs added to the tipping fees developed for the landfill option. This alternative is particularly sensitive to the tipping fees charged and the overall haul distance. *Export* is ranked third for the "Economic/Cost" criterion.

The *do-nothing* alternative involves no immediate costs however, considering lifecycle costs and the likely higher, long term cost for emergency disposal when there is no remaining disposal capacity in the existing landfill, this alternative is considered least preferred (fifth).

Increased waste diversion and *landfill* are both considered to have a lower cost range and are ranked as first.

4.2.3 Evaluation of "Alternatives To" Results

The rankings are summarized for each of the criteria in **Table 4.3** with a rank of first being preferred and a rank of fifth being least preferred. The cells of the table have also been highlighted from darkest (preferred) to lightest (least preferred) to visually represent the ranking.

Table 4.3 clearly shows that the *do-nothing* alternative has no advantages for any of the criteria considered. The table also shows that the *export* alternative has few advantages when compared to the other alternatives. This is consistent with the input received at the public input sessions where comments were received that the *do-nothing* alternative was not a realistic option and *exporting* waste is not reliable or sustainable for the long term.

Table 4.3 also demonstrates that *increased waste diversion* is considered to be a preferred method of managing Sault Ste. Marie's waste. It is ranked as preferred or equal to other alternatives for five of the seven criteria. This alternative was also strongly supported by the public during consultation events. The primary disadvantage of this alternative is that it can only manage a portion of the City's waste and therefore requires another alternative to manage the remaining waste.

The remaining two alternatives, *landfill* and *incineration/high heat processes* are considered to be equal for three of the following criteria:

- Compliance with Regulations and Policies – both landfill and incineration/high heat processes can comply with regulations and policies.
- Environmental Acceptability – both alternatives are highly engineered and can be designed to minimize potential for environmental effects.
- Proven Technical Capability – both alternatives have a proven ability to manage solid waste.

Table 4.3 Summary of "Alternatives To" Ranking

Criterion	Increased Waste Diversion	Landfill	Incineration / High Heat Processes	Export	Do Nothing
Compliance with Regulations and Policies	Ranked First	Ranked First	Ranked First	Ranked Fourth	Ranked Fifth
Environmental Acceptability	Ranked First	Ranked Second	Ranked Second	Ranked Fourth	Ranked Fifth
Ability of City to Implement the Alternative	Ranked First	Ranked First	Ranked Third	Ranked Fourth	Ranked Fifth
Flexibility of the System	Ranked Second	Ranked First	Ranked Third	Ranked Third	Ranked Fifth
Capability of Managing Waste Quantities and Qualities	Ranked Fourth	Ranked First	Ranked Second	Ranked Second	Ranked Fifth
Proven Technical Capability	Ranked First	Ranked First	Ranked First	Ranked First	Ranked Fifth
Economic/Cost	Ranked First	Ranked First	Ranked Fourth	Ranked Third	Ranked Fifth

Landfill is preferred when compared to incineration/high heat processes for the remaining four criteria:

- Ability of the City to Implement the Alternative – the City has significant experience with landfill and no experience with incineration/high heat processes. The City would likely have to rely on the private sector to operate an incinerator or high heat technology but could continue to operate a landfill site.
- Flexibility of the System – landfill is considered to be more flexible in its ability to be quickly and efficiently adapted to changes in the waste stream, fluctuation in quantity and changes in government regulations and policies; whereas incineration/high heat process facilities must be designed for a specified waste stream and can be costly to retrofit and/or expand.
- Capability of Managing Waste Quantities and Qualities – landfill can accommodate all of Sault Ste. Marie's waste[18]; whereas, incineration/high heat process must be designed for the most reliable component of the waste stream and this reduces its ability to include some of the other waste (e.g. IC&I) which is an important factor in attracting and retaining economic development in Sault Ste. Marie.
- Economic/Cost – Landfill is currently significantly less costly than incineration/high heat processes with a cost range of $70-$80 per tonne compared to $110 to $190 per tonne for incineration/high heat processes depending on the technology used.

It is noted that based on the discussion about evaluation criteria at the Public Input Session in June 2007, issues related to environmental acceptability, and cost were top of mind for session participants. Landfill is equal or preferred over *incineration/high heat processes* for these criteria.

Considering the results of the detailed evaluation and input received, **the preferred way for Sault Ste. Marie to manage its solid waste is a combination of *increased waste diversion* and *landfill***. During consultation on the "Alternatives To", comments were received in support of *increased waste diversion* and

[18] It is noted that for both Landfill and Incineration/High Heat Processes, household hazardous waste must be collected and disposed of separately.

landfill. Comments were also received in support of *incineration/high heat processes*. The incineration and *high heat processes* alternative would also require landfill capacity to address process residual waste.

The combination of *increased waste diversion* and *landfill* are the most flexible alternatives to address changes in the waste stream, fluctuations in recycling and waste quantities, has proven ability to manage solid waste through many years of successful operating history, and should not result in a significant cost increase to implement and operate. The preferred alternatives together can fulfill all of Sault Ste. Marie's waste management needs and meet Provincial goals and objectives.

These two alternatives were carried forward for further review and analysis in the Alternative Methods Evaluation. The *do-nothing* alternative was also carried forward as a baseline for the assessment of potential effects.

Table 4.2 - "Alternatives To" Evaluation Matrix

Criteria/ (*Indicator)*	Increased Waste Diversion	Landfill	Incineration/High Heat Processes[19]	Export	Do-Nothing
Compliance with regulations and policies *(Ability to meet the requirements of the Waste-Free Act, the Environmental Assessment Act, and the Environmental Protection Act).*	**Ranked First**: Diversion facilities and activities can be designed to meet applicable government policies and regulations and there are many currently operating facilities that meet requirements. This alternative is well-aligned with the objectives of the Waste Free Act. The Province's target is to achieve 50% diversion by 2030.	**Ranked First**: Landfill can be designed and operated to meet all applicable government policies and regulations. Many facilities currently meeting requirements.	**Ranked First**: Incineration/high heat processes and RDF production have the ability to meet all applicable regulations and policies. The technologies available to mitigate air pollution have advanced such that incineration facilities in Ontario and Europe operate well within the regulatory limits for various air pollutants. Limited number of facilities currently meeting requirements in Ontario.	**Ranked Fourth**: Disposal sites which receive exported waste must be in compliance with all applicable government regulations and policies in their jurisdiction. Many facilities currently meeting requirements. However, it is noted that the province ceased residential waste export to Michigan in 2010. There are provincial guidelines in place supporting the management of waste close to source.	**Ranked Fifth**: The do-nothing option would lead to closure of the City landfill and would not meet the municipal mandate to provide disposal services.
Environmental acceptability *(Ability of the alternative to be designed to minimize nuisance impacts, air quality impacts, and impacts to water.* *Likelihood that potential impacts can be mitigated and*	**Ranked First**: Diversion promotes environmental protection and conservation.	**Ranked Second**: Modern landfills are highly engineered and landfilling can be undertaken in an environmentally sound manner.	**Ranked Second**: Modern incineration/high heat/RDF processes are highly engineered and can be undertaken in an environmentally sound manner.	**Ranked Fourth**: Site(s) must be licensed for operation and must meet environmental protection requirements.	**Ranked Fifth**: Does not manage the projected waste stream, so not environmentally acceptable.
	Some potential for nuisance impacts (noise, odour, dust, truck traffic).	Some potential for nuisance impacts (noise, odour, dust, truck traffic).	Some potential for nuisance impacts (noise, odour, truck traffic.	Some potential for nuisance impacts (noise, odour, dust, truck traffic.	Potential nuisance impacts from illegal dumping.
	Limited air quality lifecycle emissions.	Potential air quality lifecycle emissions: • higher net GHG and smog precursors and acid gases than Incineration. • lower net heavy metals and dioxins.	Potential air quality lifecycle emissions: • lower net emissions of GHG and smog precursors and acid gases than landfill. • higher net emissions of heavy metals and dioxins.	Potential for air quality lifecycle emissions depends on nature of disposal facility • additional emissions related to extra truck traffic.	Limited air quality lifecycle emissions.

[19] Generally, the evaluation assumes incineration as there is limited experience with high heat processes in Ontario.

Table 4.2 - "Alternatives To" Evaluation Matrix

Criteria/ (*Indicator)*	Increased Waste Diversion	Landfill	Incineration/High Heat Processes[19]	Export	Do-Nothing
opportunity for benefits.)	Lowest potential for impacts to water.	Landfill has potential for greater impact on ground and surface water. However, engineered facilities include a liner and leachate management system that mitigates the potential for negative effects.	Incineration/high heat processes still requires landfilling of a small quantity of residual materials. For conventional incineration, the bottom ash is generally stable, but the fly ash (5% by weight) must be stabilized before landfilling so that heavy metals cannot leach. In addition, engineered landfills include a liner and leachate management system that mitigates the potential for negative effects.	Potential for impact on ground and surface water depends on the nature of disposal facility.	Limited impact to water.
	Effects can typically be mitigated; significance of effect depends on location of facility. Typically, the potential environmental effects associated with a diversion facility are considered less significant than the potential effects associated with a landfill or incineration/high heat process facility.	Most of the effects can typically be mitigated and the extent of impact depends on facility location.	Most of the effects can typically be mitigated and the extent of impact depends on facility location.	Added environmental effects resulting from transfer station operations, haulage including air emissions from haul trucks, disruption of local residents and users of haul roads.	Significant adverse impacts from illegal dumping.
	Environmental benefits: • recovery of non-renewable resources.	Environmental benefits: • Some recovery on-site of non-renewable resources. • Landfill gas can be collected and can recover electrical energy.	Environmental benefits: • Pre or post processing can recover some non-renewable resources. • An incinerator/high heat process facility can recover more energy than landfill.	Environmental benefits: • Dependant on disposal facility.	Environmental benefits: • None.
Ability of City to implement the alternative *(extent to which City has existing*	**Ranked First**: City is regulated to provide waste diversion under the *Environmental Protection*	**Ranked First**: City is required to provide waste disposal, and has many years of experience with landfilling.	**Ranked Third**: City is required to provide waste disposal, and can consider incineration/high heat or RDF processes. Need	**Ranked Fourth**: City is required to provide waste disposal and can export waste but will have less control on pricing and	**Ranked Fifth**: City is required to provide waste disposal, therefore

Table 4.2 - "Alternatives To" Evaluation Matrix

Criteria/ (*Indicator)*	Increased Waste Diversion	Landfill	Incineration/High Heat Processes[19]	Export	Do-Nothing
infrastructure and experience).	*Act* and has been doing so for many years.		to consider procurement approaches. The municipality could design/build/own/operate a facility or enter into a "put or pay" (pay for minimum guaranteed tonnages) contract with a private company that would develop a facility (ie: similar to the existing blue box recycling contract). This alternative involves a considerable learning curve for municipal staff.	security of contracts in the long term for the waste exported. The Province ceased residential waste export to Michigan in 2010. The City's ability to implement this alternative is significantly restricted by the limited number of waste disposal facilities within a reasonable travel distance that have adequate capacity and can accept waste from Sault Ste. Marie. The nearest large disposal site is in Sudbury (300 km east). This disposal site is currently not licensed to accept waste from outside of their service area.	do-nothing is not acceptable.
Flexibility of the system *(ability to manage changing waste streams).*	**Ranked Second**: Increased diversion increases flexibility in the overall waste management system and responds to government 3Rs policies, regulations and public expectations. To-date waste diversion systems have been able to respond to new materials and increased quantities through expansion and innovation.	**Ranked First**: Landfill has a high degree of flexibility to respond to changes in the waste stream, fluctuations in waste quantities and changes in government regulations and policies. Increased quantities will reduce site life and reduced quantities will increase site life.	**Ranked Third**: Generally, incineration/high heat processes are somewhat 'less flexible' to changes in waste quantities than landfill as changes to the facility are typically costly. Thus, facilities are typically designed for only the most reliable/dependable waste stream (ie: the residential stream). This reduces the flexibility to manage IC&I waste component. The total quantity of waste assumed for incineration,	**Ranked Third**: The export of waste is reliant on the availability of financially feasible destinations and unrestricted export regulations/legislation and trade agreements and thus can be unpredictable. Waste export contracts can also have limited flexibility for changing waste disposal quantities.	**Ranked Fifth**: There is no flexibility possible with the do-nothing alternative.

Table 4.2 - "Alternatives To" Evaluation Matrix

Criteria/ (*Indicator)*	Increased Waste Diversion	Landfill	Incineration/High Heat Processes[19]	Export	Do-Nothing
	Changes to materials collected may require system modifications or upgrades.		gasification/pyrolysis or RDF production in Sault Ste. Marie is in the order of 20,000 to 24,000 tonnes per year. This is a relatively low quantity of feedstock. There are however, facilities operating at this scale in other jurisdictions (e.g. Norway, Denmark).		
Capability of managing waste quantities and qualities *(ability to manage projected quantity and type of waste).*	**Ranked Fourth**: In recent years the City has been diverting approximately 30% of residential waste. Even aggressive diversion is not capable of handling the entire waste stream.	**Ranked First**: A municipal solid waste landfill can manage the entire identified waste stream. Hazardous wastes must be managed at special disposal facilities.	**Ranked Second**: Of the total waste stream, it is estimated that 50,000 to 58,000 tonnes per year (ie: 65% to 75%) of waste generated by residential and IC&I sources is suitable for processing in an incinerator or high heat process. Materials that are generally unsuitable include municipal waste (often street sweepings, catch basin clean-out materials), sewage sludge, and contaminated soil. It is also noted that these facilities are typically designed to only manage the residential waste stream which is the most reliable waste stream resulting in only 20,000 to 24,000 tonnes of waste being directed to incineration/high heat processes. The solid residual wastes that are produced as by-products of the processes must also be landfilled and represent approximately 25% - 30% by	**Ranked Second**: Exporting waste to a landfill can manage the identified waste stream; however, the City is dependent on the availability of economic disposal capacity. Hazardous wastes must be managed at special disposal facilities. The City also does not have control over political decisions related to the border.	**Ranked Fifth**: The do-nothing option is incapable of managing the identified waste quantities.

Table 4.2 - "Alternatives To" Evaluation Matrix

Criteria/ (*Indicator)*	Increased Waste Diversion	Landfill	Incineration/High Heat Processes[19]	Export	Do-Nothing
			weight and 10% by volume of the processed waste. Hazardous wastes must be managed at special disposal facilities.		
Proven technical capability *(extent to which the alternative has been proven to be effective at managing municipal waste).*	**Ranked First**: Current proven diversion technology is capable of managing specific waste streams e.g. blue box materials and household organics, but not the entire waste stream.	**Ranked First**: Landfill has a proven technical capability to manage the projected waste stream. Engineering designs have advanced significantly to reduce environmental impacts.	**Ranked First**: Operating experience with incineration in North America and Europe has established a reasonable operating track record and a much-improved track record with regards to environmental protection. There are over 400 incinerators worldwide operating with full environmental compliance and very low emissions. Generally, incineration is assumed for this criterion. Less operating experience with gasification/pyrolysis within few facilities in Europe or North America. Current operating examples can be found primarily in Japan and Germany. Over the past few years since the passage of the European Union (EU) landfill directive, a number of RDF facilities have been developed in Europe. Many of these facilities market the RDF to existing cement kilns and industrial uses. Mechanical/Biological Treatment (MBT) component is considered reasonably reliable given past	**Ranked First**: Disposal facilities with proven technical capability may be available to the City.	**Ranked Fifth**: The do-nothing option has no proven technical capability to manage the waste.

Table 4.2 - "Alternatives To" Evaluation Matrix

Criteria/ (*Indicator)*	Increased Waste Diversion	Landfill	Incineration/High Heat Processes[19]	Export	Do-Nothing
			experience with mechanical component and aerobic composting.		
Economic/Cost *(estimated construction and operating costs).*	**Ranked First**: Approximately $45 to $170/tonne	**Ranked First**: Approximately $70-$80/tonne and assumes a revenue neutral position relating to the sale of electricity.	**Ranked Fourth**: There is a significant range in potential costs related to Incineration, Gasification or RDF generation options. **Incineration:** cost range in the order of $110 to $190 per tonne **Gasification/Pyrolysis:** cost range in the order of $110 to $190 per tonne, or possibly higher (costs uncertain due to lack of operating facilities) **Refuse Derived Fuel:** cost range in the order of $65 to $130 or more per tonne. Net system cost assumes conservative market price for electrical energy generated from thermal treatment of waste and for ferrous metals recovered from ash/char.	**Ranked Third**: Approximately $85-$105/tonne.	**Ranked Fifth**: No immediate cost but high potential long-term cost as problem is not addressed.

5.0 ALTERNATIVE METHODS

The City remains committed to investigating, implementing and supporting programs to increase waste diversion through 3Rs initiatives. Since the implementation of 3Rs initiatives does not require EA Act approval; the EA study, in this and subsequent chapters, focuses on alternative methods of landfilling residual waste. The key objective of this phase of the study was to find an environmentally suitable location and design for additional landfill capacity. The Ontario EA Act requires the consideration of a reasonable range of alternatives. During the development of the EA the "alternative methods" (i.e. alternative landfill locations and designs) evaluation, was described as a two-step process as follows:

- Step 1 – Non site-specific comparison of a new landfill to an expansion of an existing landfill; and
- Step 2 – Identify specific sites or expansion options based on the outcome of Step 1 and the comparison of these sites or options.

Step 1 in the evaluation of alternative methods for landfilling residual waste was presented for public comment in the April 2011 working paper *Solid Waste Management Environmental Assessment-Alternative Methods - Step 1 (Landfill Expansion versus Development of a New Landfill Site).*

The primary purpose of Step 1 was to provide initial focus to the search for additional landfill capacity. This approach was taken in part to recognize the results of an extensive greenfield landfill site search that had previously been conducted in the 1980's (refer to Section 5.1.2) and that a landfill siting process can create anxiety and uncertainty for residents in Sault Ste. Marie and in particular around potential sites. Reducing the number of potential siting alternatives early in the process was intended to help to reduce this anxiety.

This step initially used a comparative process to explore in a, non site-specific manner, whether it is preferable for Sault Ste. Marie to focus its efforts to find additional landfill capacity by expanding an existing facility or through the development of a new site.

Following the review of the Draft EA, the first step in this process was revised based on input from the MECP. Section 5.1 below reflects the revised approach to Step 1.

5.1 Step 1 – Determining Feasibility of a New Landfill and an Existing Landfill Expansion

The City has two potential options when considering landfill (in combination with continued diversion) for the management of municipal solid waste – expand the existing landfill or identify a new landfill.

The Code of Practice (2014) provides the following questions proponents should consider when determining alternatives:

- *Do they provide a viable solution?*
- *Are they proven technologies?*
- *Are they technically feasible?*
- *Are they consistent with relevant planning objectives, policies and decisions?*
- *Are they consistent with relevant Provincial government initiatives?*
- *Could they affect any sensitive environmental features?*
- *Are they practical, financially realistic, and economically viable?*
- *Are they within the ability of the proponent to implement?*
- *Can they be implemented within the defined study area?*

- *Are they appropriate to the proponent doing the study?*
- *Are they able to meet the provisions of the Environmental Assessment Act?*

Step 1 used these screening questions to determine if the option of developing a new landfill and the option of expanding the existing landfill were feasible or if one should be screened from further consideration. The following subsections describe each option and their feasibility.

5.1.1 Description of Options

The following describes the characteristics of the two options for landfill that were considered. *(Note: As discussed in Section 2 of this EA document, changes were made to reduce landfill longevity and capacity based on comments received during the review of the Draft EA. Specifically, the proposed disposal volume has been reduced from 2.33M tonnes to 1.78M tonnes and the projected longevity of the site has been reduced from 2055 to 2049. This and subsequent Sections of this report have been updated to reflect these changes.*

Common Characteristics of a New Site and Expanded Site

Amount of Waste and Truck Traffic: Both site alternatives would need to accommodate 1.78 million tonnes of waste to meet disposal needs to 2049. The combination of waste trucks and trucks carrying fill and/or cover material were assumed to be equal for an expansion or a new site. However, given the constraints and challenges in siting a new site, it is anticipated travel distances would be longer for a new site.

Leachate Control: It was assumed that a new site or expanded site would be designed and constructed with a liner and leachate collection system. Leachate management is usually carried out by collecting and trucking or piping wastewater to an existing municipal wastewater treatment plant. Costs vary depending on the proximity of a landfill to the municipal sewer system or treatment plant. Given the constraints and challenges in siting a new site, it is anticipated that a new site would likely be further removed from the municipal sewer system and treatment plant.

Landfill Gas Management: It was assumed that landfill gas (LFG) collection and flaring would be required for a new or expanded landfill because the disposal volume needed is more than 1.5 million m³ (threshold for mandatory installation of LFG control in Ontario).

Buffer Area: The buffer area is the lands between the area where the waste is placed (referred to as the waste fill area) and the edge of the landfill property. Landfill facilities such as equipment and administration buildings, drop-off areas, scales, etc., are often located within the buffer. The regulated buffer width is 100 m with a minimum buffer width of 30 m as long as it can be confirmed that the buffer provides adequate space for access, structures and is sufficient to ensure potential effects of the landfill operation do not have unacceptable impacts off-site[20].

Characteristics of a New Site

The City of Sault Ste. Marie has different areas in which a new landfill site could be located: within the urban settlement area or beyond the urban settlement area but within the municipal boundary.

[20] Ontario Regulation 232/98, Section 7(3), MECP, October 31, 2011

It was assumed that the existing urban settlement area as shown in the Sault Ste. Marie Official Plan, cannot likely accommodate a new landfill site due to constraints in available land, conflicting land uses, and the number of people, businesses and recreation and institutional areas. Therefore, within the context of this study, consideration was given to areas beyond the urban settlement area and still within the City of Sault Ste. Marie municipal boundary.

Site characteristics specific to a new landfill site in Sault Ste. Marie include:

Site Area: The site area includes both the land required for the waste fill area and buffer area. Depending on the topography, the fill area of a new site would likely be rectangular in shape as this configuration results in a more efficient use of land compared to a square fill area. To accommodate Sault Ste. Marie's waste disposal need, a new landfill would require a minimum site area of approximately 50 ha. This is the approximate minimum area that would require property purchase and potentially displace existing features.

Facilities: Landfill facilities typically include a scale or scales, scale house, equipment and administrative building(s), public drop-off bins, internal roads, fencing, storm water management features, groundwater and landfill gas monitoring wells, leachate management features, etc. For a new landfill it was assumed that all these facilities would be constructed at the new site. Although some of the existing equipment can be relocated to a new site, there would still be a need for some equipment to remain at the old site for ongoing maintenance and monitoring.

Natural Environment: In order to accommodate the fill area and site facilities it was assumed that some natural environmental features would be displaced and/or disturbed and likely more so in a remote setting compared to a rural setting. In order to meet current design standards and effectively mitigate potential impacts to ground water resources there would be a requirement to provide leachate collection and treatment. For a new site this would take the form of trucking leachate to one of the City's wastewater treatment plants or an extension to the municipal waste water collection and conveyance system. In addition, the natural environmental impacts associated with the closed site would also have to be considered.

Social Environment: Although the extent of the social impacts is site dependent, there would likely be impacts to the social environment adjacent to a new site and/or along the routes used to access the new site. These impacts would involve a new group of people and would likely affect more people in a rural setting compared to a remote setting. In addition, there would likely be some, albeit reduced impacts, associated with the continued maintenance and monitoring of the existing site.

Existing Landfill Site: Inherent in this alternative is the closure and post closure activities at the existing site which occur after the site no longer accepts waste. These activities would likely include:

- Final capping of all or a portion of the site;
- Installation of storm water management features;
- Monitoring groundwater and surface water quality;
- Collection and treatment of leachate;
- Landfill gas monitoring and management (i.e., collection and flaring); and
- Ongoing operation and maintenance of various monitoring systems, management systems, drainage systems and final cover.

Approximate Cost: A present value lifecycle cost analysis was completed for a new landfill capable of accommodating 1.78 million tonnes. The analysis incorporated estimated pre-development, development,

operational, closure and post closure costs. Based on the analysis completed the estimated tipping fee that would have to be charged to recover all anticipated costs will range from approximately $70/tonne to $80/tonne in 2010 $'s.

Characteristics of an Expanded Site

Site characteristics specific to an expanded landfill site in Sault Ste. Marie, regardless of whether located within a rural or remote area include:

Expansion Site Area: The expansion of an existing site would most likely involve a horizontal and/or vertical expansion and/or landfill mining. The expansion would likely be designed to overlap with the existing waste fill area and reasonable buffers would likely already be in place. As a result, the expansion area required would most likely be less than 50 ha (the specific expansion area size would depend on the extent of overlap with the existing fill area and the suitability of existing buffers).

Facilities: Over the operating lifetime of a landfill, investment in infrastructure typically may include scale(s), scale house, administration/equipment building(s), operating equipment, public drop-off, compost pad, landfill gas collection and flaring system, leachate collection and conveyance systems, internal roads, fencing, storm water management, and a monitoring network including groundwater and gas wells and surface water monitoring stations. This infrastructure represents a significant investment. For a landfill expansion, some of this infrastructure will most likely continue to be used.

Natural Environment: In order to accommodate the fill area and site facilities required with a landfill expansion, it was assumed that some natural environmental features will be displaced and/or disturbed. Some natural environmental features have already been displaced and disturbed with the existing landfill. The area of land impacted by an expanded disposal footprint would most likely be smaller in area in comparison to a new site. In order to meet current design standards and effectively mitigate potential impacts to ground water resources there would be a requirement to provide leachate collection and treatment. For an existing site with leachate management features this would most likely take the form of an extension and/or upgrading of an existing system. There may also be an opportunity to enhance the current level of leachate management that is provided at an existing landfill.

Social Environment: Although the extent of social impacts is site dependent, the routing used to access an existing site will not change and no significant additional impacts would be expected. Furthermore, there would only be a single site contributing to social impacts whereas a new site would result in social impacts from both a closed site and a new site.

Approximate Cost: The estimated lifecycle cost for a landfill expansion is expected to be less than the lifecycle cost for a new landfill. As noted above, an expansion would likely be able to make use of some of the existing site infrastructure which would result in cost savings. An expansion also has a potential savings in approvals and property purchases. Furthermore, the City would only have to monitor, maintain and report on a single site resulting in further cost savings.

5.1.2 Feasibility Assessment – New Landfill

Developing a new landfill is proven technology that is technically feasible, and in general is a viable solution to providing additional landfill capacity.

New landfills must meet Provincial policies, adhering to the stringent requirements of the Environmental Assessment and Environmental Protection Acts. While a new landfill can be planned and designed to meet

these legislative requirements it is noted that few new landfills have been approved recently in Ontario with many municipalities and private sector waste management companies favouring the expansion of existing landfills. A new landfill can also be planned and designed to be consistent with initiatives such as source water protection, waste diversion and reducing greenhouse gas emissions.

In 1984 an Environmental Assessment was completed for the Sault Ste Marie Landfill (formerly the Cherokee Landfill). The EA considered the potential for a new landfill. The study area for the 1984 EA was the same as the Service Area for this current EA – The City of Sault Ste. Marie, Prince Township and Rankin Reserve. The 1984 EA concluded that there were no sites that were as suitable for a landfill other than the existing Cherokee site due to environmental features and constraints as follows:

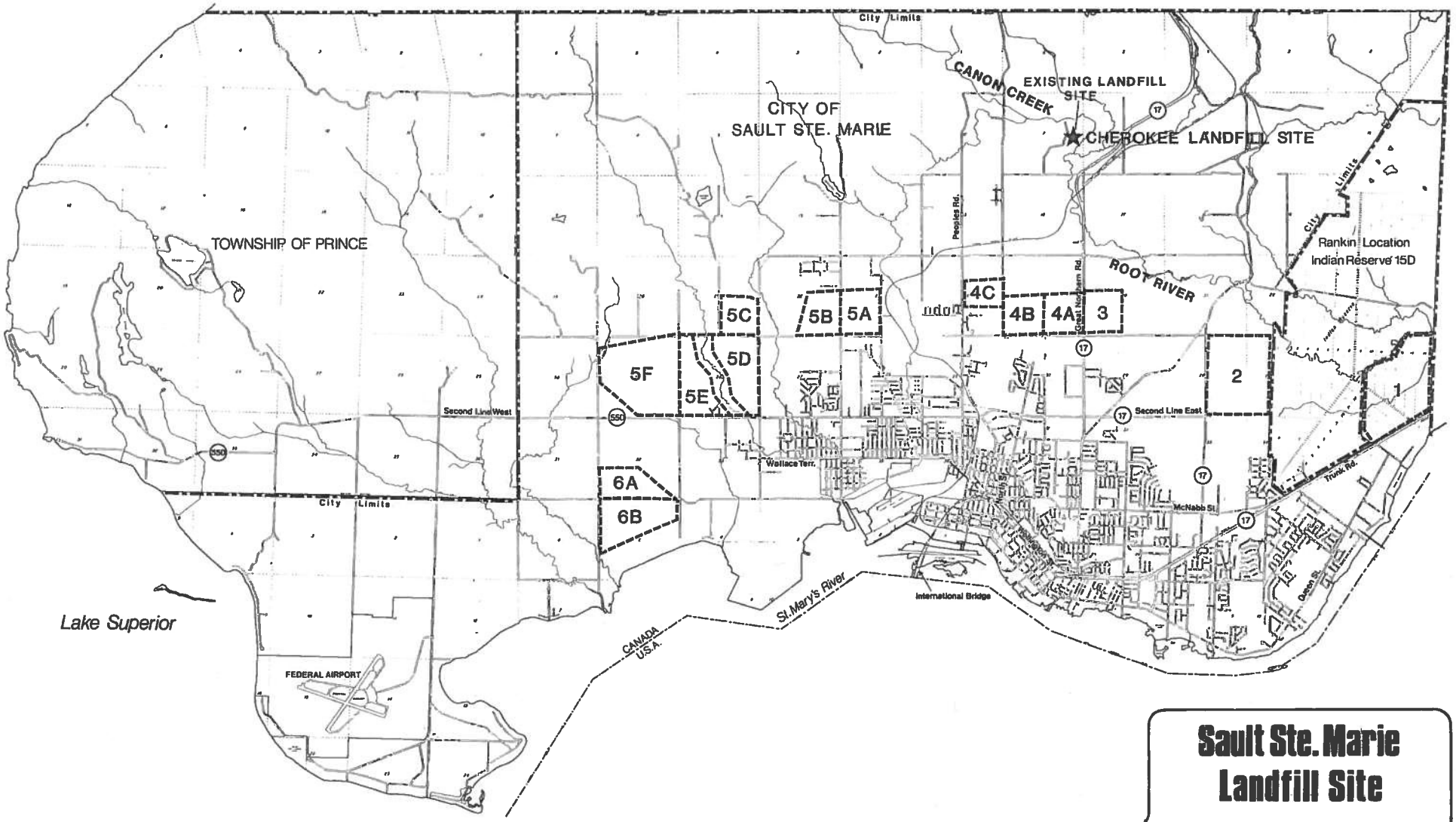
- An initial screening of land within the study area eliminated unsuitable areas (i.e. environmentally sensitive and significant areas, built up areas, lands within 8 km of the airport, regional recharge areas, and bedrock shield where there is limited overburden) and identified 12 potential sites, plus the Cherokee Landfill. The type of information used to complete this screening would be very similar to current screening requirements and protocols but would be more challenging in the current environment as the extent of developed areas have increased. This screening is still considered to be valid.
- A more detailed investigation of hydrogeological constraints and conditions was completed for the 12 identified sites. This work included assessing the relationship of the locations to well depth, a more detailed analysis of ground water flows and an analysis of aerial photographs for soils, slopes and drainage. Sites considered suitable from a hydrogeological and terrain perspective were examined for other constraints (e.g. utility corridors) to ensure that there was sufficient land for a landfill. Five sites were screened out as part of this step. This work is also considered to be valid today.

The remaining 8 sites (including the Cherokee site) were subject to a detailed comparative evaluation involving additional social and environmental considerations. None of the site areas were considered as suitable for a landfill as the existing Cherokee site. **Table 5.1** below highlights the key findings and current use for each of the sites considered in 1984. The sites are shown on **Figure 5.1**.

Table 5.1: Key Findings from 1984 Evaluation of Short-Listed Sites

Site Number	Key Findings (1984)	Current Use
Site 1	• Considered hydrogeologically less suitable than the Cherokee site. • Approximately 100 homes within 500 m.	Located adjacent to the eastern City limit and directly borders both Batchewana's Rankin Reserve along the site's west and north limits and Garden River Reserve along the site's east limit. The site currently includes a number of residential properties fronting onto Frontenac Street.
Site 2	• Considered acceptable from a hydrogeological perspective. • High water table could result in challenging site development. • Large number of residences with direct views. • Displaces 3 commercial uses.	The site directly borders Batchewana's Rankin Reserve along the site's eastern boundary and has since been developed as a Solar Farm.

Site Number	Key Findings (1984)	Current Use
	• Approximately 68 homes within 500m. • Adjacent to a future urban area.	
Site 4C	• Considered hydrogeologically less suitable than the Cherokee site. • 22 homes would be displaced. • Approximately 240 homes within 500 meters of the site.	The site includes many residential properties accessed from both Peoples Road and Old Goulais Bay Road and a large residential subdivision has been developed immediately south of the site. A cemetery directly borders the north limit of the site.
Site 5A	• Considered hydrogeologically less suitable than the Cherokee site with a high number of domestic wells downgradient. • 6 homes would be displaced. • Approximately 131 homes within 500 m. • Adjacent to a future urban area.	Number of rural residential homes within the site and within 500 m of the site has increased significantly.
Site 5B	• Considered hydrogeologically less suitable than the Cherokee site with a high number of domestic wells downgradient. • 3 homes would be displaced. • 152 homes within 500 m. • Displaces an operating farm (39 ha). • Adjacent to a future urban area.	Number of rural residential homes within the site and within 500 m of the site has increased.
Site 5E	• Considered hydrogeologically less suitable than the Cherokee site. • Adjacent to a future urban area. • 1 home would be displaced. • Approximately 29 homes within 500m. • Displaces 42 ha of Class 3 lands.	Site now includes a rural residential subdivision with many more homes that would be displaced and more homes within the 500 m radius.
Site 5F	• Considered hydrogeologically less suitable than the Cherokee site. • 3 homes would be displaced. • Approximately 50 homes within 500m. • Displaces 60 ha of Class 3 lands.	Site includes more rural residential homes that would be displaced and considerably more homes within the 500 m radius.
Cherokee	• Considered equal or more suitable than the other sites from a hydrogeological perspective. • No homes would be displaced. • Approximately 15 homes within 500m.	The City has successfully operated the current site for 30+ years and has over time expanded the buffer lands and enhanced nuisance mitigation.



Sault Ste. Marie Landfill Site

Legend

5A POSSIBLE LANDFILL SITES

DILLON

0 2 4

Kilometers

Figure No. 5.1

POTENTIAL LOCATIONS FOR LANDFILL SITES

While a new site is theoretically within the ability of the City of Sault Ste. Marie to implement, a new site is not considered to be practical given the limited location options demonstrated through past work. In addition, the hydrogeological understanding of the existing site gained over 30+ years of monitoring results, demonstrates that this site is very predictable compared to a new site where the groundwater movement is less well known. A new landfill site would also result in environmental effects from two sites and additional infrastructure that the City would need to maintain over the long term.

5.1.3 Feasibility Assessment – Expanded Existing Landfill

Expanding the existing landfill provides a viable opportunity for additional landfill capacity using a proven and feasible technology.

An expanded landfill must meet Provincial policies and can be planned and designed in accordance with the stringent requirements of the Environmental Assessment and Environmental Protection Acts. An expansion of the existing landfill can also be planned and designed to be consistent with initiatives such as source water protection, waste diversion and reducing greenhouse gas emissions.

Environmental features in the vicinity of the existing landfill include the Root River and Canon Creek. An expansion of the existing site can fit within the existing property and could be designed to avoid any change that would impact these aquatic systems.

An expansion is considered to be practical, financially realistic and economically viable and is within the ability of the City to implement. By making use of existing infrastructure, an expansion would be an efficient use of taxpayer resources and would not result in additional facilities the City would need to maintain. An expansion would also allow the City to focus attention and resources on managing and mitigating environmental effects at one site rather than two sites.

Furthermore, the City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success. The planned expansion will be accommodated within existing City-owned lands.

5.1.4 Step 1 Conclusions

After assessing both options it was concluded that a new site is less feasible, less practical, and more costly. This option was screened from further consideration. It was clear that an expansion could be developed to:

- Provide a technically feasible option that is consistent with policy, regulations and planning initiatives;
- Provide a viable site location in the Sault Ste. Marie service area;
- Manage impacts to environmental features and neighbours;
- Minimize the number of sites contributing to potential adverse environmental effects;
- Be financially realistic making cost effective use of existing infrastructure; and
- Minimize the number of facilities that would require long term management.

This conclusion indicates that it is preferred to focus resources on developing a strategy to expand the existing site subject to the results of more detailed site investigation in the next steps of the EA process.

The preliminary Step 1 conclusion was provided for public review at a workshop held on April 19, 2011. Participants at the workshop generally acknowledged that there would be more challenges and costs associated with establishing a new site. The principle concern raised at the workshop with an expansion scenario related to the potential for ground water quality impacts and odour management which will be considered in the evaluation of alternative site expansion options.

5.2 ALTERNATIVE METHODS – STEP 2

As discussed in Section 5.1, the Alternative Methods Evaluation was divided into two steps. This chapter discusses Step 2 of the evaluation which identified and comparatively evaluated site expansion alternatives.

The site expansion alternatives and evaluation criteria were presented in the document *Solid Waste Management Environmental Assessment - Alternative Methods - Step 2 (Identification and Comparison of Expansion Options), February 2012.*

5.2.1 Evaluation Methodology and Criteria

5.2.1.1 Methodology

The following outlines the evaluation method used to comparatively evaluate the expansion options. This description, while more detailed, is consistent with the approach outlined in the EA ToR and subsequent documentation.

1. **Preparation of Options:** Expansion options were prepared based on the constraints and characteristics of the existing landfill site. The expansion options were developed in sufficient detail to allow the identification of potential effects.

2. **Collection of Data and Effects Assessment:** Data was collected, and potential effects were assessed for each of the expansion options. The potential effects identified represent those effects anticipated assuming a standard level of mitigation is put in place. The effects were described using a combination of quantitative (i.e. numeric) and qualitative (i.e. descriptive) data.

   In order to assess the potential effects of the expansion options, site-specific study areas have been identified as follows:

   - On-site study area - This is the land that will be required for the expanded fill area.
   - Off-site study area - This study area encompasses the vicinity of the site. It includes the area from the fill area boundary extending to 1,000 m. The area within 500 m of the fill area coincides with the area of influence of a landfill site as prescribed in Ministry Guideline D-4. The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500 m of the perimeter of the fill area. The off-site study area has been conservatively expanded to 1,000 m to provide some context on land uses and potential impacts surrounding the area that is typically impacted the most by a landfill site.

   The assessment of the potential effects of each of the expansion options was based on a set of criteria/indicators. The criteria and indicators are intended to ensure that the evaluation of options and the resulting identification of a preferred option consider the potential positive or negative effects of the options on all aspects of the natural, social, and economic environment as well as technical considerations, cost and transportation effects.

3. **Comparison of Options by Indicator, Criteria and Criteria Group:** Criteria groups are general categories of effects such as natural environment, social environment, cost, etc. Criteria describe the potential effects that are identified under each of these categories and indicators describe how the effect will be measured. Using the data collected the expansion options have been ranked in order of preference for each indicator and criterion.

4. **Overall Comparison of Options:** The expansion options were comparatively evaluated based on each of the criteria groups; natural environment, social-cultural environment, economics, cost, technical and transportation.

   This comparison was completed in a two-step process. The first step involved comparing Options to identify the preferred geometry of the expansion footprint. The second step involved comparing the preliminary preferred expansion option with and without a landfill mining component. Landfill mining was included as an important consideration to enhance environmental management at the site and in particular leachate management along the site's western boundary.

5. **Solicitation of Public Input:** Input on the expansion options and the preliminary evaluation results was solicited through the public consultation process. The principle objective of the Step 2 Alternative Methods consultation task was to obtain feedback from the general public, agencies, Aboriginal Communities and stakeholders regarding the evaluation criteria and the preliminary results. To assist in soliciting as much input as possible, a questionnaire was developed to provide targeted feedback and a comment sheet was made available to provide general comments. The questionnaire and comment sheet were available at the March 6, 2012 Public Input Session and were posted on the project webpage on the City's website. In addition, digital responses were encouraged through Survey Monkey, an online survey website. Public input was also requested on the relative importance of criteria groups. A clear order of importance was not determined through this consultation and thus all criteria were considered equal.

6. **Selection of a Preferred Option:** The selection of a preferred expansion option involves considering input received through the public consultation process and identifying and making trade-offs amongst the advantages and disadvantages of the options. The option that on balance has the most advantages and least disadvantages was recommended as the preferred expansion option and carried forward for detailed effects assessment and mitigation related work. To confirm the preferred option it was compared with a do-nothing scenario to fully understand whether proceeding with the proposed expansion is appropriate given its potential for impact on the environment.

The EA process is designed to be iterative to allow for additional options to be considered if the evaluation of the site options does not result in an environmentally sound solution or if additional information comes to light during the detailed impact assessment.

5.2.1.2 Evaluation Criteria

Table 5.3 presents the evaluation criteria used for the evaluation of alternative expansion options. These criteria were presented first in the EA Terms of Reference and were included in the Alternative Methods Step 1 Working Paper. It is noted that some changes were made to the indicators and data sources to better reflect the options that were evaluated and to address input from MECP on the Draft EA, they include:

- Removal of indicators related to the evaluation of impacts along the access route since all options are within the existing property boundary and will continue to use the existing entrance;

- Revision of indicators to evaluate groundwater and surface water impacts since all options are within the existing site;
- Separation of residential disruption or displacement impacts from agricultural operations since agricultural operations are better represented in impacts to businesses and there are no significant agricultural operations in the vicinity of the site;
- Combination of three indicators in cost criteria (estimated lifecycle cost of construction, operation and waste haulage) into one indicator (placement in estimated range of landfill tipping fees for full cost recovery (e.g. low, medium, high);
- Revisions to some of the indicators to improve their ability to measure potential effects.

Some of the data sources were also revised to reflect the fact that all options are within the existing site where there is sufficient background information available.

Input was requested on the evaluation approach, evaluation criteria and their relative importance through the public consultation process including a public input session. Through the input received there was general agreement with the planned approach and the changes proposed as noted above.

5.2.2 Description of Site Expansion Options

Expansion options were developed that make best use of the existing site characteristics and the area available to expand, and to maintain existing landfill facilities and features where possible.

Potential design constraints were considered in the development of expansion options. The site is limited in terms of footprint expansion as there is a hydro corridor along the western property boundary, Canon Creek flows along the eastern boundary and there is a large bedrock ridge along the northern boundary. Fifth Line runs east-west along the southern property boundary and a setback distance had to be maintained between the site and the adjacent sensitive features (i.e. residences). It is noted that the existing site is not lined so an alternative that focused on vertical expansion was not considered as it could negatively impact the groundwater management. It was also highlighted through the MECP hydrogeological review of the DRAFT EA that a vertical expansion is not practical given the current environmental characteristics at the site. In addition, the side slopes of the existing site are not conducive to a vertical expansion. Although landfill mining will provide modest increased capacity it is discussed in section 5.2.5 as an opportunity to improve groundwater conditions for the preferred horizontal expansion option. Neither a vertical expansion nor landfill mining are practical options as they fail to generate adequate capacity to meet future needs. As such, the options considered provide capacity through horizontal footprint expansion.

Based on the characteristics of the existing site, four proposed horizontal footprint expansion options were developed:

- Option 1 - West Expansion;
- Option 2 - West and North Expansion A;
- Option 3 - West and North Expansion B; and
- Option 4 - West and South Expansion.

As all options relate to expanding the same site, there are commonalities between the options including:

- **Haul Route:** Vehicles would continue to enter the site from Fifth Line and any potential disruptions to residents, businesses and agricultural/mining/forestry areas along the haul route would be the same for all options.

- **Property Boundary:** All expansion options are within the existing Sault Ste. Marie owned property.
- **Setback Distance:** All expansion options have a minimum 30 metre setback distance from the property boundary.
- **Lined Landfill Base:** A liner would be installed for all new landfill cells and mined cells.
- **Slope Stability Analysis:** Side slopes of 4:1 (horizontal to vertical) and top slopes of 20:1 have been assumed for the waste fill and excavation side slopes of 3:1 have been assumed for the excavated cells. A geotechnical analysis to assess the stability of slopes for the preferred option was completed as part of the site design.
- **Quantity of Waste Disposed:** As per Section 2.0 of this document, all options were designed to manage a minimum of 1.78 million tonnes of waste. A landfill capacity of approximately 3.17 million m³ (waste and daily/intermediate cover) is required to landfill this quantity of waste based on historic waste densities. (The capacity is calculated as 1.78 million tonnes / 0.56 tonnes/m^3 = 3.17 million m^3.)

It is noted that the do-nothing alternative, an important part of the EA process, is considered in Section 5.2.7.

The following sections provide a description of each proposed footprint expansion option.

5.2.2.1 Option 1 – West Expansion

Option 1 – West Expansion involves the expansion of the current site from the western edge towards the hydro corridor (**Figure 5.2**). The height of the expansion would be the same as the existing landfill mass (i.e. no change in height) and the average depth of expansion would be 18 metres.

Expansion to the west would require relocation of several facilities; the public drop off area, inbound and outbound scales, scale house, administration building and maintenance building. **Table 5.2** summarizes the site features and infrastructure that may require relocation or removal as a result of this option.

The estimated disposal capacity with Option 1 is 3.17 million m³ (i.e. 1.78 million tonnes) assuming that current waste densities are achieved.

The soil generated by the base excavation is expected to supply soil for cover needs with a modest surplus available as a contingency.

N.W. 1/4 SECTION 7

S. 1/2 of N.E. 1/4 SECTION 7

S.W. 1/4 SECTION 7

N. 1/2 of S.E. 1/4 SECTION 7

S. 1/2 of S.E. 1/4 SECTION 7

S.W. 1/4 SECTION 8

N.E. 1/4 SECTION 18

CONTAMINANT ATTENUATION ZONE

PUBLIC DROP OFF AREA

30.0m (TYP.)

LFG HEADER PIPE

LFG FLARE STATION

GROUNDWATER FLOW

GOUNDWATER FLOW

1ST ACCESS ROAD

MEANDER AREA

CANOE CREEK

REALIGNED CANOE CREEK (2006)

EXTENDED LEACHATE COLLECTION LINE (2006)

GRAVEL PIT

LAFARGE GRAVEL PIT

OLD GOULAIS BAY ROAD

FIFTH LINE

THE KING'S HIGHWAY No. 17 (T.C.)

P.I.N. 31508-0048

P.I.N. 31508-0077

P.I.N. 31508-0083

P.I.N. 31508-0080

P.I.N. 31508-0078

P.I.N. 31508-0073

P.I.N. 31508-0074

P.I.N. 31508-0075

P.I.N. 31508-0056

P.I.N. 31508-0057

P.I.N. 31508-0058

P.I.N. 31508-0161

LP-3

PW-8 MH10

PW-7 MH9 310.0

PW-6 MH8

PW-5 MH7

PW-4 MH6

PW-3 MH5

PW-2 MH4

PW-1 MH3

MH1 MH2 MHA MHB

305.0m

300.0m

295.0m

290.0

285.0

303 304 305 306 307 308 309

M-1 M-2 M-3 M-4 M-5 M-6

EW-1 EW-2 EW-3 EW-4 EW-5 EW-6 EW-7 EW-8 EW-9 EW-10 EW-11 EW-12 EW-13 EW-14 EW-15 EW-16 EW-17 EW-18

A1 A2 A3 A4 A5 A6 A7 A8 A9

20 23 25 26 27 28 29 30 31 36 37 40 43 44 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75

0 100 200

SCALE IN METRES

DILLON CONSULTING

Legend:

- 24 — MONITORING WELL THAT NO LONGER EXISTS
- 52 — MONITORING WELL NOT SAMPLED IN 2007
- PW 3 — PUMPING WELL
- MH 3 — LEACHATE COLLECTION SYSTEM
- PROPERTY BOUNDARY
- LIMIT OF FILL
- 40 — MONITORING WELL SAMPLED IN 2007
- M-1 — METHANE GAS MONITOR
- FORMER CREEK LOCATION
- NEW CREEK LOCATION
- EXISTING BULDING\RESIDENCE
- LFG EXTRACTION WELL
- SURFACE WATER CONTROL DITCH
- PROPOSED LANDFILL EXPANSION
- EXISTING LANDFILL

Sault Ste. Marie Municipal Landfill Site

OPTION 1
WEST EXPANSION

Proj. Manager: KK		Drawn By: SKB	Figure No. 5.2
Scale: 1 : 6000		Checked By: FRG	
Date Issued: NOV. 2011		Project No: 06-6988	
Location: G:\CAD\066988		File Name: Option-1.dwg	

5.2.2.2 Option 2 – West and North Expansion A

Option 2 – West and North Expansion A would expand the western and northern limits of the existing landfill (**Figure 5.3**). The height of the expansion would be the same as the existing landfill mass (i.e. no change in height) and the average depth of the west expansion would be 18 metres.

By including a northerly expansion, this alternative preserves the public drop-off area, inbound and outbound weigh scales, scale house, administration building and maintenance building. **Table 5.2** presents a summary of the site features and infrastructure that may require relocation or removal as a result of this option.

The estimated disposal capacity is 3.17 million m³ (i.e. 1.78 million tonnes) assuming that current waste densities are achieved.

The soil generated by the base excavation is expected to supply soil for cover needs with a modest surplus available as a contingency.

N.W. 1/4 SECTION 7

S. 1/2 of N.E. 1/4 SECTION 7

S.W. 1/4 SECTION 8

CANOE CREEK

GRAVEL PIT

LFG HEADER PIPE

CONTAMINANT ATTENUATION ZONE

GROUNDWATER DIVIDE

N. 1/2 of S.E. 1/4 SECTION 7

S. 1/2 of S.E. 1/4 SECTION 7

S.W. 1/4 SECTION 7

WATER TABLE CONTOUR (TYP.)

LFG FLARE STATION

NORTH ACCESS ROAD

MEANDER AREA

REALIGNED CANOE CREEK (2006)

EXTENDED LEACHATE COLLECTION LINE (2006)

LAFARGE GRAVEL PIT

OLD GOULAIS BAY ROAD

FIFTH LINE

N.E. 1/4 SECTION 18

THE KING'S HIGHWAY No. 17 (T.C.)

30.0m (TYP.)

P.I.N. 31508-0048

P.I.N. 31508-0077

P.I.N. 31508-0083

P.I.N. 31508-0080

P.I.N. 31508-0079

P.I.N. 31508-0067

P.I.N. 31508-0068

P.I.N. 31508-0073

P.I.N. 31508-0074

P.I.N. 31508-0075

P.I.N. 31508-0076

Legend:

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- MONITORING WELL NOT SAMPLED IN 2007
- PW 3 PUMPING WELL
- MH 3 LEACHATE COLLECTION SYSTEM
- PROPERTY BOUNDARY
- LIMIT OF FILL
- MONITORING WELL SAMPLED IN 2007
- M-1 METHANE GAS MONITOR
- FORMER CREEK LOCATION
- NEW CREEK LOCATION
- EXISTING BULDING\RESIDENCE
- LFG EXTRACTION WELL
- SURFACE WATER CONTROL DITCH
- PROPOSED LANDFILL EXPANSION
- EXISTING LANDFILL

0 100 200
SCALE IN METRES

DILLON CONSULTING

Sault Ste. Marie Municipal Landfill Site

OPTION 2
WEST AND NORTH EXPANSION A

Proj. Manager: KK		Drawn By: SKB	Figure No.
Scale:	1 : 6000	Checked By: FRG	5.3
Date Issued:	NOV. 2011	Project No: 06-6988	
Location:	G:\CAD\066988	File Name: OPTION-3.dwg	

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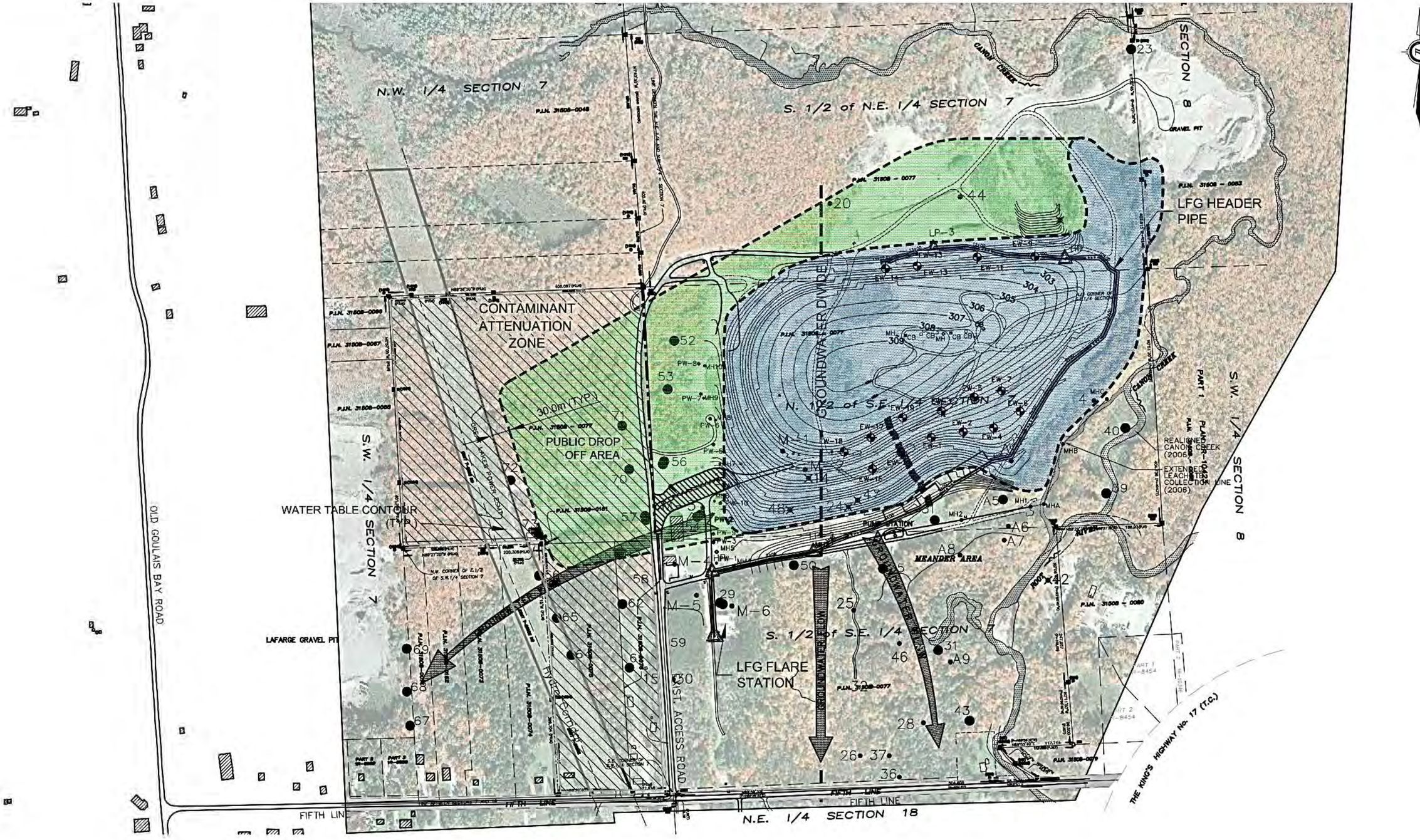
5.2.2.3 Option 3 – West and North Expansion B

Option 3 – West and North Expansion B is a combination of Options 1 and 2 which includes the expansion of the landfill from the western edge of the existing site towards the hydro corridor and a northern expansion from the northern limit of the existing landfill (**Figure 5.4**). The height of the expansion would be the same as the existing landfill mass (i.e. no change in height) and the average depth of the west expansion would be 11 metres which is 7 metres shallower than the other Options. This is possible due to the increase in surface area available for this expansion option.

Expansion to the west would require the relocation of the public drop off area, inbound and outbound scales, scale house, administration building and maintenance building. **Table 5.2** presents a summary of the site features and infrastructure that may require relocation or removal if this option were selected.

The estimated disposal capacity for Option 3 is 3.17 million m³ (i.e. 1.78 million tonnes) assuming that current waste densities are achieved.

The soil surplus generated by the base excavation is expected to supply soil for cover needs with a modest surplus available as a contingency.



DILLON CONSULTING

Legend:

- MONITORING WELL THAT NO LONGER EXISTS
- MONITORING WELL NOT SAMPLED IN 2007
- PW 3 PUMPING WELL
- MH 3 LEACHATE COLLECTION SYSTEM
- PROPERTY BOUNDARY
- LIMIT OF FILL
- MONITORING WELL SAMPLED IN 2007
- M-1 METHANE GAS MONITOR
- FORMER CREEK LOCATION
- NEW CREEK LOCATION
- EXISTING BULDING\RESIDENCE
- LFG EXTRACTION WELL
- SURFACE WATER CONTROL DITCH
- PROPOSED LANDFILL EXPANSION
- EXISTING LANDFILL

0 100 200
SCALE IN METRES

Sault Ste. Marie Municipal Landfill Site

OPTION 3
WEST AND NORTH EXPANSION B

Proj. Manager: KK	Drawn By: SKB	Figure No.	
Scale: 1 : 6000	Checked By: FRG	5.4	
Date Issued: NOV. 2011	Project No: 06-6988		
Location: G:\CAD\066988	File Name: OPTION-3.dwg		

5.2.2.4 Option 4 – West and South Expansion

Option 4 - West and South Expansion involves two separate landforms for the expansion (**Figure 5.5**). The first is an expansion west from the existing western limit of the site and the second is south of the southern limit of the existing site. The height of the expansion site would be the same height as the existing site and the average depth of the expansion is 18 m. Expansion to the south and west would require relocation of the Household Hazardous Waste facility and blower station. **Table 5.2** presents a summary of the site features and infrastructure that may require relocation or removal as a result of this option.

In addition to the 30 m setback from the hydro corridor, there is also a 100 m setback from Fifth Line. Creating separate landforms requires larger footprints since a separate landform cannot build on an existing side slope.

The estimated disposal capacity is 3.17 million m³ (i.e. 1.78 million tonnes) assuming that current waste densities are achieved.

The soil surplus generated by the base excavation is expected to supply soil for cover needs with a modest surplus available as a contingency.

N.W. 1/4 SECTION 7

S. 1/2 of N.E. 1/4 SECTION 7

S.W. 1/4 SECTION 7

S.W. 1/4 SECTION 8

N. 1/2 of S.E. 1/4 SECTION 7

S. 1/2 of S.E. 1/4 SECTION 7

N.E. 1/4 SECTION 18

CONTAMINANT ATTENUATION ZONE

PUBLIC DROP OFF AREA

MEANDER AREA

CANOE CREEK

REALIGNED CANOE CREEK (2006)

EXTENDED LEACHATE COLLECTION LINE (2006)

GREAT LAKES POWER (GLP)

GROUNDWATER DIVIDE

OLD GOULAIS BAY ROAD

LAFARGE GRAVEL PIT

GRAVEL PIT

EAST ACCESS ROAD

FIFTH LINE

THE KING'S HIGHWAY No. 17 (T.C.)

100.0

P.I.N. 31508-0048

P.I.N. 31508-0077

P.I.N. 31508-0083

P.I.N. 31508-0080

P.I.N. 31508-0079

P.I.N. 31508-0074

P.I.N. 31508-0073

P.I.N. 31508-0075

P.I.N. 31508-0076

P.I.N. 31508-0085

P.I.N. 31508-0087

P.I.N. 31508-0088

PART 1 1R-8454

PART 2 1R-8454

PART 3 1R-8454

0 100 200

SCALE IN METRES

Legend:

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- 52 MONITORING WELL NOT SAMPLED IN 2007
- PW 3 PUMPING WELL
- MH 3 LEACHATE COLLECTION SYSTEM
- PROPERTY BOUNDARY
- LIMIT OF FILL
- 40 MONITORING WELL SAMPLED IN 2007
- M-1 METHANE GAS MONITOR
- FORMER CREEK LOCATION
- NEW CREEK LOCATION
- EXISTING BULDING\RESIDENCE
- LFG EXTRACTION WELL
- PROPOSED LANDFILL EXPANSION
- EXISTING LANDFILL

DILLON CONSULTING

Sault Ste. Marie Municipal Landfill Site

OPTION 4
WEST AND SOUTH EXPANSION

Proj. Manager: KK	Drawn By: SKB	Figure No.	
Scale: 1 : 6000	Checked By: FRG	5.5	
Date Issued: NOV. 2011	Project No: 06-6988		
Location: G:\CAD\066988	File Name: Option-5.dwg		

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Table 5.2 Summary of Infrastructure Changes for Geometric Expansion Options

Infrastructure Element	Relocation or Reconstruction Required (Y or N)			
	Option 1	Option 2	Option 3	Option 4
Public access road	N	N	N	N
Inbound and outbound weigh scales	Y	N	Y	N
Scale house	Y	N	Y	N
Public waste drop-off	Y	N	Y	N
Administration building	Y	N	Y	N
Maintenance garage	Y	N	Y	N
Internal access roads throughout the disposal area	Y	Y	Y	Y
Wood waste drop-off area	Y	Y	Y	Y
Compost processing area	N	Y	Y	N
Tire drop-off area	Y	Y	Y	Y
Shingles, construction and demolition materials drop-off bunker	Y	Y	Y	Y
Batteries and propane tank drop-off area	Y	Y	Y	Y
Recyclables drop-off area	Y	Y	Y	Y
Purge wells (adjacent to the western boundary of the disposal footprint);	Y	Y	Y	N
Gravity leachate collection system (adjacent to the southern and south-eastern boundary of the disposal footprint)	N	N	N	N
Groundwater monitoring wells	Some	Some	Some	Some
Active landfill gas wells and associated piping network (constructed in 2010)	N	N	N	N
Blower station and central flare for the active landfill gas system (constructed in 2010)	N	N	N	Y
Leachate pump station	N	N	N	N
Storm water management pond	N	Y	Y	N
Household Hazardous Waste facility	N	N	N	Y

5.2.3 Description of Environmental Conditions and Comparative Evaluation of Options

Data was collected by the project team on the basis of the criteria and indicators for each of the four proposed site expansion alternatives. **Table 5.4** (at the end of this report section) provides the data collected and preference ranking for each of the criteria and indicators used in the evaluation of the geometric expansion options. The site expansion options are ranked from most preferred (rank of 1) to least preferred (rank of 4). The ranking is based on a comparative assessment of the net effects of the site expansion alternatives. The net effects refer to the potential for effects assuming standard mitigation measures are implemented.

The following sections present the information collected for each of the expansion alternatives describing the key differences between the expansion options based on each of the criteria groups: Natural Environment, Socio-Cultural Environment, Economics, Cost, Technical Considerations, and Transportation.

Table 5.3 Alternative Methods Step 2 Evaluation Criteria

Criteria Group/Criteria	Indicators	Data Sources
Natural Environment		
• Compare potential for displacement or disruption of terrestrial features	• Area of terrestrial features on site that would be displaced.	• Aerial photos • Field assessment
	• Area of terrestrial features off-site that may experience disruption effects during operation.	• Aerial photos • Field assessment
	• Significance of terrestrial features that would be displaced or disrupted.	• Aerial photos • Field assessment
• Compare potential for displacement or disruption of aquatic features	• Amount of aquatic habitat on-site that would be displaced or disrupted.	• Aerial photos • MNR mapping/fisheries data • Field assessment
	• Amount of aquatic habitat off-site that may be disrupted during operation.	• MNR mapping/fisheries data • Aerial photos
	• Significance of aquatic features that would be displaced or disrupted.	• MNR mapping/fisheries data • Aerial photos
• Compare potential for effects on groundwater resources	• Ability to implement a horizontal collector to protect groundwater to the west.	• Discussion with City Staff • Conceptual site design
	• Extent of groundwater monitoring requirements .	• Groundwater mapping • Topographic mapping • Historical groundwater quality results
• Compare potential for effects on surface water resources	• Proximity to on-site surface water.	• Aerial photos • Field assessment • Conceptual design
	• Extent of new surface water monitoring stations requirements.	• Aerial photos • Surface water mapping • Topographic mapping • Field assessment • Conceptual design • Historical surface water quality results

Table 5.3 Alternative Methods Step 2 Evaluation Criteria

Criteria Group/Criteria	Indicators	Data Sources
• Compare potential for atmospheric impacts	• Relative magnitude of air emission (based on waste received and construction activity) and anticipated magnitude of impact (based on distance of receptors from predominant sources).	• Conceptual design • Aerial mapping • Waste receipt data • Equipment operation data • Distance of predominant sources to receptors
	• Relative magnitude of odour generating potential (based on waste received) and anticipated magnitude of impact (based on distance of receptors from predominant sources). • Presence of landfill mining.	• Conceptual design • Aerial mapping • Waste receipt data • Equipment operation data • Distance of predominant sources to receptors
	• Relative magnitude of dust emissions (based on length of on-site haul route) and anticipated magnitude of impact (based on distance of receptors from predominant sources).	• Conceptual design • Aerial mapping • Equipment operation data • On-Site haul routes • Distance of predominant sources to receptors
	• Relative potential for noise impacts.	• Topographic and aerial mapping • Noise assessment • Equipment operation data • Distance of predominant sources to receptors
Social-Cultural Environment		
• Compare potential for displacement or disruption to residents[21]	• Number of residences on-site who would be displaced.	• Topographic and aerial mapping • Site review
	• Number of residences off-site who may experience disruption effects (e.g. noise, dust, odour) during operation.	• Topographic and aerial mapping • Site review
	• Character of the community in the vicinity of the site and potential for impact on that character.	• City input • Land use mapping • Site review
• Compare potential for displacement or disruption to community features (e.g. parks, recreational facilities)	• Number and type of community features on-site that would be displaced.	• Topographic and aerial mapping • Site review

[21] In the EA Terms of Reference, this criterion included reference to agriculture. All alternatives are on-site and thus there will be no impact to agricultural operations so this reference was removed from the criterion.

Table 5.3 Alternative Methods Step 2 Evaluation Criteria

Criteria Group/Criteria	Indicators	Data Sources
	• Number and type of community features off-site that may experience disruption effects (e.g. noise, dust, odour) during operation.	• Topographic and aerial mapping • Land use mapping • Site review
• Compare potential for impact on future land use plans	• Area and designation of land to be displaced on-site.	• Official plan(s) • Zoning by-laws • City planning staff contact • Ministry guidelines D-1 and D-4 • PPS 2020
	• Area and designation of land to be disrupted off-site.	• Official plan(s) • Zoning by-laws • City planning staff contact • Ministry guidelines D-1 and D-4 • PPS 2020
	• Change in land use character compared to existing designations.	• Official plan • Zoning by-laws • City planning staff contact • Ministry guidelines D-1 and D-4 • PPS 2020
• Compare potential for displacement or disruption of heritage or archaeological resources	• Presence of known archaeological resources on-site.	• Ministry of Heritage, Sport, Tourism and Culture industries • City mapping and staff
	• Number of built heritage or cultural landscape features on-site that would be displaced.	• Historical records • City mapping and staff
	• Number of built heritage or cultural landscape features off-site that might be disrupted.	• Historical records • City mapping and staff
• Compare potential for impacts to public health and safety	• Potential for worker safety issues associated with type of work required. • Distance to drinking water wells.	• Historical health and safety records • City safety standards • Aerial mapping
Economics		
• Compare potential for displacement or disruption to existing businesses	• Number, type and sensitivity of businesses on-site that would be displaced.	• Topographic and aerial mapping • Site review

Table 5.3 Alternative Methods Step 2 Evaluation Criteria

Criteria Group/Criteria	Indicators	Data Sources
	• Number, type and sensitivity of businesses off-site that might experience disruption effects during operation.	• Topographic and aerial mapping • Site review
• Compare potential for displacement or disruption on agriculture/forestry/mining resources	• Area of on-site agriculture/forestry or mining industry resources that would be displaced.	• Topographic and aerial mapping • MNR mapping • Site review
	• Area of off-site agriculture/forestry or mining industry resources that might experience disruption effects during operation.	• Topographic and aerial mapping • MNR mapping • Site review
Cost		
• Compare potential lifecycle cost of alternative	• Placement in estimated range of landfill tipping fees for full cost recovery (e.g. low, medium, high).	• Conceptual site designs • Historical operating costs
Technical Considerations		
• Compare ease of implementation[22]	• Ease of site development and operation.	• Waste density • Conceptual site design
	• Effects on existing/proposed landfill infrastructure.	• Conceptual site design
Transportation		
• Compare potential for effects on airports	• Distance from Sault Ste. Marie airport.	• Topographic mapping
• Compare potential for effects on traffic volumes	• Annual truck kilometres travelled and character of roadway (i.e. single lane one direction, multi-lane).	• Estimated numbers of trucks • Topographic mapping
	• Annual number of trucks travelling through intersections.	• Road maps • Estimated numbers of trucks
• Compare potential for impacts of haulage truck traffic on the movement of farm equipment	• Annual number of trucks travelling through agricultural areas.	• Road maps • Estimated numbers of trucks

[22] The wording of this criterion was revised from that included in the EA Terms of Reference for clarity purposes.

5.2.3.1 Natural Environment

The Natural Environment Criteria Group includes criteria to evaluate the potential for displacement or disruption to terrestrial features and aquatic features, effects on groundwater and surface water resources, and potential for atmospheric impacts. The following describes the difference between the options for each criterion. The overall ranking of the options from a natural environment perspective is shown in **Table 5.5**.

Compare potential for displacement or disruption of terrestrial features - For terrestrial features, all options require a footprint expansion and therefore a resulting displacement of on-site forested area. Option 4 requires the largest amount of on-site forest displacement at 16.1 ha. Options 1, 2, and 3 all displace less than half that amount (6.9 ha, 7.1 ha, and 7.7 ha respectively). Further, Option 4 encroaches on a wetland feature. All options have the same potential for disruption off-site. The majority of the terrestrial features displaced are considered to have low potential to be significant wildlife habitat. There were no endangered species or species at risk noted on-site that would be impacted.

Compare potential for displacement or disruption of aquatic features - Aquatic features on-site include Canon Creek and Root River. Options 1, 2, and 3 are not expected to change the impact to these features nor any aquatic habitat downstream. The west and south expansion, Option 4, has the greatest potential for disruption to aquatic habitat on-site and downstream since it overlaps a tributary of Root River. None of the displaced or disrupted aquatic features are considered significant; there are no aquatic species at risk.

Compare potential for effects on groundwater resources - To assess site impacts to groundwater, the ability to install a horizontal collector and the extent of groundwater monitoring requirements were assessed. Options 1, 2, and 3 allow the construction of a horizontal collection system to further mitigate existing site impacts near the western property boundary. Options 2 and 3 also involve an increased area of fill which will result in a lower mass loading (tonnes of waste per hectare) and thereby reduce peak concentrations and contaminating lifespan. Option 4 provides less opportunity to create a horizontal collector in the west, but allows for continued use of existing purge wells. From the perspective of monitoring, Option 4 creates three distinct fill areas which increases monitoring requirements and impacts contingency measures. All other options result in a singular site for monitoring as well as a singular approach to contingency options.

Compare potential for effects on surface water resources - Proximity to on-site surface water and monitoring requirements were assessed to determine the effects on surface water resources. Option 1 would not change the proximity of the fill area to Canon Creek and requires no changes to monitoring. Options 2 and 3 moderately change the proximity of the fill area to Canon Creek north of the disposal footprint and may require a small change in surface water monitoring requirements. Due to the southern expansion portion of Option 4, surface water monitoring requirements will increase, and contingency measures for the former meander area (i.e. Root River) will be required.

Compare potential for atmospheric impacts - As the daily and annual waste acceptance rate of the landfill and the number and type of operating equipment across the options will not change, the greatest contributor to air quality, odour, and dust is the proximity of on-site operations to receptors. The working face is considered to be the prominent source of these types of atmospheric impacts.

The receptors are predominantly located to the northwest, southwest, and southeast of the landfill boundary. The worst-case air quality impact scenario will occur when the working face is located closest to the receptors.

While Options 1, 2, and 3 have different configurations they are similar in distance between receptors to the northwest and southeast and a worst case fill area. Option 2 has a moderately greater separation

(approximately 125 m further) from the SW receptors. Based on the impact assessment completed for the preferred alternative, all three of these options are anticipated to be in compliance for air and odour and as such are equally ranked. Landfill mining is not considered in this evaluation.

The relative magnitude of dust generated is also impacted by the length of haul routes within the site boundary. Due to the northern expansion areas in Options 2 and 3, the length of the worst-case haul routes are anticipated to be moderately longer than Options 1 and 4. Options 2 and 3 have an increased potential for dust generation which can typically be effectively mitigated through regular application of dust suppressants or hard surfacing the roadway.

Option 4 would include a working face very close to Fifth Line and receptors to the southwest and southeast of the landfill and was considered least preferred for air, odour and dust.

From a noise perspective, Option 3 has been confirmed to have no noise impacts on surrounding residences based on the impact assessment included in Appendix L. The nearest noise receptors are shown in **Figure 5.6** and as shown in **Table 5.6**, Options 1, 2 and 3 are anticipated to have minimal change in noise impact over what is being experienced today. Option 4 is least preferred as the noise associated with landfilling is closer to the residences along Fifth Line.

Table 5.6 – Relative Potential Noise Impact

Receptor Number	Option 1 (West Expansion)	Option 2 (West and North Expansion A)	Option 3 (West and North Expansion B)	Option 4 (West and South Expansion)
R1	Medium Impact	Medium Impact	Medium Impact	Medium Impact
R2	Low Impact	Low Impact	Low Impact	Medium Impact
R3	Low Impact	Low Impact	Low Impact	Low Impact
R4	Low Impact	Low Impact	Low Impact	Low Impact
R5	Low Impact	Low Impact	Low Impact	Low Impact
R6	Negligible	Negligible	Negligible	Low Impact
R7	Negligible	Negligible	Negligible	Low Impact
R8	Negligible	Negligible	Negligible	Low Impact
R9	Negligible	Negligible	Negligible	Low Impact
R10	Negligible	Negligible	Negligible	Medium Impact
R11	Negligible	Negligible	Negligible	Medium Impact

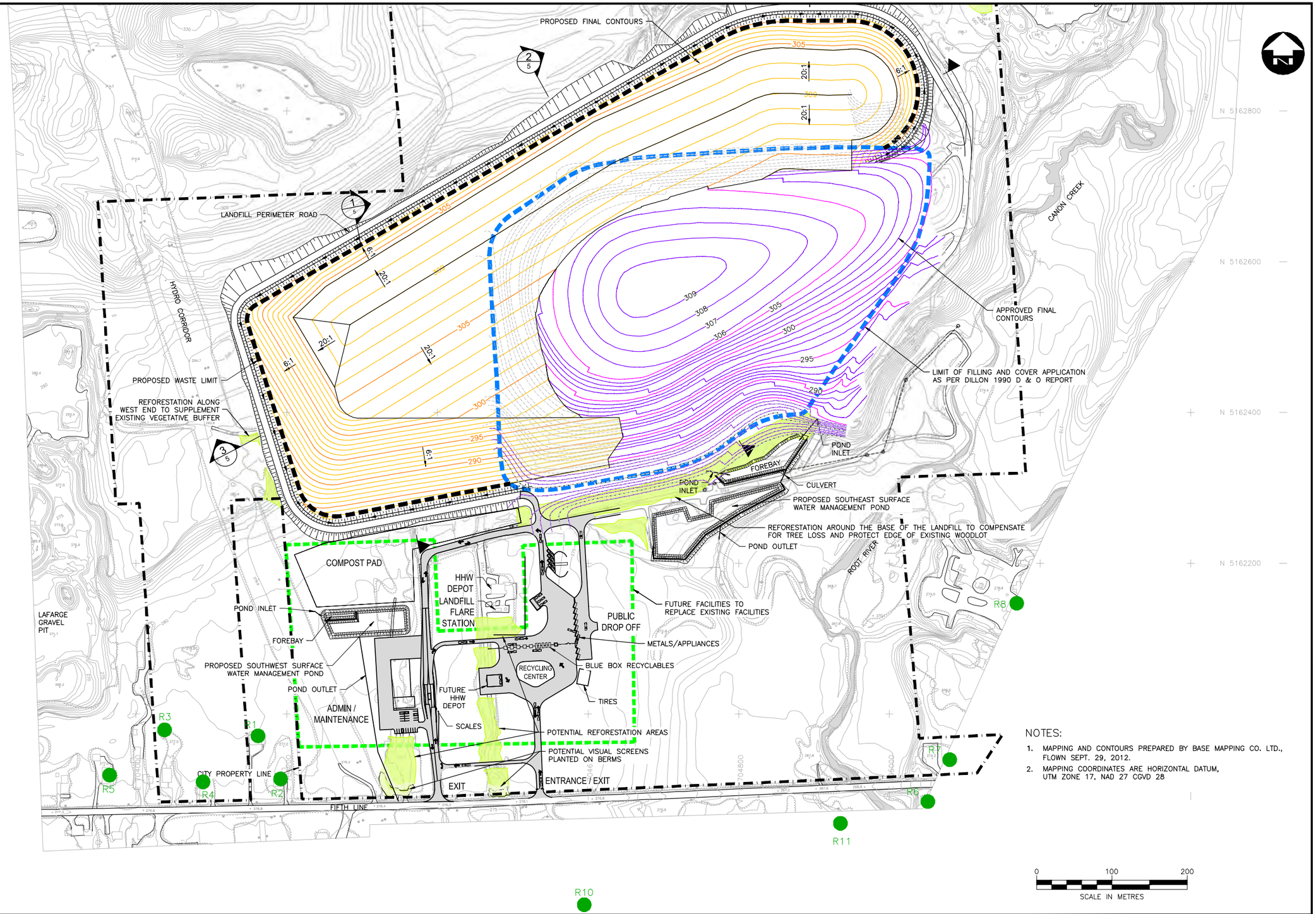
Note: Change in receptor noise levels reflect the following approximate ranges:

- Negligible <1 dB
- Low impact: 1 to 6 dB
- Medium impact: 7-11 dB
- Significant: >11 dB

Overall Natural Environment Ranking – Option 4 was considered least preferred for all natural environment criteria. The differences between Options 1, 2 and 3 primarily related to ground and surface water resources. Options 2 and 3 provide added groundwater protection however they have additional surface water monitoring requirements with the expansion to the north and a higher potential for nuisance dust. Ultimately there are modest differences between Options 1, 2, and 3 and impacts to groundwater resources was considered to be harder to mitigate than surface water impacts but options 2 and 3 also have the potential for increased dust nuisance. Thus Options 2 and 3 were considered equal to Option 1 for the Natural Environment group.

Table 5.5 Natural Environment Criteria Group Ranking Summary

Criteria	Option 1 – West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Compare potential for displacement or disruption of terrestrial features	First	First	First	Second
Compare potential for displacement or disruption of aquatic features	First	First	First	Second
Compare potential for effects on groundwater resources	Second	First	First	Third
Compare potential for effects on surface water resources	First	Second	Second	Third
Compare potential for atmospheric impacts	First	Second	Second	Third
Natural Environment Ranking	First	First	First	Third



NOTES:

1. MAPPING AND CONTOURS PREPARED BY BASE MAPPING CO. LTD., FLOWN SEPT. 29, 2012.
2. MAPPING COORDINATES ARE HORIZONTAL DATUM, UTM ZONE 17, NAD 27 CGVD 28

0 100 200
SCALE IN METRES

Conditions of Use

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Do not scale dimensions from drawing.

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No.	ISSUED FOR	DATE	BY
1	NOISE RECEPTOR LOCATIONS	2023/06/27	EA

DESIGN: EA	REVIEWED BY: EA
DRAWN: GCC	CHECKED BY: EA
DATE: JUNE 2023	
SCALE: 1:2500	

SAULT STE. MARIE MUNICIPAL LANDFILL SITE
DESIGN AND OPERATIONS REPORT

PROJECT NO. 22-5411

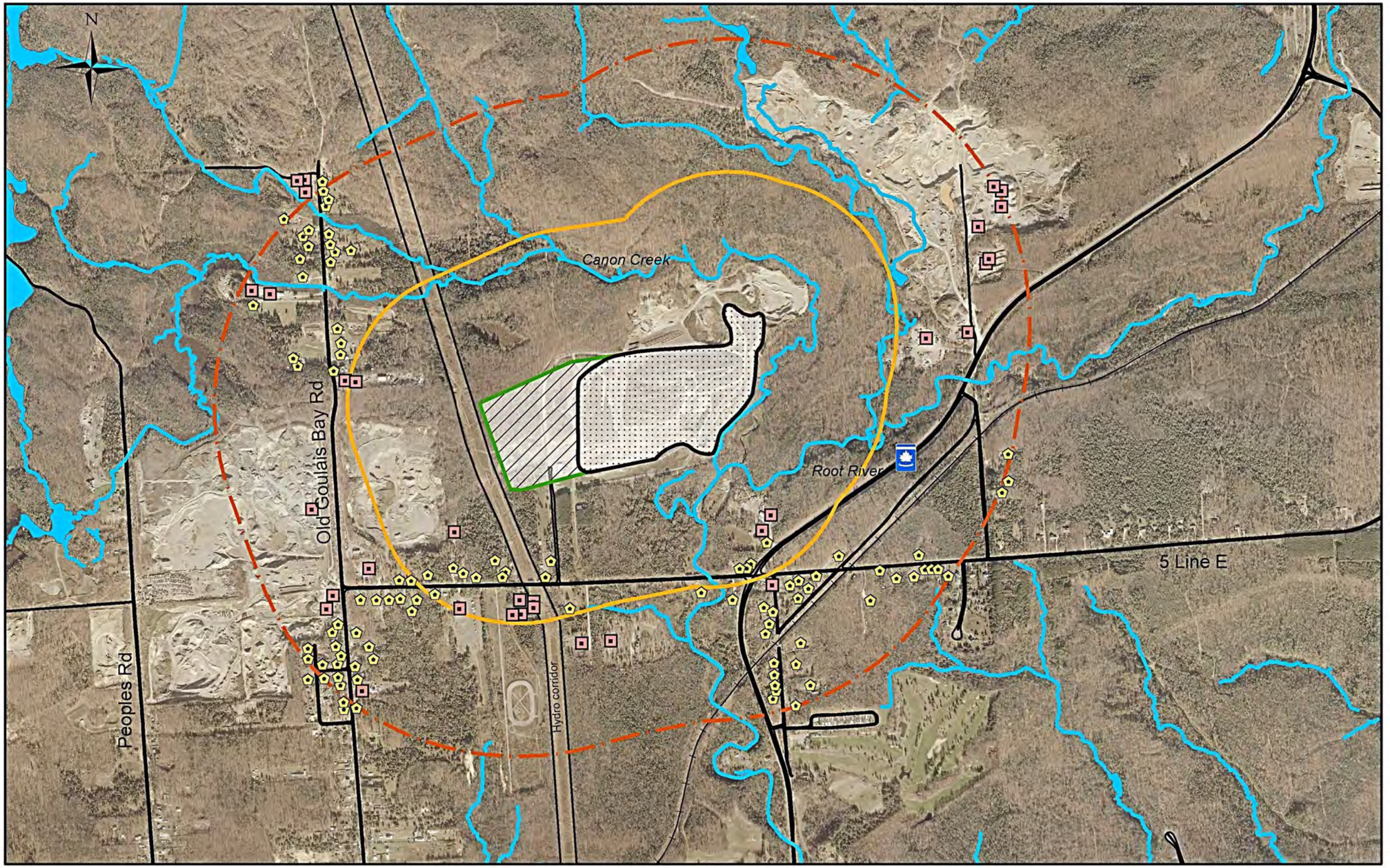
SAULT STE. MARIE LANDFILL AND NEARBY RECEPTORS

DRAWING NO. 5.6

FILENAME: C:\PW_WORKING DIRECTORY\PROJECTS 2022\JULIAN 2005\MXD\SDO\225411-05-NOISE RECEPTOR LOCATIONS.MXD PLOT DATE: 2023-06-27 @ 2:56:43 PM PLOT SCALE: 1:2500 PLOT STYLE: JULIUS SHADE.CTB PLOTTED BY: CHONG, GARY

5.2.3.2 Social-Cultural Environment

The Social-Cultural Environment Criteria Group includes criteria to evaluate the potential for displacement or disruption to residents, community features, heritage or archaeological resources, as well as potential impacts to future land use plans, and public health and safety. The following describes the difference between the options for each criterion. The mapping completed as a part of this evaluation is found in **Figures 5.7 to 5.10**. The figures show residences and businesses within the study area for each of the proposed expansion Options. The overall ranking of the options from a social-cultural perspective is shown in **Table 5.7**.



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DILLON CONSULTING

Legend

- TRANS-CANADA HIGHWAY
- ROADS
- RAILWAY
- WATER BODY
- EXISTING LANDFILL
- PROPOSED LANDFILL EXPANSION
- 1000 m STUDY AREA
- 500 m STUDY AREA

BUILDINGS
- Industry
- Residence
- School

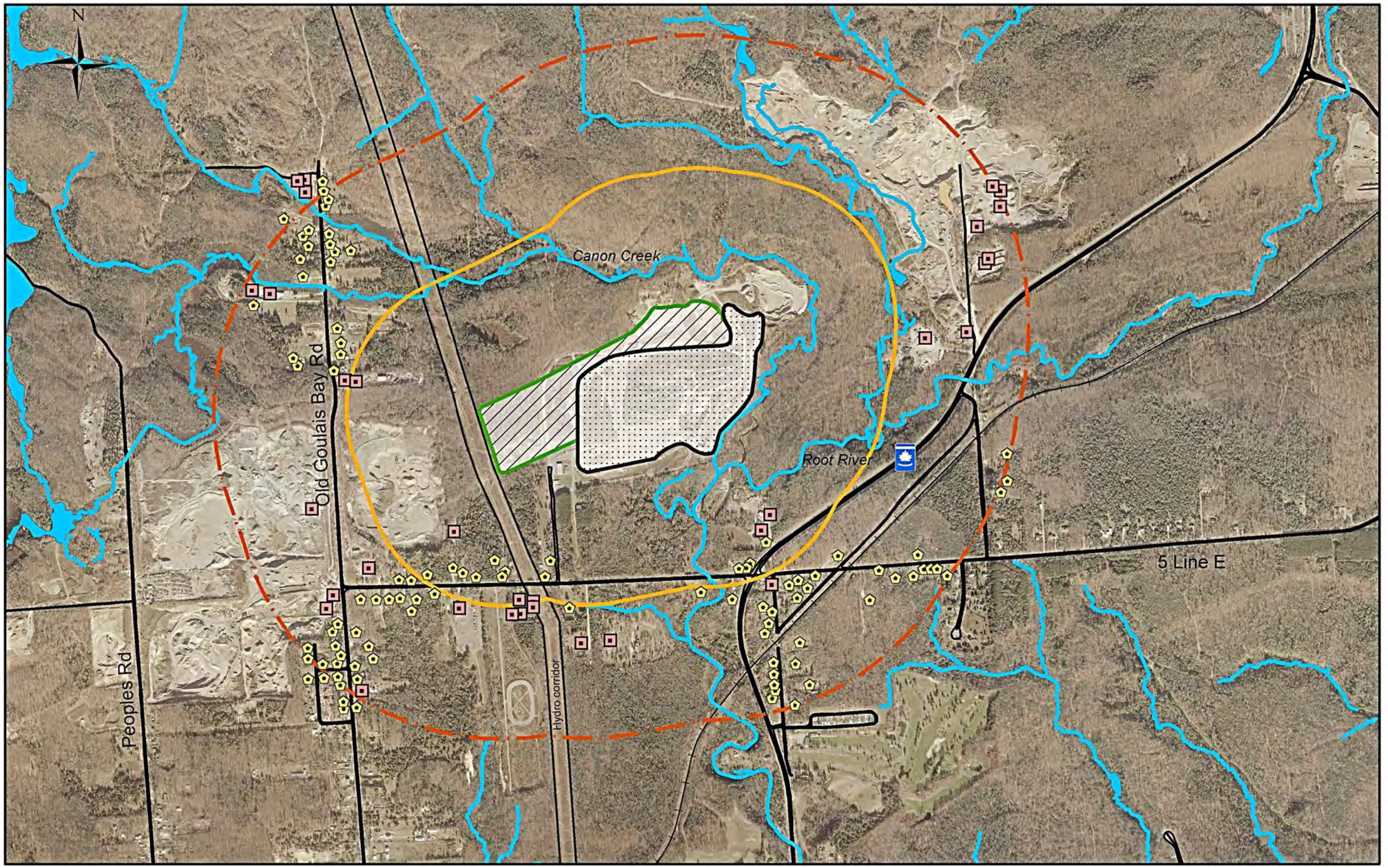
Sault Ste. Marie Municipal Landfill Site

OPTION 1
WEST EXPANSION

Project Manager:	KK	Drawn By:	SLP
Scale:	1 : 20 000	Checked By:	BV
Date Issued:	FEB 2012	Project No:	06-6988
Location:	G:\GIS\066988	File Name:	SSM Option 1 - 2012

Figure No.

5.7



0 125 250 500 750 1,000 Meters

DILLON CONSULTING

Legend

- TRANS-CANADA HIGHWAY
- ROADS
- RAILWAY
- WATER BODY
- EXISTING LANDFILL
- PROPOSED LANDFILL EXPANSION
- 1000 m STUDY AREA
- 500 m STUDY AREA

BUILDINGS
- Industry
- Residence
- School

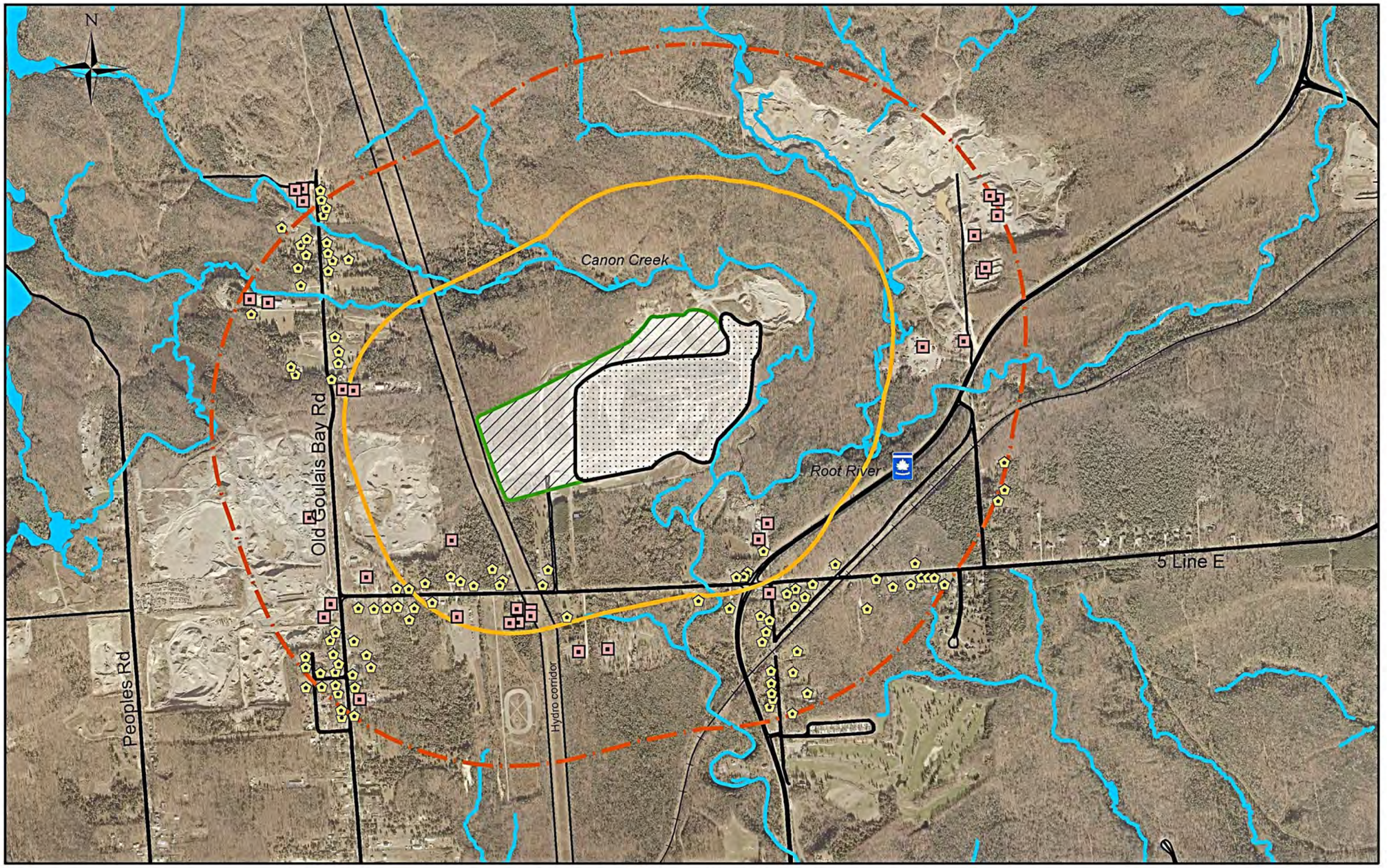
Sault Ste. Marie Municipal Landfill Site

OPTION 2
WEST AND NORTH EXPANSION A

Project Manager:	KK	Drawn By:	SLP
Scale:	1 : 20 000	Checked By:	BV
Date Issued:	FEB 2012	Project No:	06-6988
Location:	G:\GIS\066988	File Name:	SSM Option 2 - 2012

Figure No.

5.8



0 125 250 500 750 1,000 Meters

Legend

- TRANS-CANADA HIGHWAY
- ROADS
- RAILWAY
- WATER BODY
- EXISTING LANDFILL
- PROPOSED LANDFILL EXPANSION
- 1000 m STUDY AREA
- 500 m STUDY AREA

BUILDINGS

- Industry
- Residence
- School

DILLON CONSULTING

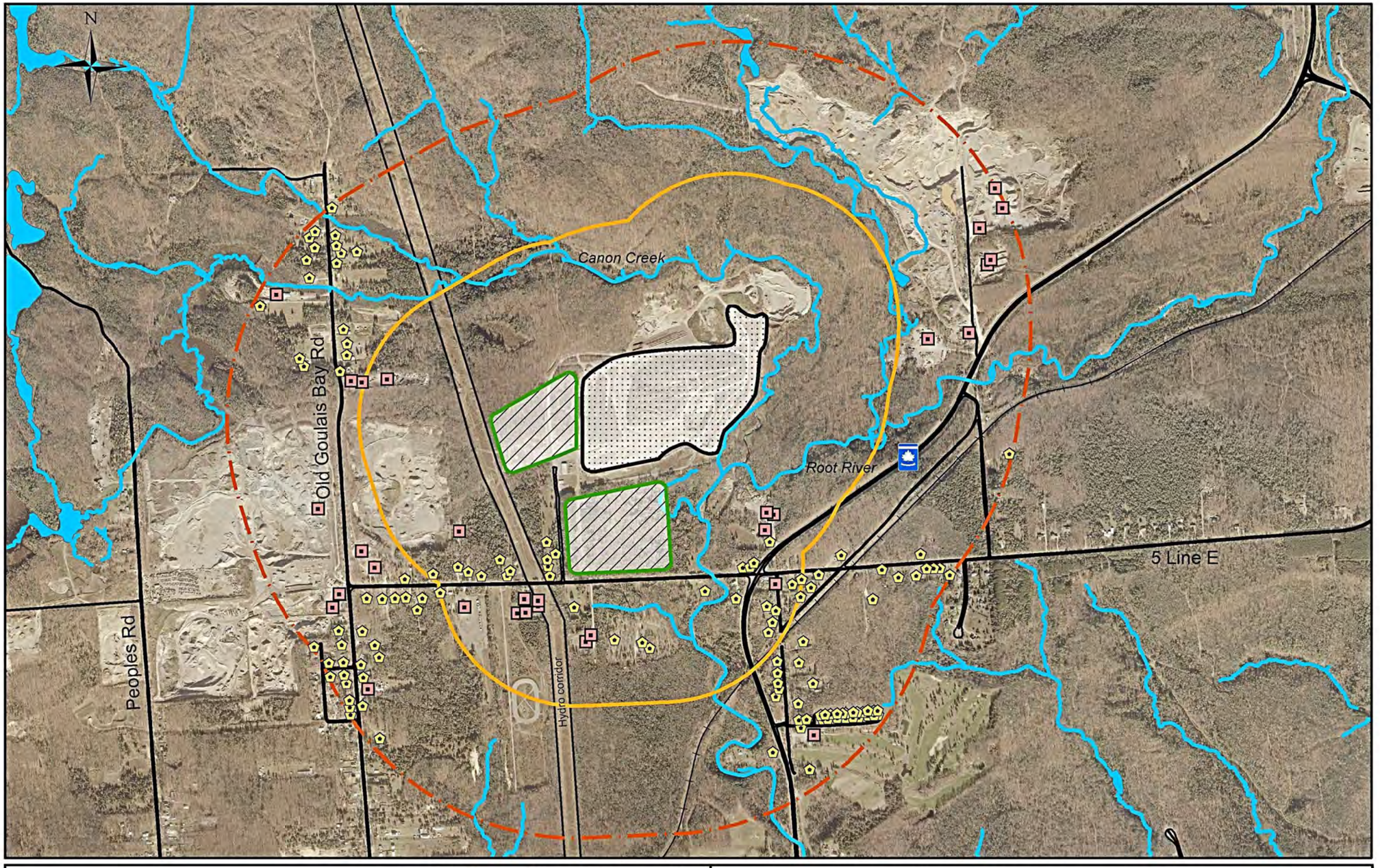
Sault Ste. Marie Municipal Landfill Site

OPTION 3
WEST AND NORTH EXPANSION B

Project Manager:	KK	Drawn By:	SLP
Scale:	1 : 20 000	Checked By:	BV
Date Issued:	FEB 2012	Project No:	06-6988
Location:	G:\GIS\066988	File Name:	SSM OPTION 3 - 2012

Figure No.

5.9



DILLON CONSULTING

Sault Ste. Marie Municipal Landfill Site

OPTION 4
WEST AND SOUTH EXPANSION

Project Manager:	KK	Drawn By:	SLP
Scale:	1 : 20 000	Checked By:	BV
Date Issued:	FEB 2012	Project No:	06-6988
Location:	G:\GIS\066988	File Name:	SSM Option 4 - 2012

Figure No.

5.10

Compare potential for displacement or disruption to residents – To evaluate impacts on residents, this criteria examines the number of residential displacements, number of residents in the Area of Influence as defined in Ministry Guideline D-4 and the 1 km off-site study area, and the potential for impact to community character. All four Options involve an expansion within the existing property boundary and therefore result in no residential displacement. All four Options also have the same potential to impact the character of the community within the vicinity of the site. While all four options have approximately the same number of residences within the 500 m Area of Influence and 1 km off-site study area, (approximately 22 and 110 residences within 500 m and 1 km respectively), Option 4 has an increased potential for disruption and visual impact since it is closest to residences by its southern extension.

Compare potential for displacement or disruption to community features; Compare potential for displacement or disruption of heritage or archaeological resources – For these two criteria, all four Options have equal potential for impact on community features, heritage or archaeological resources. There are no anticipated impacts to community features since all Options are within the existing property boundary and there are no community features within 1 km. Similarly, there are no known archeological resources on-site and no built heritage or cultural landscape features within 1 km of the off-site study area.

Compare potential for impact on future land use plans – When considering the impact to future land uses, all Options also have similar affects. As mentioned, the expansion Options all sit within the existing property boundary and fall within the same land use designation (i.e. rural area), thus a change in land use character is not anticipated. Option 4 is less preferred as it is closest to an area with an Environmental Management designation (i.e. Root River) and results in a more significant increase to the Area of Influence. An amendment to the zoning by-law would be required for all Options.

Compare potential for impacts to public health and safety – Both worker health and safety and public health and safety were considered under this criterion. All options are designed to meet provincial regulations and Municipal requirements for worker health and safety and are considered equal from that perspective. Options 1, 2, and 3 are approximately 375 m from the closest existing private water well. Option 4 is closer at approximately 250 m from the closest water well and is less preferred.

Overall Social-Cultural Ranking – Options 1, 2 and 3 were ranked equally for all five social-cultural criteria. In three cases, for residential displacement or disruption, potential impact on future land use plans and potential impacts to public health and safety, Option 4 was less preferred than Options 1, 2, and 3. Therefore, Options 1, 2, and 3 were preferred over Option 4.

Table 5.7 Social-Cultural Criteria Group Ranking Summary

Criteria	Option 1 – West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Compare potential for displacement or disruption to residents	First	First	First	Second
Compare potential for displacement or disruption to community features (e.g. parks, recreational facilities)	Equal	Equal	Equal	Equal
Compare potential for impact on future land use plans	First	First	First	Second
Compare potential for displacement or disruption of heritage or archaeological resources	Equal	Equal	Equal	Equal
Compare potential for impacts to public health and safety	First	First	First	Second
Social-Cultural Ranking	First	First	First	Second

5.2.3.3 Economics

The Economic Considerations Criteria Group includes an assessment of the extent of displacement or disruption to existing business and natural resources for industry (i.e., agriculture, forestry, and mining). The following describes the difference between the options for each criterion. The overall ranking of the options from an economics perspective is shown in **Table 5.8**.

Compare potential for displacement or disruption on agriculture / forestry / mining resource; *Compare potential for displacement or disruption to existing businesses* – As there are no agricultural, forestry, or mining resources on-site there is no impact to these industries by any of the options (i.e., they are all ranked equally). While there are sand and gravel resources off-site, it is not expected that expansion activities for any Options would affect the available resource. For those existing businesses in the off-site study area, Options 1, 2 and 3 will have a similar disruption impact to staff and clients. Option 4 has greater potential for disruption effects and visual impact since the southern expansion area is closest to businesses including a campground and is less preferred.

Overall Economics Ranking – Option 4 is less preferred due to its potential for displacement or disruption on existing businesses. Thus, Options 1, 2, and 3 were preferred.

Table 5.8 – Economics Criteria Group Ranking Summary

Criteria	Option 1 – West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Compare potential for displacement or disruption to existing businesses	First	First	First	Second
Compare potential for displacement or disruption on agriculture / forestry / mining resource	Equal	Equal	Equal	Equal
Economics Ranking	First	First	First	Second

5.2.3.4 Cost

When evaluating cost, the sole criterion is an assessment of the potential lifecycle cost. This was assessed by the placement (low, medium, high) within the estimated range of landfill tipping fee cost. The range is estimated to be from $73 to $80 (2012 dollars) per tonne of waste. (Tipping fee would increase in line with future rates of inflation.) The overall ranking of the options from a cost perspective is shown in **Table 5.9**.

Compare potential lifecycle cost of alternative – Options 1 and 2 are both in the low end of the range for lifecycle costs, but for different reasons. Option 1 requires the relocation of the public drop-off depot, administration building, maintenance building, scale house, scales, and internal roads. Alternatively, Option 2 does not require relocation of infrastructure but has an increased area to landfill compared to Option 1.

Option 4 is in the middle of the $73 to $80 per tonne landfill tipping fee range. This is because it requires relocation of the Household Hazardous Waste Depot and landfill gas management blower/flare station. It also requires an increased area to be lined relative to Options 1 and 2.

Option 3 is in the high end of the lifecycle cost range since it requires relocation of the same infrastructure as in Option 1 and has the greatest area to landfill.

Overall Cost Ranking – Option 3 is the least preferred due to its higher lifecycle cost. Option 4 is less preferred as it is in the middle of the lifecycle cost range. Options 1 and 2 are the preferred option for the cost criteria group since it is in the low end of the lifecycle range.

Table 5.9 Cost Criteria Group Ranking Summary

Criteria	Option 1 – West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Compare potential lifecycle cost of alternative	First	First	Third	Second
Cost Ranking	First	First	Third	Second

5.2.3.5 Technical Considerations

In the evaluation of Technical Considerations Criteria Group, the ease of implementation of the landfill expansion was considered by assessing the ease of site development and operation and the

existing/proposed infrastructure as indicators. The following summarizes the results of the evaluation which are also presented in **Table 5.10**.

Compare ease of implementation – For the impact on existing/proposed infrastructure, Option 2 does not require relocation of any principle facilities. Option 4 would require the relocation of the Household Hazardous Waste Depot and blower/flare station. Options 1 and 3 require the relocation of the public drop-off area, scales, scale house, administration building and maintenance building. Landfill sequencing could allow the relocation of this infrastructure to be delayed allowing it to operate in its current location for a period of time.

When assessing the ease of site development indicator, available surplus soil, disposal capacity, footprint configuration, and average depth of the west expansion were evaluated. All Options have a surplus of soil for cover needs and all Options provide the required disposal capacity at existing waste densities. Option 2 results in development challenges such as storm water management in vicinity of the existing public drop-off area. The average depth of the west expansion for Option 3, 11 metres, means it is easier for operators to develop the fill area – compared to 18 metres for the other Options. Additionally, Option 4 is unique in that it may require more intense operational controls due to its proximity to Fifth Line East despite the assumed 100 m buffer.

Overall Technical Considerations Ranking - While Option 3 requires more on-site infrastructure relocation these relocations can be delayed based on site design, and this option is more favourable in terms of footprint configuration and average excavation depth. Thus, Option 3 is the preferred option.

Table 5.10 Technical Considerations Criteria Group Ranking Summary

Criteria	Option 1 – West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Compare ease of implementation	Third	Second	First	Fourth
Technical Considerations Ranking	Third	Second	First	Fourth

5.2.3.6 Transportation

The Transportation Considerations Criteria Group evaluates the potential for effects on airports, truck traffic volume, and truck traffic impact on movement of farm equipment. **Table 5.11** presents the results of the evaluation of the transportation conditions, which are also described below.

Compare potential for effects on airports; Compare potential for effects on traffic volumes; Compare potential for impacts of haulage truck traffic on the movement of farm equipment – All Options have equal (minimal) impact for these three transportation criteria. The landfill site is 25 km from the nearest airport, so all Options easily meet the 15 km radius recommended from Transport Canada (to reduce risk of bird strikes). All options will use the same haul routes and manage the same quantity of waste. Therefore the truck kilometres travelled, the intersections traversed, and the impact of trucks travelling through agricultural areas will be the same for all options.

Overall Transportation Ranking – Unlike other criteria groups, all indicators for the three criteria are ranked equally for all Options. As a result, no Option is preferred from the perspective of transportation.

Table 5.11 Transportation Criteria Group Ranking Summary

Criteria	Option 1 – West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Compare potential for effects on airports	Equal	Equal	Equal	Equal
Compare potential for effects on traffic volumes	Equal	Equal	Equal	Equal
Compare potential for impacts of haulage truck traffic on the movement of farm equipment	Equal	Equal	Equal	Equal
Transportation Ranking	Equal	Equal	Equal	Equal

Table 5.4 Evaluation of Geometric Expansion Options
(expansion options are ranked from most preferred (First) to least preferred (Fourth), where applicable)

Criteria Group/Criteria	Indicators	Option 1 - West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Natural Environment					
Compare potential for displacement or disruption of terrestrial features	• Area of terrestrial features on site that would be displaced.	***Ranked First***: Requires 16.7 ha of land for footprint area and displaces 6.9 ha of forested area.	***Ranked First***: Requires 17.1 ha for footprint area and displaces 7.1 ha of forested area.	***Ranked First***: Requires 20.2 ha for footprint area and displaces 7.7 ha of forested area.	***Ranked Second***: Requires 20.0 ha for footprint area and displaces 16.1 ha of forested area. This Option removes more forested lands than Options 1-3 and encroaches into a wetland feature, it is considered less preferred.
	• Area of terrestrial features off-site that may experience disruption effects during operation.	***Ranked Equally***: All site expansion options have the same potential for disruption impacts off-site.	***Ranked Equally***: All site expansion options have the same potential for disruption impacts off-site.	***Ranked Equally***: All site expansion options have the same potential for disruption impacts off-site.	***Ranked Equally***: All site expansion options have the same potential for disruption impacts off-site.
	• Significance of terrestrial features displaced or disrupted.	***Ranked Equally:*** The impacted lands are within the existing landfill site boundary and are not identified as significant forests.	***Ranked Equally:*** The impacted lands are within the existing landfill site boundary and are not identified as significant forests.	***Ranked Equally:*** The impacted lands are within the existing landfill site boundary and are not identified as significant forests.	***Ranked Equally:*** The impacted lands are within the existing landfill site boundary and are not identified as significant forests.
Compare potential for displacement or disruption of aquatic features	• Amount of aquatic habitat on-site that would be displaced or disrupted.	***Ranked First***: Options 1-3 are not expected to change the impact to Canon Creek or Root River. There are no other aquatic features on-site.	***Ranked First***: Options 1-3 are not expected to change the impact to Canon Creek or Root River. There are no other aquatic features on-site.	***Ranked First***: Options 1-3 are not expected to change the impact to Canon Creek or Root River. There are no other aquatic features on-site.	***Ranked Second***: Greatest potential for disruption and/or alteration of aquatic habitat as this option overlaps a tributary to the Root River.
	• Amount of aquatic habitat off-site that may be disrupted during operation.	***Ranked First***: Low potential for disruption of downstream aquatic habitat.	***Ranked First***: Low potential for disruption of downstream aquatic habitat.	***Ranked First***: Low potential for disruption of downstream aquatic habitat.	***Ranked Second:*** Greatest potential for disruption of aquatic habitat downstream as this option is close to the Root River.
	• Significance of aquatic habitat displaced or disrupted.	***Ranked Equally:*** None of the aquatic habitat is considered significant.	***Ranked Equally:*** None of the aquatic habitat is considered significant.	***Ranked Equally:*** None of the aquatic habitat is considered significant.	***Ranked Equally:*** None of the aquatic habitat is considered significant.
Compare potential for effects on groundwater resources	• Ability to implement a horizontal collector to protect groundwater to the west.	***Ranked Second***: Option makes possible construction of a horizontal collection system to further mitigate existing site impacts near the western property boundary.	***Ranked First***: Option makes possible construction of a horizontal collection system to further mitigate existing site impacts near the western property boundary. Increased area of fill will result in a lower mass loading (tonnes of waste per hectare) and thereby reduce peak concentrations and contaminating lifespan.	***Ranked First***: Option makes possible construction of a horizontal collection system to further mitigate existing site impacts near the western property boundary. Increased area of fill will result in a lower mass loading (tonnes of waste per hectare) and thereby reduce peak concentrations and contaminating lifespan.	***Ranked Third***: Allows for continued use of existing purge wells but has less opportunity to create a horizontal collector in west.
	• Extent of groundwater monitoring requirements (# of distinct fill areas).	***Ranked First***: Groundwater monitoring requirements similar for Options 1-3 as there is only one distinct fill area.	***Ranked First***: Groundwater monitoring requirements similar for Options 1-3 as there is only one distinct fill area.	***Ranked First***: Groundwater monitoring requirements similar for Options 1-3 as there is only one distinct fill area.	***Ranked Second:*** Groundwater monitoring requirements increased by having three distinct fill areas.
Compare potential for effects on surface water resources	• Proximity to on-site surface water.	***Ranked First***: Option does not materially change the proximity of the landfill fill area to Canon Creek.	***Ranked Second***: Option moderately changes the proximity of the landfill fill area to Canon Creek.	***Ranked Second***: Option moderately changes the proximity of the landfill fill area to Canon Creek.	***Ranked Third:*** Expansion to the south creates a fill area within the meander area of the Root River.
	• Number of new surface water monitoring stations required.	***Ranked First***: No change in surface water monitoring requirements.	***Ranked Second***: Expansion in the north may require a small change in surface water monitoring requirements.	***Ranked Second***: Expansion in the north may require a small change in surface water monitoring requirements.	***Ranked Third:*** Southern fill area will increase surface water monitoring requirements.
Compare potential for atmospheric impacts	• Relative magnitude of air emission (based on waste received and construction activity) and anticipated magnitude of impact (based on distance of receptors from predominant sources).	***Ranked First***: All options involve the same amount of waste and generally the same construction activities. The worst-case air quality impact scenario would occur when the working face is located closest to the receptors to the NW, SW and SE. Options 1, 2, and 3 have slight differences in the separation between the worst-case working face location and the closest receptors (i.e.	***Ranked First***: All options involve the same amount of waste and generally the same construction activities. The worst-case air quality impact scenario would occur when the working face is located closest to the receptors to the NW, SW and SE. Options 1, 2, and 3 have slight differences in the separation between the worst-case working face location and the closest receptors (i.e.	***Ranked First***: All options involve the same amount of waste and generally the same construction activities. The worst-case air quality impact scenario would occur when the working face is located closest to the receptors to the NW, SW and SE. Options 1, 2, and 3 have slight differences in the separation between the worst-case working face location and the closest	***Ranked Second:*** All options involve the same amount of waste and generally the same construction activities. The worst-case air quality impact scenario would occur when the working face is located closest to the receptors to the NW, SW and SE. This option expands south to near Fifth Line significantly reducing the separation distance

Table 5.4 Evaluation of Geometric Expansion Options
(expansion options are ranked from most preferred (First) to least preferred (Fourth), where applicable)

Criteria Group/Criteria	Indicators	Option 1 - West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
		Option 2 has a greater separation from the SW receptors of approx. 125 m). However, based on the impact assessment completed for the preferred alternative all three of these options are anticipated to be in compliance for air.	Option 2 has a greater separation from the SW receptors of approx. 125 m). Based on the impact assessment completed for the preferred alternative all three of these options are anticipated to be in compliance for air.	receptors (i.e. Option 2 has a greater separation from the SW receptors of approx. 125 m). Based on the impact assessment completed for the preferred alternative all three of these options are anticipated to be in compliance for air.	to SW and SE. It is not certain if this option would be compliant for air.
	• Relative magnitude of odour generating potential (based on waste received) and anticipated magnitude of impact (based on distance of receptors from predominant sources).	***Ranked First***: The daily and annual acceptance rate of waste will not change. The worst case odour scenario is when the working face, the predominant odour source, is located closest to the receptors to the NW, SW and SE. Options 1, 2, and 3 have slight differences in the separation between the predominant odour source and the closest receptors (i.e. Option 2 has a greater separation from the SW receptors of approx. 125 m). However, based on the impact assessment completed for the preferred alternative all three of these options are anticipated to be in compliance for odour.	***Ranked First***: The daily and annual acceptance rate of waste will not change. The worst case odour scenario is when the working face, the predominant odour source, is located closest to the receptors to the NW, SW and SE. Options 1, 2, and 3 have slight differences in the separation between the predominant odour source and the closest receptors (i.e. Option 2 has a greater separation from the SW receptors of approx. 125 m). However, based on the impact assessment completed for the preferred alternative all three of these options are anticipated to be in compliance for odour.	***Ranked First***: The daily and annual acceptance rate of waste will not change. The worst case odour scenario is when the working face, the predominant odour source, is located closest to the receptors to the NW, SW and SE. Options 1, 2, and 3 have slight differences in the separation between the predominant odour source and the closest receptors (i.e. Option 2 has a greater separation from the SW receptors of approx. 125 m). However, based on the impact assessment completed for the preferred alternative all three of these options are anticipated to be in compliance for odour.	***Ranked Second:*** All options involve the same amount of waste and generally the same construction activities. The worst-case odour impact scenario would occur when the working face, the predominant odour source, is located closest to the receptors to the NW, SW and SE. This option expands south to near Fifth Line significantly reducing the separation distance to SW and SE. It is not certain if this option would be compliant for odour.
	• Relative magnitude of dust emissions (based on length of on-site haul route) and anticipated magnitude of impact (based on distance of receptors from predominant sources).	***Ranked First***: Option 1 and Option 4 present a shorter worst-case on-site haul route which may decrease the overall magnitude of dust generation. Options 1, 2, and 3 have slight differences in the separation between the working face, a predominant dust source, and the closest receptors (i.e. Option 2 has a greater separation from the SW receptors of approx. 125 m). This option is ranked first based on the shorter on-site haul route.	***Ranked Second***: Options 2 and 3 present a moderately longer worst-case on-site haul route which may increase the overall magnitude of dust generation. Options 1, 2, and 3 have slight differences in the separation between the working face, a predominant dust source and the closest receptors (i.e. Option 2 has a greater separation from the SW receptors of approx. 125 m). This option is ranked second based on the longer on-site haul route.	***Ranked Second***: Options 2 and 3 present a moderately longer worst-case on-site haul route which may increase the overall magnitude of dust generation. Options 1, 2, and 3 have slight differences in the separation between the working face, a predominant dust source and the closest receptors (i.e. Option 2 has a greater separation from the SW receptors of approx. 125 m). This option is ranked second based on the longer on-site haul route.	***Ranked Third:*** Option 1 and Option 4 present a shorter worst-case on-site haul route which may decrease the overall magnitude of dust generation. However, this option expands south to near Fifth Line significantly reducing the separation distance to SW and SE. It is not certain if this option would be compliant for dust.
	• Relative potential for noise impacts.	***Ranked First:*** This option will result in potential change in noise that is negligible (<1dB) to low (1-6 dB) for most receptors. One receptor may experience a medium level of change (7-11dB).	***Ranked First:*** This option will result in potential change in noise that is negligible (<1dB) to low (1-6 dB) for most receptors. One receptor may experience a medium level of change (7-11dB).	***Ranked First:*** This option will result in potential change in noise that is negligible (<1dB) to low (1-6 dB) for most receptors. One receptor may experience a medium level of change (7-11dB).	***Ranked Second:*** This option will likely result in potential change in noise that is low (1-6 dB) to medium (7-11dB).
Social-Cultural Environment					
Compare potential for displacement or disruption to residents	• Number of residences on-site who would be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no residences will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no residences will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no residences will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no residences will be displaced.
	• Number of residences off-site who may experience disruption effects (e.g. noise, dust, odour) during operation (i.e. within the 500 m Area of Influence and 1 km off-site study area).	***Ranked First:*** There are approximately 110 residences within the 1 km off-site study area and 22 within the 500 m Area of Influence.	***Ranked First:*** There are approximately 107 residences within the 1 km off-site study area and 20 within the 500 m Area of Influence.	***Ranked First:*** There are approximately 110 residences within the 1 km off-site study area and 22 within the 500 m Area of Influence.	***Ranked Second:*** There are approximately 112 residences within the 1 km off-site study

Table 5.4 Evaluation of Geometric Expansion Options
(expansion options are ranked from most preferred (First) to least preferred (Fourth), where applicable)

Criteria Group/Criteria	Indicators	Option 1 - West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
					area and 23 within the 500 m Area of Influence. Greater potential for disruption effects and visual impact since the southern expansion area is closest to residences.
	• Character of the community in the vicinity of the site and potential for impact on that character.	***Ranked Equally***: All site expansion options have the same potential to impact the character of the community in the vicinity of the site.	***Ranked Equally***: All site expansion options have the same potential to impact the character of the community in the vicinity of the site.	***Ranked Equally***: All site expansion options have the same potential to impact the character of the community in the vicinity of the site.	***Ranked Equally***: All site expansion options have the same potential to impact the character of the community in the vicinity of the site.
Compare potential for displacement or disruption to community features (e.g. parks, recreational facilities)	• Number and type of community features on-site that would be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no community features will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no community features will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no community features will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no community features will be displaced.
	• Number and type of community features off-site that may experience disruption effects (e.g. noise, dust, odour) during operation.	***Ranked Equally***: There are no community features within the 1km off-site study area.	***Ranked Equally***: There are no community features within the 1km off-site study area.	***Ranked Equally***: There are no community features within the 1km off-site study area.	***Ranked Equally***: There are no community features within the1km off-site study area.
Compare potential for impact on future land use plans	• Area and designation of land to be displaced on-site.	***Ranked Equally***: Requires 16.7 ha for the footprint area. The expansion is located within the existing property boundary so there will be no change in land use.	***Ranked Equally***: Requires 17.1 ha for the footprint area. The expansion is located within the existing property boundary so there will be no change in land use.	***Ranked Equally***: Requires 20.2 ha for the footprint area. The expansion is located within the existing property boundary so there will be no change in land use.	***Ranked Equally***: Requires 20 ha for the footprint area. The expansion is located within the existing property boundary so there will be no change in land use.
	• Area and designation of land to be disrupted off-site.	***Ranked First***: All site expansion options have the same land use designation (Rural Area). Options 1, 2 and 3 have very similar Areas of Influence.	***Ranked First***: All site expansion options have the same land use designation (Rural Area). Options 1, 2 and 3 have very similar Areas of Influence.	***Ranked First***: All site expansion options have the same land use designation (Rural Area). Options 1, 2 and 3 have very similar Areas of Influence.	***Ranked Second:*** All site expansion options have the same land use designation (Rural Area). Option 4 is closest to an Environmental Management designation (Root River) and also results in the largest increase in the Area of Influence.
	• Change in land use character compared to existing designations.	***Ranked Equally***: The footprints for all site expansion options are within the existing property boundary and therefore no change in land use character is anticipated.	***Ranked Equally***: The footprints for all site expansion options are within the existing property boundary and therefore no change in land use character is anticipated.	***Ranked Equally***: The footprints for all site expansion options are within the existing property boundary and therefore no change in land use character is anticipated.	***Ranked Equally***: The footprints for all site expansion options are within the existing property boundary and therefore no change in land use character is anticipated.
Compare potential for displacement or disruption of heritage or archaeological resources	• Presence of known archaeological resources on-site.	***Ranked Equally***: All site expansion options are located on the same site where there are no known archaeological resources on-site.	***Ranked Equally***: All site expansion options are located on the same site where there are no known archaeological resources on-site.	***Ranked Equally***: All site expansion options are located on the same site where there are no known archaeological resources on-site.	***Ranked Equally***: All site expansion options are located on the same site where there are no known archaeological resources on-site.
	• Number of built heritage or cultural landscape features on-site that would be displaced.	***Ranked Equally***: There are no built heritage or cultural landscape features on-site that would be displaced for all site expansion options.	***Ranked Equally***: There are no built heritage or cultural landscape features on-site that would be displaced for all site expansion options.	***Ranked Equally***: There are no built heritage or cultural landscape features on-site that would be displaced for all site expansion options.	***Ranked Equally***: There are no built heritage or cultural landscape features on-site that would be displaced for all site expansion options.
	• Number of built heritage or cultural landscape features off-site that might be disrupted.	***Ranked Equally***: There are no built heritage or cultural landscape features within the 1 km off-site study area.	***Ranked Equally***: There are no built heritage or cultural landscape features within the 1 km off-site study area.	***Ranked Equally***: There are no built heritage or cultural landscape features within the 1 km off-site study area.	***Ranked Equally***: There are no built heritage or cultural landscape features within the 1 km off-site study area.
Compare potential for impacts to public health and safety	• Potential for worker safety issues associated with type of work required.	***Ranked Equally***: All options have been designed to meet provincial regulations and the operating requirements and operating environment are very similar for all options.	***Ranked Equally***: All options have been designed to meet provincial regulations and the operating requirements and operating environment are very similar for all options.	***Ranked Equally***: All options have been designed to meet provincial regulations and the operating requirements and operating environment are very similar for all options.	***Ranked Equally:*** All options have been designed to meet provincial regulations and the operating requirements and operating environment are very similar for all options.
	• Distance to private water wells.	***Ranked First:*** Options 1, 2, and 3 are approximately 375 m from the closest existing private water well.	***Ranked First:*** Options 1, 2, and 3 are approximately 375 m from the closest existing private water well.	***Ranked First:*** Options 1, 2, and 3 are approximately 375 m from the closest existing private water well.	***Ranked Second:*** Option 4 is approximately 250 m from the closest existing private water well.

Table 5.4 Evaluation of Geometric Expansion Options
(expansion options are ranked from most preferred (First) to least preferred (Fourth), where applicable)

Criteria Group/Criteria	Indicators	Option 1 - West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Economics					
Compare potential for displacement or disruption to existing businesses	• Number, type and sensitivity of businesses on-site that would be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no business will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no business will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no business will be displaced.	***Ranked Equally***: All site expansion options are located within the existing property boundary and therefore no business will be displaced.
	• Number, type and sensitivity of businesses off-site that might experience disruption effects during operation.	***Ranked First***: There are approximately 19 businesses within the 1 km off-site study area. Staff and clients may experience some disruption effects.	***Ranked First***: There are approximately 19 businesses within the 1 km off-site study area. Staff and clients may experience some disruption effects.	***Ranked First***: There are approximately 19 businesses within the 1 km off-site study area. Staff and clients may experience some disruption effects.	***Ranked Second***: There are approximately 19 businesses within the 1 km off-site study area. Staff and clients may experience some disruption effects. Greater potential for disruption effects and visual impact since the southern expansion area is closest to businesses including a public campground.
Compare potential for displacement or disruption on agriculture / forestry / mining resources	• Area of on-site agriculture/forestry or mining industry resources that would be displaced.	***Ranked Equally***: There are no agricultural/forestry or mining industry resources on-site and therefore no displacement for all site expansion options.	***Ranked Equally***: There are no agricultural/forestry or mining industry resources on-site and therefore no displacement for all site expansion options.	***Ranked Equally***: There are no agricultural/forestry or mining industry resources on-site and therefore no displacement for all site expansion options.	***Ranked Equally***: There are no agricultural/forestry or mining industry resources on-site and therefore no displacement for all site expansion options.
	• Area of off-site agriculture/forestry or mining industry resources that might experience disruption effects during operation.	***Ranked Equally***: There are sand and gravel resources located off-site. The expansion activities are not expected to affect the resource.	***Ranked Equally***: There are sand and gravel resources located off-site. The expansion activities are not expected to affect the resource.	***Ranked Equally***: There are sand and gravel resources located off-site. The expansion activities are not expected to affect the resource.	***Ranked Equally***: There are sand and gravel resources located off-site. The expansion activities are not expected to affect the resource.
Cost					
Compare potential lifecycle cost of alternative	• Placement in estimated range of landfill tipping fees for full cost recovery (e.g. low, medium, high).	***Ranked First***: The estimated range in tipping fees for all Options is $73 to $80 (2012 dollars) per tonne of waste landfilled. The tipping fee will escalate with inflation in the future. Option 1 is in the low end of the range as it has a reduced area to landfill but requires the relocation of the public drop off depot, maintenance building, administration building, scale house, scales and internal roads.	***Ranked First***: The estimated range in tipping fees for all Options is $73 to $80 (2012 dollars) per tonne of waste landfilled. The tipping fee will escalate with inflation in the future. Option 2 is in the low end of the range and doesn't require any significant infrastructure relocations but has an increased area to landfill (compared to Option 1).	***Ranked Third:*** The estimated range in tipping fees for all Options is $73 to $80 (2012 dollars) per tonne of waste landfilled. The tipping fee will escalate with inflation in the future. Option 3 is in the high end of the range as it requires relocation of the same infrastructure in Option 1 and has the greatest area to landfill.	***Ranked Second***: The estimated range in tipping fees for all Options is $73 to $80 (2012 dollars) per tonne of waste landfilled. The tipping fee will escalate with inflation in the future. Option 4 is in the middle of the range as it requires relocation of the Household Hazardous Waste Depot and landfill gas management blower/flare station and requires an increased area to be landfilled relative to Options 1 and 2.
Technical Considerations					
Compare ease of implementation	• Ease of site development and operation.	***Ranked Third:*** Provides the target disposal capacity with current waste density. Proposed footprint configuration is easily developed. All options have a surplus of soil for cover needs. The average depth of west expansion is 18 m which creates some construction and operational challenges.	***Ranked Second***: Provides the target disposal capacity with current waste density. Footprint configuration is somewhat awkward with development challenges including storm water management in vicinity of existing public drop-off area. All options have a surplus of soil for cover needs. The average depth of west expansion is 18 m which creates some construction and operational challenges.	***Ranked First***: Provides the target disposal capacity with current waste density. Footprint configuration is enhanced relative to option 2. All options have a surplus of soil for cover needs. The average depth of west expansion is 11 m. A shallower excavation depth will be easier for operators to develop the fill area.	***Ranked Fourth***: Provides the target disposal capacity with current waste density. Proposed footprint configuration is easily developed. Although a 100 m buffer has been assumed, more intense operational controls may be required due to the proximity to Fifth Line East. All options have a surplus of soil for cover needs.

Table 5.4 Evaluation of Geometric Expansion Options
(expansion options are ranked from most preferred (First) to least preferred (Fourth), where applicable)

Criteria Group/Criteria	Indicators	Option 1 - West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
					The average depth of west expansion is 18 m which creates some construction and operational challenges.
	• Effects on existing / proposed landfill infrastructure.	***Ranked Third***: Most notably would require relocation of public drop off area, scales, scale house, administration building and maintenance building.	***Ranked First***: No relocation of principle facilities would be required.	***Ranked Third***: Most notably would require relocation of public drop off area, scales, scale house, administration building and maintenance building. The timing of facility relocation can likely be deferred for a number of years.	***Ranked Second***: Most notably would require relocation of the Household Hazardous Waste Depot and blower/flare station.
Transportation					
Compare potential for effects on airports	• Distance from Sault Ste. Marie airport.	***Ranked Equally***: Transport Canada recommends that waste disposal sites be located beyond a 15 km radius from airports to reduce the risk of bird strikes. All site expansion options are located beyond this radius (25 km).	***Ranked Equally***: Transport Canada recommends that waste disposal sites be located beyond a 15 km radius from airports to reduce the risk of bird strikes. All site expansion options are located beyond this radius (25 km).	***Ranked Equally***: Transport Canada recommends that waste disposal sites be located beyond a 15 km radius from airports to reduce the risk of bird strikes. All site expansion options are located beyond this radius (25 km).	***Ranked Equally***: Transport Canada recommends that waste disposal sites be located beyond a 15 km radius from airports to reduce the risk of bird strikes. All site expansion options are located beyond this radius (25 km).
Compare potential for effects on traffic volumes	• Annual truck kilometres travelled and character of roadway (i.e. single lane one direction, multi-lane).	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the truck kilometres travelled will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the truck kilometres travelled will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the truck kilometres travelled will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the truck kilometres travelled will be the same for all options.
	• Annual number of trucks travelling through intersections.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the intersections traversed will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the intersections traversed will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the intersections traversed will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the intersections traversed will be the same for all options.
Compare potential for impacts of haulage truck traffic on the movement of farm equipment	• Annual number of trucks travelling through agricultural areas.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the impact of trucks travelling through agricultural areas will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the impact of trucks travelling through agricultural areas will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the impact of trucks travelling through agricultural areas will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the impact of trucks travelling through agricultural areas will be the same for all options.

5.2.4 Overall Evaluation of Alternatives

The overall evaluation of alternatives involved consideration of the ranking of alternatives for each criteria group. **Table 5.12** shows the criteria group ranking summary. Shading is used to highlight the ranking of the alternatives with darker colour representing the preferred alternative within each criteria group.

Table 5.12 Criteria Group Ranking Summary

Criteria Group	Option 1 - West Expansion	Option 2 – West and North Expansion A	Option 3 – West and North Expansion B	Option 4 – West and South Expansion
Natural Environment	First	First	First	Third
Social-Cultural Environment	First	First	First	Second
Economics	First	First	First	Second
Cost	First	First	Third	Second
Technical Considerations	Third	Second	First	Fourth
Transportation	Equal	Equal	Equal	Equal
Overall Ranking	Third	Second	First	Fourth

Table 5.12 shows that Options 1, 2 and 3 are equal to or preferred over Option 4 for all criteria groups except for cost where Option 3 was least preferred.

To determine the preferred alternative Options 1, 2 and Option 3 were compared to identify the advantages and disadvantages with each alternative and to discuss the trade-offs between criteria groups and the rationale for selecting one alternative over another as preferred.

Options 1, 2 and 3 are considered to be equal to each other for all criteria groups except Cost and Technical Considerations. From a cost perspective, the range of costs for the three options is relatively narrow and within 10% of each other. Options 1 and 3 require the relocation of more on-site facilities including the public drop off area, scales, administration building and maintenance building. In addition, Options 2 and 3 have a larger footprint area and thus a higher cost for a liner and leachate collection system. From the perspective of technical considerations, Option 3 is preferred over Options 1 and 2 as the site configuration is shallower resulting in less complex construction and operations. In addition, the Option 3 footprint configuration is easier to work with relative to Option 2, where the footprint is immediately adjacent to the public drop-off which creates operational challenges with storm water management, waste deposition and heavy equipment in close proximity to the public which may impact site safety.

Overall, the disadvantage of a moderately higher cost was outweighed by the site configuration advantages realized through Option 3. Thus, Option 3 was considered the preferred geometric expansion option.

5.2.5 Consideration of Landfill Mining

Landfill mining was not considered as an alternative method on its own but rather in combination with a footprint expansion to improve groundwater conditions in the western portion of the existing site.

Landfill mining involves excavating disposed waste and cover material, recovering recyclable materials and cover material and returning the residual waste to the disposal footprint. Landfill mining has been used on landfills in Ontario to create additional capacity and/or mitigate impacts to groundwater.

The City of Barrie was contacted in June 2011 to obtain information on their landfill mining project which was completed between 2009 and 2015. A site visit was also conducted on October 14, 2014. The main purpose of the mining project was to protect groundwater by installing a landfill liner and a leachate collection system. The process involves the excavation of previously disposed waste and cover material. The mined waste is fed through screens to separate the coarse waste from the fine materials. Coarse waste is transported to the active landfill working face, materials that can be recycled are separated and sent for further processing and the fines (primarily sand) are saved for future use as a daily cover. It is estimated that 50% of landfill capacity is gained as a result of mining operations.

The City of Barrie mined a total of 1.62 million m³ of waste between 2009 and 2015. Typical waste densities achieved before the re-engineering of the landfill were approximately 750 kg/m³ and the average waste density achieved during the full reclamation operation was 1,180 kg/m³. This is because the in-situ waste has decayed making it more malleable and mixes well with fresh municipal solid waste. The landfill mining and reengineering of the site increased the life of the landfill by approximately 18 years[23].

The City of Barrie began landfill mining operations in the winter of 2009 and had received consistent complaints on odour (particularly during hot summer periods when they received an average of 10 odour complaints/day). The Barrie landfill is in close proximity to residential areas on three of its sides therefore, the City of Barrie has had to take measures to mitigate odour issues through the use of masking agents, aerosols, and foam canons for cover, and limiting the area that is uncovered during the mining process. The City of Barrie had air quality assessments completed to confirm they were within MECP air quality limits.

Once a preferred footprint expansion option was selected for the City of Sault Ste. Marie, it was then evaluated on its potential to add a landfill mining component. The location to mine landfilled waste was selected based on improving groundwater conditions in the western portion of the existing site. There exists a groundwater divide (runs north-south) in the central portion of the existing landfill. The footprint for landfill mining was selected based on the opportunity to enhance mitigation to the south and south-west through the installation of a liner to the west of the groundwater divide.

The evaluation of geometric expansion options revealed that Option 3 is preferred. The advantages and disadvantages of adding a landfill mining component within the western portion of the existing disposal footprint for Option 3 was considered. The same criteria and indicators used for the landfill expansion evaluation were used for this comparison. **Table 5.13** documents the data collected and the preference ranking of the Option 3 without landfill mining and Option 3 with landfill mining. For the majority of the indicators, the two options were considered to be equal. The key areas of difference are as follows:

- *Potential for effects on groundwater resources* – Option 3 with landfill mining is preferred as the removal of existing fill and installation of a liner allows for further mitigation / reduction of existing site impacts.
- *Potential for atmospheric impacts* – Option 3 without landfill mining is preferred as the landfill mining has the potential to result in additional dust, odour, and release of air contaminants.
- *Potential for displacement or disruption to residents* – Option 3 without landfill mining is preferred as neighbouring residents will not experience odour effects due to landfill mining. The mining operation is expected to continue for approximately two years.
- *Compare potential for impacts to public health and safety* – Option 3 without landfill mining is preferred when considering the additional mitigation measures required to protect worker health

[23] Resilient Infrastructure, June 1-4, 2016, Barrie Landfill Reclamation and Re-Engineering 2009-2015 (Paul J. Dewaele, P.Eng., Golder Associates Ltd. and Sandra Brunet, B.Sc., City of Barrie.

and safety. Based on other landfill mining work in Ontario, these concerns can likely be mitigated. Conversely, the lining of the south-western portion of the existing disposal footprint will result in improved groundwater quality to the west of the site and better protection of the private water wells. Therefore given these trade offs, the two options were ranked equally under this criterion.

- *Potential for displacement or disruption to existing businesses* - Option 3 without landfill mining is preferred as staff and clients from local businesses are expected to experience less disruption effects with no landfill mining.
- *Ease of implementation* – Option 3 without landfill mining is preferred as landfill mining adds complexity to site operations and will also require ongoing odour mitigation during landfill mining activities.

While Option 3 without landfill mining is preferred for more criteria, it was determined that Option 3 with landfill mining provided the opportunity to implement long term improvements to ground water quality. The short-term nuisance effects associated with landfill mining were considered manageable given the long term benefit of removing the waste in the western portion of the landfill and lining that area for better groundwater protection. Furthermore, through the review of the DRAFT EA submission, the MECP highlighted the importance of addressing potential groundwater quality impacts to the west of the existing site. The implementation of landfill mining to the west of the groundwater divide provides a proven approach to enhance groundwater quality to the west of the site.

Table 5.13 Evaluation of Preferred Geometric Expansion Option With and Without Landfill Mining
(expansion options are ranked from most preferred (First) to least preferred (Second), where applicable)

Criteria Group/Criteria	Indicators	Option 3 – West and North Expansion B	Option 3 with Landfill Mining
Natural Environment			
Compare potential for displacement or disruption of terrestrial features	• Area of terrestrial features on site that would be displaced.	***Ranked Equally***: Requires 20.2 ha for footprint area and displaces 7.7 ha of forested area.	***Ranked Equally***: Requires 20.2 ha for footprint area and displaces 7.7 ha of forested area.
	• Area of terrestrial features off-site that may experience disruption effects during operation.	***Ranked Equally***: Both options have the same potential for disruption impacts off-site.	***Ranked Equally***: Both options have the same potential for disruption impacts off-site.
	• Significance of terrestrial features displaced or disrupted.	***Ranked Equally:*** Both options are within the existing landfill site boundary and are not identified as significant forest.	***Ranked Equally:*** Both options are within the existing landfill site boundary and are not identified as significant forest.
Compare potential for displacement or disruption of aquatic features	• Amount of aquatic habitat on-site that would be displaced or disrupted.	***Ranked Equally***: Both options are not expected to change the impact to Canon Creek or Root River. There are no other aquatic features on-site.	***Ranked Equally***: Both options are not expected to change the impact to Canon Creek or Root River. There are no other aquatic features on-site.
	• Amount of aquatic habitat off-site that may be disrupted during operation.	***Ranked Equally***: Low potential for disruption of downstream aquatic habitat.	***Ranked Equally***: Low potential for disruption of downstream aquatic habitat.
	• Significance of aquatic habitat displaced or disrupted.	***Ranked Equally:*** There is no impact on significant aquatic habitat for either option.	***Ranked Equally:*** There is no impact on significant aquatic habitat for either option.

Table 5.13 Evaluation of Preferred Geometric Expansion Option With and Without Landfill Mining
(expansion options are ranked from most preferred (First) to least preferred (Second), where applicable)

Criteria Group/Criteria	Indicators	Option 3 – West and North Expansion B	Option 3 with Landfill Mining
Compare potential for effects on groundwater resources	• Ability to implement a horizontal collector to protect groundwater to the west.	***Ranked Second***: Option makes possible construction of a horizontal collection system to further mitigate existing site impacts near the western property boundary.	***Ranked First***: Option makes possible construction of a horizontal collection system to further mitigate existing site impacts near the western property boundary. Landfill mining of existing fill and installation of a liner allows for further mitigation / reduction of existing site impacts.
	• Extent of groundwater monitoring requirements (No. of distinct fill areas).	***Ranked Equally***: Both options have the same fill area; groundwater monitoring requirements similar for both options.	***Ranked Equally***: Both options have the same fill area; groundwater monitoring requirements similar for both options.
Compare potential for effects on surface water resources	• Proximity to on-site surface water.	***Ranked Equally***: Option does not affect present mitigation of surface water impacts from the existing site.	***Ranked Equally***: Option does not affect present mitigation of surface water impacts from the existing site.
	• Surface water monitoring requirements.	***Ranked Equally***: Expansion in the north may require a small change in surface water monitoring requirements.	***Ranked Equally***: Expansion in the north may require a small change in surface water monitoring requirements.
Potential for atmospheric impacts	• Relative magnitude of air emission (based on waste received and construction activity) and anticipated magnitude of impact (based on distance of receptors from predominant sources).	***Ranked Equally:*** Both options have the same location and site configuration.	***Ranked Equally:*** Both options have the same location and site configuration.
	• Relative magnitude of odour generating potential (based on waste received) and anticipated magnitude of impact (based on distance of receptors from predominant sources). • Presence of landfill mining.	***Ranked First:*** Both options have the same location and site configuration.	***Ranked Second:*** Both options have the same location and site configuration. Landfill mining adds a significant potential odour source.
	• Relative magnitude of dust emissions (based	***Ranked Equally:*** Both options have the same location and site	***Ranked Equally:*** Both options have the same

Table 5.13 Evaluation of Preferred Geometric Expansion Option With and Without Landfill Mining
(expansion options are ranked from most preferred (First) to least preferred (Second), where applicable)

Criteria Group/Criteria	Indicators	Option 3 – West and North Expansion B	Option 3 with Landfill Mining
	on length of on-site haul route) and anticipated magnitude of impact (based on distance of receptors from predominant sources).	configuration and generally similar potential for dust impacts.	location and site configuration and generally similar potential for dust impacts. Landfill mining may result in short term minor increase in dust.
	• Relative potential for noise impacts.	***Ranked Equally:*** Both options will result in similar noise levels. Noise may be slightly less (i.e. 2-3 decibels) for the closest receptors to the landfill.	***Ranked Equally:*** Both options will result in similar noise levels. The assessment of this option has identified that MECP noise criteria will be met for all receptors.
Social-Cultural Environment			
Compare potential for displacement or disruption to residents	• Number of residences on-site who would be displaced.	***Ranked Equally***: Both options are located within the existing property boundary and therefore no residences will be displaced.	***Ranked Equally***: Both options are located within the existing property boundary and therefore no residences will be displaced.
	• Number of residences off-site who may experience disruption effects (e.g. noise, dust, odour) during operation.	***Ranked First:*** There are approximately 110 residences within the 1 km off-site study area and 22 within the 500 m Area of Influence.	***Ranked Second:*** There are approximately 110 residences within the 1 km off-site study area and 22 within the 500 m Area of Influence. Neighbouring residents may experience odour effects due to landfill mining. The mining operation is expected to continue for approximately two years.
	• Character of the community in the vicinity of the site and potential for impact on that character.	***Ranked Equally***: Both options have the same potential to impact the character of the community in the vicinity of the site.	***Ranked Equally***: Both options have the same potential to impact the character of the community in the vicinity of the site. The mining operations are short term and expected to continue for approximately two years.
Compare potential for displacement or disruption to community features (e.g. parks, recreational facilities)	• Number and type of community features on-site that would be displaced.	***Ranked Equally***: Both options are located within the existing property boundary and therefore no community features will be displaced.	***Ranked Equally***: Both options are located within the existing property boundary and therefore no community features will be displaced.
	• Number and type of community features off-site that may experience disruption effects (e.g. noise, dust, odour) during operation.	***Ranked Equally***: There are no community features within the 1 km off-site study area.	***Ranked Equally***: There are no community features within the 1 km off-site study area.
Compare potential for impact on future land use plans	• Area and designation of land to be displaced on-site.	***Ranked Equally***: Requires 20.2 ha for the footprint area. The expansion is located within the existing property boundary so	***Ranked Equally***: Requires 20.2 ha for the footprint area. The expansion is located within the existing property

Table 5.13 Evaluation of Preferred Geometric Expansion Option With and Without Landfill Mining
(expansion options are ranked from most preferred (First) to least preferred (Second), where applicable)

Criteria Group/Criteria	Indicators	Option 3 – West and North Expansion B	Option 3 with Landfill Mining
		there will be no change in land use.	boundary so there will be no change in land use.
	• Area and designation of land to be disrupted off-site.	***Ranked Equally***: All site expansion options have the same land use designation (Rural Area). Both options all have the same Area of Influence.	***Ranked Equally:*** All site expansion options have the same land use designation (Rural Area). Both options have the same Area of Influence.
	• Change in land use character compared to existing designations.	***Ranked Equally***: The footprints for all site expansion options are within the existing property boundary and therefore no change in land use character is anticipated.	***Ranked Equally***: The footprints for all site expansion options are within the existing property boundary and therefore no change in land use character is anticipated.
Compare potential for displacement or disruption of heritage or archaeological resources	• Presence of known archaeological resources on-site.	***Ranked Equally***: All site expansion options are located on the same site where there are no known archaeological resources on-site.	***Ranked Equally***: All site expansion options are located on the same site where there are no known archaeological resources on-site.
	• Number of built heritage or cultural landscape features on-site that would be displaced.	***Ranked Equally***: There are no built heritage or cultural landscape features on-site that would be displaced for all site expansion options.	***Ranked Equally***: There are no built heritage or cultural landscape features on-site that would be displaced for all site expansion options.
	• Number of built heritage or cultural landscape features off-site that might be disrupted.	***Ranked Equally***: There are no built heritage or cultural landscape features within the 1 km off-site study area.	***Ranked Equally***: There are no built heritage or cultural landscape features within the 1 km off-site study area.
Compare potential for impacts to public health and safety	• Potential for worker safety issues associated with the type of work required.	***Ranked First*:** Landfilling of waste will be carried out to meet worker health and safety requirements.	***Ranked Second***: Landfilling of waste will be carried out to meet worker health and safety requirements. Additional mitigation measures will be required to address concerns as a result of landfill mining. Based on other landfill mining work in Ontario, concerns can likely be mitigated.
	• Distance to private water wells.	***Ranked Second:*** Both alternatives would be approximately 375 m from the closest existing private water well.	***Ranked First:*** Both alternatives would be approximately 375 m from the closest existing private water well. The addition of a liner will improve groundwater protection and the quality of the downstream private wells.

Table 5.13 Evaluation of Preferred Geometric Expansion Option With and Without Landfill Mining
(expansion options are ranked from most preferred (First) to least preferred (Second), where applicable)

Criteria Group/Criteria	Indicators	Option 3 – West and North Expansion B	Option 3 with Landfill Mining
Economics			
Compare potential for displacement or disruption to existing businesses	• Number, type and sensitivity of businesses on-site that would be displaced.	***Ranked Equally***: Both options are located within the existing property boundary and therefore no business will be displaced.	***Ranked Equally***: Both options are located within the existing property boundary and therefore no business will be displaced.
	• Number, type and sensitivity of businesses off-site that might experience disruption effects during operation.	***Ranked First***: There are approximately 19 businesses within the 1 km off-site study area. Staff and clients may experience some disruption effects.	***Ranked Second***: There are approximately 19 businesses within the 1 km off-site study area. Staff and clients may experience some disruption effects including increased odour effects due to landfill mining.
Compare potential for displacement or disruption on agriculture / forestry / mining resources	• Area of on-site agriculture/forestry or mining industry resources that would be displaced.	***Ranked Equally***: There are no agricultural/forestry or mining industry resources on-site and therefore no displacement for all site expansion options.	***Ranked Equally***: There are no agricultural/forestry or mining industry resources on-site and therefore no displacement for all site expansion options.
	• Area of off-site agriculture/forestry or mining industry resources that might experience disruption effects during operation.	***Ranked Equally***: There are sand and gravel resources located off-site. The expansion activities are not expected to affect the resource.	***Ranked Equally***: There are sand and gravel resources located off-site. The expansion activities are not expected to affect the resource.
Cost			
Compare potential lifecycle cost of alternative	• Estimated lifecycle cost.	***Ranked Equal:*** The estimated tipping fee for this Option is $80 (2012 dollars) per tonne of waste landfilled. The tipping fee will escalate with inflation in the future. This option will also likely include a future cost to address potential off-site groundwater impacts. For the purposes of the evaluation, it is assumed the costs for both options are similar.	***Ranked Equal***: The estimated tipping fee for this Option is $88 (2012 dollars) per tonne of waste landfilled. The tipping fee will escalate with inflation in the future. Landfill mining increases the area to be lined and will require purchase of additional equipment and require additional mitigation measures and therefore will be higher than Option 3 without landfill mining.
Technical Considerations			
Compare ease of implementation	• Ease of site development and operation.	***Ranked First***: Provides the target disposal capacity with current waste density. All options have a surplus of soil for cover needs. The average depth of west expansion is 11 m.	***Ranked Second***: Provides the target disposal capacity. Will require ongoing odour mitigation during landfill mining activities. All options have a surplus of soil for cover needs.

Table 5.13 Evaluation of Preferred Geometric Expansion Option With and Without Landfill Mining
(expansion options are ranked from most preferred (First) to least preferred (Second), where applicable)

Criteria Group/Criteria	Indicators	Option 3 – West and North Expansion B	Option 3 with Landfill Mining
			The average depth of west expansion is 11 m.
	• Effects on existing / proposed landfill infrastructure.	***Ranked Equally***: Most notably would require relocation of public drop off area, scales and scale house, administration building and maintenance building.	***Ranked Equally:*** Most notably would require relocation of public drop- off area, scales and scale house, administration building and maintenance building.
Transportation			
Compare potential for effects on airports	• Distance from Sault Ste. Marie airport.	***Ranked Equally***: Transport Canada recommends that waste disposal sites be located beyond a 15 km radius from airports to reduce the risk of bird strikes. All site expansion options are located beyond this radius (25 km).	***Ranked Equally***: Transport Canada recommends that waste disposal sites be located beyond a 15 km radius from airports to reduce the risk of bird strikes. All site expansion options are located beyond this radius (25 km).
Compare potential for effects on traffic volumes[24]	• Annual truck kilometres travelled and character of roadway (i.e. single lane one direction, multi-lane).	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the truck kilometres travelled will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the truck kilometres travelled will be the same for all options.
	• Annual number of trucks travelling through intersections.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the intersections traversed will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the intersections traversed will be the same for all options.
Compare potential for impacts of haulage truck traffic on the movement of farm equipment	• Annual number of trucks travelling through agricultural areas .	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the impact of trucks travelling through agricultural areas will be the same for all options.	***Ranked Equally***: All site expansion options use the same haul route and will manage the same quantity of waste and therefore the impact of trucks travelling through agricultural areas will be the same for all options.

5.2.6 Landfill Gas Management and Leachate Treatment

Landfill EAs often consider alternatives for landfill gas management and leachate treatment. For the Sault Ste. Marie landfill this infrastructure is in place and is working effectively so considering alternative approaches was not considered necessary. The proposed expansion incorporates plans to expand and enhance existing landfill gas and leachate management systems. The following provides commentary on the current and proposed systems:

[24] The waste haul route for this criterion includes public roads from the main waste generation points to each site alternative.

- Leachate Treatment – To address groundwater impacts, a horizontal west-to-east collection system was installed in 1992 south of the existing fill area and has been operating without interruption since that time. The collection system intercepts leachate impacted groundwater moving south from the waste area and protects groundwater quality in the downgradient meander area. The horizontal collection system has been very effective at collecting leachate and the ground water quality south of the collection system, in the meander area, has improved to the point where there is no longer a discernible ground water plume in this area.

  In response to the identified deterioration in groundwater quality in the western portion of the site where the water table is much deeper, a purge well system was designed to intercept impacted groundwater moving west and southwest from the existing site. Currently there are ten purge wells operational 24/7 (with the exceptions of shutdowns due to component failures or required for maintenance of the system).

  Leachate collected at the current site is pumped via forcemain to the City's wastewater collection system and ultimately to the wastewater treatment plant. The landfill pump station has reached the end of is theoretical service life and the City, through its asset management planning initiatives is currently undertaking a preliminary design study to assess and identify necessary equipment replacements and or upgrades. The study is considering current and future flows and will address equipment and force main capacity, and contingency planning and associated provisions including consideration of standby power. Preliminary findings are that the pumps and station piping components require replacement due to age and the existing forcemain capacity is adequate to accommodate existing and future flows. The City plans to implement the study recommendations in 2024-2025.

  Sampling of the leachate collection system has been undertaken quarterly since it has been in operation and the 2021 Annual monitoring report indicates that leachate continues to comply with the City's Sewer Use By-law for Sanitary Sewer Use.

  The existing leachate management system is pumping in the range of 13-15 L/s to the City's wastewater treatment system. This represents approximately 6% of the capacity of the treatment plant when compared to the average day plant capacity of 231.5 L/s. The proposed expansion area will include an engineered liner and leachate collection system such that leachate from the expansion area will also be collected and pumped to the City's wastewater collection system and treated in the West End Water Pollution Control Plant (WEWPCP). The leachate management enhancements will result in a modest increase in flows, estimated to be in the range of 1.5 to 2.5 L/s directed to the wastewater treatment plant. The City completed a capacity assessment of the WEWPCP in 2022. Through that assessment it was confirmed that the plant has adequate capacity to support the projected growth to at least 2038.

  The site stormwater management design includes features and controls to minimize the volume of stormwater that comes into contact with waste. Stormwater generated outside of the disposal footprint will be managed and controlled through ditching and stormwater management ponds so that it does not come into contact with waste. Following treatment within the stormwater ponds the surface water is discharged to the adjacent surface water systems including Canon Creek and Root River. Precipitation that comes into contact with and filters through the waste will be managed though the site's leachate management systems which includes the existing systems and proposed leachate management enhancements noted above.

- Landfill Gas Management – Current landfill gas management infrastructure includes 41 vertical extraction wells and a flare. The gas collection system will be extended to the expansion areas. The existing flare and blower are likely adequate to satisfy landfill gas management requirements. This will be confirmed prior to submission of the ECA application. A landfill gas to energy feasibility study was completed in October 2011 for the site. Electricity generation and sale to the grid was recommended if long-term revenue incentives are secured. The City will continue to look at opportunities to utilize landfill gas to create energy where there is an appropriate business case. The beneficial use of landfill gas was most recently evaluated in 2022 in conjunction with the design of the biosolids/SSO processing facility which concluded it was cost prohibitive.

5.2.7 Consideration of the "Do Nothing" Alternative

Within the context of this EA report, the "do-nothing" alternative is a benchmark to confirm the preferred alternative is the appropriate approach to addressing the need for additional landfill capacity in Sault Ste. Marie.

In a do-nothing scenario, the City of Sault Ste. Marie would no longer be able to provide their residents and businesses with the ability to dispose of waste locally and the existing landfill would close.

The following **Table 5.14** highlights the key elements of the preferred alternative and the do-nothing alternative for the six criteria groups considered:

Table 5.14 – Preferred Alternative (Option 3 with Landfill Mining versus Do Nothing)

Criteria Group	Preferred Alternative – Option 3 with Landfill Mining	Do-Nothing Alternative
Environment	Removal of approximately 7.7 ha of terrestrial habitat within the landfill property.	This habitat will remain in place, however without a location for waste disposal there would be a greater risk of illegal dumping which may impact the natural environment.
	Landfill mining and the addition of engineered liner on the west portion of site will provide improvement in groundwater protection.	No improvement in groundwater protection and ongoing concerns on the west side of the landfill property.
	No exceedances of Air quality anticipated. There is some dust anticipated that will need to be managed.	Landfill gas emissions will continue to be managed after site closure. Dust would be reduced as site activity would cease.
	Noise from the expansion is expected to meet MECP guidelines.	There would be some reduction in noise if the landfill no longer operated.
Social-Cultural Environment	Some additional nuisance effects particularly odour during the period of landfill mining. A pilot study will be undertaken and best management practices identified and implemented to mitigate the impacts.	If the landfill is closed, nuisance effects such as truck traffic would decrease. Landfill gas emissions and associated potential odour will continue after site closure but will be reduced. Without a location for waste disposal there would be a greater risk of illegal dumping which may impact residents.
Economics	Some additional nuisance effects for businesses in close proximity particularly	If the landfill is closed, nuisance effects such as truck traffic would decrease. Landfill gas

Criteria Group	Preferred Alternative – Option 3 with Landfill Mining	Do-Nothing Alternative
	odour during the period of landfill mining. A pilot study will be undertaken and best management practices identified and implemented to mitigate the impacts.	emissions and associated potential odour will continue after site closure but will be reduced. Without a location for waste disposal there would be a greater risk of illegal dumping which may impact businesses.
Cost	The estimated tipping fee is in the range of $88 per tonne (2012 dollars). Based on input received through the public consultation process residents and businesses recognize there is a cost to effectively manage waste and are willing to pay reasonable fees.	Without a waste disposal site the City would not be able to look after its own waste. Although there is a cost to effectively manage waste it is generally preferred by the vast majority when compared to having no formal means of waste disposal and the likelihood that illegal dumping would be prevalent.
Technical Considerations	Landfilling is a proven approach to waste management and the existing site has a successful 30+ year operating history. The proposed expansion builds on the historical success and incorporates important leachate management and nuisance management enhancements. The site can be developed to provide the required capacity with some relocation of infrastructure.	Site closure requires no relocation of infrastructure but the site will no longer be developed and provide needed disposal capacity. The City also fails to fulfill an important mandate of providing waste disposal services to its residents which is particularly important given that there are no private sector waste disposal facilities in or around Sault Ste. Marie.
Transportation	Continued use of Fifth Line by waste trucks.	The route would no longer be required by waste trucks but will remain an important route for aggregate extraction and hauling.

As demonstrated above, there are some potential impacts associated with the preferred alternative method (Option 3 with Landfill Mining) most of which represent a continuation of the nuisance impacts associated with the existing landfill site. However, the City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success. The planned expansion will be accommodated within existing City-owned lands.

In comparison with the do-nothing alternative, the key advantage of proceeding with the proposed expansion is the improvement to downstream groundwater quality to the west of the site and the continued delivery of an essential service to the residents and businesses in the service area. The downstream groundwater quality was highlighted as an important component by the MECP during their review of the DRAFT document. The key disadvantage relative to existing operations at the site is the temporary odour impact associated with landfill mining. As noted in Section 5.2.5, the short term nuisance effects associated with landfill mining were considered manageable given the long term benefit of removing the waste in the western portion of the landfill and lining that area for better groundwater protection.

6.0 DESCRIPTION OF THE PROPOSED FACILITY

This section of the EA summarizes the design of the proposed expansion and discusses how it will be constructed and operated. The complete Design and Operations Report for the proposed expansion is provided in **Appendix C.**

Table 6.1 Summary of the Proposed Undertaking

Parameter	Description
Service Area	City of Sault Ste. Marie, Prince Township and Rankin Reserve (no change in service area relative to the existing site)
Waste Type	Solid residential, industrial, commercial and institutional (IC&I), construction and demolition (C&D) wastes and biosolids (no changes proposed)
Maximum Rate of Fill	76,000 tonnes/year and 1,750 tonnes/day*
Total Site Area	Original approval: 83.6 ha Current: Approximately 151 ha – the City has added a CAZ and additional buffer lands over time
Fill Area	Existing Fill Area as per 1990 D & O Report Drawings: 25.8 ha Proposed Expansion Fill Area Addition: 17.8 ha Existing Fill Area plus Proposed Expansion Fill Area Addition: 43.6 ha Proposed Mining Area (included in the Existing Fill Area): 3.4 ha
Total Waste Disposal Volume (Waste and Daily/Intermediate Cover)	Currently Approved as per 1990 D & O Report: 2,260,000 m^3 (excluding the original Cherokee Landfill capacity) Proposed Expansion: 3,170,000 m^3 Currently Approved plus Expansion: 5,430,000 m^3
Apparent Waste Density**	0.56 t/m^3 (based on experience with the existing site)
Estimated Disposal Capacity***	1,777,000 t for the proposed expansion 3,042,600 t for the existing and proposed expansion combined
Maximum Top of Final Cover	310 m ASL – existing and proposed (no increase from current approved maximum elevation)
Minimum Bottom of Excavation	274 m ASL - proposed

*The maximum daily acceptance rate is based on recent historical operations and the high value is the result of significant surplus soild from local construction projects.
**Apparent waste density is defined as the weight (tonnes) of waste divided by the volume of waste and daily/intermediate cover.
*** Tonnes of waste only (i.e. cover material not included).

6.1 Waste Quantities and Characteristics

Service Area
The service area will remain unchanged, i.e. the City of Sault Ste. Marie, the Township of Prince and the Batchewana First Nation's Rankin Reserve.

Waste Characteristics
The Landfill is approved to accept solid non-hazardous residential, industrial, commercial and institutional (IC&I), and construction and demolition (C&D) waste, and biosolids. This includes waste generated by the City's operations. No changes to the types of waste are proposed.

Waste Quantities
It is forecasted that waste will be landfilled at a maximum rate of 76,000 tonnes per year.

6.2 Landfill Expansion Design

It is proposed to expand the existing landfill by an additional disposal capacity of 3.17 million m^3 of waste and daily/intermediate cover (including disposal capacity associated with mining as described in Section 6.3). The proposed expansion will comprise of north and west horizontal expansions. The existing site has an existing fill area of 25.8 hectares as per 1990 D & O Report Drawings. The horizontal expansion will add a waste footprint of 17.8 hectares, for a total footprint of 43.6 hectares. The landfill maximum height

would remain at 310 m ASL. **Figure 6.1** shows the conceptual design for the Sault Ste. Marie Landfill expansion.

Landfill Design Criteria

Ontario Regulation 347, made under Part V of the *Environmental Protection Act*, defines landfilling as:

> *"The disposal of waste by deposit, under controlled conditions, on land or on land covered by water, and includes compaction of the waste into a cell and covering the waste with cover materials at regular intervals."*

The Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfill Sites (MECP, 2012) gives directions on the appropriate methods and approaches for landfill design, operation, closure and post-closure maintenance. The Guide to Applying for an Environmental Compliance Approval (MECP, 2012) is also relevant to this application.

The conceptual design of the landfill expansion has been prepared in accordance with these and other MECP regulations, policies and guidelines. The following parameters were used in the expansion design:

- A volumetric capacity for waste and daily/intermediate cover of 3,170,000 m³ to manage 1,777,000 tonnes of waste assuming an apparent density of 0.56 t/m³.
- Maximum 6 horizonal to 1 vertical (6:1) above-ground side slopes.
- Minimum 20:1 for top slopes.
- Maximum 3:1 excavation side slopes.
- Apparent density of 560 kg/m^3.
- Waste to daily cover ratio of 4:1.
- Final cover depth of 1 m.
- Minimum 30 m setback distance from the property boundary (Note: the City has acquired additional buffer lands since the submission of the Draft EA and is currently pursuing one additional property through expropriation which will significantly enhance the buffer to adjacent sensitive uses at the southwest of the proposed expanded fill area).
- Minimum base of excavation grade of 0.5%.
- A composite liner consisting of a geocomposite clay liner overlaid by a 1.5 mm thick HDPE geomembrane for new landfill cells, including the mined cell.
- A full underdrain leachate collection system consisting of clear stone with thickness varying between 0.3 and 0.8 m and sand protective layer with 0.2 m thickness.
- Transmission of leachate to the sanitary sewer system at Fifth Line/Old Goulais Bay Road.
- Active landfill gas management system.

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.

AECOM

DILLON CONSULTING

No.	ISSUED FOR	DATE	BY
2	RESPONSE TO MOE COMMENTS	2020/02/15	R.K.
1	SUPPLEMENT TO EA REPORT	2015/01/31	F.R.G.

DESIGN	F.R.G.
REVIEWED BY	F.R.G.
DRAWN	D.B.C./S.K.B.
CHECKED BY	F.R.G.
DATE	MARCH 2023
SCALE	1:2500

SAULT STE. MARIE MUNICIPAL LANDFILL SITE
DESIGN AND OPERATIONS REPORT

PROPOSED EXPANSION

PROJECT NO. 06-6988

DRAWING NO. **6.1**

FILENAME: C:\PW WORKING DIRECTORY\PROJECTS 2022\DILLON_465CC\DMS63518\225411-02-CELL STAGING.DWG PLOTTED BY: CARTAGENA, SHARMAINE
PLOT DATE: 2023-03-01 @ 11:41:42 AM PLOT SCALE: 1:25.4 PLOT STYLE: DILLON-STANDARD.CTB

Other criteria, specific to various features, were established in the conceptual design process.

Limits of Landfilling

The waste limit is the outermost boundary of waste landfilling and was generally established based on site topography, groundwater and surface water divides and buffers and setbacks from property limits. The waste fill area is proposed to increase from 25.8 hectares to 43.6 hectares for a net increase of 17.8 hectares. The proposed mining area of 3.4 hectares is included in the existing 25.8 hectares of waste fill.

The proposed waste fill area will maintain the current setback along the east boundaries, slightly reduce the existing setback along the south boundary and establish a 30 m buffer along the west boundary and a 100 m setback along Canon Creek, located north of the Site.

It is noted that the setbacks meet all the considerations noted in Reg 232, section 7(3) that would allow for a buffer less than 30 m including;

(a) the buffer area provides adequate space for vehicle entry, exit, turning, access to all areas of the site and parking;
(b) the buffer area provides adequate space on the surface of the site for all anticipated structures, equipment and activities, and
(c) the buffer area is sufficient to ensure that potential effects of the landfilling operation do not have any unacceptable impact outside the site (including consideration of surface runoff, litter, vectors, vermin, leachate, subsurface migration of landfill gas and aesthetic effects).
(d) furthermore, the City has acquired additional buffer lands since the submission of the Draft EA and is currently pursuing one additional property through expropriation which will significantly enhance the buffer to adjacent sensitive uses at the southwest of the proposed expanded fill area.

Base Contours and Liner

The base of the proposed landfill expansion area was designed with a minimum 3 m vertical separation from historical groundwater elevation. Borehole logs and available monitoring data were used to establish the highest recorded water table elevation at applicable monitoring wells. The type of soil recorded in borehole logs was also reviewed.

Generally, the excavation depth below existing ground for the proposed expansion will range from approximately 5 to 13 m. The proposed base grades of the west expansion were influenced by existing site topography. The base grades of the north expansion were influenced by landfill geometry, considering constructability, leachate drainage and operations. The base of the proposed north expansion has a high point that divides the base slopes to the east and west. The north expansion will have 2.8% and 3% at east and west valleys, respectively. The base of the proposed west expansion area generally slopes towards the southeast corner. The west expansion will have 2.9% longitudinal base slopes (from north to south).

Two sumps will collect leachate from the north and west expansion areas as part of the leachate management system.

The proposed composite liner and leachate collection system for the expansion and mining areas will consist of, from bottom to top:

- Cushion geotextile.
- Geosynthetic clay liner.
- 1.5 mm thick high density polyethylene (HDPE) geomembrane.
- Cushion geotextile.
- 0.3 to 0.8 m thick stone drainage layer.
- Separator geotextile.
- 0.2 m thick sand protective layer.

An approximately 1 m high berm will be constructed at the toe of the existing fill areas that are being expanded or mined to separate the lined area from the unlined area. The berm will anchor the liner and geotextiles, provide leachate containment, assist in directing surface water from the unlined areas away from the lined areas and control sediments from entering the lined area.

Final Contours

The final contours were designed in accordance to Regulation 232/98 which requires maximum 4:1 and minimum 20:1 (5%) side slopes. Side slopes were designed with 6:1 slopes as recommended by the *Landfill Expansion – Geotechnical Report* (June, 2014), prepared by AECOM (refer to **Appendix G**)

The maximum elevation of the entire waste fill is 310 m ASL, including the 1 m thick final cover, which is the current maximum fill elevation.

6.3 Landfill Mining

Landfill mining operations are proposed to be performed in the Cell 1A area indicated on **Figure 6.1**.

Process Description

The contractor selected by the City will choose the means and methods, including equipment, sequence and personnel to complete the mining work based on tender specifications to be prepared by a qualified engineer. The mining process should, in general, be completed according to the following sequence:

- Mobilization - Contractor mobilization, submission and review of health & safety plan, odour mitigation plan, dust and erosion and sedimentation control plans.
- Site preparation - Existing soil cover stripping within the area of Cell 1A to be mined. Soil will be stockpiled for future cover use.
- Waste excavation and pre-separation - The waste excavation will be completed in lifts of approximately 3 m thick by an excavator and/or dozer. Materials that can be reused or recycled will be pre-separated. During waste excavations, large size materials (e.g. tires, metals, concrete, etc.) are to be pre-separated and stockpiled or stored for reuse or recycling, which may include on-site or off-site mechanical processing such as shredding, grinding or crushing.
- Waste screening - Excavated waste materials that are not pre-separated will be loaded by an excavator into screening equipment (e.g. trommel screen). The screening process will mechanically separate fine parts (mainly soil), from the residual materials typically referred to as waste overs.
- Fines - The fines fraction will be hauled to the working face of the active cell to be stockpiled and either used as daily/intermediate cover or re-landfilled. Other uses of fines within the approved waste footprint may be allowed, such as berms or road fill. Pre-approval by the resident inspector will be required for uses other than cover.
- Waste overs - The waste overs will be hauled to the working face of the active cell and immediately re-landfilled along with the regular incoming solid waste materials.

- Compaction and cover - Mined waste that will be re-landfilled will be treated as regular waste and will be compacted and/or mixed with other waste and will be covered with approved daily cover at the end of each operating day.

Before waste excavation can commence, the following activities must be completed:

- Develop and implement a health and safety plan.
- Conduct landfill mining trial or pilot to assist in defining best practices for operations and odour management.
- Delineate areas to be mined, areas dedicated to the processing equipment, stockpiles and hazardous or suspect waste storage areas, and provide signs as necessary.
- Develop the Odour Management Plan.
- Develop and implement dust mitigation and erosion and sediment control measures.
- Excavate interim/final cover from the area to be mined and stockpile.
- If perched leachate is encountered, collect and dispose of leachate in accordance to the leachate management plan, prior to further excavation.

Existing site drainage should be maintained and modified as necessary to prevent run-on or run-off from the area being mined. In general, mining operations should be confined to designated areas. Additional swales, ditches or berms should be constructed as needed to control surface water drainage. The Contractor will also develop and submit for approval a detailed Erosion and Sediment Control Plan.

Mining operations will be monitored and documented to assess the performance of the equipment employed, evaluate the quantity and quality of the various material fractions and to recommend modifications or improvements to the operation.

Fines Management

Based on analytical data available for landfill mining sites in Ontario (e.g. City of Barrie, Northumberland County, Simcoe County and City of Blue Mountains), fines generated from mining operations (primarily soil) either meet or marginally exceed MECP Tables 1 or 2 criteria. MECP Tables 1 and 2 is used to assess maximum acceptable level of contaminants under the Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the *Environmental Protection Act*.

In general, fines will be assumed to be non-hazardous solid waste and will be used within the approved waste fill limit as daily cover, intermediate cover, road fill or temporary berming.

If fines are being considered for on-site use outside the approved waste limits, site specific testing should be conducted. Furthermore, any fines to be used for road fill shall require approval of the City's on-site representative.

Design Considerations

Excavated waste at Cell 1A should be maintained with a stable slope expected to be no flatter than 4:1, with typical waste slopes ranging from 2:1 to 3:1.

A composite liner and leachate collection system consistent with the design for the proposed expansion is proposed for the base of the excavated waste (Cell 1A) for groundwater protection. Leachate will be collected at the base of the lined Cell 1A by a drainage layer and perforated pipes and conveyed by gravity to the proposed sump located in Cell 3.

A 1 m high berm will be constructed at the toe of the excavated waste to separate the lined area from the unlined area (existing landfill). The berm will anchor the geosynthetic materials (GCL, geomembrane and geotextiles), provide leachate containment, assist in directing surface water from the unlined areas away from the lined area and control sediments from entering the lined area.

Health and Safety Considerations

A site-specific health and safety plan will be prepared prior to commencement of mining operations and will be implemented during mining operations.

The health and safety plan will consider various applicable hazards associated with mining operations and should be in compliance with the City of Sault Ste. Marie policies and procedures and Ministry of Labour regulations. Physical, chemical and biological hazards such as gases (methane, hydrogen sulphide), sharps, wastewater biosolids, asbestos and equipment traffic will be identified and mitigated. The health and safety plan will include specific operating procedures to address air quality/odour, dust, airborne contaminants, personal protective equipment (PPE), decontamination procedures and emergency procedures.

The health and safety plan will include procedures to manage anticipated or confirmed hazardous materials as well as the presence of any material of concern. Any hazardous waste that may be encountered will be properly managed at a licensed facility for proper disposal or processing.

The health and safety plan will also include procedures to operate heavy equipment, processing equipment and tools. Heavy equipment and processing equipment should be provided with engineering controls. Tools should be of adequate design and include engineering controls to provide a safe environment to the site personnel.

Odour Management

A preliminary Odour Management Plan (OMP) was developed as part of this EA and will be further developed and finalized as the landfill mining program evolves and information on Contractor's procedures, means and methods are available. A waste mining pilot project will be completed prior to full-scale waste mining activities to further develop and refine the OMP based on actual site conditions.

The final OMP will be specific to the site and will be prepared by a Consultant retained by the mining Contractor (or by the City directly) documenting procedures for odour management. The OMP will be based on the MECP's recommended FIDOL (frequency, intensity, duration, offensiveness and location) approach.

Environmental parameters such as temperature, humidity, wind direction and speed will be monitored as part of the OMP. Odour mitigation measures to be contemplated include operational and administrative controls such as: adjust work areas to reduce the amount of exposed waste; place cover material close to the work areas so exposed waste can be covered quickly; transport waste under optimal temperature and wind speed conditions; and use odour suppressant foam and misters where appropriate.

Dust and Airborne Contaminant Management

Mining operations have the potential to generate dust during dry periods (usually in the summer when the ground is dried up by higher temperatures). Dust can be generated by typical mining operations such as cover stripping, waste and soil excavation, screening and heavy equipment and truck traffic.

Dust is a concern because it may reduce visibility, generate airborne contaminants and potentially may become a nuisance to off-site receptors if not controlled at the source. Airborne contaminants should be controlled because they represent a safety hazard to site personnel and should be addressed in the health and safety plan.

A dust and airborne contaminant management plan should be prepared and implemented by the mining Contractor and approved by the City and the contract administrator retained by the City. The dust and airborne contaminant management plan should include equipment used to control dust and describe the liquid and rate that will be applied. Monitoring procedures should also be included in the dust and airborne contaminant management plan.

6.4 Landfill Capacity Calculations

The volume between the top of final cover contours and base (excavation) contours of the landfill represents the volume available for the construction of a leachate collection system, the landfilling of waste, and the application of daily, intermediate, and final cover. **Table 6.2** highlights the capacity achieved by the expansion.

Table 6.2 Landfill Capacity

DESCRIPTION	QUANTITY
Disposal capacity generated by expanded waste limit for waste and daily/intermediate cover, estimated from the top of the leachate collection system or top of waste within the existing approved disposal footprint to the underside of the final cover, excluding mining volumes*.	3,010,000 m^3
Excavated waste volume generated by mining operations.	320,000 m^3
Volume of mining residual waste that will be re-landfilled (assumed 50%).	-160,000 m^3
Total volume of waste plus daily/intermediate cover:	**3,170,000 m^3**

*Includes disposal capacity of 115,000 m^3 generated by final cover stripping of the existing site that overlaps with the proposed expansion (153,000 m^2 final cover area x 0.75 m final cover thickness).

6.5 Site Features

Various existing facilities will be replaced/relocated as the site is expanded. Most of the replacement site infrastructure/facilities will have to be established prior to initiating development activities in Cell 3. Application(s) for amendment(s) to the site Environmental Compliance Approval will be submitted to the MECP prior to initiating construction of the replacement site infrastructure. The following general development sequence is suggested for the landfill expansion and proposed facilities, subject to revisions as new options are identified:

- Build the proposed northeast surface water management pond.
- Decommission the existing northeast stormwater management pond.
- Relocate the compost pad before construction of Cell 1.
- Build the proposed southwest surface water management pond as part of the compost pad relocation.
- Build the proposed perimeter road to serve Cell 1.
- Build Cell 1.

- Implement the initial phase of the landscape plan per Environmental Management Plan that will be prepared following EA approval. Other phases of the landscape plan will be implemented as per Environmental Management Plan that will be prepared following EA approval.
- Build proposed pump station to serve Cell 1 and associated forcemain. Connect forcemain to the existing pump station.
- Build the east and south perimeter ditches for the existing site and the southeast surface water management pond.
- Build Cell 2.
- Complete a pilot program for Cell 1A mining.
- Proceed and complete full-scale mining operation at Cell 1A.
- Build the liner and leachate collection system for Cell 1A.
- Build proposed south pump station and associated forcemain. Connect forcemain to the existing pump station.
- Relocate existing Public Drop-Off, Maintenance Garage, Scale House/Administration Building and Scales.
- Build the new entrance/exits.
- Build the Recycling Centre.
- Build the HHW Depot.
- Build the South surface water management pond.
- Build roads to serve the relocated facilities.
- Decommission and remove or repurpose (where not in conflict with future site development) the existing site infrastructure (i.e. Public Drop-Off, Maintenance Garage/Administration Building and Scales/Scale house, HHW Depot).
- Decommission purge wells within the footprint of Cell 3. Replace purge wells as needed (depending on remaining groundwater impacts, if any, after landfill mining is completed).
- Build Cell 3.
- Decommission remaining purge wells. Replace purge wells, as needed (depending on groundwater impacts, if any, after landfill mining is completed).
- Build Cell 4.
- Build Cell 5.
- Build the horizontal leachate collector (based on a need assessment completed prior to construction of Cells 6 and 7, as per contingency plan).
- Build Cell 6.
- Build Cell 7.

The replacement site infrastructure is described in the following paragraphs.

Site Entrance and On-Site Roads

The site entrance will continue to be provided from Fifth Line. The site entrance will, however, be relocated further east relative to the existing entrance and a separate exit only gate will be provided at the location of the existing entrance. The relocated entrance gate will provide access to both the landfill and the Recycling Centre.

The access roadway to the landfill provides access to the scales and eventually to the public waste drop-off area and the landfill perimeter road.

A 7.2 m wide, two-lane hard-surfaced landfill perimeter road will be constructed. Drainage ditches, where necessary, will be constructed adjacent to the road.

Access to the landfill working face will be provided via several haul roads departing from the perimeter road. Waste materials, such as wood chips or fines generated by mining operations may be used as an alternative building material for these haul roads. Consideration will be given to the finished surface of the haul roads to reduce dust emissions from waste haul truck traffic.

Scales and Scale House

Two weigh scales will be relocated to the south as shown on **Figure 6.1** and will have a setback from the entrance to allow for vehicle queuing on site. The distance from the Fifth Line entrance to the scale will provide adequate queuing length. A scale house equipped with a methane detection system will be provided for the scale attendant.

Administration/Maintenance Building

The existing Administration Building and Maintenance Garage will be replaced/relocated. The Administration and Maintenance Building will be equipped with a methane detection system.

Stockpiles

Stockpiles will be located within designated areas or adjacent to the active working face. Soil for daily cover will be located near the active working face. Stockpiles shall be sized and managed to minimize the potential for off-site dust.

Drop-Off Area

The site plan has been developed to separate diversion activities from disposal activities. The main entrance to the site will facilitate access to both the waste diversion drop-off area and the weigh scales which are located upstream of the waste disposal drop off-area.

Customers are able to enter the waste diversion drop-off area without passing over the weigh scales. This approach encourages customers to properly manage diversion items as they can be tipped at no charge. The waste diversion drop-off area is configured to facilitate traffic flow in a counter clockwise direction with various diversion stations located along the periphery of the traffic loop. The following diversion stations have been included:

- Metals including appliances and propane tanks;
- Tires;
- Typical blue box recyclables (i.e. fibres and containers);
- Waste electrical and electronic equipment; and
- Household special waste.

Customers can then proceed to the weigh scales and the waste drop-off area once diversion items are discarded. Customers that do not have diversion items may also proceed directly to the weigh scales.

After passing over the weigh scales, customers proceed in a counter clockwise direction through the waste disposal drop-off area. Separate stations have been established for normal household waste, construction and demolition waste and clean wood waste including brush. Typical blue box material recyclable containers are also accessible from the waste disposal drop off area.

Once customers have tipped their waste they will proceed over the outbound weigh scale and pay appropriate charges before exiting the site.

6.6 Environmental Control Measures

6.6.1 Access and On-site Traffic Control

Access to the site is provided from Fifth Line and controlled by a gate which is locked during non-operating hours. Security cameras are also mounted on poles adjacent to the scale house to monitor activity during non-operating hours.

The Site will be supervised during operating hours. This will ensure that vehicles will be directed to an appropriate area (i.e., public drop-off, working face or waste diversion facilities). Traffic control is provided by traffic signals mounted at each end of each weigh scale. Traffic signals are semi-automated and controlled by the weigh scale attendants.

The weigh scale attendants will also be responsible for vetting customers to confirm they reside within the approved service area. This may include questioning customers on the inbound weigh scale or asking them to provide identification to confirm their residency.

6.6.2 Waste Control

Vehicles delivering waste are required to stop at the weigh scale to confirm waste types and vehicle weight with the scale house attendant. If a load is considered "unacceptable" (i.e., waste type or materials not identified in the ECA), the attendant will have the authority to reject the load.

Another opportunity for waste control is at the working area and drop-off areas. Equipment operators and other staff will be trained to recognize non-permitted wastes. If "unacceptable" waste is identified when a vehicle is unloading, it will be reloaded back into the source vehicle for removal. If the source vehicle has left the site, the unacceptable waste will be segregated and the hauler/generator will be contacted and asked to promptly remove the waste. The rejection and action will be recorded and kept with the site operating records.

If a waste is suspected to be hazardous, it will be segregated and assessed. The hauler will be informed of the receipt of the waste, its storage and any testing that is required to confirm the nature of the waste. Each event will be reported to the MECP. If the waste is confirmed to be hazardous, the operator will obtain an Emergency Generator Number and waste number from the MECP and arrange to have the waste removed for proper disposal at an approved hazardous waste site. The costs of testing and handling of all suspect waste will be charged to the hauler.

If the waste is proven to be non-hazardous and “acceptable”, results of testing will be provided to the hauler and generator (via the hauler) and the MECP. The waste will be sent back to the working area for disposal.

6.6.3 Leachate & Groundwater Management

As a minimum, the leachate management system for the proposed expansion will be designed to comply with provincial requirements for surface water quality, and with the requirements of the “Reasonable Use Guideline” for groundwater.

Leachate Collection System

The leachate collection system (LCS) serves to convey generated leachate to a collection point, and to drain the leachate mounding over the liner. The leachate is then pumped through a force main to the City’s

wastewater collection system and ultimately to the wastewater treatment plant. An assessment of the performance of the leachate collection system and an estimate of the quality and quantity of leachate pumped is addressed in the Annual Monitoring Report.

For the expansion, the proposed LCS consists of the following key components (on top of the liner system):

- Drainage blanket - The drainage blanket will be a continuous layer of 19 mm – 38 mm clear stone with thickness ranging from 0.3 m to 0.8 m over the low permeability base liner.
- Lateral collection pipes and header pipes – The lateral collection pipes (200mm perforated HDPE pipes) will be installed at valleys and will run in a north-south orientation within the proposed west landfill expansion area and from a high point divide to the west and east within the proposed north landfill expansion area. Since the base contours are designed to be sloped towards the lateral collection pipes, leachate from the blanket will be drained to the header pipes which are 200 mm diameter perforated HDPE pipes with the same perforation pattern as the lateral pipes. A geotextile filter will surround the clear stone to prevent migration of soil fines into the perforated collection pipes.
- Pumps - Leachate will drain by gravity to the leachate sumps and pump stations located south and east of the landfill footprint. Collected leachate will be pumped from the sump using submersible stainless steel pumps equipped with all necessary piping, valves, controls, power supply, and flow meters.
- Existing pump station and force main – Leachate will be pumped to an existing pump station located adjacent to the south boundary of the existing landfill footprint. The leachate is pumped from this location through a forcemain which discharges to the collection system at Fifth Line and Old Goulais Bay Road. Five flushing stations and an air release valve are installed along the forcemain between the pumping station and Fifth Line to remove air and accumulated solids within the pipe. Leachate from the expanded landfill will continue to be conveyed to the City's wastewater treatment plant. The existing leachate management system is pumping in the range of 13 to 15 L/s to the City's wastewater treatment system. This represents approximately 6% of the capacity of the treatment plant when compared to the average day plant capacity of 231.5 L/s. The leachate management enhancements will result in a modest increase in flows, estimated to be in the range of 1.5 to 2.5 L/s directed to the wastewater treatment plant. The City completed a capacity assessment of the West End Water Pollution Control Plant (WEWPCP) in 2022 which receives the leachate from the landfill. Through that assessment it was confirmed that the plant has adequate capacity to support the projected growth in the catchment area to at least 2038. Furthermore, the landfill pump station has reached the end of is theoretical service life and the City, through its asset management planning initiatives is currently undertaking a preliminary design study to assess and identify necessary equipment replacements and or upgrades required at this station. The study is considering current and future flows and will address equipment and forcemain capacity, and contingency planning and associated provisions including consideration of standby power. Preliminary findings are that the pumps and station piping components require replacement due to age and the existing forcemain capacity is adequate to accommodate existing and future flows. The City plans to implement the study recommendations in 2024-2025.

6.6.4 Surface Water Management

The overall objective of the surface water management plan is to ensure that any drainage leaving the site does not adversely affect surface water in the vicinity of the site and that the site is in compliance with environmental regulations. As such, the site has been designed to minimize surface water coming in contact with the waste. A further objective is to maintain the existing drainage conditions under which the majority of surface water infiltrates to groundwater due to the permeable nature of the native soils.

The surface water management plan consists of several components, which collectively will achieve the objectives.

Separation of Surface Drainage System from Leachate

Non-contaminated stormwater originating from non-operating areas of the landfill (i.e., undeveloped areas or areas completed with final cover), will be collected in a ditch inside the perimeter road and conveyed to one of the three (3) stormwater management (SWM) ponds that will serve the existing and proposed landfill. The internal ditching will be designed to accommodate the peak flow generated from the 25-year design storm. Berms or ditching will be used to divert any non-contaminated stormwater away from landfill excavations where it may cause operational problems and from operating areas where it may come in contact with waste. Consideration of the potential impacts of climate change (e.g. more frequent or severe storm events) will be incorporated into detailed design as appropriate.

Potentially contaminated stormwater, such as that originating from operating areas where drainage may come in contact with waste or leachate, will not be discharged to the surface drainage system. This isolation of drainage from operating areas will be accomplished by grading of waste and daily/intermediate cover surfaces (i.e. interim separation berms, slopes and diversion ditches will be constructed as part of the landfill operations). All drainage from operating areas that may come in contact with waste or leachate will be collected and managed as leachate, i.e. allow infiltration within the active waste filling areas.

Infiltration of Surface Water

To compensate (to the extent possible) for surface water overland flow loss and groundwater recharge loss that will occur over the lined area of the landfill, infiltration of surface water will be encouraged at the landfill site. Non-contaminated stormwater from non-operating areas will be conveyed to the proposed stormwater management ponds and subsequently discharged to the Root River/Canon Creek.

Stormwater Management Ponds

Four SWM Ponds are proposed to mitigate runoff impacts. Three SWM ponds will serve the landfill; and the fourth, the South SWM Pond will serve the public drop-off, administration building, recycling centre, and adjacent paved areas.

The SWM Ponds serving the landfill will have sufficient storage capacity to accommodate runoff from the 1:100 year storm event for operation under emergency leachate spill conditions. Such emergency control is not required for the South SWM Pond.

All four SWM Ponds will be designed to operate as water quality control facilities as identified in the City's SWM Guidelines (RV Anderson 2014) and will achieve MECP Level 1 criteria (80% TSS removal). The SWM Ponds will be lined as a contingency in the event that the water quality exceeds the trigger parameters.

The proposed SWM Ponds will have no quantity control function, i.e. they will be operated with the valves in normally open position and water quality monitored. In case the water quality exceeds a trigger parameter, a visual inspection of the landfill shall be conducted for possible leachate seeps or other contributors and appropriate action taken to address any adverse observations. Should a trigger parameter be exceeded on two successive sampling events, the contingency plan is to be executed which includes collection of confirmatory samples. If confirmed, the contaminated runoff will either be treated and discharged to the receiving watercourse or pumped or hauled for treatment. The SWM pond valve can be

operated in normally open condition again once the water quality falls below the trigger concentrations for two consecutive sampling events.

Erosion and Sediment Control Plan

During the construction and operation of the landfill site, large volumes of soil will be moved and/or exposed during excavation and preparation of the landfill area. During this period, non-vegetated areas are particularly vulnerable to soil erosion. Erosion control and mitigation shall include some or all of the following temporary and permanent controls:

- stabilization using seeding and/or mulch;
- erosion control blankets;
- rip rap and rock protection;
- check dams; and
- silt fencing.

6.6.5 Landfill Gas Management

Landfill gas (LFG) is generated during the decomposition of organic material under anaerobic conditions. The rate of LFG production depends on the interrelationship of many factors of which, waste composition and age, temperature, moisture content, pH, and quantity and quality of nutrients and microbial populations are the principal factors.

The current landfill gas collection system includes:

- 41 vertical LFG extraction wells which are equipped with valves, to permit the adjustment of the well flow rates, and monitoring ports designed to allow the measurement of gas composition. The extraction wells are located throughout the eastern portion of the existing landfill footprint.
- Various header pipes and lateral pipes.
- One enclosed flare with a temperature control system and landfill gas burner which is designed to handle a LFG flow of 770 standard cubic feet per minute (scfm) which is equivalent to 0.36 m^3/s. The flare is equipped with a centrifugal blower which provides the flexibility of adjusting flow rates.

The air quality impact assessment for the landfill expansion predicts that the maximum air quality concentrations are below the Ministry's and Canadian Council Ministers of the Environment (CCME) air quality criteria. Therefore, the proposed LFG collection system layout represents an extension of the existing landfill gas management system. The existing flare and blower are likely adequate to satisfy the landfill gas management requirements for the existing and expansion areas. The need for future flare upgrades will be monitored.

The current landfill has a gas collection and flaring system. The gas collection system for the proposed expansion will be expanded to provide full coverage as explained above. This system reduces a significant amount of greenhouse gases.

A landfill gas to energy feasibility study for the site was completed in October 2011. Electricity generation and sale to the grid was recommended if long-term revenue incentives are secured. The City may consider the installation and operation of a landfill gas powered power plant in the future and decisions will be contingent on the business case. The beneficial use of landfill gas was most recently evaluated in 2022 in conjunction with the design of the biosolids/SSO processing facility which concluded it was cost prohibitive.

6.6.6 Odour Control

Landfill odours may originate from the waste (at the working face), landfill gas, leachate or waste reclamation activities.

Refuse odour is generated by recently disposed waste or waste excavation in the mining cell area and is controllable by various mitigation measures. Wastes with very strong odours will be placed at the toe of the working face and will be immediately covered with other waste or daily cover. The proper application of cover material at the close of the day will aid in controlling odour. If required, odour suppressing agents will be used as an additional measure to control waste odours.

Landfill gas odour is generated during the anaerobic decomposition of organic waste material. Landfill gas may be released at cracks or fissures in the cover soils long after landfilling has taken place. Depending on weather conditions, these may create an odour problem if landfill gases are being released in sufficient quantities. Regular inspections can identify cracks or fissures that must be repaired by filling with cover soil. The existing landfill gas management system helps to reduce landfill gas odours by extracting the gas and burning in a flare. The gas management system shall be systematically expanded as cells are filled to capacity (final contours).

If landfill gas odours become problematic, a number of measures can be taken, including the following:

- Identification and elimination of any potential source of odour;
- Placement of additional cover material;
- Repair fissures in the final cover;
- Application of de-odourizers; and
- Expand the landfill gas collection system.

Odours generated from leachate can be emitted at locations where it is exposed to the atmosphere in manholes and pump stations. Leachate odours may also be emitted to the atmosphere if leachate seeps develop. Leachate will be collected and discharged to the sanitary sewer system by means of a force main. Any leachate seeps will be promptly repaired.

As noted previously an odour management plan specific to landfill mining will be prepared.

6.6.7 Litter Control

Security of loads is a matter of public safety and is mandated through the Ontario Highway Traffic Act. Regulation 363/04 "Security of Loads" which adopts Canada's *National Safety Code* 10 Cargo Securement published by the Canadian Council of Motor Transport Administrators (CCMTA). The standard is based on consultations with all Provinces, Territories and Transport Canada. Motor vehicle operators must ensure loads do not fall or become dislodged from their vehicle.

Given the nature of landfilling operations, as well as waste mining activities, litter control is needed within and adjacent to the site. Several measures can be taken to minimize the amount of wind-blown debris leaving the active disposal area of the Landfill. Control measures can be divided into two groups: preventative measures to limit the generation of litter and regular maintenance measures to collect and prevent litter from leaving the site. Litter inspections will be carried out around the perimeter of the site on a monthly basis.

The following preventative actions will be taken to control and minimize the amount of litter generated at the Site:

- All vehicular traffic transporting waste to and around the Site will have loads secured to prevent waste from becoming dislodged or blowing out of the vehicle;
- Daily cover soils will be placed over the working face of the landfill in order to minimize the blowing of debris;
- Waste will be compacted to reduce blowing litter;
- The active face of the landfill and waste reclamation areas will be kept to a minimum, especially on windy days. This may be accomplished by placing daily cover soils over a portion of the active face, should windy conditions warrant this action; and
- Portable litter control fences will be utilized at the active face of the landfill, if required, to prevent wind-blown litter from leaving the active disposal area. Temporary (i.e., snow fences) or permanent litter control fences may also be used around the perimeter of the landfill, if required.

Under normal operating conditions and with the implementation of the above control measures it is still expected that some litter will be blown from the active landfill area. The landfill operator will carry out monthly inspections around the perimeter of the site. Any wind-blown litter observed during the inspections will be collected through both manual and mechanical methods and returned to the active landfill area.

6.6.8 Dust Control

Dust generation is common at most landfill sites due to the handling of soils and the movement of vehicles along gravel and dirt roads. Dust impacts result from: landfill site traffic, landfill operation, waste excavation and screening, soil borrow operation, and wind erosion. Dust in the vicinity of a landfill site should not be problematic under normal conditions and is usually controllable.

To ensure dust does not become a problem at the site during normal or extremely dry and windy conditions, the following control measures will be implemented:

- the extent of the waste reclamation area and soil handling operations will be minimized during high wind conditions;
- vegetation will be established on inactive areas, if required, to minimize wind erosion; and
- if dry conditions warrant, a dust suppressant will be applied to the on-site roadways and/or soil borrow areas and/or active disposal area.

6.6.9 Noise Control

Potential noise impacts from the site may result from operation of the landfill equipment and/or waste reclamation operation equipment. The operation of this equipment will be conducted in such a manner as to minimize noise impacts, whenever possible. In order to reduce the noise impacts to surrounding residents, operation of landfill equipment will not be undertaken prior to 1 hour before and no later than 2 hours after the approved hours of operation.

All operation equipment used during landfill construction, landfill operation and waste reclamation activities will comply with the noise level limits outlined in the "Noise Guidelines for Landfill Sites" (MECP, 1997). In addition, a landfill equipment maintenance program will be implemented at the site with particular attention to maintaining and where feasible, improving the noise muffling systems on landfill equipment.

The noise Impact Assessment completed for this study indicates that the predicted sound levels for all receptors are below the MECP's daytime criterion of 55 dBA for landfills. As such noise mitigation measures are not required to achieve compliance.

6.6.10 Vector Control

The terms vector and vermin refer to objectionable insects, rodents, birds and other animals that may establish a habitat at a landfill. Common landfill vector and vermin include flies, rats, gulls and bears. The presence of animals at landfill sites is of concern because they represent potential pathways for the dissemination of disease to humans and domestic animals. Animals that can harbour or carry pathogens that may cause disease are collectively known as vectors. Disease may be transmitted by vectors through direct or indirect contact with humans.

Animals may be attracted to a landfill because site features offer suitable foraging habitat. Consequently, they may move onto the landfill temporarily or permanently. Secondly, animals may arrive at a landfill by chance as part of refuse delivered to the site. Because the working face is compacted and covered daily, rodents and insects do not survive and do not typically create problems.

Bears are expected to be present on-site. Daily, intermediate and final cover should minimize the attraction to bears. If bears become a problem, an electrical fence may be installed around the active working face and energized during the active bear season.

6.6.11 Fire Control

Accidental fires at landfills are rare. They are caused by two processes. The more common is a surface fire caused by undetected hot loads that are landfilled. Hot loads (i.e., loads that are smoking or visibly burning) may arrive at the site. Staff will monitor all vehicle arrivals for signs of a hot load. In the event that a hot load arrives on-site, the driver will be directed to an isolated area of the landfill to prevent a fire at the working face. The vehicle will then be unloaded and the fire smothered with soil.

Much less common is a subsurface fire resulting from the spontaneous combustion of wastes, usually caused by inappropriate operation of a landfill gas collection system drawing air into the landfill.

A fire plan has been developed by the City and staff will be trained regarding its contents. The following measures are in place at the landfill to either reduce the potential for fires, or to react to fires in the event they occur:

- No smoking is permitted in the landfill;
- A stockpile of clean fill material is maintained adjacent to the working face for smothering any accidental fire;
- Burning of waste is prohibited at the site; and
- Suitable fire extinguishers are kept and maintained in working order in all structures and landfill vehicles and equipment.

Site staff will be trained in the prevention and detection of fires along with the procedures to be followed in case of fires. Fire Services will be called to investigate and respond to fires other than small incidental fires brought under control by the landfill staff.

6.6.12 Site Inspection and Maintenance

Regular Site inspections will be conducted by landfill personnel to verify that nuisance factors associated with housekeeping procedures, such as dust, litter, and odour, are under control, thereby, preventing routine operational nuisances from developing into more serious environmental problems. Inspections will be carried out daily, weekly and monthly for various elements of the site development and operations. Routine maintenance activities shall be undertaken regularly to address items identified through the site inspections to ensure the site is clean and functioning as intended.

6.7 Site Development and Operation

Initial Site Preparation

Before wastes are received at the expanded landfill, the following activities will be undertaken:

- Implement sediment control plan;
- Relocate the existing compost pad and earth borrow area located north of the existing Landfill;
- Clear and grub the initial areas of construction (Cell 1);
- Strip topsoil from Cell 1 and other initial construction areas that will be regraded;
- Excavate and grade Cell 1 to proposed base contours;
- Construct berms and/or ditching to divert any surface water from the cell excavation area, and away from the lined area of Cell 1;
- Construct the liner and leachate collection system for Cell 1;
- Construct a new stormwater management pond and perimeter ditches;
- Construct the leachate pump station and leachate force main extension and connection;
- Construct initial perimeter road extension;
- Establish new groundwater and gas monitoring stations; and
- Begin waste reclamation activities in Cell 1A.

The City will ensure all the nuisance control measures are in place to minimize any environmental impacts during landfill construction, mining and operation activities.

Development Sequence

The proposed landfill expansion consists of seven cell areas (Cells 1 to Cell 7) and one landfill mining area (Cell 1A) as shown on **Figure 6.1.** The Cell Development Staging assumes cells will be constructed from Cell 1 through to Cell 7. Waste reclamation will commence at Cell 1A following completion of Cell 1. The approximate timing for development over the estimated residual site life of the existing site combined with the estimated site life for the expansion is shown below:

Year*	Main Activities
1	Cell 1 construction and existing landfill operations
2-3	Cell 1 operation and mining operations on Cell 1A
4	Cell 1 operation and Cell 1A construction
4-8	Cell 1 operation
9	Cell 1A operation and Cell 2 construction
10-11	Cell 2 operation and Cell 3 construction
12-15	Cell 3 operation
16-17	Cell 3 operation and Cell 4 construction

18-20	Cell 4 operation and Cell 5 construction
21-23	Cell 5 operation and Cell 6 construction
24-26	Cell 6 operation and Cell 7 construction
26-28	Cell 7 operation
28-29	Landfill Closure

* Assumes new landfill footprint receives waste beginning in Year 2. (Note: residual waste capacity remains within the existing footprint at the time that disposal operations commence in the new footprint).

Hours of Operation

The maximum proposed hours of operation for the expanded landfill are Monday to Saturday, 7:30 am to 5:00 pm, except for statutory holidays. The landfill management may decide to increase or decrease the hours of operations anytime within the maximum proposed hours of operation.

Landfill equipment may start internal operations one hour earlier or later to prepare or close the daily operations respectively.

Site Equipment

Basic functions to be performed by landfill equipment are:

- Waste grading and compaction; and
- Excavating and placing of daily and intermediate cover.

Typically, these functions will be performed by a landfill compactor, excavator, dozer and loader. A rock truck will be used to haul soil to the active area.

Other functions requiring equipment are landfill cell preparation, final cover construction, delivery of drop-off bin wastes to the working face, road maintenance, snow removal, litter pickup, odour mitigation and dust control. Some of these functions may be performed with on-site equipment, but others may require equipment to be leased or a contractor to be hired.

Routine maintenance and cleaning will be performed as necessary to keep on-site equipment in good operating order.

Landfill Staff

Operations will be undertaken by City staff but may be contracted to a third party in the future. All employees working at the landfill will be properly trained for the jobs that they will be expected to perform. The following gives a brief description of the staff at the landfill:

- Landfill Site Management - The Landfill Management staff are responsible for the operation of the Landfill. They oversee and co-ordinate day-to-day operations at the site.
- Equipment Operators and Labourers - Under the direction of the Landfill Management staff, the Equipment Operators and Labourers are responsible for operating and maintaining mobile equipment used for waste handling and disposal operations, site maintenance and housekeeping and other assigned work tasks.
- Administrative Personnel - administrative personnel will be employed at the landfill to conduct work as directed by Management staff.

Continuing on-the-job training will be provided for all employees. The training will emphasize the safe and environmentally sound operation of the landfill. All employees will be given safety training covering all equipment and systems with which they will be expected to interact with on a daily basis.

Daily Operations

Waste will be placed utilizing the area fill method in which the waste will be placed and compacted on previously filled areas or the prepared base, where applicable, and covered with daily cover soil at the end of each working day.

Intermediate cover will be placed on disposal areas which remain inactive for long periods of time, after which landfilling will resume until final contours are reached. Intermediate cover will be stripped prior to the resumption of landfilling, in order to promote hydraulic connection between waste lifts.

Interim stormwater berms will be constructed as required in each stage to divert clean surface runoff from the disposal footprint and thus reducing the leachate quantity.

Final Cover

A progressive final cover placement program will be utilized throughout development of the site in order to maximize surface water runoff, thereby reducing the amount of infiltration into the landfill area and consequently minimizing leachate generation. Final cover will be progressively placed over all areas of the landfill that have reached final contours. The final cover will be constructed with a 0.85 m soil layer overlain by a 0.15 m layer of soil capable of sustaining vegetation.

Environmental Monitoring (Public Liaison) Committee

An Environmental Monitoring Committee exists for the Sault Ste. Marie Landfill. This committee has been kept aware of the proposed expansion throughout the EA process. It is anticipated that the committee will continue to be active into the future and will serve as the focal point for dissemination, review and exchange of information and monitoring results relevant to the Site. Any changes to committee membership will follow an open transparent application process.

Site Closure and Post-Closure Care

During landfill development, final cover and seeding will be applied progressively to portions of the fill area that are completed. Consequently, site closure will involve reaching final waste elevations over the last remaining area of the landfill followed by the application and seeding of final cover in that area. The entrance gate will be retained to control access.

Long-term maintenance will be concerned primarily with maintenance of the final cover, gas management system, leachate management systems and monitoring well network. Erosion, ponding from settlement, and leachate seeps will be corrected, as required. Typically, regular inspection and monitoring takes place for a period of two years after site closure, after which a long-term monitoring and care program is established.

A Closure Plan will be submitted to the Regional Director of the MECP for approval when the landfill site is five years from its projected completion.

7.0 POTENTIAL NET EFFECTS

This chapter of the Environmental Assessment describes the potential for net effects (i.e. effects remaining after mitigation) to occur as a result of the proposed landfill expansion (including landfill mining). Potential effects have been described for each of the following:

- Natural Environment (biology, hydrogeology and surface water);
- Atmospheric (air quality, odour and noise);
- Socio-Cultural Environment (archaeological, social, land use and visual); and
- Economic Environment (business and transportation).

The assessment of potential net effects was based on the landfill conceptual design as noted in Section 6.0 of this report. As such it was assumed that a section of the existing fill area would be mined and lined and the new fill area lined to reduce the potential for groundwater impacts. Summaries of potential effects are included in the following subsections. Technical discipline specific reports are included in appendices to this EA (**Appendix D to N**).

Mitigation measures were recommended to reduce or eliminate potential effects on the environment. This site has been operated successfully by the City for 30+ years. The City's commitment to continual improvements has positively impacted the operational practices over time and further enhancements and mitigation measures have been incorporated in this proposal to further build upon the historical success. The recommended mitigation measures are discussed in the following subsections and included in the future commitments for the site (see Section 8.0 of this report).

For this expansion, the access route was considered to be along Fifth Line from Highway 17 to the site as this represents the route for the majority of trucks and individual residents coming to the landfill. It is noted that this route has not changed from the current access route to the site. The discipline specific study areas used to assess net effects are described in Section 1.8.2. The areas identified for each discipline reflect the areas for potential effects.

7.1 Approach to the Assessment of Net Effects

The assessment of net effects was completed using criteria initially documented in the EA Terms of Reference. **Table 7.1** presents the evaluation criteria used for the effects assessment and notes the rationale for any changes to the criteria included in the Terms of Reference.

The study areas used for the assessment of effects were determined by the technical disciplines and represent the area with the greatest potential for impact from the proposed expansion activities. The study areas considered are also noted in **Table 7.1**.

Table 7.1 Environmental Components to be Considered in Evaluations (Table 5.1 in EA Terms of Reference)

Criteria From EA Terms of Reference		Rationale for Changes to Criteria	Study Area Used in EA
Environmental Component	**Indicators**		
Natural Environment			
Biology	• Terrestrial systems on site, off site and in the vicinity of the current or potential site. • Aquatic habitat and fisheries on site, off site and in the vicinity of the current or potential site. • Presence of wildlife on site, off site and in the vicinity of the current or potential site. • Presence of medicinal plants on site.	No substantive change from assessment criteria proposed in Terms of Reference.	• On-site – within the existing and proposed expanded fill area. • Off-site within 100 m of the preferred expansion boundary.
Geology/Hydrogeology	• Geologic conditions. • Groundwater flow and quality. • Geological/hydrogeological complexity. • Wellhead protection areas of municipal supply wells. • Groundwater use (private and municipal). • Development of future water resources.	No substantive change from assessment criteria proposed in Terms of Reference. Geologic conditions and geological/hydrogeological complexity were considered in the assessment but not included as separate assessment criteria.	• On-site - within the existing and proposed expanded fill area. • Off-site – within the city owned landfill property. • The study area for the ground water impact assessment focuses on the City-owned landfill property. The objective is to meet ground water quality criteria prior to discharging from the site
Surface Water	• Watersheds. • Drainage paths. • Surface water flows and quality.	No substantive change from assessment criteria proposed in Terms of Reference. Watersheds and drainage paths were considered in the assessment but not included as separate assessment criteria.	• The study area for the surface water impact assessment focuses on the City-owned landfill property. The objective is to meet surface water quality criteria prior to discharging from the site.

Table 7.1 Environmental Components to be Considered in Evaluations (Table 5.1 in EA Terms of Reference)

Criteria From EA Terms of Reference		Rationale for Changes to Criteria	Study Area Used in EA
Environmental Component	**Indicators**		
Atmospheric **Dust** **Noise** **Air Quality**	• Ambient (baseline) dust conditions. • Ambient (baseline) noise conditions. • Ambient (baseline) air quality conditions.	No substantive change from assessment criteria proposed in Terms of Reference.	• Air quality generally considered and area within 10 km of the site which may experience potential impacts. • Noise study area generally considered an area within 1000 m of the proposed expanded disposal boundary and considers nearest receptors.
Socio-Cultural Environment			
Archaeology	• Presence of known or potential archaeological resources on site.	No substantive change from assessment criteria proposed in Terms of Reference.	• The study area considered for the Archaeological assessment generally consists of the City owned landfill property (most recent acquisitions were excluded) and encompasses all areas that may be disturbed by future site development.
Heritage	• Presence of known heritage landscapes on site.	There are no significant heritage landscapes on the site and the view from the road will not significantly change.	• The study area considered for the Heritage assessment generally consists of the City owned landfill property (most recent acquisitions were excluded) and encompasses all areas that may be disturbed by future site development.
Social	• Presence of existing residences on site, off site in the vicinity of the current or potential site and along the access route(s). • Presence of institutional, community and recreational features on the site, off site, in the vicinity of the current or potential site and along the access route(s). • Presence of First Nations reserves and communities and spiritual, cultural or ceremonial and traditional use sites. • Community characteristics. • Community concerns.	No substantive change from assessment criteria proposed in Terms of Reference. Information on community concerns was collected and used to inform the assessment of potential for displacement and disruption effects on residents and community features. This was not considered as separate criteria.	• The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500m of the perimeter of the fill area. For the purposes of this proposal we have conservatively considered a 1000 m radius to be the principal area of potential impacts. The area between the one and two kilometre radii has also been included to further characterize the area surrounding the zone of potential impacts.

Table 7.1 Environmental Components to be Considered in Evaluations (Table 5.1 in EA Terms of Reference)

Criteria From EA Terms of Reference		Rationale for Changes to Criteria	Study Area Used in EA
Environmental Component	**Indicators**		
Planned Land Use	• Official Plan designations and zoning on site, off site and in the site vicinity. • Future development proposed in the site vicinity and along the access route(s).	No substantive change from assessment criteria proposed in Terms of Reference.	• On-site - within the existing and proposed expanded fill area. • Site vicinity - within 500 m of the on-site study area which coincides with the area of influence of a landfill site as prescribed in Ministry Guideline D4. • Regional – the lands extending 1 km beyond the site vicinity study area to provide some context on land uses surrounding the area that is typically impacted the most by a landfill site.
Visual	• Existing views/viewsheds of the facility in the site vicinity.	No substantive change from assessment criteria proposed in Terms of Reference.	• On-Site - within the existing and proposed expanded fill area; • Site-Vicinity - within 500 m of the on-site study area which coincides with the area of influence of a landfill site as prescribed in Ministry Guideline D-4. • Regional - the lands extending 1 km beyond the site vicinity study area.
Economic Environment			
Agriculture/Forestry/Mining	• Presence of or potential for agricultural/forestry and mining activity on site, off site, and in the vicinity of the current or potential site.	There is no agriculture or forestry in the site vicinity. Mining (i.e. aggregate extraction) was considered under Businesses.	• Not applicable
Businesses	• Presence of business enterprises on site, off site, in the vicinity of the current or potential site and along the access route(s).	No substantive change from assessment criteria proposed in Terms of Reference.	• The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500m of the perimeter of the fill area. For the purposes of this proposal we have conservatively considered a one kilometre radius to be the principal area of potential impacts. The area between the one and two kilometre radii has also been included to further characterize the area surrounding the zone of potential impacts.
Transportation	• ~~Proximity of the site to airports~~. • Traffic safety along access route(s).	No substantive change from assessment criteria proposed in Terms of Reference.	• On-site - within the existing and proposed expanded fill area.

Table 7.1 Environmental Components to be Considered in Evaluations (Table 5.1 in EA Terms of Reference)

Criteria From EA Terms of Reference		Rationale for Changes to Criteria	Study Area Used in EA
Environmental Component	**Indicators**		
	• Traffic operations along access route(s).	The criterion "proximity of the site to airports" was removed as there are no airports in the vicinity of the landfill.	• Site vicinity – along Fifth Line to Old Goulais Bay Road to the west and Highway 17 to the east including the respective intersections.
~~**Tourism**~~	~~• Presence of tourist enterprises on site, off site, in the vicinity of the current or potential site and along the access route(s).~~	Tourism facilities were captured under Businesses and thus removed as a separate criterion.	• Not applicable

7.2 Natural Environment Effects

The following describes the natural environment impact assessment completed for the preferred expansion option. Full details are provided in **Appendices D to F and M**.

7.2.1 Biology

Data Collection:

Field assessment of the proposed expansion area was undertaken in September 2011. Information collected during this field visit was supplemented with data available from past field work undertaken over a number of years prior to this point. The field work provided site specific information to supplement the background data collection undertaken for the site. When in the field staff conducted a vegetation inventory, completed an ecological land classification, conducted an aquatic assessment, and documented wildlife observations.

The off-site study area for this work included areas within 100 m of the preferred disposal footprint boundary. It is generally assumed that the natural features that most commonly occurred in this region of Ontario would not be impacted by proposed expansion works if they were located outside of this 100 m setback.

Existing Conditions:

The following outline the existing conditions observed during the field work.

Vegetation Inventory - A total of 76 plant species were documented during terrestrial field studies. Just over half of the species found were identified as native species and just under half as introduced species. All of the native plant species observed are considered to be relatively common (more than 100 occurrences in the province). Based on the species found it was determined that the natural vegetation communities adjacent to the current landfill have undergone previous disturbance. A number of non-native and potentially invasive species were observed during site investigations, mainly associated with the regularly disturbed areas in the landfill.

Ecological Land Classification - A total of seven natural and/or naturalized ecological communities and one cultural (human influenced) land use were observed within the study area. All vegetation communities surveyed are considered common in Ontario and no rare vegetation community types were observed.

Incidental Wildlife Observations – Thirteen wildlife species were observed in the study area during the field work including: American Crow, Bald Eagle, Black-Capped Chickadee, Common Raven, Mourning Dove, Ring-Billed Gull, Song Sparrow, Turkey Vulture, White-Crowned Sparrow, Red Squirrel, Black Bear, Spring Peeper, and Mourning Cloak. With the exception of Bald Eagle, which is listed as Special Concern under Ontario's Endangered Species Act (ESA), 2007, all of the species listed are considered common and secure in Ontario.

Aquatic Assessment - Ministry of Northern Development, Mines, Natural Resources and Forestry (MNRF) historical fish collection data, as well as incidental observations made during sampling events, indicate that the Root River and lower sections of Canon Creek can support a diverse fish community, including salmonid species. During the sampling events, salmonid migration and individual fry were observed. The Root River was identified as sensitive cold-water fish habitat (e.g., brook trout, rainbow trout), while Canon Creek is warm-water fish habitat (e.g., blacknose dace, brook stickleback and creek chub), with the occasional coldwater species present.

Species at Risk and Species of Conservation Concern - Through a search of available historical occurrence records within 3 km of the landfill from the MNRF and various wildlife atlases, it was determined that 27 Species at Risk (SAR) and Species of Conservation Concern (SCC) have the potential to occur in the general geographic vicinity of the study area.

One SCC, a Bald Eagle, was observed in the Study Area during fieldwork but no nests were observed in area. The Root River adjacent to the landfill may provide seasonal foraging habitat. However, existing site noise disturbance may preclude nesting in proximity to the landfill.

Candidate Significant Wildlife Habitat - The MNRF has developed a set of criteria by which Significant Wildlife Habitat can be identified in Ontario. Based on site characteristics observed during field work, four Candidate Significant Wildlife Habitats were identified in the study area. Most habitats were assessed to have a low potential of occurrence in the study area. Woodland raptor nesting habitat had a moderate potential due to the presence of woodlands and viable nesting trees; although, no raptor nests were observed in the immediate vicinity of the study area. Further, existing site noise disturbance may preclude nesting in proximity to the landfill. Therefore, it is unlikely that this potential habitat is present.

Potential Effects and Mitigation: Typically, the adverse effects from landfill expansion on vegetation and wildlife are most evident during the site preparation and construction phase of a development with some potential for tree and ground vegetation removal resulting from landfill construction or disturbance resulting from noise during operation. While there is some removal of vegetation required, it is expected that the proposed expansion will lead to a minimal residual effect on local wildlife habitat. The potential for direct and indirect impacts as a result of landfill expansion are summarized in **Table 7.2**.

Environmental monitoring during each landfill expansion phase will consist of monitoring the erosion and sediment control measures, tree protection fencing, and the edges of protected natural features. Periodic environmental monitoring is recommended to be carried out through the duration of construction activities to ensure that the erosion and sediment control measures described above operate effectively and to monitor the potential impacts to natural features. The duration of construction is defined as the period of time from the beginning of site preparation (e.g., vegetation clearing and grubbing) and earthworks until the site is stabilized. Site stabilization is defined as the point in time when expansion works have been completed, the associated infrastructure installed, and exposed soil has been stabilized.

Protected vegetation areas will require periodic monitoring to ensure that they are not impacted by the adjacent development landfill expansion. Should impacts be observed, necessary steps will be taken to ensure that the impacted vegetation is either restored or replaced.

Environmental monitoring will be initiated during operations to track potential effects on local groundwater and surface water systems and their associated aquatic habitat. Environmental monitoring activities during operations will also include monitoring of invasive species encroachment, invasive species control, if necessary, and woodland edges.

Table 7.2 Biology Summary of Net Effects

Criteria	Potential Effect	Proposed Mitigation	Net Effect
Terrestrial systems on-site, off-site and in the vicinity of the current or potential site.	The expansion of the Sault Ste. Marie Landfill will require the removal of trees and ground vegetation (approximately 13 ha). Forest fragmentation on a landscape level scale is not anticipated as alternative movement corridors exist in the general area of the landfill. Tree removal may result in the following impacts on a site level: • Loss of woodland and meadow vegetation. • Loss of woodland and meadow habitat potentially used by wildlife common to this area. • Narrowing of the ecological linkage west of the landfill. • Physical injury, root damage, and compaction of trees not intended for removal that may result from construction activity.	Minimize need for tree removal to the extent possible. General tree protection and edge management practices are recommended to minimize the physical disturbance associated with vegetation removal. These include: • Remove and dispose of waste pile and inorganic debris. • Use qualified professional for tree removal. • Trees located along new woodland edge that may conflict with construction activity should be pruned by a qualified professional. • Where feasible, select felled logs and other organic debris should be placed carefully in existing forest. • Small trees, shrubs and ground vegetation immediately adjacent to clearing area should be preserved. • Tree protection fencing should be installed around critical root zone of preserved trees. The fencing should be monitored and maintained throughout construction. • Heavy machinery should be avoided within the root zones of the adjacent trees to prevent soil compaction and root damage. • Avoid placing fill in periods of high run-off (e.g. spring and fall) to prevent deposition of sediment in tree root zones. • If excavation is required near the forest edge, an arborist should expose the root system to determine where root pruning is required. • Use of core aerators should be considered where appropriate to improve aeration and drainage of compact soils near forest edge. • Woodland edge should be inspected periodically during construction for indicators of tree dieback. If observed a condition assessment should be completed by a qualified arborist.	Minor net effects anticipated resulting from vegetation removal.

Table 7.2 Biology Summary of Net Effects

Criteria	Potential Effect	Proposed Mitigation	Net Effect
		• Within 12 months of each stage of landfill expansion, a qualified arborist should assess the new woodland edge and conduct removal or pruning as required.	
	Physical site disturbance may increase the likelihood that exotic and/or invasive flora species will be introduced to the surrounding vegetation communities.	• The potential impact of invasive species can be largely mitigated through the implementation of an edge management plan (see points above). • Select removal should occur in areas heavily invaded by invasive exotic species.	No net effects anticipated.
Aquatic habitat and fisheries on-site, off-site and in the vicinity of the current or potential site.	No direct aquatic effects anticipated as a result of erosion and sedimentation as there are vegetation buffers between the landfill expansion area and the Root River and Canon Creek. Potential for erosion and sedimentation effects will be limited to localized edge disturbance and/or loss of adjacent vegetation due to the deposition of dust and/or overland mobilization of soil.	Mitigation for erosion and sediment control includes: • Silt fencing or a reasonable alternative should be installed on the edge of the development limits and grading limits. • Mud Mat should be installed at the construction entrance. • Rock Check Dams and/or Filter Socks in swales and ditches. • Removal of any accumulated sediments. • Surface stabilization for stockpiles and temporary sediment basins. • Erosion control blankets may be required for sloped restoration areas regardless of timing. • ESC measures should be monitored regularly and/or after every 10 mm or greater rainfall events for cleaning, maintenance and/or reconstruction.	No net effects anticipated.
	Potential release of leachate from the landfill could result in water quality effects. Landfill leachate could contain microorganisms and high concentrations of nutrients and other deleterious substances (e.g., organic carbon, nitrogen, chloride, iron, manganese, phenols, pesticides, solvents, heavy metals, etc.) that could degrade groundwater and aquatic systems in surface water.	• Employ operational best management practices to collect leachate. • Employ an operational stormwater management (SWM) plan.	No net effects anticipated.
Presence of wildlife on-site, off-site and in the vicinity of the current or potential site.	Potential for incidental wildlife mortality on-site primarily attributed to vehicle collisions. This is common when a construction project is located	• Vegetation removal should not take place during established core breeding bird season (i.e. May 9th to August 8th).	Minor net effects anticipated.

Table 7.2 Biology Summary of Net Effects

Criteria	Potential Effect	Proposed Mitigation	Net Effect
	within or in proximity to potential wildlife habitat.	• Where appropriate retain non-hazardous wildlife habitat trees that contain nest, den or roost cavities. • Avoid construction lay-down and staging within the boundary of a natural feature scheduled for preservation.	
	Man-made disturbance to local wildlife communities within the off-site study area due to indirect impacts such as noise, light, vibration and human presence can adversely influence movement, population size and breeding success of local wildlife. Local wildlife is likely habituated due to the existing operational activity on the site. The disturbance is expected to be most pronounced during the site preparation (vegetation removal) phase of the expansion. Localized ecological connectivity west of the site may be affected by removal of vegetation cover, subsequent narrowing of the ecological linkage and the disturbances mentioned above associated with operations.	• Where possible maximize the distance of construction equipment from the woodland edge. • Limit the use of lighting where possible. • Advise contractor and construction staff through drawing specifications and awareness training to visually monitor wildlife species and report encounters.	No net effects anticipated.
Presence of medicinal plants	Plant species were inventoried. The City has not been made aware of any First Nations medicinal plants on-site through the consultation process.	Continue to reach out to Aboriginal Communities as the project continues to move forward and incorporate mitigation as necessary.	No net effects anticipated.

7.2.2 Hydrogeology

Data Collection:

The assessment of potential hydrogeological effects associated with the proposed expansion was based on secondary source information, a site-specific hydrogeological assessment and annual monitoring data collected over the last 35 years. The study area for the hydrogeological impact assessment is the area within the landfill property owned by the City of Sault Ste. Marie. Consideration was also given to the immediate vicinity and the regional context. The contaminant model POLLUTE was used to assess potential impacts on groundwater.

Existing Conditions:

Geology - The physiography of Sault Ste. Marie is heavily influenced by both the topography of the bedrock surface and the nature and thickness of the overburden which consists of Quaternary sediments of the most recent Wisconsinan glaciation.

An Archean upland known as the Gros Cap Highland that has rock knob topography occurs in the northern part of the city. The upland bedrock consists of intrusive gneissic granitoid rock which has very thin overburden. South of the exposed bedrock ridges, most of the city is located in a lowland area underlain by Proterozoic bedrock chiefly the red sandstone of the Jacobsville Formation. The Proterozoic bedrock is overlain by thick overburden comprised of glacial and postglacial sediment. A major northeast-trending fault, referred to as the Anderson Fault separates the Jacobsville Formation from the Archean rock to the north (Cowan et al., 1998).

The landfill site occurs immediately south of the bedrock ridge in an area of sand and gravel which was deposited by meltwaters flowing south from glacier ice on the Gros Cap Highland. These deposits are associated with the main Glacial Lake Algonquin shoreline. Underlying the sand and gravel and extending further south from the landfill, fine and medium sand was deposited in a nearshore or deltaic environment. Further south from the sand deposits, deep fine-grained clay was deposited in a deep-water environment.

The landfill site is developed on the northern limit of a stratified glaciolacustrine beach type deposit which is underlain by deltaic sands and gravels. Maximum overburden thickness approaches 36 m below the existing landfill. Alluvial sands and gravels border Canon Creek and the Root River, and also form the flood plain of the abandoned meander area of the Root River located south of the fill area and north of Fifth Line. Monitoring wells located along the Root River, in the vicinity of Fifth Line, are placed in these alluvial deposits.

Hydrogeology - A large groundwater recharge zone occurs at the southern extent of the Gros Cap Highland. The recharge area consists of sand and gravel beaches deposited adjacent to the uplands, and covers an area of 37.5 km² (SSMRSPA, 2011). The landfill site is situated in this recharge zone.

The municipally serviced area (i.e. potable water) extends to the landfill site (extends north along Old Goulais Bay Road and then east along Fifth Line to the site). Water Well Records along Fifth Line in the vicinity of the landfill indicate that water wells are more than 40 m deep and are typically installed in sand.

On-site, a groundwater divide is located along the western portion of the existing fill area. Groundwater flows both southeast and southwest from this divide. The lateral direction of shallow groundwater flow, beneath the central and eastern portion of the landfill fill area, is south-southeastward with discharge to Canon Creek and the meander area. Intermediate flow, at approximately 10 m in depth in the area of the

meander loop, continues southward with ultimate discharge estimated to be into the Root River south of the property boundary.

The till units of the meander area, and east of Canon Creek and the Root River have lower permeability than the sand. This causes preferential lateral flow in the overlying sands and gravels.

Groundwater flows both southwest and west from the groundwater flow divide through a massive, relatively undifferentiated sand deposit. The water table west of the existing fill area is significantly deeper (e.g., typically greater than 15 m) than the water table south and southeast of the existing landfill.

Source Water Protection - In March 2015, the Sault Ste. Marie Region Source Protection Plan (SPP) was approved and became effective July 1, 2015. The SPP was prepared to protect existing and future drinking water sources. The plan includes policies to manage land uses within vulnerable areas.

The existing landfill site and proposed expansion are not within a wellhead protection area as identified by the SPP. They do occupy a small portion of an area identified as a Significant Groundwater Recharge (SGRA) area as identified on Map 11 of the SPP. The SPP recognizes municipal waste disposal sites as potential threats to sources of drinking water and identifies policy tools to address drinking water threats. As such the site is carefully managed. There is an extensive annual groundwater quality monitoring program that has been completed since 1988 as required by the Environmental Compliance Approval and landfill site's annual monitoring reports are presented to Council, MECP and the Environmental Monitoring Committee. For the landfill expansion, approval is required under the *Environmental Assessment Act* and *Environmental Protection Act*. Obtaining approval under these legislations will require demonstration that the expansion does not pose a threat to the aquifer and drinking water. It is also noted that the expansion as proposed provides an opportunity to implement enhanced leachate management for the western portion of the site.

Existing Site Monitoring - Extensive hydrogeological investigations were completed in the early 1980's as part of the expansion of the landfill at that time. A comprehensive monitoring program has been in place at the site since the mid-1980s and the monitoring well network has expanded through the years.

Potential Effects and Mitigation:

The conceptual design of the landfill expansion addresses mitigation of potential groundwater impacts from the proposed expansion fill area as well as the western portion of the existing fill area (i.e. the area west of the groundwater divide). The design for the expansion involves construction of engineered cells with a full underdrain leachate collection system and composite liner system.

The impact mitigation that currently occurs in the western portion of the site (purge wells and contaminant attenuation zone) will be removed and replaced with the proposed enhanced controls. The proposed expansion includes landfill mining in the western portion of the existing fill area to accommodate a liner and leachate collection system (i.e. the same system proposed for the new fill areas).

Groundwater impact control is well established and effective on the south and east sides of the existing fill area through a horizontal collection system which will continue to be maintained through the contaminating lifespan of the landfill. The horizontal collector system is located beyond the limit of the existing fill area and at a depth that allows for easy replacement, if necessary.

In addition, although initially included as a contingency, the City has proactively acquired additional buffer lands adjacent to the site's western boundary. The City has successfully negotiated three Fifth Line properties adjacent to the western boundary and is proceeding with expropriation of a fourth and final

property. Over several years the City has now acquired a total of eight (8) Fifth Line properties to enhance its buffer lands along the western and eastern boundaries.

For the proposed expansion area, the evaluation of the potential for groundwater impacts was based on the following:

- Underlying soil characteristics;
- Leachate collection system service life;
- Waste density per unit area; and
- Leachate generation rate.

Using this information, contaminant transport modelling was completed to estimate groundwater quality impacts resulting from the proposed expansion. The computer program POLLUTE was used to predict groundwater quality considering the performance of the leachate control system and the hydrogeological setting. The impact of the landfill on groundwater quality was assessed by comparing the predicted impact to the Ontario Drinking Water Objectives and Reasonable Use Guideline. **Table 7.3** presents the potential effects of the expansion and proposed mitigation for hydrogeology.

Table 7.3 Hydrogeology Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effects
Groundwater flow and quality.	Based on the anticipated leachate generation for the site and the contaminant transport model, the site is predicted to meet appropriate criteria and have minimal impacts during the service life of the engineered systems that have been incorporated into the design assuming proposed mitigation is put in place in the design.	The following mitigation is incorporated in the design: • Landfill mining of the western portion of the existing site and the addition of an engineered liner and leachate collection system for the mined area and the new fill areas. • Continued operation of the existing horizontal collection system to maintain mitigation of impacts to the south and east of the site.	Anticipated improvement in overall groundwater protection.
Wellhead protection areas of municipal supply wells.	The proposed expansion is outside of the municipal wellhead protection zone.	Leachate management as noted above. No additional mitigation necessary	No net effects anticipated.
Groundwater use (private and municipal).	Some residents in the vicinity of the landfill have groundwater wells and some concern has been raised about the potential for impact to residential wells.	The City will implement a residential well water monitoring program (see Section 8 for more details on this program). Should impacts be detected, extension of the municipal water system could be completed to service properties east of the site or alternative water supplies provided. Municipal potable water is currently available along Fifth Line west of the landfill site.	No net effects anticipated.
Development of future water resources.	The existing landfill and proposed expansion is located in a Significant Groundwater Recharge Area in the Sault Ste. Marie Region Source Water Protection Plan (SPP). The proposed expansion	The following mitigation is incorporated in the design: • Landfill mining of the western portion of the existing site and the addition of an engineered liner and leachate collection	Anticipated improvement in overall groundwater protection.

Table 7.3 Hydrogeology Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effects
	complies with policies in the SPP and minimal impacts to the groundwater aquifer are anticipated assuming mitigation is incorporated into the design.	system for the mined area and the new fill areas. • Continued operation of the existing horizontal collection system to maintain mitigation of impacts to the south and east of the site.	

7.2.3 Surface Water

Data Collection:

The evaluation of hydrological impacts (water quality and water quantity) from the proposed landfill expansion was completed using a Visual OTTHYMO (VO2) hydrology model. The use of this model is in keeping with the City's Stormwater Management Guidelines (Anderson 2014). Data on flows in Canon Creek and Root River was obtained from WSC gauge 02CA002 – Root River at Sault Ste. Marie which provides 48 years of observed flow data (1971-2018). Information gathered and input to the model included:

- Drainage area;
- Land use, surface and soil type to define imperviousness; and
- Physical watershed characteristics.

The surface water analyses were based on two key assumptions:

1. The general layout and drainage characteristics conform to the design concept presented in the Design and Operations Report;
2. The surface water drainage system collects runoff generated from uncontaminated areas; runoff which has come into contact with refuse, such as the working face or other possible sources of contamination, are collected by the leachate collection system and are conveyed via the sanitary sewer system for treatment.

Existing Conditions:

The existing landfill site and proposed landfill expansion area are adjacent to Canon Creek to the North and East and the Root River to the South-East. The entire Root River basin is oriented in a northwest to southeast direction and drains approximately 210 km^2. It is the largest watershed within the jurisdiction of the Sault Ste. Marie Region Conservation Authority (SSMRCA). The Root River flows in a south to southeast direction from the Goulais River through the City of Sault Ste. Marie and the Rankin Reserve to its outlet into the St. Mary's River near Little Lake George. There are four main tributaries within the basin, the Root River, the West Root River, Crystal Creek and Canon Creek.

Canon Creek is a major tributary of the Root River. It is oriented in a west to east direction and drains an area of approximately 23.3 km^2. In 2006, a small portion of Canon Creek was realigned by moving the most southern section of the creek east away from the landfill to facilitate the extension of the existing landfill leachate collection system within the old creek bed. Canon Creek joins the Root River approximately 400 m north of Fifth Line. Downstream of the confluence of Canon Creek and Root River is an old meander area that is to the south of the landfill and is frequently inundated with water during high flow periods.

Physiography and Surficial Deposits - The northern portion of the Root River basin (including a majority of the Canon Creek basin) is located within the Pre-Cambrian Shield. This area is characterized by hard, igneous intrusive bedrock with little or no overlying soils.

The southern portion of the basin consists of a series of ancient lake beaches and terraces left after the last period of glaciation. The soils in this portion of the basin consist of medium textured sands and gravels. These sands are underlain by glacial till, silts and clays.

In the area immediately upstream of the outlet of the Root River, the soil types change to lacustrine clays and silts, and glacial till. These soils characterize the area south of the shoreline of a glacial melt water lake.

The soils in the area of the proposed landfill expansion consist of a deep layer of medium to coarse sands and gravels over silt or clay.

Land Use – The lands in the upstream reaches of the Root River basin are primarily forested areas. The area in close proximity to the landfill site is generally sparsely developed with aggregate extraction, low density residential, and some commercial uses. Downstream of the landfill site the sparsely developed land use pattern persists in proximity to the Root River extending to the Rankin Reserve.

Flow Characteristics – Water Survey of Canada (WSC) has maintained a gauging station on the Root River located near the western boundary of the Rankin Reserve since 1971. Flow recorded at the gauge from this unregulated watershed can be regarded as representative of the entire study area.

Historical flows show that annual flood peaks typically occur in month of April but can also occur in the September – November period. The highest flow observed for the 1971 – 2013 period was 66.8 m^3/s on April 22, 1992. However, the peak flow in 2013 has been estimated at 76.4 m^3/s based on a recorded maximum daily flow of 59.7 m^3/s on September 10, 2013 and a peaking factor of 1.28. Low flows can be expected in July and August but can occur as late as September.

The September 10, 2013 event caused significant creek bank erosion along Canon Creek adjacent to the landfill site but did not impact the landfill site itself. Following the event the City completed significant creek bank erosion protection measures along the south and west banks of Canon Creek to mitigate potential future erosion impacts.

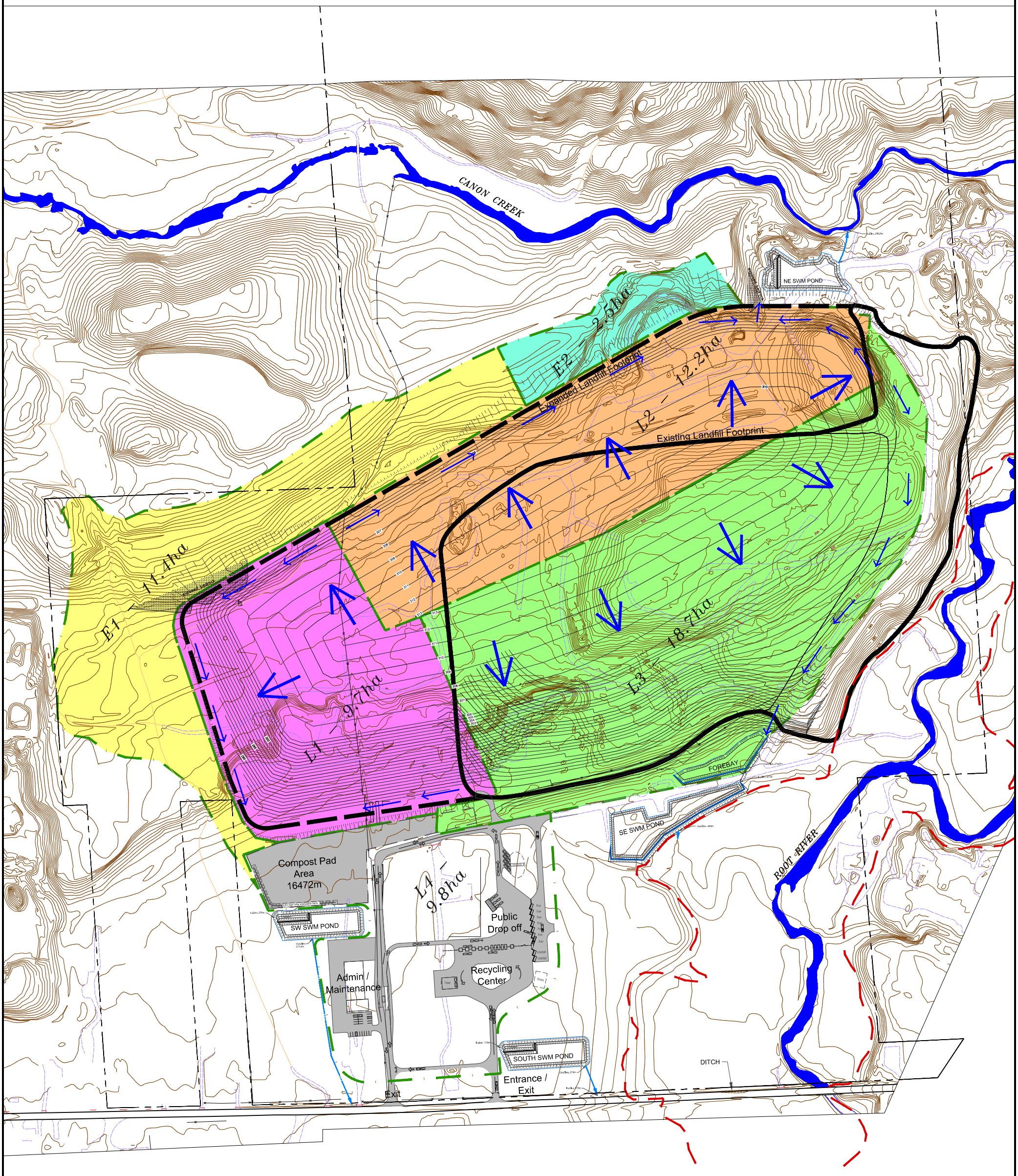
Climate – Sault Ste. Marie is located in the western part of the Sudbury climatic region. The growing season is longer and the winters are warmer than most of northern Ontario.

Local climatic variations occur due to topography, altitude, and proximity to water.

Stormwater Management - There is currently no formal facility that provides SWM servicing for the existing landfill site, aside from the existing pit that collects water from the northeast portion of the site. Drainage ditches along the landfill perimeter intercept surface runoff and route stormwater from surrounding lands around the fill areas to one of the three outlets or the existing pit.

Figure 7.1 is a base map of the landfill site including the proposed expansion, showing the drainage network, outlets and contributing subareas. The proposed expanded landfill site (L1, L2, L3, L4) covers a total area of 50.4 ha (out of approximately 151 ha owned by the City) and straddles the drainage divide between the Canon Creek and the Root River watersheds. Surface drainage will be provided by drainage ditches adjacent to the landfill; 12.2 ha of the northern half of the landfill site drains to Canon Creek while

38.2 ha drains to the Root River via both the meander loop south of the existing landfill footprint and the drainage ditch along Fifth Line. Of the remaining drainage adjacent to the site that is not active landfill (E1, E2), 2.5 ha in the northeast will outlet to Canon Creek by a swale, adjacent to the north perimeter of the SWM Pond that conveys flow to the outfall swale at the SWM Pond.



LEGEND

- CATCHMENT AREAS
- FLOODPLAIN (100 YEAR)
- PAVEMENT
- OUTLET SWALE
- EXISTING LANDFILL FOOTPRINT
- EXPANDED LANDFILL FOOTPRINT

AECOM

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City of Sault Ste. Marie

THE CORPORATION OF THE CITY OF SAULT STE. MARIE, ONTARIO
ENGINEERING DEPARTMENT

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Sault Ste. Marie Municipal Landfill Site

ON-SITE DRAINAGE

Figure 7.1

Potential Effects and Mitigation:

From a water quality perspective, the proposed expansion could result in potential impacts due to accidental spills or leachate seeps to the surface and/or increases in Total Suspended Solids (TSS) concentration due to runoff from the internal gravelled access roadways or site erosion.

On-site stormwater management (SWM) will be achieved through the existing/proposed system of ditches, culverts, and SWM ponds that have been designed to mitigate the impacts of stormwater runoff on water quality before discharge to Canon Creek or the Root River. The SWM criteria, as identified by the MECP in Ontario Regulation 232/98 and related Landfill Standards (MECP, 2012), include ditches with a 1:25 year capacity and treatment for 80% TSS removal.

All four new SWM ponds will be designed for 80% TSS removal and three (L1, L2 and L3) will have emergency flow control systems at their outlet, as a contingency. The SWM Pond can act as an emergency response cell where runoff can be stored in case of surface water contamination by leachate or on-site spills. Emergency response would be assisted by regular visual monitoring for leachate seeps, annual SWM pond outflow compliance monitoring during three significant rainfall events, and an operational program that incorporates immediate reporting of on-site spills. Manual shutdown response would be achieved through either a control valve or gate at the outlets. The ponds will be lined and designed to retain the complete runoff from the 1:100 year rainfall until appropriate treatment can be applied. The runoff will either be treated and discharged to the receiving watercourse or pumped and hauled for treatment elsewhere.

From a water quantity perspective, there are negligible impacts since peak flows from the site are significantly smaller than those of the receiving watercourse and the peak flow from the landfill does not coincide with peak flows in the receiving watercourses. There is no mitigation proposed for water quantity as the impact is insignificant.

The potential surface water effects, proposed mitigation measures, and net effects are summarized in **Table 7.4**.

Table 7.4 Surface Water Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Surface water flows and quality	Water quality impact from leachate or spills	• Leachate seeps and spills will be directed to lined stormwater management (SWM) ponds with emergency flow control systems. • A monitoring program has been developed which includes annual monitoring of influent and effluent from stormwater ponds which will facilitate an evaluation of the pond effectiveness during rainfall events. Parameters to be analysed include TSS together with current parameters included in the existing sites surface water monitoring program and additional parameters based on the Ministry's groundwater trigger list. • The monitoring program includes trigger values and a contingency plan. • Downstream surface water receivers will be monitored as per current practice.	No net effects anticipated
	Water quality impact from total suspended solids (TSS)	• The SWM ponds will be designed for 80% TSS removal.	Minimal net effects anticipated
	Stormwater from the ponds has the potential to result in thermal impact to Root River which is a cold water fishery.	• Ponds will not discharge directly to the Root River and the overall flow contribution from the ponds relative to base flow is very small. • The SWM pond outflow structure will be designed to have bottom draw characteristics. • Landscaping around the ponds will encourage shading.	Reduced impact anticipated
	Negligible potential for water quantity impacts since peak flows from the site are significantly smaller than the receiving watercourse and the peaks do not coincide.	• No specific mitigation proposed.	No net effects anticipated
	On-site drainage paths will be altered with the proposed landfill expansion.	• The proposed expansion areas will be drained by ditches adjacent to the internal roadway system to convey stormwater to the SWP ponds before discharge.	No net effects anticipated.

7.2.4 Atmospheric Air Quality

Data Collection:

The air quality, odour, and greenhouse gas assessment for the proposed Sault Ste. Marie Landfill Expansion was completed using the following steps:

- Definition of baseline concentrations of indicator compounds based on ambient air quality data;
- Review of future operational scenarios (including equipment location and estimated emissions) to select a worst-case operating scenario specific to air quality;
- Prediction of off-property concentrations of air quality indicator compounds; and
- Comparison of the combination of the predicted concentrations and baseline conditions to relevant air quality criteria.

The indicator compounds selected for the air quality assessment were those of greatest significance from typical landfill operations, namely:

- Oxides of Nitrogen (NO_X) and Nitrogen Dioxide (NO_2)
  - Generated from combustion of fuel in mobile and stationary equipment at the landfill.
  - Air quality criteria are based on prevention of health impacts.
- Total Suspended Particulate (TSP)
  - Generated from movement of vehicles on paved roads, movement of vehicles on unpaved roads/surfaces and material handling and movement.
  - Air quality criteria are based on visibility (dust).
- Particulate Matter with aerodynamic diameter less than 10µm (PM10)
  - Generated from movement of vehicles on paved roads, movement of vehicles on unpaved roads/surfaces and material handling and movement.
  - Air quality criteria are based on prevention of health impacts.
- Particulate Matter with aerodynamic diameter less than 2.5µm (PM2.5)
  - Generated from movement of vehicles on paved roads, movement of vehicles on unpaved roads/surfaces and material handling and movement.
  - Air quality criteria are based on prevention of health impacts.
- Carbon Monoxide (CO)
  - Generated from the flare, vehicular traffic on site, and stationary combustion sources.
  - Air quality criteria are based on prevention of health impacts.
- Sulphur Dioxide (SO_2)
  - Generated from fugitive landfill gas, flare, vehicular traffic on site, and stationary combustion sources.
  - Air quality criteria are based on prevention of health impacts.
- Vinyl Chloride, Chloroform, Acetone, Acrylonitrile, and Benzene
  - Generated from fugitive landfill gas and flare emissions.
  - Air quality criteria are based on prevention of health impacts.
- Hydrogen Sulphide (H_2S)
  - Generated from fugitive landfill gas and flare emissions.
  - Air quality criteria are based on prevention of health impacts and odour.

Existing Conditions:

In order to define existing air quality (baseline conditions), a review was performed of ambient air quality monitoring stations in close proximity to the landfill. The Ministry of the Environment, Conservation and Parks (MECP) and Environment and Climate Change Canada (ECCC) National Air Pollution Surveillance

(NAPS) stations were reviewed for each indicator compound. The closest monitoring station to the study area with a three (3) year data set was selected. A summary of the MECP and ECCC NAPS stations and data range available for each indicator compounds is summarized in **Table 7.5** below.

Table 7.5: Indicator Compound MECP and ECCC NAPS Station ID

Indicator Compound	Station ID	Data Range
TSP	NA	NA
PM_{10}	NA	NA
$PM_{2.5}$	Sault Ste. Marie (71078)	2015-2017
Nitrogen Oxides (NO_x)	Sault Ste. Marie (71078)	2015-2017
Hydrogen Sulphide (H_2S)	NA	NA
Vinyl Chloride	NA	NA
Chloroform	NA	NA
Acetone	NA	NA
Acrylonitrile	NA	NA
Benzene	NA	NA
Carbon Monoxide (CO)	Sault Ste. Marie (71078)	2006-2008
Sulphur Dioxide (SO_2)	Sault Ste. Marie (71078)	2015-2017
Nitrogen Dioxide (NO_2)	Sault Ste. Marie (71078)	2015-2017
Odour	NA	NA

The background concentrations for the indicator compounds from the MECP and ECCC NAPS stations were estimated based on the 90th percentile of the data obtained for the monitoring stations.

Ambient monitoring data for hydrogen sulphide is not readily available for the study areas. The ECCC documents an overall average concentration, measured in urban area presumed to be away from major anthropogenic (originating from human activity) sources in Canada[25], which was used as the background concentration for this assessment.

Ambient monitoring data for acetone and acrylonitrile are not readily available from ECCC NAPS stations. Background data is available from various ECCC NAPS stations for vinyl chloride, chloroform, and benzene, however, the background concentrations in these areas are not considered to be representative of the study area. The location of the available ECCC NAPS stations vary from the study area by:

- Industry type and prevalence;
- Differences in transportation types and volume;
- Differences in urban development; and
- Geographical variances.

It would therefore not be appropriate to use background ambient air quality data as a surrogate for data that is unavailable at the Sault Ste. Marie ECCC NAPS station. The Site's potential impact to cumulative air quality is expected to be minimal and the contribution to the ambient air quality is likely dominated by background concentrations.

[25] ECCC. Draft Screening Assessment: Hydrogen Sulfide (H_2S), Sodium Sulfide (NA(SH)) and Sodium Sulfide (Na_2S), September 2017.

MECP and ECCC ambient monitoring data for TSP and PM10 size fractions are not readily available for the study areas. To be consistent with using 3-years of background data where possible, the MECP station PM2.5 data was scaled to calculate TSP and PM10 background data. As PM2.5 is a size fraction subset of PM10, and PM10 is a size fraction subset of TSP, the PM10 and TSP background concentrations can be estimated based on the PM2.5 background concentration. Background concentrations of PM10 and TSP can be estimated by applying a PM2.5/PM10 ratio of 0.54 and a PM2.5/TSP ratio of 0.3 as shown below[26]:

$$PM2.5_{concentration} / 0.3 = TSP_{concentration}$$
$$PM2.5_{concentration} / 0.54 = PM10_{concentration}$$

The environment surrounding the site consists of primarily forest, low density residential, aggregate operations, and light manufacturing. It is expected that the ambient odour would be characteristic of this setting. There have not been any odour studies performed within the study area and therefore no baseline value has been defined for odour.

The background concentrations defined for this project are shown below in the **Table 7.6**.

Table 7.6: Background Air Quality Concentrations of Indicator Compounds

Indicator Compound	Averaging Period	Background Concentration ($\mu g/m^3$)
TSP	24 hr.	30.6
	Annual	19.8
PM_{10}	24 hr.	17.0
$PM_{2.5}$	24 hr.	9.2
	Annual	6.0
Nitrogen Oxides	1 hr.	23.4
	24 hr.	20.0
Nitrogen Dioxide	1 hr.	18.8
	24 hr.	13.5
	Annual	9.1
Hydrogen Sulphide	10 min	1.4
	24 hr.	1.4
Carbon Monoxide	0.5 hr.	389.5
	1 hr.	389.5
	8 hr.	458.2
Sulphur Dioxide	10-min	2.6
	1 hr.	2.6
	24 hr.	5.3
	Annual	2.0

Potential Effects and Mitigation:

The evaluation of potential effects of the project activities on air quality included the following tasks:

[26] Lall, R., Kendall, M., Ito, K., Thurston, G., 2004. Estimation of historical annual $PM_{2.5}$ exposures for health effects assessment. Atmospheric Environment 38(2004) 5217-5226.

- Analysis of Operating Scenarios – The worst-case operating scenario for air quality was used to determine the potential air quality effects of the expansion. To determine the worst-case, eight (8) future operational scenarios representing different stages of landfill development and operations were considered. The worst-case year of landfill gas generation for the expansion was used to determine the potential impact air quality effect from landfill gas compounds and odour.
- Emission Estimation - Emissions of indicator compounds from significant sources/activities at the landfill, including vehicles travelling into and out of the site, vehicles and equipment traveling within the site, combustion emissions from stationary and mobile equipment operating within the site, and the handling of materials within the site were estimated for the worst-case scenario.
- Dispersion Modelling and Analysis of Potential Effects - Air dispersion modelling was used to predict the maximum off property concentrations of indicator compounds. These maximum concentrations were combined with the corresponding baseline air quality concentrations to define a predicted cumulative impact, and compared to the pertinent ambient air quality criteria.

The criteria for air quality in Ontario are established in Ontario Regulation 419/05[27] (O. Reg. 419/05) and in Ontario's Ambient Air Quality Criteria[28] (AAQC). O. Reg. 419/05 provides contaminant concentration standards and guidelines to assess impacts for permitting requirements (i.e., compliance). The AAQCs developed by the MECP are commonly used in environmental assessments, special studies using ambient air monitoring data, assessment of general air quality in a community and annual reporting on air quality across the province.

Federally, the Canadian Council of Ministers of the Environment has a set of Canadian Ambient Air Quality Standards[29] (CAAQS) that were developed to be outdoor air quality targets for air quality actions across the country.

The applicable Ontario and Canada-wide standards and criteria are provided in **Table 7.7**. The most stringent criteria, standard, or guideline for each averaging period (shown in bold in **Table 7.7**) will be used throughout the assessment.

Table 7.7 Ontario and Canada-Wide Standards and Criteria

Indicator Compound	Averaging Period	Criterion ($\mu g/m^3$)	Regulation/Guideline
TSP	**24 hr.**	**120**	**O. Reg. 419/05, AAQC**
	Annual	**60**	**AAQC**
PM_{10}	**24 hr.**	**50**	**AAQC**
$PM_{2.5}$	24 hr.	30	AAQC
	24 hr.	28	CAAQS
	24 hr.	**27**	**CAAQS 2020**
	annual	10	CAAQS
	annual	**8.8**	**CAAQS 2020**
Nitrogen Oxides	**1 hr.**	**400**	**O. Reg. 419/05**
	24 hr.	**200**	**O. Reg. 419/05**

[27] MECP. Environmental Protection Act. Ontario Regulation 419: Air Pollution – Local Air Quality, January 1, 2019.
[28] MECP. Ontario's Ambient Air Quality Criteria, April 30, 2019.
[29] ECCC. Canadian Ambient Air Quality Standards (CAAQS) for Fine Particulate Matter ($PM_{2.5}$) and Ozone, October 2012.

Indicator Compound	Averaging Period	Criterion ($\mu g/m^3$)	Regulation/Guideline
Nitrogen Dioxide	**1 hr.**	**400**	**AAQC**
	24 hr.	**200**	**AAQC**
	1 hr.	112.8	CAAQS 2020
	annual	31.96	CAAQS 2020
	1 hr.	**78.96**	**CAAQS 2025**
	annual	**22.56**	**CAAQS 2025**
Hydrogen Sulphide	**24 hr.**	**7**	**O. Reg. 419/05, AAQC**
	10 min	**13**	**O. Reg. 419/05, AAQC**
Vinyl Chloride	**24 hr.**	**1**	**O. Reg. 419/05, AAQC**
	annual	**0.2**	**AAQC**
Chloroform	**24 hr.**	**1**	**O. Reg. 419/05, AAQC**
	annual	**0.2**	**AAQC**
Acetone	**24 hr.**	**11,800**	**O. Reg. 419/05, AAQC**
Acrylonitrile	**24 hr.**	**0.6**	**O. Reg. 419/05, AAQC**
	annual	**0.12**	**AAQC**
Benzene	**24 hr.**	**2.3**	**AAQC**
	annual	**0.45**	**O. Reg. 419/05, AAQC**
Carbon Monoxide	**0.5 hr.**	**6000**	**O. Reg. 419/05**
	1 hr.	**36200**	**AAQC**
	8 hr.	**15700**	**AAQC**
Sulphur Dioxide	**10 min**	**180**	**AAQC**
	1 hr.	690	O. Reg. 419/05, AAQC
	1 hr.	**100**	**O. Reg. 419/05 (Future 2023)**
	24 hr.	**275**	**O. Reg. 419/05, AAQC**
	annual	**10**	**O. Reg. 419/05 (Future 2023)**
Odour	**10-min**	**1 (OU/m^3)**	**MECP Guideline**

The predicted air quality for the worst-case operating scenario and worst-case landfill gas generation year is summarized in **Table 7.8**. The predicted POI concentrations from the dispersion model have been added to the background concentrations to determine the cumulative air quality.

The cumulative air quality for each indicator compound was compared against the most stringent applicable air quality criteria. The predicted concentrations for all contaminants are below their respective O.Reg. 419/05 and AAQC criteria.

The predicted concentrations for all contaminants are below their respective CAAQS aspirational air quality objectives with the exception of the 1-hr NO2 comparison to the 2025 CAAQS.

The background air quality for 1-hr NO2 was estimated at 18.8 µg/m3, which is 23.8% of the 2025 CAAQS. The cumulative air quality predictions for 1-hr NO2 are higher than the 2025 CAAQS at 28 receptors as summarized in **Table 7.9**.

The predicted cumulative levels of NO2 for the environmental effects assessment are not considered to be significant due to the infrequency of occurrence. **Table 7.10** provides a comparison of the frequency that receptors with 1-hr NO2 cumulative concentrations higher than the 2025 CAAQS. The CAAQS are

stringent aspirational drivers for air quality management across Canada that are intended to be used as objectives and not as criteria.

Table 7.8: Summary of Predicted Cumulative Air Quality

Contaminant Name	CAS No.	Total Facility Emission Rate [g/s]	Averaging Periods [hrs.]	Maximum POI Concentration [ug/m^3](1)	Background Concentration [ug/m^3]	Resulting Ambient Air Quality [ug/m^3]	Most Stringent POI Criteria [ug/m^3]	Criteria	Percent of Criteria [%]
Nitrogen oxides	10102-44-0	2.59E+00	1	177.4	23.4	200.8	400	O. Reg. 419/05	50.2%
Nitrogen oxides	10102-44-0	9.33E-01	24	11.8	20.0	31.8	200	O. Reg. 419/05	15.9%
Nitrogen dioxide	10102-44-0	2.59E+00	1	177.4(2)	18.8	196.2	400	AAQC	49.1%
Nitrogen dioxide	10102-44-0	2.59E+00	1	128.4(3)	18.8	147.2	78.96	CAAQS 2025	186.4%
Nitrogen dioxide	10102-44-0	9.33E-01	24	11.8(2)	13.5	25.2	200	AAQC	12.6%
Nitrogen dioxide	10102-44-0	9.33E-01	annual	1.5(3)	9.1	10.6	22.56	CAAQS 2025	47.2%
Sulphur dioxide	7446-09-05	3.56E-02	10 min	0.7	2.6	3.3	180	AAQC	1.8%
Sulphur dioxide	7446-09-05	3.56E-02	1	0.4	2.6	3.0	100	O. Reg. 419/05 (Future 2023)	3.0%
Sulphur dioxide	7446-09-05	3.34E-02	24	0.2	5.3	5.4	275	O. Reg. 419/05, AAQC	2.0%
Sulphur dioxide	7446-09-05	3.32E-02	annual	0.02	2.0	2.0	10	O. Reg. 419/05 (Future 2023)	20.3%
Carbon monoxide	630-08-0	1.35E+00	0.5	101.7	389.5	491.2	6,000	O. Reg. 419/05	8.2%
Carbon monoxide	630-08-0	1.35E+00	1	84.8	389.5	474.3	36,200	AAQC	1.3%
Carbon monoxide	630-08-0	1.35E+00	8	22.4	458.2	480.6	15,700	AAQC	3.1%
TSP	N/A - TSP	7.36E-01	24	6.8	30.6	37.3	120	O. Reg. 419/05, AAQC	31.1%
TSP	N/A - TSP	7.36E-01	annual	1.0	19.8	20.8	60	AAQC	34.7%

Contaminant Name	CAS No.	Total Facility Emission Rate [g/s]	Averaging Periods [hrs.]	Maximum POI Concentration [ug/m^3](1)	Background Concentration [ug/m^3]	Resulting Ambient Air Quality [ug/m^3]	Most Stringent POI Criteria [ug/m^3]	Criteria	Percent of Criteria [%]
PM10	N/A - PM10	3.21E-01	24	2.6	17.0	19.6	50	AAQC	39.1%
PM2.5	N/A - PM2.5	1.51E-01	24	1.3	9.2	10.5	27	CAAQS 2020	38.7%
PM2.5	N/A - PM2.5	1.35E-01	annual	0.2	6.0	6.1	8.8	CAAQS 2020	69.8%
Hydrogen sulphide	7783-06-04	4.45E-03	10-min	0.5	1.4	1.9	13	O. Reg. 419/05, AAQC	14.5%
Hydrogen sulphide	7783-06-04	4.45E-03	24	0.1	1.4	1.5	7	O. Reg. 419/05, AAQC	20.8%
Vinyl chloride	75-01-4	1.66E-03	24	0.020	-	0.020	1	O. Reg. 419/05, AAQC	2.0%
Vinyl chloride	75-01-4	1.66E-03	annual	0.002	-	0.002	0.2	AAQC	1.1%
Chloroform	67-66-3	1.30E-05	24	0.0002	-	0.0002	1	O. Reg. 419/05, AAQC	<1%
Chloroform	67-66-3	1.30E-05	annual	0.00002	-	0.00002	0.2	AAQC	<1%
Acetone	67-64-1	1.48E-03	24	0.017	-	0.017	11,880	O. Reg. 419/05, AAQC	<1%
Acrylonitrile	107-13-1	1.21E-03	24	0.014	-	0.014	0.6	O. Reg. 419/05, AAQC	2.4%
Acrylonitrile	107-13-1	1.21E-03	annual	0.002	-	0.002	0.12	AAQC	1.4%
Benzene	71-43-2	3.12E-03	24	0.037	-	0.037	2.3	O. Reg. 419/05, AAQC	1.6%
Benzene	71-43-2	3.12E-03	annual	0.004	-	0.004	0.45	O. Reg. 419/05, AAQC	<1%

Contaminant Name	CAS No.	Total Facility Emission Rate [g/s]	Averaging Periods [hrs.]	Maximum POI Concentration [ug/m^3](1)	Background Concentration [ug/m^3]	Resulting Ambient Air Quality [ug/m^3]	Most Stringent POI Criteria [ug/m^3]	Criteria	Percent of Criteria [%]
Odour(5)	N/A - Odour	3.57E+03 OU/S	10-min	0.65 OU(4)	-	0.65 OU	1 OU	MECP Guideline	64.6%

Table Notes:
(1) All modelled maximum POI concentrations are taken from the worst-case discrete receptor with meteorological outliers removed as per MECP guidance (ADMGO).
(2) Maximum concentration of NO2 estimated using a full conversion from NOX for comparison against the applicable AAQC.
(3) Maximum concentration of NO2 estimated using the ozone limiting method of conversion from NOX for comparison against the CAAQS 2025 aspirational air quality objective.
(4) Maximum odour concentration corresponding to 99.5% frequency occurrence at discrete receptors.
(5) Maximum odour concentration modelled with the working face located at the worst-case position in Cell 6.

Table 7.9: Preferred Alternative Scenario 2 NO_2 1-hr. Average Comparison to 2025 CAAQS

Receptor	Coordinate [x]	Coordinate [y]	Maximum POI Concentration [ug/m^3](1)	Resulting Ambient Air Quality [ug/m^3]	Percent of 2025 CAAQS [%]
1	702911.5	5163337.87	33.10	51.91	66%
2	702973.6	5163599.12	36.97	55.78	71%
3	703378.3	5163266.77	49.85	68.67	87%
4	703435.5	5163118.59	48.95	67.77	86%
5	703447.9	5163050.38	49.87	68.69	87%
6	703449.6	5163199.48	49.46	68.28	86%
7	703456.8	5163402.92	60.24	79.06	100%
8	703467.9	5163160.81	44.66	63.47	80%
9	703474.4	5163223.84	52.90	71.72	91%
10	703523.8	5163407.01	63.24	82.05	104%
11	703532	5163230.73	58.33	77.14	98%
12	703532.5	5163366.56	64.70	83.52	106%
13	703535.6	5163311.04	59.29	78.11	99%
14	703544.1	5163340.67	63.84	82.66	105%
15	703546.1	5163209.19	59.33	78.15	99%
16	703546.9	5163105.31	55.97	74.79	95%
17	703547.6	5163182.71	57.94	76.75	97%
18	703567.1	5163142.89	58.44	77.26	98%
19	703568.2	5163043.72	57.61	76.42	97%
20	703571.6	5161709.85	53.69	72.51	92%
21	703572.1	5161748.72	56.23	75.04	95%
22	703574.3	5161687.71	53.13	71.95	91%
23	703577.3	5161654.51	54.17	72.98	92%
24	703578	5161595.47	52.86	71.68	91%
25	703584.7	5161620.07	53.80	72.62	92%
26	703584.7	5162695.08	84.55	103.37	131%
27	703584.7	5162695.08	68.68	87.50	111%
28	703595.1	5162656.62	87.15	105.96	134%
29	703602.7	5162744.35	77.68	96.49	122%
30	703634.1	5161833.64	61.93	80.75	102%
31	703640	5161580.22	56.66	75.48	96%
32	703640.2	5161608.57	58.03	76.85	97%
33	703641.3	5161754.92	59.86	78.67	99.6%
34	703643.5	5161704.47	60.42	79.23	100%
35	703681.2	5161655.69	62.87	81.68	103%
36	703729.5	5161833.55	70.72	89.53	113%
37	703762.6	5161834.77	72.71	91.53	116%
38	703805.9	5161834.37	79.62	98.44	125%

Receptor	Coordinate [x]	Coordinate [y]	Maximum POI Concentration [ug/m^3](1)	Resulting Ambient Air Quality [ug/m^3]	Percent of 2025 CAAQS [%]
39	703821.9	5161938.09	84.63	103.44	131%
40	703862.3	5161834.37	88.42	107.24	136%
41	703904.8	5161924.08	96.21	115.03	146%
42	703932.8	5161849.58	98.31	117.13	148%
43	703958.9	5161922.08	108.00	126.81	160%
44	703971.3	5161847.18	103.37	122.18	155%
45	704013.3	5161920.47	118.07	136.88	173%
46	704032.6	5161982.92	128.38	147.20	186%
47	704039.4	5161926.08	123.08	141.90	180%
48	704082.2	5161913.26	116.86	135.67	172%
49	704152.7	5161974.14	120.05	138.86	176%
50	704194	5161925.28	86.56	105.38	133%
51	704245.6	5161823.61	63.64	82.45	104%
52	704423.6	5161803.65	51.60	70.42	89%
53	704568.2	5161769.84	39.34	58.15	74%
54	704936.9	5161856.85	27.24	46.06	58%
55	705039.5	5161885.7	28.78	47.60	60%
56	705045.6	5161821.89	24.22	43.03	54%
57	705070.1	5161942.63	34.73	53.55	68%
58	705159.9	5162147.4	66.88	85.70	108%
59	705162.2	5162041.19	48.37	67.18	85%
60	705170.1	5161717.05	19.38	38.19	48%
61	705172.8	5161739.24	20.72	39.54	50%
62	705178.2	5161804.69	24.79	43.61	55%
63	705181.6	5161847.42	27.07	45.89	58%
64	705185.4	5161879.6	29.08	47.90	61%
65	705186.7	5161763.1	22.28	41.10	52%
66	705256.5	5161880.71	29.06	47.88	61%
67	705270	5161985.09	39.71	58.52	74%
68	705279.4	5161578.88	14.18	32.99	42%
69	705293.1	5161836.87	25.47	44.29	56%
70	705293.6	5161895.13	30.82	49.63	63%
71	705302.7	5161657.12	17.54	36.36	46%
72	705330.3	5161863.51	28.35	47.17	60%
73	705331.1	5161298.85	9.73	28.55	36%
74	705344.1	5161899.57	30.78	49.59	63%
75	705354.1	5161966.16	37.01	55.82	71%
76	705358.2	5161381.07	9.82	28.64	36%
77	705436.2	5161983.91	37.19	56.00	71%
78	705891.7	5161921.63	26.66	45.48	58%

Receptor	Coordinate [x]	Coordinate [y]	Maximum POI Concentration [ug/m^3](1)	Resulting Ambient Air Quality [ug/m^3]	Percent of 2025 CAAQS [%]
79	706059.8	5162035.52	23.94	42.76	54%

Table Notes:
(1) Modelled concentration post processed for the maximum 3 year average of the annual 98th percentile of the NO_2 daily maximum 1-hr average concentration.

Table 7.10: Preferred Alternative Scenario 2 NO_2 1-hr. Average Percent Occurrences above CAAQS

Receptor	Coordinate [x]	Coordinate [y]	# of Occurrences Above 2025 CAAQS	Percent of Occurrences Above 2025 CAAQS [%]
7	703456.8	5163402.92	35	0.08%
10	703523.8	5163407.01	47	0.11%
12	703532.5	5163366.56	47	0.11%
14	703544.1	5163340.67	44	0.10%
26	703584.7	5162695.08	76	0.17%
27	703584.7	5162695.08	50	0.11%
28	703595.1	5162656.62	99	0.23%
29	703602.7	5162744.35	64	0.15%
30	703634.1	5161833.64	65	0.15%
34	703643.5	5161704.47	41	0.09%
35	703681.2	5161655.69	49	0.11%
36	703729.5	5161833.55	77	0.18%
37	703762.6	5161834.77	88	0.20%
38	703805.9	5161834.37	96	0.22%
39	703821.9	5161938.09	119	0.27%
40	703862.3	5161834.37	100	0.23%
41	703904.8	5161924.08	136	0.31%
42	703932.8	5161849.58	108	0.25%
43	703958.9	5161922.08	157	0.36%
44	703971.3	5161847.18	96	0.22%
45	704013.3	5161920.47	151	0.34%
46	704032.6	5161982.92	240	0.55%
47	704039.4	5161926.08	157	0.36%
48	704082.2	5161913.26	160	0.37%
49	704152.7	5161974.14	236	0.54%
50	704194	5161925.28	158	0.36%
51	704245.6	5161823.61	78	0.18%
58	705159.9	5162147.4	42	0.10%

The potential air quality and dust effects, proposed mitigation and net effects are summarized in **Table 7.11**.

Table 7.11 Air Quality & Dust Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Ambient (baseline) air quality conditions.	Based on the air quality assessment of the proposed expansion no exceedances of relevant criteria were predicted.	No mitigation required	No net effects anticipated.
Ambient (baseline) dust conditions.	Off-site dust effects are influenced by site activities and conditions. The air quality assessment identified that predicted concentrations of indicator compounds are anticipated to be within MECP criteria. It is acknowledged however that at times dust from construction and operation of the proposed expansion can be a source of nuisance.	Best management practices for dust at the site will include watering of gravel roads when needed. In addition the main access road and site perimeter road shall be hard surfaced to minimize dust nuisance.	Minimal net effects anticipated.

7.3 Socio-Cultural Environment Effects

The following describes the socio-cultural impact assessment completed for the preferred expansion option. Full details are provided in **Appendices H to M.**

7.3.1 Archaeology

Data Collection:

The Stage 1 and 2 archaeological assessments carried out for the proposed expansion included an historical records review and appropriate fieldwork:

- Site files at the offices of Archaeological Data Co-ordinator Ministry of Tourism, Culture and Sport (MTCS) and Woodland Heritage Services Limited site files were checked to determine if any prehistoric sites had been previously recorded and registered either in or near the study area.
- Stage 1 fieldwork included observation of the subject lands to confirm archaeological potential previously identified in Sault Ste. Marie Archaeological Master Plan (ASI, 2011). With the exception of the recent residential land acquisitions completed by the City to enhance the site's buffer lands, 100% of the subject property was examined during the Stage 1 fieldwork. There are no site development activities planned within the recently acquired buffer lands that would impact heritage resources.
- Stage 2 test pitting was undertaken within areas that were confirmed as retaining archaeological potential through field observation. Stage 2 fieldwork was conducted October 7, 8, 21, and 22, 2013. Test pits were excavated at 5m intervals in areas where archaeological potential was confirmed to exist. The test pits were at least 30x30cm in size and extended down to where either disturbed soils or sterile soils were observed. Test pits were backfilled. All excavated materials were screened through 1/4" mesh. The weather conditions on those days were ideal for Stage 2 fieldwork and in no way impacted the ability to conduct fieldwork.

The study area for the archaeological assessment was within the City owned landfill property boundary at the time the assessment was completed. Although additional buffer lands have been acquired since the assessment was completed, there are no plans to disturb or undertake excavation activities on the additional buffer lands.

Existing Conditions:

People have been living in the study area since the time glaciers receded and the land could support plants and animals. There are no known or registered archaeological sites within 1km of the study area.

The subject property demonstrates the entire range of conditions: from undisturbed to completely disturbed. Additionally, areas along the Canon Creek were subject to extraordinary natural disturbance a month prior to fieldwork as a result of an extreme weather event which eroded a considerable portion of the river's shoreline.

The property sits astride the southern edge of the Gros Cap/Algoma highlands. South of Fifth Line, the terrain is relatively flat, clay-based and known locally as the Korah Uplands. The topography of the Gros Cap Highland is primarily controlled by the bedrock, which ranges in elevation from approximately 300 metres asl to over 370 metres asl. In the lowlands, the topography is influenced by the bedrock, but largely controlled by the overlying Quaternary deposits. The main bedrock feature influencing the topography of the lowlands is a large, broad upland (herein, the Great Northern Road upland), approximately 3.5 kilometres east-west by 6 kilometres north-south, with its main axis roughly aligned along the Great Northern Road. A second, smaller upland (herein, the Korah upland), approximately 2.75 kilometres east-west by 3.5 kilometres north-south, occurs along Leigh Bay Road north of Baseline Road. The crests of these upland ridges stand at approximately 240 metres asl and 180 metres asl, respectively. To the east and west of these ridges, the underlying bedrock falls away to elevations as low as about 50 metres asl, which is approximately 133 metres below the current elevation of the St. Mary's River at 183 metres asl. (ASI 2011).

The glacial outwash plains and beaches of Glacial Lake Algonquin are thought to have been formed sometime around 11-10,500 years ago. Subsequent glacial events in the form of advances, uplift, lake discharges occurred creating numerous complicated beaches. With the filling of Lake Minong and the catastrophic outflows around 9,400 years ago, it is likely that significant portions of Sault Ste. Marie were flooded again.

It is important to note that the dynamic environment that existed at this time suggests that these various early post-glacial environments would not have been 'active' for long periods of time and lake levels would have risen/fallen on an annual basis. The nature of the topography in Sault Ste. Marie is such that a 1 metre vertical fall in water levels could have moved a shoreline several kilometres horizontally.

The existence of a late Palaeo Indian site at the southern end of Leigh's Bay Road (only 1 kilometre from the current shore of the St. Mary's River) suggests that beaches further removed inland may not have been suitable for occupation.

The main Canon Creek flows through the subject property and a smaller creek joins the Canon Creek near the eastern side of the property. The Canon Creek (and the associated smaller creek) are not navigable where they cross the property and fall continuously over cobbles, bedrock and for much of the year (outside of spring melt) do not carry enough water to float a birch-bark canoe. Indeed a bark canoe would be damaged within minutes.

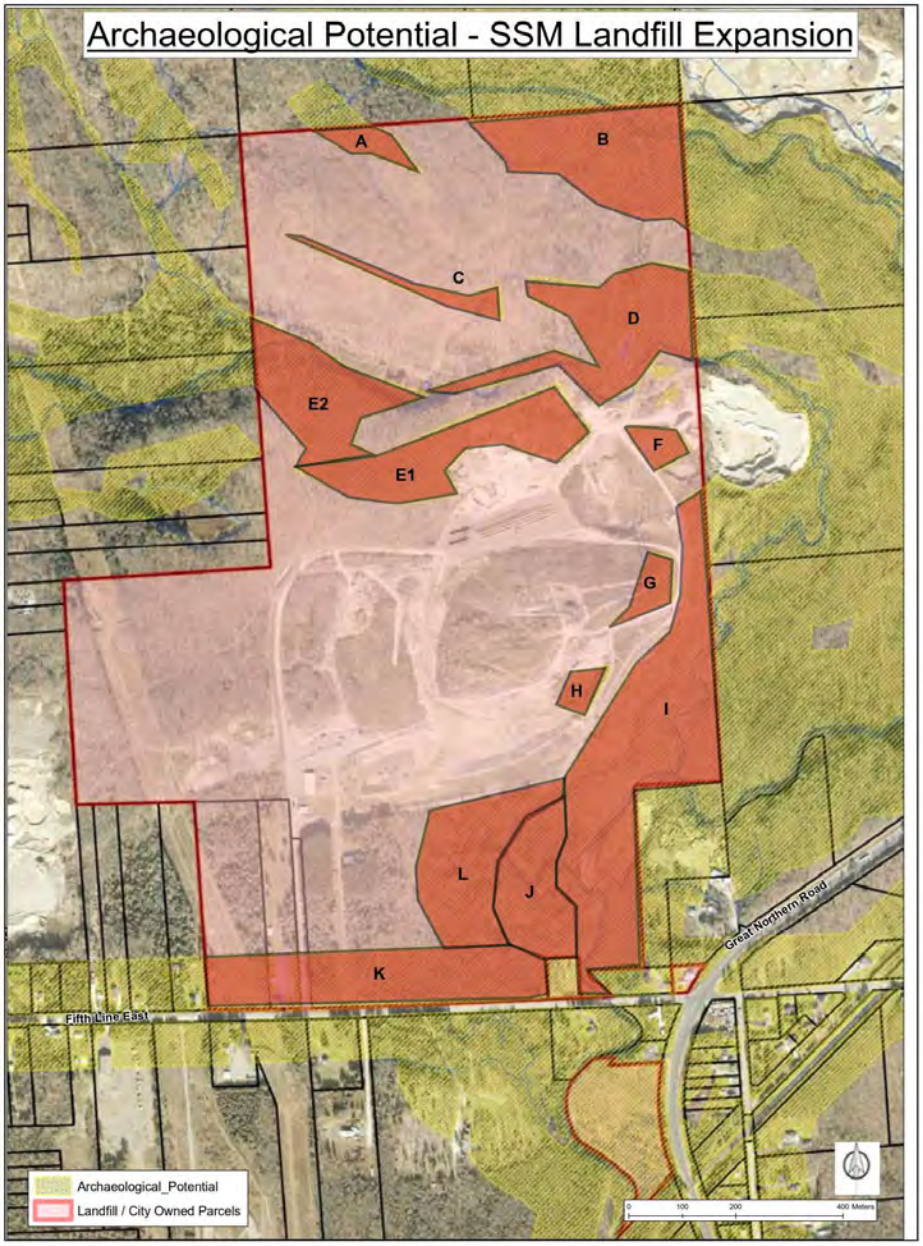
In terms of present-day conditions, the property may be split into two parts: those areas north of the main Canon Creek and those areas south of the main Canon Creek.

North of Canon Creek, the terrain is wildly undulating with a topographic bedrock high. Vegetation is dominated by a variety of second growth communities of softwoods and hardwoods. The diameters of the trees suggest that the property was likely harvested in the 1950s and the remnants of several tertiary harvest roads are still in evidence. Push piles, stumps, abandoned/rusting vehicles attest to the previous uses of this area.

The area south of the Canon Creek is dominated by the City of Sault Ste. Marie Landfill. For the most part, this is an entirely disturbed area. What has not been excavated, leveled, developed for roads, buildings, or sewage infrastructure has been stripped of top soil and levelled again. In September 2013, an extreme weather event resulted in extreme erosion of the Canon Creek, primarily along the eastern extents of the property. From that point, the entire shoreline of the river (on both sides) was stripped of soil right down to bare rock for a distance of 30-50 metres back from the river.

The 2011 Archaeological Master Plan identified a number of areas as having potential. As a result of the Stage 2 assessment conducted for the proposed landfill expansion, suggestion was made to reclassify a number of these areas. The following summarizes the suggested reclassifications which are shown on **Figure 7.2**.

Figure 7.2 – Reclassification of Areas of Archaeological Potential



Archaeological Potential Area A - This area is more than 100m from the nearest permanent water source. It is expected that this area was identified as potential due to a 'GIS mapping artifact' and should be reclassified as not archaeological potential.

Archaeological Potential Area B - This area is located in the northwest corner of the subject property. It is generally low and poorly drained. Because it is low, there are many remnant backwater channels that would be flooded when the water is higher (e.g., spring runoff). The area is approximately 150 m back from the river. As the first 50m does not exhibit qualities associated with archaeological potential, it is acceptable to discount the 100m beyond that as well. It is suggested that this area be reclassified as not having archaeological potential.

Archaeological Potential Area C - This thin triangle exhibited none of the qualities associated with archaeological potential. It is several hundred metres from any significant water source, in undulating bedrock terrain and there is no feature associated with it that would suggest archaeological potential. It is suggested that this area be reclassified as not having archaeological potential.

Archaeological Potential Area D - This area is located primarily along the north bank of the Canon Creek. The western extents of this area are poorly mapped as the mapped potential is a thin strip that straddles the river as the river meanders. There are gravel banks here but the gravel has been stripped away by erosion and shoreline stabilization engineering has been effected. If there was any archaeological potential here, it was washed away long ago. Along the eastern edge of the property north of the Canon Creek, there is a larger area of potential, seemingly falling within the 150m buffer from the Canon Creek. The first 50m of the river here is undulating, with exposed bedrock knobs, rocks and cobbles in the soils and poorly drained. This area does not exhibit the qualities of having archaeological potential and should be reclassified as not having archaeological potential.

Archaeological Potential Area E1 - This area has all but been removed by earth moving operations. This area should be reclassified as not having archaeological potential.

Archaeological Potential Area E2 - This area is a gravel hill. The hill appears to have been logged and cleared approximately 30-40 years ago. There is significant evidence of earth moving. Push piles of earth are found throughout as are remnant logging tracks. On the south side of the hill, considerable portions of the hillside have been removed through earthmoving. It would appear that this area was identified as having high potential due to being within 150m of water. The portion of this area that is within 50m of the Canon Creek is too steep to scale, thus the balance of the 150m should be reclassified as not having archaeological potential.

Archaeological Potential F, G, H - These areas are within the active landfill areas and have been extensively remodelled. These areas should be reclassified as not having archaeological potential.

Archaeological Potential Area I - This is an area identified as having archaeological potential along the banks of the Canon Creek. This area includes previous landfilling activities and Canon Creek was realigned in this area in 2006 to increase separation from the landfill. In September 2013, an extreme weather event resulted in record high water eroding the river banks down to rock - all the soils were removed. Due to the soils being removed by erosion, and previous river course engineering, this area should be reclassified as not having archaeological potential.

Archaeological Potential Area J - This area of archaeological potential is a seasonally flooded embayment of the river. River flood channels and undrained pools, wetlands and trapped water predominate in this area. This area should be reclassified as not having archaeological potential due to wet soils, seasonal flooding and generally not being a place one would set up camp.

Archaeological Potential Area K - This area is stretch of land extending 100m back from Fifth Line East. The potential here was likely ascribed due to a 100m buffer around roads as pioneer potential. Fifth Line was never a pioneer road and even today, it does not extend more than 1.5 kilometres west of Great Northern Road. This area of archaeological potential was examined and there is no evidence for house foundations. It is recommended that this area of archaeological potential be reclassified as not having archaeological potential.

Archaeological Potential Area L - This area is a relatively flat area, approximately 3-5 metres higher in elevation than Area J. The trees are generally uniform in age (having been cut in the last 30 years). Several

larger spruce stand near the edge of area. Evidence of buried dumping is found throughout the area as is road/tracks for access. Test pits were excavated in this area. All test pits exhibited evidence that original soils did not exist. It would appear that this area was also stripped after logging. All the soils were unconsolidated and mixed with plastic and other modern materials being found 10-15cm below the surface. After evaluating the information obtained through test pitting, it became clear that this area should be reclassified as not having archaeological potential.

Potential Effects and Mitigation:

As summarized in **Table 7.12**, no archaeological sites were found. It is recommended that no further archaeological assessment of the property is required.

Table 7.12 Archaeology – Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Presence of known or potential archaeological resources on site.	No archaeological sites were found.	• Should undocumented archaeological resources be uncovered during landfill construction, alteration of the site must cease immediately. • If undocumented archaeological resources are uncovered, a licensed archaeologist should be contacted to carry out archaeological fieldwork in compliance with Section 48(1) of the Ontario Heritage Act.	No net effects anticipated.

7.3.2 Social

Data Collection:

Primary and secondary sources were used in order to inventory the existing conditions as follows:

Secondary Source Information Gathering: To gather information relevant to the study area, secondary source information was collected and reviewed. This was done using aerial mapping, street views of the roads within the study area (using Google Earth) and recording all social features either adjacent to the road or at access and egress points. Local and municipal websites and Census data from Statistics Canada were also used.

Primary source information gathering included:

- Windshield survey of study area - In order to confirm and update secondary source data, a windshield survey of the study area was undertaken in July 2013. To do this, staff drove through the study area and documented all social features (e.g. schools, recreation facilities and open spaces, churches etc), and residences within the 1 km and 2 km study areas so that an overall picture of the area and its features could be ascertained.
- Residents' Surveys - A self-completion survey was hand delivered to all residences within 1 km of the landfill site. Residents were able to return the survey by mail or complete it online. This survey covered aspects such as current use and enjoyment of private property (including issues related to the existing landfill), satisfaction with living in the community and concerns related to the construction and future operation of the landfill.

To assess the potential for social impact as a result of the proposed expansion, information was also obtained on the potential for noise, dust, odour and other impacts from other project team disciplines.

The study area used for the social impact assessment included residents within 1 km of the expanded disposal footprint and considered other features and businesses within 2 km of the site. The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500m of the perimeter of the fill area. For the purposes of this proposal we have conservatively considered a 1 km radius to be the principal area of potential impacts. The area between the 1 and 2 km radii has also been included to further characterize the area surrounding the zone of potential impacts.

Existing Conditions:

Based on GIS records provided by the City there are approximately 110 residences within 1 km of the site; consisting primarily of homeowners and some tenants. However, significant portions of the study area remain largely unspoiled by development. Residential properties in the vicinity of the site are generally situated on large plots and the study area is not densely populated with homes. The area features a large amount of green, open space and aggregate resource extraction.

A number of churches and cemeteries, one school and a conservation area (Hiawatha Highlands) were observed within the 2 km study area.

The residents' survey asked a number of questions related to peoples use and enjoyment of their property, community issues and likes and dislikes about the community. In total, 39 surveys were completed (either partially or fully).

The following summarizes survey respondents' sentiments regarding their community:

- The area is an established neighbourhood with over half the respondents being in their place of residence for more than 11 years.
- Resident's typical use of their backyard space is for relaxing, barbequing and gardening.
- Noise or quietness has the most influence on resident's enjoyment of their outdoor space.
- Peace and quiet is the primary aspect respondents appreciate about their community.
- Speed and volume of traffic on Fifth Line East and Old Goulais Bay Road were identified as the most disliked aspect of the community. Other dislikes included odour from the landfill, garbage on the road, and truck/traffic noise.
- Respondents identified the key ways the neighbourhood was changing to include the construction of more homes, additional traffic, and more noise and increasing odour from the landfill.
- Most respondents identified being satisfied or very satisfied with being in their community.

The residents' survey identified some issues with the landfill – primarily trucks, odour and garbage on the road. Official odour complaints lodged with the City of Sault Ste. Marie were made available and show that over the period from 2009 to 2018, 104 complaints (average of 10/year) regarding odour had been made to the City. The highest number of complaints was registered in 2010 when 17 complaints were lodged relating to a sewage-like odour.

The increased number of odour complaints in 2010 coincided with the landfill gas management construction project. Prior to initiating construction, notices were mailed to property owners in the vicinity of the site to inform them of the proposed landfill gas construction project and the potential for off-site odours despite the planned mitigation efforts. The mitigation strategies employed included application of daily cover following trenching operations and application of odour control products to exposed wastes. The active landfill gas

collection system became operational on a part time basis in early December, 2010 and became fully operational the last week of January, 2011.

Potential Effects and Mitigation:

The residential survey asked a number of questions relating to whether respondent's use and enjoyment of their property was affected by the current landfill and the potential for a change in satisfaction or usage of outdoor spaces as a result of construction and operation of the proposed expansion.

When asked to respond in their own words to questions about the landfill and improvements, the focus of responses was on odour, noise, traffic, water quality, litter and community information.

This information, combined with information on the potential nuisance effects (i.e. odour, noise, traffic) associated with the proposed expansion was used to assess the potential for social impacts. A summary of the social impact assessment including potential effects, proposed mitigation measures and net effects is included in **Table 7.13.**

Applicable monitoring programs and mitigation measures will be implemented to ensure that there are no significant increased nuisance effects (above the existing conditions) for local people. It is anticipated that some of the proposed enhancements (e.g. Biosolids/SSO processing facility) will reduce nuisance impacts for area residents.

The socio-economic environment can be affected by a number of different issues such as increased, noise, odour and traffic which can have an adverse effect on factors such as use and enjoyment of personal property and outdoor spaces, recreation facilities and open spaces and community character. Through an analysis of findings from surveys with residents, air quality, noise and traffic impact assessments it has been possible to evaluate the impacts on the socio-economic environment. This analysis concludes that there will not be significant effects on the socio-economic environment relative to current levels provided the mitigation detailed herein and in other related reports are implemented. Appropriate mitigation and monitoring plans will be adopted to ensure that issues are not exacerbated by landfill construction or operations.

While some concerns do exist among local people, these are not expected to be exacerbated by the landfill expansion. The site has a long successful operating history, and through the proposed expansion enhanced mitigation is proposed relative to current practices to further mitigate nuisance odours. Odour complaints have been consistently trending downwards in recent years (i.e. averaged less than 2 per year for the period spanning 2021 – 2022) which is a reflection of the City's commitment to best management practices and a culture of continual improvement.

During the EA process, the City initiated and has successfully enhanced the buffer lands to the southwest of the site through property acquisitions. The City identified four important properties and successfully negotiated voluntary sales of three of the four properties. The fourth and final property is currently being acquired through expropriation and the City is committed to achieving a fair financial settlement with the property owner. Furthermore, the City will also consider other mitigation measures to minimize the potential for adverse impacts to the property owner which may include ongoing occupation of the residential property on an interim basis. This approach has been implemented for two of the other three property acquisitions whereby the resident continues to occupy the property on an interim basis at their discretion. Although the ongoing expropriation may have some modest adverse impacts to the property owner, the long-term reduction in potential nuisance impacts to sensitive uses and the improved groundwater quality compliance to the southwest of the site will result in significant positive net effects.

Table 7.13 Social – Summary of Net Effects

Indicator	Potential Effect	Mitigation Measures	Net Effects
Presence of existing residences on site, off site in the vicinity of the current or potential site and along the access route(s).	Land acquisition was initiated and is ongoing to enhance the buffer lands to the southwest of the proposed fill area. Three acquisitions were voluntarily negotiated and a fourth and final property acquisition is proceeding through expropriation. These additional properties will significantly enhance the buffer lands to the southwest and will reduce the potential for future offsite nuisance impacts and improve groundwater quality compliance.	Every effort will be made to mitigate the impacts of the expropriation though a fair financial settlement. The City may also consider continued residential occupation of the site on an interim basis if desired by the property owner. This approach has been used by the City for two of the other three acquired properties.	Overall positive net effects with reduced potential for nuisance impacts to sensitive uses and improved groundwater quality compliance. Based on the fair and satisfactory negotiated voluntary property acquisitions, modest potential for adverse impacts associated with the ongoing expropriation.
	Construction of an expansion could result in residents feeling inclined to leave the community. However, residential surveys suggest very few residents will move from the area as a result of the landfill.	Ongoing liaison and community outreach to keep area residents apprised of the construction schedule, construction activities and planned mitigation.	No net effects anticipated.
	Nuisance effects from both construction and operations at the landfill may disrupt the extent people can use and enjoy their/ public property (both inside and outside). Disturbance of use and enjoyment of outdoor space on their property was a current and potential issue for a large number of residents who completed the survey (12 respondents out of 24 said that noise affected their enjoyment of outdoor activities and 5 out of 24 said poor air quality affected it). Major concerns included noise, odour and traffic. In addition, there is a perception that private well water quality may be adversely impacted due to the presence of the landfill site. The City has historically experienced population decline and more recently the	Continuation of current successful operational practices to manage nuisance effects plus the additional measures noted below. Development of a best practices Odour Management Plan for the proposed landfill mining operations. Construction of a Biosolids Management and Processing facility. Staged expansion of the landfill gas collection system. On-going engagement with the public including timely responses to public complaints.	Minimal net effects anticipated.

Table 7.13 Social – Summary of Net Effects

Indicator	Potential Effect	Mitigation Measures	Net Effects
	population has stabilized. For the purposes of this EA modest future growth has been considered and daily waste acceptance rates will not increase significantly. The planned cell construction activities will occur periodically over the operating life of the facility and will result in some additional activity and related noise during the periods of construction. The proposed site operations are expected to generally remain unchanged relative to existing waste deposition and management activities at the existing site and should not result in any additional noise. Furthermore, the odour profile (Frequency, Intensity, Duration, Offensiveness and Location) of the Site's operations is expected to be improved with the implementation of the planned best practices approach to odour management together with the construction of a biosolids/SSO processing facility and staged expansion of the landfill gas collection system. It is expected that the Site's planned enhanced odour management program would be able to effectively manage odour impacts associated with these activities. Some additional odour is likely during landfill mining operations which is expected over a of ten-month period spanning two years. The results of the noise analysis indicate that for the worst-case operational scenario, the predicted receptor sound levels will be below the Ministry's daytime criterion of 55 dBA for all the nearby noise receptors. Traffic volumes are generally moderate and no significant increases in landfill related traffic	No proposed changes to operational hours or operational practices that would significantly increase noise. Initiate a routine sampling and analysis program for private wells in close proximity to the site. Extend the potable water distribution system easterly along Fifth Line to west of Highway 17 if necessary to address contamination of potable wells. Construction of a liner and leachate collection system in all new and mined cells.	

Table 7.13 Social – Summary of Net Effects

Indicator	Potential Effect	Mitigation Measures	Net Effects
	levels (including heavy vehicles) are anticipated. Groundwater flow from the landfill is well understood through the extensive monitoring well network that has been established within and surrounding the site (i.e. approximately 40 wells are sampled and analysed three times annually). The Municipal water distribution system has been extended along Fifth Line from Old Goulais Bay Road to the landfill site. There is no evidence of impacts to area private wells. Overall, no significant increase in nuisance effects are expected from noise, odour or traffic assuming appropriate mitigation.		
Presence of institutional, community and recreational features on the site, off site, in the vicinity of the current or potential site and along the access route(s)	Nuisance effects from both construction and operations at the landfill may disrupt the extent people can use and enjoy the school, churches and conservation area identified within the study area. There are no institutional, community or recreational facilities located in the vicinity of the existing or potential site (i.e. within the 1 km radius). Although there are a few features within or beyond the 2 km radius there are no significant increase in nuisance effects (i.e. noise, odour or traffic) or water quality impacts are anticipated from the proposed landfill expansion assuming appropriate mitigation.	Mitigation as noted above.	Minimal net effects anticipated.
Presence of First Nations reserves and communities and spiritual, cultural or ceremonial and traditional use sites.	The City has not been made aware of any First Nations Reserves, communities or spiritual, cultural or ceremonial and traditional	Continue to reach out to Aboriginal Communities as the project continues to move forward and incorporate mitigation as necessary.	No net effects anticipated.

Table 7.13 Social – Summary of Net Effects

Indicator	Potential Effect	Mitigation Measures	Net Effects
	use sites within the landfill site or in the vicinity of the landfill site. Stage 2 Archaeological assessment completed and no archaeological resources identified.	Should any cultural resources be uncovered during the site development activities the construction activities will cease and an Archaeologist will be engaged.	
Community characteristics	The presence of the landfill may have an effect on the character/cohesion of the community and its cohesion due to changes in behaviour and attitude. It is noted that the existing Community has adapted to the landfill operations and there was little evidence from the residents' survey to suggest that people's satisfaction with the community would change as a consequence of the landfill expansion.	Ongoing engagement with the public to continue. The City remains committed to a process of continual improvement.	No net effects anticipated.

7.3.3 Planned Land Use

Data Collection:

The approach taken to complete the land use impact assessment was to inventory the land uses within the study area, identify potential impacts the proposed expansion may have relative to Provincial Policy Statement (PPS) 2020, relevant MECP guidelines and City of Sault Ste. Marie land use policies and guidelines and develop mitigating measures to address potential impacts. A portion of the site is situated within an area subject to the regulation of development, interference with wetlands and alterations to shorelines and watercourses administered by the Sault Ste. Marie Regional Conservation Authority (SSMRCA).

For the purposes of the detailed impact assessment, the “on-site study area” is defined as lands within the preferred landfill footprint (existing and expansion areas). The “site vicinity study area” is defined as all properties lying wholly or partially within a 500 m radius of the “on-site study area” and the “regional study area” extends an additional 1km from the “site vicinity study area”. The broader “regional study area” has been included to provide context on land uses surrounding the area that is typically impacted the most by a landfill.

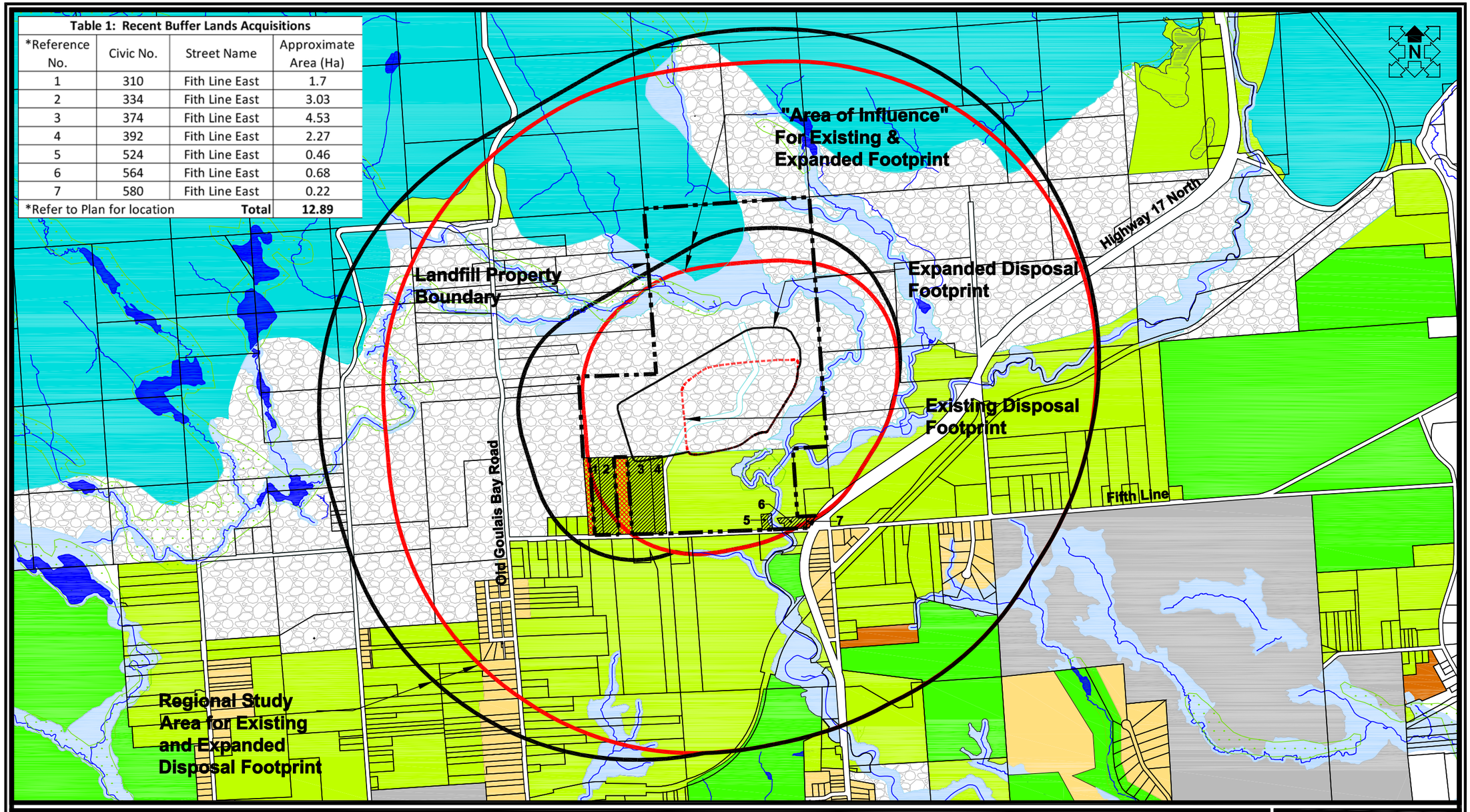
Existing Conditions:

On-Site - The existing land uses within the on-site study area consist of existing waste disposal activities (existing disposal footprint), organic processing (i.e. leaf and yard waste composting in open windrows, curing and screening compost and storage of the final product) and wooded area. All of the lands required for the waste disposal activities and ancillary activities are currently owned by the City of Sault Ste. Marie.

The on-site study area is designated Rural Area in the Sault Ste. Marie Official Plan, and zoned Rural Area (RA) and Rural Aggregate Extraction (REX) in the City’s Zoning By-Law. A significant proportion of this area is also subject to Special Exception 23. Special Exception 23 allows use as a sanitary landfill where “sanitary landfill site” shall mean a place where waste is deposited under controlled conditions including proper compaction and regular covering with an approved cover material. It also may include ancillary operations associated with the landfill site such as, but not limited to, leachate collection, site access, storage and maintenance of heavy equipment, weigh scales and monitoring wells.

The current comprehensive zoning by-law was approved in 2005 and since that time, the City has acquired 8 additional properties adjoining the landfill site which has resulted in an expansion of the overall landfill site boundaries, enhanced the buffer lands and removed sensitive uses from the area of influence. The City is continuing to actively pursue other proposed acquisitions within the area of influence with a focus on the Fifth Line residential property immediately abutting the site’s west property boundary. As a result of the latest land acquisitions and the proposed landfill expansion, a municipal zoning by-law amendment is required to adjust the “Sanitary Landfill Site” boundary defined by Special Exception 23 to coincide with the expanded property boundaries. Refer to **Figure 7.3** for the current property and Special Exception 23 boundaries.

Table 1: Recent Buffer Lands Acquisitions			
*Reference No.	Civic No.	Street Name	Approximate Area (Ha)
1	310	Fith Line East	1.7
2	334	Fith Line East	3.03
3	374	Fith Line East	4.53
4	392	Fith Line East	2.27
5	524	Fith Line East	0.46
6	564	Fith Line East	0.68
7	580	Fith Line East	0.22
*Refer to Plan for location		**Total**	**12.89**



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THE CORPORATION OF THE CITY OF SAULT STE. MARIE ONTARIO

- Rural Precambrian Uplands
- Rural Area Zone; RAhp
- Rural Aggregate Extraction Zone
- Institutional Zone
- Parks and Recreation Zone
- Mobile Home Residential Zone
- Highway Zone
- Estate Residential
- Environmental Management
- Recent Buffer Lands Acquisitions (See Table 1). Currently excluded from Special Exception 23
- Proposed Buffer Lands Acquisitions

LAND USE IMPACT ASSESSMENT STUDY AREA AND EXISTING ZONING

Project 60117627
December 2022

Figure 7.3

The landfill site is situated within the City's Groundwater Recharge Protection Area and the Source Water Protection Plan (SWPP). The SWPP encourages the City to include specific policies, in its Official Plan, to manage specific activities to protect this resource. The City's Official Plan specifically addresses this matter under Section 4.1 entitled "Groundwater Recharge Protection Area" which prescribes specific policies for the management and storage of fuel and chemicals, vehicle maintenance, repair and storage, spill response, and storm water management. The City is currently developing a new Official Plan and the new plan will include similar language to protect the groundwater recharge area.

Site Vicinity - The site vicinity study area includes all properties lying wholly or partially within a 500 m radius of the proposed expansion footprint. This area coincides with the area of influence of a landfill site a prescribed in MECP Guideline D4: Land Use On or Near Landfills and Dumps. The existing land uses within the site vicinity study area include ancillary waste management and disposal activities (i.e. weigh scales, leachate collection and management, site access, maintenance and storage of heavy equipment, administration offices, public drop-off for waste and recyclables, landfill gas blower station and flare), residential (single family homes), recreational (campground), aggregate extraction operations, and contractor's yards.

Within the Official Plan and Zoning By-Law all of these properties are designated Rural Area and zoned Rural Area, Rural Precambrian Uplands, Environmental Management, Rural Aggregate Extraction and Highway. In addition, the following Special Exceptions apply within this area; S-11, S-23, S-113, S-228, S-233, S-239, S-303.

The proposed expansion of the site will result in a moderate increase in the site's area of influence as defined in MECP Guideline D4 and illustrated in **Figure 7.3**. There are a total of 12 properties located within the site's expanded area of influence that are not included in the existing site's area of influence. These properties are summarized in **Table 7.14**.

Table 7.14 Land Uses in Expanded Area of Influence

Current Land Use	Quantity	Zoning
Residential	8	Rural Area and Aggregate Extraction
Contractor Yard/Aggregate Extraction	2	Rural Area and Aggregate Extraction
Vacant/inactive (includes a former race track)	2	Rural Area and Aggregate Extraction

Note: In cases where a property includes a residence and business it has been classified as residential.

Regional Study Area - The regional study area consists of all properties outside of the site vicinity study area and lying wholly or partially within a 1 km radius from the site vicinity study area. There is a broad mix of land uses within the regional study area. Within the Official Plan all of these properties are designated Rural Area. Zoning includes Rural Area, Environmental Management, Rural Aggregate Extraction, Rural Precambrian Uplands, Highway, Estate Residential, Mobile Home Residential and Parks and Recreation.

Potential Effects and Mitigation: Land use planning in the vicinity of landfill sites is guided by PPS 2020, City planning policies and guidelines and MECP Guidelines D1: Land Use Compatibility and D4: Land Use On or Near Landfills and Dumps.

Table 7.15 summarizes the alignment of the proposed project with the PPS 2020 and the paragraphs following the table address how the City Planning policies and Ministry guidelines have been addressed.

Table 7.15: Project Alignment with PPS 2020

PPS 2020 Excerpts or Concept	Project Alignment
Land use must be carefully managed to accommodate appropriate development to meet the full range of current and future needs, while achieving efficient development patterns which optimize the use of land, resources and public investment in infrastructure and public service facilities.	The proposed project is planned to meet the current and future waste management needs within the service area. The expansion of the existing site represents efficient development as it confines the disposal activities to a single site and reduces the overall site area requirements. The proposed project takes advantage of existing transportation routes (external and internal) and existing site servicing eliminating a need for additional road and servicing infrastructure.
Infrastructure is to be sustainable and financially viable over its lifecycle.	The proposed project, as planned, is the most cost effective means of providing long-term waste disposal capacity. The City has prepared a long-term financial plan for its landfill and other waste services to ensure long-term financial viability.
Protect the environment and public health and minimize the undesirable effects of development, including impacts on air, water and other resources.	The proposed project will ensure that there continues to be a safe, reliable and environmentally responsible approach to waste disposal for residents within the service area. Numerous impact assessment reports, including hydrogeological, surface water, air and odour, have been completed and mitigating measures have been proposed as necessary to ensure undesirable effects are minimized and public health and the environment are protected. The City has also demonstrated through 30+ years of operational experience that this site can be operated effectively with limited risk to the environment and public health and safety and this EA includes operational enhancements to further safeguard the public and environment.
The PPS notes that planning for infrastructure, public service facilities and employment areas can extend beyond a 25 year time horizon.	The City recognizes the challenges and significant timelines involved in undertaking a waste management EA. Given these challenges and the flexibility incorporated in the PPS which encourages longer term infrastructure planning, this EA covers an estimated timeframe of 25 years which is in keeping with the commentary provided by the EA Branch through its review of the DRAFT EA submission.
Opportunities should be retained to locate new or expanding land uses that require separation from other uses. Major facilities and sensitive land uses shall be planned and developed to avoid, or if avoidance is not possible, minimize and mitigate any potential adverse effects from odour, noise and other contaminants, minimize risk to public health and safety, and to ensure the long-term operational and economic viability of major facilities in accordance with provincial guidelines, standards and procedures. Where avoidance is not possible planning authorities shall protect the long-term viability of existing or planned industrial, manufacturing	The site is situated in a rural area with relatively few sensitive receptors. The proposed expansion is planned on lands that are wholly owned by the City. These lands were retained for this purpose and for buffer lands. The City recognizes the importance of buffer lands surrounding a landfill site and has continued to maintain a significant treed buffer around the full periphery of the site. In addition, the City has purchased a number of properties over time to increase the buffer lands. This approach is expected to continue in the future as area properties are offered for sale at fair market value. The City has also demonstrated through 30+ years of operational experience that this site can be operated to effectively manage adverse effects from odour, noise and

PPS 2020 Excerpts or Concept	Project Alignment
or other uses that are vulnerable to encroachment by ensuring that the planning and development of proposed adjacent sensitive land uses are only permitted if the following are demonstrated in accordance with provincial guidelines, standards and procedures: a) there is an identified need for the proposed use; b) alternative locations for the proposed use have been evaluated and there are no reasonable alternative locations; c) adverse effects to the proposed sensitive land use are minimized and mitigated; and d) potential impacts to industrial, manufacturing or other uses are minimized and mitigated.	other contaminants. In addition to the successful operating history, a significant level of study has also been completed through this EA to understand the potential impacts of the proposed expansion and recommend additional mitigation as appropriate. The City has established an environmental monitoring committee which includes representation from the Ministry, City staff, City Council, and residents. This committee was established to identify potential concerns and provide input into landfill operations. The committee has been effective in communicating concerns and influencing change as necessary. This committee will continue its function with the expanded site. The City is also updating its Official Plan Policies to address land use compatibility and plans to include a designated 500 m influence area around the disposal footprint. The development of sensitive uses within this area will be strictly controlled as outlined in PPS 2020.
Infrastructure should consider greenhouse gas emissions and impacts of climate change.	The existing site includes an active landfill gas collection system which will be expanded to encompass the expanded site in phases. This system significantly reduces the overall greenhouse gas emissions from this site. The emissions are also considered in the air quality and odour impact assessment discipline report. The City will also continue to support and comply with Provincial organics program requirements as they evolve. Presently the City offers an extensive curbside and self-haul leaf and yard waste program throughout the growing season and uses the composted material on City properties. The City is also planning to initiate a residential source separated organics collection and composting program by approximately 2025. On-site stormwater ponds have been designed to retain the complete runoff from the 1:100 year rainfall.
A land use pattern should be promoted that minimizes the length and number of vehicle trips.	Based on the Community buildout and the screening criteria used to screen for potential new greenfield sites a greenfield landfill option would result in increased travel distances. Furthermore, the existing routes that provide access to the site are well-established and are appropriately designated and no significant traffic volume increases are projected over the proposed extended life of the landfill.
Waste management systems need to be provided that are of an appropriate size and type to accommodate present and future requirements, and facilitate, encourage and promote reduction, reuse and recycling objectives.	The proposed project is planned to meet the current and future (i.e. until 2049) waste management needs within the service area and the City will continue with its current aggressive diversion programs and will supplement them as appropriate based on market conditions and regulatory requirements. The City will continue to support the Province in its efforts aimed at establishing a circular economy and reducing litter and waste generated in Ontario Communities, food and organic waste diversion programs and producer responsibility for

PPS 2020 Excerpts or Concept	Project Alignment
	packaging. The City is proceeding with the construction of a biosolids processing facility which will facilitate the diversion of 100% of the biosolids (sewage sludge) that is currently being landfilled. Furthermore, the City is also planning to initiate a residential source separated organics collection and composting program by approximately 2025 which will assist in boosting the residential diversion rate to 50%.
Waste Management Systems shall be located and designed in accordance with provincial legislation and standards.	The proposed landfill expansion will be designed in accordance with provincial legislation and standards.
Protect natural heritage.	A study was completed to assess the potential impacts to the natural heritage. That study concluded that the proposed landfill expansion project, with the implementation of appropriate mitigation measures is not anticipated to have a residual adverse effect on the natural environment. Furthermore an expansion of the existing site as proposed through this undertaking is expected to have less adverse impacts on the natural environment relative to a new greenfield landfill.
Engage with Indigenous communities and coordinate on land use planning matters.	This EA has incorporated opportunities for Aboriginal engagement and no specific land use planning matters have been raised to date. Engagement will also continue through the next phases of the study.
Development shall generally be directed to areas outside of hazardous lands adjacent to river stream and small inland lake systems which are impacted by flooding hazards and/or erosion hazards.	The proposed development has been located outside of the 100 year flood line of the adjacent Canon Creek and Root River. In addition, the City has incorporated erosion protection measures along the Canon Creek adjacent to the landfill site.
Significant built heritage resources, cultural heritage landscapes and archaeological resources shall be conserved.	The proposed project will not impact any significant built heritage resources or cultural heritage landscapes. In addition, a Stage 1 and 2 Archaeological Assessment was completed for the proposed expansion and no archaeological sites were found and the report concluded no further archaeological assessment of the property is required.
Before consideration is given to developing new infrastructure and public service facilities the use of existing infrastructure and public service facilities should be optimized.	The proposed expansion project is an optimization of an existing service facility. Furthermore, the existing site is currently fully serviced whereas a new site would likely require new servicing.
Protect, improve and restore quality of water.	The site is being designed using current design standards and includes a liner system in all new cells. In addition, the City is making an extra effort to improve water quality through the proposed mining and lining of the south-western portion of the existing disposal footprint.
Ensuring stormwater management practices minimize stormwater volumes and contaminant loads and maintain or increase the extent of vegetative and pervious surfaces.	A “Surface Water Impact Assessment and Mitigation Report” was prepared to address stormwater volumes and contaminant loading. The proposed expansion will not have any significant impact on stormwater flows and the site design incorporates four separate ponds to manage and mitigate contaminant loading.

City Planning Policies:

The following summarizes how City Official Plan policies are addressed. Further details on potential effects and proposed mitigation for each of these can be found in other sections of this document.

- Heritage – City Official Plan policy requires an Archaeological Impact Assessment prior to construction. This work was completed and no archaeological sites were found within the limits of the proposed site development activities.
- Natural Heritage – City Official Plan policy requires an Environmental Impact Study to assess possible impacts of new development. The Natural Heritage Impact Assessment completed for the proposed expansion meets these requirements and identified no net effect on the terrestrial or aquatic environment.
- Groundwater Recharge Protection Area – City Official Plan policy addresses the specific policies to manage potential impacts in recharge areas. Section 4.1 entitled "Groundwater Recharge Protection Area", prescribes specific policies for the management and storage of fuel and chemicals, vehicle maintenance, repair and storage, spill response, and storm water management. Given that the landfill site operations include many of these prescribed activities, these policies are relevant to the existing site and the proposed site expansion and have been and will continue to be addressed through site design and operations. In addition, the Official Plan policies also identify a need for a spill response action plan which is to be reviewed and updated annually. This requirement is addressed for the existing site and will be updated for the expanded site. The City is currently developing a new Official Plan and it will contain similar language to protect the groundwater recharge area.

MECP Guidelines:

Guideline D1 is intended to minimize or prevent, through the use of buffers, the exposure of any person, property, plant, or animal life to adverse effects associated with the operation of specified facilities. It is intended to apply when a change in land use is proposed and a sensitive land use is within an area of influence. This Guideline is relevant as a zoning change is required to facilitate the proposed expansion and sensitive land uses exist within the expanded area of influence. In accordance with Guideline D-1, adequate separation based on the facility's influence area is the preferred method of mitigating adverse effects. In cases where the required separation is not available, potential compatibility problems need to be addressed through the completion of studies to assess the level of impact and develop appropriate mitigation. These studies have been completed and mitigation proposed as part of this EA.

Guideline D-4 prescribes the specific area of influence that applies for a landfill site and is used to confirm whether a potential compatibility concern exists with proposed changes in land use. D-4 specifies restrictions and controls on land use that the MECP wishes to see implemented in the vicinity of landfills in order to protect the health, safety, convenience and welfare of residents near the facility. MECP considers the most significant contaminant discharges and visual problems to typically occur within 500m of the perimeter of the fill area. For the purposes of this proposal the site vicinity study area reflects this area of influence as prescribed by the MECP.

Of the 12 additional properties within the site vicinity study area, 8 of them are residential and considered sensitive. In order to address potential impacts, the following detailed impact assessment studies have been completed as part of the EA:

- Air Quality and Odour Impact;
- Noise Impact;
- Hydrogeological (groundwater) Impact;
- Traffic Impact;

- Socio-Economic Impact;
- Visual Impact; and
- Surface Water Impact.

The impacts identified through these studies and the proposed mitigation are summarized in other sections of this EA. In addition to the proposed mitigation, the City has been proactively acquiring properties in the vicinity of the site. The recent acquisitions are included in Figure 7.3 and these additions significantly enhance the site's buffer lands and remove sensitive uses from the area of influence.

Table 7.16 summarizes the results of the planned land use impact assessment including potential effects, proposed mitigation measures and net effects.

It is noted that the City will proceed with rezoning as required and will consider the purchase of additional buffer properties at market prices in the vicinity of the landfill as they become available. The City has been active in acquiring properties in the vicinity of the site and has, in recent years, reduced the number of sensitive uses within the Area of Influence thereby increasing the buffer lands.

Table 7.16 Planned Land Use Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Official Plan designations and zoning on site, off site and in the site vicinity.	Additional property will need to be re-zoned under Special Exemption 23. The waste footprint expansion will effectively extend the site's area of influence further west.	Implementation of mitigation measures as identified in other discipline reports to address potential effects: • Air quality and odour impact; • Noise impact; • Hydrogeological impact; • Traffic impact; • Socio-economic impact; • Visual impact; and • Surface water impact.	Potential for odour effects associated with landfill mining. No other net effects anticipated.
Future development proposed in the site vicinity and along the access route(s).	If new sensitive land uses are permitted to develop within the sites expanded area of influence there is the potential for increased overall net effects.	Future development of vacant properties or redevelopment of existing developed properties within the area of influence will include consideration of Ministry Guideline D1 and D4. The City is currently updating its OP and shall incorporate policies addressing land use compatibility in the vicinity of the landfill. The City also understands and acknowledges the application of Ministry guidelines and City Planning Policies may restrict future development in the vicinity of the landfill.	Limited impacts to potential future development within the area of influence.
Permit is required from the Sault Ste. Marie Regional Conservation Area (SSMRCA) if development is planned in a regulated area.	Potential impacts to flooding or erosion.	Development is generally being planned outside of the regulated areas and if there is a need to develop within a regulated area it will be completed to meet SSMRCA approval requirements.	No net effects anticipated.

7.3.4 Visual

Data Collection:

The assessment of visual impacts associated with the Preferred Alternative Landfill Expansion was undertaken through the collection and assessment of the following:

- Desktop review of the site and surrounding area using the Google Maps® and Google Streetview® software program.
- Review of the existing topography of the site and the neighbouring lands within the study area.
- Review of photographs taken from key locations on site and neighbouring lands to understand land use and the significance of views and vistas.

The study areas for the visual impact assessment included on-site - the lands required for the preferred expanded landfill footprint; site-vicinity - the lands in the vicinity of the preferred expanded landfill footprint,

extending approximately 500 m in all directions from the edge of the preferred footprint; and a regional study area - the lands within approximately 1.5 kilometres of the preferred expanded landfill footprint.

Existing Conditions:

The present landfill feature is located on the east side of the site and is surrounded by existing vegetation and hilly topography. In general, the existing surrounding vegetation and topographic features block any views to the site and present landfill form from all immediately adjacent viewpoints. At present, there is only one opportunity to view the interior of the site from the adjacent surrounding areas. This view is isolated and limited occurring at the entrance to the landfill facility along Fifth Line East.

The effectiveness of the screening is dependent on a few factors including: the surrounding topography; the presence, density and make-up of vegetation surrounding the site; and the distance of the viewer from the site. The surrounding region generally falls away to the south from a ridge of hills that is located immediately north of the landfill site. The topography creates an effective visual block of the site from surrounding areas to the northwest, north, and northeast.

Distant views of the site are well screened due in large part to the expansive existing vegetation growth that covers much of the area. The coniferous – deciduous tree ratio of the existing vegetative cover varies at different locations around the site. The cover is predominantly deciduous to the north, west, and east but changes to predominantly coniferous in areas south of the site. The width of these vegetative buffers is significant in all directions. As the viewer moves away from the site, more elements located in the middle-ground and in the foreground provide increased visual screening. On a regional level, there is a very effective visual screen that surrounds the existing landfill feature.

Potential Effects and Mitigation:

As a result of this assessment it has been determined that the expansion of this landfill feature will have no significant adverse impact on the visual make-up of the existing landscape. The existing topography and vegetation that covers the area is quite effective in screening the interior of the landfill site from external viewpoints. The height of the landfill expansion will attain an elevation that is higher than the surrounding lands to the south, east and west, however the landform will not be visible from a distance due to the fact that the land continues to drop in elevation as one moves away from the site, and that the existing vegetation cover is dense and expansive across the area.

Within the site-vicinity and regional study areas, views of the landfill expansion will vary from fully obscured to moderately visible.

- Distant views in general from all directions around the site will not be adversely impacted by the introduction of the preferred landfill expansion due to the presence of existing vegetation and topographic features. There is the potential of observing a minimal amount of the top of the preferred expansion from the south. However, given the distance of the observer from the landfill site and the presence of existing topographic features located immediately north of the site, it is highly doubtful that the feature will be distinguishable or stand out from the surrounding landscape.
- Close-Up Views (Site-Vicinity) from the northwest to the northeast will be unaffected by the introduction of the preferred landfill expansion due to the presence of existing significant growths of vegetation and topography immediately adjacent to the site. These features effectively isolate the landfill site from areas to the north. The land falls away to the south, making the existing vegetative cover more effective at screening close-up views of the landfill from the west, south, and east.

- The footprint and elements of the site infrastructure redevelopment extend to a point on the west that comes close to the existing hydro easement that runs north-south through the area. This creates an isolated glimpse of the expanded landfill feature from Fifth Line East and from an existing residential property that borders the southwest edge of the site. The landfill feature will not be totally visible as there will still be a remnant vegetative screen along the property line. If left untreated, it is possible that the upper portion of the landfill could be visible when completed.

Table 7.17 summarizes the visual impact assessment including potential effects, proposed mitigation measures and net effects.

Table 7.17 Visual Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Views/viewsheds of the facility in the site vicinity.	The assessment indicates that the preferred expansion at completion will not interfere, obscure or compete with any nearby man-made or natural landmarks, nor will it significantly alter the existing vistas within the study area. The visual impact of the preferred landfill expansion is dependent on how it is perceived by the public from surrounding viewpoints. The expansion will be visible from small sections of Fifth Line near the hydro easement cross-over and a residential property bordering the south-west edge of the site. The expansion requires the removal of approximately 6.5 Ha of woodlot.	Mitigation proposed to lessen the impact of the preferred expansion includes: • planting of vegetative buffers on berms where necessary to obscure the feature from the surrounding areas. • introduce native grass/wildflower vegetative cap mixture that will improve the aesthetic quality of the landfill feature itself. • Reforestation plots to compensate for loss of woodlot.	Minimal net effects anticipated.

7.3.5 Noise

Data Collection:

The noise impact assessment completed for the proposed expansion involved the following steps:

- Identification of all dominant noise sources at the site;
- Determination of worst-case noise emission scenario (i.e., Scenario 8);
- Acoustical modelling of the site under the defined worst-case scenario to predict worst-case noise impacts at nearby receptors;

- Comparison of the predicted maximum receptor sound levels with the applicable Ministry criterion for landfills to determine compliance; and
- Determining noise mitigation measures in cases of non-compliance.

Data collection included determining the noise source characteristics for all equipment in use at the landfill for operation and construction. Eight future operational scenarios representing different stages of landfill operations and construction were considered. A screening level assessment was undertaken based on the vehicles, equipment and activities at the site to determine the worst-case noise impact.

The noise assessment took into consideration the receptors within a 1000m setback as prescribed in the *Noise Guidelines for Landfill Sites* (MECP, 1998). The noise receptors in the area include residences, campgrounds and businesses that are located in proximity of the site. In total, the noise impact at eleven (11) closest receptors were assessed in this study. Ten nearest receptors are residences, and one is a KOA campground. The receptors are shown on **Figure 5.6**.

Operating Conditions:

Noise emissions from the site are dominated by activities such as vehicular traffic along on-site roads and the operation of heavy equipment such as bulldozers, compactors and earth moving equipment. Specifically, the following site operations details were incorporated into the noise assessment modelling for the proposed expansion:

- Landfill staging – Landfilling operations will regularly change in location thus the worst-case is assumed to be operations closest to receptor locations.
- Site access – Trucks will all enter off of Fifth Line. Those with municipal solid waste will go to the tipping face and public vehicles will go to the drop-off.
- Working face – Noise generating equipment assumed to be operating at the working face includes a compactor, odour control unit, a dozer/front-end loader, and trucks transporting cover and waste. To be conservative it has been assumed that the typical operating berms at the working face would not be installed.
- Cell construction – Noise generating equipment assumed to be operating for cell construction includes a dozer and haul trucks for gravel hauling and placement.
- Landfill gas flare system – Noise sources for this activity include the blower and flare.
- Stockpile – Noise generating equipment assumed at the stockpile is an articulated dump truck to transport material from the stockpile to the working face.
- Composting pad – The composting pad will be relocated to an area immediately south of the south-east quadrant of the expanded fill area. Noise generating equipment at this location will include a front-end loader, a water truck, a tractor and a trommel screen.
- Site maintenance – Various construction and maintenance activities at the site are assumed to include a backhoe, a water truck, a Kobota 4x4, a plow truck and a sweeper. It is noted that the maintenance vehicles will not necessarily be operational at the same time. For the purpose of assessment, those with higher noise levels that can operate simultaneously have been considered.

The Ministry's publication *Noise Guidelines for Landfill Sites* (MECP, 1998) applies to the operations at the Sault Ste. Marie Landfill in terms of absolute sound exposure from landfill operations. The guidelines specify a daytime (7:00 am and 17:00 pm) receptor noise criterion of 55 dBA and a nighttime (7:00 pm and 7:00 am) receptor noise criterion of 45 dBA. These sound exposure limits apply to any receptor, in any worst-case hour of operation at the landfill. The acoustical descriptor used is the one-hour energy equivalent continuous sound exposure, denoted as "Leq (1)".

The landfill operates only during the day (i.e., between 8:30 am and 4:30 pm) therefore, for the purposes of this assessment, the predicted worst-case hourly sound level equivalent (Leq(1)) at the receptors resulting from the operations at the landfill are compared against the MECP's landfill noise guideline daytime criterion of 55 dBA.

Consideration was also given to the noise impact from stationary sources during non-operating hours and compared to the most stringent nighttime criteria of 40 dBA for all representative receptors in a Class 3 rural area.

The details of each noise source, including octave band sound levels as well as acoustic modelling details and results are in accordance with MECP publications NPC-233 – "Information to Be Submitted for Approval for Stationary Sources of Sound". The noise impact considerations for the landfill site, including sound level limits and the potential noise sources considered in the assessment are in accordance with the Ministry publication *Noise Guidelines for Landfill Sites* (MECP, 1998).

Potential Effects and Mitigation:

The results indicate that the predicted sound levels for all receptors are below the MECP's daytime and nighttime criteria of 55 dBA for operating landfills and 40 dBA for stationary sources during non-operating hours respectively. As such noise mitigation measures are not required to achieve compliance.
The overall worst-case receptor sound levels which occur during operating hours are also summarized in **Table 7.18**. The nighttime sound levels are much lower than the MECP threshold and are included in the detailed report in **Appendix L**. **Table 7.19** summarizes the noise impact assessment including potential effects, proposed mitigation measures and net effects.

Table 7.18 Predicted Receptor Sound Levels

Receptors		Coordinates		Receptor Height	Elevation	Predicted SPL	Applicable Criterion	Compliant
ID	Description	UTM - X	UTM - Y	(m)	(m)	(dBA)	(dBA)	(Yes / No)
R1	Assumed 2-storey residential dwelling	704162	5161971	4.5	282.1	51	55	Yes
R2	Assumed 2-storey residential dwelling	704192	5161914	4.5	281.5	49.9	55	Yes
R3	Assumed 2-storey residential dwelling	704038	5161979	4.5	282	49.1	55	Yes
R4	Assumed 2-storey residential dwelling	704089	5161910	4.5	281.5	48.6	55	Yes
R5	Assumed 2-storey residential dwelling	703965	5161919	4.5	281.7	47	55	Yes

Receptors		Coordinates		Receptor Height	Elevation	Predicted SPL	Applicable Criterion	Compliant
ID	Description	UTM - X	UTM - Y	(m)	(m)	(dBA)	(dBA)	(Yes / No)
R6	Assumed 2-storey residential dwelling	705051	5161884	4.5	278.5	40	55	Yes
R7	Assumed 2-storey residential dwelling	705080	5161941	4.5	280.7	40.4	55	Yes
R8	Assumed 2-storey residential dwelling	705169	5162147	4.5	281	40	55	Yes
R9	Assumed 2-storey residential dwelling	703615	5162609	4.5	293.8	38.4	55	Yes
R10	Assumed 2-storey residential dwelling	704595	5161747	1.5	257.29	34.9	55	Yes
R11	Assumed 2-storey residential dwelling	704935	5161855	4.5	270.26	40.2	55	Yes

Note: Ground elevation is above Mid-sea level.

Table 7.19 Noise Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Ambient (baseline) noise conditions.	Based on the noise assessment undertaken for the proposed expansion, MECP noise criteria will be met for all receptors.	No noise mitigation required.	No anticipated net effects.

7.3.6 Odour

Data Collection:

In addition to the quantitative air quality impact assessment as described in **Section 7.2.4,** a qualitative assessment of the odour generation potential from operations at the Site is provided in the context of the MECP's recommended FIDOL (Frequency, Intensity, Duration, Offensiveness and Location) approach[30].

The City has owned and successfully operated this site for 30+ years and the proposed expansion incorporates operational and site development enhancements to further build on the historical success. Historically, there has been a modest number of odour complaints, averaging 9 per year over the ten-year period 2012 to 2021 in the most recent two-year period spanning 2021-2022 there have only been three complaints received. This success is attributable to the City's commitment to continual improvement in its operations and nuisance mitigation such as enhanced communication between landfill staff and wastewater treatment plant operators in advance of deliveries to allow time to prepare for the acceptance and prompt covering of this waste. The proposed undertaking includes additional significant odour mitigation enhancements including the processing of biosolids in lieu of disposal in the working face, source separated organics collection and processing in lieu of disposal in the working face and staged expansion of the active landfill gas collection system.

[30] MECP. 2006. Proposed Approach for the Implementation of Odour-Based Standards and Guidelines. Position Paper, June 2006.

The baseline and future operations of the project were compared to determine whether significant changes in the odour profile of the site would be expected. Where significant changes may occur, an analysis was completed on the approaches to be used at the Site to reduce the potential for odour impacts.

Existing Conditions:

The baseline environment at the Site is characterized by an odour profile typical of the disposal of waste in a landfill. The Site maintains relationships with neighbours and staff are trained on the management of odour from the operations.

Practices in place to manage odourous emissions from the Site are documented within the Annual Development and Operations Report for the Site. A historical summary of the actions taken by the City to better manage nuisance odours includes:

- In 2003 the City conducted an odour study in response to increased number of odour complaints. During the study the following activities were performed in an attempt to reduce odours from suspected sources:
  - Changes to sludge handling;
  - Purchase and deployment of odour control granules to neutralize surface emissions; and
  - Application of clay cover to an inactive but uncompleted area (due to settlement) of the landfill in the northeast corner.
- A formalized complaint recording procedure was adopted and complaints were analysed to assist in the determination of the source of odours and factors contributing to odour complaint incidents (e.g., weather).
- In 2004 an odour study was completed and it was concluded that landfill gas emissions were likely the sources of odours.
- In 2006, an odour control spray system was also installed along a portion of the south fence line. The system included four (4) spray nozzles mounted directly on the fence. The system ran 24/7 appropriately nine months of the year (i.e., April to November). This system was decommissioned in 2010 when excavation activities related to the active landfill gas collection system required the removal of the fence. Throughout the construction period, a portable deodorizing system was employed to mitigate off-site odours.
- In 2010, the City completed an upgrade from a passive system to an active landfill gas collection system over a portion of the Site. The system reduced the quantity of methane released to the atmosphere and also reduced the odours generated at the Site. The active landfill gas collection system has been continuously active with the exception of occasional shutdowns required for system maintenance and repairs.
- In 2013, the City initiated programs to manage and mitigate odours associated with the transport, management and disposal of biosolids, including:
  - The use of an odour neutralizing agent, which is applied to the biosolids at the water pollution control plants prior to delivery to the landfill site. Once the biosolids are tipped at the working face, they are mixed with other wastes and cover is applied. A hand held sprayer is also used by the vehicle operators to apply the odour neutralizing agent to the empty trailers before they leave the Site;
  - Purchase of a portable odour fogging machine, which effectively distributes an odour neutralizing agent in the form of a light mist. The fogging machine typically runs from the time the first load of biosolids arrives until after the last lead has been received, tipped and covered;
  - Enhanced biosolids trailer washing to remove residual biosolids from the outside faces and wheels of the trailers; and

  - Replacement of mesh tarps with impermeable waterproof tarps on the biosolids trailers.
- In 2015 a Biosolids Management Class Environmental of Assessment (EA) was completed by the City. That EA identified and assessed various long term biosolids management strategies with the objective to develop a sustainable and effective approach that reduces the impact on the City's landfill, more effectively manages nuisance odours in transit and at the landfill site. The City has engaged an Engineering Consultant to select a preferred vendor, complete preliminary and detail designs, tender the work and oversee the construction. The project is expected to be tendered in 2023.
- In response to the Province's Food and Organic Waste Policy statement the City has initiated the planning and design for a residential source separated organics collection and processing program with implementation planned in approximately 2025.
- The City has been actively acquiring properties in close proximity to the site. Most notably they have acquired three residential properties along Fifth Line immediately west of the site and they are actively engaged in acquiring a fourth residential property. These acquisitions are effectively enhancing the sites buffer lands and reducing the number of sensitive uses proximal to the site.

In addition to the foregoing the following are included in the operating protocols for the Site:

- Minimizing the size of the active area;
- Minimizing the storage time of waste prior to disposal within the active area;
- Appropriate management of leachate;
- Use of special practices for disposal of highly odorous waste; and
- Use of daily cover.

The City continues to be committed to a process of continual improvement in its odour management protocols. Their odour management program will continue to include the on-going review of operational practices with potential for odour generation, completion of odour studies if necessary, formal response to odour complaints, and the implementation of capital improvements to reduce the potential impacts of odour.

Potential Effects and Mitigation:

The proposed project will consist of two activities that may have the potential to result in odour impacts: typical landfill operations (within new waste cells) and landfill mining.

- Typical Landfill Operations - The City has been successfully operating this site for 30+ years and has been continually implementing odour management improvements over time. The City has an active complaint response process and the number of complaints received annually is modest (ie. averaged 9 per year over the ten-year period 2012-2021 and in the most recent two year period spanning 2021-2022 there have only been three complaints received). Based on the input received, most of the complaints are believed to be attributable to the disposal of biosolids in the landfill working face. It is anticipated that the planned construction of the biosolids/SSO processing facility will have a significant positive impact on future odour complaints. Therefore, based on the removal of biosolids from the working face and recognizing the proposed activities associated with cell construction and typical landfill operations will not significantly increase the daily waste acceptance rate of the Site, nor will they adjust how waste deposition is conducted in the landfill, the odour profile (Frequency, Intensity, Duration, Offensiveness and Location) of the Site's operations is expected to improve. It is expected that the Site's existing odour management program would be able to effectively manage odour impacts associated with these activities.

- Landfill Mining - Landfill mining is proposed for the southwestern portion of the existing disposal footprint, as part of an environmental enhancement at the landfill to further mitigate the potential for groundwater impacts associated with unlined waste cells. The evaluation of alternative methods identified a preference for an expansion that included landfill mining, concluding that the shorter-term odour effects and additional effort and cost to manage them was worth the opportunity to enhance groundwater management along the western site boundary. This conclusion was based on the experience of other landfill sites in North America where odour impacts were effectively managed through the implementation of best management practices. The proposed waste mining activities are expected to occur over a period of two years, for approximately five months each year.

The mining process will involve the excavation of waste from a currently dormant area of the landfill and transfer of this waste to a lined cell. The mining process may include:

- Screening of this waste to separate large and small factions;
- Removal of recyclables or material with residual value; and,
- Transfer of screened residual waste to a lined cell.

In developing the landfill mining program, the following will be completed:

- Draw upon the experience of other municipalities and landfill operators in setting up the waste mining process and detailed mitigation strategies;
- Complete a pilot mining program, to better characterize the type of waste, odour profile of the waste and logistical processes for screening and transfer to a lined cell;
- Use findings of pilot mining program to guide the development of Standard Operating Practices (SOPs) and the Odour Management Plan (OMP) for full-scale landfill mining;
- Engage local stakeholders to keep them informed of the landfill mining process and gather their feedback on the process;
- Train all staff on SOPs and the OMP; and
- Conduct a monitoring campaign for odours around the landfill mining process.

In order to mitigate the potential for landfill mining to generate odour impacts, an OMP supplement will be developed specifically for this activity to support the site OMP. A preliminary version of the OMP supplement is included in **Appendix M**. The OMP will be finalized as the landfill mining program is designed and developed and will include input from the contractor/landfill mining team and effective best management practices that have been implemented at similar sites. The OMP will be shared with the MECP in preparation for the landfill mining activities.

Table 7.20 shows the linkage between some of the key planned odour management measures associated with the proposed landfill mining process and the MECP recognized FIDOL approach for assessing/managing odours. It is anticipated that odour impacts from landfill mining can be managed through the practices described in **Table 7.20**, coupled with on-going engagement of the public.

The overall OMP for the Site will be enhanced to incorporate additional measures to mitigate potential impacts associated with the landfill mining process, and will become a ‘living’ document, requiring review and update as Site conditions change. The City is committed to making continuous improvement to reduce the sources of odours at the Site and along travel routes, and effectively manage and mitigate sources of odour that are inherent with typical landfill operations. Through the implementation of the odour management practices outlined above, and ongoing engagement with local stakeholders, it is expected that odours associated with the proposed landfill expansion can be effectively managed.

Table 7.20 Summary of Odour Criteria and Proposed Management Practices for Landfill Mining

Odour Assessment Criterion	Management Practices
Frequency	• Management of operations based on meteorological conditions (e.g., shut down during calm periods or specific wind direction). • Daily inspection program used to adjust and refine mining operations. • Bypass screening of waste where highly odorous material is excavated.
Intensity	• Use of chemical and biological treatment to reduce significance of odour. • Use of periphery odour misting system. • Minimize size of active excavation. • Bypass screening of waste where highly odorous material is excavated.
Duration	• Cover applied to excavated area at the end of the day. • Daily inspection program used to adjust and refine mining operations. • Bypass screening of waste where highly odorous material is excavated.
Offensiveness	• Use of chemical and biological treatment to reduce significance of odour. • Use of periphery odour misting system. • Minimize size of active excavation. • Bypass screening of waste where highly odorous material is excavated.
Location	• Management of operations based on meteorological conditions (e.g., shut down when winds blowing to nearest receptors). • Daily inspection program used to adjust and refine mining operations.

Table 7.21 summarizes the assessment of impacts for odour including potential effects, proposed mitigation measures and net effects.

Table 7.21 Odour Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Ambient (baseline) odour conditions.	There is potential for odour as a result of ongoing landfill operations.	The City will continue or initiate the following practices to minimize odour from landfill operations: • Minimizing the size of the active area; • Minimizing the storage time of waste prior to disposal within the active area; • Appropriate management of leachate; • Use of daily cover; • Use of odour neutralizing agent applied to the biosolids; • Use of a portable odour fogging machine to effectively distribute odour neutralizing agent at the site; • Enhanced biosolids trailer washing; • Use of impermeable waterproof tarps on the biosolids trailers; • Construction of a Biosolids and SSO Management and Processing facility; • Use of new fully sealed biosolids trailers in conjunctions with the Biosolids Processing facility implementation; and • Staged expansion of the landfill gas collection system. • Expansion of the site's buffer lands.	Minimal net effects anticipated and likely an improvement relative to existing odour conditions.
Ambient (baseline) odour conditions.	There is potential for odour as a result of the proposed landfill mining (limited to approximately 10 months over two years).	In order to mitigate the potential for landfill mining to generate odour impacts, an Odour Management Plan (OMP) supplement will be developed. The OMP will be a 'living document' incorporating input from the contractor/landfill mining team, effective best management practices that have been implemented at similar sites, and ongoing input from site neighbours. It is anticipated that the odour management will include: • Completion of a pilot landfill mining program to characterize the type of waste and odour profile. Use of the information from this pilot to develop standard operating practices (SOP) for the full scale mining program; • Train all staff on the OMP and SOPs; • Management of mining operations based on meteorological conditions (e.g., shut down during calm periods or specific wind direction); • Daily inspection program used to adjust and refine mining operations; • Bypass screening of waste where highly odorous material is excavated. Use of chemical and biological treatment to reduce significance of odour; • Use of periphery odour misting system; • Minimize size of active mining excavation;	Some short-term net odour effect during the landfill mining.

Table 7.21 Odour Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
		• Cover applied to mined area at the end of the day; • Keeping local residents informed and responding to complaints; and • Develop and implement a monitoring campaign for landfill mining.	

7.4 Economic Effects

The following describes the economic impact assessment completed for the preferred expansion option. Full details are provided in **Appendices I and N**.

7.4.1 Businesses

Data Collection:

Primary and secondary sources were used to inventory the existing conditions as follows:

- *Secondary Information Gathering*: To gather information relevant to the study area, secondary source information was collected and reviewed. This was done using aerial mapping, street views of the roads within the study area (using Google Earth) and recording all businesses either adjacent to the road or at access and egress points. Further desktop research was conducted to gather descriptive information on the identified features using company websites, business directories, etc.
- *Business Surveys*: A windshield survey was undertaken to identify businesses within 2 km of the proposed footprint. In addition, ten businesses within 1 km were identified for interview to determine current business operations and evaluate potential effects from both construction and operations phases of the Project. These businesses were selected for interview based on the type of service(s) they provided and also the presence of an outdoor component which may be affected by nuisance effects from the landfill. Seven businesses were available and were interviewed by telephone.

The study area for the business impact assessment focussed on an area within 1 km of the site footprint and considered other features and businesses within 2 km of the site. The Ministry considers the most significant contaminant discharges and visual problems to typically occur within 500m of the perimeter of the fill area. For the purposes of this proposal, we have conservatively considered a 1 km radius to be the principal area of potential impacts. The area between the 1 and 2 km radii has also been included to further characterize the area surrounding the zone of potential impacts.

Existing Conditions:

The existing landfill site is situated between two gravel pits owned by Pioneer Construction Inc. and Ellwood Robinson Ltd. and opposite a campground on the south side of Fifth Line East. Generally, the area is not commercialized; and the primary businesses are gravel/sand pits which cover large areas within the study area. There are approximately 45 businesses within the 2 km study area as shown in **Figure 7.5**.

The seven businesses interviewed were well established businesses being in operation for at least 10 years. They all stated that they owned the business and land it was situated on.

When asked what things they liked about their business location, common answers from those surveyed included the proximity to nature, customers, the highway, and the city. Things that business operators disliked about the area included traffic, garbage trucks, noise and odour from the landfill, and poor road maintenance.

Respondents were asked about changes in the community since their business had been in operation. Positive changes included an increase in passing traffic resulting in more customers; while negative aspects included the economic downturn and decreasing number of American tourists. The loss of St. Marys Paper was also mentioned as a negative factor affecting the community in recent time as well as increased development resulting in a loss of natural environment.

Potential Effects and Mitigation:

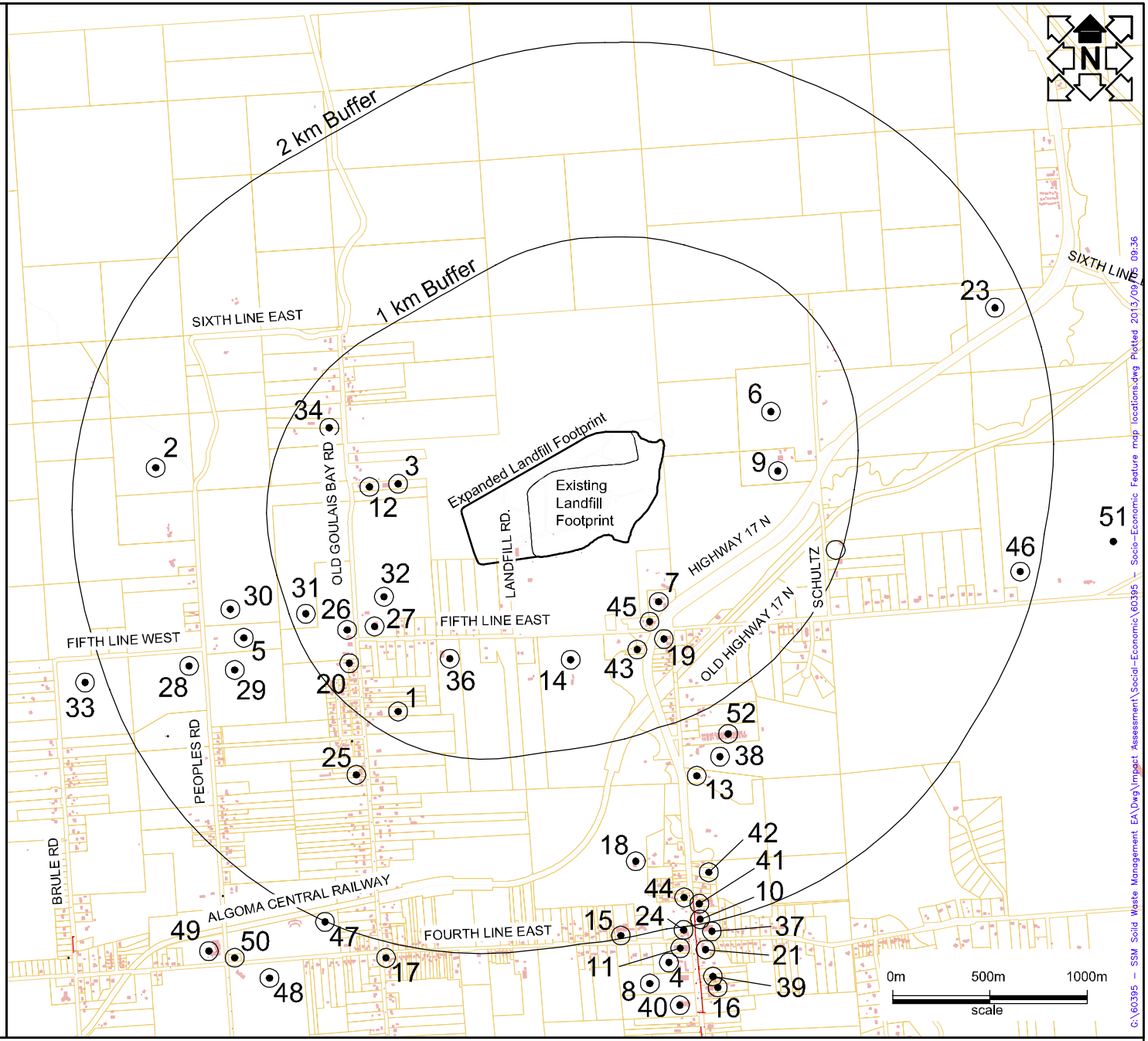
The proposed expansion will not result in any displacement of businesses.

Most of the businesses interviewed had an outdoor component that may be affected by factors such as noise or odour. Odour was mentioned by a number of survey respondents as an issue that affects the outdoor activity at their business. Only one business interviewed stated that they had considered moving from their current location; this was due to odour from the landfill which many customers had complained about.

Key concerns related to the landfill expansion were traffic (including trucks) and the capacity for existing roads to accommodate this traffic, odour and increased bears coming onto business properties.

Table 7.22 summarizes the impact assessment of the proposed landfill expansion on businesses including potential effects, proposed mitigation measures and net effects. Conclusions are based on survey findings and findings from other disciplines (odour and noise). Applicable monitoring programs and mitigation measures will be implemented to mitigate nuisance effects (above the existing conditions) for local businesses.

Feature #	Name
1	744 Auto
2	A. J. Positano Paving
3	Algoma Energy Solutions
4	Ambassador Motel
5	Andre's Auto Recyders
6	Brandes Gravel Pit
7	Caswell Concrete products
8	Construction Equipment Co.
9	Ellwood Robinson Limited
10	Esso Gas Station
11	Eternal Monuments
12	HET Heavy Equipment Technicians
13	Home on the Range Practise Facility
14	KOA Campground
15	Kresin Engineering Corporation
16	Lakeway Truck Centre
17	Maple View Inn
18	Maplewood Golf Course
19	Martin's trailers and Accessories
20	Maxoverdock computers
21	Monster Muffler
22	OMNI Global Ltd
23	Palmer Construction Group Inc
24	Perry's Great Northern Gun & Bow Shop
25	Pet Pleasure Resort
26	Pioneer Construction
27	Pioneer Construction Test Lab
28	Pioneer Construction Young Pit
29	Pioneer Construction McMillan Pit
30	Pioneer Construction City Pit
31	Pioneer Construction McQueen Pit
32	Pioneer Construction ? Pit
33	Pioneer Construction ? Pit
34	Possamai Construction & Aggregate
35	PUC Services Inc
36	Red Star Electric Contractors
37	Riuniti Banquet Halls
38	Root River Golf Club
39	Sims Custom Countertops
40	Toromont CAT
41	Trading Post And Frontier Village
42	Unidentified Quarry
43	WHAM Warren Hull's Asphalt Maintenance
44	Woody's Wheels
45	Vacant Commercial Property For Sale
46	Sault Ste. Marie Region Conservation Authority
47	Holy Sepulchre Cemetery
48	Greenwood Cemetery
49	Greenwood Public School
50	East Korah Maxwell United Church
51	Hiawatha Highlands
52	Root River Trailer Park



AECOM
AECOM Canada Ltd.
523 Wellington Street East, Sault Ste. Marie Ontario, Canada
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Sault Ste. Marie Municipal Landfill Site
Socio-Economic Features

Figure 7.5

C:\60395 – SSM Solid Waste Management EA\Dwg\Impact Assessment\Social-Economic\60395 – Socio-Economic Feature map locations.dwg Plotted 2013/09/[illegible] 09:36

Table 7.22 Business Summary of Net Effects

Indicator	Potential Effects	Proposed Mitigation	Net Effects
Presence of business enterprises on site, off site, in the vicinity of the current or potential site and along the access route(s).	No commercial land acquisition is planned for the expanded site but residential acquisitions have been made (refer to Table 7.13)to expand the site's buffer lands and/or Contaminant Attenuation Zone (CAZ).	No mitigation required.	No net effects anticipated.
	Business survey data suggests that businesses felt their operations could be affected by a downturn in customers related to increased nuisance effects such as noise or odour as well as traffic levels making routes to businesses dangerous and more difficult for customers. The City has historically experienced population decline and more recently the population has stabilized. For the purposes of this EA modest future growth has been considered and daily waste acceptance rates will not increase significantly. The planned cell construction activities will occur periodically over the operating life of the facility and will result in some additional activity and related noise during the periods of construction. The proposed site operations are expected to generally remain unchanged relative to existing waste deposition and management activities at the existing site and should not result in any additional noise. Furthermore, the odour profile (Frequency, Intensity, Duration, Offensiveness and Location) of the Site's operations is expected to be improved with the implementation of the planned best practices approach to odour management together with the construction of a biosolids/SSO management/processing facility and staged expansion of the landfill gas collection system. It is expected that the Site's planned enhanced odour management program would be able to effectively manage odour impacts associated with these activities. Some additional odour is likely during landfill mining operations which is expected over a ten-month period spanning two years. The results of the noise analysis indicate that for the worst-case operational scenario, the predicted receptor sound levels will be below the Ministry's daytime criterion of 55 dBA for all the nearby noise receptors. Traffic volumes are generally moderate and no significant increases in landfill related traffic levels (including heavy vehicles) are anticipated.	Continuation of current successful operational practices to mitigate nuisance effects plus the additional measures noted below. Development of a best practices Odour Management Plan for the proposed landfill mining operations. Construction of a Biosolids Management and Processing facility. Staged expansion of the landfill gas collection system. On-going engagement with the public including timely responses to public complaints. No proposed changes to operational hours or operational practices that would significantly increase noise. Initiate a routine sampling and analysis program for private wells in close proximity to the site. Extend the potable water distribution system easterly along Fifth Line to west of Highway 17 if necessary to address contamination of potable wells. Construction of a liner and leachate collection system in all new and mined cells.	Minimal net effects anticipated.

	Groundwater flow from the landfill is well understood through the extensive monitoring well network that has been established within and surrounding the site (i.e. approximately 40 wells are sampled and analysed three times annually). The Municipal water distribution system has been extended along Fifth Line from Old Goulais Bay Road to the landfill site. There is no evidence of impacts to area private wells. Overall, no significant increase in nuisance effects are expected from noise, odour or traffic assuming appropriate mitigation		
	Concerns regarding increased numbers of bears were raised by 2 of 7 businesses interviewed.	A vermin management plan will be developed and detailed in the Design and Operations report.	No net effects anticipated.

7.4.2 Transportation

Data Collection:

The traffic impact assessment examines and evaluates the potential for impacts on transportation infrastructure/networks associated with the landfill expansion. The assessment was completed with consideration of existing and historical traffic volumes, projected traffic growth related to future landfill operations, traffic growth related to landfill site development activities and the most recent update to the City's Transportation Master Plan. The potential disruption effect on local residents and businesses is evaluated as part of the socio-economic assessment.

For the purposes of the detailed impact assessment, the "on-site study area" is defined as lands within the preferred landfill footprint (existing and expansion areas). The "site vicinity study area" extends along Fifth Line to Old Goulais Bay Road to the west and Highway 17 north to the east. The site vicinity study area includes the Fifth Line intersections with Highway 17 north and Old Goulais Bay Road.

Data collection included:

- A review of historical traffic volumes and accident history.
- Traffic counts completed over 3 days from February 5, 2020 to February 7, 2020 and 6 days from May 17, 2014 to May 22, 2014.
- An 8-hour intersection traffic count at the Fifth Line/Highway 17 intersection on Tuesday, September 15, 2015 and Wednesday October 28,1998.

Existing Conditions:

Access to the municipal landfill site is provided via Fifth Line, an east-west traffic corridor near the City's northern Municipal boundary with intersections at Old Goulais Bay Road and Highway 17 North. Fifth Line is a Class B truck route and classified as a local road. It provides limited mobility as a thoroughfare as it terminates at a "T-intersection" to the west of the landfill at Old Goulais Bay Road. Old Goulais Bay Road, to the north of Fifth Line, dead ends and transitions to a trail some 1.6 km north of Fifth Line. In addition to the landfill site, Fifth Line also services area residents along Fifth Line and Old Goulais Bay Road, several local businesses, KOA campground and it is an important truck route for Contractor's yards and aggregate extraction operations in the Fifth Line/Old Goulais Bay Road area. Both intersections in the site vicinity study area operate with stop control along Fifth Line.

Posted Speed and Road Geometrics – Posted speeds on Old Goulais Bay Road, Fifth Line and Highway 17 in the site vicinity study area are 50 km/h, 60 km/h and 70 km/h respectively. The speed limit on Highway 17, on the approaches to Fifth Line, were reduced from 80 km/h to 70 km/h in the spring of 2018 specifically to address comments received from area residents pertaining to perceived intersection safety. Fifth Line has a tangential alignment throughout the site vicinity study area and the road grades are generally "flat" with the exception of the Fifth Line grade on either side of Root River where the maximum grade is in the range of 6% and 8% respectively.

Historical Traffic Volumes - The Fifth Line traffic volumes have remained stable and have historically been in the range of 900 to 2,300 vehicles per day (vpd) between 1998 and 2020. Peak hourly two way traffic volumes have slightly exceeded 200 vehicles per hour (vph).

Based on an eight hour intersection traffic count on September 15, 2015, at the Fifth Line/Highway 17 intersection, the hourly two way traffic volumes on Fifth Line west of Highway 17 ranged from 111 to 137 vph. During the same period the number of hourly left turns from Highway 17 to Fifth Line ranged from 18 to 41 vph and the right turns from Fifth Line to Highway 17 ranged from 24 to 49 vph (i.e. very similar to the

left turn movements from Highway 17 to Fifth Line). Other turning movements to and from Highway 17 were much less significant as the majority of vehicle trips are to and from the City center located to the south.

This count was compared to a similar count completed in 1998. The volumes in 1998 were moderately higher relative to the volumes presented in the preceding paragraph for 2015 which highlights the consistency in traffic volumes over time.

Accident History – The accident history within the site vicinity study for the periods spanning from January 1, 2015 to December 31, 2019 (5 years) and January 1, 2008 to March 30, 2013 (ie. 5 ¼ years) is shown in **Table 7.23**. The comparison of the two time periods highlights the low and consistent accident rates over time.

Table 7.23 Accident History in Site Vicinity

Location	Total Number of Accidents (2015-2019)	Total Number of Accidents (2008-2013)	Average Annual Accident Rate
Fifth Line/Highway 17 N intersection	13	11	2.3
Fifth Line (Highway 17 N to Old Goulais Bay Road)	0	1	0.1
Fifth Line/Old Goulais Bay Road intersection	1	3	0.4

Pedestrians and Cyclists - There is anecdotal evidence of modest pedestrian/cyclist traffic along this route. A total of zero and seven pedestrian crossings were recorded during the Fifth Line/Highway 17 N eight-hour intersection traffic counts undertaken in 2015 and 1998 respectively. Pedestrians are currently accommodated on shoulders adjacent to the roadway and cyclists are either accommodated within the travel lane or along the partially paved shoulders. The accommodation of pedestrians along shoulders is consistent with the City's approach along other rural road corridors in the City and in this instance the traffic volumes are modest relative to other traffic corridors with a similar road cross section.

There are no identified cycling destinations within the site vicinity study area and Fifth Line is not identified as a significant cycling corridor (i.e. part of Hub Trail or spoke route) within the 2007 Cycling Master Plan Update.

Projected Traffic Volumes - No significant increase in traffic is anticipated as a result of the proposed landfill expansion, population growth or other land development activities in the vicinity of the site. The City has developed mapping illustrating potential residential and Industrial, Commercial & Institutional (IC&I) growth areas over the next 20 years and no potential development sites have been identified in the vicinity of the landfill site.

The City has also recently completed an update to their Transportation Master Plan. There are no references to any significant changes in traffic patterns/volumes in the site vicinity study area nor are there any specific upgrades or improvements referenced for the Fifth Line corridor within the site vicinity study area.

The overall increase in traffic associated with site development activities and increased site visits associated with population growth is expected to be very modest throughout the planning period as summarized below.

Potential Effects and Mitigation:

Population projections have been developed in conjunction with the Environmental Assessment process. The projections have been developed based on the most recent work (i.e. 2018) completed by the City's consultant. Based on these projections, it is anticipated that the population within the service area may increase to 90,470 by 2049.

Based on the weigh scale records for the site for the period from 2015 to 2019 inclusive, the estimated average annual number of trips to the site is in the range of 58,300 to 66,200 with an average of 62,100 over the 5 year period. This translates into an average annual daily traffic volume of approximately 450 vehicles per day.

Assuming that the number of visits to the site will grow in proportion to the population increases there may be in the order of 100 additional vehicles per day on Fifth Line by 2049.

In addition to an increase in customers visiting the site, there are a total of eight development sequences for the proposed expansion which will require construction activity. Typically the construction activity will be undertaken in the spring through fall periods and the level of construction traffic accessing the site will vary considerably during this period. It is anticipated that the activity that will generate the most traffic to and from the site will be the delivery of granular materials for the cell liner construction. The maximum estimated rate of deliveries is five round trips per hour over an 8 hour period. This may increase the average annual daily traffic volume in the range of 80 vehicles per day. The impact may be reduced if existing trucks that currently haul granular materials from nearby aggregate extraction operations are routed to the landfill site in lieu of other projects.

Based on the forgoing, projected traffic volumes are expected to remain below 3,000 vehicles per day along Fifth Line. A standard two lane roadway can typically accommodate average annual daily traffic volumes in the range of 15,000. Thus, no significant capacity related impacts are anticipated.

The intersections within the site vicinity study area are operating effectively with acceptable levels of service and no significant impacts are anticipated with the projected modest increased traffic volumes.

Fifth Line was last upgraded by the City in 1990 and is currently in fair to good condition and classified Category B (2020 classification) which implies a timeline of 6-10 years for rehabilitation or reconstruction. The roadway has been designed to accommodate heavy truck traffic and includes 80 mm of asphalt. No significant impacts are anticipated to the road structure integrity as a result of the modest increase in traffic volumes that will be routed along Fifth Line to access the expanded landfill site.

The projected modest growth in traffic associated with construction activities and increased site visits is not anticipated to result in any traffic safety concerns or significant impact on pedestrian and cyclist safety and mobility relative to current conditions.

Table 7.24 summarizes the potential traffic impacts and identifies completed and proposed mitigating measures together with proposed monitoring to ensure the predicted effects are not exceeded.

Table 7.24 Traffic Summary of Net Effects

Indicator	Potential Effect	Proposed Mitigation	Net Effect
Traffic safety along access route(s).	The projected modest growth in traffic associated with construction activities and increased site visits is not anticipated to result in any traffic safety concerns or significant impact on pedestrian and cyclist safety and mobility relative to current conditions.	In order to address the reported near misses observed by area residents at the Fifth Line/Highway 17 intersection a speed limit reduction along Highway 17 on the approaches to Fifth Line and sight line improvements have been completed. A detailed review to confirm the suitability and adequacy of warning signage is recommended prior to initiating the expansion and enhancements to the road geometrics should be considered in conjunction with the next capital improvement project along the Highway in this area. In addition, the following monitoring is suggested: • Review accident history every 5 years and identify high risk road segments or intersections. • Monitor vegetation growth within the right-of-way and maintain maximum sight lines.	No net effects anticipated.
Traffic operations along access route(s).	No significant capacity related impacts, intersection impacts or roadway condition issues are anticipated.	No mitigation required. However, the following monitoring is suggested: • Conduct 24-hour traffic counts over a period of several days along Fifth Line to the east and west of the landfill entrance and confirm adequacy of the lane configuration every 5 years. • Conduct 8-hour intersection traffic count at the Fifth Line/Hwy 17N intersection to confirm adequacy of the level of service, lane configuration and intersection controls as needed based on volume. • Continue to complete road condition assessments and schedule maintenance/ repairs/upgrades as required in accordance with the City's Road Management Plan.	No net effects anticipated.

7.5 Consideration of Cumulative Effects

Cumulative Effects:

The MECP Code of Practice for Reviewing Environmental Assessments in Ontario encourages proponents to consider cumulative effects of the project and other projects and activities happening currently or proposed in the foreseeable future. If there are overlapping effects additional or different mitigation may be required.

Consideration of whether there is a cumulative impact from the proposed expansion and other activities requires consideration of the following:

- To act cumulatively, the proposed landfill expansion must have adverse net effects on the environment.
- Other activities that have the potential to cause effects on the environment have to be taking place in the vicinity of the proposed landfill expansion.
- Other activities have to be taking place at the same time as the proposed landfill expansion activities such that potential effects from both projects overlap.

The following steps were taken to determine cumulative effects:

- Characterize potential future adverse effects from the proposed expanded landfill – The potential effects of the expansion are documented in Sections 7.1 to 7.4 of this EA. These are summarized by criteria group in **Table 7.25** below.
- Identify and characterize other planned/future projects that may be constructed and/or operated in the future within the project study areas based on input from City planning and engineering departments. The following provides this information including the timing, nature and spatial extent of potential effects:
    - The City of Sault Ste. Marie Biosolids/SSO processing facility will be constructed at the landfill. That project was planned under the Municipal Class EA process and although there may be some short-term nuisance impacts associated with the construction of the facility, the change that will result from operation of the new facility is anticipated to be positive. Once complete, the biosolids generated at the two wastewater treatment plants and SSO collected curbside will be processed in an indoor facility with odour control technologies rather than being disposed of in the landfill working face. Odours are expected to be reduced significantly and the processed material will be available fur use as landfill cover and/or other beneficial purposes.
    - A new use is proposed at 339 Fifth Line East which is located south-west of the site. Based on information publicly available, Algoma Craft Cannabis is a Cannabis micro-cultivator and micro-processor. Their mission is to provide high quality, craft-grown, and hand packaged Cannabis goods to the Canadian marketplace. As a micro cultivator/processor the indoor garden can generate a maximum yield of approximately 1,200 lbs (550 kgs) of dried Cannabis annually. This equates to a typical average production of approximately 100 lbs of dried Cannabis monthly.

      As a condition of their license (as prescribed by Federal regulations) zero discernible odours are permitted from the site. Licensed indoor producers are mandated to implement odour control strategies and any air expelled from the site will be filtered to remove potential Cannabis odour using industry-standard activated carbon filtration. From a practical perspective this means that NO discernible Cannabis odours will be detectable outside of the site. This is a strict condition of the license to operate and is enforced by Health Canada. By-products include wastewater and biomass (stocks and stems of plants). Wastewater would consist of what would be expected from a home tomato garden (i.e., 99% water with trace minerals (calcium, potassium, magnesium, nitrogen, etc.)). No harsh chemicals or pesticides will be used.

      Federal regulations mandate a minimum level of security for all licensed producers. These regulations include maintaining controlled and selective access to the site, secure storage,

closed-circuit cameras, access control, etc. The site will have 24/7 video surveillance and monitoring.

From a shipping/receiving perspective, shipping would only occur once or twice per month and likely to be in a small panel van. Receiving would be two to three times per month and consist mainly of small shipments of soil and nutrients.

It is estimated there will be between 2 and 4 full-time employees on site at a given time and once per month there would be a crew of 4 to 6 additional part-time workers to perform harvesting operations. Added traffic to the neighbourhood is expected be limited.

No planning applications are required at the local level as cannabis cultivation and processing is a legal use and no potential impacts are anticipated based on the available information and regulatory framework for this use. Further details pertaining to this development are included in **Appendix P**.

- No development applications were identified within 1km of the proposed expansion. No potential impacts are anticipated.
- The existing gravel pits and concrete products manufacturing facility located near the site are assumed to continue to operate into the future. These uses have occurred for many years in concert with the existing site operations and are expected to continue to overlap in time with the proposed expansion. The existing and future gravel and concrete products manufacturing operations are expected to continue to result in noise, dust and truck traffic disruption in the area but no increases in the nuisance effects are anticipated relative to historical operations.
- The existing campground south of the site is assumed to continue to operate into the future. This use has occurred at the same time as the existing site operation and is expected to continue to overlap with the proposed expansion. The campground has limited impacts on the environment.

- Describe the nature and extent of any possible cumulative effects and propose mitigation, impact management and/or monitoring strategies to address them. The potential for cumulative effects is addressed in **Table 7.25** below.

Table 7.25: Identification and Mitigation of Potential Cumulative Effects

Criteria Group	Net Effects of the Proposed Expansion	Activities that Overlap with the Proposed Expansion	Cumulative Effects	Mitigation to Address Cumulative Impact
Biology	Some vegetation removal, however forest fragmentation is not anticipated given the extent of wooded areas. Reforestation plots have been recommended under the visual impact assessment which will mitigate the necessary vegetation removal.	No other known activities that would result in significant vegetation removal in the area.	No cumulative effects beyond the effects of the proposed expansion.	No mitigation required beyond that noted in Sections 7.2.1 and 7.3.4 for proposed expansion.
Hydrogeology	Anticipated improvement in overall groundwater protection with the implementation of landfill mining, final capping of the	Although gravel pits are typically developed above the water table, excavation could encounter groundwater.	The proposed expansion which includes mining of the current western fill area and the construction of	No mitigation required beyond that noted in Sections 7.2.2 for proposed expansion.

Criteria Group	Net Effects of the Proposed Expansion	Activities that Overlap with the Proposed Expansion	Cumulative Effects	Mitigation to Address Cumulative Impact
	existing site and lining of all new and mined cells.		fully lined western landfill cells, will mitigate westward advancement of leachate from the landfill. No incidents of leachate in area of gravel pits have been reported historically.	
Surface Water	Inclusion of stormwater management ponds with emergency flow control and regular monitoring will improve surface water quality relative to the existing site.	A gravel pit located north-east of the site is also improving their stormwater management. They currently discharge to the Root River and will be incorporating stormwater management pond(s) to improve stormwater quality discharging to the receiver. No other known surface water impacts in the area.	The anticipated net effect is an overall improvement in surface water quality adjacent to the site.	No mitigation required beyond that noted in Sections 7.2.3 for proposed expansion.
Atmospheric	No net effect to air quality anticipated as the Landfill will operate within regulatory compliance limits. Relative levels of material movement and vehicular activity are indicators of dust emissions. Standard mitigation practices are in place to manage emissions at the site including effective vehicle maintenance and the management of fugitive dust. This will result in minimal off-site dust.	There are other activities ongoing in the vicinity of the site primarily consisting of aggregate extraction/hauling operations and manufacturing of concrete products that have been ongoing in the area for many years. These activities are expected to continue in the future. There are no known capacity increases or new developments.	The air quality assessment completed for the Landfill expansion includes an assessment of the predicted and background concentrations of indicator compounds compared to their respective air quality criteria. The assessment concludes that air quality in the area will be within compliance limits.	No mitigation required beyond that noted in Sections 7.2.4 for proposed expansion.
Archaeological	No net effects from the expansion are anticipated as no archaeological resources were identified through the Stage 2 assessment.	No known archaeological resources identified in close proximity to the site.	No cumulative effects anticipated.	No mitigation required beyond that noted in Sections 7.3.1 for proposed expansion.
Social	Site has been successfully operated for 30+ years. Moderate short-term increase in nuisance effects anticipated primarily related to odour during the landfill mining operation.	Truck traffic, noise and dust have been ongoing for many years related to the aggregate extraction/hauling and concrete products manufacturing operations in the area and are	Dust, noise and traffic associated with the landfill, aggregate extraction and concrete products manufacturing activities could occur at the same time but this has been the case for	The City will continue to encourage landfill neighbours to report occurrences of nuisance effects so that they can be addressed.

Criteria Group	Net Effects of the Proposed Expansion	Activities that Overlap with the Proposed Expansion	Cumulative Effects	Mitigation to Address Cumulative Impact
	Odour during regular operations will be reduced in the future with the processing of SSO and biosolids in lieu of disposal at the working face. The City proactively initiated discussions with four residential property owners that are nearest to the site's western CAZ boundary and, since the submission of the Draft EA, has successfully acquired three of these properties and has initiated expropriation of the fourth and final property.	expected to continue. Traffic data indicates there has been no increase in traffic over time and no substantive increase is expected in the future.	many years. No substantial increases are anticipated. Traffic volumes on this designated truck route are modest. Traffic is expected to remain within historical ranges.	No mitigation required beyond that noted in Sections 7.3.2 for proposed expansion.
Planned Land Use	A portion of the landfill site will need to be rezoned and the proposed expansion expands the area of influence of the site. Nuisance impacts may be more prevalent within the expanded area of influence and future development may be restricted. The City proactively initiated discussions with four residential property owners that are nearest to the site's western CAZ boundary and, since the submission of the Draft EA, has successfully acquired three of these properties and has initiated expropriation of the fourth and final property.	A new development is proposed at 339 Fifth Line east which is within the expanded area of influence. The new development consists of a Cannabis micro-cultivator and micro-processor. The proposed use is Federally regulated and is a legal use relative to the existing Official Plan and Zoning By-law. Activities related to the proposed use will be indoors and no significant impacts are anticipated from the expanded landfill.	No cumulative effects beyond the effects of the proposed expansion. The proposed Cannabis facility will generate limited traffic volumes and activities will be indoors with odour control.	No mitigation required beyond that noted in Sections 7.3.3 for proposed expansion.
Visual	Minimal net effect on views given the extensive tree cover in the area. Some vegetation treatment and reforestation plots are planned to mitigate the modest impacts.	No known new development or expansion of existing development is anticipated that would introduce a visual conflict with surrounding lands.	No cumulative effects beyond the effects of the proposed expansion.	No mitigation required beyond that noted in Sections 7.3.4 for proposed expansion.
Noise	No exceedance of noise criteria.	There are other activities ongoing in the vicinity of the site primarily consisting of aggregate extraction/hauling operations and manufacturing of concrete products that have been ongoing in the area for many years. These activities are	Noise associated with both the landfill and aggregate extraction and concrete products manufacturing activities could occur at the same time but this has been the case for many years. No substantial increases are anticipated.	The City will continue to encourage landfill neighbours to report noise effects so that they can be addressed. No mitigation required beyond that noted in Sections 7.3.5 for proposed expansion.

Criteria Group	Net Effects of the Proposed Expansion	Activities that Overlap with the Proposed Expansion	Cumulative Effects	Mitigation to Address Cumulative Impact
		expected to continue in the future but there are no known capacity increases or known noise generating new development.		
Odour	Some net effects anticipated primarily during landfill mining. Odour during regular operations will be reduced in the future with the processing of SSO and biosolids in lieu of disposal at the working face. The City proactively initiated discussions with four residential property owners that are nearest to the site's western CAZ boundary and, since the submission of the Draft EA, has successfully acquired three of these properties and has initiated expropriation of the fourth and final property	Other existing or new operations in the area are not a source of odour.	No cumulative effects beyond the effects of the proposed expansion.	No mitigation required beyond that noted in Sections 7.3.6 for proposed expansion.
Business	Nuisance effects such as noise, odour and traffic could result in a downturn of customers; however impact is anticipated to be minimal. Odour during regular operations will be reduced in the future with the processing of SSO and biosolids in lieu of disposal at the working face. The City proactively initiated discussions with four residential property owners that are nearest to the site's western CAZ boundary and, since the submission of the Draft EA, has successfully acquired three of these properties and has initiated expropriation of the fourth and final property	Truck traffic, noise and dust have been ongoing for many years related to the aggregate extraction/hauling and concrete products manufacturing operations in the area and are expected to continue. Traffic data indicates there has been no increase in traffic over time and no substantive increase is expected in the future.	Dust, noise and traffic associated with the landfill, aggregate extraction and concrete products manufacturing activities could occur at the same time but this has been the case for many years. No substantial increases are anticipated. Traffic volumes on this designated truck route are modest.	The City will continue to encourage landfill neighbours including businesses to report occurrences of nuisance effects so that they can be addressed. No mitigation required beyond that noted in Sections 7.4.1 for proposed expansion.
Transportation	No net effect on traffic safety or operations anticipated. Traffic volumes are projected to remain within the historical traffic volume ranges.	Truck traffic has been present for many years related to the aggregate extraction/hauling operations in the area and are expected to	Any cumulative effects have been taken into consideration as assessment of traffic impacts was based on existing and future	No mitigation required beyond that noted in Sections 7.4.2 for proposed expansion.

Criteria Group	Net Effects of the Proposed Expansion	Activities that Overlap with the Proposed Expansion	Cumulative Effects	Mitigation to Address Cumulative Impact
		continue. Traffic data indicates there has been no increase in traffic over time and no substantive increase is expected in the future.	traffic which included trucks.	

7.6 Consideration of Climate Change

The existing disposal site is located at the northern limits of the urban settlement area and the expansion of the existing site provides a disposal facility that is optimally located to minimize travel distances by waste vehicles and the general public. Based on the Community buildout and the screening criteria used to screen for potential new greenfield sites, a greenfield landfill option would result in increased travel distances and increased GHG emissions. Furthermore, the expansion of the existing site allows use of existing critical infrastructure that is necessary for the operation and management of the site. A new greenfield site would require the development of new supporting infrastructure that would also result in increased emissions.

The City has been proactive in its effort to mitigate anthropogenic climate change with an upgrade from 30 passive vent flares to an “active” landfill gas collection system at the landfill site in 2010. The system reduces the quantity of methane released to the atmosphere (i.e. reduces the carbon footprint of the site) and also reduces odours generated at the site.

As part of the work completed for this EA an assessment of GHG emissions was completed. Existing GHG emissions were estimated to be approximately 37,660 tonnes of carbon dioxide equivalent (CO_2e) per year (2018 was used for this estimate). The worst case cell development scenario was assumed to be when Cell 1 is active and landfill mining is active. GHG emissions for this period were estimated to be approximately 44,370 tonnes CO_2e per year. The worst-case GHG emissions from sources on-site during post closure were estimated to be in the year following closure. Post closure GHG emissions were estimated to be approximately 44,415 tonnes CO_2e per year.

The best available estimate of Ontario’s reported GHG emissions is provided in the ECCC National Inventory Report (NIR). A review of the 2015-2017 GHG emission summaries from the ECCC NIR[31] show that Ontario had an average annual total GHG emission of 162 mega-tonnes (Mt) CO_2e.

The existing conditions at the Sault Ste. Marie Landfill account for an estimated 0.038 Mt CO_2e which would result in a 0.02% contribution to Ontario’s total GHG emission profile.

The GHG emissions profile from the worst-case future condition (post-closure) is estimated to be 0.044 Mt CO_2e. The Sault Ste. Marie Landfill’s future contribution to Ontario’s total GHG emissions profile is estimated to be 0.03%.

[31] Environment and Climate Change Canada (2019). National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada. Part 3. 2019.

Ontario's GHG emission data by sector is also available in the NIR. A review of the 2015-2017 GHG emission summaries from the ECCC NIR[32] show that Ontario Solid Waste Disposal facilities contributed an average annual total of 5.4 Mt of CO_2e. The Sault Ste. Marie Landfill's existing condition would result in a 0.70% contribution to Ontario's Solid Waste Disposal total GHG emission profile. The Sault Ste. Marie Landfill's post-closure condition would result in a 0.83% contribution to Ontario's Solid Waste Disposal total GHG emission profile.

A region specific GHG inventory is not available, and limited methodologies exist to accurately estimate the regional baseline GHGs. One cursory approach is to scale the provincial emissions by population. For the purpose of the assessment, Sault Ste. Marie together with Prince Township and Batchewana First Nation's Rankin Reserve is considered to be the service area of the landfill. Scaling Ontario's overall GHG emissions derived from Stats Canada by the relative populations of the service area and Ontario results in an approximate service area annual total GHG emission of 0.942 Mt CO_2e.

The Sault Ste. Marie Landfill's existing conditions account for 4.0% of the service area GHG emission profile (<0.1% of Ontario's GHG emissions). The average GHG emissions under the future post-closure condition are expected to account for 4.7% of the service area GHG emissions profile (<0.1% of Ontario's GHG emissions).

To support the mitigation of GHG, the City remains committed to incrementally expanding the existing landfill gas collection system to provide effective landfill gas collection across the expanded site. The gas collection system will be expanded on the following schedule:

- after Cell 1 and 2 have been completed and are at final contours (approximately Year 10 of operation)
- after Cells 3, 4 and 5 have been completed and are at final contours (approximately Year 22 of operation)
- at landfill closure at Year 25 (Cells 6 and 7)

Although the collected gas is currently being flared, the City, through its subsidiary, PUC Services Inc. has completed a comprehensive feasibility study and business case to utilize the collected gas for electricity generation. PUC Services Inc. remains committed to moving forward with an electricity generation project if suitable incentives become available to support the business case.

The City will also continue to support and comply with Provincial organics program requirements as they evolve. Presently the City offers an extensive curbside and self-haul leaf and yard waste collection program throughout the growing season and uses the composted material on City properties. The City is also planning to initiate a residential SSO collection and composting program by approximately 2025 and although not specifically mandated, the City is also proceeding with the construction of a biosolids management facility which will divert 10,000 tonnes of biosolids from disposal. The diversion of a significant fraction of the organics waste stream will effectively reduce GHG at the site.

Climate change adaptation was also considered in the development of the proposed landfill expansion. The City of Sault Ste. Marie completed a Stormwater Master Plan and Guidelines document in 2015 which considered the possible impacts of climate change on drainage systems and stormwater best management practices. The proposed landfill expansion was designed in accordance with this guideline document and the stormwater management ponds have been designed for the 1:100 year storm event. Steps have also been taken to protect the site from erosion along the south and west banks of Canon

[32] Environment and Climate Change Canada (2019). National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada. Part 3. 2019.

Creek. Rip rap has been placed along the banks that border the site to mitigate potential erosion of the banks and redirection of the creek closer to the disposal footprint.

8.0 MONITORING, REPORTING AND COMMITMENTS

8.1 Environmental Effects Monitoring

Effective monitoring is needed to confirm the impacts predicted through this EA and to confirm that mitigation is in place and operating effectively. Monitoring will be undertaken for odour, groundwater, surface water, landfill gas and traffic. Although odour mitigation will improve substantively with the construction of a biosolids and SSO processing facility and discontinuing active disposal of these organic wastes in the working face, monitoring for odour will be completed by staff on a daily basis and will be supplemented by the current successful area property owners reporting and operations staff response protocols. The results of monitoring programs are documented each year in the Annual Development, Operations and Monitoring Reports for the Sault Ste Marie landfill. Through the City's commitment to continual improvement in mitigating nuisance impacts the number of odour complaints over the period spanning 2021 and 2022 have been reduced from an average of 10 per year to less than 2 per year. It is noted that the monitoring program for odour will be further defined in conjunction with the ECA approval for the proposed expansion, in consultation with the MECP, and through the landfill mining pilot program.

The following subsections describe the proposed monitoring programs that will be carried out or will continue to be carried out. It is noted that the potential effects associated with biology, air quality, archaeology, social, planned land use, visual, noise, and business components of the environment will be mitigated through the measures identified in Section 7.0, and no monitoring is proposed.

8.1.1 Groundwater Monitoring

The groundwater monitoring program for the proposed expansion will utilize existing monitoring wells. Currently, there are 40 groundwater monitoring wells in the existing sampling program that were chosen for their strategic locations and potential to detect changes in ground water chemistry as a result of leachate generation in the refuse.

The monitoring wells provide data on source (leachate) concentrations, background concentrations and provide groundwater quality data downstream of the fill area (see further information on existing monitoring wells in Appendix E). Additional monitoring wells will be required as existing wells are decommissioned as part of the design of the landfill expansion. The locations of the existing groundwater monitoring wells as well as the proposed new monitoring well locations are shown on **Figure 8.1**. Groundwater monitoring wells are selected to provide sufficient chemical information to evaluate the impact of the landfill site on groundwater quality. Groundwater samples will be collected in the spring, summer and fall which is consistent with the existing landfill monitoring program. Groundwater elevations for all accessible monitoring wells on-site will be obtained in conjunction with groundwater sampling events. Groundwater samples will be analyzed for general chemistry, major and minor ions, trace metals and volatile organic parameters as recommended in Schedule 5 of O.Reg. 232/98. Additional monitoring wells will be installed west of the new footprint. The locations will be finalized based on final design and potential property acquisitions.

The groundwater monitoring program is dynamic and changes are made periodically to address changing groundwater quality trends. At the time of the ECA submission, the existing monitoring program will be reviewed and modified in consultation with the Ministry to ensure appropriate groundwater monitoring

coverage through existing and, if necessary, new wells. Furthermore, the annual site monitoring report will include an assessment of the need for changes to, or additions to the active groundwater monitoring program. Clear recommendations will be included regarding the adequacy of the groundwater monitoring program in each report.

8.1.1.1 Residential Well Water Monitoring

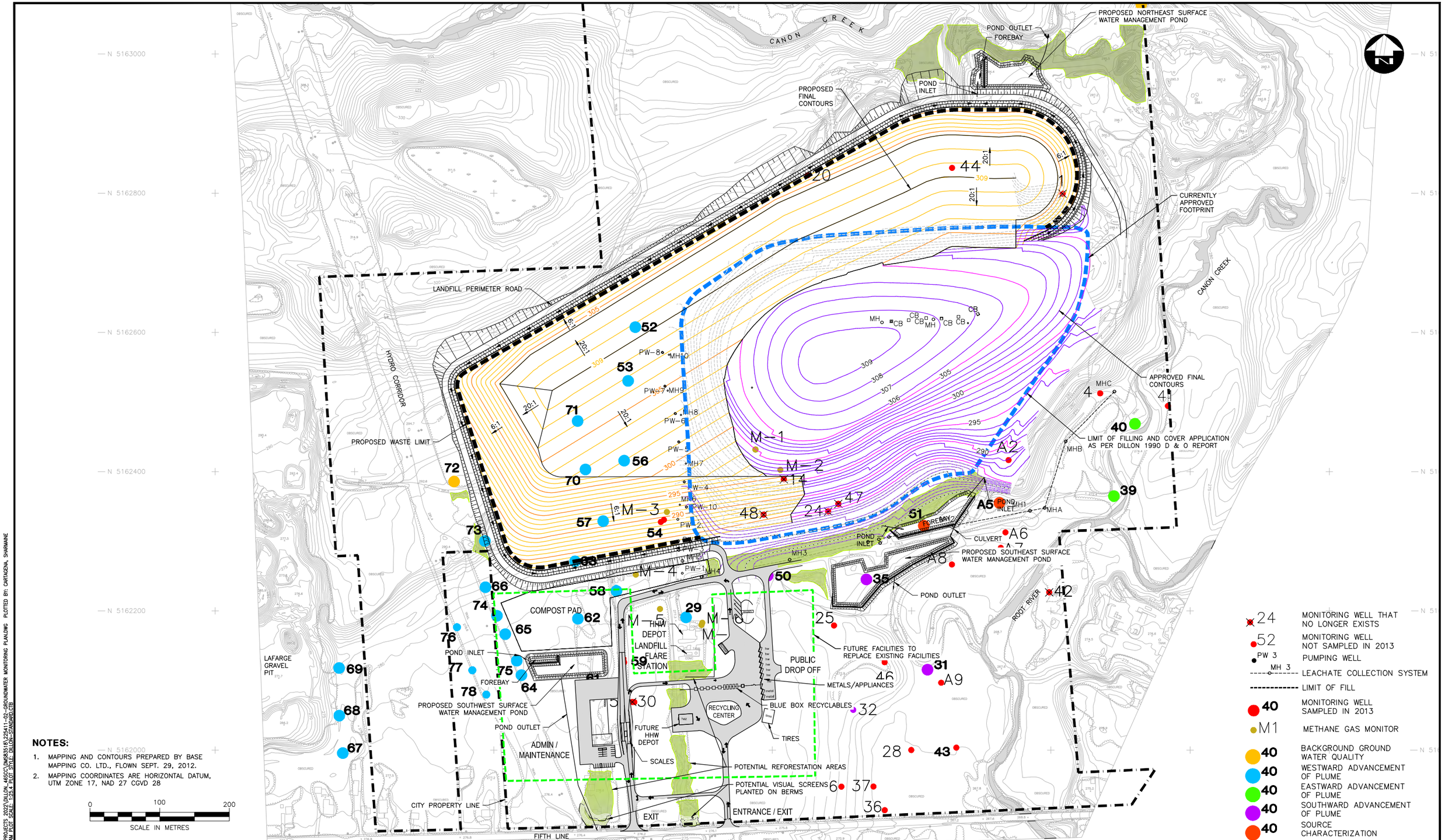
Municipal water currently extends north along Old Goulais Bay Road and then east along Fifth Line to the landfill site. Residences and businesses east of the landfill site are on private wells and some residences and businesses west of the site may also continue to use private wells.

A residential water well monitoring program will be implemented as part of the landfill expansion. While there is no guideline on how water wells are chosen to be included in a monitoring program, a 500 m “rule of thumb” is often used for landfill sites, quarries and other land uses/activities that may impact residential water well quality. Residences along Fifth Line from Highway 17 to approximately 400 m east of Old Goulais Bay Road are within 500 m of existing or proposed fill areas. It is recommended that the residential water well monitoring program extend along Fifth Line from Highway 17 in the east to Old Goulais Bay Road in the west (Note: we have conservatively included properties to approximately 900 m west of the proposed fill area which represents a predominate groundwater flow path based on historical sampling at the site). There are some residences on Old Goulais Bay Road northwest of the landfill which are slightly more than 500 m from the northwest corner of the westerly expansion area. Given that groundwater does not flow in a northwest direction, it is not considered necessary to monitor residential water wells in this area.

The first component of the water well monitoring program will be a water well survey consisting of a questionnaire that will be provided to residents with questions regarding their well such as location, depth and existing water quantity or quality issues. It will also ask if the residence wants to be included in the water well monitoring program. For those residences who volunteer to have their well included in the monitoring program, a baseline water well assessment is recommended. The water well assessment will be completed by a licensed Water Well Contractor under Reg. 903 who will document the depth and type of well at each location. Where possible this information will be correlated with water well records. The Ontario Water Well Record database is incomplete and location information is prone to error, but efforts will be made to match well information to available water well records.

Water samples from the residential wells included in the monitoring program will be taken on an annual basis. Where possible, samples will be taken from the wells prior to any treatment systems such as water softeners. Water samples will be analyzed for the parameters included in the indicator and comprehensive list of Schedule 5, of the Landfill Standards (MECP, 2012) which is the same target parameter list for on-site and off-site monitoring wells.

Should the landfill be shown to impact private wells, contingency measures to ensure residents have clean drinking water would include extension of the municipal water system to residents east of the site, or the provision of alternative water supplies to adjacent and nearby affected properties.



NOTES:

1. MAPPING AND CONTOURS PREPARED BY BASE MAPPING CO. LTD., FLOWN SEPT. 29, 2012.
2. MAPPING COORDINATES ARE HORIZONTAL DATUM, UTM ZONE 17, NAD 27 CGVD 28

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FILENAME: C:\PW WORKING DIRECTORY\PROJECTS 2022\DILLON_465CC\DM8351812254111-02-GROUNDWATER MONITORING PLAN.DWG PLOTTED BY: CARTAGENA, SHARMAINE
PLOT DATE: 2023-03-07 @ 10:12:20 AM PLOT SCALE: 1:25.4 PLOT STYLE: DILLON-STANDARD.CTB

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No.	ISSUED FOR	DATE	BY
2	RESPONSE TO MOE COMMENTS	2020/02/18	R.K.
1	SUPPLEMENT TO EA REPORT	2015/03/31	F.R.G.

DESIGN F.R.G.	REVIEWED BY F.R.G.
DRAWN D.B.C./S.K.B.	CHECKED BY F.R.G.
DATE MARCH 2023	
SCALE 1:2500	

SAULT STE. MARIE MUNICIPAL LANDFILL SITE
DESIGN AND OPERATIONS REPORT

PROJECT NO. 06-6988

GROUNDWATER MONITORING PLAN

DRAWING NO. 8.1

8.1.2 Surface Water Monitoring

Surface water quality samples are obtained and analysed to provide a general assessment of the surface water quality conditions near the Sault Ste. Marie Municipal Landfill Site. The existing surface water monitoring program includes the collection of water samples at five of the eight sampling points along Canon Creek and the Root River. These sampling points are located upstream, adjacent to and downstream of the landfill and are described below in **Table 8.1** and shown on **Figure 8.2**. The samples collected are analysed for general parameters, nutrients, mercury and trace constituents (metals and phenols). The target surface water parameter list is based on that recommended in Schedule 5 O.Reg. 232/98 and further details regarding the monitoring program are included in **Appendix F**.

Table 8.1: Surface Water Sampling Locations

Station	Description
S-IB	Canon Creek upstream (currently active)
S-2	Root River upstream (currently active)
S-3	Canon Creek adjacent to the landfill site (currently active)
S-4	Meander area (currently active)
S-5	Root River downstream (currently active)
S-8	Root River at Highway 17
S-9	Root River at Fourth Line
S-10	West Branch of Root River at confluence with East Branch

Water quality monitoring is also recommended for the surface water management ponds that will be constructed progressively with landfill expansion. The proposed monitoring program includes annual monitoring of influent and effluent from stormwater ponds which will facilitate an evaluation of the pond effectiveness during rainfall events. Parameters to be analysed included TSS together with current parameters included in the existing sites surface water monitoring program and additional parameters based on the Ministry's groundwater trigger list. The monitoring program includes trigger values and a contingency plan. More details are included in **Appendix F** and the specific pond monitoring requirements would be confirmed at the time of Ministry ECA approval.

The annual site monitoring report will include an assessment of the need for changes to, or additions to the active surface water monitoring program. Clear recommendations will be included regarding the adequacy of the surface water monitoring program in each report.

8.1.3 Landfill Gas Monitoring

Methane gas is produced as a result of biodegradation of waste. The absence of a low permeability cap on the landfill facilitates the venting of methane gas directly from the waste to the atmosphere. During frozen ground conditions, a build-up of gas pressure will likely occur within the landfill. This could cause the lateral migration of methane gas in the sand and gravel deposits surrounding the waste. The methane gas will migrate until:

- It is able to vent to the atmosphere;
- The pressure gradient is reduced at a distance from the source such that lateral migration is negligible; or
- An effective barrier is encountered.

The water table is known to be an effective natural barrier for methane gas (since methane gas is relatively insoluble in water). Therefore, Canon Creek will effectively retard the lateral migration of methane gas along the north and east boundaries of the fill area. Southern migration of gas will be limited by the high water table in the meander area.

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DILLON CONSULTING

No.	Issued For	Date	By
2	RESPONSE TO MOE COMMENTS	2020/02/18	R.K.
1	SUPPLEMENT TO EA REPORT	2015/03/31	F.R.G.

Design: F.R.G.	Reviewed by: F.R.G.
Drawn: D.B.C./S.K.B.	Checked by: F.R.G.
Date: MARCH 2023	
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SAULT STE. MARIE MUNICIPAL LANDFILL SITE
DESIGN AND OPERATIONS REPORT

Project No.: 06-6988

SURFACE WATER MONITORING PLAN

Drawing No.: 8.2

The monitoring program currently consists of measurements of gas in five gas monitors (M3, M4, M5, M6 and M7) the locations for which are shown in **Figure 8.1**. These locations have been selected based on their proximity to on-site infrastructure and buildings. Due to the proximity of the proposed expansion to the western site boundary and the proposed redevelopment of some of the site infrastructure and buildings new methane monitors will be required and the location of new methane monitors will be assessed during final landfill design and during site development.

The annual site monitoring report will include an assessment of the need for changes to, or additions to the landfill gas monitoring program. Clear recommendations will be included regarding the adequacy of the gas monitoring program in each report.

8.1.4 Landfill Mining Monitoring

As noted in Section 7, the City will draw on the experience of other municipalities and landfill operators and develop a pilot mining program to gather the information required to establish the waste mining process and detailed mitigation strategies. An important part of the pilot will be the monitoring of odours during excavation and processing of mined waste. An odour monitoring program for full scale landfill mining will be prepared using the data collected from the pilot. Input and complaints from the public will also be valuable in the ongoing odour monitoring.

8.1.5 Transportation Monitoring

Traffic volumes and accident rates will continue to be monitored periodically by the City over time. Counts will be undertaken once every five years and more frequently if a need or problem arises. The counts will include volume counts on Fifth Line to the east and west of the landfill entrance and will also include an 8 hour intersection traffic count if the Fifth Line counts reflect meaningful changes. These counts will be reviewed in conjunction with the accident rates within the site vicinity study area to assess and confirm the adequacy of the basic lane and intersection configurations and controls relative to the standards of the day.

The road structure and riding surface will continue to be assessed by the City every two years. Based on the most recent assessment consideration will be given to rehabilitating or reconstructing the road within a 6 to 10 year timeframe.

The City will also review the need for clearing activities in the vicinity of the Fifth Line/Highway 17 intersection on an as needed basis to ensure sight lines are maintained.

8.2 Resident Complaints

The City has implemented and will continue to operate a complaint procedure with the goal of continual improvement in its nuisance management and mitigation. Property owners within 500 m of the expanded disposal footprint will be provided with contact information and details for registering complaints. This information will be forwarded to area residents in an Annual Notice. The Notice will be issued in January of each year and will also highlight any special landfill activities or projects that are planned in the current year. The Notice will also be posted in the local newspaper and on the City’s website.

All pertinent information is recorded by the staff member documenting the compliant to ensure the best possible approach is taken to mitigating the nuisance.

8.3 Contingency Measures

The development of contingency measures acknowledges that there is a degree of uncertainty in estimating potential net impacts and that unexpected effects could occur. A contingency plan is required by O.Reg. 232/98 and defined as "an organized set of procedures for identifying and reacting to an unexpected, but possible occurrence" (MECP, 2012). The contingency plan consists of a predictive monitoring program, establishing trigger levels for investigation and response and a description of potential contingency measures. Summarized below are proposed contingency measures related to groundwater quality, surface water quality and landfill gas management.

Groundwater Quality Contingency Measures

While the new leachate management system is predicted to have maximum impacts below allowable Reasonable Use Guideline (RUG) concentrations groundwater contingency measures are proposed as follows:

- Maintenance and replacement, if necessary, of the existing horizontal collection system on the south and east sides of the existing site. The horizontal collection system is located beyond the fill area and can be maintained or replaced, if necessary, throughout the contaminating lifespan of the existing fill area.
- Extension of the municipal water system to the residents located along Fifth Line east of the site to Highway 17 or the provision of alternative water supplies to adjacent and nearby affected properties if monitoring data indicates the potential for water quality impacts (i.e. does not meet provincial drinking water standards).
- Establishment of an extended contaminant attenuation zone (CAZ) down gradient of the proposed expansion. This would include lands that currently consist of several residential properties along Fifth Line east of Old Goulais Bay Road and an aggregate extraction pit. The City proactively initiated discussions with four residential property owners that are nearest to the site's western CAZ boundary and, since the submission of the Draft EA, has successfully acquired three of these properties and has initiated expropriation of the fourth and final property.
- Installation of a new north-south horizontal groundwater collector system installed within the expansion area or a new purge well system west of the expansion area to provide groundwater protection to the area west and southwest of the new fill area.

Surface Water Quality Contingency Measures

The water quality in the SWM Ponds will be monitored regularly to ensure that it meets surface water quality objectives. Water quality monitoring, coupled with routine site inspections, will prompt maintenance or changes in operational practices to minimize surface water impacts.

Trigger values for the SWMP surface water quality program have been established and if a trigger value is exceeded at a particular SWMP, a visual inspection of the landfill shall be conducted for possible leachate seeps or other contributors and appropriate action is to be taken to address any adverse observations. The action taken may include item 3 noted below if warranted by the parameter and magnitude of the exceedance.

Should a trigger value be exceeded on two consecutive sampling events a contingency plan would be executed. The recommended contingency plan is as follows:

1. Conduct a visual inspection of the landfill for leachate seeps or other contributors.
2. Collect a duplicate inlet and outlet sample at the SWMP as soon as possible. If the SWMP is no longer flowing, the sample should be collected as soon as outlet flows resume (i.e., during the next significant storm event). These samples should be analyzed for the parameter whose trigger value was exceeded. Additional parameters may be added as appropriate based on scientific judgement.

If the duplicate outlet sample result exceeds the trigger value:

3. Depending on the parameter and magnitude, manually shut down the SWMP outlet using the control valve or gate. Determine options for treating water contained in the SWMP (i.e., pump and transport for treatment, pump and temporary treatment on-site, in-situ treatment)
4. Conduct an assessment into the cause of the trigger value exceedance and execute the recommended solution.

If the duplicate outlet sample result does not exceed the trigger value:

5. Continue with the regular SWMP monitoring program.

Uncontrolled leachate breakouts or accidental spills detected by site inspections may also trigger the contingency plan. In such a case, early detection can minimize or effectively eliminate impacts to surface water, particularly if containment of the contamination and repair of the landfill cover is undertaken promptly.

In case of a sudden acute release of fuel or other hazardous material (spill), the procedures outlined in the Spills and Hazardous Materials Procedure issued by the City should be followed.

Landfill Gas Management Contingency Measures

In the event that monitoring of subsurface LFG migration reveals unacceptable levels of landfill gas are occurring in the subsurface, the first response will be to ensure there is no imminent hazard (e.g., explosion hazard at on-site building). Next, an investigation will be conducted to confirm whether the landfill is the source by the installation and monitoring of additional gas probes. If the source is confirmed to be the landfill, several alternatives will be evaluated to reduce subsurface migration as follows:

- Modification of the design or operation of the LFG collection system; or
- Installation of a low permeability barrier (i.e., cut-off wall).

An evaluation of alternatives will be completed, and an appropriate contingency measure will be implemented.

8.4 Commitments

An EA must include a framework for monitoring compliance with the EA during planning, design, construction, operation and post closure.[33] An EAA Compliance Monitoring Program will be prepared for MECP review and approval and an EAA Compliance Monitoring Report will be prepared and submitted annually to the MECP. **Table 8.2** is a summary of the commitments made in this EA related to the

[33] Ministry of the Environment, Conservation and Parks (2014a). Code of Practice: Preparing and Reviewing Environmental Assessments in Ontario, January 2014.

construction, operation, closure and post-closure of the landfill that will be included in the EAA Compliance Monitoring Program and reported on in the annual reports. The table has been subdivided into categories and includes the following information:

- EA Reference – where, in the EA, the commitment is made;
- EA Commitment - specific commitment made in the EA; and
- Timing – When the commitment will be implemented (e.g., planning, design, site preparation, construction, operation, closure).

Commitments made during the development of the ToR have been reviewed and are included in the table where appropriate.

TABLE 8.2 Table of Commitments to Mitigation and Monitoring

EA Reference	Commitment	Approximate Timing
COMPLIANCE MONITORING		
8.1	Implement the groundwater, surface water , landfill gas, landfill mining and transportation monitoring identified in Section 8.1.	Ongoing
8.2	Implement the complaint management process outlined in Section 8.2	Ongoing
7.0 & 8.0	Prepare an EAA Compliance Monitoring Program which will include the commitments described in Sections 7.0 and 8.0 of this EA. Prepare annual EAA Compliance Monitoring Reports.	Following EA approval Annually
CONSULTATION		
9.0	Continue to update Indigenous Communities, stakeholders and the general public throughout the remainder of the EA process and as the expansion progresses.	Ongoing
7.3.6	Notify residents prior to and during the landfill mining pilot and full-scale mining operations.	Immediately prior to initiating mining and at least once during pilot and regularly during the full-scale mining operation.
7.2.2	Make annual reports available.	Annually following submission to MECP
8.2	Continue to provide annual construction and operation updates to residents in the vicinity of the site.	Ongoing
6.7 and 7.3.3	Continue to engage with the Environmental Monitoring Committee through regular meetings conducted each year.	Ongoing
4.1.1	Continue to encourage residents and businesses to reduce, reuse and recycle.	Ongoing
BIOLOGY		
7.2.1	Tree removal will be minimized to the extent possible and where possible wildlife habitat trees that contain nest, den or roost cavities will be maintained. Construction lay-down and staging will be avoided within the boundary of a natural feature scheduled for preservation. Contractor to develop and implement City and agency approved erosion and sediment control plans and the City's Consultant to monitor the suitability and effectiveness of the plan throughout the duration of construction.	Detailed Design, Site Preparation and Construction Detailed Design, Site Preparation and Construction Detailed Design, Site Preparation and Construction

TABLE 8.2 Table of Commitments to Mitigation and Monitoring

EA Reference	Commitment	Approximate Timing
	General tree protection and edge management practices will be followed to minimize the physical disturbance associated with vegetation removal. A qualified arborist will assess the new woodland edge and conduct removal or pruning as required.	Detailed Design, Site Preparation and Construction Within 12 months of each stage of landfill expansion
7.2.1	Follow established protocols to avoid breeding bird season.	Detailed Design, Site Preparation and Construction
7.2.1	Limit the use of lighting where possible. Operations and construction staff to visually monitor wildlife species and report encounters to City staff.	Detail Design, Site Preparation and Construction Detailed Design, Site Preparation, Construction and during operations
HYDROGEOLOGY		
7.2.2 and 8.1.1	Ongoing monitoring of the western plume and liaison with MECP regarding improvements as a result of liner. Ongoing liaison with MECP during Landfill mining. Continued operation of the existing horizontal collection system along the south and southeast boundary of the existing fill area to maintain mitigation of impacts to the south and east of the site.	Ongoing during Operations Detailed Design, Site Preparation and Construction of Mined Cell Ongoing During Operation
7.2.2 and 8.1.1	Implement a residential well water monitoring program. Should impacts be detected alternative water sources will be provided.	Ongoing During Operations
SURFACE WATER		
7.2.3 and 8.1.2	<u>Stormwater Quality</u> The proposed expansion areas will be drained by ditches adjacent to the internal roadway system to convey stormwater to lined stormwater management (SWM) ponds before discharge to the natural drainage systems. The SWM ponds will be designed to remove 80% TSS. Stormwater in ponds and downstream surface water receivers will be monitored .	Detailed Design, Site Preparation and Construction Ongoing During Operations

TABLE 8.2 Table of Commitments to Mitigation and Monitoring

EA Reference	Commitment	Approximate Timing
7.2.3	The SWM pond outflow structure will be designed to have bottom draw characteristics. Landscaping around the ponds will encourage shading.	Detailed Design, Site Preparation and Construction
ATMOSPHERIC		
7.2.4	Based on the air quality assessment of the proposed expansion no exceedances of relevant criteria were predicted Best management practices for dust at the site will include watering of gravel roads when needed. In addition, the main access road and site perimeter road shall be hard surfaced to minimize dust nuisance. (Note: odour is addressed under “Residents and Businesses/ Nuisance Effects” below)	Planning Detailed Design, Site Preparation, Construction and Ongoing During Operations
CLIMATE CHANGE		
7.6	Proceeding with site expansion rather than a greenfield development. Stormwater will be directed to lined stormwater management (SWM) ponds designed for the 1:100 year storm event. Move forward with an electricity generation project using collected landfill gas if suitable incentives become available to support the business case. Staged expansion of the landfill gas management system. Implement a residential organics collection and processing program and processing of biosolids for a beneficial use in lieu of disposal in the working face.	Planning. Detail Design and Construction and Ongoing during Operations Ongoing Ongoing During Operations Project is currently in the design phase and will be operational in approximately 2025 or 2026 - Ongoing During Operations
ARCHAEOLOGY		
7.3.1	Should undocumented archaeological resources be uncovered during landfill construction, alteration of the site must cease immediately. If undocumented archaeological resources are uncovered, a licensed archaeologist shall be contacted to carry out archaeological fieldwork in compliance with Section 48(1) of the Ontario Heritage Act.	During Construction During Construction
RESIDENTS AND BUSINESSES / NUISANCE EFFECTS		
6.6.9, 7.3.2 and 7.3.5	On-site noise	

TABLE 8.2 Table of Commitments to Mitigation and Monitoring

EA Reference	Commitment	Approximate Timing
7.3.5	Noise modeling for worst case scenarios has shown that the site will comply with MECP noise criteria.	Planning and Ongoing During Operations
	Significant changes relative to the modelling assumptions will be re-evaluated for compliance.	Ongoing During Operations
8.2	Ongoing engagement and response to public complaints.	Ongoing During Operations
6.6.6, 7.3.2, 7.3.6 and 8.2	<u>Odour associated with ongoing operations</u> Development and ongoing updates to an odour management plan.	Ongoing During Operations
	Minimizing the size of the active area.	Ongoing During Operations
	Minimizing the storage time of waste prior to disposal within the active area.	Ongoing During Operations
	Appropriate management of leachate.	Ongoing During Operations
	Use of daily cover.	Ongoing During Operations
	Use of odour neutralizing agent applied to the biosolids.	Ongoing During Operations
	Use of a portable odour fogging machine to effectively distribute odour neutralizing agent at the working face.	Ongoing During Operations
	Enhanced biosolids trailer washing.	Ongoing During Operations
	Construction of an organics (biosolids and SSO) processing facility to process organics in an enclosed facility with an engineered odour control system.	Ongoing During Operations
	Use of fully sealed trailers to transport biosolids in conjunction with the implementation of a Biosolids processing facility.	Ongoing During Operations
	Staged expansion of the landfill gas collection system.	Ongoing During Operations
	Ongoing engagement and response to public complaints.	Ongoing During Operations
6.3, 6.6.6, 7.3.2, 7.3.6 and 8.2	<u>Odour associated with landfill mining</u> Limit the duration of landfill mining operations (estimated two years).	Ongoing During Landfill Mining

TABLE 8.2 Table of Commitments to Mitigation and Monitoring

EA Reference	Commitment	Approximate Timing
	Development and ongoing updates as appropriate of an Odour Management Plan (OMP) supplement.	Ongoing During Landfill Mining
	Completion of a pilot landfill mining program to characterize the type of waste and odour profile. Use of the information from this pilot to develop standard operating practices (SOP) for the full scale mining program. Train all staff on the OMP and SOPs.	Prior to Landfill Mining
	Management of landfill mining operations based on meteorological conditions (e.g., shut down during calm periods or specific wind direction).	Ongoing During Landfill Mining
	Daily inspection program used to adjust and refine mining operations.	Ongoing During Landfill Mining
	Bypass screening of waste where highly odorous material is excavated.	Ongoing During Landfill Mining
	Use of chemical and biological treatment to reduce significance of odour.	Ongoing During Landfill Mining
	Use of periphery odour misting system.	Ongoing During Landfill Mining
	Minimize size of active landfill mining excavation.	Ongoing During Landfill Mining
	Cover applied to mined area at the end of the day.	Ongoing During Landfill Mining
	Keeping local residents informed and respond to public complaints.	Ongoing During Landfill Mining
	Develop and implement a monitoring campaign for landfill mining.	Ongoing During Landfill Mining
6.6.8, 7.2.4, 7.3.2 and 8.2	<u>Off-site dust effects</u> Best management practices for dust at the site will include watering of gravel roads when needed.	Construction & Operations
	Main access road and site perimeter road shall be hard surfaced to minimize dust nuisance.	Detailed Design, Site Preparation and Construction
6.6.10	<u>Vector and vermin management</u> A vermin management plan will be developed and detailed in the Design and Operations report.	Ongoing During Operations
9.4.6	<u>Access to Adjacent pit operations</u>	

TABLE 8.2 Table of Commitments to Mitigation and Monitoring

EA Reference	Commitment	Approximate Timing
	The City has historically permitted access to the Ellwood Robinson pit and will continue to do so in the future while the pit remains active.	Ongoing while pit remains active
PLANNED LAND USE		
7.3.3	Compliance with zoning Re-zoning additional property under Special Exemption 23.	Planning – to be completed following EA Act approval
7.3.3	Future development within the vicinity (area of influence) The City will consider land use compatibility and the expanded area of influence in deliberating over any proposed land use matters that fall within their control. The City will incorporate appropriate provisions that are consistent with PPS 2020 and Guidelines D-1 and D-4 with the OP and Zoning By-law updates.	Ongoing Ongoing
VISUAL		
7.3.4	Planting of vegetative buffers on berms where necessary to obscure the feature from the surrounding areas. Application of native grass/wildflower vegetative cap mixture that will improve the aesthetic quality of the landfill feature itself.	Detailed Design, Site Preparation and Construction Detailed Design, Site Preparation and Construction
TRANSPORTATION		
7.4.2 and 8.1.5	Transportation safety Sight-line improvements at intersections and the main entrance as necessary Detailed review to confirm the suitability and adequacy of warning signage at the Fifth Line/Hwy. 17 intersection. Enhancements to the road geometrics should be considered in conjunction with the next capital improvement project along Highway 17 in this area. Review of accident history every 5 years to identify high risk road segments or intersections.	Previously completed and ongoing as needed in the future Detailed Design and Construction When Highway Improvements are Considered Ongoing During Operation
7.4.2 and 8.1.5	Traffic volumes Conduct 24 hour traffic counts over a period of several days along Fifth Line to the east and west of the landfill entrance and confirm adequacy of the lane configuration every 5 years.	Ongoing During Operation

TABLE 8.2 Table of Commitments to Mitigation and Monitoring

EA Reference	Commitment	Approximate Timing
	Conduct 8 hour intersection traffic count at the Fifth Line/Hwy 17N intersection to confirm adequacy of the level of service, lane configuration and intersection controls as needed based on volume changes.	Ongoing During Operation
	Continue to complete road condition assessments and schedule maintenance/repairs/upgrades as required in accordance with the City's Road Management Plan.	Ongoing During Operation

9.0 PUBLIC AND AGENCY CONSULTATION

Since the initiation of the Solid Waste Management Plan in 2000, which preceded the EA work plan, the City has placed an emphasis on working with the public, agencies, stakeholders and Aboriginal Communities to develop an appropriate long-term solid waste management plan. This section focuses on the consultation undertaken, who participated, the comments received and how the comments have been addressed within this EA. Additional details, including consultation predating this EA which was undertaken as part of the Solid Waste Management Plan from 2000 through 2005 is summarized in the Public Consultation Report included as Appendix O in this report.

The Environmental Assessment process was initiated in October 2006 and is designed to be responsive to comments, issues or concerns that are raised by government agencies, stakeholders, Aboriginal Communities and the general public. A comprehensive public consultation program was undertaken to solicit input from a broad cross-section of people and interests, ensure issues/concerns were identified early in the process and provide a means for addressing and incorporating input received. Over time, the contact list has grown to include additional interested groups and individuals. The original and current contact lists are included as an Appendix to the Public Consultation Report which is included in this report as Appendix O.

The principle goals of the consultation process include:

- Engage the public, stakeholders and Aboriginal Communities in the consultation process;
- Provide sufficient information in a user-friendly format;
- Provide opportunities for input before decisions are made;
- Be flexible to meet the needs of the all participants when undertaking consultation;
- Be responsive – listening to comments, giving them careful consideration, making changes where appropriate and providing rationale when no change is made.

Ultimately the consultation process:

- Enhances the quality of the decision-making process by capturing ideas and experiences of a broad cross-section of people;
- Ensures transparency in the decision making process;
- Enhances public understanding of the process, and rationale for the decisions reached; and
- Meets legislative requirements.

To meet these goals and objectives various tools and methodologies were utilized to disseminate project information and solicit input including:

- Notices;
- Newsletters;
- Project Webpage;
- Advertisements;
- Interim Reports;
- Comment sheets;
- Email;
- Questionnaires (online and hard copy);
- Workbooks;
- Discussion groups;

- Open houses;
- Meetings; and
- Presentations.

Further details pertaining to those contacted, how they were contacted, and the input received are included in the following subsections. Sections 9.4 through 9.7 focus on the input received through various forms throughout the study and how that input was addressed within the context of the EA. Specifically, Section 9.4 summarizes the input received through the public consultation events. The summary tables included throughout Section 9.4 document the comments and questions received, how they were addressed at the time the input was received and also how and where the item is addressed in the EA document. Sections 9.5 though 9.7 summarize the input received outside of the public consultation events from Aboriginal Communities, Elected Officials and Agencies and the general public respectively.

More comprehensive details of our efforts in soliciting input is included in the Public Consultation Report included in Appendix O. Specifically, separate tables have been established for each of the four principle stakeholder groups with subsections established for subgroups. The tables have been organized to provide a description of the consultation activity, the date it occurred, comments/questions or input received as a result of the activity, how the input was addressed, where the relevant reference material can be found and whether there are any outstanding issues to be resolved. These tables will allow individuals to easily identify what consultation has occurred with the various stakeholder groups.

In addition to the foregoing we have also prepared a chronological summary of the consultation activities which is also included in Appendix O.

9.1 Project Contact List

At the onset of the project a contact list was developed by the project consultant with input from City staff. The list was developed to reach a broad cross-section of individuals, agencies, Communities and Aboriginal interests including all property owners and tenants located within a 1000m radius of the existing site. The contact list has been updated periodically over the course of the study as additional individuals, agencies, or Aboriginal Communities have expressed interest in the project.

The original and current project contact lists are included in Appendix O.

9.2 Project Webpage

A webpage has been established on the City of Sault Ste. Marie website. This page includes important and relevant planning documentation that was developed prior to initiating the EA together with documentation that has been developed within the framework of the EA process. The site also provides contact information for the Consultant Project Manager and the City's principle contact. The webpage has been updated periodically and updates will continue to be made as the study continues to progress.

Invitations were also extended to neighbouring communities, including Aboriginal Communities, to explore the possibility of including a link to the City's webpage on their community websites with the ultimate goal of enhancing the level of engagement.

9.3 Notices and Newsletters

Notices and Newsletters were used to invite participation in consultation activities and events and to disseminate important information and project updates. There were 10 notices or newsletters issued through to the submission of the DRAFT EA document to the Ministry.

These items were typically posted on the project webpage and distributed to all individuals, agencies, municipalities and Aboriginal Communities included on the project contact list. In addition, advertisements were placed in the local newspapers (Sault Star and Sault This Week), and when available included on the community calendar on Shaw Cable 10. Notices and advertisements were also distributed to adjacent communities for posting on community bulletin boards and websites and/or publishing in their newsletters.

More details pertaining to each Notice and Newsletter is included in Appendix O.

9.4 Public Input Sessions

Public open houses and workshops were undertaken to disseminate project information and solicit input at key milestones or decision points within the process. The events were staged to solicit feedback and input from government agencies, stakeholders, Aboriginal Communities and the general public.

The format for the “workshops” included a presentation followed by the formation of focus groups to provide input specifically tailored to the topics and issues being contemplated at the time (eg. evaluation criteria, evaluation methodology, etc.). The workshops were led by consultant staff with the assistance of Municipal staff. The input was solicited through the completion of “workbooks” by focus groups.

The “open houses” were intended to be less formal and consisted of a series of display panels arranged to guide individuals through the process. The project consultants, with the assistance of City staff, ushered individuals or groups of individuals through the presentation materials, explained the contents and addressed questions and issues.

Both formats were used to cater to the preferences of individuals. Some individuals prefer a more formal setting while others are more comfortable with a less formal setting and one on one time with the project Consultant or City staff.

The principle objectives of the workshops and open houses were:

- communicate project progress;
- solicit input and feedback;
- enhance the quality of the decision making process by making adjustments as necessary based on the feedback received; and
- enhance understanding of the process and the decisions reached.

Six (6) public input sessions where held:

- Public Input Session #1 addressing “Alternatives To” and Evaluation Criteria (June 26, 2007);
- Public Input Session #2 in Garden River First Nations addressing “Alternatives To” and Evaluation Criteria (August 9, 2007);
- Public Input Session #3 addressing Preferred “Alternative To” and Next Steps (June 3, 2010);
- Public Input Session #4 addressing Evaluation Approach/Criteria for a New Site vs. Expansion

of an Existing Site and Preliminary preference (April 19, 2011);
- Public Input Session #5 addressing Evaluation Approach/Criteria and Preliminary Preferred Expansion Option (March 6, 2012); and
- Public Input Session #6 addressing Impact Assessment for the Preferred Option (February 9, 2016).

A comprehensive summary of each event including notifications, information available to participants, issues, questions and concerns raised together with the responses provided are included in the Public Consultation Report included in Appendix O.

A concise summary of the purpose of each event, issues, questions and concerns raised together with the responses provided have been included in the following subsections. Where appropriate the relevant section of the EA where the issue is addressed is also referenced.

9.4.1 Public Input Session #1 on "Alternatives To" and Evaluation Criteria (June 26, 2007)

A public input session was conducted on Tuesday June 26, 2007 in the Russ Ramsay Boardroom of the Sault Ste. Marie Civic Centre. The session provided a forum for interested individuals, Aboriginal representatives, agency representatives, and property owners, to discuss the "alternatives to" the undertaking and review evaluation criteria and their relative importance to compare and select a preferred approach to manage waste in Sault Ste. Marie, Prince Township and Batchewana First Nation's Rankin Reserve. The meeting format included a presentation followed by facilitated discussions regarding the alternatives and the evaluation criteria.

Table 9.1 highlights comments/questions raised, and responses provided during the presentation portion of the meeting. In addition, where relevant, we have included in the right-most column, how the item is addressed within the EA document.

Table 9.1 Questions and Responses Regarding the "Alternatives To" – June 2007

Questions	Response	How Addressed in the EA and EA Reference
Where would the hazardous waste from an incinerator go?	It would need to be taken to a hazardous waste facility near Sarnia or other suitably licensed site.	Hazardous waste would have to go to an appropriately licensed facility (i.e. exported) - Sections 4.2.2.2, 4.2.2.5 and 4.2.3.
How big a landfill would be needed?	Based on the projections, a landfill that could accommodate approximately 2.7 million tonnes would be needed. A typical landfill footprint for a 2.0 million tonne landfill would likely be in the range of 20 Ha. (Note: The waste projections were subsequently modified to address MECP comments on the DRAFT submission and the FINAL EA incorporates a requirement for 1.78 million tonnes with an estimated longevity to 2049).	The planned expansion has been designed for 1.78 million tonnes or 3.17 million m^3 - Sections 2.4, 5.2.2, 6.0 and 6.4.
Have you considered population in your waste quantity disposal projections?	Yes, the waste quantity projections are based on population projections completed by another consultant. The total estimated Sault Ste. Marie population in 2046 is nearly 86,000 (Note: the City Planning department revised their projections in 2015. As a result of those revisions the projected 2046 was reduced to 82,820. The population projections were further modified in 2018 resulting in a 2046 Sault Ste. Marie population of 89,895.	The planning has been completed based on a 2049 service area population of 92,487 - Section 2.1.

Questions	Response	How Addressed in the EA and EA Reference
	The most recent projections are incorporated in the FINAL EA).	
Have you considered increasing the service area so that incineration or high heat technologies would be more cost effective? Sault Ste. Marie could service a larger area as a profitable business generating jobs for our residents. You should establish a committee with a mandate to look at this.	A waste management steering committee comprised of City staff is overseeing the project. The City's mandate is to look after its own waste and that is the intention of this study. The province has also recently released a draft provincial policy statement which encourages the management of waste close to source. The transport of waste over significant distances results in additional impacts including noise, dust and air emissions. The private sector is more likely to explore opportunities for a facility servicing a broad geographic region.	Not a City priority or mandate - Sections 1.1, 1.3, 1.8.2 and 2.1.
Can there be more than one "Alternative to" selected?	Yes, the preferred waste management system is likely to include a combination of the alternatives. For example, it is expected that increased 3R's would be part of the system along with one or more disposal method(s).	Preferred "Alternative To" includes both Increased Waste Diversion and Landfilling residual waste - Section 4.2.3.
Doesn't diversion have a bigger service area?	The collection of blue and yellow box materials outside of the study area is a private collection and is not part of the municipal system.	Not a City priority or mandate - Section 1.5.
Would a high heat process be able to manage nuclear or hospital waste?	Requires further study and would be looked at if "high heat" is the preferred "Alternative To".	Included as an "Alternative To" throughout Section 4.0 but was not selected as the preferred "Alternative To".
It was suggested that the City should not overlook incineration/high heat as a future waste management option. A lot can change over the years and it may prove to be beneficial and cost effective in the future.	Agreed.	Included as an "Alternative To" throughout Section 4.0 but was not selected as the preferred "Alternative To".
It was noted that the timing of the meeting right before a long weekend made it challenging to attend as this is a very busy week.	It was noted that the project team wanted to have a meeting prior to vacation season. Future sessions will consider statutory holidays.	N/A

In addition to the foregoing feedback obtained through the facilitated discussions three completed workbooks were also received following the consultation event.

In general, preferences were noted for waste diversion, incineration/high heat processes and landfilling. Export and do-nothing were identified as impractical and unrealistic. Comments that were included in the workbooks together with responses are summarized in **Table 9.2** below. In addition, where relevant, we have included in the right-most column, how the item is addressed within the EA document.

Table 9.2 Summary of Completed Workbooks

Comment	Response	How Addressed in the EA and EA Reference
The selected system should allow conversion of waste into energy without sorting.	Some sorting is completed at source as part of the recycling programs including the public drop-off area at the landfill site. Typically, no additional sorting is done for landfilling however most incineration/high heat processes will include some upfront sorting.	Some upfront sorting is completed - Sections 4.2.2.4 and 4.2.2.5.
Consider processing of waste for the Region as a potential job creation strategy.	See response in Table 9.1 which addressed the service area.	Not a City priority or mandate - Section 1.5.
Consider impacts of combined alternatives.	Consideration of combined impacts is included in the rankings under each criterion.	Consideration of combined impacts considered in the selection of two “Alternatives To” - Section 4.2.3.
Quality of residues from incineration and high heat processes is dependant on what is included in the waste which is difficult to control.	Agreed.	Some residues will be landfilled in a conventional or hazardous waste site - Sections 4.2.2.2, 4.2.2.5 and 4.2.3.
Concerns were noted with possible need for land expropriation and the location of the existing site on the City’s aquifer.	Property impacts are considered at a general level at this time but will be considered in greater detail in the next phase of the process. Potential impacts to surface water resources is included. An engineered leachate collection and management system is included in the landfilling alternative.	Despite the success of the existing leachate management controls further enhancements are proposed to protect the aquifer including landfill mining and lining, lining all new cells, residential well monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal groundwater collector - Sections 4.2, 5.1, 5.2, 6.3, 6.6.3, 7.2.2, 7.2.3, 8.1.1, 8.1.1.1 and 8.3.
It is important that waste reduction is included as an alternative or at least incorporated as part of the waste diversion alternative.	The waste diversion alternative includes the 3 R’s (reduce, reuse, recycle).	Waste reduction is included as part of the Waste Diversion Alternative - Section 4.1.1.

Comment	Response	How Addressed in the EA and EA Reference
Concern was noted that incineration and high heat processes may generate more hazardous waste than is noted in the EA documentation.	The information included in the documentation was obtained through research completed on existing operating facilities.	It is noted that hazardous waste will be generated and will have to be managed at an appropriately licensed facility - Sections 4.2.2.2, 4.2.2.5 and 4.2.3.
Skepticism was noted that incineration/high heat processes are safe. Research needs to be independent and unbiased.	Incineration and high heat processing plants would be required to meet MECP regulated emission requirements of the day. Facilities must be instrumented with monitoring equipment to demonstrate ongoing compliance.	There are facilities operating and meeting the regulatory requirements - Sections 4.1.2 and 4.2.
Need to consider leachate impacts and impacts on habitat associated with landfilling including attraction of bears and rats.	This is considered at a general level at this time and will be considered in more detail in the next phases of the process.	Despite the success of the existing leachate management controls further enhancements are proposed to protect groundwater including landfill mining and lining, lining all new cells, residential well monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal groundwater collector - Sections 4.2, 5.1, 5.2, 6.3, 6.6.3, 7.2.2, 8.1.1, 8.1.1.1 and 8.3. Vector and vermin control is addressed in 6.6.10.

9.4.2 Public Input Session #2 conducted in GRFN on “Alternatives To” and Evaluation Criteria (August 9, 2007)

A public open house was conducted on Thursday August 9, 2007 in the Garden River First Nation Community Centre. The session provided a forum for interested individuals, agency representatives, and First Nations representatives and stakeholders, to discuss the “alternatives to” the undertaking and criteria that will be used to compare and select a preferred approach to manage solid waste in Sault Ste. Marie, Prince Township and Batchewana First Nation’s Rankin Reserve. The session was conducted in an open house format which allowed interested individuals to attend at any time between 4:00 pm and 7:00 pm.

Representatives of the Consultant team and the City of Sault Ste. Marie were in attendance throughout the session to provide information, address questions, and facilitate discussions. A total of 5 individuals

recorded their names on the sign-in sheet. The input received through dialogue with participants and through the two workbooks completed is summarized in Table 9.3.

Table 9.3 Summary of Input Received During the Session and Through Completed Workbooks

Comment	Response	How Addressed in the EA and EA Reference
There were no additional alternatives or evaluation criteria identified and no opinions voiced on the importance of the evaluation criteria during discussions with participants.	N/A	N/A
Considerable interest in expanded diversion programs and an understanding that some form of waste disposal will continue to be required in the future.	Consideration is being given to expanded diversion programs in the “Alternatives To” evaluation.	The proposed “Alternative To” includes Increased Waste diversion and the diversion rate is expected to increase from 30% to 50% - Section 4.1.1.
There were no additional alternatives identified in the workbook submissions.	N/A	N/A
Long-term benefits resulting from public education including changed habits and reduced waste generation.	It was acknowledged that enhanced public education plays an important role in waste reduction, reuse and recycling.	The Increased Waste Diversion alternative incorporates enhanced public education - Sections 1.5 and 4.1.1.
Exporting waste sends the “wrong” message and encourages increased waste generation – “out of sight out of mind”.	Comments are supported by the ranking in the evaluation.	Export waste ranked fourth amongst five alternatives - Sections 4.2.2 and 4.2.3
Do-nothing and exporting of waste should not be pursued further. Do-Nothing is not a realistic option as there is a need to manage waste. Export has higher costs, increased environmental impacts, and we need to be responsible for our own problems.	Comments are supported by the ranking in the evaluation.	Export and Do Nothing ranked fourth and fifth respectively amongst five alternatives - Sections 4.2.2 and 4.2.3.
Increased waste diversion should be ranked the highest possible under each criterion and landfill and incineration should be similar with a slight preference shown for landfill.	Comments were generally supported by the ranking in the evaluation.	Increased Waste Diversion and Landfilling ranked the highest and Incineration and High Heat Processes was next - Sections 4.2.2 and 4.2.3.
“Environmental acceptability” should be the most important criterion. The importance of other criteria was not differentiated.	Acknowledged.	Sections 4.2.2 and 4.2.3 – given the very limited input on the importance of criteria equal weighting was given to all criteria.
Support for the development of a residential organics	A curbside residential SSO program will be considered.	Sections 2.3.1 and 4.1.1 – a curbside SSO

Comment	Response	How Addressed in the EA and EA Reference
collection and processing program and/or encouraging individuals to compost organics themselves.		program is proposed with implementation expected in 2025 or 2026.

9.4.3 Public Input Session #3 on Preferred "Alternative To" and Next Steps (June 3, 2010)

A public information centre was conducted on Thursday June 3, 2010 in the Thompson Room at the Civic Centre. The session provided a forum for interested individuals, agency representatives, Aboriginal representatives and stakeholders, to obtain updated information regarding waste management planning, gain an understanding of the Environmental Assessment process, review and provide comments on the results of the "alternatives to" the undertaking evaluation, identify next steps in the process and have questions answered. The session was conducted in an open house format which allowed interested individuals to attend at any time between 3:30 pm and 7:30 pm.

Representatives of the Consultant team and the City of Sault Ste. Marie were in attendance throughout the session to provide information, address questions, and facilitate discussions. A total of 10 individuals recorded their names on the sign-in sheet. Some individuals in attendance did not record their names on the sign-in sheet.

During the conduct of the Open House, no comment sheets were received. There were however, a number of comments/questions that are summarized in **Table 9.4**.

Table 9.4 Comments/Questions from the June 2010 Information Session

Comment/Question	Response	How Addressed in the EA and EA Reference
Has consideration been given to the energy requirements to recycle plastics vs. thermally processing plastics?	Municipalities are mandated by Provincial legislation to collect and recycle No's 1 and 2 plastics (ie. designated by the Province). In Sault Ste. Marie, other plastics (ie: numbers 3 through 7) are currently being disposed of in landfill and are currently available for thermal processing. A comparison of the energy requirements to recycle no's 1 and 2 plastics versus thermally processing these plastics is beyond the scope of this study and should be done at the Provincial level as part of the material designation process.	Blue box recycling is transitioning to a Producer responsibility framework - Sections 2.3.1 and 4.1.1.
A concern was noted with the potential impact of the landfill on groundwater resources in the area of the landfill site. It was noted that the City had extended the Municipal water distribution system along Fifth Line west of the landfill to address water quality concerns in drinking water wells.	The extension of the Municipal water distribution system to the landfill site was completed in 1997± to address potential concerns with potable water quality on the landfill site itself. The City is not aware of any water quality problems in potable wells surrounding the landfill site that may be attributable to the landfilling operations. (Note: time was also spent educating the individual regarding the various monitoring and leachate control systems that are present at the existing landfill site to safeguard groundwater quality beyond the boundaries of the landfill site).	Despite the success of the existing leachate management controls further enhancements are proposed to protect groundwater including landfill mining and lining, lining all new cells, residential well monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal

		groundwater collector - Sections 4.2, 5.1, 5.2, 6.3, 6.6.3, 7.2.2, 8.1.1, 8.1.1.1 and 8.3.
The biosolids generated at the two wastewater pollution control plants could be processed in the proposed Elementa facility.	This may be a viable approach but Elementa has not yet tested and confirmed that biosolids can be processed in their facility. Furthermore, Elementa's proposed commercial scale plant will not have adequate capacity to process all residual waste generated in Sault Ste. Marie and they will likely prefer waste streams with higher energy content if available.	The City terminated the agreement with Elementa when the company entered receivership – Section 1.6.
Surprised that thermal processes did not fare better in the evaluation relative to landfilling.	The rationale for the rankings is included in a summary table in the Alternatives to the undertaking report and any comments on individual rankings are encouraged.	Rationale for the rankings is included throughout Section 4.2.

9.4.4 Public Input Session #4 Evaluation Approach/ Criteria for a New Site vs. Expansion of an Existing Site and Preliminary Preference (April 19, 2011)

A public input session was conducted on Tuesday April 19, 2011 in the Russ Ramsay Room at the Civic Centre. The session provided a forum for interested individuals, agency representatives, Aboriginal representatives and stakeholders, to obtain updated information regarding waste management planning, gain an understanding of the Environmental Assessment process, review and provide comments on the criteria and their relative importance used to evaluate a new site versus expansion of an existing site, discuss and comment on the preliminary results of the evaluation, provide input regarding the evaluation criteria and their relative importance to be used in the next steps and have questions answered. The session included a presentation by the Consultant team followed by a question and answer period and a working group session to complete the workbook.

Representatives of the Consultant team and the City of Sault Ste. Marie were in attendance throughout the session to disseminate information, address questions, and facilitate discussions.

Questions/comments raised during the presentation are summarized in **Table 9.5**.

Table 9.5 Comments/Questions from the April 2011 Information Session

Comment/Question	Response	How Addressed in the EA and EA Reference
Is 34% diversion comparable to other municipalities?	Yes. City of Sault Ste. Marie is in line with other similarly sized municipalities with similar diversion programs.	As identified in Sections 2.3.1 and 4.1.1, the City plans to increase its residential diversion rate from approximately 30% to 50% by approximately 2025.
In southern Ontario there is a large weight associated with newspapers so their diversion rate shows as higher. We should use volume to indicate diversion rate rather than weight.	It is very difficult to measure volume and weights are much more practical/convenient.	As identified in Sections 2.3.1 and 4.1.1, the City plans to increase its residential diversion rate from approximately 30% to 50% by approximately 2025.

Comment/Question	Response	How Addressed in the EA and EA Reference
Sudbury diversion rates are higher but they do collect more plastics and they have organics collection. It is a single stream process with improved participation. The waste from the Sudbury MRF is approximately 1.5-4%	No response required.	As identified in Sections 2.3.1 and 4.1.1, the City plans to increase its residential diversion rate from approximately 30% to 50% by approximately 2025. This will be achieved in part through the introduction of a source separated organics program.
Are there items banned from the landfill?	Yes old corrugated cardboard and leaf and yard waste are banned.	Old corrugated cardboard and leaf and yard waste are currently banned and other items could be banned in the future - Section 1.5.
Elementa tried to do their EA and Certificate of Approval at the same time. They should have finished one process and then gone to the next.	No response required.	The City terminated the agreement with Elementa when the company entered receivership – Section 1.6.
How much of the residual waste is organics?	Based on previous studies completed, approximately 30-40% of the residential waste stream is organic.	As identified in Sections 2.3.1 and 4.1.1, the residential curbside waste consists of approximately 30%-40% organics. The City plans to increase its residential diversion rate from approximately 30% to 50% by approximately 2025 which will be achieved, in part, through the introduction of a source separated organics program.
How much does the existing site cost? How much less will an expansion cost compared to a new site?	Although detailed estimates have not been completed qualitatively an expansion is less costly and the rationale is detailed in the EA report.	A high-level comparison of costs for an expansion versus a new greenfield site is presented in Section 5.1.1.
The City has improved odour control with the installation of the gas management system. Sludge is the remaining issue that needs to be dealt with at the existing site.	Agreed. A biosolids management plan has been completed to mitigate odours in transit to the landfill and at the site itself.	A biosolids/SSO processing facility is currently in the design stage and is expected to come online in approximately 2025 – Sections and 2.3.3 and 4.1.1.
Needs to be clear that, while local residents may have become used to	Understood. The City will continue to be as proactive as possible to continually improve nuisance management at the site.	Section 7.3.2 highlights the principle concerns of local or area residents in the immediate vicinity of the site. The City plans to enhance mitigation in

Comment/Question	Response	How Addressed in the EA and EA Reference
the site it does not mean that they like it.		conjunction with the proposed expansion as summarized in Table 7.13 in Section 7.3.2. The City will continue to have an Environmental Monitoring Committee with representation from local residents to ensure there continues to be a commitment to continual improvement related to nuisance impacts and environmental management – Section 6.7.
Representatives from Elementa indicated that they can process any carbon based material that is available. In their discussions with Spain they understand that landfills are banned there. The comment "why bury energy" was made.	The City has endorsed a waste supply agreement with Elementa which provides for the management of a portion of the residual waste stream in an energy-from-waste facility. (Note: the referenced agreement was eventually terminated when Elementa went into receivership).	The City terminated the agreement with Elementa when the company entered receivership in 2015 – Section 1.6.
Is the City of Sault Ste. Marie looking at new recycling products? The City should work with the contractor to get more recyclable materials collected.	The City's contract for recycling collection and processing includes provisions to consider new products. The inclusion of new material is however contingent upon having an established market to purchase/utilize the materials.	Blue box recycling is transitioning to a Producer responsibility framework - Sections 2.3.1 and 4.1.1.

Following the presentation and question/answer period, a small group discussion was held with participants to go through the public input session workbook. Six participants joined in the small group discussion including two site neighbours. Participants were asked to comment on the project team's preliminary conclusion that a landfill expansion is preferred over the development of a new site and the key differences between the two options. Participants commented as follows:

Table 9.6 Comments/Questions During Working Group Session

Comment/Question	Response	How Addressed in the EA and EA Reference
An expansion option assumes there is land to expand into. We need to confirm that there is enough room.	This is an important consideration and will be addressed in Step 2 of the Alternative Methods evaluation provided expansion is selected as preferred in Step 1.	As outlined in Section 5.2.2 the expansion options were developed within the available site area. The City has purchased several properties in the vicinity of the landfill site at market prices with the objective of increasing the buffer lands surrounding the site. The City is currently proceeding with expropriation of one single property to enhance the buffer

Comment/Question	Response	How Addressed in the EA and EA Reference
		lands and enhance groundwater quality compliance along the western boundary. The City will consider the acquisition of additional properties at market value, within the site vicinity as they become available. This will continue to be implemented on a long-term basis to further enhance mitigation of nuisance impacts – Section 5.3 of Appendix J.
Should consider mining the existing site and expanding upwards. You could remove recyclables from the mined material and then take it to Elementa for processing.	Mining and a vertical expansion will be considered in the next step of the Alternative Methods phase. Recoverable materials encountered during the mining operations would be separated and marketed.	Landfill mining was considered and is included as part of the preferred expansion option - Section 5.2.5 and 6.3. Vertical expansion was considered but was excluded from a detailed analysis based on input received from the Ministry – Section 5.2.2 together with the slope stability considerations.
It was noted that you could always mine the existing site even if a new site was identified as preferred.	Agreed, however there would be two sites that would generate nuisance impacts and would require additional resources to operate and manage.	Landfill mining was considered and is included as part of the preferred expansion option - Section 5.2.5 and 6.3.
A new site brings a lot of headaches – Where are you going to find a clay dish like you have at the existing site? You will spend 10 years and a lot of money to look for a new site and then find out at the last minute that there is something about it that makes it not workable.	The search for a suitable new site can be very time consuming and costly and typically generates significant anxiety in communities. Significant investment can occur with no guarantees that a workable site will be established. This is also the case for site expansion, but a lessor investment is likely required. Both a site expansion and a new site will however require a liner to manage leachate.	The initial step in the Alternatives Methods Evaluation consisted of consideration of a new greenfield site versus the expansion of an existing site. Consideration of a new greenfield site had previously been considered by the City in the 1980's and relevant information from that site search has been leveraged and incorporated into this EA – Section 5.1. Through that analysis it was concluded that a new site is less feasible, less practical, and more costly and it would be prudent to initially focus resources on developing a strategy to expand the existing site subject to the results of more detailed site investigation.
The existing site is a known quantity.	Agreed. This was cited as an advantage in the evaluation.	This was noted as an advantage in Section 5.1.
We don't have the density and sprawl in Sault Ste. Marie that they have in southern Ontario so we could probably find a new site that might be better than the existing site.	The search for a suitable new site can be very time consuming and costly and typically generates significant anxiety in communities. Although a new site could potentially be identified, the preliminary conclusion reached through the evaluation completed is that the City should initially focus resources on assessing the	The initial step in the Alternatives Methods Evaluation consisted of consideration of a new greenfield site versus the expansion of an existing site. Consideration of a new greenfield site had previously been considered by the City in the 1980's and relevant information from that site search has

Comment/Question	Response	How Addressed in the EA and EA Reference
	practicality and net impacts of an expansion. A search for a new site was also completed in the late 80's with limited success.	been leveraged and incorporated into this EA – Section 5.1. Through that analysis it was concluded that a new site is less feasible, less practical, and more costly and it would be prudent to initially focus resources on developing a strategy to expand the existing site subject to the results of more detailed site investigation.
You will run in to NIMBY if you try to site a new landfill. Residents and property owners were concerned with wind turbines so they are certainly going to be concerned with a landfill.	Agreed.	The initial step in the Alternatives Methods Evaluation consisted of consideration of a new greenfield site versus the expansion of an existing site. Consideration of a new greenfield site had previously been considered by the City in the 1980's and relevant information from that site search has been leveraged and incorporated into this EA – Section 5.1. Through that analysis it was concluded that a new site is less feasible, less practical, and more costly and it would be prudent to initially focus resources on developing a strategy to expand the existing site subject to the results of more detailed site investigation.
It was noted that both sites have similar potential for disruption to the neighbouring community.	Agreed but there has been some adaptation with the existing site.	This is addressed and contrasted under "Social Environment" in Section 5.1.1.
Concern about mining is the odour. There was a lot of odour when they dug into the site to place the pipes for the landfill gas collection system.	Odour is a significant concern associated with mining operations and will require close attention to best practices to mitigate. The intent would also be to limit the timeline for mining operations.	The inclusion of landfill mining as part of the preferred expansion option was carefully considered in Section 5.2.5. Ultimately it was concluded that the long-term environmental benefits outweighed the short-term nuisance impacts including odour. The approach to odour mitigation and monitoring is addressed in 6.3, 6.6.6, 7.3.6 and 8.1.4
Don't think a community will allow a new landfill. The City should go with what we have and make it better.	The preliminary conclusions reached through the evaluation suggest focusing on an expansion for a number of reasons as noted elsewhere in the report. The intent would be to further improve the environmental management features at the existing site in conjunction with an expansion.	The initial step in the Alternatives Methods Evaluation consisted of consideration of a new greenfield site versus the expansion of an existing site. Consideration of a new greenfield site had previously been considered by the City in the 1980's and relevant information from that site search has been leveraged and incorporated into this EA – Section 5.1. Through that analysis it was concluded that a new site is less feasible, less practical, and more

Comment/Question	Response	How Addressed in the EA and EA Reference
		costly and it would be prudent to initially focus resources on developing a strategy to expand the existing site subject to the results of more detailed site investigation. As part of the proposed expansion there are numerous improvements planned to nuisance mitigation and environmental management as detailed throughout Section 7.
It was suggested that an expansion could not go east or south, there is not much room to go west, and the north is the best direction for an expansion as there are no additional people to impact. North was preferred over going higher. A separate fill area to the north was suggested.	Various expansion options will be explored in the next step of the process if the preferred alternative from the current step is expansion. It was acknowledged that expansion east or south is not likely practical.	Various expansion options were explored in Section 5.2 including expansion to the north, south and west. Expansion to the east was not possible due to property restrictions and the presence of Canon Creek.
It was acknowledged that there would be a cost savings with an expansion over a new site.	Agreed.	A high-level comparison of costs for an expansion versus a new greenfield site is presented in Section 5.1.1 and it is noted that an expansion is more cost efficient.
There was discussion on the lifecycle cost of existing equipment and whether it could be re-used if a new site was selected. It was suggested that the equipment cost difference for the site is probably not that great and should not be what is relied upon to make the decision between the options.	It was noted that in addition to the equipment there are infrastructure items on the current site that could potentially be reused including site roads, weigh scale(s), scale house and administrative and maintenance buildings existing groundwater, surface water and landfill gas monitoring systems. Collectively these items could result in a substantial cost savings.	Although equipment could be transferred to a new site the high-level comparison of costs for an expansion versus a new greenfield site presented in Section 5.1.1 concluded that an expansion is more cost efficient for the reasons noted in the adjacent column.
It was noted that investigations on a new site would be very costly and there is a lot less certainty than with an existing site.	The search for a suitable new site can be very time consuming and costly and typically generates significant anxiety in communities. Significant investment can occur with no guarantees that a workable site will be established. Although a significant investment is also required for a site expansion the required investment	This was noted as an advantage in Section 5.1. The initial step in the Alternatives Methods Evaluation consisted of consideration of a new greenfield site versus the expansion of an existing site. Consideration of a new greenfield site had previously been considered by the

Comment/Question	Response	How Addressed in the EA and EA Reference
	is likely much less given the significant knowledge that pre-exists for the site.	City in the 1980's and relevant information from that site search has been leveraged and incorporated into this EA – Section 5.1. Through that analysis it was concluded that a new site is less feasible, less practical, and more costly and it would be prudent to initially focus resources on developing a strategy to expand the existing site subject to the results of more detailed site investigation.
Don't think that a new site would be much harder to approve but it would be harder to get buy-in from the community.	Agreed that there may be increased challenges in obtaining buy-in from the community for a new site particularly if it is located near sensitive uses. The approval for a new site would require more extensive investigations to ascertain potential impacts particularly with groundwater.	Significant investment can occur with a new greenfield site with no guarantees that a workable site will be established The initial step in the Alternatives Methods Evaluation consisted of consideration of a new greenfield site versus the expansion of an existing site. Consideration of a new greenfield site had previously been considered by the City in the 1980's and relevant information from that site search has been leveraged and incorporated into this EA – Section 5.1. Through that analysis it was concluded that a new site is less feasible, less practical, and more costly and it would be prudent to initially focus resources on developing a strategy to expand the existing site subject to the results of more detailed site investigation.
The existing site is well run there have been improvements (e.g. gas management). The sludge smell and potential for groundwater impacts are the only issues at the existing site that neighbours are concerned about. If you fix these issues then there is no problem with the existing site.	A biosolids management study has been completed to address the management, nuisance impacts and potential beneficial use of the sewage biosolids. The City has been effectively monitoring and managing groundwater quality at the existing site and expansion would include further enhancements to the existing leachate management features and protocols.	The City is continuing to work to address odours and groundwater quality and the proposed expansion includes the following principle elements to better address these concerns: A biosolids/SSO management facility is currently in the design stage and is expected to come online in approximately 2025 – Sections and 2.3.3 and 4.1.1. Despite the success of the existing leachate management controls further enhancements are proposed to protect groundwater including landfill mining and lining, lining all new cells, residential well monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal groundwater collector - Sections 4.2, 5.1, 5.2, 6.3, 6.6.3, 7.2.2, 8.1.1, 8.1.1.1 and 8.3.

Comment/Question	Response	How Addressed in the EA and EA Reference
One option to fix the concern about groundwater is to supply municipal water to local residents.	Municipal water is currently available to all Fifth Line property owners from the landfill site westerly to Old Goulais Bay Rd. Consideration will also be given to potential impacts to private well supplies in the next phase of the study.	Despite the success of the existing leachate management controls further enhancements are proposed to protect groundwater including landfill mining and lining, lining all new cells, residential well monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal groundwater collector - Sections 4.2, 5.1, 5.2, 6.3, 6.6.3, 7.2.2, 8.1.1, 8.1.1.1 and 8.3.
The long-term plan for the landfill is good but we should also be focusing on what we can do to help Elementa. It was noted that their biggest issue at this point was getting an appropriate electricity rate from the Ontario Power Authority. Waste-to-energy is the only thing not included in the government's feed-in-tariff program and it should be.	The City has endorsed a waste supply agreement with Elementa. It is anticipated that Elementa will continue to negotiate with OPA with the goal of establishing an acceptable power purchase agreement.	The City terminated the agreement with Elementa when the company entered receivership in 2015 – Section 1.6.
It was noted that we should be focusing on reducing and recycling.	Increased 3R's was identified as an important element of the overall preferred solution identified in the first phase of the study and the City is committed to investigating and implementing cost effective 3R's strategies.	The proposed "Alternative To" includes Increased Waste diversion and the diversion rate is expected to increase from 30% to 50% - Section 4.1.1.

With respect to the evaluation criteria to be used in the next step, participants suggested that they liked the approach taken to-date where the team goes through the evaluation using their technical expertise and brings it back to the community for review and input.

In addition to the workbook that was collectively reviewed by the group at the Public Input Session, a member of the public also submitted a completed workbook. Comments were made throughout the workbook and were summarized as follows:

"I agree with the preliminary conclusions, however the City must continue to find ways to reduce the amount of garbage in the first place." This is addressed in Section 4.1.1 as the proposed "Alternative To" includes Increased Waste Diversion and the diversion rate is expected to increase from 30% to 50% with the implementation of the food and organic waste collection program.

9.4.5 Public Input Session #5 - Evaluation Approach/Criteria and Preliminary Preferred Expansion Option (March 6, 2012)

A Public Input Session was conducted on March 6, 2012 in the Russ Ramsay Room of the Civic Center. Representatives of the Consultant team and the City of Sault Ste. Marie were in attendance throughout the session to provide information, address questions, and facilitate discussions. The information session was open from 3:30 p.m. to 7:30 p.m. with a total of seventeen (17) individuals recording their names on the sign-in sheet.

The principle objective of the Step 2 Alternative Methods consultation task was to obtain feedback from the general public, agencies, Aboriginal Communities and stakeholders regarding the evaluation criteria, their relative importance and the preliminary results. To assist in soliciting as much input as possible, a questionnaire was developed to provide targeted feedback and a comment sheet was made available to provide general comments. The questionnaire and comment sheet were available at the March 6, 2012 Public Input Session and were posted on the project webpage on the City's website. In addition, digital responses were encouraged through Survey Monkey, an online survey website. The information received through the various formats is summarized in the **Table 9.7**.

Table 9.7 Summary of Comments/Input Received at the March 2012 Public Input Session

Comments	Response	How Addressed in the EA and EA Reference
Suggested that a waste-to-energy vendor be invited to convert our waste (Elementa or an alternate vendor).	A private sector energy-from-waste (EFW) proponent called The Elementa Group (Elementa) has built and tested a pilot steam reformation plant that converts municipal solid waste into a char and synthetic gas that can be used to generate electricity. The pilot testing was completed from 2007 to 2009 and Elementa had plans to construct a new larger-scale facility, with an estimated annual throughput capacity of at least 35,000 tonnes. In 2009, the City entered into a waste supply agreement with Elementa to process a minimum 12,500 tonnes per year of the City's residential MSW for a minimum ten-year period commencing in 2011. The project implementation was delayed on a number of occasions and the waste supply agreement was amended on a number of occasions to reflect changes in waste supply commencement dates. Ultimately, Elementa was ordered into receivership in December 2015 and the City terminated the waste supply contract.	The City terminated the agreement with Elementa when the company entered receivership in 2015 – Section 1.6. The implementation of this project does not preclude the possibility of implementing another private sector waste-to-energy (WTE) solution at a future date. It is anticipated that the additional landfill capacity approved through this project will continue to be needed even if a WTE facility were developed in the future.
Prevent leachate from entering groundwater and surface water sources.	The proposed expansion includes strategies to mitigate potential adverse impacts to ground and surface water that could be generated from the proposed expansion area. The preliminary	Despite the success of the existing leachate management controls further enhancements are proposed to protect groundwater including landfill mining and lining, lining all new cells, residential well

Comments	Response	How Addressed in the EA and EA Reference
	preferred expansion option also includes provisions to enhance ground and surface water protection measures associated with the existing disposal footprint. Further details will be forthcoming in the next phase of the project (ie. detailed impact assessment).	monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal groundwater collector - Sections 4.2, 5.1, 5.2, 6.3, 6.6.3, 7.2.2, 8.1.1, 8.1.1.1 and 8.3.
The necessity and cost of the proposed landfill mining in the western portion of the existing footprint was questioned.	Although landfill mining is not a "necessity" there are pros and cons to this component of the preliminary preferred option. Landfill mining provides an opportunity to enhance groundwater protection measures associated with the existing disposal footprint. A secondary benefit is the additional disposal capacity sourced by separating the waste from the fines and re-landfilling only the waste. The principle drawbacks to landfill mining are the added cost, nuisance impacts (ie. odours, dust, noise) and worker protection. The feedback that we have received to date is that the long-term ground water quality benefits outweigh the added costs and short-term operational impacts.	The inclusion of landfill mining as part of the preferred expansion option was carefully considered in Section 5.2.5. Ultimately it was concluded that the long-term environmental benefits outweighed the short-term nuisance impacts and increased costs.
Displays and presentation was well done and very informative.	No response required.	N/A
Consideration should be given to petition the expansion of the current Provincial Groundwater Monitoring Network (PGMN). This expansion could allow for additional groundwater quality and quantity monitoring away from the landfill. The additional monitoring capability would increase the predictability of any potential threat of off-site contamination and allow the operators of the municipal drinking water distribution network to have ample notice of any impending issues. Policies will be included in the Municipality's	There is an extensive network of monitoring wells located within and immediately adjacent to the existing waste disposal site. This network provides ample opportunity to assess groundwater quality within and adjacent to the site. We support your suggestion that there are benefits to expanding the PGMN within the capture zones of the municipal wells to identify contaminants well in advance of reaching the well head.	The City has no control over the PGMN but is committed to ensuring the landfill site monitoring network is robust and adequate to assess potential impacts associated with the site. There is an extensive existing monitoring program which includes annual monitoring and reporting. A comprehensive annual report is available as a reference. In addition, details of the proposed groundwater and surface water monitoring programs to be implemented in conjunction with the proposed expansion are detailed in Sections 8.1.1 and 8.1.2.

Comments	Response	How Addressed in the EA and EA Reference
Source Protection Plan to address.		
Concern was expressed regarding the long-term quality of drinking water sourced from private wells adjacent to the site.	There is an extensive network of monitoring wells located within and immediately adjacent to the existing waste disposal site. This network provides ample opportunity to assess groundwater quality within and adjacent to the site. Despite the extensive monitoring network we understand the concern raised and further consideration will be given to this concern in the next phase of the project (ie. detailed impact assessment).	Despite the success of the existing leachate management controls further enhancements are proposed to protect groundwater including landfill mining and lining, lining all new cells, residential well monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal groundwater collector - Sections 4.2, 5.1, 5.2, 6.3, 6.6.3, 7.2.2, 8.1.1, 8.1.1.1 and 8.3.
Concern was expressed with the location of a landfill on a significant ground water recharge area but also acknowledged that the expansion of the existing site allows an opportunity to help reduce the risk of the existing landfill operation with ongoing monitoring and through the application of partial or total impervious cover over the existing footprint to limit infiltration and leachate production.	The ongoing operation and site monitoring by the Municipality has demonstrated that leachate is being effectively managed as demonstrated through the annual reporting. Despite the effective leachate management, the City believes the proposed expansion offers an opportunity to further enhance the protection measures associated with the existing disposal site. These measures may include a liner at the base of the waste and at the interface between the new and existing waste in the expansion areas, a partial or full impervious final cover design, mining and lining a portion of the existing site, and installation of a horizontal collector or the addition of replacement purge wells along the western boundary of the expansion area.	Despite the success of the existing leachate management controls further enhancements are proposed to protect groundwater including landfill mining and lining, lining all new cells, residential well monitoring, and contingencies including an extension of the municipal water distribution system and the possible installation of a horizontal groundwater collector - Sections 4.2, 5.1, 5.2, 7.2.2, 8.1.1 and 8.3. There is also an extensive existing monitoring program which includes annual monitoring and reporting. A comprehensive annual report is available as a reference. In addition, details of the proposed groundwater and surface water monitoring programs to be implemented in conjunction with the proposed expansion are detailed in Sections 8.1.1 and 8.1.2.
Support for landfill mining to improve groundwater quality but also identified a need to consider air quality and protection of workers during the operations.	There are pros and cons to landfill mining. Landfill mining provides an opportunity to enhance groundwater protection measures associated with the existing disposal footprint. A secondary benefit is the additional disposal capacity sourced by separating the waste from the fines and re-landfilling the waste only. The principle drawbacks to landfill mining are the added cost, nuisance impacts (ie. odours, dust, noise) and worker protection during the operations. Further consideration of the nuisance impacts and safety will be included in the detailed impact assessment.	The inclusion of landfill mining as part of the preferred expansion option was carefully considered in Section 5.2.5. Ultimately it was concluded that the long-term environmental benefits outweighed the short-term nuisance impacts and increased costs. It is also recognized that nuisance impacts and safety will have to be carefully considered during implementation as outlined in Section 6.3.

Comments	Response	How Addressed in the EA and EA Reference
Composting should be fast tracked by the MECP.	The City, through its Consultant, interacted regularly with MECP staff regarding proposed changes to the composting regulations. Ultimately new regulations were released by the MECP in July, 2012 which provide enhanced flexibility in composting biosolids.	Sections 2.3.1 and 4.1.1 – a curbside SSO program is proposed with implementation expected in 2025 or 2026.
Support expressed for Option 3 - North and West Expansion B. Also suggested that landfill mining should be considered as technology becomes available and this option becomes more cost competitive. It was also noted that there should continue to be a focus on recycling.	Although there is additional expense associated with the proposed landfill mining it will help to mitigate potential ground water impacts to the south-west of the site. The preferred solution that was identified in the "Alternatives To" stage of the process included increased waste diversion and the City is committed to investigating and implementing cost effective ways and means of reducing residual waste disposal quantities.	Option 3 with Landfill Mining was selected as the preferred option and the approach and rationale for the selection is included in Section 5.2. The proposed "Alternative To" includes Increased Waste diversion and the diversion rate is expected to increase from 30% to 50% - Section 4.1.1.
Every effort should be made to reduce the timeframe to initiate the landfill expansion plan.	The City is committed to moving forward with the next steps of the EA process and the technical approvals required for the expansion.	The City plans to submit the Final EA in 2023.

9.4.6 Public Input Session #6 – Impact Assessment for the Preferred Option (February 9, 2016)

A Public Input Session was conducted on February 9, 2016 in the Russ Ramsay Room of the Civic Center. Representatives of the Consultant team, and the City of Sault Ste. Marie were in attendance throughout the session to provide information, address questions, and facilitate discussions. The information session was open from 3:30 p.m. to 7:30 p.m. with a total of nine (9) individuals recording their names on the sign-in sheet.

The principle objective of the Impact Assessment consultation task was to obtain feedback from the general public, agencies, Aboriginal Communities and stakeholders regarding the identified impacts and the proposed mitigation measures for the preferred option. A comment sheet was provided which incorporated two key questions and provided space to record any other comments or concerns. The comment sheet was also posted on the project webpage on the City's website. The information received through the various formats is summarized in the **Table 9.8**.

Table 9.8 Summary of Comments/Input Received at the February 2016 Public Information Session

Comments	Response	How Addressed in the EA and EA Reference
Concern was expressed with litter sprawl and plastic bags and odours.	The City has proactive litter pickup protocols in place at the landfill site which include manual and mechanical collection methods. There are a significant number of odour mitigation protocols in place as follows:	In conjunction with the proposed expansion enhancements are proposed to mitigate nuisance impacts. The proposed approach to litter sprawl and odour management are addressed in Sections 6.3, 6.6.6, 6.6.7 and 7.3.6 .

Comments	Response	How Addressed in the EA and EA Reference
	• In 2010 the City completed an upgrade from a “passive” system to an “active” landfill gas collection system over a portion of the site. The system reduces the quantity of methane released to the atmosphere (ie: reduces the carbon footprint of the site) and also reduces odours generated at the site. • In addition to landfill gas, biosolids (i.e: sewage sludge) delivered to the site for disposal may also contribute to off-site odours. The City continues to be proactive in its efforts to manage and mitigate odours associated with the transport, management and disposal of biosolids. • An odour neutralizing agent is applied to the biosolids at the water pollution control plants prior to delivery to the landfill site. Once the biosolids are tipped at the working face they are mixed with other wastes and cover is applied promptly. A handheld sprayer is used by the vehicle operators to apply an odour neutralizing agent to the empty trailers before they leave the site throughout the year. • Early in 2013, mesh tarps were replaced with impermeable, waterproof tarps on one biosolids trailer at the west plant and two biosolids trailers at the east plant to mitigate odour release in transit to the landfill. • Regular trailer washing was also initiated in 2013 to remove residual biosolids from the outside faces and wheels of the trailers. • A Biosolids Management Plan has been completed and the City is proceeding with the implementation of the recommendations which includes a new processing	

Comments	Response	How Addressed in the EA and EA Reference
	facility and improved transportation to the site. Careful attention will also be given to the implementation of best management practices to mitigate odours associated with the proposed landfill mining operations. Local residents are encouraged to contact the landfill to alert operations staff of any issues related to litter sprawl or odours to ensure actions are taken to mitigate nuisances.	
A request was made to undertake groundwater sampling to the north of the landfill to confirm impacts are not migrating to the north.	There are several monitors that are located to the north of the disposal footprint that have been sampled historically and have been used as background monitors because they have not shown any significant impacts. In addition, there is a significant inventory of groundwater monitors that have consistently demonstrated that groundwater flows south, south-east and south-west from the landfill site.	Details pertaining to the existing monitoring program and the annual results are available in the Annual Monitoring Reports. The proposed monitoring program to be implemented in conjunction with the proposed expansion is included in Section 8.1.1 and contingency measures are included in Section 8.3
A representative of Ellwood Robinson Ltd. (local Contractor) requested that access be maintained to their pit in conjunction with the proposed expansion. The pit is currently only accessible through the landfill site.	City staff noted that they believe there is an agreement addressing access to the pit and it will continue to be respected in conjunction with the proposed expansion.	The City has committed to maintaining access to the pit.
A local resident had several questions related to pay-as-you-throw programs, source separated organics/ backyard composters, bi-weekly waste collection and the use of clear bags for waste disposal.	A detailed response was issued and it describes the current partial pay-as-you-throw program and future potential enhancements, the challenges with a source separated organics collection and processing program and bi-weekly waste collection in Sault Ste. Marie, the potential for future enhanced public education related to backyard composting and considerations in mandating clear waste disposal bags in the future. In addition, we provided a comprehensive summary of 3R's initiatives that are integral to the City's waste management plan.	Details pertaining to the existing waste diversion programs are included in Section 1.5 and details of the proposed enhancements that are expected to increase the residential waste diversion rate from approximately 30% to approximately 50% are included in Sections 2.3.1 and 4.1.1.
A local resident questioned what	We provided a comprehensive summary of current and proposed future 3R's	Details pertaining to the existing waste diversion programs are included in

Comments	Response	How Addressed in the EA and EA Reference
initiatives are planned to enhance diversion and the status of the proposed waste-to-energy facility.	initiatives that are integral to the City's waste management plan. We also explained that the waste-to-energy project has been delayed on several occasions and the contract with the City has been amended at the request of the vendor. In addition, in December 2015 the vendor was ordered into receivership and ultimately the contract with the City was terminated.	Section 1.5 and details of the proposed enhancements that are expected to increase the residential waste diversion rate from approximately 30% to approximately 50% are included in Sections 2.3.1 and 4.1.1. The City terminated the agreement with Elementa when the company entered receivership in 2015 – Section 1.6.

9.5 Aboriginal Communities and Agencies

Aboriginal consultation was identified as an important element of the overall consultation plan. In addition to the consultation activities described elsewhere in this document, focused activities were undertaken to engage Aboriginal Communities and associated Agencies that may have an interest in the project. Activities included correspondence (i.e. notices, newsletters, letters and emails), telephone calls, meetings and visits to drop off project materials throughout the progress of the study. Invitations were issued for all public consultation events and offers were made to undertake separate consultation events in neighbouring Aboriginal Communities. The Aboriginal Communities contacted generally provided input relevant to their respective communities or community members while Agencies contacted generally provided guidance regarding process requirements and the respective mandates of their Agency. The Aboriginal Communities and Agencies that were consulted consisted of the following:

- Batchewana First Nation;
- Garden River First Nation;
- Historic Sault Ste. Marie Metis Council;
- Metis Nation of Ontario Historic Sault Ste. Marie Traditional Territory Consultation Committee;
- Missanabie Cree;
- Anishinabek/Union of Ontario Indians;
- Association of Iroquois and Allied Indians;
- Ministry of Aboriginal Affairs; and
- Indigenous and Northern Affairs Canada.

The approach taken in developing the Aboriginal Community contact list included input from relevant Government Agencies, a review of Aboriginal Communities that are proximal to the project and historical Aboriginal Community engagement undertaken on other City of Sault Ste. Marie infrastructure projects. The approach included a review of available online mapping together with a review of land claims in the project area (Note: none were identified that would impact this project).

The steps taken to solicit input from Aboriginal Communities are summarized below and complete details are included in the consultation report included in **Appendix O**.

Throughout the project regular contact was maintained with Aboriginal Communities. The following summarizes the key methods of exchanging information that occurred during the project:

- ***Project Introduction and Consultation Strategy*** - Letters were mailed in January 2007 to Aboriginal Communities (ie. Batchewana First Nations, Garden River First Nations, Missanabie

Cree First Nation and the Métis Nation of Ontario) requesting to meet to discuss the EA and consultation strategies. Meetings were held in March/April 2007 with Batchewana First Nation, Garden River First Nation, the Missanabie Cree First Nation, and the Métis Nation of Ontario. Subsequent meetings were also held with Garden River First Nation and Batchewana regarding consultation strategy.

- ***Public Input Session Notification*** – First Nation Community members were invited to all public input sessions. Hardcopy and digital notices were distributed to all First Nation communities. Requests were made to post notices in prominent locations in their communities.

- ***Aboriginal Public Input Sessions*** – Offers were extended to conduct dedicated sessions in Aboriginal Communities at key points during the study process. A Public Input Session was held on August 9, 2007 in Garden River First Nation to obtain input on the alternatives being considered and the evaluation criteria as presented in the "Alternatives To" Working Draft (refer to Section 9.4.2 and Appendix O for further details). An offer was made to hold similar sessions in other Aboriginal Communities.

- ***Progress Updates*** – The project team issued project updates to Aboriginal Communities on an ongoing basis and also attended Band Council and Committee meetings.

A summary of the input received from each of the Aboriginal Communities and Agencies is presented in Tables 9.9 to 9.12. A complete inventory of all contacts with each of the Aboriginal Communities and Agencies is included in **Appendix O**.

Table 9.9: Summary of Input from Batchewana First Nations

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
March 19, 2007- Meeting with BFN to update Chief on EA status and to solicit input on a preferred consultation strategy.	Chief Sayers expressed his appreciation for updating him and explained that he cannot speak on behalf of Council. Noted the current meeting should not be construed as consultation and requested that Council be given an opportunity to review the Terms of Reference. Chief Sayers suggested a submission be made to Chief and Council requesting input regarding an effective consultation strategy.	R.Talvitie explained that the ToR was approved by the Ministry in Sept. 2005 and there is flexibility incorporated in the document. The EA process is intended to be responsive to issues and concerns raised. Suggested a distinct PIC in BFN may be advantageous. ToR was forwarded to Chief and Council for review. Encouraged BFN input on an effective consultation strategy.	Specific BFN input related to the meeting and discussions was not provided but representatives of BFN did participate in the June 2007 public input session that followed this meeting. Input received at that event is summarized in Section 9.4.1.
June 26, 2007- Public Input Session No. 1- First public open house to provide updates on diversion improvements and to discuss "Alternatives To" and criteria to be	Representation from BFN attended the open house – comments and input received at the open house are included in Section 9.4.1.	Refer to Section 9.4.1.	Refer to Section 9.4.1.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
used in the evaluation.			
July 31, 2007- Meeting with BFN (Chief Sayers and Agnes Lidstone) to confirm the preferred consultation strategy. The following working DRAFT reports were provided for Community input; "Waste Quantity Projections and Environment Profile" and Alternatives to the Undertaking". In addition, sample documents pertaining to the planned August 9th Garden River First Nation Open House were provided.	Their Community has an inherent responsibility to look after the environment, in particular lands and waterways that are included in their traditional territory. Chief Sayers expressed interest in partnering with the City. Chief Sayers outlined a different approach to consultation. A Band Council briefing note will be prepared by A. Lidstone outlining the project status and the input required. The project will be included on the Aug. 21, 2007 Band Council agenda (public forum). Subject to Band Council approval BFN will proceed with a community brainstorming session. Through this session BFN will identify a preferred alternative from their perspective together with the rationale for the selection. This information will be forwarded to the City by the end of Sept., 2007	The City and/or consultant staff would be pleased to attend Band Council meeting or act as a resource for any follow-up consultation activities. Once BFN input is received, the project team will be reviewing all of the input received and will identify a preferred alternative with due consideration of all of the input.	The input promised was not received despite numerous follow-ups. Project notifications and public input session invitations continued to be distributed to BFN.
Sept. 26, 2007- Correspondence - Email from BFN (Agnes Lidstone) regarding the actions she has taken.	Submitted report to BFN Council on Aug. 22, 2007 with recommendations and to date Council has not dealt with the report. Awaiting Council direction.	We will await further input.	No further input was received despite numerous follow-ups. Project notifications and public input session invitations continued to be distributed to BFN.
May 17, 2017 - **Correspondence – Letter to BFN (Danny Sayers) from R. Talvitie notifying and requesting input on the Draft EA. Provided the Notice of the Draft EA and requested the Notice be shared with BFN community members. Also indicated that a hard copy of the Draft EA Report would be**	BFN notified the City that further discussions are necessary in order for BFN to endorse the subject project and provided input on how they expect their members to be engaged in consultation. BFN noted that they require funding in order to engage the services of a third-party to review the Draft EA document and confirm the proposed expansion will not impact the Treaty Rights and Interests of BFN nor impact the land, groundwater, flora, fauna or other environmental features of Rankin Reserve 15D. A preliminary meeting was	No further communication.	No further input was received.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
delivered to the BFN Band Office prior to May 24, 2017 and it was requested that this document also be made available to BFN community members. Notification was also provided that the document could be viewed on the City's website and link to the website was provided. An offer was also made to meet in person to discuss project details. Response letter dated August 2, 2017 from Chief Dean Sayers (BFN) to Don Elliott (City of Sault Ste. Marie).	requested and it was noted that this meeting will not be viewed by BFN as part of the consultation record with regard to their participation in this project.		
February 16, 2023 - **Correspondence – Email to BFN (Dan Sayers) from R. Talvitie notifying BFN of the City's intent to submit the EA documentation to the Ministry in 2023 and requested a meeting with BFN to further engage BFN in a meaningful discussion regarding the EA and to ensure the rights and interests of BFN are protected and respected.**	Telephone call received from Dan Sayers (BFN) where next steps were discussed. BFN identified that funding is required in order to engage the services of an external firm to review the Draft EA document. It was suggested that BFN be provided with a copy of the current documentation (i.e., Solid Waste Management Draft EA Report) to establish the scope of services that would be required by a third-party to review and provide opinion on the Draft EA.	BFN was emailed a link to the City's webpage for this project where they could access the Draft EA report.	No further input was received.

Table 9.10: Summary of Input from Garden River First Nations

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
April 3, 2007-TSH (Rick Talvitie) and City of SSM (Susan Hamilton Beach) attended GRFN Council meeting to provide an update on the status of the EA and discuss consultation strategies and opportunities for members to provide input.	Has the City approached GRFN to solicit their interest in participating in the Household Special Waste Facility?	R. Talvitie and S. Hamilton Beach noted that the City's Waste Diversion Supervisor contacted many area Municipalities and First Nations. GRFN had been contacted previously and the City was willing to contact GRFN again.	HHW is accepted at the site from adjacent communities including Aboriginal Communities. HHW transitioned to a Producer responsibility framework in Oct, 2021. This Waste Management element is outside of the City's control.
	Can GRFN take advantage of the City's recycling programs?	R. Talvitie explained that the City contracts the collection and processing of recycling materials to a private contractor. It was noted that there are several contractors that would likely be willing to provide pricing to GRFN for collection and processing of their recyclables.	Blue box recycling programs are transitioning to a Producer responsibility framework – Sections 2.3.1. and 4.1.1.
	GRFN is located downstream of the Root River which is situated adjacent to the landfill, are there appropriate water quality monitoring programs in place to safe guard the water quality?	R. Talvitie and S. Hamilton Beach explained that a leachate collection system is in place on the site which collects and pumps leachate to the City's sewage treatment plant where it is treated prior to discharge. There is an extensive network of ground water monitoring wells, and surface water quality is also monitored adjacent to, upstream and downstream of the site. In addition, an extensive monitoring report is prepared annually which documents the findings of the sampling programs.	Sections 7.2.2 and 7.2.3 address the impact assessment related to ground and surface water resources and highlight the proposed mitigation and anticipated net effects. Sections 8.1.1 and 8.1.2 describe the proposed monitoring programs to assess and monitor the effectiveness of the proposed mitigation.
	How are tires managed by the City?	It was noted that the City accepts non-commercial tires at the landfill site for a fee and they are removed by a Contractor for recycling.	The existing diversion programs are addressed in Sections 1.5 and 4.1.1. Tires are accepted at the landfill site.
August 9, 2007-Public Open House No. 1 for GRFN in order to discuss the alternatives being considered, the criteria used to compare the alternatives, and select a preferred approach. Information on waste quantities,	Comments and input received at the Open House are included in Section 9.4.2.	Refer to Section 9.4.2.	Refer to Section 9.4.2.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
the alternatives and the evaluation criteria were provided in the form of two working papers which were also made available online and at the GRFN Band Office. Attendees were also encouraged to contact TSH and the City of Sault Ste. Marie with questions or concerns.			
June 8, 2010- AECOM (Rick Talvitie) and City of SSM (Susan Hamilton Beach) attended GRFN Council meeting to provide an update on waste management planning, provide an overview of the EA process, review the solid waste management alternatives considered during the EA process; present preferred waste management alternative, and provide next steps in the EA process.	Concerned with impacts to surface water (Root River) which flows through GRFN. Suggested that the City/AECOM contact Sue Chiblow of Chiefs of Ontario to assist in identifying potential concerns with Environmental projects.	Environmental controls were explained such as leachate collector, groundwater and surface water monitoring, aquatic biological community sampling and methane gas collection system. Contacted Sue Chiblow as requested.	There is an annual Monitoring Report that is prepared for this site that includes a robust surface water monitoring program with sampling locations upstream, adjacent to and downstream of the landfill site. Sampling is undertaken in the spring, summer and fall and compared to Provincial Water Quality Objectives. These reports can be provided if desired. Sections 7.2.2 and 7.2.3 of the EA address the impact assessment related to ground and surface water resources and highlight the proposed mitigation and anticipated net effects. Sections 8.1.1 and 8.1.2 describe the proposed monitoring programs to assess and monitor the effectiveness of the proposed mitigation
July 28, 2010- AECOM (Rick Talvitie) and City of SSM (Susan Hamilton Beach) met with Sue Chiblow, Chiefs of Ontario to discuss status of EA, environmental controls, identify concerns, and	S. Chiblow questioned why purge wells were not located along the southeastern portion of the landfill site? S. Chiblow acknowledged that the water quality is top of mind with GRFN as it is used for both sustenance and recreation. Concerned with *E-*	The horizontal leachate collector has been installed in this area in lieu of purge wells in the southeastern portion of the site. The collector has proven to be more effective than the purge wells. Invitation had been extended to First Nation Communities to participate in Source Water Protection Planning initiatives	Sections 7.2.2 and 7.2.3 address the impact assessment related to ground and surface water resources and highlight the proposed mitigation and anticipated net effects. Sections 8.1.1 and 8.1.2 describe the proposed monitoring programs to assess and monitor the effectiveness of the proposed mitigation.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
address the concerns of GRFN.	*Coli* levels in surface water. Questioned whether First Nation Communities have been invited to participate in Source Water Protection Planning initiatives?	and financial assistance has been offered.	
	S. Chiblow questioned how hazardous wastes such as pharmaceuticals are managed at the landfill site?	The City established a HHW depot in 2001. The site accepts various hazardous wastes and has been very successful in terms of the quantity of waste that has been diverted from the landfill site. GRFN had been contacted to participate.	The existing waste management components are discussed in Section 1.5.
	S. Chiblow provided an overview of the governing structure for First Nations communities. S. Chiblow questioned what level of consultation has occurred between the City and GRFN regarding Waste Management EA?	Provided an overview of the work completed to-date including consultation with the ToR document and various points of contact during the EA process. Historical summary of First Nations involvement in the process was subsequently forwarded to S. Chiblow.	EA Terms of Reference and Summary of First Nation Consultation appended to the EA ToR. Refer also to the summary table in Appendix O which identifies all contacts with GRFN during the EA.
	S. Chiblow noted that First Nations have developed an EA tool kit which addresses both traditional knowledge and technical information. S. Chiblow to forward a CD of the tool kit. Training for EA tool kit proposed for Fall 2010. S. Chiblow noted First Nations have prepared a Water Declaration which may be of assistance with respect to water quality concerns. S. Chiblow to forward copy.		Sections 7.2.2 and 7.2.3 address the impact assessment related to ground and surface water resources and highlight the proposed mitigation and anticipated net effects. Sections 8.1.1 and 8.1.2 describe the proposed monitoring programs to assess and monitor the effectiveness of the proposed mitigation.
	S. Chiblow questioned if the City is involved in the Great Lakes Water Quality Agreement? S. Chiblow provided next meeting date for this initiative. S. Chiblow noted that a First Nations conference is planned for October 2010 regarding water quality and she will look into possibility of City participation in the conference.	SHB was unaware if the City is currently participating in the Great Lakes Water Quality Agreement. SHB highlighted the improvements made with wastewater treatment and offered to conduct a tour of the SSM WPCP for various GRFN staff if desired.	

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
	S. Chiblow noted that visual aids in newsletters are a helpful approach to reaching First Nations members. S. Chiblow requested copy of a current project schedule so the First Nations community can understand the various tasks and activities that will be ongoing.	Noted that community newsletter was used in past to advertise GRFN Open House. Schedule provided.	

Table 9.11: Summary of Input from Missanabie Cree First Nations

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
March 26, 2007- Meeting between TSH (Rick Talvitie), City of SSM (Susan Hamilton Beach) and Missanabie Cree representative (Lesley Gagnon) to provide an update on project progress and discuss strategies for outreach to members	L. Gagnon noted that active enforcement (fines) of the waste diversion programs should be considered. L. Gagnon pointed out that the residents in her area violate the two bag/container limit and waste is still collected without tags. The issue of Tim Horton's cups found littered along streets and should be addressed was noted. It was identified that many items are disposed of that could be re-used and the City should develop a re-use centre. Other items should be recycled or banned (ie: Styrofoam cups).	R. Talvitie and S. Hamilton Beach indicated that the City does have a continuing education program that is implemented by collection crews. R. Talvitie noted that every effort is made to enforce the collection by-law however crews sometimes have difficulty identifying the number of residential units that set out waste so it is collected anyway. Tim Horton's has implemented recycling programs and participate and sponsor community clean-up events. However more can be done to educate the public particularly that the cups are recyclable. S. Hamilton Beach noted that regulations exist that prohibit scavenging, however Habitat for Humanity operates a re-use centre within the City and public awareness could be increased through advertising. The City is moving forward with the implementation of a single-use plastics ban in support of the federal government's proposed Single-Use Plastics Prohibition Regulations (Dec, 2021). Single-use plastics include plastic bags, straws, coffee stir sticks, soda and water bottles and food packaging. The City is	Section 1.5 highlights the numerous elements of the overall diversion strategy including landfill bans, curbside disposal limits, a re-use centre, etc. Section 2.3.1 notes that additional materials may be considered as programs transition to the Producer responsibility framework – the City will no longer have control. Details of the proposed enhancements are expected to increase the residential waste diversion rate from approximately

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
		implementing the single-use plastics ban in 2022-2023. R. Talvitie noted that the WDO is considering ways of recovering some of the disposal costs for packaging materials that are not recyclable. R. Talvitie pointed out that diapers are composted in some larger municipalities.	30% to approximately 50% are included in Sections 2.3.1 and 4.1.1.

Table 9.12: Summary of Input from Metis Nation of Ontario

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
March 26, 2007-Meeting between TSH (Rick Talvitie), City of SSM (Susan Hamilton Beach) and Metis Nation of Ontario representative (Brent McHale) to provide an update on project progress and discuss strategies for outreach to members.	B. McHale noted that service in the outlying areas and leachate management are issues that should be addressed in the EA. B. McHale suggested he and the President of the Metis Nation of Ontario attend the proposed Public Input Session.	R. Talvitie responded that a separate study was initiated to address waste management in the Sault North Planning Area. Leachate management will be addressed in the study process. Newsletter was forwarded with particulars regarding Public Input Session and suggested advertising the event in the Metis Nation of Ontario newsletter and website.	Section 7.2.2 address the impact assessment related to groundwater resources and highlights the proposed mitigation and anticipated net effects. Sections 8.1.1 describes the proposed monitoring programs to assess and monitor the effectiveness of the proposed mitigation
April 5, 2016-Met with representatives of Metis Nation of Ontario to provide overview of project.	The process has changed, and a consultation committee has been formed. Jesse Fieldwebster requested that information be forwarded to the Committee for the consideration.	It was noted the team met with local representatives in the past and have continued to deliver project information and updates to them. Requested information was forwarded to the committee as requested.	
April 13, 2016-Correspondence – Email from Metis Nation of Ontario (Jesse Fieldwebster) requesting to meet with the Historic SSM Consultation Committee.	The Historic SSM Consultation Committee reviewed the project and would like to meet.	Meeting confirmed for April 22, 2016	
April 22, 2016-Meeting with MNO Consultation Committee (Yvonne Jensen - Metis North Channel Council President; Ernie Gatien - Historic SSM Metis	Will native tree species be used for the reforestation that will be undertaken at the time of site closure? Have contaminants been identified that will be	Reforestation will be undertaken with similar species. Monitoring of ponds is identified and shall include:	Section 7.3.4 addresses reforestation. Section 7.2.3 address the impact assessment related to surface water

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
Traditional Territory Region 4 Councillor; Art Bennet - MNO Region 4 Captain of the Hunt; Kim Powley - President MNO Historic SSM Metis Council; Jesse Fieldwebster – MNO Consultation Assessment Co-ordinator) to discuss the Waste EA and update on the project.	monitored in the storm water ponds?	• TSS, 5-day biochemical oxygen demand (BOD), alkalinity, total ammonia nitrogen (TAN), nitrate, nitrite, phenols, chloride, total phosphorus, total metals (barium, boron, cadmium, total chromium, copper, lead and zinc) • *In-situ parameters*: temperature, pH, conductivity, dissolved oxygen (DO) • *Calculated parameters*: un-ionized ammonia	resources and highlights the proposed mitigation and anticipated net effects. Sections 8.1.2 describes the proposed monitoring programs to assess and monitor the effectiveness of the proposed mitigation
	Can a copy of the Annual monitoring report be provided for review? Can a summary of the annual groundwater monitoring results be forwarded to MNO? MNO is interested in a review of the EA document when available. Comments were made that it was evident the City is being proactive. Acknowledged that a signoff from MNO on this project would be in the best interest.	Copy provided A presentation prepared for the Environmental Monitoring Committee each year and a copy of the 2014 Annual Monitoring Report were provided. Will be provided. Agreed. A signoff from MNO was provided	Signoff incorporated in Appendix O.

9.6 Elected Officials and Agencies

In addition to the consultation activities described elsewhere in this document, focused activities were undertaken to engage Elected Officials and Review Agencies that may have an interest in the project. Elected Officials and staff at the Municipal level and numerous review agencies at the provincial and federal levels were included on the project contact list and were kept apprised of the project progress as the study evolved (refer to the contact list included in **Appendix O** for details). The Agencies generally provided guidance regarding process requirements and the respective mandates of their Agency.

A summary of the input received from Elected Officials and Review Agencies is presented in Table 9.13. A complete inventory of all contacts with Elected Officials and Review Agencies is included in **Appendix O**

Table 9.13: Summary of Input from Elected Officials and Public Agencies

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
Ontario Realty Corporation (ORC) / Infrastructure Ontario (IO)			
June 15, 2010 – Correspondence- Letter from ORC representative (Lisa Myslicki) to Susan Hamilton-Beach acknowledging receipt of May, 2010 Notice of Public Input Session and outlining ORC's interest in the project and requesting mapping of the study area.	Interested in any potential impacts to ORC-managed property. Requested copy of Draft EA report for review, comment and discussion if project directly affects any ORC managed property. Requested mapping showing the project location to confirm whether ORC has any properties in the vicinity of the proposed project.	Have not identified any required land acquisitions. As we continue with this process we will be identifying area lands that may be impacted by a site expansion. As we get further into this process we will inventory the potentially impacted land owners. Should we identify IO lands that may be impacted we will provide relevant plans and details of the various alternatives and potential impacts for your consideration.	Noted at several locations in the EA that the proposed project is to be undertaken within existing City-owned properties (refer Section 1.3). The proposed project includes a contingency to expand the contaminant attenuation zone (CAZ) to the south-west of the disposal footprint if needed in the future. (Note: City has proactively purchased three residential properties southwest of the landfill and is currently expropriating a fourth to enhance buffer lands and improve groundwater compliance). No ORC managed properties are included in the contingency scenario (refer to Section 8.3).
July 13, 2011 - Correspondence Letter from Infrastructure Ontario (IO) representative (Lisa Myslicki) to R. Talvitie and S. Hamilton-Beach acknowledging receipt of April, 2011 Notice of Public Input Session and outlining IO's interest in the project and requesting mapping of the study area.	Interested in any potential impacts to IO-managed properties. Requested copy of Draft EA report for review, comment and discussion if project directly affects any ORC managed property. Requested mapping showing the project location to confirm whether IO has any properties in the vicinity of the proposed project.	Have not identified any required land acquisitions. As we continue with this process we will be identifying area lands that may be impacted by a site expansion. As we get further into this process we will inventory the potentially impacted land owners. Should we identify IO lands that may be impacted we will provide relevant plans and details of the various alternatives and potential impacts for your consideration.	Noted at several locations in the EA that the proposed project is to be undertaken within existing City-owned properties (refer Section 1.3). The proposed project includes a contingency to expand the contaminant attenuation zone (CAZ) to the south-west of the disposal footprint if needed in the future. . (Note: City has proactively purchased three residential properties southwest of the landfill and is currently expropriating a fourth to enhance buffer lands and improve groundwater compliance)No ORC managed properties are included in the contingency scenario (refer to Section 8.3).
Ministry of Tourism and Culture			
April, 2011 – Correspondence Notice of Public Input Session – Project update and information regarding the upcoming April 19, 2011 PIC No. 3 which is intended to solicit input and feedback on	Ministry of Tourism and Culture (MTC) expressed an interest in the conservation of cultural heritage resources including archaeological resources, built heritage and cultural heritage landscapes and requested notification of future opportunities for input as the study progresses.	Cultural heritage resources are considered in the EA.	Proposed expansion is confined to existing City-owned site much of which has been disturbed. Cultural heritage resources are considered in the evaluation of options in Section 5.2 and addressed for the preferred option in Section 7.3.1.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
the alternative approaches to landfilling residual waste (i.e. expand existing disposal site versus a new site.			
May 5, 2011 - Correspondence – Notice of Public Input Session – Project update and information regarding the upcoming March 6, 2012 PIC which is intended to solicit input and feedback on the alternative approaches to expanding the existing disposal site.	Provided "Screening for Impacts to Built Heritage and Cultural Heritage Landscapes" form to identify/assess potential heritage resources within the study area. Provided "Criteria for Determining Archaeological Potential" form in order to determine whether an archaeological assessment by an archaeologist licensed under the Ontario Heritage Act will be required for this project.	Cultural heritage resources are considered in the EA. A Stage 1 and Stage 2 Archaeological Assessment was completed for the EA study	Impact assessment report was completed for the preferred option which is included as an Appendix to the EA and summarized in Section 7.3.1. Archaeological assessment report was completed which is included as Appendix H to the EA and summarized in Section 7.3.1.
Sault Ste. Marie Region Conservation Authority			
June 5, 2012 - Correspondence – Letter Rhonda Bateman, Sault Ste. Marie Region Source Protection Committee (SPC) from R. Talvitie reiterating points made during a March 5, 2012 presentation to the Source protection Committee and addressing comments identified in a letter from the SPC dated April 12, 2012.	Consideration should be given by the City of SSM and the PUC to petition the expansion of the current Provincial Groundwater Monitoring Network (PGMN). This expansion could allow for additional groundwater quality and quantity monitoring away from the landfill. This additional monitoring capability would increase the predictability of any potential threat of off-site contamination and allow the operators of the municipal drinking water distribution network to have ample notice of any impending issues.	The City has an extensive network of monitors within and immediately adjacent to the landfill site. We agree that it would be beneficial to establish monitors elsewhere within the City and upstream of PUC's production wells to assess groundwater quality changes, trends and potential impacts. This would allow for early identification of potential problems from a wide variety of potential sources of contamination and allow adequate lead time to take action. We fully support petitioning the expansion of the PGMN. We will continue to keep the SPC informed of project progress and future opportunities for public input.	Historical groundwater protection and monitoring results are incorporated in the annual monitoring reports and the proposed groundwater protection enhancements, future monitoring and contingency measures are addressed in Sections 6.6.3, 7.2.2, 8.1.1 and 8.3
Ministry of Environment			
June 4, 2010 and September 8, 2010 - Correspondence – Email from Betsy Varghese (Dillon Consulting) to MECP representative (Edward Naval)	Requested information on updates on the progress of the SSM EA for Solid Waste Disposal.	We are currently in the process of drafting the alternative methods report and we are also preparing a comprehensive public consultation plan. We will be forwarding the public consultation plan to you.	N/A

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
providing minutes for a March 25, 2010 EA meeting. Response email provided by Edward Naval requesting updates on the progress of the EA. Response email provided by Rick Talvitie advising that he will forward the requested information and encouraged to review the City's website which includes a number of completed reports and information on the most recent public consultation event with link provided.		We will also provide you with a comprehensive update regarding the project status at that time. A link to the City of SSM's website of completed project reports and information on the most recent public consultation event was provided and advised that hardcopies of any of the reports could be provided if requested.	
Ministry of Natural Resources and Forestry			
June 20, 2017 - **Correspondence – Email from Marjorie Hall (MNRF) to Rick Talvitie** providing comment on the technical information within the Draft EA document with respect to **natural heritage screening for known critical biological values associated with the lands proposed for the landfill expansion** and r**esponse email from Rick Talvitie dated June 21, 2017.**	The screening did not identify any known critical biological values. The MNRF provided a SSM MNRF District Biological Information Package of species that have the potential to have habitats in the area and that the MNRF should be notified if any of the species are identified at the site to discussion mitigation measures and if a permit under the Endangered Species Act is required.	Noted that the information provided would be forwarded to the expansion biology team.	N/A
Ministry of Northern Development and Mines			
June 23, 2017 - Correspondence – Letter from Stephanie Rocca (MNDM) to Rick Talvitie providing comment on the technical information within the Draft EA document with respect to geology and mineral resource potential, mining lands and abandoned mine hazards.	No concerns with respect to mining lands in the area. No concerns from the Abandoned Mines Rehabilitation program. No concerns with respect to the geology or mineral resource potential in the area.	N/A	N/A
Ministry of Transportation Ontario			

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
June 23, 2017 - Correspondence – Email from Rebecca Henderson (MTO) to Rick Talvitie providing comment on the Draft EA document; Response email from Rick Talvitie dated June 23, 2017.	No comments at this time. Would like to remain on the contact list.	Acknowledged the MTO would remain on the contact list for the EA.	N/A

9.7 General Public

Ongoing communication and updates for the general public were undertaken throughout the study process. As the study evolved the contact list was updated to include all individuals that expressed an interest in the project. Input was gathered from individuals through various means and methods including direct dialogue during public consultation events (open houses, discussion groups, presentations – refer to Sections 9.4.1 to 9.4.6 inclusive), direct correspondence (typically email), comment sheets, questionnaires, and workbooks. Interest in the project was most prevalent from property owners in the vicinity of the site.

A summary of the input received from the General Public outside of the Public Consultation Events is presented in Table 9.14. A complete inventory of all contacts with the General Public is included in Appendix O.

Table 9.14: Summary of Input Received from the General Public

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
June 7, 2010 and July 23, 2010 - Correspondence – Email from a local citizen to AECOM and City of SSM dated June 7, 2010 regarding adding his email address to the mailing list for this project and outlining a series of questions regarding the project. Response email provided to R. Rattle from R. Talvitie dated July 23, 2010 addressing Mr. Rattle's questions and concerns and providing a link to the City of Sault Ste. Marie website to obtain a number of background documents related to previous waste management planning work and work completed recently	Are the Terms of Reference for this study/project available? Is there a report describing this project or any results to date available? Has there been a gap between now and the last work on this project? Is this EA only considering waste once it enters the waste stream and whether there's a role in this study/project to consider the City's capacity to reduce the generation of waste. Was a role for composting considered?	Yes, posted on City website (and provided the link). Yes there are a number of background reports (refer to email for detailed response) in Appendix O. Yes there has been a gap (refer to email for detailed response) in Appendix O. One of the alternatives included in the EA is enhanced Waste Division. This alternative reflects diversion from disposal through 3R's initiatives. (refer to email for detailed response) in Appendix O. Yes (refer to email for detailed response) in Appendix O.	Included at the end of this document and preceding the Appendices. Included as part of EA Reference page and included as appendices. Diversion is discussed extensively in Sections 1.5 and 2.3.1. The City has included some landfill bans and the Province is taking action through their Circular Economy initiative. The plans related to composting are included in Section 2.3.1.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
within the EA process. In addition, provided May 31, 2010 Report to Council which provides a summary of the waste management planning work completed over the last decade.	What exactly is the project? Are the current activities part of a larger project? The next steps indicates your team will be evaluating landfilling options. Has the decision to pursue this option been finalized, or are those landfilling options to be evaluated for decision making purposes? What is the length of the Elementa contract in which the City has agreed to 12,500 tons annually?	(Refer to email for detailed response) in Appendix O. Within the context of the EA a decision has been made to manage waste through enhanced waste diversion and landfilling of residual waste (refer to email for detailed response) in Appendix O. The duration of the contract is ten years with an option to extend it for an additional ten years.	The project undertaking is described in Chapter 6. The rationale for the selection of increased waste diversion and landfill is documented in Chapter 4. Elementa contract was terminated as noted in Section 4.1.2.
Correspondence – Email from R. Talvitie to Elementa Group representative (M. Wozny) responding to comments/questions in his email to City of SSM dated July 15, 2010. Also provided a link to the City of Sault Ste. Marie website to obtain a number of background documents related to previous waste management planning work and work completed recently within the EA process.	No comments received.	Explained the rationale for the inclusion of "High Heat Processes" as an "Alternative To" and referenced the detailed evaluation that is included on the City's webpage. Explained that the information presented at PIC No. 2 was a summary only and more detailed information evaluation criteria and rationale for assigned rankings is included in the Final Report. Suggested reviewing the information in the Final Report and advising if any of the assigned rankings require amending. Also highlighted the preferred "Alternative To" and the role Elementa is expected to play in the City's overall waste management plan.	The description and evaluation of the "Alternatives To" including high heat process is documented in Section 4.0 with the results of the evaluation included in Section 4.2.3. As noted in Section 1.6 Elementa became bankrupt in 2015 and the City subsequently terminated the agreement.
May 5, 2011 and May 27, 2011 - Correspondence – Email from A. Riopel to R. Talvitie dated May 5, 2011 regarding questions concerning	Do you know how much of our garbage is now going to Dafter, Michigan?	Very little residential waste is being exported to Michigan as a result of the voluntary agreement between Michigan Senators and the MECP	As noted in Section 2.2.2 a portion of the IC&I waste is being disposed of in Dafter Michigan but given the challenges with the border and lack of other nearby disposal

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
how much of the waste from the City of Sault Ste. Marie is disposed in Dafter, Michigan and waste diversion ideas.		that came into effect on January 1, 2011 (refer to email for detailed response) in Appendix O.	facilities in Ontario the City is planning to manage all locally generated non-hazardous solid waste.
Response email provided to A. Riopel from R. Talvitie dated May 27, 2011 addressing Mr. Riopel's questions and concerns and providing a link to a webpage on Canadian waste disposal in Michigan.	The local waste management company that we use in my business takes the garbage there.	The landfill in Dafter is owned by Waste Management.	
	How long have they been doing this?	Waste Management took ownership of the Dafter disposal site some 8 or 9 years ago.	
	How does that affect the graph about how much garbage we produce? Would some of the reduction demonstrated be related to this?	There is clearly some impact since they are exporting waste generated in our City and disposing of it elsewhere. However, based on our knowledge the quantity is relatively small.	
	We should be diverting 90% of our waste. This could be improved by stronger by-laws that make it illegal to put any recyclable, hazardous or compostable in the garbage. We could also make it so that you have to pay for every bag set out.	Although there have been significant successes achieved as the diversion rate has climbed from 9% to 30%, there is room for improvement. A Waste Management Business and Implementation Plan was prepared a number of years ago and an update is currently underway (refer to email for detailed response) in Appendix O.	Further commitments have been made in the EA to enhance residential waste diversion from approximately 30% to 50% by 2025 (refer to Section 2.3.1).
	Politically, it might be a hard sell but I can assure you that the rules in other cities and countries are much stiffer.	Yes there are many more restrictions/rules in other countries. The political arena is an important consideration which typically favours steady progress in lieu of dramatic changes over short periods of time.	There is a significant ongoing effort to reduce waste disposal. This is addressed in Section 2.3.1.
	We could also make plastic shopping bags illegal and force merchants to accept packaging and old appliances that were purchased there.	These are good ideas and areas where progress is being made. The current campaign to encourage the use of reusable bags in lieu of plastic shopping bags has been quite successful	The province is shifting towards a circular economy which includes extended producer responsibility as discussed in Section 2.3.1 and 4.1.1. The City is implementing a single-use plastics ban in 2022 in

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
		and many appliances are being recycled for scrap metal. There is always room for improvement and the City continues to support and implement changes to enhance diversion.	support of the Federal government's proposed Single-Use Plastics Prohibition Regulations (Dec., 2021) as discussed in Section 1.5 and 4.1.1.
May 29, 2012 - **Correspondence – Letter to Alex MacDonald from R. Talvitie addressing concerns raised from his comment sheet provided at the March 6, 2012 Public Input Session.**	What is the depth of the deepest well south of the leachate collection system?	See the attached ground water monitor details. Attached table includes details on all monitors at the landfill site and the monitors that have been highlighted in blue represent the 17 monitors located south and south east of the leachate collector. Each year several of these monitors are sampled and analysed. The table includes the depth of the monitors as well as the top and bottom elevations of the monitors. The deepest monitor in the area is 38.85m deep and this monitor also reaches the lowest elevation in this area (ie 230.33)	Details regarding existing monitors are included in the annual Monitoring reports.
	What is the maximum depth of the leachate collector?	The lowest elevation along the leachate collector is approx. 268m or a depth of approx. 6m.	The horizontal leachate collector is designed to straddle the water table. Details are included in the as-constructed records.
June 5, 2012 - Correspondence – Letter to Gord Acton, Wishart Law Firm from R. Talvitie in response to his letter dated March 30, 2012 expressing his client's (Mr. Caswell) concerns related to the proposed landfill expansion. It was identified that we also had an opportunity to discuss these concerns with Mr. Caswell at past public consultation events.	Concerns related to the safety of drinking water system.	Our response highlighted the leachate management controls, groundwater monitoring system and annual reporting completed for the existing site, and described the preferred expansion option and the proposed leachate management controls for the expanded site. Consideration of the safety of his drinking water supply will be investigated in detail in the next phase of the project (ie impact assessment for the preferred expansion	The proposed expansion includes a number of enhancements to build on the existing effective leachate management systems including landfill mining of a portion of the existing disposal footprint to incorporate a liner system at the base of the waste, lining of all new waste disposal cells, inclusion of a contingency to add a horizontal collector along the western side of the site to replace the purge well system if necessary. These items are addressed in Sections 6.3, 6.6.3, 7.2.2, 8.1.1 and 8.3. To further address this concern a private residential well sampling program is proposed

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
		option) and plan to consider mitigation options including the feasibility of extending the municipal drinking water distribution system. It was noted that we will continue to keep Mr. Caswell informed of the project progress and will continue to inform him of future opportunities for public input.	and included in Section 8.1.1.1 and a number of contingencies are included in Section 8.3 including the potential extension of the municipal water distribution system.
March 30, 2012 and June 6, 2012 - Correspondence – Email to Peter McLarty from R. Talvitie addressing various questions and concerns from his email dated March 30, 2012 including concerns regarding locating a landfill site on a groundwater recharge area, benefits of expansion, lining the older area of the site and advocating for composting and a waste-to-energy facility.	Would never recommend that a landfill be located on a significant groundwater recharge area.	The existing landfill site includes effective leachate collection and management features and the proposed expansion will provide an opportunity to enhance the existing controls (refer to email for detailed response) in Appendix O.	The effectiveness of the existing leachate management controls is addressed in the Annual Monitoring Reports. The proposed expansion includes a number of enhancements to build on the existing effective leachate management systems including landfill mining of a portion of the existing disposal footprint to incorporate a liner system at the base of the waste, lining of all new waste disposal cells, inclusion of a contingency to add a horizontal collector along the western side of the site to replace the purge well system if necessary. These items are addressed in Sections 6.3, 6.6.3, 7.2.2, 8.1.1 and 8.3. To further address this concern a private residential well sampling program is proposed and included in Section 8.1.1.1 and a number of contingencies are included in Section 8.3 including the potential extension of the municipal water distribution system.
	Expansion of the current site is more politically saleable than a new site. We will always require some form of landfill.	The conclusion to expand the existing site was reached through the EA process. A significant level of study has been completed to date (refer to email for detailed response) in Appendix O.	Consideration of a new site versus site expansion was contemplated and rationalized in Section 5.1 with the conclusions documented in Section 5.1.4.
	Allowing expansion of the present site allows us an opportunity to help lower the risk presented by the	Agree the expansion of the existing site will provide an opportunity to enhance groundwater	As documented in Section 5.1 there are benefits to focussing on expansion of the existing site which includes enhancing

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
	present landfill by ensuring ongoing monitoring of the present landfill operation, and providing an opportunity to partially cover the current footprint thus limiting the amount of infiltration from precipitation.	protection measures and reduce the overall risk associated with the site. The City will continue to monitor this site through its operating life and following its closure until the MECP is satisfied that no further monitoring is required.	leachate management features. The enhanced leachate management features and contingencies are documented in Sections 6.3, 6.6.3, 7.2.2, 8.1.1 and 8.3.
	Although costly and potentially hazardous to workers and the air, would recommend mining the current landfill (thus removing some of the current hazardous material) and placed a new liner under the old site.	Landfill mining is currently included in the preferred expansion strategy. Agree that there are nuisance and safety issues associated with the implementation of landfill mining. It has been successfully implemented elsewhere within the Province of Ontario and best management practices and lessons learned in other jurisdictions will be considered as part of the detail impact assessment. Care will be taken to mitigate nuisance and safety issues.	The addition of landfill mining is contemplated in Section 5.2.5 and although there are elements such as worker safety, odour and air quality that will require mitigation the long-term ground water quality benefits were considered to be important to the overall project. It is also recognized that nuisance impacts and safety will have to be carefully considered during implementation as outlined in Section 6.3.
	The City should push very hard to get either Elementa facility or another approved waste-to-energy facility.	The City has endorsed a waste supply agreement with Elementa to process at least the waste generated in the residential curbside program. It is unlikely that the City can entertain any other vendor offers until the agreement is satisfied or comes to an end.	As noted in Section 1.6 Elementa became bankrupt and the City terminated the agreement. The City could potentially entertain other private sector waste-to-energy offers in the future but our economies of scale and the business case for this type of technology may be challenged in our geographic location.
	The City should be pushing the Ministry to fast-track composting.	Under the current regulatory regime composting can be undertaken in the Province of Ontario and the City has a very successful open windrow leaf and yard waste composting program (refer to email for detailed response) in Appendix O.	As noted in Section 1.5 the City currently composts leaf and yard waste and has initiated the process to incorporate composting of biosolids and source separated organics as noted in Sections 2.3.1 and 2.3.3.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
Correspondence – Emails from a R. Rattle dated January 30, 2016 and February 22, 2016 to C. Taddo and R. Talvitie, and response emails from C. Taddo dated February 1, 2016 and R. Talvitie dated February 22, 2016 and March 21, 2016.	Requested copy of project Terms of Reference.	The Terms of Reference is available on the project website for download.	Terms of Reference appended at the end of this report and preceding the Appendices.
	What municipal supporting programs to increase waste diversion currently exist, are planned, what's the process to advance additional programs and how these connect to the municipal solid waste EA?	The City has been very diligent to promote, develop and enhance waste division programs and services that support the 3R's hierarchy: reduce, reuse and recycle and has complemented these programs and services with by-laws to encourage residents to divert waste (refer to email for detailed response) in Appendix O.	The existing waste management system and diversion programs are summarized in Section 1.5 and further commitments have been made in the EA to enhance residential waste diversion from approximately 30% to 50% by 2025 (refer to Section 2.3.1).
	Assume that the recently announced changes to waste-to-energy plant has had something to do with the EA input session? How has that change affected timing, capacity and interest in new City programs to divert waste through the 3R's.		Elementa became bankrupt in 2015 and the City terminated the agreement as noted in Section 1.6.
	Does the City still distribute backyard composters? Haven't seen any advertising or information from the City about these, their value to waste reduction or how to use/install them.	The City no longer distributes backyard composters.	The City has made significant commitments in the EA to increase residential waste diversion from approximately 30% to 50% as detailed in Section 2.3.1. This includes a residential source separated organic program.
Correspondence – Emails from Andre Riopel to R. Talvitie dated February 8, 2016 and February 9, 2016 and response emails from R. Talvitie to Andre Riopel dated February 9, 2016 and March 21, 2016.	Cost per ton for landfilling is approximately $100/ton so 2 x 50lb bags of garbage per week costs the City of SSM $20/week or $1,040/year in 2016? What will happen in 20 years assuming that the rate of inflation stays the same?	Quoted figure is based on a metric tonne and based on historical data. On average families are not disposing of 100 lbs/week. The estimated average cost per year for disposing of each person's waste is $29 or $116/year for a family of four. This includes what is set out curbside and hauled to the landfill's public drop off.	As noted in Section 4.2.2 a lifecycle cost approach was used to establish appropriate tipping fees to provide adequate revenues to cover the lifecycle costs of a landfill.
	To increase compliance with recycling, communities (Halifax)	Addressed the items raised and provided an overview of 3R's	The existing waste management system and diversion programs are

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
	have a clear bag policy to make sure no recyclables are put in the garbage. They also collect every second week to save costs.	initiatives in the City, Pay-as you-throw programs, organic waste and bi-weekly waste collection, clear bag policy, etc. (refer to email for detailed response) in Appendix O.	summarized in Section 1.5 and further commitments have been made in the EA to enhance residential waste diversion from approximately 30% to 50% by 2025 (refer to Section 2.3.1). The City uses a mechanical collection approach to address worker health and safety and hence clear bags are not suitable.
Correspondence – Email from Donald Caswell to R. Talvitie dated June 5, 2017 and response emails from Rick Talvitie to Donald Caswell dated June 6, 2017 and June 16, 2017.	If the drinking water supply, namely groundwater wells, of the businesses and residences east and south of the landfill become contaminated with pollutants associated with landfills (i.e., leachates, iron lead, hydrocarbons, etc., what contingency plans are in place to address this situation should it arise? The City should be proactive and extend the fresh drinking water supply to homes and businesses to the east and south of the landfill as they have done for the homes and businesses to the west and southwest of the site. Wells adjacent to landfill sites are at high risk of becoming contaminated.	The methodology used to protect groundwater will be enhanced for both the expansion areas and also for the southwestern portion of the existing site where landfill mining is proposed. A composite liner consisting of a geocomposite clay liner overlaid by a 1.5mm thick HDPE geomembrane and leachate collection system will be installed at the base of the waste in each of these areas to ensure that leachate generated within the mined and expansion areas is collected and directed to the City's sewage treatment plant. In addition, the City will continue to monitor groundwater quality within and adjacent to the site and plans to enhance the current monitoring program. The current program includes the sampling and analyses of groundwater sourced from approximately 40 monitoring wells within and adjacent to the site. The City is implementing a new residential well water monitoring program whereby volunteer residences will have their wells monitored annually and water samples will be analysed for the parameters included in the indicator and comprehensive list of	Leachate management is addressed extensively throughout the EA and is included in Sections 4.1.3, 4.2.2.2, 5.2.3, 5.2.5, 6.6.3 and 7.2.2. In addition proposed private water well quality monitoring program is planned and described in Section 8.1.1.1. A number of contingencies are included in Section 8.3 including the potential extension of the municipal water distribution system. Groundwater monitoring has been ongoing at this site for many years and the results are documented in an annual report. The monitoring program is addressed in Section 8.1.1 and contingency measures are included in Section 8.3.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
		Schedule 5 of the Landfill Standards. Should the landfill be shown to impact private wells, contingency measures have been included such as extending the municipal water system to residents east of the site, or the provision of alternative water supplies to adjacent and nearby affected properties.	
	What measures are going to be used to alleviate and mitigate the odour and methane gasses when proposed landfill mining begins? The last attempt at odour mitigation failed miserably when excavation of methane gas wells and leachate collection piping were carried out.	In order to mitigate the potential for landfill mining to generate odour impacts, an Odour Management Plan (OMP) supplement will be developed specifically for this activity to support the site OMP. The OMP will be finalized as the landfill mining program is designed and developed, and will include input from the contractor/landfill mining team and effective best management practices that have been implemented at similar sites. Some of the specific items that have been identified for the Odour Management Plan include completion of a pilot landfill mining program to characterize the type of waste and odour profile. Use of the information from this pilot to develop standard operating practices (SOP) for the full scale mining program; management of operations based on meteorological conditions (e.g., shut down during calm periods or specific wind direction); daily inspection program used to adjust and refine mining operations; bypass screening of waste where highly odorous material is	Potential odour impacts and mitigation are addressed extensively in the EA including Sections 5.2.5, 6.3, 6.6.6, 7.3.6, 8.1.4 and 8.4.

Description of Communication	Comments/Questions/ Issues	How Addressed	Where Addressed In EA and/or Status
		excavated; use of chemical and biological treatment to reduce significance of odour; use of periphery odour misting system; minimize size of active excavation; cover applied to excavated area at the end of the day; keeping local residents informed and responding to complaints; develop and implement a monitoring campaign for landfill mining. In addition, other significant planned improvements to mitigate odour as part of the planned expansion include the staged expansion of the landfill gas collection system as the footprint expands and the construction of a processing facility where biosolids will be processed in a controlled indoor environment with engineered odour control systems and the final product will be much less odourous.	

10.0 OTHER APPROVALS

Table 10.1 lists other potential approvals that may be required to expand the landfill and the EA documentation that could support these approval processes.

Table 10.1 Other Approvals

Approval (Acts, Regulations)	Component of the Undertaking Requiring Approval	Supporting EA Document
Environmental Protection Act	Landfill Expansion, Stormwater Management	Design & Operations report (Appendix C) Surface Water report (Appendix F) Hydrogeology report (Appendix E)
Ontario Water Resources Act	Stormwater Management	Design & Operations report (Appendix C) Surface Water report (Appendix F) Hydrogeology report (Appendix E)

Sault Ste. Marie Conservation Authority Permit	Developing in proximity to on-site watercourses.	Design and Operations Report (Appendix C) Surface Water report (Appendix F)
City of Sault Ste. Marie Zoning Amendment	Change to the site area.	Land Use report (Appendix J)

11.0 BACKGROUND STUDIES AND REPORTS

The City previously completed a Waste Management Environmental Assessment in 1984 which considered the potential to establish a new landfill site. Those study results are referenced in this EA. Furthermore, over a four-year period spanning 2000-2003, the City of Sault Ste. Marie developed a comprehensive Waste Management Plan which included a number of background studies and reports. Each of the reports is listed in **Table 11.1** below and can be provided either digitally or in hard copy format upon request.

Table 11.1 Background Studies and Reports

Study/Report Name	Date
Sault Ste. Marie Landfill Site Environmental Assessment	March, 1984
Current Waste Management System Summary	September, 2000
Waste Diversion System Components	February, 2001
Organic Waste Diversion Report	March, 2001
Residential Waste Composition Study – Summer/Fall 2000	March, 2001
Alternative Waste Diversion/Collection System Options	June, 2001
Revised Waste Collection and Disposal	July, 2002
Solid Waste Management Plan Business and Implementation Plan	February, 2003
Solid Waste Management Plan - Recommended Program and Fee Changes (2003 to 2006)	May, 2003
Solid Waste Management Plan - Recommended Changes to Waste Collection and Diversion in the Multi-Residential Sector	August, 2003

12.0 REFERENCES

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