



City of Sault Ste. Marie

Solid Waste Management Environmental Assessment Alternative Methods – Step 1 (Landfill Expansion versus Development of a New Landfill Site)

April, 2011 - Updated December, 2014

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LIST OF ABBREVIATIONS

EA	Environmental Assessment
HSW	Household Special Waste
IC&I	Industrial, Commercial and Institutional
LFG	Landfill Gas
MNR	Ministry of Natural Resources
MOE	Ministry of the Environment
SSM	Sault Ste. Marie
TOR	Terms of Reference

1. INTRODUCTION AND BACKGROUND

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, comprising of the City of Sault Ste. Marie, Prince Township and Batchewana First Nation's Rankin Reserve, over the next 20 to 40 years. 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 3R's hierarchy of reduce, reuse and recycle (see Section 1.2).

The City has implemented and/or promoted programs to divert blue and yellow box recyclables, electronic waste, styrofoam, used tires, leaf and yard waste, metals and municipal hazardous waste and has complemented these programs with by-laws to encourage residents to divert waste.

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 (MOE) in September, 2005.

As outlined in the EA TOR, the environmental assessment includes an evaluation of "alternatives to" or functionally different ways of addressing the need for additional waste disposal capacity; and an evaluation of alternative methods which are different ways of doing the same activity (e.g. alternative locations or designs).

The evaluation of "alternatives to" was completed and is documented in the report titled "Alternatives to the Undertaking", June 2010. The "alternatives to" considered by Sault Ste. Marie were: increased waste diversion, landfill, incineration/high heat processes, export and "do nothing". Based on the evaluation that was undertaken, the preferred alternative is increased waste diversion in combination with additional landfill capacity to manage waste until at least 2049. This combination of alternatives is cost efficient and the most flexible to address changes in waste streams and enhanced 3R's initiatives.

A high heat process is 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). The agreement is contingent on Elementa securing all necessary environmental and technical approvals and provides for processing of a portion of the residual municipal solid waste stream in Elementa's proposed steam reformation plant.

This Alternative Methods - Step 1 Draft Working Paper relates to the landfill component of the solid waste management plan. Following the “alternatives to” evaluation, the next step in the EA process is the identification and evaluation of alternative methods of landfilling. This can include both alternative locations and alternative designs.

The work undertaken in Step 1 of the evaluation of alternative methods for landfilling and the results are included in this report.

1.1 Background

In September 2000, the City initiated a four-phased Solid Waste Management planning process to provide direction on all aspects of solid waste management for the next 20 to 40 years. The plan was completed in 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.

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 approximately 35% in recent years.

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.

An overview of the current waste diversion programs is provided in Section 1.2.

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 on the disposal alternatives 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.

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. Since that time, work has focused on enhanced 3R's initiatives and completing this EA.

The above reports provide significant details regarding the background on the existing and future waste management system in the City. Public input was solicited in the preparation of these documents.

1.2 Overview of the City's Waste Management System

The population serviced through the City's waste management system is approximately 75,141 residents¹. 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. The City has completed a Waste Quantities Report (June 2010) which documents historical waste quantities and predicts future residual waste disposal quantities. 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 2020-21 based on the 2013 report.

The City has been very diligent to promote, develop and enhance waste diversion 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.



The City has been leading active campaigns to reduce the amount of waste that residents generate with initiatives such as the plastic shopping bags campaign. This initiative educates residents to reduce the amount of plastic bags generated and encourages them to shop with reusable shopping bags instead. The City also

¹ Stats Canada 2011 Census data

provides a discounted beverage price to patrons that bring their own refillable cups to some of its venues within the City.

In efforts 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.

Some of the recycling programs in Sault Ste. Marie have been established and refined to manage materials designated by the Ontario Waste Diversion Act such as blue and yellow box recyclables, used tires, waste electrical and electronic equipment and municipal hazardous or special waste. These programs are supplemented by other programs that collect and recycle non-designated materials such as styrofoam and plastic grocery bags.

In addition, the City strongly encourages the business sector to comply with recycling mandates and implements strong programs in municipal facilities and at public events. The City also initiated a fluorescent light program that targets local businesses and the public to drop off bulbs to the Hazardous Waste Facility so they can be safely transported to a recycling facility.

An overview of the waste diversion programs is provided below.

- The City offers an extensive curbside recycling program which services approximately 26,251 single family households². In addition the program services approximately 6,266 multi-residential units². 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 may change from a Municipal responsibility to a Stewards responsibility in the future. This change will impact the Municipality's ability to influence the future curbside diversion rate. A decision on the future management and operation of this program was expected late in 2010 but has been delayed indefinitely.
- It is estimated that approximately 12,100² backyard composters have been distributed to residents in years past. The City also collects leaf and yard waste bi-weekly throughout the growing season (i.e.: late April to early November) and composts the feedstock in open windrows at the landfill site on Fifth Line. The final compost is used on City projects by the City's Parks and Recreation Department.
- The City has banned leaf and yard waste and old corrugated cardboard (OCC) from the landfill.

² 2013 WDO Data Call

- The City has also established a permanent Household Special Waste Facility (HSW) at the Public Works yard. The facility has been operational since 2001 and has been effective in diverting household hazardous waste generated within Sault Ste. Marie and surrounding areas. The management and operation of the HSW program became a Stewards responsibility in July, 2010. The City continues to own and operate the facility under a contract with the Stewards but this may change in the future.
- 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. Tipping fees at the landfill were most recently increased early in 2011 to \$70/tonne and the gate fee was increased in 2012 to \$10/visit. In 2006 the City also reduced the permissible weight associated with the gate fee from 500 kg to 300 kg.
- Separation and diversion of clean wood waste and brush, white goods, metals, propane tanks, tires, and batteries is also completed at the City's landfill.
- A diversion event is staged by Clean North (a local environmental group) on an annual basis to facilitate the diversion of Christmas trees.
- Habitat for Humanity has established a ReStore for the sale of reusable household items and construction and renovation materials.
- A Community Recycling Depot was established in 2008. The Depot is operated by Community Living Algoma and accepts a broad range of electronics and styrofoam. Some products are accepted free of charge and others are accepted for a nominal fee.

Through these programs, approximately 11,329 tonnes of residential material was diverted from disposal in 2013. This represents a residential diversion rate of 35 4%.

The City has also initiated a Biosolids Management Study. The objective of the study is 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 Study is scheduled to be completed in early 2015.

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 has plans for the construction of 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 has been delayed on a number of occasions and the agreement was amended in 2013 to reflect a waste supply commencement date of January, 2016 in lieu of 2011. Construction of the facility was scheduled to be initiated in 2014, but no construction activity has been initiated yet.

1.3 Residual Wastes to be Managed

A report entitled *Waste Quantity Projections and Existing Environmental Profile* was also prepared in June, 2010. This report estimated the future waste quantities requiring disposal within the service area over a 40-year planning period (2010 to 2049). 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 waste water pollution control plants. **Table 1.1** shows the range of waste, by sector, that requires disposal in 2010 and 2049.

Table 1.1				
WASTE REQUIRING DISPOSAL				
	Residential (tonnes per year)	IC&I (tonnes per year)	Biosolids¹ (tonnes per year)	TOTAL (tonnes per year)
2010	22,519	42,343	10,393	75,255
2049	26,409	52,061	0	78,470

1 – It is assumed that all municipal biosolids will be diverted commencing in 2016.

Over the 40-year study period, the City of Sault Ste. Marie would require additional disposal capacity of approximately 2.33 million tonnes. This information will be used in the alternative methods evaluation to determine the space required in a landfill to accommodate this quantity of residual waste.

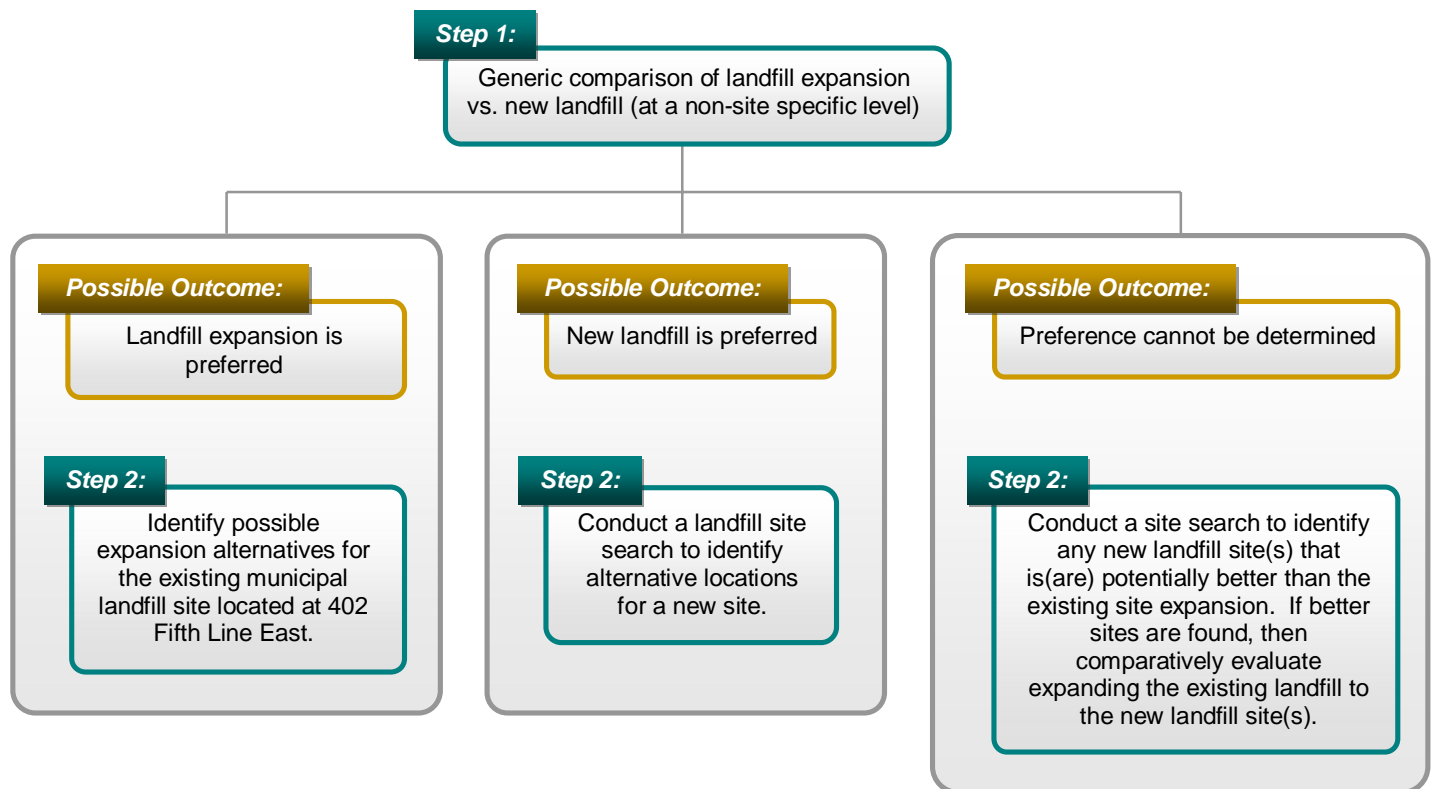
2. ALTERNATIVE METHODS EVALUATION PROCESS

As was noted in the EA Terms of Reference, the “alternative methods” (i.e. alternative landfill locations and designs) evaluation, will be carried out in two steps:

- Step 1** Generic non-site specific comparison of a new landfill to an expansion of an existing landfill; and
- Step 2** Identification of specific sites or expansion options based on the outcome of Step 1 and the comparison of these sites or options.

The key objective of the “alternatives methods” evaluation is to find an environmentally suitable location for the development of additional landfill capacity that is needed. The Ontario EA Act requires the consideration of a reasonable range of alternatives. The process proposed for this study will meet the above objective and the EA Act requirements.

Step 1 and Step 2 (depending on the various possible outcomes of Step 1) are shown in the flowchart below:



This paper presents the generic, non-site specific potential effects and differences of a landfill expansion and new landfill, and the proposed approach for the next step.

The primary purpose of Step 1 is to provide initial focus to the search for additional landfill capacity. Undertaking this first step recognizes 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 can help to reduce this anxiety.

This step explores in a generic, 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. Sault Ste. Marie has one operating landfill facility that is viewed as a valuable resource. A new site could be located in either a remote area (e.g. north of the Canadian Shield line), a more developed area such as the rural area within Sault Ste. Marie or within the Sault Ste. Marie urban envelope. These areas (remote, rural and urban) are shown in **Figure 1** which is a map taken from the City of Sault Ste. Marie's Official Plan.

The conclusion of this step will provide direction for Step 2 and the identification of specific sites. It is important to note that the Environmental Assessment process is iterative in nature and thus, the decision made in Step 1 does not necessarily preclude the consideration of other site options at a later stage of the EA process as more site specific information becomes available through the impact assessment (i.e., identification of potential environmental impacts and mitigation measures for the preliminary preferred site).

3. STEP 1 – GENERIC COMPARISON OF NEW LANDFILL TO AN EXISTING LANDFILL EXPANSION

The generic comparison of developing a new landfill site versus expanding an existing landfill site is being carried out at a general level of detail in this step. Step 1 considers the different types of areas within the City where a new landfill site could be located including remote, rural, and urban areas. Specific site locations and characteristics have not been considered in Step 1; they will be evaluated in detail in Step 2.

There are three possible outcomes of this evaluation as shown in the flowchart in Section 2:

- expansion of an existing landfill is preferred;
- a new landfill site is preferred; or
- preference cannot be determined.

The generic alternatives are being evaluated using the proposed criteria first presented in the EA Terms of Reference.

The following sections describe the:

- generic alternatives that are being evaluated (expansion of an existing site and development of a new landfill site);
- criteria and indicators that are being used to comparatively evaluate these two alternatives and select a preferred alternative; and
- potential effects and differences of the two alternatives.

3.1 Description of Generic Alternatives

The characteristics of the two generic alternatives that are being considered are described in the following subsections.

Common Characteristics of a New Site and Expanded Site

Amount of Waste and Truck Traffic: Both site alternatives would need to accommodate 2.33 million tonnes of waste to meet disposal needs to 2049. The combination of waste trucks and trucks carrying fill and/or cover material are assumed to be equal for an expansion or a new site.

Leachate Control: It is assumed that a new site or expanded site would be designed and constructed with a liner and leachate collection system. Leachate management is usually done by collecting and trucking or piping waste water to an existing municipal

wastewater treatment plant; costs vary depending on the proximity of a landfill to the municipal sewer system or treatment plant.

Landfill Gas Management: It is assumed that landfill gas (LFG) collection and flaring is required for a new or expanded landfill because the disposal volume need 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 minimum buffer width is 30 m from non-sensitive receptors and the desired minimum buffer width is 100 m from sensitive receptors.

Characteristics of a New Site

The City of Sault Ste. Marie has different types of areas in which a new landfill site could be located: remote, rural, and urban. Each area is unique with different characteristics.

It is assumed that the existing urban settlement area (i.e. within the municipal service line) 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 rural and remote areas within the City of Sault Ste. Marie. Rural areas typically are more heavily populated in comparison to remote areas and remote areas are typically characterized by relatively pristine natural areas with wildlife habitat.

Site characteristics specific to a new landfill site in Sault Ste. Marie, regardless whether located in a rural or remote area of the City 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 will still be a need for some equipment to stay at the old site for ongoing maintenance and monitoring.

Natural Environment: In order to accommodate the fill area and site facilities it is assumed that some natural environmental features will 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 will be a requirement to provide leachate collection and treatment. For a new site this will take the form of trucking leachate to one of the City's waste water 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 will also have to be considered.

Social Environment: Although the extent of the social impacts is site dependent, there will be impacts to the social environment adjacent to a new site and/or along the routes used to access the new site. These impacts will likely involve a new group of people and would likely affect more people in a rural setting compared to a remote setting. In addition there will 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 will 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 2.33 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 2011 \$'s.

Characteristics of an Expanded Site

Site characteristics specific to an expanded landfill site in Sault Ste. Marie, regardless 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 is 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 will 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 will be a requirement to provide leachate collection and treatment. For an existing site with leachate management features this will 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 will only be a single site contributing to social impacts whereas a new site will 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 will likely be able to make use of some of the existing site infrastructure which will result in cost savings. An expansion also has a potential savings in approvals and property purchases. Furthermore the City will only have to monitor, maintain and report on a single site resulting in further cost savings.

3.2 Evaluation Criteria

The EA Terms of Reference included a list of proposed criteria for the evaluation of alternative methods. These criteria are included in Table 3.1. Specific indicators or ways to evaluate the alternatives under the criteria have also been presented in **Table 3.1**.

The indicators are similar for several of the criteria related to displacement and disruption. The reason is that there is only general information available to compare the alternatives when no specific sites are being considered.

The approach taken in completing the evaluation was to consider the “most probable outcome”. As an example, although a new site could potentially be identified without displacing or disrupting terrestrial habitat the most probable outcome is that there will be some displacement and disruption.

Table 3.1
ALTERNATIVE METHODS EVALUATION CRITERIA– GENERIC COMPARISON

Evaluation Criteria	Indicators
Natural Environment	
Compare potential for displacement or disruption ³ of terrestrial features	<ul style="list-style-type: none"> • site area required • potential for disruption
Compare potential for displacement or disruption of aquatic features	<ul style="list-style-type: none"> • site area required • potential for disruption
Compare potential for effects on groundwater resources	<ul style="list-style-type: none"> • type of leachate control system • ability to meet provincial requirements
Compare potential for effects on surface water resources	<ul style="list-style-type: none"> • ability to meet provincial surface water protection requirements
Social-Cultural Environment	
Compare potential for displacement or disruption to residents	<ul style="list-style-type: none"> • site area required • potential for disruption
Compare potential for displacement or disruption to community features (e.g. parks, recreational facilities)	<ul style="list-style-type: none"> • site area required • potential for disruption
Compare potential for impact on future land use plans	<ul style="list-style-type: none"> • site area required • potential for disruption
Compare potential for displacement or disruption of heritage or archaeological resources	<ul style="list-style-type: none"> • site area required • potential for disruption
Compare potential for impacts to public health and safety (air quality, noise and dust)	<ul style="list-style-type: none"> • ability to meet provincial requirements
Economics	
Compare potential for displacement or disruption to existing businesses	<ul style="list-style-type: none"> • site area required • potential for disruption
Compare potential for displacement or disruption on agriculture/forestry/mining resources	<ul style="list-style-type: none"> • site area required • potential for disruption
Cost	
Compare potential lifecycle cost of alternative	<ul style="list-style-type: none"> • lifecycle cost analysis.
Technical Considerations	
Compare potential for providing necessary service	<ul style="list-style-type: none"> • ability to provide service • ease of obtaining approval and providing service
Transportation	
Compare potential for affects on airports	<ul style="list-style-type: none"> • ability to manage birds
Compare potential for affects on traffic volumes	<ul style="list-style-type: none"> • approximate number of trucks/day
Compare potential for impacts of haulage truck traffic on the movement of farm equipment	<ul style="list-style-type: none"> • approximate number of trucks/day

³ Disruption includes consideration of nuisance effects.

3.3 Potential Effects of Landfill Expansion and New Landfill Site

Table 3.2 (at end of this paper) describes the potential effects of the two alternatives, generic landfill expansion and a generic new landfill site, on the basis of the evaluation criteria and indicators.

The following summarizes the key differences between a generic new site and a landfill expansion.

Natural, Social-Cultural, Economic Environments

- ***Potential for displacement*** – A new landfill site generally requires more land than a landfill expansion, and therefore has greater potential for displacement of environmental and social features (assuming similar site characteristics). The degree of displacement will vary between remote and rural sites. Generally speaking, a site located in a remote area will displace more environmental features than a rural area. However, a site located in a rural area will likely affect more social features and agricultural lands.
- ***Potential for disruption*** – Both alternatives have similar potential to result in nuisance effects such as noise, dust, odour and truck traffic.

A new landfill site has the potential to disrupt a new community that currently does not experience potential negative effects from a landfill. The significance of this would depend on the character of the community in the vicinity of a new site and along the haul route. The haul route is defined as the point at which all waste vehicles converge which is usually from the closest highway intersection to the landfill site. If a new site was located in a remote area there would be fewer neighbours to disrupt but greater disruption to the natural environment and wildlife habitat.

For an existing site expansion, a degree of mutual adaptation between landfill operations and the local community occurs over the years of operating existing landfills. These adaptations include modifications to operations to reduce impacts, the establishment of communications/relationships between the operator and affected community residents/businesses, and the implementation of impact management programs. The existence of a relationship with the community in the vicinity of an existing landfill is an advantage to the operation of a site. We do note that the existing Sault Ste. Marie site has operated for almost 25 years and before that, the landfill was operated by a private contractor since the 1960's. Although some of the immediate neighbours at the site have expressed concerns during the operating life, the site has not resulted in significant disruption to the broader community. In addition, there is a comprehensive monitoring and impact mitigation

program at the existing site to minimize environmental effects and social disruption. Through the ongoing communication between the City and area residents there has been a process of continual improvement with nuisance mitigation and the City remains committed to this initiative.

The determination of potential site and haul route disruption impacts is typically based on the number of residents and community features in the vicinity of a landfill and this information is not available for a new site. From this perspective, whether a site expansion can be expected to result in more or less disruption to a community than a new site is difficult to judge at a generic level of detail. However, a new site will require ongoing maintenance and monitoring of the closed site for a significant period of time (e.g. 50 years±) in addition to the operations at the new site. Although the level of impacts at the closed site will likely be significantly reduced, some level of impact will likely be experienced by area residents.

Cost

- **Lifecycle cost** - The comparative cost of developing and operating a landfill expansion can be expected to be less than the cost of developing and operating a new landfill.

Site development costs for an expansion will most likely be comparatively less as it can be phased into the existing landfill infrastructure and operations. The expansion may be able to make use of some of the infrastructure associated with the existing landfill (e.g. external haul route, internal roads, existing equipment, weigh scale(s), scale house and administrative and maintenance buildings). It could also make use of portions of existing groundwater, surface water and landfill gas monitoring systems. This represents a cost savings in site infrastructure for an expansion compared to a new site. A significant level of knowledge and understanding of site geology and hydrogeology typically exists for an existing site. Approvals costs would likely be higher for a new site because more investigation would be required compared to an existing site to bring it to a similar level of understanding for approvals. Property costs would likely be higher for a new site since more property is required.

A site expansion can likely be phased into the operation of an existing landfill, thus reducing operational costs. With many years of direct operational experience and monitoring experience at an existing site, the City can apply this site knowledge directly to the design, development and operation of an expansion, thus reducing the cost of the operational start up period. Similarly, the government agencies that regulate the landfill have developed considerable experience in dealing with an existing site. This represents a level of regulatory

experience with the existing site and its operation that could result in cost savings.

A new site will result in the addition of a new facility for which the City must develop, operate, monitor and manage. The closed site will also require ongoing maintenance, monitoring and management for a significant period of time (estimated at 50 years±). This will result in added costs compared to the site expansion.

Technical Considerations

- ***Ability to provide service*** – Both alternatives can provide waste management services to Sault Ste. Marie, Prince Township and Batchewana First Nation's Rankin Reserve.
- ***Ease of obtaining approval and providing service*** – It is anticipated that the knowledge and understanding and the level of comfort or certainty established over time with an existing landfill, will most likely result in a lower level of effort and fewer challenges to be overcome in gaining approvals in comparison to a new site.

Transportation

- ***Affects on airports*** – Both alternatives can most likely be managed to minimize the potential for bird impacts on airports.
- ***Impacts on traffic volumes*** – Both alternatives will most likely involve similar truck traffic.

Summary

After evaluating both options (site expansion versus new site), our preliminary conclusion is that the expansion of an existing landfill is the preliminary preferred option. For several of the evaluation criteria/indicators it was not possible to establish a clear preference between the options at a generic level of detail. However, it was clear in the evaluation that an expansion is generally preferred over a new site as it will:

- Require less land and therefore displace fewer people and/or social and natural features;
- Disrupt fewer people as maintenance, mitigation and monitoring would continue at a closed site in addition to the operations at a new site if a new site was identified. Furthermore residents in the vicinity of an existing site have become accustomed to its operations and a relationship has been established between

area residents and the City to focus on continual improvement of nuisance impacts;

- Cost less;
- Encounter fewer challenges in gaining technical approvals; and
- Provide opportunities for effective phasing, and minimize the number of facilities the City has to look after.

The preliminary preferred alternative method will be finalized following consultation with the public.

These preliminary conclusions indicate that it is preferred to initially focus resources on developing a strategy to expand an existing site. There will be a significant level of study and analysis undertaken to identify potential impacts and mitigating measures at a site specific level. As noted previously the EA process is iterative in nature and thus, the decision made in Step 1 does not necessarily preclude the consideration of other site options at a later stage of the EA process as more site specific information becomes available through the impact assessment (i.e. identification of potential environmental impacts and mitigation measures for the preliminary preferred site). If the detailed investigation of a site expansion results in unacceptable net effects a search for a new Greenfield site may be initiated.

4. PUBLIC CONSULTATION PROGRAM

Public and external agency consultation is a key component of this study. The public consultation program has been developed to incorporate and address input received from a broad cross-section of people and interests. The principle objective of the public consultation process is to solicit meaningful input from the public, stakeholders, First Nations and review agencies throughout the process. The solicitation of public input will:

- Enhance the quality of the decision making process by capturing ideas and experiences of a broad cross-section of people;
- Ensure transparency in the decision making process;
- Enhance public understanding of the process, and rationale for the decisions reached; and
- Meet legislative requirements.

Details of the consultation undertaken in conjunction with the Alternative Methods – Step 1 component of the project are included in section 4.1 and an overview of the overall public consultation plan and individual consultation events are included in a separate document titled “Solid Waste Management Environmental Assessment – Public Consultation Plan”.

4.1 April 19, 2011 Public Input Session

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, 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 approach 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 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 AECOM, Dillon and the City of Sault Ste. Marie were in attendance throughout the session to disseminate information, address questions, and facilitate discussions.

Notification of Public Input Session

The Session was advertised as follows:

- Sault Star on April 16, 2011;
- Sault this Week on April 6 and 13, 2011;
- City of Sault Ste. Marie website; and
- Local Shaw Cable 10 for approximately two weeks.

The Notice of the Open House and Newsletter were also forwarded to Prince Township, Garden River First Nation (GRFN), Batchewana First Nation (BFN), Metis Nation of Ontario, and Missanabie Cree. Offers were also extended to GRFN and BFN to attend a Band Council meeting to update them on the study progress.

In addition, Newsletters were distributed to agencies, stakeholders, individuals who previously expressed an interest in the study, and property owners within 1,000 m of the existing landfill site.

Information Available to Participants

Large scale copies of the power point presentation slides were posted on the walls for easy reference throughout the public input session. The following slides/displays were posted:

- A display welcoming resident;
- A display summarizing planned activities;
- Objectives of the Public Input Session;
- Overview of waste management planning work completed over the last decade;
- Principle Waste Management Services provided by the City;
- Other Diversion Opportunities provided to residents;
- Historical Overview of the Residential Waste Diversion Rate;
- Historical Overview of Waste Quantities Landfilled;
- Composition of waste landfilled;
- Project Need;
- What is an EA?;
- Overview of the EA Process
- Phase 2 - “Alternatives To” conclusions reached;
- Overview of Alternative Methods being considered;
- Overview of the two step evaluation to be completed;
- Overview of the Evaluation Criteria;
- Results of the Preliminary Evaluation;
- Preliminary Preferred “Step 1 Alternative Methods” and the rationale for the selection;

- Next steps to be undertaken in the process; and
- How to contact the project team.

In addition to presenting the material on the slides an overview of the landfill environmental management features and monitoring program was provided.

Comments/ Questions Raised During the Presentation

The following questions/comments were raised during the presentation:

Table 4.1: Comments/Questions during Presentation

Comment/Question	Response
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.
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.
Sudbury diversion rates are higher but they do collect more plastics and they have organics collection. It is a single stream process which improved participation. The waste from the Sudbury MRF is approximately 1.5-4%	No response required.
Are there items banned from the landfill?	Yes old corrugated cardboard and leaf and yard waste are banned.
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.
How much of the residual waste is organics?	Based on previous studies completed, approximately 30-40% of the waste stream is organic.
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 Section 3.3 of this report.
The City has improved odour control with the installation of the gas management	Agreed. A biosolids management plan is being prepared to mitigate odours in transit

Comment/Question	Response
system. Sludge is the remaining issue that needs to be dealt with at the existing site.	to the landfill and at the site itself. It is scheduled to be completed in 2015.
Needs to be clear that, while local residents may have become used to the site it does not mean that they like it.	Understood. The City will continue to be as proactive as possible to continually improve nuisance management at the site.
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.
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.

Public Input Session Workbook

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. The following documents the discussion that took place.

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 4.2: Comments/Questions during Working Group Session

Comment/Question	Response
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 I selected as preferred in Step 1.
Should consider mining the existing site and expanding upwards. You could remove recyclables from the mined material and then take it to Elementa for	Mining and a vertical expansion will be considered in the next step of the Alternative Methods phase. Recoverable materials that are encountered during the

Comment/Question	Response
processing.	mining operations will be separated and marketed.
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.
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 existing site is a known quantity.	Agreed. This was cited as an advantage in the evaluation.
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 practicality and net impacts of an expansion. A search for a new site was also completed in the late 80's with limited success.
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.
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.
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

Comment/Question	Response
<p>Don't think a community will allow a new landfill. The City should go with what we have and make it better.</p>	<p>the timeline for mining operations. 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.</p>
<p>It was suggested that an expansion could not go east or south, there is not much room to go west, and that 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.</p>	<p>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.</p>
<p>It was acknowledged that there would be a cost savings with an expansion over a new site.</p>	<p>Agreed.</p>
<p>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.</p>	<p>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.</p>
<p>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.</p>	<p>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 is likely much less given the significant knowledge that pre-exists for the site.</p>
<p>Don't think that a new site would be much harder to approve but it would be harder to</p>	<p>Agreed that there may be increased challenges in obtaining buy-in from the</p>

Comment/Question	Response
get buy-in from the community.	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.
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 is ongoing 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.
One option to fix the concern about groundwater is to supply municipal water to local residents.	Consideration will be given to potential impacts to private well supplies in the next phase of the study.
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 governments 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.
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.

There was not sufficient time to review 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.”

5. CONCLUSIONS

The key objective of the “alternatives methods” evaluation is to find an environmentally suitable location for the development of additional landfill capacity that is needed. The Ontario EA Act requires the consideration of a reasonable range of alternatives.

As was noted in the EA Terms of Reference, the “alternative methods” (i.e. alternative landfill locations and designs) evaluation, will be carried out in two steps:

- Step 1** Generic non-site specific comparison of a new landfill to an expansion of an existing landfill; and
- Step 2** Identification of specific sites or expansion options based on the outcome of Step 1 and the comparison of these sites or options.

This paper addresses step 1 and focuses on generic, non-site specific potential effects and differences of a landfill expansion relative to a new landfill. The primary purpose of Step 1 is to provide initial focus to the search for additional landfill capacity. Undertaking this first step recognizes 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 can help to reduce this anxiety.

The following conclusions were reached through the Alternative Methods – Step 1 study process:

- After evaluating both options (site expansion versus new site), and considering the input received through the public consultation process, the study team concluded that an expansion is generally preferred over a new site as it will:
 - Require less land and therefore displace fewer people and/or social and natural features;
 - Disrupt fewer people as maintenance, mitigation and monitoring would continue at a closed site in addition to the operations at a new site if a new site was identified. Furthermore residents in the vicinity of an existing site have become accustomed to its operations and a relationship has been established between area residents and the City to focus on continual improvement of nuisance impacts;
 - Cost less;
 - Encounter fewer challenges in gaining technical approvals; and

- Provide opportunities for effective phasing, and minimize the number of facilities the City has to look after.
- Through the public consultation process, there appeared to be a general understanding and acknowledgement that there would be more challenges and costs in establishing a new site versus expanding an existing site.
- The principle concerns identified by area residents were potential ground water quality impacts and odour management.

6. NEXT STEPS

These conclusions indicate that it is preferred to initially focus resources on developing a strategy to expand an existing site. There will be a significant level of study and analysis undertaken to identify potential impacts and mitigating measures at a site specific level. As noted previously the EA process is iterative in nature and thus, the decision made in Step 1 does not necessarily preclude the consideration of other site options at a later stage of the EA process as more site specific information becomes available through the impact assessment (i.e. identification of potential environmental impacts and mitigation measures for the preliminary preferred site). If the detailed investigation of a site expansion results in unacceptable net effects a search for a new Greenfield site may be initiated.

The next step in the identification of additional landfill capacity is the identification and comparison of specific site alternatives – referred to as Step 2. Based on the final outcome of Step 1, this will consist of developing and comparing alternative expansion configurations for the existing site (e.g. horizontal expansion, vertical expansion, landfill mining, or a combination of these).

6.1 Approach to the Comparative Evaluation of Site Alternatives

We propose to carry out the evaluation of sites in the following steps:

1. **Preparation of Site Concepts** - Site concepts will be prepared for each of the alternatives. These concepts will be of sufficient detail to determine site boundaries and to allow the identification of potential effects for each of these alternatives. The concepts will be developed to work with the characteristics of the site location and to minimize potential effects on the natural environment and site neighbours.
2. **Net Effects Analysis** - Data will be collected and potential net effects assessed for each of the alternatives. The potential effects identified will represent those effects anticipated assuming a standard level of mitigation is put in place. It is expected that

the effects will be described using a combination of quantitative (i.e. numeric) and qualitative (i.e. descriptive) data.

In order to assess the potential effects of the alternatives, specific study area(s) have been identified as follows:

- On-site study area – This is the actual land that will be acquired for the landfill site.
- Off-site study area – This study area encompasses the vicinity of the site. It will be based on a distance of 0.5 to 1 km from the site boundary. This distance is commonly used to assess the relative potential for impacts between alternative site locations.
- Access route study area – This study area represents the route that landfill trucks would take to the site entrance.

The assessment of the potential effects of each of the alternatives will be based on a set of criteria and indicators. The criteria and indicators are intended to ensure that the evaluation of alternatives and the resulting identification of a preferred alternative consider the potential positive or negative impacts on all aspects of the natural, social, and economic environment as well as technical considerations and cost.

3. **Solicitation of Public Input** - Discussion with the public and the project team will take place on whether there is a difference in relative importance of the criteria or criteria groups that should be taken into consideration in determining a preferred site. For example, some criteria may be considered to have less importance in the overall evaluation if the data gathered shows limited difference between the alternatives, if there is insufficient data or based on public sentiment. The evaluation criteria/criteria groups will then be ranked in terms of their relative importance. This will determine the criteria/criteria groups that will have the greatest to least influence in selecting a preferred alternative.
4. **Comparison of Alternatives** - The alternatives will be ranked in order of preference for each criterion and then summarized by criteria group (e.g. natural environment, social-cultural environment, etc.).

The advantages and disadvantages of each of the alternatives will be comparatively evaluated reflecting the relative importance of each criteria group/criterion. It is expected that this comparison will be conducted by comparing the alternatives in pairs until all pairs have been compared (i.e. Alternative 1 versus Alternative 2, then Alternative 2 vs. Alternative 3, etc). The preferred alternative of each pair will be carried forward for comparison with the next alternative until a single alternative is identified as being preferred to all others.

-
5. **Selection of a Preferred Alternative** - The selection of a preferred alternative will involve identifying and making trade-offs among the advantages and disadvantages of the alternatives. The alternative that on balance has the most advantages and least disadvantages taking into consideration the importance assigned to the various criteria, will be recommended as the preferred alternative and carried forward for detailed effects assessment and mitigation related work.

If the assessment and evaluation of the landfill alternatives does not result in an environmentally sound landfill for the City's future waste management needs, then additional landfill alternatives would be identified and evaluated.

6.2 Proposed Evaluation Criteria

As previously noted, criteria for the evaluation of Alternative Methods was included in the EA Terms of Reference. Specific indicators or measurements for the criteria have been developed for the evaluation of alternatives reflecting the level of detail of information that is expected to be available. These criteria would apply to the comparative evaluation of the expansion alternatives. **Table 6.1** (at the end of this paper) presents the criteria and proposed indicators for the site specific comparative evaluation.

Table 3.2
POTENTIAL EFFECTS OF GENERIC NEW LANDFILL SITE AND LANDFILL EXPANSION

Shading indicates a clear preference; no shading indicates the alternatives were considered equal or no clear preference was identifiable

Evaluation Criteria	Indicators	Landfill Expansion	New Landfill Site
Natural Environment			
Compare potential for displacement or disruption ¹ of terrestrial features	• site area required	An expansion has the potential to result in displacement of fewer terrestrial features as less land would be required for the site.	A new landfill has the potential to result in displacement of more terrestrial features as more land would be required for the site. It is recognized that the characteristics of a new site would vary depending on its location. However it is unlikely that any new site, regardless of location would have less disruption on the natural environment than the expansion of an existing site where the lands are already part of a landfill operation.
	• potential for disruption	Both alternatives have similar potential for disruption to terrestrial features during operation. Over time some adaptation by terrestrial features has likely occurred adjacent to an existing site.	Both alternatives have similar potential for disruption to terrestrial features during operation. A new site in a remote area could potentially result in more significant disruption effects.
Compare potential for displacement or disruption of aquatic features	▪ site area required	An expansion has the potential to result in displacement of fewer aquatic features as less land would be required for the site.	A new landfill has the potential to result in displacement of more aquatic features as more land would be required for the site. It is noted that more remote sites are more likely to have pristine aquatic environments that could be displaced.
	▪ potential for disruption	Both alternatives have similar potential for disruption to aquatic features during operation.	Both alternatives have similar potential for disruption to aquatic features during operation. It is noted that more remote sites are more likely to have pristine aquatic environments that could be disrupted.

¹ Disruption includes consideration of nuisance effects.

Table 3.2
POTENTIAL EFFECTS OF GENERIC NEW LANDFILL SITE AND LANDFILL EXPANSION

Shading indicates a clear preference; no shading indicates the alternatives were considered equal or no clear preference was identifiable

Evaluation Criteria	Indicators	Landfill Expansion	New Landfill Site
Compare potential for effects on groundwater resources	<ul style="list-style-type: none"> type of leachate control system 	It is assumed both sites would have the same leachate control system for the new waste component.	It is assumed both sites would have the same leachate control system for the new waste component. With a new landfill both the existing closed site and the new site would have leachate controls.
	<ul style="list-style-type: none"> ability to meet provincial requirements 	Both alternatives must meet provincial requirements to ensure ground water protection.	Both alternatives must meet provincial requirements to ensure ground water protection. With a new landfill both the existing closed site and the new site would have to be capable of meeting provincial requirements.
Compare potential for effects on surface water resources	<ul style="list-style-type: none"> ability to meet provincial surface water protection requirements 	Both alternatives must meet provincial requirements to ensure surface water protection.	With a new landfill both the existing closed site and the new site must meet provincial requirements to ensure surface water protection.
Social-Cultural Environment			
Compare potential for displacement or disruption to residents	<ul style="list-style-type: none"> site area required 	An expansion has the potential to result in displacement of fewer residences as less new land is required.	A new landfill has the potential to result in displacement of more residences as more land would be required for the site. It is noted that locating a new landfill site in a remote area would minimize displacement impacts on residences but would increase natural environment displacement and disruption effects.
	<ul style="list-style-type: none"> potential for disruption 	Both alternatives have similar potential for disruption to residents around the site and along the haul route during operation. For an existing site expansion, a degree of mutual adaptation occurs between the existing	Both alternatives have similar potential for disruption to residents around the site and along the haul route during operation. A new landfill site has the potential to disrupt a new community that currently does not experience

Table 3.2
POTENTIAL EFFECTS OF GENERIC NEW LANDFILL SITE AND LANDFILL EXPANSION

Shading indicates a clear preference; no shading indicates the alternatives were considered equal or no clear preference was identifiable

Evaluation Criteria	Indicators	Landfill Expansion	New Landfill Site
		hauling and landfill operations and the local community over the years of operating the landfill. The adaptations include modifications to operations, the establishment of communications/ relationships between the operator and affected community, and the implementation of impact management programs.	potential negative effects from a landfill. This change could be significant depending on the character of the community in the vicinity of a new site and along the haul routes. It is noted that locating a new landfill site in a remote area may minimize disruption impacts on residences but would increase natural environment displacement and disruption effects.
Compare potential for displacement or disruption to community features (e.g. parks, recreational facilities)	<ul style="list-style-type: none"> site area required 	An expansion has the potential to result in displacement of fewer community features as less new land is required.	A new landfill has the potential to result in displacement of more community features as more land would be required for the site. It is noted that locating a new landfill site in a remote area may minimize displacement impacts on community features but would increase natural environment displacement and disruption effects.
	<ul style="list-style-type: none"> potential for disruption 	Both alternatives have similar potential for disruption to community/recreation features during hauling and site operations. For an existing site expansion, a degree of mutual adaptation occurs between the existing hauling and landfill operations and the local community over the years of operating the landfill. The adaptations include modifications to operations, the establishment of communications/relationships between the operator and affected community, and the implementation of impact management programs.	Both alternatives have similar potential for disruption to community/recreation features during operation. A new landfill site has the potential to disrupt a new community that currently does not experience potential negative effects from a landfill. This change could be significant depending on the character of the community in the vicinity of a new site and along the haul route. It is noted that locating a new landfill site in a remote area may minimize disruption impacts on community/recreation features but would increase natural environment displacement

Table 3.2
POTENTIAL EFFECTS OF GENERIC NEW LANDFILL SITE AND LANDFILL EXPANSION

Shading indicates a clear preference; no shading indicates the alternatives were considered equal or no clear preference was identifiable

Evaluation Criteria	Indicators	Landfill Expansion	New Landfill Site
Compare potential for impact on future land use plans	<ul style="list-style-type: none"> site area required 	An expansion has the potential to require change in land use designation for the expansion area but less new land is required.	and disruption effects. A new landfill site has the potential to require change in land use designation over a larger area for the landfill.
	<ul style="list-style-type: none"> potential for disruption 	Both alternatives have similar potential for disruption to future land use plans during operation. In some instances land use plans have been developed accommodating an existing landfill.	Both alternatives have similar potential for disruption to future land use plans during operation.
Compare potential for displacement or disruption of heritage or archaeological resources	<ul style="list-style-type: none"> site area required 	An expansion has the potential to result in displacement of fewer archaeology or heritage features as less new land is required.	A new site has the potential to result in displacement of more archaeology or heritage features as more new land is required.
	<ul style="list-style-type: none"> potential for disruption 	Both alternatives have similar potential for disruption to heritage features during operation. For an existing site expansion, a degree of mutual adaptation occurs between the existing landfill operations and any local heritage features over the years of operating the landfill. The adaptations include modifications to operations, the establishment of communications/ relationships between the operator and affected community, and the implementation of impact management programs.	Both alternatives have similar potential for disruption to heritage features during operation. A new landfill site has the potential to disrupt new heritage features that currently do not experience potential negative effects from a landfill. This change could be significant depending on the character of the community in the vicinity of a new site and along the haul route.
Compare potential for impacts to public health and safety (air quality, noise and dust)	<ul style="list-style-type: none"> ability to meet provincial requirements 	Both alternatives must meet provincial requirements to minimize impact to air quality, noise and dust.	Both alternatives must meet provincial requirements to minimize impact to air quality, noise and dust.

Table 3.2
POTENTIAL EFFECTS OF GENERIC NEW LANDFILL SITE AND LANDFILL EXPANSION

Shading indicates a clear preference; no shading indicates the alternatives were considered equal or no clear preference was identifiable

Evaluation Criteria	Indicators	Landfill Expansion	New Landfill Site
Economics			
Compare potential for displacement or disruption to existing businesses	<ul style="list-style-type: none"> site area required 	An expansion has the potential to result in displacement of fewer existing businesses as less new land is required.	A new site has the potential to result in displacement of more existing businesses as more land is required. It is noted that locating a new landfill site in a remote area would likely minimize displacement of businesses but would increase natural environment displacement and disruption effects.
	<ul style="list-style-type: none"> potential for disruption 	Both alternatives have similar potential for disruption to businesses during hauling and site operations. For an existing site expansion, a degree of mutual adaptation occurs between the existing hauling and landfill operations and local businesses over the years of operating the landfill. The adaptations include modifications to operations, the establishment of communications/relationships between the operator and affected community, and the implementation of impact management programs.	Both alternatives have similar potential for disruption to businesses during operation. A new landfill site has the potential to disrupt new businesses that currently do not experience potential negative effects from a landfill. This change could be significant depending on the character of the businesses in the vicinity of a new site and along the haul route. It is noted that locating a new landfill site in a remote area may minimize disruption impacts on businesses but would increase natural environment displacement and disruption effects.
Compare potential impacts on agriculture/forestry/ mining resources	<ul style="list-style-type: none"> site area required 	An expansion has the potential to impact less agriculture/forestry/ mining resources as less new land is required.	A new site has the potential to impact more agriculture/forestry/ mining resources as more new land is required.
	<ul style="list-style-type: none"> potential for disruption 	Neither alternative is anticipated to have disruption impacts.	Neither alternative is anticipated to have disruption impacts.

Table 3.2
POTENTIAL EFFECTS OF GENERIC NEW LANDFILL SITE AND LANDFILL EXPANSION

Shading indicates a clear preference; no shading indicates the alternatives were considered equal or no clear preference was identifiable

Evaluation Criteria	Indicators	Landfill Expansion	New Landfill Site
Cost			
Compare potential lifecycle cost of alternatives	<ul style="list-style-type: none"> approximate lifecycle cost of facility 	<p>The comparative cost of a landfill expansion over its life (i.e. pre-development, development, operations, closure and post closure) can be expected to be less than the cost of developing a new landfill.</p> <p>The expansion will most likely be able to make use of some of the infrastructure associated with the existing landfill. It could also likely make use of portions of the groundwater, surface water and landfill gas monitoring systems. This represents a cost savings in site infrastructure for an expansion compared to a new site. An expansion also has potential savings in approvals and property purchases.</p> <p>The operation of the expansion can be phased into the operation of the existing landfill, thus reducing operational costs. With many years of direct operational experience at an existing site, the City can apply their high level of site knowledge directly to the design, development and operation of an expansion, thus reducing the cost of the operational start up period. Similarly, the government agencies that regulate landfills have developed considerable experience in dealing with an existing site. This level of regulatory experience could result in cost savings for an expansion.</p>	<p>The comparative cost of a new landfill site over its life (i.e. pre-development, development, operations, closure and post closure) can be expected to be more than the cost of expanding an existing landfill.</p> <p>A new site will not be able to make use of most of the infrastructure associated with an existing landfill, such as internal roads, weigh scale, and scale house, maintenance and administration buildings, and leachate and landfill gas management features.. It will also require completely new groundwater, surface water and landfill gas monitoring systems. Costs may also be higher for a new site because a) more investigation would be required at a new site compared to an existing site to bring it to a similar level of understanding for approvals, and b) since more property is required for a new site, property purchase costs could be higher.</p> <p>A new site will not have any operational experience and knowledge, resulting in higher operational start up costs. The lack of operational experience, site monitoring experience and regulatory experience could also result in higher costs until an operating history is in place.</p> <p>A new site will result in the addition of a new</p>

Table 3.2
POTENTIAL EFFECTS OF GENERIC NEW LANDFILL SITE AND LANDFILL EXPANSION

Shading indicates a clear preference; no shading indicates the alternatives were considered equal or no clear preference was identifiable

Evaluation Criteria	Indicators	Landfill Expansion	New Landfill Site
		Expansion of an existing facility will limit the number of waste management facilities for which the City must monitor and manage groundwater, surface water and landfill gas.	facility for which the City must monitor and manage groundwater, surface water and landfill gas (i.e. there will continue to be ongoing maintenance and monitoring at the existing closed site). This will result in added costs compared to the site expansion.
Technical Considerations			
Compare potential for providing necessary service	<ul style="list-style-type: none"> ability to provide service to study area 	Both alternatives provide the necessary waste management service to the City.	Both alternatives provide the necessary waste management service to the City.
	<ul style="list-style-type: none"> ease of obtaining approval and providing service 	An expansion allows the City to make the best use of their existing knowledge of the site hydrogeology and surroundings, its infrastructure and impact management efforts. It is anticipated that the existing knowledge of an expansion site will result in a lower level of effort and fewer challenges to be overcome in gaining approvals compared to a new site.	A new site will require the City to build new infrastructure, develop impact management at another site and develop a level of knowledge of the site hydrogeology and surroundings. It is anticipated that the lack of knowledge with a new site will result in a greater level of effort and increased challenges to overcome in gaining approvals compared to existing site.
Transportation			
Compare potential for affects on airports	<ul style="list-style-type: none"> ability to manage birds 	Both alternatives can be managed to minimize the potential for bird impacts on airports.	Both alternatives can be managed to minimize the potential for bird impacts on airports.
Compare potential for affects on traffic volumes	<ul style="list-style-type: none"> approximate number of trucks/day 	Both alternatives will involve similar truck traffic.	Both alternatives will involve similar truck traffic.
Compare potential for impacts of haulage truck traffic on the movement of farm equipment	<ul style="list-style-type: none"> approximate number of trucks/day 	Both alternatives will involve similar truck traffic.	Both alternatives will involve similar truck traffic.

**Table 6.1
 PROPOSED EVALUATION CRITERIA – EVALUATION OF POTENTIAL SITES**

Criteria Group/Criteria	Indicators	Data Sources
Natural Environment		
<ul style="list-style-type: none"> Compare potential for displacement or disruption¹ of terrestrial features 	<ul style="list-style-type: none"> Area and significance of terrestrial features on site that would be displaced. 	<ul style="list-style-type: none"> City mapping MNR mapping Aerial photos Roadside surveys
	<ul style="list-style-type: none"> Area and significance of terrestrial features off-site that may experience disruption effects during operation. 	<ul style="list-style-type: none"> City mapping MNR mapping Aerial photos Roadside surveys
	<ul style="list-style-type: none"> Area and significance of terrestrial features along haul route that might experience disruption effects during operation. 	<ul style="list-style-type: none"> City mapping MNR mapping Aerial photos Roadside surveys
<ul style="list-style-type: none"> Compare potential for displacement or disruption of aquatic features 	<ul style="list-style-type: none"> Amount and significance of aquatic habitat on-site that would be displaced or disrupted 	<ul style="list-style-type: none"> City mapping MNR mapping/fisheries data Aerial photos Roadside surveys
	<ul style="list-style-type: none"> Amount and significance of aquatic habitat off-site that may be disrupted during operation 	<ul style="list-style-type: none"> City mapping MNR mapping/fisheries data Aerial photos Roadside surveys
	<ul style="list-style-type: none"> Amount and significance of aquatic habitat along access route that might experience disruption effects during operation 	<ul style="list-style-type: none"> City mapping MNR mapping Aerial photos Roadside surveys

¹ Disruption includes consideration of nuisance effects.

Table 6.1
PROPOSED EVALUATION CRITERIA – EVALUATION OF POTENTIAL SITES

Criteria Group/Criteria	Indicators	Data Sources
<ul style="list-style-type: none"> Compare potential for effects on groundwater resources 	<ul style="list-style-type: none"> Presence and significance of groundwater resources 	<ul style="list-style-type: none"> water well records geologic mapping surface water mapping topographic mapping
	<ul style="list-style-type: none"> Lateral extent, thickness and relative permeability of attenuation layer. 	<ul style="list-style-type: none"> water well records geologic mapping topographic mapping geophysical data
	<ul style="list-style-type: none"> Predictability of hydrogeologic environment 	<ul style="list-style-type: none"> water well records geologic mapping surface water mapping topographic mapping
<ul style="list-style-type: none"> Compare potential for effects on surface water resources 	<ul style="list-style-type: none"> Number of watersheds receiving surface water from site. 	<ul style="list-style-type: none"> Topographic mapping MNR watershed data
	<ul style="list-style-type: none"> Number of watercourses crossing the site and upstream drainage areas. 	<ul style="list-style-type: none"> Topographic mapping Roadside surveys MNR watershed data
Social-Cultural Environment		
<ul style="list-style-type: none"> Compare potential for displacement or disruption to residents 	<ul style="list-style-type: none"> Number of residences and agricultural operations on-site who would be displaced. 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Interviews
	<ul style="list-style-type: none"> Number of residences and agricultural operations off-site who may experience disruption effects (e.g. noise, dust, odour) during operation. 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Interviews
	<ul style="list-style-type: none"> Number of residences and agricultural operations along the haul route that might experience disruption effects during operation. 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Interviews
	<ul style="list-style-type: none"> Character of the community in the vicinity of the site and potential for impact on that character 	<ul style="list-style-type: none"> City input Roadside surveys

Table 6.1
PROPOSED EVALUATION CRITERIA – EVALUATION OF POTENTIAL SITES

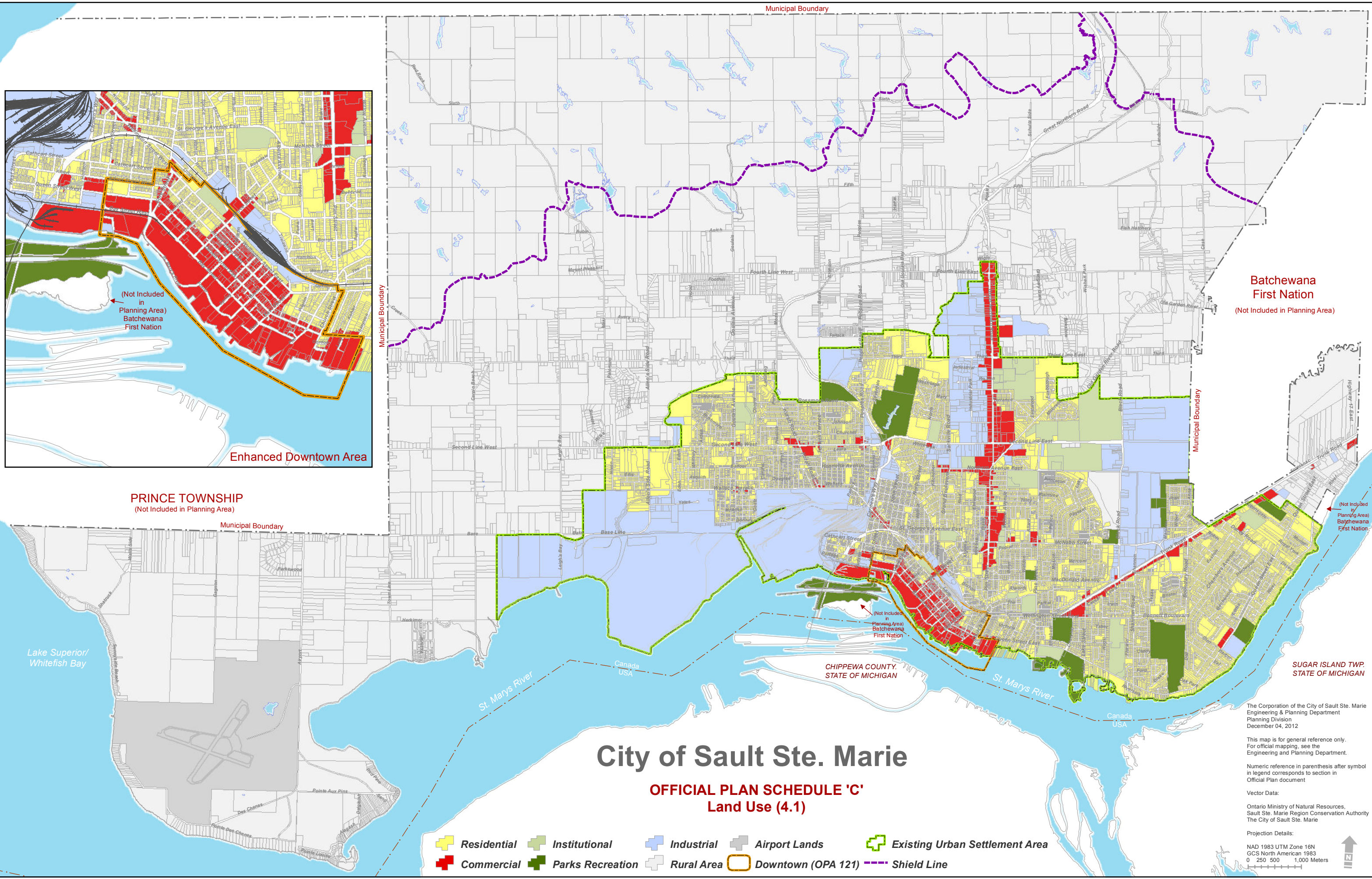
Criteria Group/Criteria	Indicators	Data Sources
		<ul style="list-style-type: none"> Community consultation Interviews
<ul style="list-style-type: none"> Compare potential for displacement or disruption to community features (e.g. parks, recreational facilities) 	<ul style="list-style-type: none"> Number and type of community features on-site that would be displaced. 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Interviews
	<ul style="list-style-type: none"> Number and type of community features off-site that may experience disruption effects (e.g. noise, dust, odour) during operation. 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Interviews
	<ul style="list-style-type: none"> Number and type of community features along the haul route that might experience disruption effects during operation. 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Interviews
<ul style="list-style-type: none"> Compare potential for impact on future land use plans 	<ul style="list-style-type: none"> Area and designation of land to be displaced on-site 	<ul style="list-style-type: none"> Official plan(s) Zoning by-laws City planning staff contact
	<ul style="list-style-type: none"> Area and designation of land to be disrupted off-site 	<ul style="list-style-type: none"> Official plan(s) Zoning by-laws City planning staff contact
	<ul style="list-style-type: none"> Area and designation of land to be disrupted along haul route 	<ul style="list-style-type: none"> Official plan(s) Zoning by-laws City planning staff contact
	<ul style="list-style-type: none"> Change in land use character compared to existing designations 	<ul style="list-style-type: none"> Official plan Zoning by-laws City planning staff contact
<ul style="list-style-type: none"> Compare potential for displacement or disruption of heritage or archaeological resources 	<ul style="list-style-type: none"> Presence of known archaeological resources on-site 	<ul style="list-style-type: none"> Ministry of Culture
	<ul style="list-style-type: none"> number of built heritage or cultural landscape features on-site that would be displaced 	<ul style="list-style-type: none"> Historical records City staff Roadside surveys

**Table 6.1
 PROPOSED EVALUATION CRITERIA – EVALUATION OF POTENTIAL SITES**

Criteria Group/Criteria	Indicators	Data Sources
	<ul style="list-style-type: none"> number of built heritage or cultural landscape features off-site that might be disrupted 	<ul style="list-style-type: none"> Historical records City staff Roadside surveys
	<ul style="list-style-type: none"> number of built heritage or cultural landscape features along the haul route that might be disrupted 	<ul style="list-style-type: none"> Historical records City staff Roadside surveys
<ul style="list-style-type: none"> Compare potential for impacts to public health and safety (air quality, noise and dust) 	<ul style="list-style-type: none"> Ability to meet provincial regulations 	<ul style="list-style-type: none"> MOE regulations
Economics		
<ul style="list-style-type: none"> Compare potential for displacement or disruption to existing businesses 	<ul style="list-style-type: none"> Number, type and sensitivity of businesses on-site that would be displaced. 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Business interviews
	<ul style="list-style-type: none"> Number, type and sensitivity of businesses off-site that might experience disruption effects during operation 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Business interviews
	<ul style="list-style-type: none"> Number, type and sensitivity of businesses along the haul route that might experience disruption effects during operation 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys Business interviews
<ul style="list-style-type: none"> Compare potential for displacement or disruption on agriculture/forestry/mining resources 	<ul style="list-style-type: none"> Area of on-site agriculture/forestry or mining industry resources that would be displaced 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys MNR mapping
	<ul style="list-style-type: none"> Area of off-site agriculture/forestry or mining industry resources that might experience disruption effects during operation 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys MNR mapping
	<ul style="list-style-type: none"> Area of agriculture/forestry or mining industry resources along the haul route that might experience disruption effects during operation 	<ul style="list-style-type: none"> Topographic and aerial mapping Roadside surveys MNR mapping
Cost		

Table 6.1
PROPOSED EVALUATION CRITERIA – EVALUATION OF POTENTIAL SITES

Criteria Group/Criteria	Indicators	Data Sources
<ul style="list-style-type: none"> Compare potential lifecycle cost of alternative 	<ul style="list-style-type: none"> Estimated lifecycle cost of landfill construction 	<ul style="list-style-type: none"> Conceptual site designs Unit costs from comparable sites
	<ul style="list-style-type: none"> Estimated lifecycle cost of landfill operation 	<ul style="list-style-type: none"> Conceptual site designs Unit costs from City operations
	<ul style="list-style-type: none"> Estimated lifecycle cost of waste haulage from waste centroid 	<ul style="list-style-type: none"> Waste centroid locations Unit haulage costs
Technical Considerations		
<ul style="list-style-type: none"> Compare potential for providing necessary service 	<ul style="list-style-type: none"> Ease of site development 	<ul style="list-style-type: none"> Conceptual site designs
	<ul style="list-style-type: none"> Effects on existing /proposed landfill infrastructure 	<ul style="list-style-type: none"> Conceptual site designs
Transportation		
<ul style="list-style-type: none"> Compare potential for affects on airports 	<ul style="list-style-type: none"> Distance from Sault Ste. Marie airport 	<ul style="list-style-type: none"> Topographic mapping
<ul style="list-style-type: none"> Compare potential for affects on traffic volumes 	<ul style="list-style-type: none"> Annual truck kilometres travelled and character of roadway (i.e. single lane one direction, multi-lane) 	<ul style="list-style-type: none"> Estimated numbers of trucks Topographic mapping
	<ul style="list-style-type: none"> Annual number of trucks travelling through intersections 	<ul style="list-style-type: none"> Road maps Estimated numbers of trucks
<ul style="list-style-type: none"> Compare potential for impacts of haulage truck traffic on the movement of farm equipment 	<ul style="list-style-type: none"> Annual number of trucks travelling through agricultural areas 	<ul style="list-style-type: none"> Road maps Estimated numbers of trucks



City of Sault Ste. Marie

OFFICIAL PLAN SCHEDULE 'C' Land Use (4.1)

- Residential
- Institutional
- Industrial
- Airport Lands
- Existing Urban Settlement Area
- Commercial
- Parks Recreation
- Rural Area
- Downtown (OPA 121)
- Shield Line

The Corporation of the City of Sault Ste. Marie
Engineering & Planning Department
Planning Division
December 04, 2012

This map is for general reference only.
For official mapping, see the
Engineering and Planning Department.

Numeric reference in parenthesis after symbol
in legend corresponds to section in
Official Plan document

Vector Data:
Ontario Ministry of Natural Resources,
Sault Ste. Marie Region Conservation Authority
The City of Sault Ste. Marie

Projection Details:
NAD 1983 UTM Zone 16N
GCS North American 1983
0 250 500 1,000 Meters

