Durham/York Residual Waste Study

Environmental Assessment Study Document
(As Amended November 27, 2009)

Originally Submitted to the Minister of the Environment on July 31, 2009 by:
The Regional Municipality of Durham and
The Regional Municipality of York

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All documentation related to the Durham/York Residual Waste Study can be viewed on our website at www.durhamyorkwaste.ca

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EXECUTIVE SUMMARY

Overall, this Environmental Assessment (EA) Study has concluded that the proposed Thermal Treatment Facility can be constructed, operated and decommissioned in an environmentally safe and acceptable manner in the Municipality of Clarington, Region of Durham.

This Environmental Assessment (EA) Study document represents the culmination of approximately three years of work since the approval of the EA Terms of Reference in March 2006. The EA Study document outlines the process followed to arrive at a preferred alternative and preferred method of managing the post-diversion residual waste generated by the Regions of Durham and York that constitutes the Undertaking. Implementation of the Undertaking will provide the Regions of Durham and York with a long-term, local, and sustainable waste management alternative that will ensure the protection of human health and the environment, while taking advantage of waste as a resource and generating energy for the local community.

This EA Study document has been prepared in accordance with the Ontario *Environmental Assessment Act* (EAA), the Approved EA Terms of Reference (March 2006) for the Durham/York Residual Waste Study and the Ministry of the Environment (MOE) Code of Practice for Preparing and Reviewing Environmental Assessments in Ontario.

Introduction and Background

The Durham/York Residual Waste Study was initiated jointly by the Regions of Durham and York in 2005 to identify a long-term sustainable solution to manage the solid waste remaining after reuse, reduction and recycling (including composting) initiatives otherwise referred to in this EA Study document as “post-diversion residual waste”. Both Durham and York recognized the advantages of partnering in the process as they faced similar waste management challenges and had partnered successfully on other projects in the past. The Regions of Durham and York officially reached an agreement to proceed as co-proponents in the completion of an EA Study on June 30, 2005.

The EA Study entailed the evaluation of: residual waste management alternatives considering the potential effects on the environment; the availability of mitigation measures that address, in whole or in part, these effects; and, the comparison of the advantages and disadvantages of the remaining “net” effects. The result of this process provided the planning rationale and support for the preferred solution, the thermal treatment of post-diversion residual waste at the Clarington 01 Site.

Identification of the Proponents

The Proponents for the EA Study are ‘The Regional Municipality of Durham (Durham Region) and ‘The Regional Municipality of York (York Region). Collectively, they will be referred to as “the Regions” in the EA Study document.

The Regions continue to face the challenge of managing residual waste. Although they have become reliant on exporting their residential residual waste outside their jurisdictional boundaries, both Regions desire a Durham/York based solution that is socially and environmentally acceptable to both communities, that maximizes environmental protection and that fosters the wise management of potential resources.

Both Regions remain committed to investigating technically feasible waste reduction, reuse, recycling and disposal opportunities. Durham is dedicated to reaching its goal of diverting 70% of its residential waste from disposal by December 2013 and will look for opportunities to increase diversion even more in the future. Similarly, York is committed to designing a waste management system that will divert approximately 65% of its residential waste from disposal in the short-term and hopes to increase this rate to over 70% in the 10-year planning horizon (2016). Moreover, both Regions are committed to developing strategies that will promote reducing and reusing waste so that managing the material may one day be avoided all-together.

Through extensive public consultation, the Regions have determined that a local landfill solution is not acceptable. The Regions also determined that continuing to transport waste to a landfill located outside of Ontario was not sustainable, as it does not provide the security of a long-term stable solution. This conclusion was reached after careful consideration of the fact that any non-local landfill option exposes the Regions to significant public policy risks that are not within their control. This direction provided the basis for Durham and York not including a purely landfill based alternative in its evaluation of long-term waste disposal options.

Statement of Purpose

Over the past few decades, Durham and York Regions have spent considerable time and money attempting to establish and site new long-term waste disposal capacity to manage their post-diversion residual waste within their respective Regional boundaries.

As a result of continued failed attempts to establish new landfill disposal capacity, Durham and York entered into contracts with the private sector to export residual waste primarily to Michigan, U.S.A. However, in December 2010, the border will be closed to municipal waste from Canada, which includes residual waste from Durham and York Regions. As a result, the Regions do not currently have sufficient long-term waste disposal capacity.

In accordance with Subsection 6.1(2)(a) of the *Environmental Assessment Act*, the purpose of the undertaking for the EA is:

> *"to process - physically, biologically and/or thermally - the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources - both material and energy - and to minimize the amount of material requiring landfill disposal.*
>
> *In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered."*

Specifically, the waste to be managed by this Undertaking is:

- Municipal Solid Waste (MSW) from residential sources generated within Durham and York remaining after at-source diversion;
- A portion of post-diversion Industrial, Commercial and Institutional (IC&I) waste traditionally managed by the respective Regions at Regional waste disposal facilities; and,
- Municipal post-diversion residual waste from neighbouring non-Greater Toronto Area (GTA) municipalities that may provide disposal capacity for processing residues. For example, the City of Peterborough, the County of Peterborough and the County of Northumberland. A condition for including waste from neighbouring non-GTA municipalities in the total amount of material that would be managed by this Undertaking, is the ability of these municipalities to provide disposal capacity (landfill space) for processing residues as neither Durham nor York currently have sufficient long-term disposal capacity for such residues.

Approved EA Terms of Reference Requirements

The EA Study was undertaken in accordance with the Approved EA Terms of Reference which defined the framework and methodology for the EA including the scope, study areas, study periods and consultation to be included in the Project. The EA Terms of Reference included those activities required to fulfill the requirements of Ontario's *Environmental Assessment Act* (EAA). The EA Terms of Reference, developed in 2005 were approved by the Ontario Minister of the Environment (MOE) on March 31, 2006.

The Planning Process

An EA is a planning and decision-making process used to promote environmentally responsible decision-making. In Ontario, this process is defined and finds its authority in Ontario's EAA. The Regions joined in a Planning Study to address the long-term residual waste disposal capacity requirements of both Regions. This joint Study is subject to the requirements of an Individual EA under Ontario's EAA related to municipal waste disposal undertakings.

The EA Study commenced following the approval of the Terms of Reference on March 31, 2006 and has continued until submission of the EA Study document to the Minister of the Environment in July 2009. As per the Approved Terms of Reference, the EA planning period is 35 years, starting in 2011 and ending in 2045.

The EA Study involves the consideration of alternatives to address the stated purpose or need to result in the identification of a preferred alternative, or the Undertaking, considering a comparison of the advantages and disadvantages to the environment, and the priorities established by the respective communities.

The Durham/York EA process consisted of the:

- Completion of the EA Terms of Reference.
- Evaluation of "Alternatives to" the Undertaking.

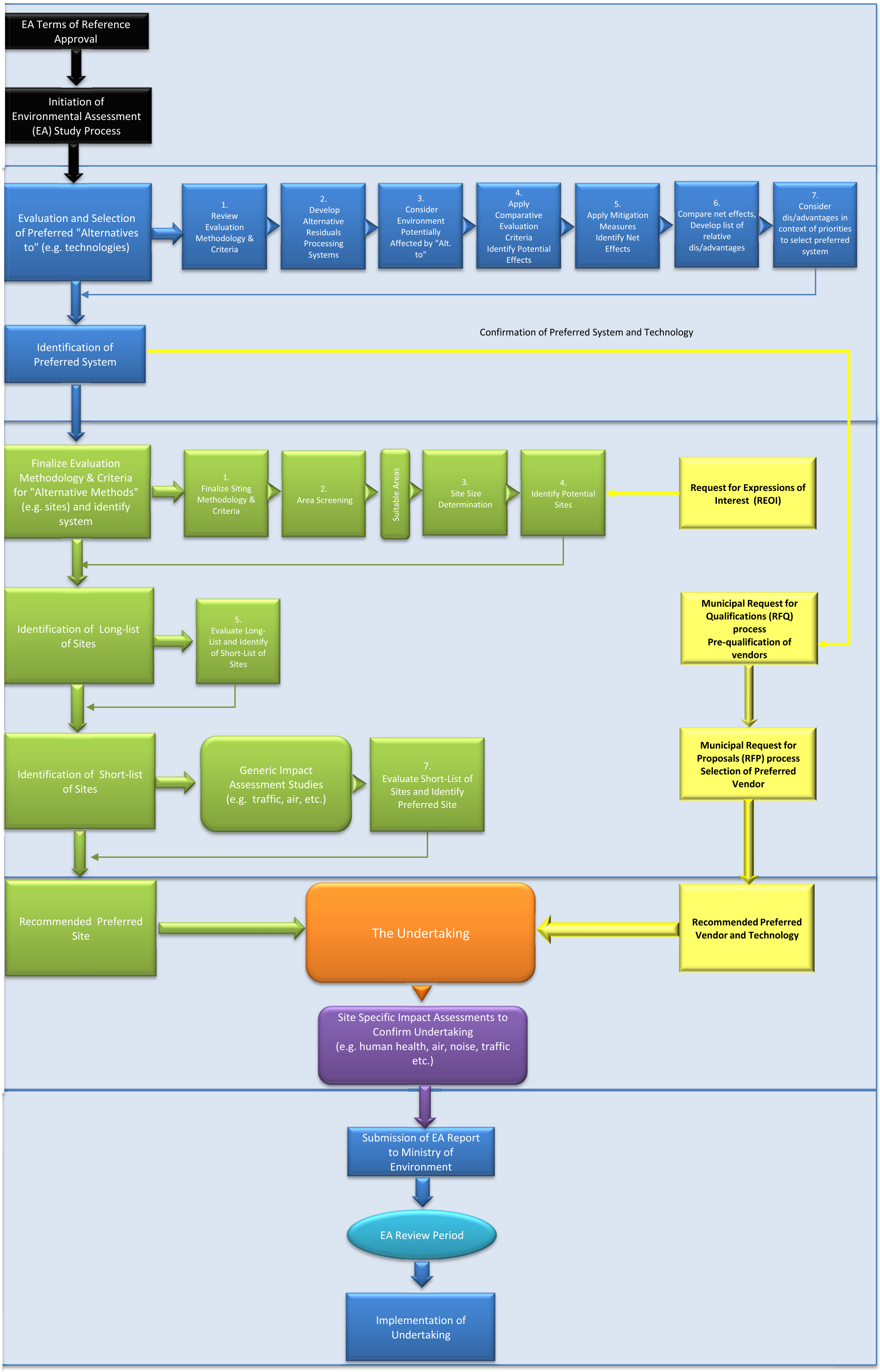
- Evaluation of “Alternative methods” of implementing the Undertaking.
- Completion of Site and Vendor specific studies to confirm the suitability of the site for the Undertaking.

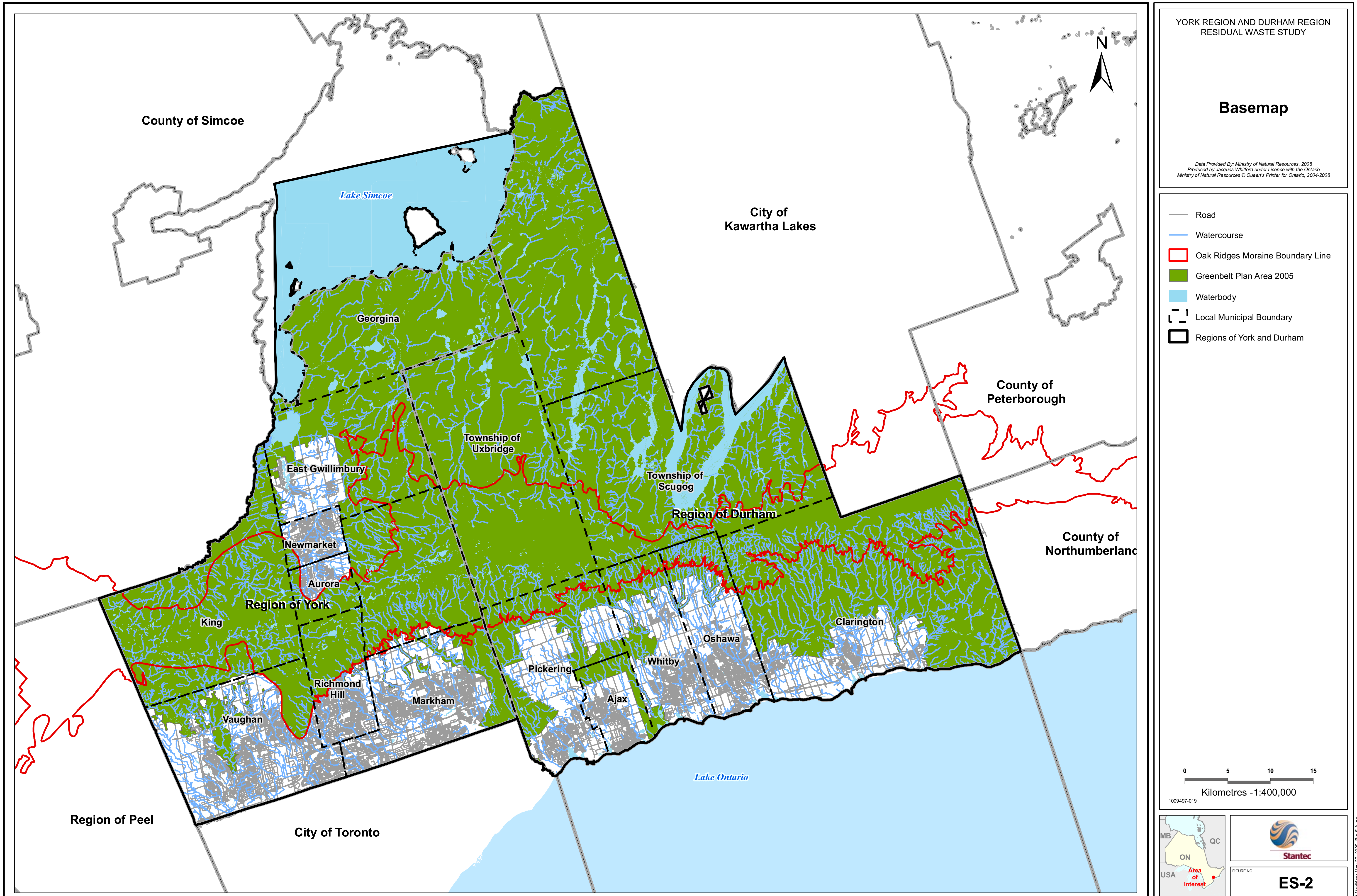
The following Figure ES- 1 provides an overview of the Durham/York EA process.

The Study Area

The study area for this EA Study is comprised of lands within the geographic boundaries of the Regions of Durham and York (see Figure ES-2).

FIGURE ES-1 - Durham York Environmental Assessment Process




YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY
Basemap
Data Provided By: Ministry of Natural Resources, 2008
Produced by Jacques Whitford under Licence with the Ontario
Ministry of Natural Resources © Queen's Printer for Ontario, 2004-2008
Road
Watercourse
Oak Ridges Moraine Boundary Line
Greenbelt Plan Area 2005
Waterbody
Local Municipal Boundary
Regions of York and Durham
0
5
10
15
Kilometres -1:400,000
1009497-019
MB
QC
ON
USA
Area of Interest
Stantec
FIGURE NO.
ES-2
Last Modified: May 27, 2009 By: S.Allen
N
County of Simcoe
Lake Simcoe
City of Kawartha Lakes
County of Peterborough
County of Northumberland
Georgina
East Gwillimbury
Township of Uxbridge
Township of Scugog
Region of Durham
Newmarket
Aurora
Region of York
King
Richmond Hill
Markham
Vaughan
Pickering
Ajax
Whitby
Oshawa
Clarington
Lake Ontario
Region of Peel
City of Toronto

"Alternatives to" - Technology Identification Process

"Alternatives to" are defined as fundamentally different ways of managing waste and achieving the purpose of the EA Study. This Section provides the relevant background and the results of the "Alternatives to" evaluation process leading to the identification and description of the preferred long-term residuals processing system for Durham and York Regions.

The Approved EA Terms of Reference established that "Alternatives to" (i.e., alternative systems) comprised of the following approaches and technologies would be formulated and evaluated:

- **Mechanical Treatment;**
- **Biological Treatment; and,**
- **Thermal Treatment** (note: thermal treatment includes combustion, gasification and pyrolysis.)

A seven (7) step methodology was applied to formulate and then comparatively evaluate and identify the advantages and disadvantages and net effects of the alternative residual processing systems relative to each other.

Section 7 of the EA Study document on "Alternatives to" is structured to reflect this seven step methodology.

Step 1- Prior to initiation of the evaluation of "Alternatives to", the proposed evaluation methodology and criteria were reviewed in consultation with the public and agencies. This review sought additional input on the proposed evaluation steps and evaluation criteria presented in the Approved EA Terms of Reference to establish and confirm the relative priorities to be considered during the evaluation.

Step 2 - The component alternatives were assembled into a range of alternative residual processing systems with each system being capable of managing the entire projected residual waste stream.

Step 3 - Data collection was undertaken to apply each of the comparative evaluation criteria to each of the alternative residual processing systems. The proposed disposal system comparative evaluation criteria were included in Appendix E – Table E-1 of the Approved EA Terms of Reference. There was provision for adjustment for suggested indicators and data sources at the initiation of the EA evaluation based on input received from agencies and the public at Step 1.

Step 4 - The comparative evaluation criteria were applied to each of the alternative residual processing systems and potential effects identified.

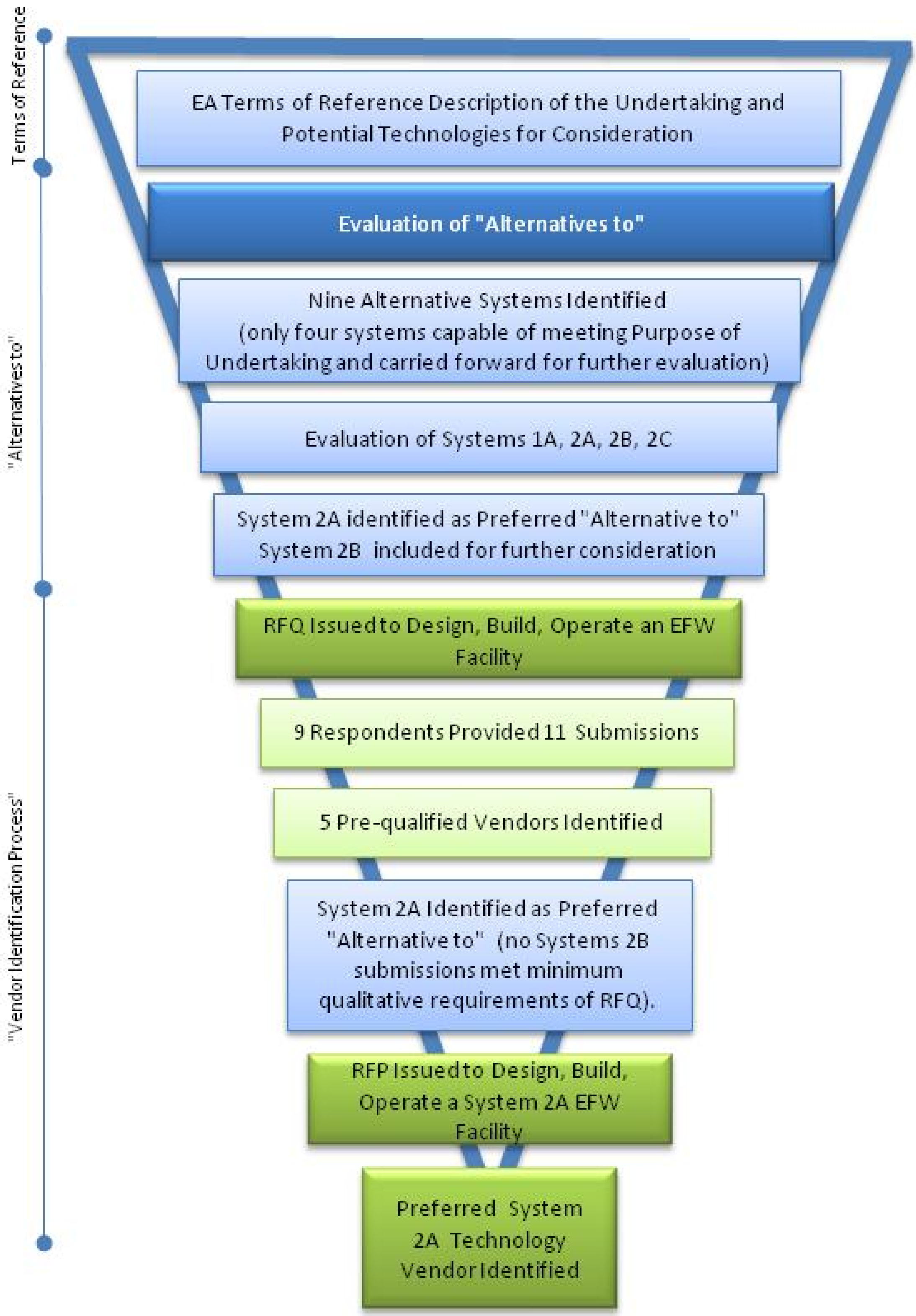
Step 5 - Each of the potential effects identified at Step 4 were considered with respect to the availability of measures to mitigate (i.e., measures that may be applied to reduce or eliminate a negative potential effect) or enhance (i.e., measures that may be applied to improve or increase the magnitude of a benefit or positive effect) the effects, and identify the remaining or 'net effects'.

Step 6 - The net effects associated with each disposal system under each comparative criterion were compared and a list of relative advantages and disadvantages associated with each alternative processing system was developed.

Step 7 - The relative advantages and disadvantages of each alternative residual processing system were considered in the context of priorities established in consultation with the public and agencies and the preferred system selected. The preferred residual processing system was that which offered the preferred balance of advantages and disadvantages given the environmental priorities established by the communities of Durham and York through the consultation process.

Figure ES- 3 illustrates the evolution of the post-diversion residual waste processing systems ("Alternatives to") and technologies throughout the EA process from the evaluation of "Alternatives to" to the identification of the preferred post-diversion residual waste processing technology vendor (discussed in Section 9).

Figure ES- 3 Evolution of Alternative Systems and Technologies throughout EA Process

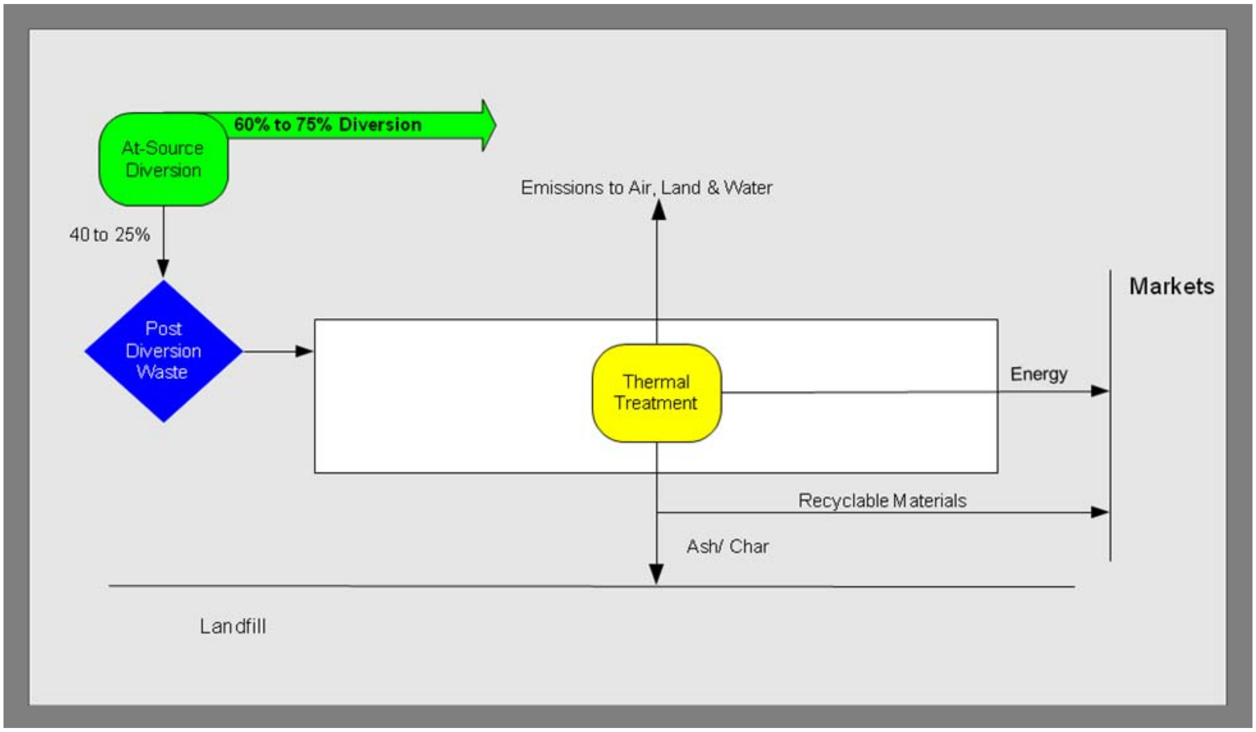


Through the completion of this seven step evaluation process and based on the consideration of the relative advantages and disadvantages of each system and the priorities established through consultation with the public and agencies, the preferred system to manage the post-diversion residual wastes is ***System 2A – Thermal Treatment of MSW and Recovery of Energy followed by the Recovery of Materials from the Ash/Char***.

More specifically, System 2a (see Figure ES- 4) includes:

- The establishment of thermal treatment capacity to process the residual waste stream and to recover energy;
- Followed by the removal of materials that may be sold to market from the ash/char residue; and,
- The landfilling of all process residues (non-combustible materials removed prior to treatment and the ash/char).

Figure ES- 4 System 2a - Thermal Treatment of MSW with Recovery of Materials from the Ash/Char



Although System 2a was identified as the Preferred Long-Term Residual Processing System, ***System 2b Thermal Treatment of Solid Recovered Fuel*** was considered to exhibit an acceptable range of advantages and disadvantages.

It was therefore recommended that the final selection of System 2a as the preferred residual processing system would be based upon the results of the competitive process used during the evaluation of “Alternative methods”.

It was recommended that the Request for Qualifications (RFQ) and Request for Proposal (RFP) processes allow for the submission of proposals to implement both System 2a and System 2b, and that the final decision on the technologies used to implement the preferred residual processing system would be based on the results of this competitive process.

Systems 2a and 2b are both based on the recovery of energy through thermal treatment. In 2a, recyclable metals are recovered following thermal treatment from the ash or char. In 2b, recyclable materials, including metals and some plastics, are recovered through mechanical treatment. Moisture from the organic fraction in the remaining material is then reduced through biological treatment. The material (now considered a Solid Recovered Fuel (SRF)) is then subjected to thermal treatment. In both cases, only a small proportion of the residual waste stream, typically 10-15% by volume, is exported to landfill. If the bottom ash could be used as construction material as it is in Europe, the percentage of waste to landfill would be reduced to approximately 5% in volume.

In summary, the advantages associated with Systems 2a and 2b include:

- Lowest impacts to water and land;
- Least potential to disrupt sensitive habitat;
- Greatest energy generation – both renewable and total;
- Lowest social impact on landfill host community due to minimizing the quantity of residual waste requiring landfill; and,
- Higher reliability due to minimum dependence on export to landfill.

The disadvantages associated with Systems 2a and 2b include:

- Highest impacts on the air environment, although current technology has the proven ability to exceed all applicable air emission standards;
- Less flexibility to changes in waste quantities and composition; and,
- Need to manage hazardous residues from the pollution control system. (It can be argued that this is not really a disadvantage as the hazardous compounds – primarily heavy metals – are in the waste stream to begin with and are simply landfilled. With the thermal systems, these contaminants are concentrated and removed for stabilization and/or management in a secure landfill.)

When comparing Systems 2a and 2b, alternative system 2a has the advantages of:

- More proven and reliable technology; and,
- Lower costs – based on experience to-date.

Alternative system 2b has the advantages of:

- The potential to recover more recyclables – some plastics as well as metals; and,
- Potential improvements in air emissions, energy conversion efficiency and costs that may be provided by new technologies presently under development.

“Alternative methods” – Site Identification Process

To measure and evaluate the potential effects and to maximize the potential of locating a site with optimum conditions to support a Thermal Treatment Facility operation identified as the outcome of the evaluation of “Alternatives to”, the scope of the evaluation criteria to be used in the siting process must consider a broadly defined environment. Consideration of a broadly defined environment is also a requirement of the EAA, and for the purpose of this EA Study includes:

- Public Health and Safety and the Natural Environment;
- Social/Cultural Considerations;
- Economic/Financial Considerations;
- Technical Considerations; and,
- Legal Considerations.

To identify a Preferred Site, a seven-step facility site selection process, outlined in Figure ES- 5 has been applied. This step-by-step methodology was originally presented in the Approved EA Terms of Reference.

Section 8 of the EA Study document on “Alternative methods” is structured to reflect this seven step methodology. Site selection started with a review of the entire study area to identify those areas considered to be generally suitable for the purpose of locating a Thermal Treatment Facility. These generally suitable areas were then systematically evaluated to identify a Long-list of sites followed by additional screening and comparative steps to narrow that list down to a preferred siting option. The following describes the major steps used in this evaluation process:

Step 1 - Prior to initiation of the evaluation of “Alternative methods” and after a preferred approach (“Alternative to”) had been identified by the EA Study, the proposed evaluation methodology and criteria were reviewed in consultation with the public and agencies. This review sought additional input on the proposed evaluation steps and evaluation criteria presented in the EA Terms of Reference and sought to establish and confirm the priorities to be considered during the evaluation.

Step 2 - The starting point for the area screening process was to identify the boundaries of the study area within which a suitable site could be identified. For this siting process, the study area being considered included all lands within the regional boundaries of Durham and York. Initiation of the facility siting process began with the delineation of the limits of the broad area, within the Regions of Durham and York that consisted of features and land uses considered unsuitable for the establishment of a Thermal Treatment Facility. It was important to conduct this high level screening early in the planning process to focus effort within potentially suitable areas, such as designated industrial lands, and to avoid and prevent undue disruption on unsuitable areas, such as significant natural features, agricultural lands and existing residential areas.

The result of this second step was the identification of areas within the study area that were considered generally suitable for the purposes of locating a Thermal Treatment Facility.

Step 3 - To identify potential sites within the remaining areas, considered potentially suitable for the establishment of a Thermal Treatment Facility, the minimum required site size was determined. The determination of the number of sites required and a minimum site size was essential to Step 4 when initiating the identification of sites to provide a minimum site size to prospective property owners.

Step 4 - Following the identification of potentially suitable areas, and determination of the minimum site size and configuration requirements, potential siting opportunities within the potentially suitable areas that would meet the minimum site size requirements were identified.

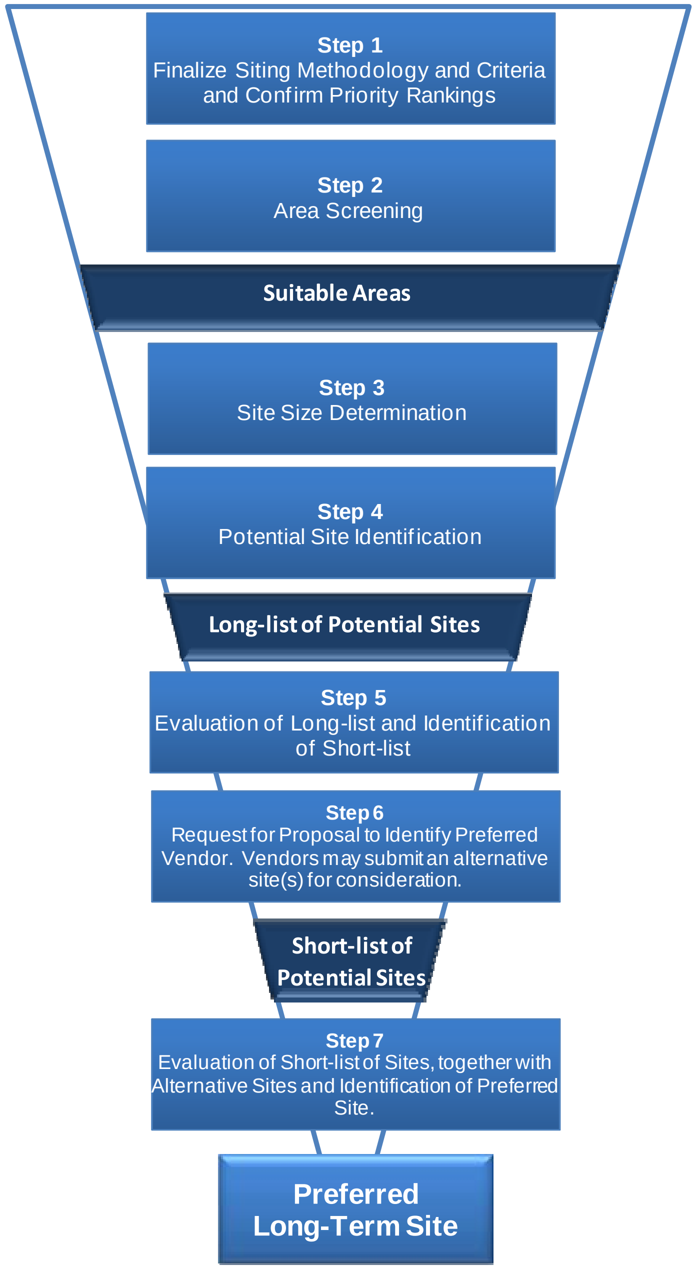
Step 5 - Following Step 4, the number of sites was reduced to a “Short-list” for comparison in greater detail. For the purpose of this level of study, sites were deemed unsuitable for further consideration if they exhibited significant technical, social and/or environmental disadvantages relative to other sites on the list considering an established set of initial comparators. Sites that passed through this evaluation step did not exhibit any obvious disadvantages of significance and were included on a Short-list of alternative sites that was carried forward to Step 6 for a detailed comparative evaluation.

Step 6 - At Step 6 of the process, prospective thermal treatment technology vendors were requested to submit their qualifications through a formal RFQ process for consideration. This resulted in the identification of a short list of qualified vendors that was carried forward to the RFP process.

Step 7 - The purpose of Step 7 was to undertake a detailed evaluation of the Short-list of sites to identify a site exhibiting the preferred balance of advantages and disadvantages given the established priorities of the Regions. The assessment considered the sites as well as associated haul routes, transfer requirements and requirements for additional infrastructure to develop the site. Sites were compared based on a broad range of criteria to identify the “Preferred Site”. Step 7 entailed a comparative evaluation of the Short-list sites utilizing criteria and indicators to determine potential effects.

Once the above was final and confirmed, the foundation was laid to allow for the initiation of the identification and evaluation of potential sites, ultimately leading to the identification of a preferred site.

Figure ES- 5 Overview of the Facility Siting Process



Step 2 revealed that the areas considered as unconstrained make up a small percentage of the Durham and York study area. These areas are primarily located in Durham Region along the Highway 401 corridor and in York Region along the Highway 404 and Highway 407 corridors. These areas consist of primarily industrial and commercial land uses, located away from city centres and suburban communities. These areas are illustrated in the following Figure ES-6.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Application of Step 2 Area Screening Criteria

Data Provided By: Ministry of Natural Resources, 2008
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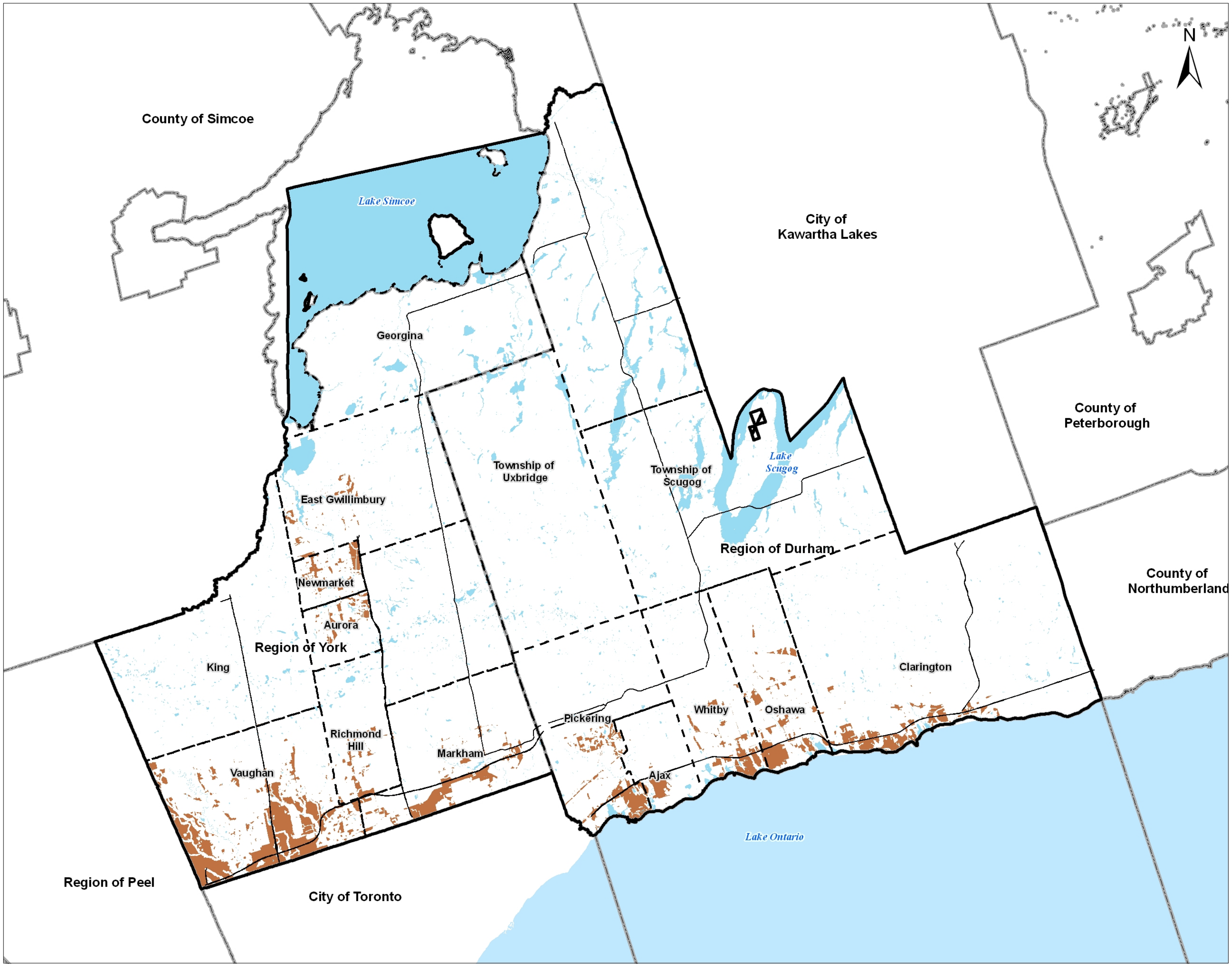

Freeway
Unconstrained Area
Waterbody
Local Municipal Boundary
Regions of York and Durham

0 5 10 15
Kilometres -1:400,000

1009497-031

Stantec

FIGURE NO.
ES-6

Last Modified: May 27, 2009 By: S.Allen

Following the identification of potentially suitable areas and the determination of the minimum site size and configuration requirements, Step 4 was completed to identify a list of siting opportunities.

It was decided at the outset of this process, based on comments received from a number of agencies, that the Regions would undertake a review of both publicly owned sites, as well as willing seller sites to ensure that both public and private sector siting opportunities were explored.

This site identification process resulted in the identification of twelve (12) siting opportunities as follows:

Public Sites	"Willing Seller" Sites	
East Gwillimbury (1)	Vaughan (1)	Oshawa (2)
Clarington (2)	Pickering (1)	Clarington (3)
	Whitby (1)	Brock Township (1)

The sites identified above, were primarily located on the outer limits of urban development. Typically, when siting these types of facilities it is advantageous to locate the Proposed Thermal Treatment Facility (the Facility) close to where the majority of the waste is being generated. However, due to the size of the site required for this Facility and the trends in urban growth in both Durham and York (i.e., residential neighbourhoods developing in close proximity to industrial lands), the siting opportunities within the urban industrial areas were limited.

Application of the Area Screening process and Site Size requirements to the twelve public and privately owned potential sites removed five (5) sites from further consideration. The seven (7) sites that remained formed the Long-list of alternative sites.

The purpose of establishing and evaluating a Long-list of alternative sites was to reduce the number to form a Short-list that would then be compared in greater detail. It is important to conduct this level of evaluation to ensure that only sites with a reasonable chance of being selected would undergo the more detailed comparative evaluation process. For each of the Long-list sites, data was collected, reviewed and applied in accordance with the Long-list evaluation factors identified below:

- Proximity to Required Infrastructure.
- Site Accessibility.
- Potential Impacts of Haul Route(s).
- Site Size.
- Land Use Compatibility.
- Site Availability.
- Potential Impacts on Unregulated Airports.

In accordance with the Approved EA Terms of Reference, the evaluation of the Long-list of alternative sites incorporates a comparative evaluation process.

It was originally envisioned in the Approved EA Terms of Reference (Step 6) that potential technology vendors would be provided the opportunity to submit a site along with their technology during the RFQ process. Under the advisement of procurement and legal counsel, it was determined that these two processes (submission of a site and submission of technology qualifications) should be completed as two entirely separate processes. Completing these processes as part of the same competitive process could represent an unfair advantage to those vendors offering both a site and technology versus only those vendors providing a technology and thereby could jeopardize the success of the competitive process.

By “uncoupling” the RFQ and RFP processes from the siting process, it allowed for a more “fair” process to those involved and also allowed for the completion of siting activities in advance of a formal RFQ/RFP process for technology(ies). The siting component of Step 6 was addressed through the development of a Request for Expressions of Interest (REOI) to potential technology vendors to provide the opportunity for this group to offer up a site through a formal competitive process as described in the approved EA Terms of Reference.

Following consultation on the Short-list of potential sites, a detailed comparative evaluation of the sites was initiated. This assessment considered a broad range of potential impacts from the sites as well as from the haul routes, transfer requirements and requirements for additional infrastructure to develop the sites.

Step 7 utilized criteria and indicators to measure potential effects. Selection of siting preferences considered relative advantages and disadvantages based on net effects after the consideration of mitigation measures reasonably available to address the potential of an effect being realized.

The evaluation criteria applied at this Step were organized into 5 categories:

- Public Health and Safety and Natural Environment;
- Social and Cultural;
- Economic / Financial;
- Technical Suitability; and,
- Legal.

Based on the consideration of the advantages and disadvantages, the Recommended Preferred Site for the Proposed Thermal Treatment Facility is Clarington 01 (Figures ES-7). This Site is considered to represent the preferred balance of advantages and disadvantages based on the priorities associated with each of the environmental considerations.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Clarington 01 Site

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- Courtice Water Pollution Plant
- Collector
- Expressway / Highway
- Railway
- Watercourse
- Clarington 01 Site

0 50 100 150

Metres - 1:7,500

1009497-079

Stantec

FIGURE NO

ES-7

Last Modified: June 10, 2009 By: S.Allen

The Proposed Thermal Treatment Facility Site (the Site), Clarington 01, consists of undeveloped land owned by the Region of Durham that is located on the west side of Osborne Road, south of Highway 401 and north of a CN Rail corridor in the Municipality of Clarington. There are commercial properties north of the Site. The lands east and west of the Site are undeveloped and are currently used for agricultural purposes. The Courtice Water Pollution Control Plant, which was completed in 2007, is situated just south of the Site and the Darlington Nuclear Generating Station is located approximately 1.8 kilometres to the east. The nearest major intersection is Highway 401 and Courtice Road, which is approximately 1.7 kilometres from the Site. The Site is approximately 12.1 hectares in area and is located in the Clarington Energy Park.

The following provides a list of the key advantages related to the Clarington 01 Site:

- Provides the shortest round-trip distances traveled for the transportation of waste resulting in the highest haul cost savings of all the sites;
- Provides the least potential impact to water quality when compared to all other sites;
- No onsite hazard lands or other natural features that could constrain development;
- No potential aquatic habitat onsite;
- Most compatible with surrounding land uses when compared to the other sites;
- Furthest from a designated residential area (existing or planned);
- Close to potential market for heat (both existing and future potential); and,
- Owned by Durham and property acquisition is not required.

The following provides a list of the key disadvantages related to the Clarington 01 Site where mitigation measures will potentially be required:

- Potential disadvantage with respect to the Site's close proximity to Highway 401 and the vehicular emissions related to this transportation route;
- Potential does exist, as with most of the other sites, for the presence of species of conservation of concern;
- Site has a high potential for the presence of prehistoric and historic archaeological resources which is common for most properties located close to the lakeshore;
- Development of electrical infrastructure may be required to market electrical energy;
- Site requires extension of water and natural gas servicing which may require additional approvals; and,
- Haul route requires approximately 1.2 kilometres of roadway improvements.

Vendor Identification Process

At the completion of the site identification phase of the EA Study, it was necessary to assess the potential environmental effects of a Thermal Treatment Facility located on the Site. However, the major components of thermal treatment technologies are proprietary and can differ from vendor to vendor. As a result, it was necessary to proceed through a competitive process to identify and engage a vendor of the preferred thermal treatment technology. To engage a vendor qualified and capable of providing for the design, construction and operation of the Facility, a two stage competitive process was utilized.

Based on the submission evaluation process, five (5) proponents were pre-qualified to submit detailed proposals in response to the RFP.

On August 22, 2008 the RFP was issued to the five pre-qualified proponents. The RFP, which closed on February 19, 2009, resulted in four (4) submissions for the design, construction and operation of the Facility.

Based upon current best practices and considering the magnitude and complexity of the project, the entire RFP process was subjected to rigorous due diligence rules and procedures consistent with common best practices applied by major provincial and federal infrastructure procurement agencies across Canada to ensure integrity and an ability to withstand any challenge regarding any impropriety.

The evaluation team, which considered proposals on the basis of pre-approved evaluation criteria (included in the RFP document) that considered the technical, project delivery, cost and commercial elements of the proposals.

Based on their consensus evaluation, the evaluation team unanimously recommended Covanta Energy Corporation (Covanta) as the preferred vendor. Covanta not only achieved the highest aggregate score, but also achieved the highest score in each of the three elements outlined in the RFP.

Covanta is proposing to be the single source, full service contractor to design, permit, build, startup, commission and operate a Thermal Treatment Facility with an initial design capacity of 140,000 tonnes per year (tpy) and a maximum design capacity of 400,000 tpy for the Regions. Covanta is the largest provider of thermal treatment services in North America with 35 operating facilities in the United States, including 24 that were designed and built directly by Covanta. The Covanta Team includes: Aecon Group, Inc. (Construction Services); Sigma Energy Solutions (Engineering); McMillan Associates (Architects); CH2M Hill (Environmental Consultant); and Miller Waste Systems (Waste Disposal/Transportation).

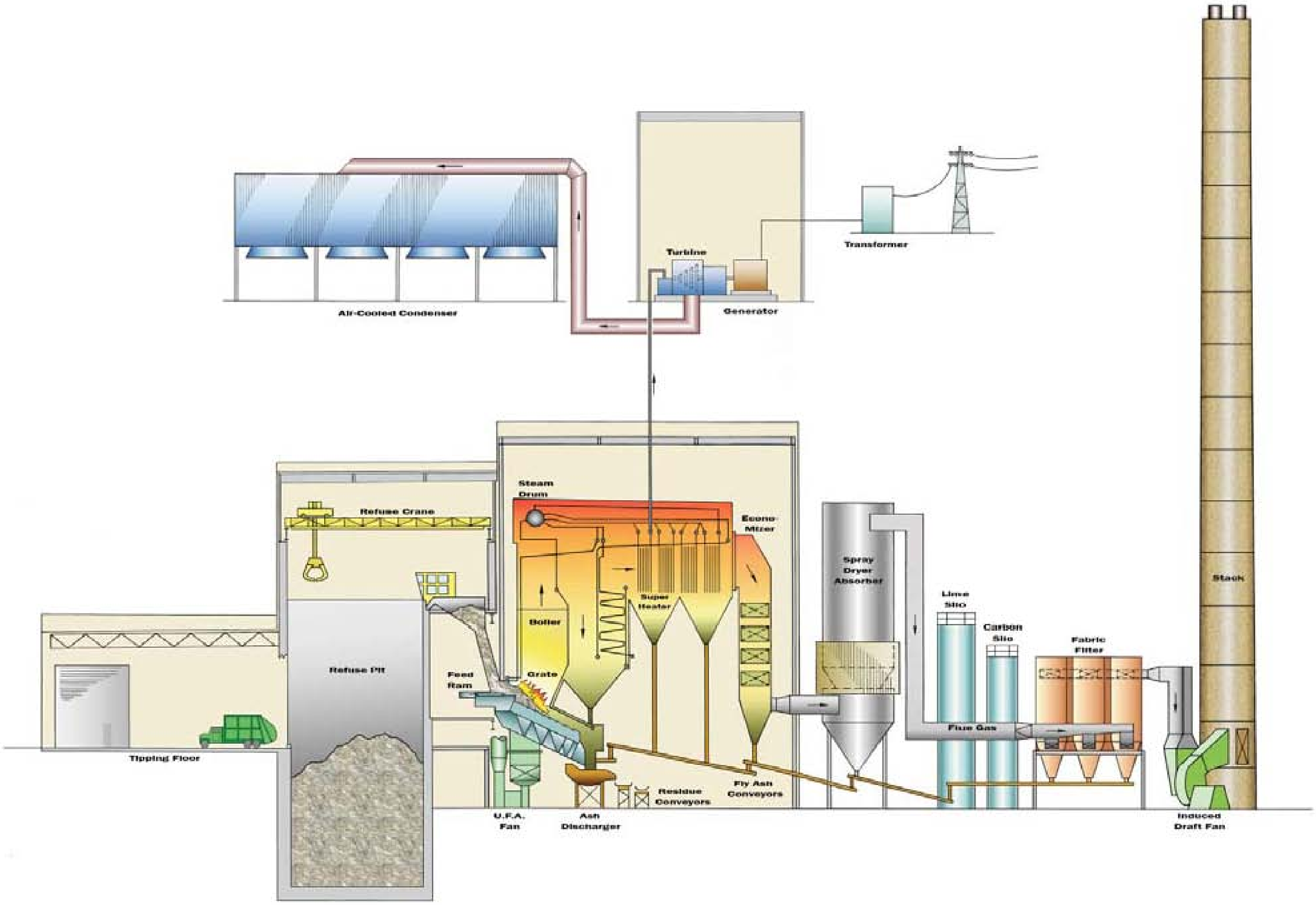
Identification and Description of the Undertaking

The Undertaking, as defined by this Environmental Assessment, is a Thermal Treatment Facility, capable of processing post-diversion residual waste and recovering materials and energy of sufficient quality and quantity to export to the marketplace (recovered metals, electricity and eventually the possibility of district heating and cooling) with an approved capacity of 140,000 tonnes per year. It is anticipated that over the 35 year planning period the maximum design capacity of the facility could be up to 400,000 tonnes per year. The expansion of this facility beyond the approved capacity of 140,000 tonnes per year would subject to environmental screening requirements under Ontario Regulation 101/07, as amended, (or the applicable piece of legislation at the time of expansion). The Facility will be designed, built and operated on the Clarington 01 Site, located in the Municipality of Clarington, Regional Municipality of Durham.

At the approved design capacity of 140,000 tpy, there would be two completely independent waste processing trains at the Facility. Each train will consist of a feed chute, stoker, integrated furnace/boiler, acid gas scrubber, a fabric filter baghouse and associated ash and residue collection systems. Steam produced in the boilers will drive an electrical power generating system consisting of one turbine-generator set, switchgear and an air cooled condenser, to produce electricity for delivery to the grid, for in-plant use and potentially to provide district heating and/or cooling to the neighbouring Courtice Water Pollution Control Plant and Clarington Energy Business Park.

The following Figure ES- 8 illustrates a simplified conceptual process flow for the Facility and its operations.

Figure ES- 8 Conceptual Facility Process Flow



Note: This is a conceptual diagram and is not entirely representative of the actual facility to be built.

The Facility description provided in the EA Study document describes each component of the Facility including:

- Facility Structures;
- Waste Receiving, Storage and Handling;
- Refuse Combustion;
- Air Pollution Control Equipment;
- Residue Handling;
- Energy Production;
- Potable, Process and Waste Water;
- Process Control Systems; and,
- Process Mass and Energy Balance.

The Regions anticipate there may be a need to expand the Facility in order to accommodate the processing of additional post-diversion residual wastes as a result of a number of factors including:

- whether or not Durham and York achieve a diversion rate of 60% by 2011;
- whether or not higher diversion rates are achieved during the planning period;
- whether there is potential for managing post-diversion residual waste from neighbouring non-GTA municipalities or IC&I wastes from Regional facilities;
- economic growth and other factors which could result in higher overall quantities of waste requiring disposal over the planning period; and,
- initiatives such as extended producer responsibility which could result in lower quantities of waste requiring disposal over the planning period.

The design of the Facility is such that it can accommodate the initial design capacity and many aspects of the expansion requirements. The Facility design also includes provisions for future supply of hot water district heating with 100% availability to the nearby Courtice Water Pollution Control Plant and the future Clarington Energy Business Park.

Assessment of the Undertaking

Following the identification of the Undertaking, a detailed assessment was conducted to identify the potential effects, impact management measures and net effects of the Undertaking on the environment together with a summary of recommended or potential environmental management measures. The discussion has been organized into two subsections. The first considers the Undertaking at an approved design capacity of 140,000 tpy (140,000 tpy scenario). The second subsection provides a summary discussion of the potential effects of the Undertaking assuming a maximum design capacity of 400,000 tpy (400,000 tpy scenario).

A more definitive assessment of the Undertaking was completed for the 140,000 tpy scenario since there is a clear understanding of the process design components and related potential effects of the Facility at this initial stage of development. The assessment of potential effects at the maximum design capacity of 400,000 tpy is, by necessity, more general since many of the design and performance elements of the Facility, used in this potential effects assessment, are not specifically known at this time.

Several site-specific assessments and analyses of potential environmental effects have been carried out for the Undertaking. The site-specific assessments and analyses of potential environmental effects have been documented in the following Technical Study Reports that are appended to this EA:

- *Air Quality Assessment - Technical Study Report;*
- *Surface Water and Groundwater Assessment - Technical Study Report;*
- *Facility Energy and Life Cycle Assessment – Technical Study Report;*
- *Geotechnical Investigation - Technical Study Report;*
- *Acoustic Assessment - Technical Study Report;*
- *Visual Assessment - Technical Study Report;*
- *Natural Environment Assessment - Technical Study Report;*
- *Social/Cultural Assessment - Technical Study Report;*
- *Stage 2 Archaeological Assessment and Built Heritage Assessment - Technical Study Report;*
- *Traffic Assessment - Technical Study Report;*
- *Economic Assessment - Technical Study Report; and,*
- *Site-Specific Human Health and Ecological Risk Assessment (HHERA) - Technical Study Report.*

The background information drawn from the Technical Study Reports is described, as necessary, to facilitate an understanding of the environmental effects, a description of the methodologies applied, a summary of the potential effects, proposed impact management measures, and conclusions associated with the assessment of the Undertaking. Each of the Technical Study Reports has considered the potential effects during the construction and operation of the Facility. Potential effects during construction have been assessed for only the initial construction activities. As stated, potential effects associated with operating the Facility have been assessed for both the 140,000 tpy and a 400,000 tpy design capacity scenarios.

There are both potential advantages and disadvantages associated with the Undertaking at 140,000 tpy and at 400,000 tpy. These advantages and disadvantages reflect the net effects that may exist after the application of impact management measures which would likely last throughout the operational period until closure of the Facility. The following provides a qualitative discussion of the potential advantages and disadvantages of the Undertaking based on the net (or residual) effects.

For many aspects of the environment there are neither advantages nor disadvantages, as no net effect of the Undertaking on the environment has been identified. The following is a summary of the aspects of the environment for which minimal to no effects are anticipated for the 140,000 tpy and 400,000 tpy scenarios:

Approved Design Capacity of 140,000 tpy:

- In regards to air quality, intermittent vehicle and dust emissions are addressed through a variety of good construction practices. Emissions during Facility construction would be the same as any other medium-sized construction site in southern Ontario. Given the results of the assessment of air emissions, no Human Health or Ecological Risk has been identified related to construction.
- During operation, air emissions are predicted to meet applicable air quality criteria and would meet or, more commonly, would be below the current air contaminant limits placed on municipal waste incinerators. The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions.
- The results of the air emissions modeling and HHERA indicate that there would be no adverse health effects to human receptors exposed either by way of inhalation or via other environmental media to emissions from the Facility or from the operation of vehicles directly related to the Facility. In addition, there would be no adverse ecological effects associated with the emissions from the Facility.
- No adverse effects at offsite locations are expected from Facility-based odour given the proposed Facility design.
- Provisions included in the Facility design for stormwater management (SWM) on the Site will meet enhanced design guidance criteria found in the MOE *SWM Planning and Design Manual*, and proposed measures to reduce runoff potential provide an enhanced level of receiving water protection.
- No effects to local groundwater resources are expected during construction or operations. The Site will be serviced via municipal infrastructure (sewer and water).
- The Facility would be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. The predicted potential noise levels at all nearby points of reception are less than the applicable criteria for the operational scenario assessed for the Facility.
- Effects to local wildlife and habitat are anticipated to be minimal given that: no populations of species of special concern, threatened and/or endangered species; no ANSI, PSWs or ESAs; and, no significant wildlife habitat, woodlands or wetlands are potentially affected by the Facility. In addition, no permanent watercourses are located onsite and no fish habitat or species are located onsite.
- The Facility is compatible with existing and planned land uses. During construction, minimal net effects are anticipated in the short-term to the closest social/cultural receptors related to noise/vibration, dust and visual effects. During operations, there will be minimal to no effect from most physical parameters (odour, noise, dust, vermin/vectors, litter and traffic) on residential properties, public facilities or institutions or

cultural/recreational resources. It is anticipated the Facility would have a minimal effect on the landscape, while having an overall medium level visual effect on some receptors within proximity to the Facility. Existing land use designations and proposed land use changes indicate that the area around the Site is currently occupied by a mixture of commercial/industrial land uses and undeveloped land and is designated for a mixture of prestige employment and light industrial land uses which would be compatible with the Facility.

- Stage 2 Archaeological Assessment identified no archaeological artifacts or sites of significance on the Site and there are no significant built heritage features on or near the Site.
- The Facility is anticipated to result in minimal disruption to the local traffic network. The only improvements proposed that would be specific to the Facility would be road/pavement improvements to the South Service Road and Osborne Road to accommodate construction and operational vehicles. Future development of the Clarington Energy Business Park (CEBP) will generate significantly more traffic in the area that would likely necessitate some traffic control measures (traffic signals, loop ramps, etc.).
- The Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating) associated with the Facility. In regards to the effect of the Facility on property value outside the CEBP, current European experience indicates that Thermal Treatment Facilities have no effect on the value or salability of property in areas around such facilities, while North American experience indicates that short-term effects may result from the perception of the impacts of proposed facilities that could be addressed through a Community Relations Plan.

Maximum Design Capacity of 400,000 tpy:

- In regards to air quality, intermittent vehicle and dust emissions are addressed through a variety of good construction practices. Emissions during Facility construction would be the same as any other medium-sized construction site in southern Ontario. Given the results of the assessment of air emissions, no risk to Human Health or Ecological Risk has been identified related to construction.
- During operation, air emissions are predicted to meet applicable ambient air quality criteria and would meet or, more commonly, would be below the current air contaminant limits placed on municipal waste incinerators. The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions.
- The results of the air emissions modeling and HHERA indicate that during normal operations there would be no adverse health effects to human receptors exposed either by way of inhalation or via other environmental media to emissions from the Facility or from the operation of vehicles directly related to the Facility. In addition, there would be

no adverse ecological effects associated with the emissions from the Facility during normal operations or “process upset” conditions.

- No adverse effects at offsite locations are expected from Facility-based odour given the proposed Facility design.
- Provisions are included in the Facility design for SWM on the Site to meet enhanced design guidance criteria found in the MOE *SWM Planning and Design Manual*, and proposed measures to reduce runoff potential provides an enhanced level of receiving water protection. During construction of the expanded Facility, the existing SWM pond should provide adequate stormwater retention and drawdown requirements. It is recommended that pond capacity expansion is undertaken in the early stages of the 400,000 tpy scenario construction.
- No effects to local groundwater resources are expected during construction or operations. The Site will be serviced via municipal infrastructure (sewer and water).
- The Facility would be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. There is a minor predicted increase in potential operational noise at some of the PORs for the maximum design capacity of 400,000 tpy compared to the initial design capacity of 140,000 tpy. However, based on the results of the acoustical modelling considering ambient noise levels and predicted noise levels from the maximum design capacity (400,000 tpy scenario) Facility and traffic sources, the predicted noise levels at all nearby PORs are less than the applicable criteria (Class 2 noise limits).
- Effects to local wildlife and habitat are anticipated to be minimal given that: no populations of species of special concern, threatened and/or endangered species; no ANSI, PSWs or ESAs; and, no significant wildlife habitat, woodlands or wetlands are potentially affected by the Facility. In addition, no permanent watercourses are located onsite and no fish habitat or species are located onsite.
- The Facility is compatible with existing and planned land uses. During construction, minimal net effects are anticipated in the short-term to the closest social/cultural receptors related to noise/vibration, dust and visual effects. During operations, there will be minimal to no effect from most physical parameters (odour, noise, dust, vermin/vectors, litter and traffic) on residential properties, public facilities or institutions or cultural/recreational resources. It is anticipated the Facility would have a minimal effect on the landscape, while having an overall medium level visual effect on some receptors within 1 km proximity to the Facility. Existing land use designations and proposed land use changes indicate that the area around the Site will continue to be occupied by a mixture of commercial/industrial land uses which would be compatible with the Facility.
- Stage 2 Archaeological Assessment identified no archaeological artifacts or sites of significance on the Site and there are no significant built heritage features on or near the Site.
- The Facility is anticipated to result in minimal disruption to the local traffic network. The only improvements proposed that would be specific to the Facility would be

road/pavement improvements to the South Service Road and Osborne Road to accommodate construction and operational vehicles. No traffic control measures are required on the adjacent road network to accommodate traffic during operations of the Facility at 400,000 tpy. The future total traffic analysis without the development of the CEBP (assuming growth in background traffic based on historical traffic data) revealed acceptable operations at all study area intersections. Traffic control measures including signal changes may be required by the year 2023 with the full build-out of the CEBP.

- The Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating) associated with the Facility. In regards to the effect of the Facility on property value outside the CEBP, current European experience indicates that Thermal Treatment Facilities have no effect on the value or salability of property in areas around such facilities, while North American experience indicates that short-term effects may result from the perception of the impacts of proposed facilities that could be addressed through a CRP.

Potential advantages of the Undertaking for the 140,000 tpy and 400,000 tpy scenarios include:

Approved Design Capacity of 140,000 tpy:

- An overall reduction in the environmental burden associated with residual waste disposal given that Life Cycle Analysis indicates that the Facility would result in:
    - A net reduction in overall GHG emissions, considering both direct emissions, indirect emissions/offsets associated with recovery of energy and metals and avoided methane emissions from landfill;
    - An overall net reduction in emissions of Acid Gases and Smog Precursors;
    - A net reduction in emissions to water; and,
    - Annual energy benefits of between 94,000 MWh and 107,000 MWh of electricity generated/saved and 7.8 million m^3 of natural gas saved if the Facility provides heating or heating/cooling to the CEBP.
- Recovery of approximately 14,750 tonnes annually of ferrous and non-ferrous metals from the post-diversion residual waste stream that would have otherwise been landfilled, particularly as the majority of these metals would be recovered from materials (e.g., mattress boxsprings) that are not acceptable in the Ontario Blue Box program.
- The Facility is expected to have a positive effect on the economic environment in the Region during construction and operations as:
    - During construction, the Facility will result in an increase in full-time employment for the labour force directly employed to construct the Facility, the local capital investment in the Facility that could result in 1,000 or more full-time equivalent positions and induced employment resulting from the purchase of goods and services by the labour force.

- During operations, the Facility will result in an increase in full-time employment for the 33 full-time positions required to manage and operate the Facility and the 100 to 114 indirect/induced full-time equivalent employment positions resulting from the $10 to $14 million per year that would potentially be spent on local/regionally sourced labour, goods and services.
- The Municipality of Clarington could benefit from the potential investment by Durham in infrastructure near the Facility and in Payment in Lieu of taxes that have been set out in the proposed Host Community Agreement.
- There is minimal potential for the Facility to disrupt the use and enjoyment of local businesses or agriculture, with the only anticipated effect being short-term noise and visual effects during construction. Local businesses stand to benefit from the up to $118 million that is anticipated to be spent during construction and the $10 to $14 million per annum that would be spent during operations on local/regionally sourced labour, goods and services.

Maximum Design Capacity of 400,000 tpy:

- An overall reduction in the environmental burden associated with residual waste disposal given that LCA indicates that the Facility would result in:
  - A net reduction in overall GHG emissions, considering both direct emissions, indirect emissions/offsets associated with recovery of energy and metals and avoided methane emissions from landfill;
  - An overall net reduction in emissions of Acid Gases and Smog Precursors;
  - A net reduction in emissions to water; and,
  - Net energy production, with the Facility providing a local source of electrical and heat energy. At maximum capacity the Facility could potentially produce approximately 3,180,000 GJ/yr of energy when only electrical energy is recovered, 3,513,000 GJ/yr when, in addition, heat is also recovered for district heating at a high efficiency, and 3,593,000 GJ/yr when heat recovery for district cooling is added (also at a high efficiency).
- Recovery of approximately 42,160 tonnes annually of ferrous and non-ferrous metals from the post-diversion residual waste stream that would have otherwise been landfilled, particularly as the majority of these metals would be recovered from materials (e.g., mattress boxsprings) that are not acceptable in the Ontario Blue Box program.
- The Facility is expected to have a positive effect on the economic environment in the Region during construction and operations as:
  - During construction, the Facility will result in an increase in person-years of employment for the labour force directly employed to construct the Facility, increases in indirect employment and induced employment resulting from the purchase of goods and services by the labour force.

- o The Municipality of Clarington could benefit from the potential investment by Durham in infrastructure near the Facility The value of property taxes (or payment in lieu of taxes) paid to the Municipality of Clarington as a result of the Project under a 400,000 tpy operating scenario has yet to be determined, but would likely be the same as or greater than that paid under the 140,000 tpy scenario.
- o There is minimal potential for the Facility to disrupt the use and enjoyment of local businesses or agriculture, with the only anticipated effect being short-term noise and visual effects during construction. Local businesses stand to benefit from the investment in construction and during operations on local/regionally sourced labour, goods and services.

Potential disadvantages of the Undertaking for the 140,000 tpy and 400,000 tpy scenarios include:

Approved Design Capacity of 140,000 tpy:

- There is some potential for short-term construction related net effects from noise levels associated with pile driving (if required) and increased short-term offsite vehicle traffic. Also, some short-term visual disturbances could affect receptors within approximately 1 km of the Site.
- The presence of the Facility cannot be readily shielded from the adjacent roadways, and could result in a change to the existing local landscape for the duration of the operational period for the Facility. It is anticipated the Facility would have a minimal visual effect on the landscape, while having an overall medium level visual effect on some receptors within proximity to the Facility. While the stack could be visible from various vantages in the Region, the dimensions of the stack and the surrounding topography make it unlikely that the stack would be visible in areas of higher population densities.

Maximum Design Capacity of 400,000 tpy:

- Some potential exists for noise and vibration effects during the construction phase of the 400,000 tpy scenario Facility. Generally, vibration effects would be confined to a couple of hundred metres, but noise is not. There are two construction activities that are likely to create elevated sound levels that are difficult to mitigate. These are similar to the initial design capacity scenario and include pile driving activities associated with the construction at the Facility (if required) and potentially increased short-term (i.e., 1-hour) offsite vehicle traffic associated with construction. However, this would depend on the future road network. These activities would only be a concern during worst-case conditions. They are temporary and of short duration relative to the Facility construction, and would cease upon completion construction activities.
- The overall visual effect of the 400,000 tpy scenario, in addition to other planned and disclosed future projects, including the initial 140,000 tpy scenario, would likely result in minor visual effects. This is because it is expected that the landscape sensitivity and magnitude rankings would decrease over time because of the increased development in the area. Overall, the visual difference of the 400,000 tpy scenario Facility compared to the 140,000 tpy Facility would not be considerable.

- During potential "process upset" conditions, a limited number of chemicals resulted in slightly elevated potential risks above two government benchmarks for human health. The two slight exceedances of benchmark risk levels were seen when the Facility was operating under "process upset" conditions, where two out of three exhaust streams affected by a process upset such as start-up or equipment malfunction, for the entire one hour period, and at the time of the worst meteorological conditions. The probability of this hypothetical situation actually occurring is expected to be very low. Regardless, in the event that a 400,000 tpy expansion of the Facility is eventually contemplated, special consideration would be given at that time to ensure that "process upset" conditions do not result in an undue risk to people living and working in the area surrounding the Facility.

Changes to the EA

Although the EA Study document includes consideration of the appropriate level of details about the Undertaking for the purposes of the *Environmental Assessment Act*, the details of these details will likely be refined and other changes may arise during the design phase and/or during the construction and operational periods. This section describes the proposed procedure to accommodate changes to the Project. These changes could occur because the environmental setting has changed since the Undertaking was approved or there is a new technology of which the Regions would like to take advantage.

Commitments

To ensure the Facility is designed, constructed and operated in accordance with the requirements set out in this EA Study document and applicable legislation, the Regions have developed a plan that sets out how and when all commitments, including impact management measures, made in the EA Study document will be fulfilled. This plan also documents how the Regions will report to the Ministry on compliance.

All environmental mitigation and commitments to future work during construction, operation, and post-closure with respect to the Undertaking for the EA in general as well as those found in the site-specific technical study reports have been documented in this section.

Monitoring

To ensure compliance with the EA Study during construction, operation and closure, the Regions will prepare and submit an Environmental Assessment Compliance Monitoring Program to the MOE for consideration. The program will include monitoring of the fulfillment of the EA Study document's mitigation measures, consultation, further studies and work to be carried out, as well as commitments made and described in the EA Study.

Additional Approval Requirements

The proponent is committed to ensuring that all applicable regulatory requirements related to the Undertaking will be met. In addition to the EA requirements, there are other approvals and agreements that are applicable to the Proposed Undertaking. These approvals include such things as a municipal building permit, site plan approval, Certificates of Approval under the *Environmental Protection Act*, etc.

Consultation Summary

Throughout the EA process, a considerable level of effort has been expended on consultation. The consultation summary provides an overview of all consultation activities undertaken during the EA Study. It documents the consultation activities conducted during the EA process, in accordance with the requirements of the EAA, the Approved Terms of Reference, and the Consultation Code of Practice. Consultation completed as part of the EA process includes input received from interested parties including the general public, government agencies (including the federal government), non-governmental organizations (NGOs) and First Nations, all of which have provided feedback that has been, and will continue to be, considered as the Project continues forward.

As part of the Communications Strategy developed by the Regions, consultation occurred through the development of public liaison committees such as the Joint Waste Management Group and the Site Liaison Committee, other committees and consultation with Government Agencies, First Nations, the public and other interested parties (e.g., non-governmental organizations).

Consultation occurred through newspaper, radio and TV advertising, a mailing list, an EA Study website (www.durhamyorkwaste.ca) maintained throughout the course of the EA Study, public polling, consultation events such as public information centres, and opportunities for delegations at Regional Committee and Council meetings.

Although opportunities for public input were available throughout the EA Study, consultation events typically took place during major milestones such as at the identification of the preferred technology, Short-list of sites, Proposed Thermal Treatment Facility Site, and for the results of the Draft EA Study document and site-specific studies.

These consultation events have been summarized in the EA document, as well as described in more detail in the Record of Consultation, which has been submitted as a separate document to the EA Study document.

Closure and Commitment to Continuous Improvement

Implementation of the Undertaking will provide Durham and York with a long-term, local, and sustainable waste management alternative that will ensure the protection of human health and the environment, while taking advantage of waste as a resource and generating energy for the local community.

This EA Study document has assessed the potential effects of the Undertaking at an appropriate level of detail for this EA during the construction, operation, and post-closure period considering appropriate and feasible mitigation, monitoring, and management plans to minimize any associated potential effects. However, over the course of the construction and operation periods there may be possible improvements that could be considered as a result of new technology or processes. The Regions understand the importance of minimizing any potential adverse effects and enhancing potential opportunities that would also benefit the environment and potentially affected stakeholders. The Regions will appropriately investigate the opportunities afforded by new technologies as they become available.

Glossary of Frequently Used Terms

'At-Source':	Referring to a waste minimization or management activity occurring at the source of waste generation (e.g., at the household, at the business, etc.).
Aboriginal Peoples:	*The Constitution Act*, *1982* specifies that aboriginal peoples include the Indian, Inuit and Métis peoples of Canada.
Aerobic Treatment:	Biological treatment of organic waste by bacteria that require oxygen. (e.g., windrow composting – see Composting)
Air Emissions:	For stationary sources, the release or discharge of a pollutant from a facility or operation into the ambient air either by means of a stack or as a fugitive dust, mist or vapour.
Alternative Disposal Technology (ADT):	Technologies, other than landfill, capable of disposing of municipal waste (e.g., incineration, EFW, gasification, pyrolosis, etc.).
Alternative Fuel:	Fuel that is obtained via various mechanical and biological processes that recover materials such as plastic, fibre, wood and dried organic matter from the residual waste stream for input to a thermal process.
Alternative Methods:	Alternative methods of carrying out the proposed undertaking are different ways of doing the same activity. Alternative methods could include consideration of one or more of the following: alternative technologies; alternative methods of applying specific technologies; alternative sites for a proposed undertaking; alternative design methods; and, alternative methods of operating any facilities associated with a proposed undertaking.
Alternatives To:	Alternatives to the proposed undertaking are functionally different ways of approaching and dealing with a problem or opportunity.
Alternatives:	Both alternative methods and alternatives to a proposed undertaking.

** An asterisk (*) beside a defined term indicates that the term is defined in the Environmental Assessment Act. The EAA should be referenced in order to obtain the complete definition of the term. The glossary summary is intended to provide a simplified description of the term.*

Anaerobic Decomposition:	See Anaerobic Digestion
Anaerobic Digestion (AD):	The controlled biological conversion of organic material, by bacteria, in the absence of oxygen, to produce biogas, liquid effluent and a solid, partially stabilized organic material.
Anaerobic Treatment:	See Anaerobic Digestion
Application:	An application for approval to proceed with an undertaking under subsection 5(1) of the *Environmental Assessment Act* (Ontario).
Approved Site or Facility:	A landfill site or waste management facility with a current valid Certificate of Approval.
Ash:	The non-combustible fraction that remains after combustion of waste.
Baghouse Residue:	Leftover material that is captured by an air pollution control / filtering device that removes dust and particles from the exhaust gas stream.
Baling:	Compacting solid waste into blocks to reduce volume and simplify handling.
Biocell:	A cell in which organic waste is decomposed biologically in an aerobic process and landfill gas is extracted.
Biodegradable:	Capable of decomposing under natural conditions.
Biogas:	Gas formed during the anaerobic decomposition of organic material, mainly consisting of methane and carbon dioxide.
Biological Treatment:	A treatment technology that uses bacteria to process organic waste.
Biomass:	Plant material, vegetation, or agricultural waste used as a fuel or as an energy source.

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Bottom Ash:	The non-airborne ash resulting from burning waste in an incinerator. The material, which falls to the bottom of the combustion grate and is removed mechanically in a Thermal Treatment Facility.
Briquetting:	The compaction of waste into small bricks to be burned in an incinerator. Bricks are easier to manage and have a higher calorific value than regular un-compacted waste.
British Thermal Unit (BTU):	Unit of heat energy equal to the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit at sea level.
Buffer Area:	That part of a disposal site or facility that is not a waste fill area (in the case of a landfill) or is not occupied by a building. (i.e., area between actual facility and the property boundary).
Bulky Waste:	Large items of waste materials, such as appliances, furniture, large auto parts, trees, stumps.
Calorific Value:	The amount of heat produced by a specific material type when combusted under specific conditions. Calorific Value is usually expressed in Calories or Joules per kilogram (i.e., Cal/Kg or J/Kg).
Canadian Council of Ministers of the Environment (CCME):	A council made up of environmental ministers from provincial and federal levels of government that proposes nationally consistent environmental standards and objectives to achieve high levels of environmental quality for waste management, air pollution, and toxic chemicals across Canada.
Candidate Site:	Property identified as suitable for consideration as a potential site for a waste management facility.
Carbon Monoxide (CO):	A colourless, odourless, poisonous gas produced by incomplete fossil fuel combustion.
Carcinogenic:	Capable, in sufficient quantities, of causing the cells of an organism to change in such a way as to produce cancer.

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Catalyst:	A substance that changes the speed or yield of a chemical reaction without being consumed or chemically changed by the chemical reaction.
Cells:	In landfill sites, areas where waste is placed, compacted, and covered with layers of cover material on a daily basis.
Cellulose:	A complex carbohydrate that is composed of glucose units and makes up the cell walls in plants. Naturally occurs in wood and other fibrous products such as cotton and is the raw material of many manufactured goods, such as paper, rayon, and cellophane.
Certificate of Approval (C of A):	A license or permit issued by the Ministry of the Environment for the operation of a waste management site/facility or for the operation of a facility or component of a facility that emits regulated substances into the natural environment.
Class Environmental Assessment (EA):	A planning and approvals process regulated under the *Environmental Assessment Act* (Ontario) that pertains to a group of projects (a "class") which are routine, similar in nature, limited in scale, and possess predictable environmental effects.
Cogeneration:	The consecutive generation of useful thermal and electric energy from the same fuel source.
Combustion Chamber:	The actual compartment where waste is burned in an incinerator.
Combustion Product:	Substance produced during the burning or oxidation of a material.
Combustion:	1. Burning, or rapid oxidation, accompanied by the release of energy in the form of heat and light. 2. Refers to controlled burning of waste, in which heat chemically alters organic compounds, converting them into stable compounds such as carbon dioxide and water.
Commercial Waste:	Waste emanating from business establishments such as stores, markets, office buildings, restaurants, shopping centers, and theatres.

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Commitment:	Represents a guarantee from a proponent about a certain course of action, that is, "I will do this, at this time, in this way." Proponents acknowledge these guarantees by documenting obligations and responsibilities, which they agree to follow, in environmental assessment documentation (terms of reference and environmental assessment).
Community Recycling Centre (CRC):	A waste management facility that offers waste management services to small businesses and residents. A CRC is a place to drop off items such as electronics, white goods, household hazardous waste, leaf and yard waste, and blue box recyclables items.
Compactor:	Equipment used to crush and compact waste, to reduce volume.
Completely Mixed Reactor:	When liquid enters the completely mixed reactor, it quickly mixes completely with the liquid already in the reactor, making the contents of the reactor homogenous. Also, commonly referred to as a continuously stirred tank reactor.
Compost:	The relatively stable humus material that is produced from the aerobic decomposition or composting process in which bacteria in soil mixed with degradable organic materials break down the mixture into an organic soil amendment.
Composting Facilities:	1. A facility where the organic component of municipal solid waste is decomposed under controlled conditions; 2. An aerobic process in which organic materials are ground or shredded and then decomposed to humus in windrow piles or in mechanical digesters, drums, or similar enclosures.
Composting:	The controlled biological decomposition of organic material in the presence of air to form a humus-like material. Controlled methods of composting include mechanical mixing and aerating, ventilating the materials in a vessel or placing the compost in piles out in the open air and mixing it or turning it periodically.

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Conditions:	Conditions of *Environmental Assessment Act* approval are legally binding and may be used as a compliance tool. Conditions can determine the way in which detail design, implementation and operation or closure of an undertaking will proceed. Conditions of *Environmental Assessment Act* approval will depend on the details of the undertaking and the environmental assessment and may be used to address Government Review Team and public and community concerns.
Consultation:	A two-way communication process to involve interested persons in the planning, implementation and monitoring of a proposed undertaking. Consultation is intended to: • Identify concerns; • Identify relevant information; • Identify relevant guidelines, policies and standards; • Facilitate the development of a list of all required approvals, licenses or permits; • Provide guidance to the proponent about the preparation of the terms of reference and the environmental assessment; • Ensure that relevant information is shared about the proposed undertaking; • Encourage the submission of requests for further information and analysis early in the environmental assessment process; and, • Enable the MOE to make a fair and balanced decision.
Contingency Plan:	A plan developed to be implemented should some aspect of the project need to be altered or some aspect of the operation fail (i.e., “Plan B”).
Corporations Supporting Recycling (CSR):	A Canadian, not-for-profit, private sector organization that works with municipalities and industries to aid in developing sustainable municipal recycling and waste diversion systems.

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Cover Material:	Soil, or other materials approved by MOE, that are used to cover compacted solid waste in a sanitary landfill. Alternatives to soil include non-hazardous ash from incinerator facilities, tarps, and other materials.
Cyclone:	A cone-shaped air-cleaning device that collects and separates particles of different densities, from the air/gas stream, by using rapid rotational effects and gravity.
Decibel, A-weighted:	A-weighted decibels (dBA). Most common units for expressing sound levels since the A weighting function is designed to approximate the response of the human ear.
Design and Operation (D&O) Plan/Report:	A document (plan/report), required for obtaining a Certificate of Approval for a landfill or waste management facility, which describes in detail the function, elements or features of a landfill site/facility or waste management facility, and how a landfill site/facility or waste management facility would function including its monitoring, and control/management systems.
Digestion:	The biochemical decomposition of organic matter
Director*:	Director of the Environmental Assessment and Approvals Branch, Ministry of the Environment.
Disposal Facilities:	Facilities for disposing of waste, including landfills and incinerators, intended for permanent containment or destruction of waste materials.
Disposal:	Final placement or destruction of wastes. Disposal is typically accomplished through use of approved sanitary landfills or incineration with or without energy recovery.
Diversion Rate:	The percentage of waste materials diverted from traditional disposal such as landfilling or incineration by recycling, composting, re-use or avoidance.
Diversion:	The management of materials by reduction, reuse, recycling, recovery and composting.

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Do Nothing Alternative:	An alternative that is typically included in the evaluation of alternatives that identifies the implications of doing nothing to address the problem or opportunity that has been identified.
Dump:	A site used to dispose of waste without environmental controls.
Durham/York Residual Waste Study:	The Durham/York Residual Waste Study is a joint initiative between the Region of Durham and York Region to work together to find a way to manage waste remaining after at-source diversion.
Durham:	The Regional Municipality of Durham or its geographic area, as the context requires.
Ecological/Environmental Risk Assessment (ERA):	A scientific method used to examine the nature and magnitude of risks from the exposure of plants and animals to contaminants in the environment.
Economies of Scale:	The theory that constructing a larger facility can be less expensive to construct and operate, on a per unit basis, than several smaller facilities having the same capacity, or throughput.
Eddy Current:	Circular electric currents in metals that create repulsive forces, similar to magnetic forces, in non ferrous electrical conductors such as Aluminum. (e.g., eddy current separator used to separate aluminum and other non ferrous metals).
Energy-from-Waste (EFW)	Facility where waste is converted into a usable form of energy, usually via combustion.
Effects Monitoring	Effects monitoring consists of activities carried out by the proponent after approval to determine the environmental effects of the undertaking. Whether this would be required is determined on a case-by-case basis.
Electrostatic Precipitator (ESP):	A device that removes particles from a gas stream after combustion occurs. The ESP imparts an electrical charge to the particles, causing them to adhere to charged metal plates inside the precipitator. Rapping on the plates causes the captured particles to fall into a hopper for disposal.

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Elevation Request:	During the mandatory review period for reports prepared under an Environmental Screening Process, members of the public, agencies or Aboriginal Peoples with outstanding environmental concerns may make a written request to the Director to elevate a project to an Individual Environmental Assessment.
Emission Factor:	A representative value that relates the quantity of pollutant release to the atmosphere with an activity or input associated with the release of that pollutant.
Emissions Trading:	The creation of surplus emission reductions at certain stacks, vents or similar emissions sources and the use of this surplus to meet or redefine pollution requirements applicable to other emissions sources. This allows one source to increase emissions when another source reduces them, maintaining an overall constant emission level. Facilities that reduce emissions substantially may "bank" their "credits" or sell them to other facilities or industries.
Emissions:	Technically, all solid, liquid, or gaseous discharges from a processing facility, but normally referring to Air Emissions (with solids referred to as residue and liquids as effluent).
Endothermic:	A chemical reaction that requires (takes in) heat.
Energy Recovery:	The recovery of energy in the form of heat and/or power from the thermal treatment of waste. Generally applied to incineration, pyrolysis and gasification but it can also include the combustion of landfill gas and gas produced from anaerobic digestion of organic materials.
Energy-from-Waste (EFW):	The recovery of energy in the form of heat and/or power from the thermal treatment of waste. Generally applied to incineration, pyrolysis, gasification but can also include the combustion of landfill gas and gas produced from anaerobic digestion of organic materials.
Environment and Plastics Industry Council (EPIC):	A council of the Canadian Plastics Industry Association (CPIA) dedicated to sustainable plastics recycling and to minimizing plastic waste sent to landfill.

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Environment*: The environment is broadly defined under the *Environmental Assessment Act* as follows:

(a) Air, land or water;

(b) Plant and animal life, including human life;

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

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

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

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

Environmental Assessment Act (EAA): The *Environmental Assessment Act* (as amended and regulations thereto) is a provincial statute that sets out a planning and decision-making process to evaluate the potential environmental effects of a proposed undertaking. Proponents wishing to proceed with an undertaking must document their planning and decision-making process and submit the results from their environmental assessment to the Minister of the Environment for approval.

Environmental Assessment: An environmental assessment is a study that, which assesses the potential environmental effects (positive or negative) of a proposal. Key components of an environmental assessment include consultation with government agencies and the public; consideration and evaluation of alternatives; and, the management of potential environmental effects. Conducting an environmental assessment promotes good environmental planning before decisions are made about proceeding with a proposal. There are several types of environmental assessments including: Class Environmental Assessments, Environmental Screening Processes and Individual Environmental Assessments.

Environmental Effect: The effect that a proposed undertaking or its alternatives has or could potentially have on the environment, either positive or negative, direct or indirect, short- or long-term.

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Environmental Protection Act (EPA):	The *Environmental Protection Act* (Ontario) provides for the protection and conservation of the natural environment.
Exothermic:	A chemical reaction that gives off heat.
Exports :	In solid waste programs, municipal solid waste, organic materials ("compostables") and recyclables that are transported outside the municipal jurisdiction or locality where they originated.
Expression of Interest (EOI):	A preliminary document prepared by an outside source documenting their interest in a proposed project and a very general set of qualifications they possess that would make them eligible to participate further in the project.
Extended Producer Responsibility (EPR):	A policy to shift the responsibility of a product's life cycle away from the municipality to the producers and to provide incentives for producers to consider the environmental impacts into the selection of materials and the design of their product.
Feedstock:	The input material to be processed at a waste management facility.
Ferrous Metals:	Metals derived from iron or steel. Products made from ferrous metals include appliances, furniture, containers, and packaging like steel drums and barrels. Recycled products include processing tin/steel cans, strapping, and metals from appliances into new products.
Flares:	A controlled open flame device used to burn off unwanted or unusable natural gas, biogas, or landfill gas.
Flue Gas:	The air coming out of a stack or a chimney after combustion in the burner it is venting. It can include carbon oxides, water vapour, nitrogen oxides, sulfur oxides, particles and other chemical pollutants.
Fluidized Bed Incinerator:	An incinerator that uses a suspended bed of hot sand or other granular material to transfer heat directly to waste. Used mainly for destroying municipal sludge or other materials of uniform particle size.

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Fly Ash:	The airborne ash resulting from burning waste in an incinerator removed by air pollution control systems.
Fugitive Emissions:	Emissions not caught by a capture system.
Gasification:	Conversion of solid material such as coal or waste into a gas for use as a fuel.
Gigajoule (GJ):	A measurement of energy equal to 1.0 X 10^9 Joules. A typical single family household (approx. 2000 sq. ft.) uses approximately 60 to 90 GJ annually for heating (NRCan).
Government Review Team:	Staff from government ministries and agencies (federal; provincial, including local Conservation Authorities; and, municipal, including local Boards of Health) who contribute to the review of environmental assessment documentation (terms of reference and environmental assessment) by providing comments from their mandated areas of responsibility.
Grapple Feeding:	A process in which material is fed by a grapple into the processing system. Usually involves grasping a planned amount of the material from a large pile.
Grapple:	A mechanical device used to grasp materials (e.g., waste). A bucket with several hooks to grasp, hold and release material.
Greenhouse Effect:	The warming of the Earth's atmosphere attributed to a build-up of carbon dioxide or other gases; some scientists think that this build-up allows the sun's rays to heat the Earth, while making the infra-red radiation atmosphere opaque to infra-red radiation, thereby preventing a counterbalancing loss of heat.
GTA:	Greater Toronto Area
Hazardous Waste:	Materials that can pose a substantial or potential hazard to human health or to the environment when improperly managed. Hazardous waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special MOE or EPA lists.

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High Density Polyethylene (HDPE):	A material used to make plastic rigid containers, milk and juice jugs, margarine tubs, and detergent bottles. The plastic is translucent or opaque and does not crack when bent. Referred to as No. 2 Plastic.
Household Hazardous Waste (HHW):	Hazardous products used and disposed of by residential as opposed to industrial consumers. Includes paints, stains, varnishes, solvents, pesticides, and other materials or products containing volatile chemicals that can catch fire, react or explode, or that are corrosive or toxic.
Household Waste (Domestic Waste):	Waste, composed of garbage and rubbish, which normally originates in a private home or apartment house.
Hydrolysis:	Decomposition of a chemical compound by reaction with water, such as the dissolving of salt in water into sodium and chloride ions or the catalytic conversion of starch to glucose.
Impact Management Measures:	Measures which can lessen potential negative environmental effects or enhance positive environmental effects. These measures could include mitigation, compensation, or community enhancement.
Impact Studies:	Studies that predict negative consequences (if any) of a proposed undertaking. Air, visual, natural environmental, traffic, hydrogeological, Noise, Health Risk, Land Use and Hydrological Impact Studies are typically completed.
Imports:	Municipal solid waste and recyclables that have been transported to a jurisdiction or locality for processing or final disposition (but that did not originate in that jurisdiction or locality).
Incineration:	A thermal treatment technology involving destruction of waste by controlled burning at high temperatures with the overall aim of reducing the volume of waste.
Incinerator:	A furnace for burning waste under controlled conditions.

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Individual Environmental Assessment:	An Individual Environmental Assessment requires the following steps to fully address the requirements of the EAA: Preparation of the Proposed EA Terms of Reference; Submission of the EA Terms of Reference to the Minister of the Environment for Approval; Completion of the EA Study in accordance with approved EA Terms of Reference, and; Submission of the EA Study to the Minister of the Environment for Approval.
Industrial Waste:	Unwanted materials from an industrial operation; may be liquid, sludge, solid, or hazardous waste.
Industrial, Commercial & Institutional (IC&I) Waste:	Combination of wastes generated by industrial, commercial and institutional sectors that are not typically picked up at the curb or accepted at public drop-off facilities as part of the municipal waste collection process. These wastes are primarily managed by way of contract with private waste management service providers.
In-Feed:	Material that is fed into the front-end of a process.
Institutional Waste:	Waste generated at institutions such as schools, libraries, hospitals, prisons, etc. (part of the IC&I waste stream).
Integrated Waste Management System:	The combination of diversion and disposal alternatives comprising one waste management system. For example - blue box recycling, source-separated organics composting, incineration, and landfilling of ash and residuals could all form part of an integrated waste management system.

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Interested Persons:	Individuals or organizations with an interest in a particular undertaking. Persons with an interest in a particular undertaking often include neighbours and individuals, environmental groups or clubs, naturalist organizations, agricultural organizations, sports or recreational groups, organizations from the local community, municipal heritage committees, ratepayers associations, cottage associations, Aboriginal Peoples and businesses. Interested persons are not required to demonstrate that they will personally be affected by a particular undertaking. Interested persons are often called stakeholders.
Landfills:	Sanitary landfills are outdoor disposal sites for non-hazardous solid wastes. Waste is spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day.
Leachate Collection System:	A system that gathers leachate and pumps it to the surface for treatment
Leachate:	Liquid that collects contaminants as it trickles through wastes, or other materials. Leaching may occur in landfills and may result in hazardous substances entering surface water, ground water, or soil.
Lift:	In a sanitary landfill, a compacted layer of solid waste placed on top of a lower level of compacted solid waste including appropriate cover material.
Limestone Scrubbing:	Use of a limestone and water solution to remove gaseous sulfur from flue gas before it reaches the atmosphere.
Liner:	A relatively impermeable barrier designed to keep leachate inside a landfill. Liner materials include plastic and/or dense clay.
Magnetic Separation:	Use of magnets to separate ferrous materials from a mixed municipal waste stream.
Mass Burn Incineration:	The incineration of waste with minimal initial pre-treatment or separation of wastes.

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Materials Recovery (or Recycling) Facility (MRF):	A facility that processes (separates, bales) mixed recyclables into individual recyclable product streams (e.g., fibre, glass, aluminum), for shipment to market.
Mechanical Separation:	The physical separation of wastes by material type, size or density using trommels, cyclones, screens and other equipment.
Mechanical Treatment:	Involves the physical treatment of waste materials to recover recyclable materials and to prepare waste for further treatment or disposal.
Mediation:	An attempt to bring about a peaceful settlement or compromise between disputants through the objective intervention of a neutral party.
Michigan:	The State or Government of Michigan, or its geographic area, as the context requires.
Ministry of the Environment (MOE) Ontario:	The MOE monitors pollution and restoration trends in Ontario and uses that information to develop environmental laws, regulations, standards, policies, programs, and guidelines. The MOE works to provide cleaner air, land, and water for Ontarians.
Mitigation:	Measures taken to reduce adverse impacts on the environment.
Modular Facility:	A facility of several parallel units designed to allow for an expansion by adding additional units in parallel.
Moisture Content:	The percentage of a material that is water.
Monitoring:	Periodic or continuous surveillance or testing to determine the characteristics of a substance or the level of compliance with statutory requirements and/or pollutant levels in various media or in humans, plants, and animals.
Municipal Solid Waste (MSW):	Common garbage or trash generated by industries, businesses, institutions, and homes.

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National Pollutant Release Inventory (NPRI):	A legislated, nation-wide, publicly accessible inventory of information on annual releases to air, water, land, and disposal or recycling from all sectors in Canada.
Non-combustible Waste:	Waste, which cannot be combusted (burned) even if energy is added. (e.g., stone, glass and metals).
Non-Ferrous Metals:	Non-magnetic metals such as aluminum, lead, and copper. Products made all or in part from such metals include containers, packaging, appliances, furniture, electronic equipment and aluminum foil.
Old Corrugated Cardboard (OCC):	Bulky cardboard that is typically found in boxes used for shipping and packaging. It is made from 2 strips of cardboard with a wavy, or "corrugated" strip running through the centre.
Old Newspaper (ONP):	Old newspapers set out, collected and processed for recycling.
Ontario Guideline A-7:	Air emission guidelines developed by the Ministry of the Environment (MOE) to govern combustion and air pollution control requirements for new municipal waste incinerators and gasifiers in the Province of Ontario.
Ontario Regulation 347 (Reg. 347):	A regulation under the *Environmental Protection Act* that specifies standards and approval requirements for waste management sites and systems in Ontario.
Ontario:	The Province of Ontario, or its geographic area, as the context requires.
Open Burning:	Uncontrolled fires in a dump.
Operation and Maintenance Costs:	Usually expressed annually, operation and maintenance costs are a sum of money to operate and maintain the facility in operating order (i.e., labour, utilities, equipment repairs, materials, supplies, disposal fees, etc.)
Organic Matter:	Carbonaceous waste contained in plant or animal matter and originating from domestic or industrial sources.

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Organic:	Referring to or derived from living organisms. In chemistry, any compound containing carbon except carbon dioxide.
Package Plant:	Small wastewater treatment systems designed to treat limited sewage flow at the facility site.
Particulate:	A particle of a solid or liquid that is suspended in air.
Pelletizing:	The compaction of waste into small pellets to be thermally processed in an incinerator or gasifier. Pellets are easier to manage and have a higher calorific value than regular uncompacted waste.
Person-Years:	A full-time position for one year constitutes a person year of employment (also known as a full-time equivalent).
Pilot Tests:	Small-scale testing of a waste management technology under actual site conditions to identify potential problems prior to full-scale implementation.
Plasma-Arc Reactor:	A thermal waste treatment technology that operates at extremely high temperatures and can produce a synthetic gas.
Plug Flow Reactor:	When a high solid slurry enters a plug flow reactor, its flow is unidirectional with minimal to no mixing in the axial direction, making the contents of the reactor heterogeneous.
Point of Impingement (POI):	A defined point or points set at a defined distance from a facility (usually between the facility and sensitive community receptors) at which a specific limit for air pollutants must be met.
Pollutant:	Generally, any substance introduced into the environment that can adversely affect the usefulness of a resource or the health of humans, animals, or ecosystems.
Pollution:	Generally, the presence of a substance in the environment that because of its chemical composition or quantity can prevent the functioning of natural processes and produce undesirable environmental and health effects

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Polyethylene Terephthalate (PET):	A type of plastic that is clear or coloured (but still transparent) with high gloss. It is used for carbonated beverage bottles, peanut butter jars, and some household cleaners. Bottles have a raised dot on the base and are referred to as No. 1 Plastic.
Positive Displacement Pumps:	A pump that forces fluid from one chamber to another by reducing the volume of the first chamber while increasing the volume in the second chamber.
Post-Closure:	The time period, following the shutdown of a landfill, waste management or manufacturing facility; established for monitoring purposes.
Post-Diversion Residual Waste:	Non-hazardous waste generated by residences, industries, businesses, and institutions that remains after at-source or other diversion programs have been used to remove readily recoverable materials.
Potable Water:	Water that is safe for drinking and cooking.
Powdered Activated Carbon (PAC):	Used in air pollution control systems to control mercury and dioxins/furans. PAC has a large surface area, which allows the carbon to adsorb (stick to) and react with contaminants.
Precipitator:	Pollution control device that collects particles from an air stream.
Project:	Encompasses the design, construction (including construction financing) and operation of the EFW Facility, and includes the EA Study, the supply of municipal waste, and the sale of energy.
Proponent*:	A person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.
Proprietary Devices:	A device that is either used, produced, or marketed under exclusive legal right of the maker.
Putrescible:	Able to rot quickly enough to cause odours and attract flies.

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Pyrolysis:	Decomposition of waste and its constituent chemicals by heat in the absence of oxygen.
Quench:	A method to cool a substance quickly and suddenly after heating. Often performed by placing the hot material in water.
Receptor:	The person, plant or wildlife species that may potentially be affected due to exposure to a contaminant.
Record of Consultation:	A document submitted with the environmental assessment that describes the consultation carried out during the environmental assessment and the results of that consultation.
Recycle/Reuse:	Minimizing waste generation by recovering and reprocessing usable products that might otherwise become waste (i.e., recycling of aluminum cans, paper, and bottles, etc.).
Refuse Derived Fuel (RDF):	Waste that has been processed to remove non-combustible materials. RDF can be compacted or compressed through processes such as pelletizing or briquetting. Pelletized or Bricked RDF is easy to manage and handle, and also usually has a higher calorific value because of the increased density and reduced moisture content. Also referred to as “solid recovered fuel”.
Refuse Reclamation:	Conversion of waste into useful products; e.g., composting organic wastes to make soil conditioners or separating aluminum and other metals from waste for recycling.
Regions:	Durham and York collectively.
Reserve Capacity:	Extra treatment capacity built into infrastructure such as waste and wastewater treatment plants and interceptor sewers to accommodate flow increases due to future population growth.
Residential Waste:	Waste generated in single and multi-family homes, including newspapers, clothing, disposable tableware, food packaging, cans, bottles, food scraps, and yard trimmings.

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Residual:	Amount of a pollutant remaining in the environment after a natural or technological process has taken place; e.g., the sludge remaining after initial wastewater treatment, or particulates remaining in air after it passes through a scrubbing or other process.
Resource Recovery:	The process of obtaining matter or energy from materials formerly discarded.
Rotary Lobe Pumps:	Type of rotary pump where two or more rotating lobes are put in a chamber between suction and discharge nozzles. Fluid that enters the suction nozzle is trapped in the pockets formed by the lobes. The fluid is then carried around and eventually forced out through the discharge nozzle.
Scrubber:	An air pollution device that either uses (a) a spray of water or another reactant or (b) a dry process to trap pollutants in emissions.
Selective Catalytic Reactor (SCR):	An air pollution control device that, using a catalyst, reduces nitrogen oxide emissions to water vapour and elemental nitrogen by injecting ammonia into the flue gases. The catalyst is required because SCR systems occur at much lower temperatures than SNCR (see below) systems.
Selective Non-Catalytic Reduction (SNCR):	An air pollution control device that converts nitrogen oxide emissions into elemental nitrogen and water by injecting a chemical reagent (typically urea, or another ammonia-based solution) into the flue gas.
Self Hauled Wastes:	Wastes that are delivered to a waste management facility by the waste generator, including the Region, the Municipalities and possibly private firms, particularly those handling IC&I waste.
Shrouded Flares:	Flares that are enclosed in order to control combustion and monitor emissions more reliably, as opposed to an open flame where there is a lack of control over combustion.
Siting:	The process of choosing a location for a facility.
Solid Recovered Fuel:	See Refuse Derived Fuel.

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Source Reduction:	Reducing the amount of materials entering the waste stream from a specific source by redesigning products or patterns of production or consumption (e.g., using returnable beverage containers). Synonymous with waste reduction.
Source Separated Organics (SSO):	Organics separated by the household or business that include food wastes and leaf and yard wastes. Source separated organics are collected by a separate collection vehicle and sent for processing/composting.
Source Separation:	Segregating various wastes at the point of generation (e.g., separation of paper, metal and glass from other wastes to make recycling simpler and more efficient).
Spent Media:	Odour control substances or other materials that can no longer be used as a result of trapping solid residue.
Stabilized Organic Material:	Organic material that has converted to a form that resists any further change. Bacteria stabilize organic material and convert the material to gases and other more inert materials.
Stack:	A chimney, smokestack, or vertical pipe that discharges flue gas or used air.
Stakeholder:	Any organization, governmental entity, or individual that has a stake in or may be impacted by a given approach to environmental regulation, pollution prevention, energy conservation, etc.
Stoichiometric:	A chemical condition whereby there exists a mixture of chemicals having the exact proportions required for complete chemical combination, applied especially to combustion of materials. (e.g., stoichometric conditions occur in an incinerator when there is sufficient oxygen present to completely combust the waste material).
Stratigraphy:	The order of rock or soil layers in a geological formation.
Syngas:	A gas product (primarily hydrogen and carbon monoxide) resulting from gasification processes and that can be used as a fuel or feedstock chemical.

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Terms of Reference:	A document prepared by the proponent and submitted to the Ministry of the Environment for approval by the Minister. The terms of reference sets out the framework for the planning and decision-making process to be followed by the proponent during the preparation of an Individual Environmental Assessment. In other words, it is the proponent's work plan for what is going to be studied. If approved, the Individual Environmental Assessment must be prepared according to the terms of reference.
Thermal Treatment:	Use of elevated temperatures to treat wastes (e.g., combustion or gasification).
Tipping Fee:	A monetary fee paid to process and dispose of waste at a facility.
Toxic Equivalents Quotients (TEQs):	Used to report toxicity-weighted masses of mixtures of dioxins. The dioxin toxicity equivalent value is compared to 2, 3, 7, 8, tetrachloridibenzo-*p*-dioxin, and determined by adding the products of the measured concentration of each dioxin and furan congener multiplied by the toxicity equivalent factor.
Toxic Waste:	A waste that can produce injury if inhaled, swallowed, or absorbed through the skin.
Transfer Station:	Facility where material is transferred from collection vehicles to larger trucks or rail cars for longer distance transport.
Trommel:	A rotary cylindrical screen typically inclined at a downward angle that separates materials of different physical size. Trommel screens are used to separate mixed recyclables, municipal solid waste components, or to screen finished compost from windrow and aerated static pile systems.
Undertaking*:	An enterprise, activity or a proposal, plan, or program that a proponent initiates or proposes to initiate.
United States Environmental Protection Agency AP-42 (US-EPA AP-42):	US-EPA document Compilation of Air Emission Factors, Volume 1: Stationary Point and Area Sources.

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Urea:	A form of nitrogen that converts readily to ammonium.
User Fee:	Fee collected from only those persons who use a particular service, as compared to one collected from the public in general.
Venturi Scrubbers:	Air pollution control devices that use water to remove particulate matter from emissions.
Volume Reduction:	Processing waste materials to decrease the amount of space they occupy, usually by compacting, shredding, incineration, or composting.
Waste Characterization:	The process of identifying the various components, including quantities, and materials found within a waste stream.
Waste Exchange:	Arrangement in which individuals or companies exchange their wastes for the benefit of both parties.
Waste Feed:	The continuous or intermittent flow of wastes into an incinerator or other device.
Waste Generation:	The weight or volume of materials and products that enter the waste stream before recycling, composting, landfilling, or combustion takes place. This also can represent the amount of waste generated by a given source or category of sources.
Waste Generator:	The individual, household, establishment or business engaged in an activity that generates a specific waste or wastes.
Waste Management System:	A set of facilities or equipment used in, and any operations carried out for, the management of waste including the collection, handling, transportation, storage, processing or disposal of waste, and may include diversion programs and facilities and one or more waste disposal sites.
Waste Minimization:	Measures or techniques that reduce the amount of wastes generated during industrial production processes; term is also applied to recycling and other efforts to reduce the amount of waste going into the waste stream.

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Waste Reduction:	Using at-source reduction, reuse, or composting to prevent or reduce waste generation.
Waste Stream:	The total flow of waste from homes, businesses, institutions, and manufacturing plants that is recycled, burned, or disposed of in landfills, or segments thereof such as the "residential waste stream" or the "recyclable waste stream."
Waste:	1. Refuse from places of human or animal habitation. 2. Unwanted materials left over from a manufacturing process.
Waste-to-Energy (WTE) Facility/Municipal-Waste Combustor:	Facility where recovered municipal waste is converted into a usable form of energy, usually via combustion.
White Goods:	Usually large household appliances such as washing machines, dishwashers, and refrigerators/freezers.
Willing Seller:	Landowner who is interested in selling their property.
Yard Waste:	The part of waste generated at the household in the yard composed of grass clippings, leaves, twigs, branches, and other garden refuse.
York:	The Regional Municipality of York or its geographic area, as context requires.
Zero Waste:	Refers to efforts to reduce waste disposal to zero, or as close to zero as possible, by minimizing excess consumption and maximizing the recovery of wastes through recycling and composting and other diversion efforts.

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List of Abbreviations

AADT	Annual Average Daily Traffic
AD	Anaerobic Digestion
ADT	Alternative Disposal Technology
AGE	Above Ground Exposed
AGP	Above Ground Protected
ALS	ALS Laboratory Group
ANSI	Area of Natural and Scientific Interest
APC	Air Pollution Control
AQI	Air Quality Index
AQSA	Air Quality Study Area
ASTDR	Agency for Toxic Substances and Disease Registry
ASTM	American Society for Testing Materials
ATR	Automatic Traffic Recorders
BG	Below Ground
BTU	British Thermal Unit
BWI	Biological Waste Incinerator
CAA	*Conservation Authorities Act*
CAC	Criteria Air Contaminants
CAEAL	Canadian Association of Environmental Analytical Laboratories
Call	The Call for Willing Sellers
CCME	Canadian Council of Ministers of the Environment
Cd	Cadmium
CDC	Centers for Disease Control
CEAA	*Canadian Environmental Assessment Act*
CEMS	Continuous Emission Monitoring Systems
CEPA	*Canadian Environmental Protection Act*
CEC	Commission of European Communities

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CH4	Methane
CHMS	Canadian Health Measures Survey
CHP	Combined Heat and Power
CN	Soil Curve Number
CO	Carbon Monoxide
CO_2	Carbon Dioxide
C of A	Certificate of Approval
COPC	Chemicals of Potential Concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRC	Community Recycling Centre
CSR	Corporations Supporting Recycling
CWTC	Chemical Waste Treatment Center
D&O	Design and Operation
DMA	Dimethyl arsenic
DPA/EHBA	Database of Published Articles on European Human Biomonitoring Activities
Durham	The Regional Municipality of Durham
EA	Environmental Assessment
EA ToR	Environmental Assessment Terms of Reference:
EAA	*Environmental Assessment Act*
EAAB	Ministry of Environment Environmental Assessment and Approvals Branch
EFW	Energy-from-Waste
EOI	Expression of Interest
EPA	*Environmental Protection Act*
EPIC	Environmental and Plastics Industry Council
EPR	Extended Producer Responsibility
EQL	Estimate of Quantification
EQS	Environmental Quality Standard
ERA	Ecological/Environmental Risk Assessment

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ES	Endangered Species
ESA	Environmentally Significant Area
ESBIO	Expert Team to Support Biomonitoring in Europe
ESP	Electrostatic Precipitator
EU	European Union
FA	*Fisheries Act*
Facility	The Proposed Thermal Treatment Facility
FOE	Friends of the Earth
GC/MS	Gas Chromatograph/Mass Spectrometer
GerES	German Environmental Survey
GHG	Green House Gas
GIS	Geographic Information System
GJ	Gigajoule
GTA	Greater Toronto Area
ha	Hectares
HAP	Hazardous Air Pollutants
HBM	Human Biomonitoring
HCl	Hydrogen Chloride
HDPE	High Density Polyethylene
HF	Hydrogen Fluoride
Hg	Mercury
HHERA	Human Health and Ecological Risk Assessment
HHW	Household Hazardous Waste
HRGC/GRMS	High Resolution Gas Chromatograph/High-resolution Mass Spectrometer
HWI	Hazardous Waste Incinerator
IC&I	Industrial, Commercial & Institutional
ICP/MS	Inductively coupled plasma mass spectrometry
ID	Induced draft

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IDAD	Institute for Environment and Development
IESO	Independent Electricity System Operator
I-TEQ	International Toxic Equivalency Factor
IWA	Interim Waste Authority Ltd.
IWMS	Integrated Waste Management System
JWMG	Durham/York Joint Waste Management Group
LCA	Life Cycle Analysis
LIPOR	Intermunicipal Waste Management of Greater Porto
LOS	Level of Service
LRASA	Local Risk Assessment Study Area
LSRCA	Lake Simcoe Region Conservation Authority
MACT	Maximum Achievable Control Technology
Max	Maximum
MBCA	*Migratory Birds Convention Act*
MBT	Mechanical, Biological Treatment
Metro Toronto	The Regional Municipality of Metropolitan Toronto
Min	Minimum
MIREC	Maternal/Infant Research on Environmental Chemicals
MMA	Monomethyl arsenic
MNR	Ontario Ministry of Natural Resources
MOE	Ontario Ministry of the Environment
MOU	Memorandum of Understanding
MPAC	Municipal Property Assessment Corporation
MPOI	Maximum Point of Impingement
MRF	Materials Recovery (or Recycling) Facility
MSW	Municipal Solid Waste
MSW-DST	Municipal Solid Waste Decision Support Tool
MTO	Ontario Ministry of Transportation

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MWI/MSWI	Municipal Waste Incinerator/Municipal Solid Waste Incinerator
NGO	Non-Governmental Organizations
NHANES	National Health and Nutritional Examination Survey
NHES	National Health Examination Surveys
NHIC	Natural Heritage Information Centre
NIOSH	National Institute for Occupational Safety and Health
NO	Nitric Oxide
NOx	Nitrogen Oxides
NPRI	National Pollutant Release Inventory
Reg. 347	Regulation 347 under the *Environmental Protection Act* (R.R.O. 1990)
OCC	Old Corrugated Cardboard
OEBA	*Ontario Energy Board Act*
OMNR	Ontario Ministry of Natural Resources
ONP	Old Newspaper
OPG	Ontario Power Generation
OPSS	Ontario Provincial Standard Specification
OTR	Ontario Typical Range
PAC	Powdered Activated Carbon
PAH	Polycyclic Aromatic Hydrocarbons
Particulate	A particle of a solid or liquid that is suspended in air.
Pb	Lead
PCB	Polychlorinated biphenyl
PCDD/PCDF	Polychlorinated dibenzo-p-dioxins and dibenzofurans (Dioxins and Furans)
PET	Polyethylene Terephthalate
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter <2.5 µm
POI	Point of Impingement
PTHIA	*Public Transportation and Highway Improvement Act*

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QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RA	Risk Assessment
RDF	Refuse Derived Fuel
RDL	Reportable Detection Limit
Regions	The Regional Municipalities of Durham and York
REOI	Request for Expressions of Interest
RFP	Request for Proposals
RFQ	Request for Quotations
RoC	Record of Consultation
ROP	Regional Official Plan
RPD	Relative Percent Difference
SCR	Selective Catalytic Reactor
Site	The Proposed Site for the Thermal Treatment Facility
SLC	Site Liaison Committee
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulphur Dioxide
SOP	Standard Operating Procedure
SRF	Solid Recovered Fuel
SSO	Source Separated Organics
SVOC	Semi-volatile organic compounds
SWM	Stormwater Management
TDGA	*Transportation of Dangerous Goods Act*
t/yr	Tonnes/year
TEF	Toxic Equivalency Factor
TEQ	Toxic Equivalent Quotient
TEQs	Toxic Equivalents

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TIBL	Thermal Internal Boundary Layer
TMC	Turning Movement Counts
ToR	Terms of Reference
Toronto	City of Toronto
tpy	Tonnes per year
TT	Thermal Treatment
U.S.A.	United States
US EPA	United States Environmental Protection Agency
US-EPA AP-42	United States Environmental Protection Agency AP-42
VOC	Volatile Organic Compounds
WDO	Waste Diversion Ontario
WHO	World Health Organization
WPCP	Water Pollution Control Plant
WTE	Waste-to-Energy
WTEF	Waste-to-Energy Facility
York	The Regional Municipality of York

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Units of Measurement

Mass/Weight

Re. Orders of Magnitude: x 10^2 = x 100, x10^3 = x 1000, etc.

kt	kilotonne	1 x 10^6 kg
t	metric tonne	1 x 10^3 kg
kg	kilogram	1 x 10^3 g
g	gram	
mg	milligrams	1 x 10^{-3} grams
µg	microgram	1 x 10^{-6} grams
ng	nanogram	1 x 10^{-9} grams
pg	picogram	1 x 10^{-12} grams
lb	pound	1 lb = 453.592 grams

Power

W	watt	
kW	kilowatt	1 x 10^3 W
MW	megawatt	1 x 10^6 W

Volume

scf	standard cubic feet	35.3 m^3
L	litre	
mL	millilitre	1 L = 1 x 10^3 mL
m^3	cubic metre	1 m^3 = 1 x 10^3 L
Rm^3 and DSm^3	dry cubic metre of flue gas corrected to standard conditions (25°C, 101.3 kPa, 11% O2) as defined by MOE APC on Incinerators Policy 01-03-02	

Time

s	second

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min	minute
hr	hour
wk	week
y	year

Elements

Al	Aluminum
As	Arsenic
Be	Beryllium
Cd	Cadmium
Cr	Chromium
Cu	Copper
Hg	Mercury
Mn	Manganese
Ni	Nickel
Pb	Lead
Si	Silver
Sn	Tin
Tl	Thallium
V	Vanadium
Zn	Zinc

Compounds

CO	Carbon Monoxide
CO_2	Carbon Dioxide
CH_4	Methane
HCl	Hydrogen Chloride
NO	Nitric Oxide
NO_x	Nitrogen Oxides

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N_2O	Nitrous Oxide
PBDE	Polybrominated diphenyl ethers
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PCDD/F	Polychlorinated dibenzo-dioxin/furan
PCDDs	Polychlorinated dibenzodioxins
PCDFs	Polychlorinated dibenzofurans
PCN	Polychlorinated naphthalene
PCP	Pentachlorophenol
$PM_{2.5}$	Particulate Matter Diameter <=2.5 micrometres
PUF	Polyurethane foam
SO_2	Sulfur dioxide
TPM	Total Particulate Matter
VOCs	Volatile organic compounds

Miscellaneous

BTU	British Thermal Unit
°C	temperature in degrees Celsius
N/A	not available
%	percent
Cfm	cubic feet per minute
Ppmdv	part per million by dry volume
Ppmv	part per million by volume
ppm (part per million)	mg/kg, ug/g, ng/mg, pg/ug, mg/L, ug/mL, ng/uL
ppb (part per billion)	ug/kg, ng/g, pg/mg, ug/L, ng/mL, pg/uL
ppt (part per trillion)	ng/kg, pg/g, fg/mg, ng/L, pg/mL, fg/uL
min	minimum
max	maximum

EA COMPONENTS AND LIST OF STUDIES

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12.0	Changes to the EA
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SEQUENCE OF EVENTS & STUDY TIMELINE

The following table outlines the sequence and timing of Study events and a brief description of each event.

Study Event	Completion	Description
EA Terms of Reference Approval	March 31, 2006	• Minister of the Environment approved EA Terms of Reference on March 31, 2006.
EA Study Initiated	April 2006	• Initiation of the EA Study.
Evaluation of “Alternatives to” the Undertaking (i.e. Technologies)	2006	• Development and evaluation of “Alternatives to”.
Identification of Preferred Approach to Manage Residual Waste	2006	• Identification of preferred “Alternative to” to manage Durham/York residual waste. • Selection of thermal treatment as preferred “Alternative to” based on results of evaluation and consultation undertaken as part of EA.
Evaluation of “Alternative Methods” of Carrying out the Undertaking (i.e. Siting)	2006 – May 2009	• Evaluation and identification of Recommended Preferred site for managing Durham/York residual waste.
Generic Human Health and Ecological Risk Assessment Study Released	2007	• Regional Council receives report and approves public consultation on report.
Request for Qualifications Issued	July 2007	• Issued by Durham Department of Finance.
Identification of Recommended Preferred Durham/York Site	October 2007	• Identification of Clarington 01 as recommended preferred site based on results of evaluation and consultation undertaken as part of EA.
Request for Qualifications Closes	October 2007	• Evaluation of qualifications by staff from Durham and York and members of the Study Team from Jacques Whitford, Genivar and Deloitte & Touche.
Approval of Qualified Vendors	January 2008	• Approval by Durham and York Regional Councils • Five (5) vendors pre-qualified.
Approval of Recommended Preferred Site Clarington 01 by Regional Councils	January 2008	• Approval by Durham and York Regional Councils.
Request for Proposals issued to prequalified vendors to identify a preferred vendor and technology	August 16, 2008	• Development, approval and issuance of RFP by Durham and York.
Request for Proposals Closes	February 19, 2009	• Submission deadline extended from January 15, 2009.
Identification of Recommended Preferred Durham/York Technology Vendor	April 2009	• Report regarding evaluation of proposals submitted as part of RFP issued by Durham and York Regions. • Authorization from the Regional Councils to proceed with negotiation and development of a contract with the selected, successful proponent.
Completion of Site Specific Studies to confirm suitability and documentation to support approvals	January – July 2009	• Incorporation of vendor data into site-specific studies to confirm suitability of site. • Preparation of documentation to support decision.
Completion of Site-specific Risk Assessment	January – July 2009	• Analysis of data and incorporation into final recommendation of site suitability.

Study Event	Completion	Description
Completion of EA Documentation	May-July 2009	• Submission of draft EA to Regional Councils. • Approval of draft EA by Regional Councils.
Submission of EA Documentation to Minister of Environment for Approval	July 31, 2009	• Submission of the EA document for consideration by the Minister of the Environment.
Submission of Amended EA Documentation to Minister of Environment for Approval	November 27, 2009	• Submission of the Amended EA document for consideration by the Minister of the Environment.
EA Review and Decision by Minister	2009- Spring 2010	• Ongoing.

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Section 1 Summary

The Durham/York Residual Waste Study was initiated jointly by the Regions of Durham and York in 2005 to identify a long-term sustainable solution to manage the solid waste remaining after reuse, reduction and recycling (including composting) initiatives otherwise referred to in this EA Study document as "post-diversion residual waste". Both Durham and York recognized the advantages of partnering in the process as they faced similar waste management challenges and had partnered successfully on other projects in the past. The Regions officially reached an agreement to proceed as co-proponents in the completion of an EA Study on June 30, 2005.

The EA Study entailed the evaluation of: residual waste management alternatives considering the potential effects on the environment; the availability of mitigation measures that address, in whole or in part, these effects; and, the comparison of the advantages and disadvantages of the remaining "net" effects. The result of this process provided the planning rationale and support for the preferred solution, the thermal treatment of post-diversion residual waste at the Clarington 01 Site.

1. Introduction and Background

Over the past few decades, the Regional Municipality of Durham (Durham Region) and the Regional Municipality of York (York Region) have spent considerable time and resources in attempting to establish and site new long-term waste disposal capacity to manage their post-diversion residual waste within their respective Regional boundaries. The most recent effort was the Greater Toronto Area (GTA) Interim Waste Authority (IWA) EA process that identified potential landfill sites in Durham and York Regions. In total, this EA process was reported to have cost in excess of $100 million, caused significant social disruption and failed to yield any new landfill disposal capacity.

As a result of continued failed attempts to establish new landfill disposal capacity, Durham and York, (the Regions) along with other GTA municipalities, entered into contracts with the private sector to export residual waste primarily to Michigan. However, through negotiations completed at the provincial and federal levels, at the end of December 2010, the Michigan border will be closed to municipal waste from Canada, which includes residential residual waste from Durham and York Regions. As a result, the Regions do not currently have sufficient long-term waste disposal capacity within their Regional boundaries or the direct control required to support their current waste management responsibilities.

Although they have become reliant on exporting their residential residual waste outside their regional boundaries, both Regions desire a Durham/York based solution that is socially and environmentally acceptable to both communities, that maximizes environmental protection and that fosters the wise management of potential resources.

Both Regions remain committed to investigating technically feasible waste reduction, reuse, recycling and disposal opportunities. Durham is dedicated to reaching its goal of diverting 70% of its residential waste from disposal by December 2013 and will look for opportunities to increase diversion even more in the future. Similarly, York is committed to designing a waste management system that will divert approximately 65% of its residential waste from disposal in the short-term and hopes to increase this rate to over 70% in the 10-year planning horizon (2016). Moreover, both Regions are committed to developing strategies that will promote reducing and reusing waste so that managing the material may one day be avoided all-together.

However, even with significant decreases in waste production (i.e., via near zero waste initiatives) and increases in waste diversion, there still remains a residual waste that is required to be managed by the Regions in the foreseeable future.

Given the above similarities and a long history of Regional partnerships on municipal infrastructure and services, the Regions of Durham and York agreed undertake a joint Residual Waste Planning Study in accordance with Ontario's *Environmental Assessment Act*. Through this process, the Regions worked together to address the social, economic, and environmental concerns of residents to develop a sustainable, long term waste residual management solution.

Durham and York also recognize the problem that the Province of Ontario does not have sufficient energy to meet its growing needs. Both Regions recognize that there is opportunity associated with the utilization of the waste stream as a fuel source to produce energy and have identified this opportunity as a key part of the EA Study.

The Durham/York Residual Waste Study was initiated jointly by the Regions in 2005 to identify a long-term sustainable solution to manage the solid waste remaining after reuse, reduction and recycling (including composting) initiatives otherwise referred to in this Environmental Assessment (EA) as “post-diversion residual waste”. Both Regions’ are in need of a solution to manage the waste remaining after diversion (residual or post-diversion waste). The Regions are working to address the social, economic, and environmental concerns of residents through the EA Study, which examines potential waste management alternatives. Each Region also recognizes the advantages of partnering in the process as they faced similar waste management challenges and had partnered successfully on other projects in the past. The Regions officially reached an agreement to proceed as co-proponents in the completion of an EA Study on June 30, 2005.

The EA Study was undertaken in accordance with the Approved EA Terms of Reference which defined the framework and methodology for the EA including the scope, study areas, study periods and consultation to be included in the Project. The EA Terms of Reference included those activities required to fulfill the requirements of Ontario’s *Environmental Assessment Act* (EAA). The EA Terms of Reference, developed in 2005 were approved by the Ontario Minister of the Environment on March 31, 2006 (See **Appendix A-1**).

In order to achieve the desired purpose of the EA and resolve the problems and challenges appropriately, the EA Study evaluated residual waste management alternatives considering the potential effects on the environment, the availability of mitigation measures that address, in whole or in part, these effects and the comparison of the advantages and disadvantages of the remaining “net” effects.

Although it was recognized from the outset that all waste management systems, no matter how progressive, require a landfill component, the Regions intent was to minimize this component as originally described in the approved EA Terms of Reference. A landfill only system, whereby a new landfill site capable of managing all waste that remains after at-source diversion does not meet the purpose of the undertaking, and thus was not considered. The decision to focus the statement of purpose and need, is based upon the factors noted above, in particular the historic experience within Durham and York regarding attempts to site new landfill capacity within their jurisdictions. It has not proven feasible to site new landfills in either jurisdiction, resulting in the current situation where all or a portion of waste is exported outside of the municipalities for disposal. The only reasonable options for a ‘local’ solution, which would provide capacity to manage the majority of the waste that remains after at-source diversion, are processing/treatment options such as mechanical, biological and thermal treatment.

The result of this EA Study process provided the recommended solution to the problem and the planning rationale and support for the preferred solution: the thermal treatment of post-diversion residual waste at the Clarington 01 Site in the Municipality of Clarington, Durham Region. This EA study has resulted in a long-term, local and sustainable solution for the management of post-diversion residual waste.

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Section 2 Summary

The Proponents for the EA Study are 'The Regional Municipality of Durham' (Durham Region) and 'The Regional Municipality of York' (York Region). Collectively, they will be referred to as "the Regions" in the EA Study document.

The Regions continue to face the challenge of managing residual waste. Although they have become reliant on exporting their residential residual waste outside their jurisdictional boundaries, both Regions desire a Durham/York based solution that is socially and environmentally acceptable to both communities, that maximizes environmental protection and that fosters the wise management of potential resources. Therefore, on June 30, 2005, the Regions reached an agreement to jointly pursue a residual waste management Environmental Assessment Study to identify a long-term sustainable solution to manage the waste remaining after reuse, reduction and recycling (including composting) initiatives otherwise referred to in this EA Study document as "post-diversion residual waste".

Both Regions' current waste management operations include a variety of activities that have successfully reduced the volume of waste going to landfill and increased diversion rates to almost 50%, Furthermore, both Regions remain committed to investigating technically feasible waste reduction, reuse, recycling and disposal opportunities. Durham Region is dedicated to reaching its goal of diverting 70% of its residential waste from disposal by December 2013 and will look for opportunities to increase diversion even more in the future. Similarly, York Region is committed to designing a waste management system that will divert approximately 65% of its residential waste from disposal in the short-term and hopes to increase this rate to over 70% in the 10-year planning horizon (2016). Moreover, both Regions are committed to developing strategies that will promote reducing and reusing waste so that managing the material may one day be avoided all-together.

Through extensive public consultation, the Regions have determined that a local landfill solution is not acceptable. The Regions also determined that continuing to transport waste to a landfill located outside of Ontario was not sustainable, as it does not provide the security of a long-term stable solution. This conclusion was reached after careful consideration of the fact that any non-local landfill option exposes the Regions to significant public policy risks that are not within their control. This direction provided the basis for Durham Region and York Region not including a purely landfill based alternative in its evaluation of long-term waste disposal options but rather to pursue alternatives that minimize landfill disposal requirements and in-turn reduce the potential risks identified above.

2. Identification of the Proponents

The Proponents for the EA Study are **'The Regional Municipality of Durham'** (Durham Region) and **'The Regional Municipality of York'** (York Region). Collectively, they will be referred to as "the Regions" in the EA Study. Figure 2-1 indicates the location and boundaries of the two proponents.

The decision to pursue a joint initiative was based on a number of factors, including:

- A long history of successful partnerships between the Region's related to municipal infrastructure and servicing;
- The potential economies of scale associated with larger quantities of material to be managed which have been demonstrated to reduce overall operating costs and therefore reduce the impact to the taxpayer;
- Common priorities and goals with respect to the implementation of fully integrated waste management systems focused on waste reduction, reuse and recycling;
- Common histories with respect to the establishment of long-term waste disposal capacity. In particular, issues with establishing local landfill capacity led both Regions' ultimately to resolve that no new landfill capacity would be sited within their municipal boundaries; and,
- The common need for long-term waste disposal capacity.

On June 30, 2005, the Regions reached an agreement to jointly pursue a residual waste management Environmental Assessment Study to identify a long-term sustainable solution to manage the solid waste remaining after reuse, reduction and recycling (including composting) initiatives otherwise referred to in this EA Study document as "post-diversion residual waste". Specifically, the agreement outlined the scope of the EA Study, how it would be managed, financial commitments, and other general mattters.

The agreement outlined:

- the scope and purpose of the EA, as stated in Section 3 of the EA Study document;
- that the EA shall meet the requirements of the EAA,
- significant milestones;
- compensation policies;
- responsibilities for disposal of residues generated by preferred technologies/systems;
- processes for potential future agreements;
- process for study management and development and composition of the Joint Waste Management Group (JWMG);
- financial and staffing responsibilities of both Regions; and,

- other general matters such as agreement commencement and termination dates, successors and assignors, agreement amendment and arbitration process, and notification requirements.

The Regions agreed to share the responsibility for implementing the Project including sharing the majority of the costs evenly. Both Durham Region and York Region recognized the advantages of partnering in the process as they faced similar waste management challenges and had partnered successfully on other projects in the past. The agreement is to be terminated upon completion of the EA Study. A copy of the agreement is included in the Terms of Reference located in **Appendix A-1** of this EA Study document.

The Regions made a number of commitments in the agreement including ensuring that the the EA Study document satisfies all requirements under the EAA and that only technologies that meet or exceed regulatory requirements would be considered during the EA Study. EA Study document committtments are outlined in Section 13.

The JWMG was set up by the Regions to manage and oversee all aspects of the Study. The JWMG is a sub-committee to Durham's Works Committee and York's Waste Management Committee. The Group consists of elected officials, residents from Durham Region and York Region, and an external observer. All major decisions during this EA Study were voted on by the JWMG and carried if the majority of voters supported the decision.

Upon approval of the EA Study document, the Proponents will work closely with the Preferred Technology Vendor to obtain all additional necessary approvals, in particular approvals under the EAA. The agreement between the Proponents, and the Preferred Technology Vendor, is currently being finalized and will be formalized following the approval of the EA and prior to the construction and operation of the Proposed Thermal Treatment Facility (the Facility).

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Identification of Proponents: Region of Durham and Region of York

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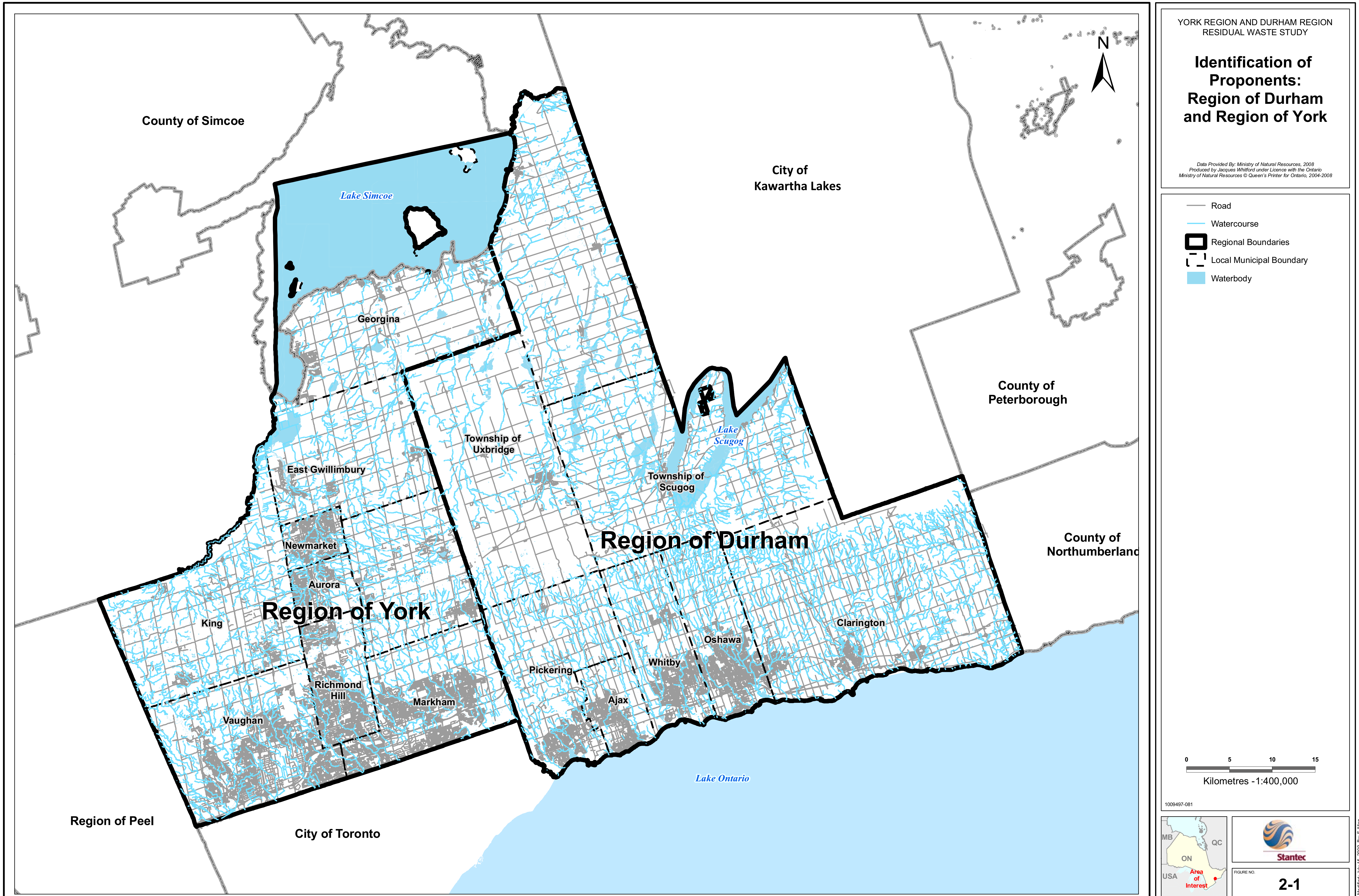

FIGURE NO.
2-1

Last Modified: July 15, 2009 By: S.Allen

2.1.1 Durham Region

Durham Region is one of five regional municipal governments of the Greater Toronto Area (GTA) established by the Province of Ontario in 1974. The system of government in this Region is comprised of two levels of municipal government; Durham Region is the upper tier government, and the eight area municipalities within its boundaries (Oshawa, Pickering, Ajax, Whitby, Clarington, Brock, Scugog, and Uxbridge) constitute the lower tier governments.

Located east of the City of Toronto, Durham Region covers an area of approximately 2,535 square kilometres. It borders Toronto and the Regional Municipality of York (York Region) in the west, Simcoe County in the north and Northumberland County, Peterborough County and the City of Kawartha Lakes in the east. In May 2006, Durham Region's population was 561,258. It is anticipated that by the year 2021, 970,000 people will inhabit the Region.

2.1.1.1 Durham Region - Current Waste Management System

Currently, the Durham Region provides collection of recyclables for all eight municipalities and provides collection of garbage and food waste, leaf and yard waste, Christmas trees, White Goods and Bulky goods for all municipalities except Oshawa and Whitby which are locally responsible for collection of these materials.

Durham Region is responsible for:

- Collection, processing and marketing of blue box recyclables;
- Disposal of residential residual waste;
- Composting of SSO, as well as leaf and yard waste;
- Operation of a Recycling Centre;
- Operation of Brock Township landfill site;
- Operation of three waste transfer facilities;
- Operation of four household hazardous waste depots; and,
- Education and promotion of waste reduction programs.

In 2007, Durham Region managed approximately 224,000 tonnes of residential waste with approximately 48% of the waste being diverted from landfill. Residual waste continues to be exported to Waste Management's Pine Tree Acres landfill site in Michigan.

To date, several of the key goals of Durham Region's *Long Term Waste Management Strategy Plan: 2000 to 2020* have already been reached:

- 48% of the residential waste managed in 2007 was diverted from disposal (near the 50% goal);
- A SSO curbside collection program was implemented in 2006 to further increase waste diversion rates and complement the integrated residential waste management program;

- Capacity at Waste Management's Pine Tree Acres landfill in Michigan was secured to accept residual waste (until 2010) to replace Toronto's Keele Valley Landfill which closed in 2002; and,
- An EFW facility is being considered for the long-term treatment of residual waste.

Residents continue to strongly support waste diversion programs in the Region. On January 23, 2008, Durham Regional Council stated its commitment to increasing waste diversion:

"The Region of Durham agrees to continue to support an aggressive residual garbage diversion and recycling program in order to achieve and/or exceed on or before December 2010, a 70 percent diversion recycling rate for the entire Region and that such aggressive programs shall continue beyond 2010."

Durham Region retained a consultant in 2008 to assist in identifying possible strategies for reaching 70% diversion. The consultant's study released in March 2009 suggests that Durham Region's waste diversion rate can be increased in two ways, by:

- Increasing participation in existing waste diversion programs; and,
- Creating new waste diversion opportunities.

The report suggests that the combination of these two initiatives has the potential to increase Durham Region's current diversion rate of 47.7% to approximately 73%.

The study concludes that reaching 70% diversion by December 2010 may not be realistic, considering the time it takes for newly implemented waste diversion programs to come to fruition. The consultant estimates that a more reasonable date for reaching 70% diversion is 2013 (Golder Associates, 2009).

2.1.2 York Region

York Region, another of the five regional municipal governments of the GTA, was established by the Province of Ontario in 1971. The regional system of government in this Region is comprised of two levels of municipal government; York Region is the upper tier municipal government, and the nine area municipalities within its boundaries (Vaughan, Aurora, Markham, Newmarket, East Gwillimbury, Richmond Hill, Whitchurch-Stouffville, Georgina, and King) constitute the lower tier.

York Region is located north of the Toronto and covers an area of approximately 1,776 square kilometres. It borders Simcoe County in the north, Peel Region in the west and Durham Region in the east. In 2006, York Region had a total estimated population of approximately 950,674. It is anticipated that by the year 2026, 1.3 million people will inhabit York Region.

2.1.2.1 York Region - Current Waste Management System

Currently, the area municipalities are responsible for the delivery of the following waste management services within their respective communities:

- Collection of residential residual waste, blue box materials, yard waste, bulky items, white goods, and SSO;

- Waste management policies and enforcement;
- Promotion and education;
- Recycling depots;
- Public space recycling; and,
- Provision of recycling containers.

York Region is responsible for the delivery of the following waste management services:

- Processing and marketing of blue box materials;
- Transfer, composting, and marketing of yard waste ;
- Transfer, composting, and marketing of SSO;
- Design, construction and operation of Community Environmental Centres;
- Waste management policies and enforcement;
- Promotion and education;
- Operation of household hazardous waste depots;
- Operation of municipal waste transfer, white goods, and blue box recycling drop-off facilities;
- Operation of residential electronics drop-off facilities; and,
- Operation of reusable goods diversion events.

In 2007, York Region managed approximately 319,000 tonnes of residential waste with approximately 45% of the waste being diverted from landfill. In 2007, residual waste was exported to three landfills: Toronto's Green Lane Landfill in Ontario, Onyx's Arbor Hills Landfill in Michigan, and Republic Waste Services' Carleton Farms Landfill in Michigan. York Region has recently committed to sending 100,000 tonnes of residual waste per year to the Dongara plant in Vaughan where the waste is processed into "fuel pellets" to be used as a fuel product to substitute for conventional fossil fuel. These pellets are currently exported outside York Region and in some cases outside Canada.

In 2008, the York Region ceased all shipments of residential residual waste to Michigan. This was made possible as a result of the above diversion initiatives, the commitment to the Dongara plant, and the continuation of the contract with the Green Lane Landfill for the receipt of residential residual waste. Although this has secured short-term waste disposal capacity for York Region (Green Lane Landfill contract expires on December 31, 2012 and Dongara contract expires on June 30, 2028), these contracts do not satisfy the long-term requirements (35 years) of York Region as defined in this EA study. However, the Region of York is still committed to supplying post-diversion residual waste to the facility that cannot be managed by through these existing contractual relationships.

Several of the priority initiatives mentioned in York Region's *Joint Waste Diversion Strategy* have already been implemented, including:

- Household SSO collection region-wide; and,
- Optimized blue box recycling: weekly collection region-wide.

These two initiatives have assisted York Region to increase its waste diversion rate to 45.7% in 2007, up from 34% in 2005.

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Section 3 Summary

Over the past few decades, Durham and York Regions have spent considerable time and money attempting to establish and site new long-term waste disposal capacity to manage their post-diversion residual waste within their respective Regional boundaries. The following section provides a summary of the each of the Regions past, present, and potential future waste management practices and initiatives to reduce waste going to landfill.

As a result of continued failed attempts to establish new landfill disposal capacity, Durham and York entered into contracts with the private sector to export residual waste primarily to Michigan, U.S.A. However, in December 2010, the border will be closed to municipal waste from Canada, which includes residual waste from Durham and York Regions. As a result, the Regions do not currently have sufficient long-term waste disposal capacity.

In accordance with Subsection 6.1(2)(a) of the *Environmental Assessment Act*, the purpose of the undertaking for the EA is:

> *"to process - physically, biologically and/or thermally - the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources - both material and energy - and to minimize the amount of material requiring landfill disposal.*
>
> *In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered."*

As outlined in Section 3.1 of the Approved EA Terms of Reference, the specific waste to be managed and service area of this Undertaking is:

- Municipal Solid Waste (MSW) from residential sources generated within Durham and York remaining after at-source diversion;
- A portion of post-diversion Industrial, Commercial and Institutional (IC&I) waste traditionally managed by the respective Regions at Regional waste disposal facilities; and,
- Municipal post-diversion residual waste from neighbouring non-Greater Toronto Area (GTA) municipalities that may provide disposal capacity for processing residues. For example, the City of Peterborough, the County of Peterborough and the County of Northumberland. A condition for including waste from neighbouring non-GTA municipalities in the total amount of material that would be managed by this undertaking, is the ability of these municipalities to provide disposal capacity (landfill space) for processing residues as neither Durham nor York currently have sufficient long-term disposal capacity for such residues.

3. Statement of Purpose

As outlined in Section 3.1 of the Approved EA Terms of Reference, this section describes the purpose of the Undertaking. To understand the reasoning for the completion of the EA Study, it is important to first understand the challenges and opportunities faced by the Regions in managing their respective waste streams. These challenges and opportunities form the basis for the purpose of the Undertaking as described in Section 1 of this EA Study document and the Approved EA Terms of Reference and have resulted in the completion of this EA Study in which they have been addressed.

3.1 Purpose of the Undertaking

The Undertaking, defined by way of this EA Study, is subject to approval under the Ontario EAA. As a result, in 2005 and 2006 Durham and York prepared an EA Terms of Reference to guide the EA Study. These EA Terms of Reference were approved by the Minister of the Environment on March 31, 2006.

In accordance with Subsection 6.1(2)(a) of the EAA, the purpose of the Undertaking for the EA is described as follows and was outlined in Section 3.1 of the approved EA Terms of Reference:

> The purpose of the undertaking is:
>
> *"to process - physically, biologically and/or thermally - the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources - both material and energy - and to minimize the amount of material requiring landfill disposal.*
>
> *In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered."*

Durham and York developed the Approved EA Terms of Reference and have undertaken this EA to address the purpose of the Undertaking. In completing this EA Study, the following factors were identified as preexisting opportunities or constraints:

- Durham and York's strong desire to implement a safe and effective local solution as quickly as possible;
- Durham and York's commitment to aggressive source separated waste diversion programs and plans;
- Durham and York's historic experience associated with attempting to site new landfill capacity within the Regions and direction from both Regional Councils preventing the siting of new landfill capacity within either Region;
- The direction provided in the Durham's *Long Term Waste Management Strategy Plan: 2000 to 2020* and York's *Vision 2026*;

- The inability to export waste for disposal to Michigan after 2010; and,
- Other potential opportunities including the opportunity for additional materials recovery to further increase waste diversion efforts and energy generation potential.

3.2 Waste to be Managed and Service Area

As outlined in Section 3.1 of the Approved EA Terms of Reference:

"Specifically, the waste to be managed will be:

- *Municipal Solid Waste (MSW) from residential sources generated within Durham and York Regions remaining after at-source diversion;*
- *A portion of post-diversion Industrial, Commercial and Institutional (IC&I) waste traditionally managed by the respective Regions at Regional waste disposal facilities; and,*
- *Municipal post-diversion residual waste from neighbouring non-Greater Toronto Area (GTA) municipalities that may provide disposal capacity for processing residues. For example, the City of Peterborough, the County of Peterborough and the County of Northumberland. A condition for including waste from neighbouring non-GTA municipalities in the total amount of material that would be managed by this undertaking, is the ability of these municipalities to provide disposal capacity (landfill space) for processing residues as neither Durham nor York currently have sufficient long-term disposal capacity for such residues."*

At-source programs refer to those initiatives undertaken at the source of waste generation (e.g., at home or work/business) to eliminate the generation of waste, manage it at the source, or to divert wastes to an appropriate facility (e.g., separation of recyclable materials from the waste stream by the home owner and placement of the recyclable material in a blue box for curbside collection or backyard composting).

Projections were used to estimate the composition and amount of residual waste that would be managed by the potential residual waste amangement facility. Data from both Regions was used in the projections (i.e., waste management data, population projections, etc.). Waste streams considered include those outlined in Figure 3-1 below:

Figure 3-1 Characterization of Post-Diversion Residual Waste Requiring Disposal in 2011- Combined Durham and York

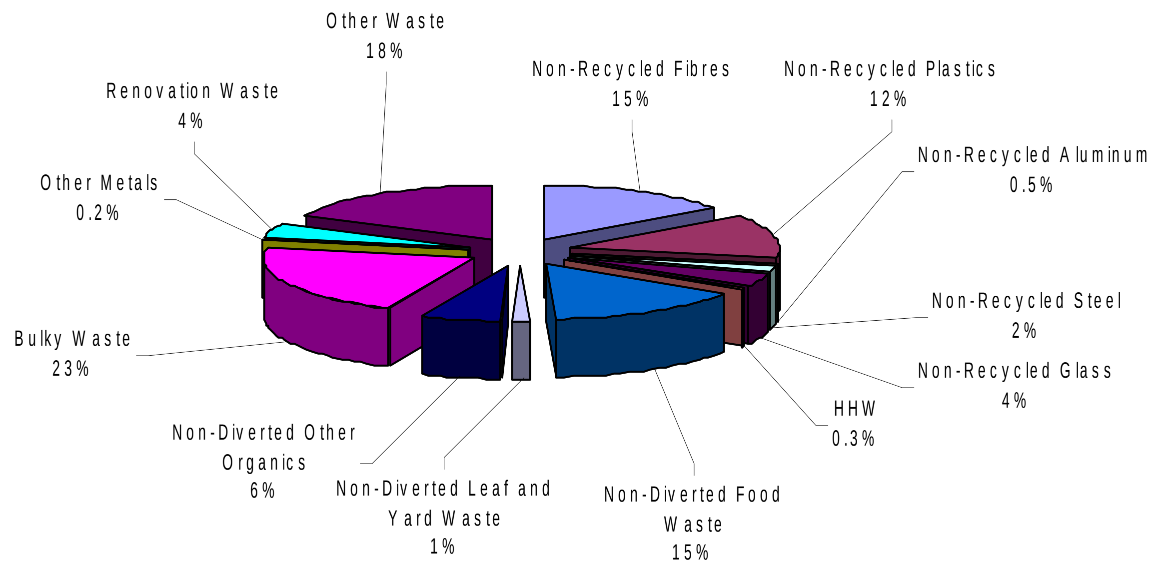

Table 3-1 shows the quantities of material generated, diverted and requireing disposal over the planning period for Durham and York.

Table 3-1 Quantities of Materials Generated, Diverted and Requiring Disposal Over the Planning Period - Durham and York Combined

For the 2011 to 2045 Period	2011 (tonnes)	2045 (tonnes)
Estimated Total Material Generation (Residential)	637,300	1,159,600
Estimated Annual Quantity Diverted At-Source	382,400	869,700
At-Source Diversion Rate	60%	75%
Estimated Annual Residual Quantity Requiring Management	254,900	289,900
Average Monthly Residual Quantity Requiring Management	21,200	24,200
Approximate Average Daily Residual Quantity Requiring Management (1)	1,020	1,160
35 Year Total Residual Wastes Quantity Requiring Management	Approximately 11,142,000	

(1) Annual quantity divided by 250 days per year.

Section 7.4.1.5 (Characterization and Quatities of Post-Diversion Residual Waste) provides a detailed summary of the projected composition and quantity of residual waste to be managed by both Regions over the 35-year planning period. Section 7.4.1.5 also provides a description of why although the estimated annual residual waste at the end of the planning period is 289,900 tpy,the maximum design capacity of the facility is 400,000 tpy.

The facility designed to process 140,000 tpy is designed to manage only those wastes from Durham and York Region. Any expansion beyond this capacity to support the importation of wastes from outside Durham and York Regions (as discussed and allowed for in the approved EA Terms of Reference) would be addressed as part of a subsequent approval under O.Reg. 101/07 (or the applicable piece of legislation at that time).

3.3 Role of Waste Diversion in the Regional Waste Management Systems

The role of at-source diversion and landfill disposal is established in the statement of purpose, stated above, which clearly expresses the intention of Durham and York to minimize the amount of material requiring landfill disposal. Both Regions have adopted a waste management hierarchy placing waste reuse, reduction and recycling as priorities in their systems.

The purpose of this EA study is to address the waste that remains after the application of at-source waste diversion. Consideration of waste diversion initiatives themselves, although included in the EA for planning purposes, are outside of the scope of this EA study.

3.3.1 Durham and York Region Waste Management

The following outlines the Regions waste management history, how each Region currently manages waste, and how the Regions intend to achieve higher diversion rates. Section 7 (Alternatives to the Undertaking) provides a more detailed discussion of the Regions historical, current, and future waste management practices.

3.3.1.1 History of Waste Management (Durham Region)

1974 Durham was formed by the Province of Ontario. Durham assumed responsibility for six operating local landfill sites located in Port Perry, Blackstock, Oshawa, Darlington, Uxbridge and Whitby. These facilities have all since been closed.

1985 Solid waste disposal was carried out by four regionally operated landfill sites, two privately owned landfill operations, and the Municipality of Metropolitan Toronto's (Metro Toronto) Brock West landfill. In addition to landfill disposal, a number of recycling groups operated in Durham.

1991 The Interim Waste Authority Ltd. (IWA) was created to find suitable long-term landfill capacity for the GTA. The Provincial Government announced that three long-term disposal sites for the GTA would be located in Durham, Peel, and Metro Toronto/York. The preferred site for Durham was in the Town of Pickering. The public reaction was strong and there were protests on how the search process was done. The project was working its way through the pre-hearing process when a new provincial government was elected in June 1995 and, in response to strong public opposition, the government ended the process. The consultant team costs for the Durham site search exceeded $11 million.

1997 Metro Toronto's Brock West landfill was closed and the bulk of Durham's residual wastes were sent to Metro Toronto's Keele Valley landfill located in neighbouring York.

1999 Durham adopted a *Long Term Waste Management Strategy Plan: 2000 to 2020* in December 1999. The main goals of the waste plan were:

- To divert at least 50 per cent of the residential waste from disposal by 2007 or earlier.
- To implement an integrated residential waste management system for the collection and processing or disposal of:
  - Blue box recyclables;
  - Food and yard waste compostables;
  - Residual residential wastes; and,
  - Special wastes.
- To secure an alternate source for the disposal of residential waste, when Toronto's Keele Valley Landfill Site was closed.
- To consider an "energy-from-waste" (EFW) facility for the disposal of post-diversion residual waste.

2002 On December 31, 2002, Toronto's Keele Valley Landfill closed and Durham began exporting the majority of its residential residual waste to Waste Management's Pine Tree Acres landfill site in Michigan. Only a small portion of Durham's Residual waste goes to the Brock Township landfill site, located within Durham's regional boundaries.

3.3.1.2 Current Waste Management System (Durham Region)

Currently, the Region of Durham provides collection of recyclables for all eight municipalities and provides collection of garbage and food waste, leaf and yard waste, Christmas trees, White Goods and Bulky goods for all municipalities except Oshawa and Whitby which are locally responsible for collection of these materials. Residual waste composition is outlined in Figure 3-1 above.

The Region of Durham is responsible for:

- Collection, processing and marketing of blue box recyclables;
- Disposal of residential residual waste;
- Composting of SSO, as well as leaf and yard waste;
- Operation of a Recycling Centre;
- Operation of Brock Township landfill site;
- Operation of three waste transfer facilities;
- Operation of four household hazardous waste depots; and,

- Education and promotion of waste reduction programs.

In 2007, Durham managed approximately 224,000 tonnes of residential waste with approximately 48% of the waste being diverted from landfill. Residual waste continues to be exported to Waste Management's Pine Tree Acres landfill site in Michigan.

To date, several of the key goals of Durham's *Long Term Waste Management Strategy Plan: 2000 to 2020* have already been reached:

- 48% of the residential waste managed in 2007 was diverted from disposal (near the 50% goal);
- A SSO curbside collection program was implemented in 2006 to further increase waste diversion rates and complement the integrated residential waste management program;
- Capacity at Waste Management's Pine Tree Acres landfill in Michigan was secured to accept residual waste (until 2010) to replace Toronto's Keele Valley Landfill which closed in 2002; and,
- An EFW facility is being considered for the long-term treatment of residual garbage.

Residents continue to strongly support waste diversion programs in the Region. On January 23, 2008, Durham Regional Council stated its commitment to increasing waste diversion:

"The Region of Durham agrees to continue to support an aggressive residual garbage diversion and recycling program in order to achieve and/or exceed on or before December 2010, a 70 percent diversion recycling rate for the entire Region and that such aggressive programs shall continue beyond 2010."

Durham retained a consultant in 2008 to assist in identifying possible strategies for reaching 70% diversion. The consultant's study released in March 2009 suggests that Durham's waste diversion rate can be increased in two ways, by:

- Increasing participation in existing waste diversion programs; and,
- Creating new waste diversion opportunities.

The report suggests that the combination of these two initiatives has the potential to increase the Durham's current diversion rate of 47.7% to approximately 73%.

The study concludes that reaching 70% diversion by December 2010 may not be realistic, considering the time it takes for newly implemented waste diversion programs to come to fruition. The consultant estimates that a more reasonable date for reaching 70% diversion is 2013 (Golder Associates, 2009).

3.3.1.3 History of Waste Management (York Region)

1983 The majority of York's waste was disposed of at Toronto's Keele Valley Landfill Site located in Vaughan, within York boundaries.

1991 Like Durham, York also participated in the IWA's efforts to site a landfill to serve both Toronto and York within York. The intent was for this new site to replace the Keele Valley landfill site. Large amounts of time and money were expended on this siting effort but in response to intense public opposition, this landfill siting exercise, like the effort in Durham, was abandoned.

1993 York Regional Council approved its first strategic plan, *Vision 2021,* as an example of its goals to meet the needs of the York community.

2002 The Keele Valley landfill closed. Since 2002, York has exported its residential waste to three landfills: Toronto's Green Lane Landfill in Ontario, Onyx's Arbor Hills Landfill in Michigan, and Republic Waste Services' Carleton Farms Landfill in Michigan.

2002 *Vision 2026* was developed. It built on the key elements of *Vision 2021.* In terms of minimizing and managing waste, *Vision 2026* encouraged the continued diversion of waste from landfill through programs such as recycling and composting, enhanced public awareness programs about recycling, pursuing new technologies to reduce and handle waste; and leadership in waste reduction.

2006 York and its nine area municipalities developed the *Joint Waste Diversion Strategy*. The results of the study led York to set a diversion goal of 65% for the short-term (by 2010) and 70% for the longer-term. The study identified the following priority initiatives to be investigated/implemented immediately:

- SSO;
- Optimized blue box material recovery programs;
- Community environmental centres;
- Bag limits/financial incentives;
- Enhanced communication and public outreach;
- Diversion of textiles;
- Infrastructure development; and,
- Advocacy.

3.3.1.4 Current Waste Management System (York Region)

Currently, the area municipalities are responsible for the delivery of the following waste management services within their respective communities:

- Collection of residential residual waste, blue box materials, yard waste, bulky items, white goods, and SSO;
- Waste management policies and enforcement;
- Promotion and education;
- Recycling depots;
- Public space recycling; and,
- Provision of recycling containers.

York is responsible for the delivery of the following waste management services:

- Processing and marketing of blue box materials;
- Transfer, composting, and marketing of yard waste ;
- Transfer, composting, and marketing of SSO;
- Design, construction and operation of Community Environmental Centres;
- Waste management policies and enforcement;
- Promotion and education;
- Operation of household hazardous waste depots;
- Operation of municipal waste transfer, white goods, and blue box recycling drop-off facilities;
- Operation of residential electronics drop-off facilities; and,
- Operation of reusable goods diversion events.

In 2007, York managed approximately 319,000 tonnes of residential waste with approximately 45% of the waste being diverted from landfill. Residual waste composition is outlined in Figure 3-1 above.

In 2007, residual waste was exported to three landfills: Toronto's Green Lane Landfill in Ontario, Onyx's Arbor Hills Landfill in Michigan, and Republic Waste Services' Carleton Farms Landfill in Michigan. York has recently committed to sending 100,000 tonnes of residual waste per year to the Dongara plant in Vaughan where the waste is processed into "fuel pellets" to be used as a fuel product to substitute for conventional fossil fuel. These pellets are currently exported outside York and in some cases outside Canada.

In 2008, the Region of York ceased all shipments of residential residual waste to Michigan. This was made possible as a result of the above diversion initiatives, the commitment to the Dongara plant, and the continuation of the contract with the Green Lane Landfill for the receipt of residential residual waste. Although this has secured short-term waste disposal capacity for York, is still requires access to long-term disposal capacity.

The identification of this new disposal capacity has resulted in a change in the amount of waste York Region will be providing to the facility. Originally, in the approved EA Terms of Reference, the Regions of Durham and York were to supply approximately equal amounts of waste to the facility. However, early in the evaluation of "Alternatives to" it was determined that York Region may be able to secure additional waste disposal capacity through a contractual agreement with the Dongara facility being built in Vaughan. To accommodate this potential reduction in waste supply, the evaluation of "Alternatives to" included a 150,000 tonnes per year scenario (later refined as part of the RFQ process to 140,000 tonnes per year). This scenario, evaluated in the "Alternatives to" evaluation process, and carried forward throughout the entire EA represents York Region's current commitment to the facility and the waste to be managed as described in the Preferred Undertaking. Should York require additional capacity beyond that currently defined, a facility expansion would be required.

Several of the priority initiatives mentioned in York's *Joint Waste Diversion Strategy* have already been implemented, including:

- Household SSO collection region-wide; and,
- Optimized blue box recycling: weekly collection region-wide.

These two initiatives have assisted York to increase its waste diversion rate to 45.7% in 2007, up from 34% in 2005.

3.3.1.5 Enhancements to Current Diversion Programs to Achieve Higher Diversion Rates

The following is a summary of potential enhancements to waste management practices to increase diversion that could be achieved by Durham and York by 2011 via the programs and policies proposed for implementation by both Regions. A more detailed discussion and assessment of these programs are included in Section 7.3.1.4 (Achieving Higher Diversion Rates in Durham and York).

Key elements required in a municipal integrated waste management system to achieve high waste diversion rates include:

- Curbside collection of recyclables, kitchen organics and leaf and yard wastes;
- Additional services either through curbside, or at a minimum depots, for white goods;
- Diversion programs for household hazardous wastes, including electronics, paint, oil, etc., and construction and demolition materials, including wood, drywall, metals, etc.;
- Incentives and/or disincentives for all sectors to ensure appropriate behaviour by the users of the system (e.g., container limits, user fees, landfill bans, by-law enforcement);
- Promotion and education campaigns, using a variety of mediums to reach the target audience; and,
- Advances in diversion technologies, and product stewardship which currently are under consideration or development will allow increased diversion of more materials in the later years of the study period.

It is the effective combination of these elements which will encourage:

- High participation rates by the users of the waste management system (e.g., residents, businesses and institutions); and,
- High capture rates of materials that can be diverted.

Both Durham and York's approved waste management plans contain most or all of the key elements necessary to achieve high diversion rates in both municipalities.

In addition, other waste management plans (i.e., Durham Region's *Long Term Waste Management Strategy Plan: 2000 to 2020 (December 1999)* and York Region's *Vision 2021 and Vision 2026)* include plans on how to further increase diversion rates. Furthermore, the Durham and York approved waste management plans include a range of 'disincentives' such as continued restrictions on the amount of waste that can be set at the curb, bi-weekly garbage collection and more restrictive landfill bans and enforcement. In addition, both Regional Councils have endorsed energy recovery from waste as preferable to landfill disposal in an integrated and sustainable waste hierarchy.

Section 7.4.1.3 provides a detailed assessment of these programs and how they would potentially affect the Regions' diversion rates.

3.4 Role of Landfill in the Regional Waste Management Systems

It was been clearly identified by Durham and York in the Approved EA Terms of Reference that there is a desire to identify a preferred long term alternative that maximizes the recovery of resources and minimizes the reliance on landfill as a primary method of disposal. Landfill facilities will be assumed to continue to play a role for the disposal of certain materials that cannot be otherwise processed or diverted. A landfill only system, whereby a new landfill site capable of managing all waste that remains after at-source diversion would not meet the stated purpose of the Undertaking, and thus has not been considered in this EA Study.

In the approved EA Terms of Reference Section 1.1, the inability to access current waste disposal capacity (ie. Landfill in Michigan) was discussed. This practice of exporting waste outside the municipal boundaries to a landfill site in Michigan represented the "Do Nothing" alternative for this environmental assessment. As a result of the agreement between the province of Ontario and State of Michigan, the "Do Nothing" alternative is not a reasonably available alternative for consideration in establishing long-term waste disposal capacity. However, for the purpose of comparison and evaluation of the "Alternatives To", a "Do Nothing" system is required as a component of the EA process. For this study the "Do Nothing" system would be the continuation of the current method of disposal of the residual waste that remains after diversion, namely, the continued export of waste from Durham and York to landfill facilities outside of the study area. However, this "Do Nothing" alternative is not a "reasonable" alternative for consideration as the "Do Nothing" alternative does not represent a long-term solution for the management of residual waste. In particular, for Durham Region, the "Do Nothing" alternative is the continued export of residual waste to Michigan, an alternative no longer available after December 31, 2010. The "Do Nothing" alternative for York Region, based on the capacity for which approval is being sought, does not address the need for approximately 20,000 tonnes per year of post-diversion residual waste that cannot be accommodated by these other waste disposal contractual arrangements. As a result, should this EA not be approved, both Durham and York Region would have post-diversion residual requiring disposal and no capacity secured to manage this material.

Each of the proposed processing alternatives will require landfill disposal capacity for process residues. Responsibility for identification of this capacity will be borne by the successful Vendor of the preferred technology. Throughout the evaluation of "Alternatives to" and "Alternative methods" the quantity and composition of the material requiring landfill has been taken into consideration where appropriate.

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Section 4 Summary

The EA Study was undertaken in accordance with the Approved EA Terms of Reference which defined the framework and methodology for the EA including the scope, study areas, study periods and consultation to be included in the Project. The EA Terms of Reference included those activities required to fulfill the requirements of Ontario's *Environmental Assessment Act* (EAA). The EA Terms of Reference, developed in 2005 were approved by the Ontario Minister of the Environment (MOE) on March 31, 2006.

4. Approved EA Terms of Reference Requirements and Concordance

In accordance with the Codes of Practice, Section 4.3.3, "Terms of Reference Requirements" the sections below have been prepared to provide the following:

- A high-level process flow/sequence of "key" events;
- Milestones/major decision making points; and,
- A tabular summary of the requirements of the Approved EA Terms of Reference and where these requirements have been addressed in the EA.

The following Table 4-1 presents, at a high-level, an overview of the study process and dated activities and timeframe for the EA Study, highlighting the key events/milestones and decision-making points from the development of the EA Terms of Reference to implementation of the Undertaking.

Table 4-1 Milestone/Major Decision Making Point

Study Milestone	Date	Decision Required and Result
EA Terms of Reference Approval	March 31, 2006	• Approval of EA Terms of Reference by the Minister of the Environment on March 31, 2006.
EA Study Initiated	April 2006	• Initiation of the EA Study.
Evaluation of "Alternatives to" the Undertaking (i.e., Technologies)	April - May, 2006	• Development and evaluation of "Alternatives to".
Identification of Preferred Approach to Manage Residual Waste	2006	• Identification of preferred "Alternative to" to manage Durham/York residual waste. • Selection of thermal treatment as preferred "Alternative to" based on results of evaluation and consultation undertaken as part of EA.
Evaluation of "Alternative Methods" of Carrying out the Undertaking (i.e., Siting)	2006 – May 2009	• Evaluation and identification of Recommended Preferred Site for managing Durham/York residual waste.
Generic Human Health and Ecological Risk Assessment Study Released	2007	• Durham and York Regional Councils receive report and approved public consultation on report.
Request for Qualifications Issued	July 12, 2007	• Issued by Durham Department of Finance.
Identification of Recommended Preferred Durham/York Site	October 2007	• Identification of Clarington 01 as the Recommended Preferred Site based on results of evaluation and consultation undertaken as part of EA.
Request for Qualifications Closes	October 2007	• Evaluation of qualifications by staff from Durham and York and members of the Study Team from Jacques Whitford, Genivar and Deloitte & Touche.
Approval of Qualified Vendors	January 2008	• Approval by Durham and York Regional Councils • Five (5) vendors pre-qualified.
Approval of Recommended Preferred Site Clarington 01 by Regional Councils	January 2008	• Approval by Durham and York Regional Councils.

Study Milestone	Date	Decision Required and Result
Request for Proposals issued to prequalified vendors to identify a preferred vendor and technology	August 16, 2008	• Development, approval and issuance of RFP by Durham and York.
Request for Proposals Closes	February 19, 2009	• Submission deadline extended from January 15, 2009.
Identification of Recommended Preferred Durham/York Technology Vendor	April 2009	• Report regarding evaluation of proposals submitted as part of RFP issued by Durham and York Regions. • Authorization from the Regional Councils to proceed with negotiation and development of a contract with the selected, successful proponent.
Completion of Site Specific Studies to confirm suitability and documentation to support approvals	January - May 2009	• Incorporation of vendor data into site-specific studies to confirm suitability of Site. • Preparation of documentation to support decision.
Completion of Site-specific Risk Assessment	January - May 2009	• Analysis of data and incorporation into final recommendation of Site suitability.
Complete EA Documentation	May-July 2009	• Submission of draft EA to Regional Councils. • Approval of draft EA by Regional Councils.
Submit EA Documentation to Minister of Environment for Approval	July 2009	• Submission of the EA Study document for consideration by the Minister of the Environment.
EA Review and Decision by Minister	2009-Winter 2010	• Ongoing.

**Study milestone as defined in the Agreement Between the Durham and York for Joint Study on Waste Disposal.*

The following Table 4-2 presents a tabular summary for the EA as set out in the requirements of the Approved EA Terms of Reference and where they are addressed in the EA Study document.

Table 4-2 Table of Concordance – Approved EA Terms of Reference

Section in EA Terms of Reference	EA Terms of Reference Requirement(s)	Section(s) in the EA where Terms of Reference Requirements Satisfied
Section 1.0		
Section 1.0 - Introduction and Background	• The EA will be prepared in accordance with the requirements set out in Subsection 6.1(2) of the EAA with regards to the content of an EA. • Inclusion of a record of public and government agency consultation in the EA documents.	• Section 16.0 - Consultation Summary
Section 3.0		
Section 3.1 – Purpose of the Undertaking	• A description of and a statement of the rationale for the Undertaking.	• Section 3.0 - Statement of Purpose
Section 3.2 – Description of the Undertaking	• A description of the Undertaking.	• Section 10.0 - Identification and Description of the Undertaking
Section 3.3 – Potential Consideration of Contingency or Surplus Disposal Capacity	• A review of the need to include contingency disposal or processing capacity.	• Section 8.8.8 - Assumptions Common to all Environmental Considerations
Section 4.0		
Section 4.1 - "Alternatives to" the Undertaking (Alternative Approaches and Technologies)	• A description of and a statement of the rationale for the "Alternatives to" the Undertaking.	• Section 7.0 - "Alternatives to" the Undertaking
Section 4.2 - "Alternative Methods" of Implementing the Undertaking (Alternative Sites)	• A description of and a statement of the rationale for the "Alternative methods" of implementing the Undertaking.	• Section 8.0 - Evaluation of "Alternative methods" of Implementing the Undertaking – Site Identification Process
Section 5.0		
Section 5.0 - Description of the Environment Potentially Affected	• A description of the environment to be affected or that might reasonably be expected to be affected, directly or indirectly.	• Section 8.8.9 - Environment Potentially Affected
Section 6.0		
Section 6.1 - Comparative Evaluation of "Alternatives to" the Undertaking	• An evaluation of alternatives to the Undertaking.	• Section 7.0 - "Alternatives to" the Undertaking

Section in EA Terms of Reference	EA Terms of Reference Requirement(s)	Section(s) in the EA where Terms of Reference Requirements Satisfied
• Step 1	• Finalize evaluation criteria and confirm priority rankings.	• Section 7.3 - Step 1: Confirmation of Evaluation Methodology
• Step 2	• Development of Alternative Residuals Processing Systems.	• Section 7.4 - Step 2: Development of “Alternatives to” (Residual Processing Systems)
• Step 3	• Data collection.	• Section 7.5 - Step 3: Data Collection on the Environment Potentially Affected and Technical Components of the “Alternatives to”
• Step 4	• Application of comparative evaluation criteria.	• Section 7.6 - Steps 4, 5 and 6: Application of Evaluation Criteria to “Alternatives to”
• Step 5	• Consideration of mitigation measures, identification of “net effects”.	• Section 7.6 - Steps 4, 5 and 6: Application of Evaluation Criteria to “Alternatives to”
• Step 6	• Comparison of net effects, development of relative dis/advantages.	• Section 7.6 - Steps 4, 5 and 6: Application of Evaluation Criteria to “Alternatives to”
• Step 7	• Consideration of dis/advantages in context of priorities to select preferred system.	• Section 7.7 - Step 7: Identification of Preferred “Alternative to” (Residual Processing System)
Section 6.2 - Screening and Comparative Evaluation of Alternative Methods of Implementing the Undertaking.	• The alternative methods of implementing the undertaking.	• Section 8.0 - Evaluation of “Alternative methods” of Implementing the Undertaking
• Step 1	• Finalize siting methodology and Criteria and confirm priority rankings.	• Section 8.2 - Step 1 - Facility Site Selection Methodology and Criteria Confirmation
• Step 2	• Area screening and identification of suitable lands.	• Section 8.3 - Step 2 - Study Area Screening
• Step 3	• Identification of minimum site size requirement.	• Section 8.4 - Step 3 - Determination of Required Site Size
• Step 4	• Potential Site Identification.	• Section 8.5 - Step 4 - Potential Site Identification
• Step 4b (optional)	• Review of privately owned and “willing seller” lands.	• Section 8.5 - Step 4 - Potential Site Identification
• Step 4c (optional)	• Review and adjustment of constraints to arrive at a Long-list of sites.	• Section 8.5 - Step 4 - Potential Site Identification

Section in EA Terms of Reference	EA Terms of Reference Requirement(s)	Section(s) in the EA where Terms of Reference Requirements Satisfied
• Step 5	• Evaluation of Long-list and identification of Short-list of sites. • Undertake public consultation upon finalization of Short-list of alternative sites.	• Section 8.6 - Step 5 - Evaluation of the Long-list of Alternative Sites
• Step 6	• RFQ for vendor.	• Section 8.7 - Step 6: Initiation of Technology Procurement Process • Section 9.1 - Step 1 RFQ Process
• Step 7	• Evaluation of Short-list. • Issue RFP to identify vendor. • Identification of preferred vendor and site. • Undertake public consultation on selection of preferred vendor and site.	• Section 8.8 - Step 7: Evaluation of the Short-list Sites • Section 9.2 - Step 2 RFP Process • Section 11.0 - Assessment of the Undertaking
Section 6.3 - Application of a Competitive Request for Proposal (RFP) Process	• A RFQ followed by a RFP process will be used to ultimately select a vendor of the preferred technology (“Alternative to”) concurrently with the selection of a preferred Durham/York site. • The RFP will request price proposals for a facility(s) to be developed on a prospective site described using generic characteristics. • Selection of overall preferred vendor.	• Section - 9.0 - Vendor Identification Process
Section 6.5 – Detailed Site Specific Studies	• Complete detailed investigations incorporating the proposed facility/technology at the preferred site to satisfy the requirements of the EPA, to obtain a Certificate of Approval and to confirm the suitability of the proposed facility on the proposed site. • Development of detailed work program upon site selection. • Preparation of detailed work program in consultation with public and relevant government agencies.	• Section 11.0 - Assessment of the Undertaking. These assessments were completed based on conceptual designs to confirm potential impacts at an EA level of detail. Further detailed information may be required to satisfy EPA requirements and to incorporate a greater degree of detail in the design.
Section 6.6 – Applicability of the CEAA	• Coordination of EA processes with provincial and federal governments if applicable.	• Section 5.2 - Canadian Environmental Assessment Act (CEAA) Requirements
Section 7.0		

Section in EA Terms of Reference	EA Terms of Reference Requirement(s)	Section(s) in the EA where Terms of Reference Requirements Satisfied
Section 7.1 – Parties to be consulted during EA study	• Parties to be consulted include Public Liaison or Advisory Committees, First Nations Groups, Government and Agencies, and the General Public.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
Section 7.2 – Scope of Consultation at Study Milestones	• Minimum scope of consultation activities.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
• Step 1 – initiate EA Study and review evaluation methodology and criteria for “Alternatives to”	• General public notices. • Consultation for input on evaluation methodology and criteria.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
• Step 2 – Evaluate “Alternatives to” and select preferred approach	• Open house/public meeting type events open to the general public and intended to notify and receive input on selection of the preferred “Alternative to”.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
• Step 3 – Review of evaluation methodology and criteria for “Alternative methods”	• Events such as open houses intended to obtain input on finalizing the evaluation methodology and criteria.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
• Step 4 – Evaluate “Alternative Methods” of implementing the undertaking, RFP to identify a preferred technology vendor and identification of preferred site.	• At identification of Short-list – open house type events intended to notify and receive input on the process leading to selection of the Short-list sites. • At identification of preferred site – one on one meetings and focused information sessions with community/residents to inform and exchange information regarding site specific issues, next steps in process and opportunities to discuss/resolve concerns. • General public notice of selected preferred site.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.

Section in EA Terms of Reference	EA Terms of Reference Requirement(s)	Section(s) in the EA where Terms of Reference Requirements Satisfied
• Step 5 – Complete site specific studies to confirm suitability and documentation to support approvals.	• Provision of opportunity to form a Site Liaison Committee. • One-on-one meetings, focused information sessions with community/residents potentially impacted by site to obtain input on Study methodologies and to inform and exchange information regarding Study results, design and operational implications, and supporting documentation.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
Section 7.2 - Feedback mechanism for responding to and incorporating public comment.	• Following each public consultation event, comments will be tabulated and addressed in a table format outlining the comment, response and any changes to the EA Study that may be required to address the issues raised. • Comment/Response tables will be made available to interested parties through the Study website, and, provided in hard copy by request or by email.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
Section 7.2 - Communications strategy	• Elements include maintenance of a Study website, development and issuance of public advisories, notices and news, and provision of a range of avenues for communication between the public and Study representatives. • This strategy will be maintained and updated, as required, for the entirety of the Study.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
Section 7.3 – Issues Resolution	• Use of a facilitator to negotiate a resolution or the EAA's mediation provisions.	• Section 16.0 – Consultation Summary. For a more detailed account of all consultation activities, please refer to the Record of Consultation.
Section 8.0		
Section 8.0 – Monitoring Strategy	• Development of a monitoring strategy and schedule for the purpose of confirming assumed or predicted impacts and the performance of mitigation measures once the undertaking is in place and operational.	• Section 14.0 - Monitoring Program
Section 9.0		

Section in EA Terms of Reference	EA Terms of Reference Requirement(s)	Section(s) in the EA where Terms of Reference Requirements Satisfied
Section 9.0 – Flexibility in application of the ToR	• Adjustments will be undertaken at the direction of the JWMG and in consultation with the MOE.	• Section 8.1.1 - Step 6: Alignment of Siting Process and Competitive Process

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Section 5 Summary

An EA is a planning and decision-making process used to promote environmentally responsible decision-making. In Ontario, this process is defined and finds its authority in the EAA. Durham and York joined in a Planning Study to address the long-term residual waste disposal capacity requirements of both Regions. This joint Study is subject to the requirements of an Individual EA under Ontario's EAA related to municipal waste disposal undertakings.

The EA Study commenced following the approval of the Terms of Reference on March 31, 2006 and has continued until submission of the EA Study document to the Minister of the Environment in July 2009. As per the Approved Terms of Reference, the EA planning period is 35 years, starting in 2011 and ending in 2045.

The EA Study involves the consideration of alternatives to address the stated purpose or need to result in the identification of a preferred alternative, or the Undertaking, considering a comparison of the advantages and disadvantages to the environment, and the priorities established by the respective communities.

The Durham/York EA process consisted of the:

- Completion of the EA Terms of Reference.
- Evaluation of "Alternatives to" the Undertaking.
- Evaluation of "Alternative methods" of implementing the Undertaking.
- Completion of Site and Vendor specific studies to confirm the suitability of the site for the Undertaking.

Figure 5-2 provides an overview of the Durham/York EA process.

5. The Planning Process

An Environmental Assessment (EA) is a planning and decision-making process used to promote environmentally responsible decision-making. In Ontario, this process is defined and finds its authority in the EAA. The purpose of the EAA is to provide for the protection, conservation and wise management of Ontario's environment. To achieve this purpose, the EAA promotes responsible environmental decision-making and ensures that interested persons have an opportunity to comment on undertakings that may affect them. In the EAA, the environment is broadly defined to include the natural, social, economic, cultural and built environments.

The first step in the approval process to proceed with an undertaking under the EAA is the submission of an EA Terms of Reference for approval by the Minister of the Environment (Minister).

The Approved EA Terms of Reference becomes the framework for the preparation and review of the EA. The proponent then completes and submits an EA that has been prepared in accordance with the Approved EA Terms of Reference.

As discussed in the Codes of Practice, the EA process is not a consensus building exercise. Participants do not have the power to veto an undertaking. They can provide information that will assist the Minister in deciding whether an undertaking can proceed in the public interest while ensuring that the environment is protected. However, it is the intent of the process that all persons interested in a particular proposal (proponent, public, government agency and others) work together as much as possible to address issues.

There are a number of EA principles which are key to successful planning and approval under the EAA. These principles were incorporated into and formed the foundation for the Durham and York's EA process.

These principles included:

- Engaging in meaningful consultation with potentially affected and other interested persons;
  - Public and Agency consultation has been conducted via a number of formats (e.g., facilitated workshops, public information sessions, a study specific website, address and telephone number).
- Consideration of a reasonable range of alternatives;
  - During the evaluation of "Alternatives to", nine alternative processing systems were identified for further evaluation and four alternatives underwent a detailed evaluation. During the evaluation of "Alternative methods", twelve sites were identified for evaluation, of which five were short-listed for a further detailed evaluation.
- Consideration of all aspects of the environment;
  - A number of studies were conducted which assessed the potential impact of the Undertaking on various aspects of the environment including air, aquatic, avian and terrestrial species, water, soil, human health and the natural environment.

- A systematic evaluation of net environmental effects; and,
  - o Generic impact assessments were carried out on the Short-list of sites and once a preferred site had been identified, a series of site-specific impact assessments were carried out to confirm and expand on the findings for the preferred site.
- The provision of clear, complete documentation.
  - o All documents have been published on the Durham/York Residual Waste Study website, www.durhamyorkwaste.ca relating to the stages of the EA process. Throughout the EA process, as reports were made public, copies were placed in libraries, municipal offices and other areas as well as being made available upon request to the Study Coordinator.

This EA Study document and all supporting documentation was completed for Durham and York Regional Councils review in June 2009. Following the endorsement by the Regional Councils, the EA Study document and associated documentation were submitted to the Ministry of the Environment on July 31, 2009.

5.1 The Ontario Individual EA Process

The following sections describe the planning process followed in the EA Study.

5.1.1 Requirements of the Ontario EAA

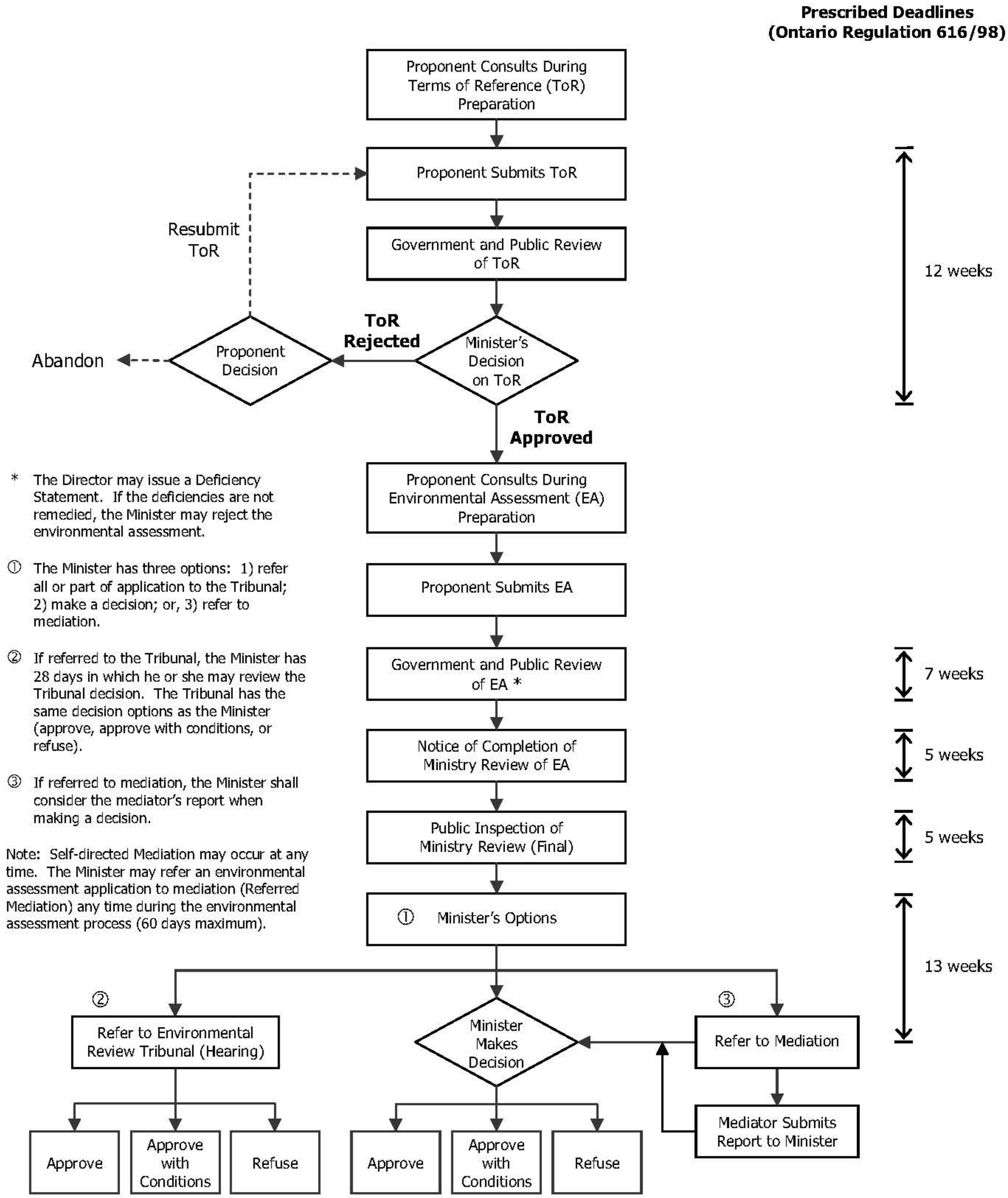
The first step in the application for approval to proceed with an undertaking under the EAA is the submission and approval of a Terms of Reference by the Minister.

An approved EA terms of reference becomes the framework for the preparation and review of the EA. The proponent then completes the application by submitting an EA that has been prepared in accordance with the approved terms of reference.

To put the process described above into context, the following figure illustrates the EA process in Ontario and associated government and public review processes and prescribed deadlines (Code of Practice: Consultation in Ontario’s EA Process, June 2007).

This process has been followed since the commencement of the EA Study.

Figure 5-1 Ontario EAA Process



Source: MOE, 2008. *Code of Practice: Preparing and Reviewing Environmental Assessments in Ontario*.

The following provides excerpts of the EAA legislation specific to this undertaking (note, the EA Terms of Reference was prepared in accordance with this section of the EAA):

> *6.(1)* ***Terms of Reference.*** *–*
> *The proponent shall give the Ministry [of the Environment] proposed terms of reference governing the preparation of an environmental assessment for the undertaking*
>
> *and,*
>
> *6.(2)* ***Same.*** *–*
> *The proposed terms of reference must,*
> *(a) indicate that the environmental assessment will be prepared in accordance with the requirements set out in subsection 6.1(2);…*

As set out in Section 1.3, the EA was prepared in accordance with the requirements set out in Subsection 6.1(2) of the EAA with regards to the content of an EA.

5.1.2 Changes to Requirements under the Ontario EAA

In March, 2007, the MOE adopted new EA requirements for waste management projects, which are set out in Ontario Regulation 101/07 (referred to as the Waste Management Projects Regulation). The regulation allows for the streamlining of the planning and approvals process for thermal treatment and other waste processing facilities. Under this regulation, proponents such as Durham and York could choose a thermal treatment technology and a site for the facility and then meet the requirements of the EAA by undertaking a comprehensive environmental screening of the proposed Facility and Site. A similar environmental screening process has been used successfully in the energy sector for some time, as set out in Ontario Regulation 116/01.

The undertaking proposed by Durham and York and considered in this EA meets the criteria of Ontario Regulation 101/07, Part III, Establishment of Site, Section 11.(1), Subsection 2 which states:

> ***11.*** *(1) The establishing of any of the following waste disposal sites is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies:*
>
> *2. A thermal treatment site, if,*
>
> *i. the site does not use coal, oil or petroleum coke as a fuel for thermal treatment at the site, and*
>
> *ii. of the energy or fuel generated by thermal treatment at the site that is used, not all of the energy or fuel is used to dispose of waste.*

Further, in accordance with Ontario Regulation 101/07, Part III, Section 10. (2) of the Regulation which states:

> ***10.*** *(1) An undertaking that is designated under this Part as an undertaking to which the Act applies is exempt from Part II of the Act if the undertaking is carried out in accordance with the Environmental Screening Process for Waste Management Projects. O. Reg. 101/07, s. 10 (1).*
>
> *(2) If the proponent of an undertaking submitted an environmental assessment or proposed terms of reference in respect of the undertaking to the Ministry before March 23, 2007, subsection (1) does not apply to the undertaking unless, not later than 60 days after, March 23, 2007 the Director of the Ministry's Environmental Assessment and Approvals Branch has received written notice from the proponent stating that the undertaking will be carried out in accordance with the Environmental Screening Process for Waste Management Projects. O. Reg. 101/07, s. 10 (2).*

Under Section 10.(2) of the new regulation, Durham and York were provided the opportunity to forgo the completion of the EA in accordance with the Approved EA Terms of Reference and complete the Study in accordance with the new Waste Management Projects Regulation. However, at their April 24, 2007 meeting, the JWMG resolved to continue the completion of the EA process in accordance with the Approved EA Terms of Reference and not take advantage of the opportunity provided by the Regulation for a more simplified approvals process. This decision was made based on a number of factors, including:

- The current status of the Project and the level of effort completed to date including the level of consultation undertaken up to that point;
- The more extensive consultation process supported by undertaking an Individual Environmental Assessment would be more beneficial than the consultation requirements of the new regulation considering the perceived potential effects and the precedence of this project; and,
- Some of the potential risks and challenges presented with the new EA Screening Process, including:
    - A potential impact to the credibility and trust established with the public and stakeholders if there was a change from one EA process to another EA process;
    - A lack of precedence for completing projects under this new legislation; and,
    - Political and public direction to ensure the most rigorous environmental process was followed.

5.2 Canadian Environmental Assessment Act (CEAA) Requirements

For the proposed undertaking to be subject to CEAA approval, one or more of the following "triggers" must be identified as per Section 5.(1) of the Act:

> "*5. (1) An environmental assessment of a project is required before a federal authority exercises one of the following powers or performs one of the following duties or functions in respect of a project, namely, where a federal authority*
>
> *(a) is the proponent of the project and does any act or thing that commits the federal authority to carrying out the project in whole or in part;*
>
> *(b) makes or authorizes payments or provides a guarantee for a loan or any other form of financial assistance to the proponent for the purpose of enabling the project to be carried out in whole or in part, except where the financial assistance is in the form of any reduction, avoidance, deferral, removal, refund, remission or other form of relief from the payment of any tax, duty or impost imposed under any Act of Parliament, unless that financial assistance is provided for the purpose of enabling an individual project specifically named in the Act, regulation or order that provides the relief to be carried out;*
>
> *(c) has the administration of federal lands and sells, leases or otherwise disposes of those lands or any interests in those lands, or transfers the administration and control of those lands or interests to Her Majesty in right of a province, for the purpose of enabling the project to be carried out in whole or in part; or*
>
> *(d) under a provision prescribed pursuant to paragraph 59(f), issues a permit or license, grants an approval or takes any other action for the purpose of enabling the project to be carried out in whole or in part."*

At the time of submission of this EA Study document, no federal authorizations are anticipated to be required for this Project as there are no applicable "triggers" under CEAA. Federal Agencies have been consulted throughout the EA process and are members of the Government Review Team. To date, no potential CEAA "triggers" have been identified by Federal Agencies. However, the Regions will ensure that the project will comply with all federal requirements, including all necessary federal approvals and authorizations, should they be identified and required.

5.3 The Durham/York EA Process

Durham and York joined in a Planning Study to address the long-term residual waste disposal capacity requirements of both Regions. This joint Study is subject to the requirements of an Individual EA under Ontario's EAA related to municipal waste disposal undertakings. This evaluation process is commonly called an EA study.

5.3.1 The EA Study Period

The EA Study commenced following the approval of the Terms of Reference on March 31, 2006 and has continued until the EA submission to the Minister in July 2009.

5.3.2 The EA Planning Period

As per the Approved Terms of Reference, the EA planning period is 35 years, starting in 2011 and ending in 2045.

5.3.3 The Consideration of Technologies

To consider the context of alternative technologies, processing systems were evaluated rather than individual components or technologies recognizing the integrated nature of waste management solutions. The types of technologies under consideration fell into three categories: mechanical; biological; and, thermal treatment. A landfill-only option was not considered, although it was recognized that each of the proposed alternatives would require landfill disposal capacity for process residues.

In accordance with the requirements of section 6.1(2)(d) of the EAA and the requirements outlined in Section 6.1 (Comparative Evaluation of “Alternatives to” the Undertaking) in the Approved Terms of Reference, each “Alternative to” under consideration underwent an evaluation process to determine its applicability and suitability to the purpose of the undertaking in a process developed and reviewed in consultation with the public. Following the identification of the preferred “Alternative to”, an RFQ was issued, the results of which confirmed the selection of the preferred system. This system was ultimately confirmed through the selection process of a preferred technology and vendor.

5.3.4 EA Process Overview

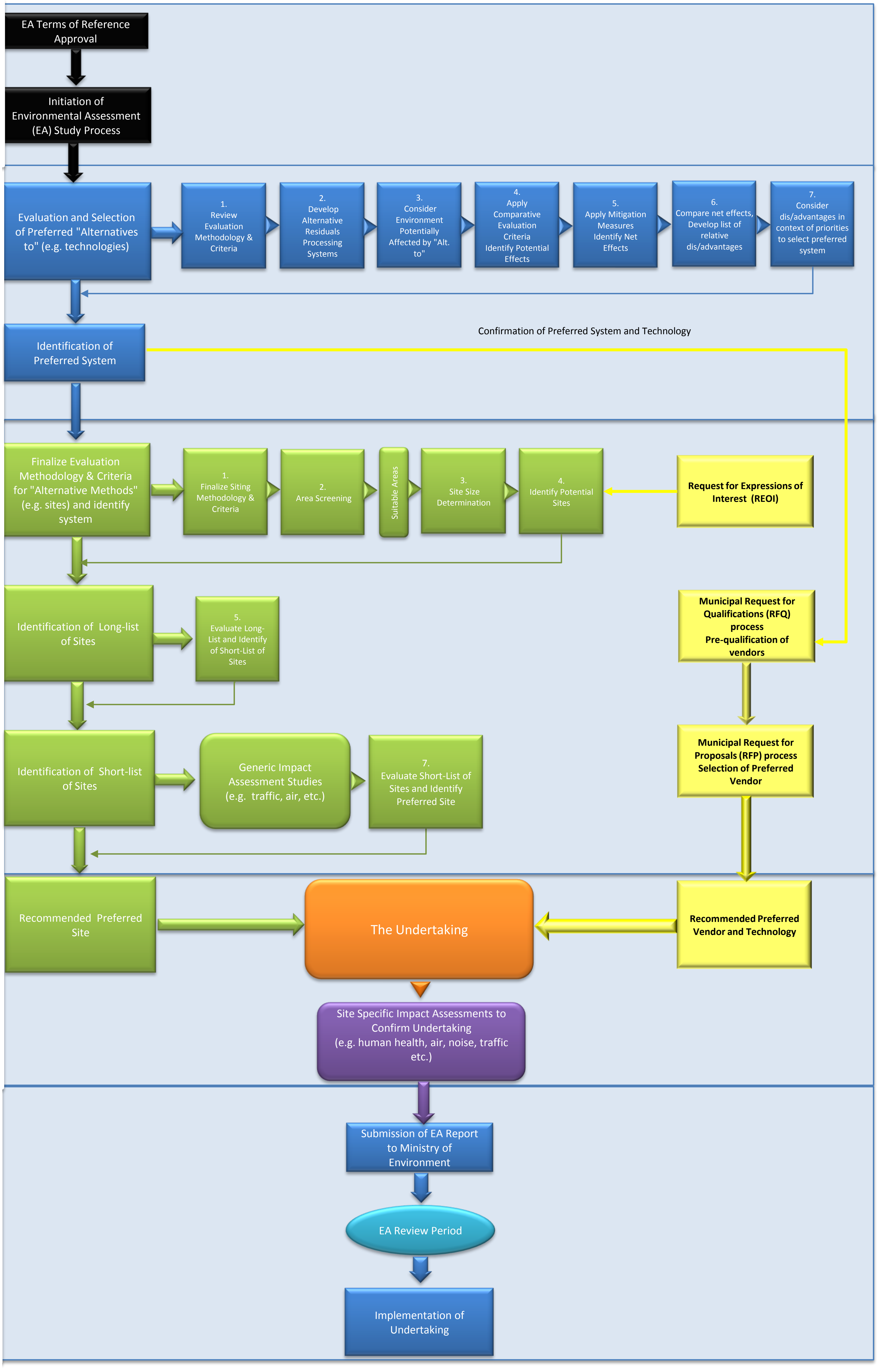
The EA Study involves the consideration of alternatives to address the stated purpose or need as described in Section 3.3 and resulted in the identification of a preferred undertaking considering a comparison of the advantages and disadvantages to the broadly defined environment including natural, social, economic, etc., together with the priorities established by the respective communities. Public and stakeholder consultation is a key requirement of the EAA and is documented in Section 14 of this EA Study document and in the accompanying Record of Consultation.

The Durham/York EA process consisted of:

- Completion of the EA Terms of Reference;
- Evaluation of “Alternatives to” the undertaking;
- Evaluation of “Alternative methods” of implementing the undertaking; and,
- Completion of site and vendor specific studies to confirm the suitability of the site for the proposed undertaking.

The following sections provide a detailed description of each phase of the EA process that is presented graphically in Figure 5-2 below.

Figure 5-2 Durham York Environmental Assessment Process



5.3.4.1 EA Approved Terms of Reference (March 31, 2006)

The EAA requires that a range of alternatives reasonably available to address the purpose of the undertaking be considered. The scope of alternatives considered reasonable and to be evaluated in the EA Study were initially defined in the Approved EA Terms of Reference. The EA Terms of Reference applicable to Durham and York and approved by the Minister of the Environment on March 31, 2006 were developed in consultation with the public and government agencies and provide a plan for continued consultation throughout the EA Study. The Approved EA Terms of Reference (March 31, 2006) can be found in **Appendix A-1.** Section 4 provides additional information on the Approved EA Terms of Reference requirements.

The EA Terms of Reference were prepared in accordance with the requirements of the EAA and with guidance provided by the MOE Environmental Assessment and Approvals Branch (EAAB).

The following sections provide a brief overview of the EA process employed for this Study in accordance with the Approved EA Terms of Reference. This process is described in greater detail in subsequent sections of this EA Study document.

Evaluation of "Alternatives to" the Undertaking

The "Alternatives to" evaluated in the EA Study, were developed within the context of Integrated Waste Management System Planning. Alternative systems capable of managing the residual waste remaining after at-source diversion were developed and evaluated. These integrated systems were developed based on the combination of at-source diversion assumptions, reasonable alternatives for the treatment of the remaining residual waste, and landfill disposal of materials that remain after treatment.

A seven (7) step evaluation methodology outlined in the Approved EA Terms of Reference was applied to formulate and then comparatively evaluate alternative residuals processing systems. Once a preferred "Alternative to" had been identified, "Alternative methods" of implementing the undertaking were considered.

The preferred "Alternative to" was the one with the preferred balance of advantages and disadvantages relative to the established category priorities and rankings. This decision was based on the priorities and professional judgment exercised by both Regions and in consideration of the technical database, advice from technical experts and input received from stakeholders (i.e., public, neighbours, agencies, etc.) Ultimately, both Regional Councils were responsible for agreeing with the selection of the preferred "Alternative to", prior to proceeding with the evaluation of "Alternative methods".

A more detailed discussion of this process can be found in Section 7.0 of the EA Study document.

"Alternative Methods" of Implementing the Undertaking

This section provides a brief overview of the process followed in the "Alternative methods" section (Section 8.0).

To identify a preferred site, a seven-step facility site selection process was applied. This step-by-step methodology was originally presented in the Approved EA Terms of Reference and is further discussed in Section 8.0 of the EA Study document.

The preferred site was the one with the preferred balance of advantages and disadvantages relative to the established category priorities and rankings. This decision was based on the priorities and professional judgment exercised by both Regions and in consideration of the technical database, advice from technical experts and input received from stakeholders (i.e., public, neighbours, agencies, etc.). Ultimately, both Regional Councils were responsible for agreeing with the selection of the Recommended Preferred site.

Vendor Identification Process

In parallel to the site identification phase of the EA Study, it was necessary to proceed through a municipal procurement process to identify the specific vendor that would ultimately provide the technology in accordance with the preferred "Alternative to". The relationship between the siting process and competitive process is further defined in Section 8.0 of this EA.

The procurement process utilized was a two (2) stage process which consisted of a RFQ process followed by a RFP process. These processes are discussed further below and in detail in Section 9.0 of the EA Study document.

Stage 1: RFQ

As the first step in identifying the Preferred Vendor, Durham and York solicited RFQ submissions. The information provided was used to select qualified respondents who were invited to submit proposals in response to the RFP. The RFQ closed in October 2007 and five companies were pre-qualified to submit detailed proposals in response to the RFP.

Stage 2: RFP

Following the completion of the RFQ stage, qualified respondents were invited to submit detailed proposals in response to a RFP for the design, construction and operating contract of the Facility. The RFP was issued on August 22, 2008 and closed February 18, 2009. Of the five (5) companies qualified to respond to the RFP, four (4) submitted proposals for consideration. The Regions evaluated the detailed proposals received from the Qualified Respondents and recommended a preferred proponent to Durham and York Regional Councils in April 2009. At these meetings, Regional Councils authorized procurement staff from Durham to proceed with the development and negotiation of a contract with the selected, successful proponent.

At the time of submission, these contract negotiations are still ongoing. Further discussion on the Vendor Identification process can be found in Section 9.0 of the EA Study document.

5.3.4.2 Completion of Site and Vendor Specific Studies to Assess Undertaking

Once a preferred site and vendor had been identified, a number of site specific/vendor specific studies were completed to assess the potential effects of developing the specific vendor's Thermal Treatment Technology on the recommended preferred site or "implementation of the undertaking". This assessment included consideration of the following:

- *Air Quality Assessment – Technical Study Report;*
- *Site Specific Human Health and Ecological Risk Assessment (HHERA);*
- *Natural Environment Impact Assessment;*
- *Acoustic Assessment – Technical Study Report;*
- *Traffic Assessment -Technical Study Report;*
- *Visual Assessment -Technical Study Report;*
- *Economic Assessment -Technical Study Report;*
- *Social/Cultural Assessment Technical Study Report;*
- *Geotechnical Investigation – Technical Study Report;*
- *Surface Water and Groundwater Assessment - Technical Study Report;*
- *Stage 2 Archaeological Assessment and Built Heritage, Clarington 01 Site, Township of Clarington, Regional Municipality of Durham, Ontario*; and,
- *Facility Energy and Life Cycle Assessment – Technical Study Report*.

Further discussion on the Site and Vendor Specific Studies can be found in Section 11.0 of the EA Study document.

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Section 6 has no tables

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Section 6 Summary

The Durham/York study area, as presented in the Approved EA Terms of Reference (March 31, 2006), is comprised of lands within the geographic boundaries of the Regions of Durham and York, which could potentially be affected by the Undertaking.

One of the first steps in the EA process is to characterize the existing environment within the study area. The study area environment, described below, is based on the Approved EA Terms of Reference and, as a result, is based on information from 2006 or before. However, as the EA Study proceeds through the process (“Alternatives to”, “Alternative methods”, and the Preferred Undertaking), the descriptions of the environments become increasingly more refined and detailed.

The existing study area environments described in Section 6 include:

- the natural environment;
- the socio-economic environment considering aspects such as First Nations Communities, industry, agriculture, and tourism;
- transportation systems;
- power generation and transmission corridors; and,
- the legal / jurisdictional considerations.

6. The Study Area

As described in the Approved EA Terms of Reference (March 31, 2006), the study area for the EA is comprised of lands within the geographic boundaries of the Regions of Durham and York (Figure 6-1). This section provides a high-level description of the study area and environments used to initiate the development and assessment of alternatives.

The environment potentially affected within the study area depicted in Figure 6-1 is described at a high level below as it was presented in the Approved EA Terms of Reference (March 31, 2006). As the Study proceeds through the EA process, the descriptions of the study areas become more refined. The study area depicted in Figure 6-1 is also described in Section 7 “Alternatives to” in a higher level of detail. The environment potentially affected and study areas associated with the siting evaluation process is described in Section 8 “Alternative methods”.

6.1 Study Area Environment

The Durham/York study area is comprised of lands within the geographic boundaries of the Regions of Durham and York, which could potentially be affected by the undertaking, as generally described in the following sub-sections.

It should be noted that the information in this section is based on that contained in the Approved EA Terms of Reference generated in 2005 and 2006 and, as a result, consists of information from 2006 or before. As stated above, the EA Study proceeded through the process (i.e., the assessment of “Alternatives to”, “Alternative methods”, and the Preferred Undertaking), the descriptions of the environments potentially effected have been updated and refined.

6.1.1 Natural Environment

The study area is bounded by three major bodies of water. These are Lake Ontario to the southeast, Lake Simcoe to the northwest and Lake Scugog to the northeast. The study area shares municipal boundaries with Simcoe County to the northwest, the City of Kawartha Lakes to the northeast, Peterborough and Northumberland Counties to the east, the City of Toronto to the southwest and The Regional Municipality of Peel to the west.

One of the dominant physical characteristics of the study area is the Oak Ridges Moraine. It is one of southern Ontario’s most prominent landforms and traverses the south-central portion of York and Durham Regions. The Oak Ridges Moraine is a ridge of sand and gravel over 160 km long running east-west between Caledon, in the west and Rice Lake in the east. The Moraine serves as the headwater region for most streams draining south through York and Durham to Lake Ontario and north to Lake Simcoe and the Kawartha Lakes. The Lake Iroquois shoreline is another significant feature within the study area that serves as a source area for some watercourses.

The management of the natural environment features within Durham and York Regions are primarily under the jurisdiction of the Ministry of Natural Resources and five conservation authorities – Central Lake Ontario, Toronto and Region, Ganaraska Region, Lake Simcoe Region and the Kawartha Region Conservation Authorities.

6.1.2 Socio-Economic

The Regional Official Plans for Durham and York Region both identify urban boundaries that are intended to manage urban development over the long term. Within the urban areas, a compact, transit-supportive urban form is supported, as are intensification and mixed-use land uses in appropriate locations. Urban areas are planned to accommodate the majority of population growth in Durham and York Regions.

Rural areas are comprised of a range of land uses including farming operations, open space uses, aggregate extraction areas, rural settlements, and environmentally sensitive areas. A major focus of land use planning in the study area is to limit rural development and to protect areas of high quality soils for agricultural use. Rural settlements are planned to act as centres for the provision of services and goods to rural communities but are not planned to absorb significant population growth in either Region. Growth in rural areas must address servicing capacity and municipal planning policies.

Industrial development occurs primarily along the major transportation routes in the study area. In particular, highway corridors such as Highway 401 in The Region of Durham and Highways 7, 407 and 404 in York Region play an important role in the location of industrial uses. Other transportation facilities such as the railways and harbours play an important role in the location of industrial lands. In addition, older industrial areas, such as the Yonge Street Corridor in York Region, are being redeveloped to promote economic revitalization.

From 1996 to 2001, The Region of Durham experienced a population change of 11%, while York Region experienced a 23% increase in population.

6.1.3 First Nations Communities

There is one First Nation community in the Region of Durham. The Mississaugas of Scugog Island First Nation is one of the smallest First Nations in Canada. There is one First Nation community in York Region, the Chippewas of Georgina Island First Nation. The Chippewas of Mnjikaning (Rama) First Nation are located just north of the study area in neighbouring Simcoe County. In addition to these First Nation communities, a number of First Nation communities in Southern Ontario are considered in this Study.

6.1.4 Economic Base

Economic development within the Region of Durham is based on the manufacturing and energy sectors. These industries have been attracted to the area because of its excellent location, highly skilled workforce, leadership in innovative technologies, superior research and development and a high quality of life.

Economic development within York Region is based on manufacturing and business service industries. These industries are attracted to York based on its accessibility, skilled labour force, high quality of life and supporting infrastructure.

6.1.4.1 Industry

General Motors and Ontario Power Generation are two of Durham's top employers and have been major contributors to the study area's economy. The energy industry benefits from

Durham's access to the North American electricity grid and Durham's commitment to workforce development from The University of Ontario Institute of Technology by offering degrees in support of energy related businesses. Magna International, manufacturers of automotive components, is one of York Region's top employers.

6.1.4.2 Agriculture

Statistics Canada reported that 44% of all farmland situated in the Greater Toronto Area (GTA) is in the Region of Durham. In 2001, the gross farm receipts for the Region equalled $234 million. Durham's agricultural products consist primarily of fruit, dairy, floriculture, livestock, poultry, and corn products. The majority of farmland in Durham in 2001 was in crop production. The Region is a leader in agriculture, in the GTA, in terms of the number of farms, amount of farmland, and gross farm receipts.

Although employment in the agricultural industry represents only 1% of the working force, agriculture is still significant in York Region. In the Holland Marsh, 10,000 acres of agricultural land are responsible for producing more than 90% of Ontario's celery and Asian vegetables, 80% of Ontario's carrots, and 66% of Ontario's onions. York Region also has the highest horse population in Ontario, with 18,000 horses and 69 commercial stables.

6.1.4.3 Tourism

Tourism is an integral part of the study area's economy. The Great Blue Heron Charity Casino in Port Perry, is owned by the Mississauga of Scugog Island First Nation and opened in 1994. Lakes Scugog, Simcoe, and Ontario provide year round fishing opportunities and are popular summer destinations for visitors to the area. Durham and York Regions have over 65 golf courses and many conservation areas.

Paramount Canada's Wonderland, located in the City of Vaughan, York Region, attracts more than 13 million guests annually. There are numerous museums in the study area, one of the most predominant being the McMichael Canadian Art Collection, which is situated on 100 acres of conservation land in Vaughan.

6.1.5 Transportation Systems

Highway 401 is the primary highway in the study area. The 401 corridor runs east-west and follows the northern shore of Lake Ontario through the Region of Durham. Highway 400 runs north-south from Toronto through the City of Vaughan and the Township of King in York Region. Highway 404 also runs north-south from Toronto through the eastern portion of York Region and ends at Green Lane in the Town of East Gwillimbury. Highway 407 runs east-west from Halton Region, through York Region, to just east of Brock Road in Pickering (Region of Durham) and Highway 427 extends into York Region presently terminating at Highway 7 in the City of Vaughan.

There are plans to extend Highways 404 and 407 through York Region and through Durham Region. The future extension of Highway 404 would affect the Township of Brock and would run east near Highway 48 and end at Highway 12. The EA process for the extension of Highway 407, east of Pickering to Highway 35/115, began in the summer of 2002. The EA Terms of Reference was approved in January 2005, and the individual EA is currently underway. The proposed work for Highway 401 includes increasing the number of lanes to ten between Westney Road and Harwood Avenue in Ajax and constructing a new interchange at Stephenson Road in Oshawa.

There are two active commercial airports in the study area: Oshawa Municipal Airport and Buttonville Municipal Airport in Markham. The Pickering lands, owned by the Federal Government, were declared an "airport site" in August 2001. To protect Federal Lands for future aviation needs, the Pickering Airport Site Zoning Regulations (AZR) came into effect September 2005. The AZR restrict the height of buildings, structures and objects including natural growth on regulated lands and protect aircraft from potential hazards such as bird strikes and electronic signal interference for a distance of up to 15 km off the end of each runway. There is one international airport approximately 50 km from the centre of the study area: Lester B. Pearson International Airport in Toronto.

The two national railroads that run through the study area are the main line of the Canadian National Railway (CNR) and the main line of the Canadian Pacific Railway (CPR).

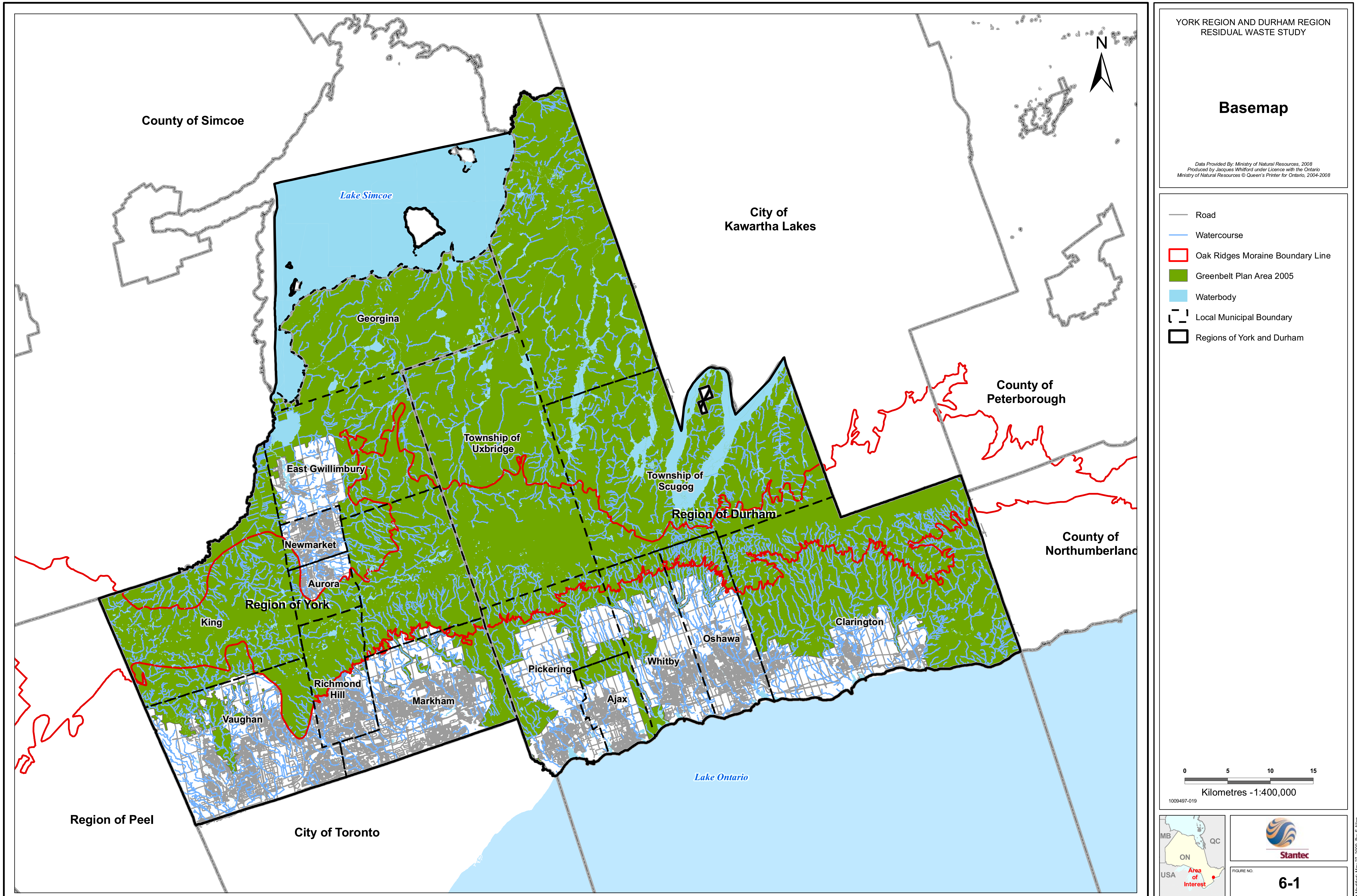
6.1.6 Power Generation and Transmission Corridors

The Region of Durham is home to two large nuclear power generating stations. Darlington Nuclear Generating Station is located in the Municipality of Clarington and has an output of 3,524 MW, enough to provide approximately 18% of Ontario's electricity needs. Pickering Nuclear Generating Station is located on the northern shore of Lake Ontario in the City of Pickering. Pickering Nuclear is one of the largest nuclear generating facilities in the world and has a total output of 4,120 MW, enough to provide approximately 21% of Ontario's electricity needs.

There is a hydro corridor (a tract of land containing hydroelectric pylons and cables) that runs north from the Pickering Power Plant. The Corridor is owned by the Province and managed by the Ontario Realty Corporation. Hydro One operates this large electricity distribution system.

6.1.7 Legal / Jurisdictional Considerations

The Regions of Durham and York are both upper-tier municipalities, with differing waste management responsibilities. The Durham Region shares the responsibility for waste management services with its local area municipalities. The Region of Durham is responsible for managing diversion and disposal of materials, and depending on the area, collection may be provided by the Region or by the lower-tier municipality. In York Region, the area municipalities are responsible for the collection of all waste streams at the curbside. York Region is responsible for all other aspects of waste management. Both Regional governments are responsible for the management of residual wastes.


YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY
Basemap
Data Provided By: Ministry of Natural Resources, 2008
Produced by Jacques Whitford under Licence with the Ontario
Ministry of Natural Resources © Queen's Printer for Ontario, 2004-2008
Road
Watercourse
Oak Ridges Moraine Boundary Line
Greenbelt Plan Area 2005
Waterbody
Local Municipal Boundary
Regions of York and Durham
0
5
10
15
Kilometres -1:400,000
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N
County of Simcoe
Lake Simcoe
City of Kawartha Lakes
Georgina
Township of Uxbridge
East Gwillimbury
Township of Scugog
County of Peterborough
Region of Durham
Newmarket
County of Northumberland
Aurora
Region of York
King
Clarington
Oshawa
Whitby
Pickering
Richmond Hill
Markham
Ajax
Vaughan
Lake Ontario
Region of Peel
City of Toronto
MB
QC
ON
USA
Area of Interest
Stantec
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6-1
Last Modified: May 27, 2009 By: S.Allen

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Section 7 Summary

"Alternatives to" are defined as fundamentally different ways of managing waste and achieving the purpose of the EA Study. This Section provides the relevant background and the results of the "Alternatives to" evaluation process leading to the identification and description of the preferred long-term residuals processing system for Durham and York Regions.

The Approved EA Terms of Reference established that "Alternatives to" (i.e., alternative systems) comprised of the following approaches and technologies would be formulated and evaluated:

- Mechanical Treatment;
- Biological Treatment; and,
- Thermal Treatment (note: thermal treatment includes combustion, gasification and pyrolysis.)

A seven (7) step methodology was applied to formulate and then comparatively evaluate and identify the advantages and disadvantages and net effects of the alternative residual processing systems relative to each other.

Section 7 of the EA Study document on "Alternatives to" is structured to reflect this seven step methodology.

Step 1- Prior to initiation of the evaluation of "Alternatives to", the proposed evaluation methodology and criteria were reviewed in consultation with the public and agencies. This review sought additional input on the proposed evaluation steps and evaluation criteria presented in the Approved EA Terms of Reference to establish and confirm the relative priorities to be considered during the evaluation.

Step 2 - The component alternatives were assembled into a range of alternative residual processing systems with each system being capable of managing the entire projected residual waste stream.

Step 3 - Data collection was undertaken to apply each of the comparative evaluation criteria to each of the alternative residual processing systems. The proposed disposal system comparative evaluation criteria were included in Appendix E – Table E-1 of the Approved EA Terms of Reference. There was provision for adjustment for suggested indicators and data sources at the initiation of the EA evaluation based on input received from agencies and the public at Step 1.

Step 4 - The comparative evaluation criteria were applied to each of the alternative residual processing systems and potential effects identified.

Step 5 - Each of the potential effects identified at Step 4 were considered with respect to the availability of measures to mitigate (i.e., measures that may be applied to reduce or eliminate a negative potential effect) or enhance (i.e., measures that may be applied to improve or increase the magnitude of a benefit or positive effect) the effects, and identify the remaining or 'net effects'.

Step 6 - The net effects associated with each disposal system under each comparative criterion were compared and a list of relative advantages and disadvantages associated with each alternative processing system was developed.

Step 7 - The relative advantages and disadvantages of each alternative residual processing system were considered in the context of priorities established in consultation with the public and agencies and the preferred system selected. The preferred residual processing system was that which offered the preferred balance of advantages and disadvantages given the environmental priorities established by the communities of Durham and York through the consultation process.

Figure 7-1 illustrates the evolution of the post-diversion residual waste processing systems ("Alternatives to") and technologies throughout the EA process from the evaluation of "Alternatives to" to the identification of the preferred post-diversion residual waste processing technology vendor (discussed in Section 9).

Through the completion of this seven step evaluation process and based on the consideration of the relative advantages and disadvantages of each system and the priorities established through consultation with the public and agencies, the preferred system to manage the post-diversion or residual wastes is ***System 2A – Thermal Treatment of MSW and Recovery of Energy followed by the Recovery of Materials from the Ash/Char***.

More specifically, System 2a (see Figure 7-11) includes:

- The establishment of thermal treatment capacity to process the post-diversion residual waste stream and to recover energy;
- Followed by the removal of materials that may be sold to market from the ash/char residue; and,
- The landfilling of all process residues (non-combustible materials removed prior to treatment and the ash/char).

Although System 2a was identified as the Preferred Long-Term Residual Processing System, ***System 2b Thermal Treatment of Solid Recovered Fuel*** was considered to exhibit an acceptable range of advantages and disadvantages.

It was therefore recommended that the final selection of System 2a as the preferred residual processing system would be based upon the results of the competitive process used during the evaluation of "Alternative methods".

It was recommended that the Request for Qualifications (RFQ) and Request for Proposal (RFP) processes allow for the submission of proposals to implement both System 2a and System 2b, and that the final decision on the technologies used to implement the preferred residual processing system would be based on the results of this competitive process.

Systems 2a and 2b are both based on the recovery of energy through thermal treatment. In 2a, recyclable metals are recovered following thermal treatment from the ash or char. In 2b, recyclable materials, including metals and some plastics, are recovered through mechanical treatment. Moisture from the organic fraction in the remaining material is then reduced through biological treatment. The material (now considered a Solid Recovered Fuel (SRF)) is then subjected to thermal treatment. In both cases, only a small proportion of the residual waste stream, typically 10-15% by volume, is exported to landfill. If the bottom ash could be used as construction material as it is in Europe, the percentage of waste to landfill would be reduced to approximately 5% in volume.

In summary, the advantages associated with Systems 2a and 2b include:

- Lowest impacts to water and land;
- Least potential to disrupt sensitive habitat;
- Greatest energy generation – both renewable and total;
- Lowest social impact on landfill host community due to minimizing the quantity of residual waste requiring landfill; and,
- Higher reliability due to minimum dependence on export to landfill.

The disadvantages associated with Systems 2a and 2b include:

- Highest impacts on the air environment, although current technology has the proven ability to exceed all applicable air emission standards;
- Less flexibility to changes in waste quantities and composition; and,
- Need to manage hazardous residues from the pollution control system. (It can be argued that this is not really a disadvantage as the hazardous compounds – primarily heavy metals – are in the waste stream to begin with and are simply landfilled. With the thermal systems, these contaminants are concentrated and removed for stabilization and/or management in a secure landfill.)

When comparing Systems 2a and 2b, alternative system 2a has the advantages of:

- More proven and reliable technology; and,
- Lower costs – based on experience to-date.

Alternative system 2b has the advantages of:

- The potential to recover more recyclables – some plastics as well as metals; and,
- Potential improvements in air emissions, energy conversion efficiency and costs that may be provided by new technologies presently under development.

7. "Alternatives to" the Undertaking

This section of the EA presents the results of the evaluation of "Alternatives to", which is the first part of the EA Study. The following discussion of "Alternatives to" is based on the results presented and consulted on within the *Report on the Evaluation of "Alternatives To" and Identification of Preferred Residuals Processing System* (May 30, 2006). Also included with this report are a series of appendices that provide additional background, detail and data directly related to the materials discussed.

Under separate cover from the *Report on the Evaluation of "Alternatives To" and Identification of Preferred Residuals Processing System* are a series of annexes, which are referenced throughout the discussion of the "Alternatives to" evaluation results. The materials in the annexes are primarily reports prepared containing background studies, which provide the detailed calculations, and rationale for results or assumptions applied in the evaluation process.

"Alternatives to" are defined as fundamentally different ways of managing waste and achieving the purpose of the Undertaking or Study. As stated in Section 3.0 Statement of Purpose, the purpose of the Undertaking identified in the Approved EA Terms of Reference is as follows:

The purpose of the undertaking is:

- *to process - physically, biologically and/or thermally - the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources - both material and energy - and to minimize the amount of material requiring landfill disposal.*
- *In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered.*

The result of the identification of a preferred long-term residuals processing system for Durham and York considers the advantages and disadvantages of alternative residuals processing systems in comparison to the environmental priorities established by the communities of Durham and York and the results of public and agency consultation.

This section provides the relevant background and the step-by-step results of the "Alternatives to" evaluation process leading up to the identification and description of the preferred long-term residuals processing system for Durham and York.

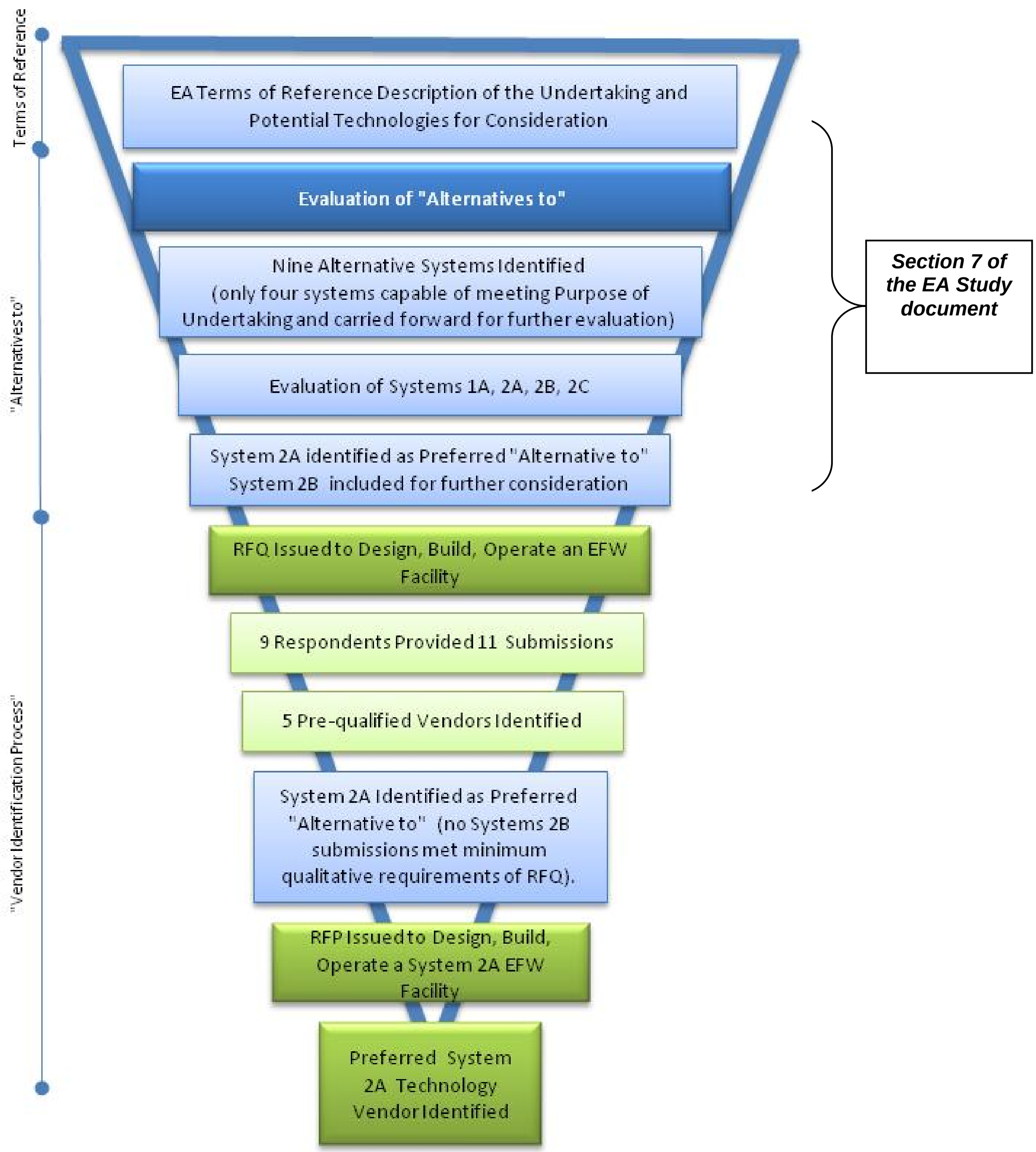
Figure 7-1 illustrates the evolution of the post-diversion residual waste processing systems ("Alternatives to") and technologies throughout the EA process from the evaluation of "Alternatives to" and selection of the preferred residual processing system, to the selection of the preferred processing technology undertaken in a separate process conducted in parallel part of the evaluation of "Alternative methods" (discussed in Section 9).

To consider the context of alternative technologies in the form of cumulative impacts and full life-cycle impact analysis, alternative processing systems were evaluated rather than individual components or technologies recognizing the integrated nature of waste management solutions. The types of technologies under consideration fell into three categories: mechanical, biological and thermal treatment. A landfill-only option was not considered, although it was recognized that each of the proposed alternatives would require landfill disposal capacity for process residues. Each alternative under consideration underwent an evaluation process to determine its applicability and suitability to the purpose of the undertaking in a process developed and reviewed in consultation with the public. Following the identification of the preferred "Alternative to", an RFQ and RFP public procurement process was completed, the results of which confirmed the selection of the preferred system. The system that was ultimately confirmed resulted from the EA selection process of a preferred technology and the public procurement process that identified the preferred technology vendor.

"Alternatives to" are also referred to as either Alternative Post-Diversion Residual Process Systems and/or Alternative Systems throughout the remainder of this EA Study document.

The *Report on the Evaluation of "Alternatives To" and Identification of the Preferred Residuals Processing System – Recommendations* and its appendices and annexes were consulted on and completed in April and May of 2006, respectively. The annexes provide detailed documents that support each major step of the "Alternatives to" evaluation process. The report and its appendices and annexes have been posted on the project website since May of 2006 at http://www.durhamyorkwaste.ca. A complete list of all studies completed in association with this project is included in the reference materials listed in the reference section of the EA Study document.

Figure 7-1 Evolution of Alternative Systems and Technologies throughout EA and Parallel Public Procurement Process



7.1 Overview of "Alternatives to" Evaluation Process

This section provides a brief overview of the evaluation process and methodology used to evaluate the "Alternatives to" considered in this EA. It is intended to provide general understanding of the step-wise methodology and consultation process employed within this part of the EA process. Details regarding each step of the "Alternatives to" evaluation process are provided in the various sub-sections of the EA Study document that follow.

To fully address the purpose of the Undertaking, different waste management approaches capable of processing and recovering resources from post-diversion waste were identified and alternative residual processing systems developed (i.e., "Alternatives to").

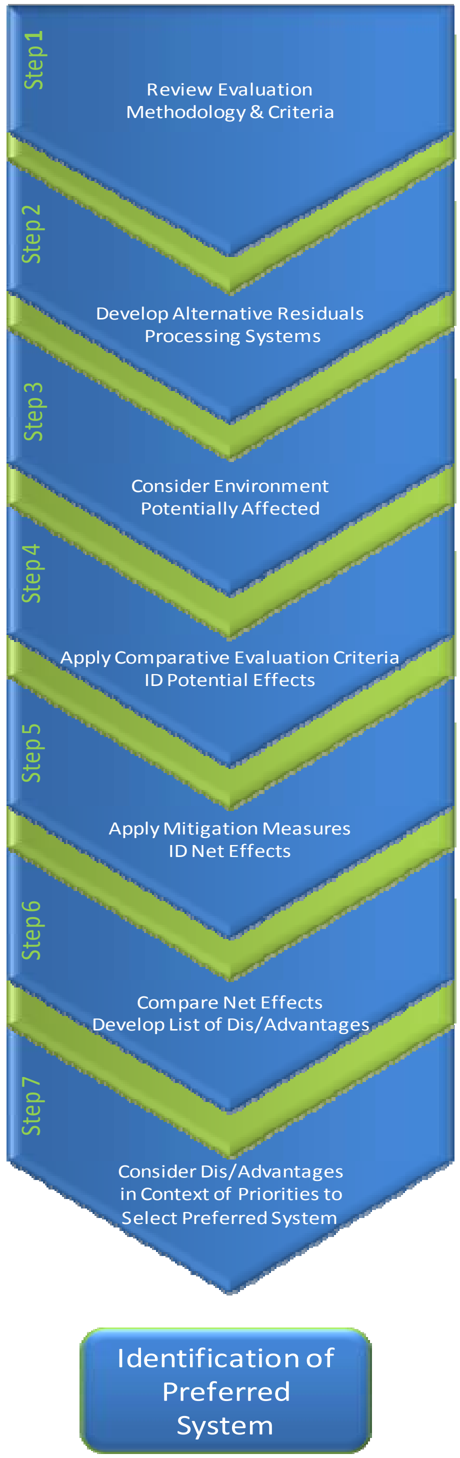
The Approved EA Terms of Reference established that alternative systems comprised of the following approaches and technologies would be formulated and evaluated:

- Mechanical Treatment;
- Biological Treatment; and,
- Thermal Treatment.

Thermal Treatment, includes approaches traditionally referenced as combustion, incineration, energy-from-waste (EFW), waste-to-energy (WTE), etc. or more contemporary/emerging technologies such as gasification or pyrolysis, in which the hydrocarbons in the waste stream are converted to thermal energy, carbon dioxide (CO_2) and water.

The following summarizes the seven (7) step methodology outlined in the Approved EA Terms of Reference applied to formulate and then comparatively evaluate and identify the advantages and disadvantages and net effects of the alternative residual processing systems relative to each other. Figure 7-2 illustrates the process.

Figure 7-2 "Alternatives to" Evaluation Process



Section 7 of the EA on "Alternatives to" is structured to reflect this seven step methodology.

Step 1- Prior to initiation of the evaluation of "Alternatives to", the proposed evaluation methodology and criteria were reviewed in consultation with the public and agencies. This review sought additional input on the proposed evaluation steps and evaluation criteria presented in the Approved EA Terms of Reference to establish and confirm the relative priorities to be considered during the evaluation.

Step 2 - The component alternatives were assembled into a range of alternative residual processing systems with each system being capable of managing the entire projected residual waste stream.

Step 3 - Data collection was undertaken to apply each of the comparative evaluation criteria to each of the alternative residual processing systems. The proposed disposal system comparative evaluation criteria were included in Appendix E – Table E-1 of the Approved EA Terms of Reference. There was provision for adjustment for suggested indicators and data sources at the initiation of the EA evaluation based on input received from agencies and the public at Step 1.

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As an initial task in the alternative systems development step, each municipality's at-source waste diversion program was reviewed to assess the suitability of the established 60% at-source diversion targets. This review concluded that waste reduction and at-source diversion approaches will continue to be preferred over disposal but that, given the current and projected diversion opportunities available to Durham and York, the set targets of 60% diversion by 2011 and 75% diversion in future years were reasonable for use in the formulation and evaluation of alternative systems.

In determining the scope of alternative systems to be evaluated, the focus was on covering the range of options to recover resources, both materials and energy, from the residual waste stream rather than all possible combinations of the alternative approaches available for consideration. Resource recovery options included recovery of recyclable materials for sale to market, energy from biogas and energy from the thermal treatment of wastes or solid recovered fuel. The intent was to identify a preferred long-term alternative that maximizes the recovery of resources and minimizes the reliance on landfill as a primary method of disposal in accordance with the stated purpose of the Undertaking identified in the Approved EA Terms of Reference.

Landfill facilities will be assumed to continue to play a role for the disposal of certain materials that cannot be otherwise processed or diverted. The "do nothing" alternative, being a landfill-only system, consisting of a new landfill site capable of managing all waste that remains after at-source diversion, would not meet the purpose of the Undertaking, and thus was not considered in this Study. Rationale for the exclusion of this option is provided in the Approved EA Terms of Reference, Section 5.3 of this EA and the detailed documentation supporting the identification of the preferred "Alternative to".

Once developed, the alternative post-diversion residual processing systems were evaluated by application of the established evaluation criteria and environmental priorities and using the net effects analysis outlined in Steps 3 to 7 in the "Alternatives to" evaluation methodology and the preferred residual processing system was identified.

7.2 Consultation on the "Alternatives to" Evaluation Methodology

The following is a summary of the consultation undertaken as part of the development of the "Alternatives to" evaluation methodology. A more detailed account of the consultation activities is included in the Record of Consultation. The Approved EA Terms of Reference included a consultation plan that identifies points in the Study where the public and agencies are to be contacted for consultation, as well as the parties that will be contacted and how consultation will be approached. With regards to the evaluation of "Alternatives to", the following Project milestones involved public and/or agency consultation:

- EA Study initiation and review of evaluation methodology and criteria (Step 1);
- Evaluation of "Alternatives to" the Undertaking including development of the alternative processing systems (Step 2); and,
- Identification of the preferred residual waste processing system (Step 7).

Consultation on Steps 1 and 2 is discussed below, while consultation regarding the identification of the preferred residual waste processing system is discussed in Section 7.9.

The evaluation of "Alternatives to" was initiated with a review and confirmation of evaluation methodology and criteria. Public and agency input was requested in order to review and confirm the evaluation methodology and environmental priorities (Step 1 consultation) and the range of alternative systems to be evaluated (Step 2 consultation). This consultation involved the following activities:

- Distribution of a questionnaire at Public Open House Events, with a total of 83 respondents;
- Distribution of an online public opinion survey, with a total of 872 respondents (conducted by Ipsos Reid); and,
- Circulation of the draft criteria, along with indicators to be used in the application of criteria to review agencies in March 2006 with a request to review and provide comment if necessary.

The Public Open House events were held on March 7, 8 and 9, 2006 in both Durham and York. The purpose of these events was two-fold. The first objective was to present, for consultation the four (4) alternative systems to be evaluated, as well as the opportunity for additional at-source diversion measures and potential for resource recovery that will be considered with each. The second objective was to confirm public agreement with the range of alternative systems, and the evaluation methodology and priorities to be utilized in the evaluation of these four (4) systems. Open house attendees were requested to complete a questionnaire where they were asked whether they agreed with the range of alternatives systems, as well as to provide priority rankings for the five (5) environmental considerations.

Eighty-three (83) Open House attendees completed the questionnaire, all of which agreed with the range of alternative systems to be evaluated. Further detail on the open houses and results from the questionnaire are provided in the Record of Consultation and within the *report on the Evaluation of “Alternatives To” and Identification of Preferred Residuals Processing System* (May 30, 2006).

The public polling firm, Ipsos Reid, was retained to conduct an online public opinion survey of Durham and York residents. Public polling was conducted with the objective of including a broader population base in order that the environmental priorities considered in the EA Study could be considered representative of the full cross-section of the Durham and York populations. On-line polling was the preferred approach to determine general opinion regarding environmental priorities, due to the complexity of the questions. Similar to the open house questionnaire, the survey asked respondents to rate the importance of the five (5) environmental categories. Overall, responses were received from 449 Durham residents and 423 York residents. This response rate was considered to be representative of all Durham and York residents. The specifics of the public opinion survey and detailed results are provided in the Record of Consultation and within the report on the *Evaluation of “Alternatives To” and Identification of Preferred Residuals Processing System* (May 30, 2006).

Environmental priorities, representative of the Durham and York communities, were established in order to guide the evaluation of the alternative systems and were derived from the following three activities:

- Public Workshops held in the two communities on February 15, 16 and 17, 2006 which asked attendees for their opinions on priorities that should be considered in identification of a long-term processing system during the development of the EA Terms of Reference;

- The results of questionnaires that were filled out by attendees of the Public Open Houses held during the evenings of March 7, 8 and 9, 2006 as noted above; and,
- The results of the online public opinion poll.

The results of the above activities were combined in order to determine the overall relative importance of the environmental categories to be to be considered in the evaluation of "Alternatives to". These have translated to the assigned priorities presented in Table 7-1 below.

Table 7-1 Environmental Categories Assigned Priorities

Environmental Category	Priority
Natural Environmental Considerations	Most Important
Social / Cultural Considerations	Important
Economic / Financial Considerations	Important
Technical Considerations	Important
Legal Considerations	Least Important

Other than the determination of the priorities assigned to the environmental categories considered in the evaluation of "Alternatives to" there were no other changes made to the criteria, indicators or evaluation methodology as a result of public consultation. The large majority of the attendees that provided comment on the evaluation methodology, agreed with the criteria and indicators and methodology as proposed.

In regards to the proposed alternative systems, all of those that completed a questionnaire at the public information sessions, supported consideration of those alternatives, and as a result the four alternative systems were carried forward in the evaluation process. No modifications were made to the four systems as a result of the consultation process. In regards to some of the suggestions for other alternatives to be considered, it was determined that either the disposal alternative had been removed from consideration during the EA Terms of Reference process (e.g., a landfill only system), or that the alternative could be accommodated within the four systems under consideration (e.g., consideration of systems that recover energy). Diversion options that were noted would largely fall within the suite of future diversion programs and/or policies that had been outlined as being necessary for the Regions to achieve their diversion goals.

Durham and York also distributed the proposed evaluation criteria and copies of the open house display panels to the Government Review Team (identified in consultation with the MOE during the review of the EA Terms of Reference) for review and comment. No comments were received from the GRT.

7.3 Step 1: Confirmation of Evaluation Methodology

The following detailed description of Step 1 of the “Alternatives to” evaluation methodology is based on the approach outlined in the Approved Terms of Reference and as described in the previously completed *Report on Evaluation of “Alternatives to” and Identification of Preferred Long-term Residuals Processing System Recommendations* (May 30, 2006).

7.3.1 Development of Methodology, Criteria, and Indicators

During the development of the evaluation methodology and criteria for “Alternatives to” the Undertaking, the focus was on addressing the approval requirements of the EAA and Approved Terms of Reference. Accordingly, the following objectives needed to be achieved:

- Consideration of a broadly defined environment including aspects such as social/cultural, economic, and legal considerations in addition to the natural environment;
- Incorporation of a net effects analysis allowing for the consideration of mitigation and/or enhancement measures, if available, in the assessment of the range of alternatives;
- Identification of relative advantages and disadvantages to the environment of each alternative to provide the basis for a decision on the preferred Undertaking;
- Incorporation of meaningful opportunities for public consultation in the decision-making process;
- Results that reflect the priorities and address the significant issues of the study area community; and,
- Generation and documentation of results in a rational, traceable and replicable manner.

The initial content of the “Alternatives to” evaluation methodology and criteria was established early in the process of developing the EA Terms of Reference and was refined to reflect the input of the public and review agencies as noted in Section 7.2.

Table 7-2 outlines the criteria, rationale, indicators, data sources and methodology used for comparative evaluation of alternative residual processing systems.

Table 7-2 Criteria, Rationale, Indicators, Data Sources and Methodology for Comparative Evaluation of Alternative Residual Processing Systems

Criterion 1:	**Environmental burden at a global or macro-environmental scale, including impacts to air, land and water.**
Category:	**Natural Environmental (Most Important Priority)**

<u>Rationale for Consideration of Criterion:</u>

The environmental impacts associated with municipal waste management systems often extend beyond the geographic boundaries of the area served. Where possible, planning and comparative evaluations should be considered in an ecosystem context when evaluating the preference and potential suitability of a waste management system.

Further, impacts associated with waste management systems often extend beyond those, which can be directly observed from the operation of the component facilities.

Other impacts external or ancillary to the facility or program operations, such as the environmental impacts associated with the refining of raw materials, the need to manage hazardous residues or the consumption of land resources, may be experienced. Where possible, planning and comparative evaluations should consider these types of life-cycle impacts when evaluating the preference and potential suitability of a waste management system.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Predicted emissions released to atmosphere by system.	➔ A Life Cycle Analysis (LCA) Model will be utilized to predict acid gas (NO_x, SO_x and HCl), smog precursor (NO_x, particulate matter and volatile organic compounds) and heavy metal/organic (lead, mercury, cadmium and dioxin) emissions to the atmosphere. ➔ A new model developed on behalf of Environment Canada will be utilized to estimate greenhouse gas (carbon dioxide, methane, and CO_2 equivalents) emissions to the atmosphere. ➔ Need for and type of air pollution control equipment will be reflected in net system costs (see criterion 7). ➔ Contaminants of concern are identified in the *Step 3 Baseline Report on the Air Environment* (Section 7.4.1.1).
b.) Predicted pollutants released to water resources by system.	➔ A LCA model will be utilized to predict lead, mercury, cadmium, and biological oxygen demand emissions to water resources. ➔ Need for and type of treatment of contaminated water and/or sewage will be reflected in net system costs (see criterion 7).
c.) Need to manage residues classified as hazardous waste associated with system.	➔ Hazardous elements within the waste stream and pollution control equipment associated with facilities comprising the system will be reviewed with regards to nature of residues. Considering the mass balance associated with the system, an estimate of hazardous waste quantities and expected management approach will be documented. ➔ Need for and type of management for hazardous residues in system will be reflected in net system costs (see criterion 7).

d.) Impacts to land by system.	➔ Types of facilities associated with the system will be considered and an estimate of total land requirements will be determined based on assumed throughputs, densities, processing methods, etc., and industry standards for buffer, ancillary facilities, etc. ➔ Quantities to be managed by the various system components will be considered and assumptions developed on the annual requirements for landfill capacity associated with each system. ➔ Resource value of lands typically consumed by the respective facilities (based on past experience with settings and surrounding land uses) will be considered in a qualitative manner (i.e., agricultural/natural heritage versus urban/industrial). ➔ The relevant *Step 3 Baseline Reports* (terrestrial/aquatic environment Section 7.4.1.2, agricultural Section 7.4.1.3, and social/cultural Section 7.4.1.4) will be considered to determine the spatial distribution of lands with a resource value in relation to those lands which may provide suitable locations for the respective waste management facilities.

Criterion 2: Consumption/preservation of non-renewable environmental resources.

Category: Natural Environmental (Most Important Priority)

<u>Rationale for Consideration of Criterion:</u>

Other impacts external or ancillary to the facility or program operations, such as the environmental impacts associated with the consumption and preservation of non-renewable resources (e.g., energy generated from waste treatment in place of energy generated from fossil fuels) may be experienced. Where possible, planning and comparative evaluations should consider these types of life cycle impacts when evaluating the preference and potential suitability of a waste management system.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Potential of the system to consume non-renewable fossil fuel or displace non-renewable fossil fuel consumption for energy generation.	➔ A LCA model will be utilized to consider the energy balance of waste management facilities considering all energy sources generated or consumed and programs comprising the systems and to calculate the net energy consumed/ generated by the system. The assumption is that net energy consumption will use non-renewable fossil fuels and net energy generation will preserve non-renewable fossil fuels. ➔ Estimate of net electrical energy consumption/generation – both renewable and total - will be calculated and stated in an equivalency to home energy requirements (e.g., annual energy typically consumed by *x* households).

Criterion 3:	Potential for destruction or disruption of sensitive terrestrial and/or aquatic habitats at an eventual site.
Category:	**Natural Environmental (Most Important Priority)**
<u>Rationale for Consideration of Criterion:</u> The establishment of new waste management facilities has the potential to disrupt or destroy sensitive terrestrial and/or aquatic habitats if located on, or in proximity to, such features. The number and area of sites for new facilities and their typical setting should be considered for each system to determine the likelihood of impacts to sensitive habitats.	
Measures or Indicators for Application of Criterion	**Methods/Approaches for Application of Indicators**
a.) Total volume of landfill capacity required to manage post-processing residual waste.	➔ Volume of landfill capacity required to manage post-process residuals will be considered and their potential impact on sensitive terrestrial and/or aquatic habitats.
b.) Land use setting typically associated with establishment of facilities comprising the system.	➔ The setting and surrounding land uses typically associated with the respective facilities (based on past experience) will be considered in a qualitative manner (i.e., rural versus urban). ➔ The relevant ***Step 3 Baseline Reports*** (terrestrial/aquatic environment Section 7.4.1.2, agricultural Section 7.4.1.3, and social/cultural Section 7.4.1.4) will be considered to determine the spatial distribution of sensitive habitats in relation to those lands which may provide suitable locations for the respective waste management facilities.

Criterion 4:	**Potential to increase diversion rate and/or make best use of residual (post-diversion) waste materials.**
Category:	**Natural Environmental *(Most Important Priority)***

Rationale for Consideration of Criterion:

It is recognized that even with the establishment of a 60% at-source waste diversion target by 2011 and 75% in future years; some materials that could have been captured at-source will be lost to the post-diversion waste stream slated for disposal. Some of the processing technologies have the capability of recovering these materials from the post-diversion stream and, in doing so, increasing the Regions' diversion rates. Further, some of the processing technologies may have the ability, by way of equipment retrofits, to recover materials for which markets do not currently exist but may develop in the future.

It is also recognized that some of the processing technologies have the ability to generate an alternative fuel and/or energy from materials in the post-diversion waste stream and to make some kind of beneficial use from materials for which recycling markets currently exist but may decline or disappear in the future.

The evaluation of alternative systems to manage the post-diversion (at-source) waste stream should consider the capabilities of the system to make some form of beneficial use from materials which would otherwise be lost to landfill.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Potential of system facilities to remove any remaining materials in the post-diversion waste stream for use in a non-disposal manner.	➔ Use post-diversion waste characterization included in the ***Step 2 Additional At-Source Diversion Report*** Section 7.3.1, and case studies / experience elsewhere (from ***Step 2 Report on Formulation of Alternative Systems*** Section 7.3.2) to determine the potential of systems to recover and market materials in the post-diversion waste stream and to estimate quantities potentially recoverable.
b.) Potential of system facilities to manage and make beneficial use of materials in the post-diversion waste stream including those materials for which diversion may decline or disappear in the future.	➔ Identify established and pending markets for outputs from systems as identified in the ***Step 2 Report on Formulation of Alternative Systems*** *Section 7.3.2*. ➔ Develop mass balance calculations for alternative systems to determine potential diversion of materials from landfill should the materials be utilized in an alternative, beneficial manner. Differentiate between outputs for which markets exist and for which a potential market has been identified and may develop in the future.

Criterion 5:	Potential for land use conflicts from siting of facilities required for alternative.
Category:	**Social / Cultural *(Important Priority)***

Rationale for Consideration of Criterion:

The establishment of new waste management facilities has the potential to conflict with surrounding land uses if facilities are located in proximity to established uses that are sensitive to potential nuisances or stigma from the respective facility operation. The number and area of sites for new facilities and their typical setting should be considered for each system to determine the likelihood of impacts to sensitive land uses.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Number of waste management facilities associated with the alternative system.	➔ The number of different technologies included in the system will be considered to determine the number of different sites potentially required to implement the system. Assumptions will be developed on what technologies would be sited together and where there is a likelihood of multiple sites. ➔ Multiple sites for the same technology or the use of transfer stations will not be considered at the systems' evaluation. These considerations will be factored into the siting exercise for the preferred system components. ➔ Types of facilities associated with the system will be considered and an estimate of total facility land requirements will be determined based on assumed throughputs, densities, processing methods, etc., and industry standards for buffer, ancillary facilities, etc.
b.) Potential for land use conflicts considering location requirements of waste management facilities.	➔ The setting and surrounding land uses typically associated with the respective facilities (based on past experience) will be considered in a qualitative manner (i.e., rural versus urban). ➔ The potential traffic related impacts associated with the system will be identified, based on assumed inputs and outputs to the systems and the need to transfer/haul materials to other locations. ➔ The relevant ***Step 3 Baseline Reports*** (terrestrial/aquatic environment Section 7.4.1.2, agricultural Section 7.4.1.3 and social/cultural Section 7.4.1.4) will be considered to determine the spatial distribution of sensitive land uses (e.g., residential, hospitals, etc.) in relation to those lands which may provide suitable locations for the respective waste management facilities.
c.) Types and degree of nuisance impacts associated with waste management facilities based on operational experience.	➔ The descriptions of alternative waste management approaches provided in ***Step 2 Report on Formulation of Alternative Systems*** Section 7.3.2 will be referenced to define the nature and extent of potential nuisances associated with each system. To the extent possible, the availability and effectiveness of operational/design controls to mitigate nuisances and, real versus perceived impacts will be factored into the consideration of this indicator.

Criterion 6:	**Technical risks associated with waste management alternative.**
Category:	**Technical *(Important Priority)***

<u>Rationale for Consideration of Criterion:</u>

The alternative waste management approaches being considered in this EA Study were assessed and deemed reasonably available to Durham and York to manage the post-diversion waste stream. This assessment included confirmation that the alternatives are capable of meeting the Province's regulations for environmental performance.

Notwithstanding the initial screening during the EA Terms of Reference development, it is recognized that processing technologies exhibit some inherent technical risks such as downtime for maintenance or repair, off-spec outputs, upsets in the processing train, etc. and that these risks may vary depending on the alternative being considered. These risks may exist at no fault of the technology as would be the case should assumed waste characteristics or quantities being provided by Durham and York change. However, these cases are not beyond the realm of possibility and are best considered in the selection of a long-term system.

The most reliable approach to managing these risks is the provision of contingency landfill capacity. To the extent possible, each of the alternative systems should be evaluated with respect to the degree of technical risk and need for contingency landfill capacity.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Flexibility of alternative system to changes in waste quantities, composition and availability of system diversion and disposal components.	➔ The descriptions of alternative waste management approaches provided in the ***Step 2 Report on Formulation of Alternative Systems*** Section 7.3.2 and other experience with operations in other jurisdictions will be referenced to determine assumed system flexibility. ➔ The ability of the systems to accommodate times when the at-source diversion system or other disposal system components may not be available (with preference given to beneficial versus landfill destinations) will be considered a positive system feature.
b.) Reliability of alternative system and component technologies and need for contingency landfill capacity.	➔ The descriptions of alternative waste management approaches provided in the ***Step 2 Report on Formulation of Alternative Systems*** Section 7.3.2 and other experience with operations in other jurisdictions will be referenced to determine assumed system reliability. ➔ The type and nature of technical sensitivities associated with each system will be described in comparative terms.

Criterion 7:	**Net system costs per tonne of waste managed – in a systems context.**
Category:	**Economic / Financial *(Important Priority)***

<u>Rationale for Consideration of Criterion:</u>

The Economic / Financial impacts associated with municipal waste management systems extend to all taxpayers in the community. Annual operating costs including debt service charges are passed onto taxpayers in visible form through direct charges (i.e., tipping fees) or included within other municipal charges through property taxes.

When determining long-term waste management approaches, it is important to address the projected gross and net annual system costs to determine the potential for impacts to taxpayers. The potential for revenues and subsidies can reduce the overall impacts to taxpayers, and should be considered in the evaluation.

It is also critical to examine the capital costs and corresponding potential debt burden associated with the systems. Municipal financing of capital costs for waste management facilities can impact on the ability of municipalities to provide capital financing either through debt or through use of reserves for other municipal programs. There is a limit to the ability of municipalities to carry debt, including a provincial annual debt repayment limit that must be considered, along with impacts related to the accumulation of long-term debt on municipal credit ratings.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Capital and operating costs over operational period of the system (2011 to 2045). b.) Estimated costs associated with perpetual care of component facilities in accordance with current environmental and municipal accounting requirements. c.) Estimated revenues associated with the system once fully implemented and operational. d.) Potential subsidies and revenues that may be realized during establishment and future operation of the system.	➔ Life cycle cost estimates incorporating capital, financing, operational, closure and decommissioning costs and that consider revenue estimates will be generated for the study period (2011 to 2045). Cost will be stated in $/tonne of waste managed for the system. Comparison will be undertaken based on system costs and <u>not</u> component costs. ➔ Assumptions regarding unit costs, financing charges, etc. will be based on existing operations in other jurisdictions and will be conservative in nature factoring the applicability of the sources to the Durham/York case. ➔ Cost estimates will include revenues/subsidies that exist or will exist with a degree of certainty and using conservative values. Sensitivities associated with revenues/subsidies will be addressed by Criterion 8.

Criterion 8:	**Sensitivity of system costs and affordability to external financial influences.**
Category:	**Economic / Financial *(Important Priority)***

Rationale for Consideration of Criterion:

It is recognized that a system that relies heavily on revenues and/or subsidies to establish affordability presents a certain risk with regards to long-term sustainability. The degree to which alternative waste management systems rely on revenues/subsidies, stability of the marketplace to sustain this revenue, and consequences should these monies decrease or disappear should be considered in the systems evaluation.

This criterion also addresses the management of post-process residual waste at a third-party landfill site under contract with the Region(s) and the potential sensitivity to escalating tipping fee / landfill disposal costs.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Types of revenues and subsidies currently available to off-set system costs and predicted sustainability of these sources into the future.	➔ The range of revenues and subsidies available, expected to become available in the future or potentially available will be identified for each system based on experience with current markets and policies/programs associated with various funding organizations. ➔ To the extent possible, revenues and subsidies identified will be arranged in an order of predicted sustainability.
b.) Degree to which system affordability relies on revenues and subsidies during long-term operation of the system.	➔ The costing models developed during application of Criterion 7 will be utilized to measure the sensitivity of the systems to changes in the value and/or availability of revenues / subsidies and the change in value and/or availability of third-party landfill disposal capacity.

Criterion 9:	**Legal / contractual risks associated with waste management alternative.**
Category:	**Legal *(Less Important Priority)***

<u>Rationale for Consideration of Criterion:</u>

The alternative waste management approaches being considered in the EA Study were assessed and deemed reasonably available to Durham and York to manage the post-diversion waste stream. This assessment included confirmation that the alternatives are capable of meeting the Province of Ontario's regulations for environmental performance and therefore is considered approvable in the Province.

Notwithstanding the initial screening during the EA Terms of Reference development, it is recognized that the types and complexity of approvals associated with each system may vary and that associated legal risks may vary depending on the alternative being considered. For example, Ontario's track record with regards to approvals under the EAA is considered to pose a degree of risk which varies depending on the type of proponent (private versus public) and technology under consideration. The legal risks associated with approval requirements should be considered when evaluating alternative waste management systems.

A review of procurement and/or information gathering processes for waste management technologies undertaken by Durham/York and other jurisdictions leading up to the initiation of the EA Study identified a varying degree of reliance on contracts with private sector vendors depending on the alternative/technology being considered. For example, many of the processing technologies being considered are proprietary and require some kind of contractual arrangement with the respective vendor(s). In addition, some alternatives are better suited to cases where municipalities have partnered to provide the economies of scale for an affordable solution. Any contractual arrangement (public-private or public-public) inherently provides some legal risks that should be considered when evaluating alternative waste management systems.

Measures or Indicators for Application of Criterion	Methods/Approaches for Application of Indicators
a.) Types and complexity of approvals required implementing components of the system.	➔ Nature of approvals required will be assumed for each system based on experience with approval agencies and other cases in Ontario. ➔ Complexity of approvals associated with each system will be estimated based on experience with approval agencies and other cases in Ontario and considering the conformity of the system with established Municipal / Provincial policies related to waste management and land use/development proposals.
b.) Degree to which system implementation and operation relies on private or public sector partnerships.	➔ Assumptions regarding need for and nature of partnerships / contractual arrangements will be developed based on experience elsewhere and considering best practices.

7.3.2 Application of Evaluation Methodology Priorities

As noted in Section 7.2, the results of consultation early in the EA process, were used to determine the overall relative importance of the environmental categories to be to be considered in the evaluation of "Alternatives to". These were translated to the assigned priorities presented in Table 7-3 below.

Table 7-3 Environmental Categories Assigned Priorities

Environmental Category	Priority
Natural Environmental Considerations	Most Important
Social / Cultural Considerations	Important
Economic / Financial Considerations	Important
Technical Considerations	Important
Legal Considerations	Least Important

The priorities and weighting determined through consultation were not assigned to individual indicators or criteria, but only to the broader environmental categories. Application of the qualitative evaluation methodology, described in more detail in Section 7.6.1 did not entail the consideration of priorities related to individual criteria or indicators. Based on the criteria and indicators outlined in Table 7-2 it was determined that given the potential effects associated with each, there was no rationale for determining that one or more criteria or indicators would be more important than the others within the same broad environmental category. However, each indicator, criterion and category of the environment was assigned a technical ranking/weighing as part of the "Alternatives to" evaluation process, reflecting the relative comparison of each of the alternatives.

The consultation process outlined in Section 7.2 also did not request that attendees attempt to assign priorities to individual indicators or criteria. Experiences in other EA studies indicated that in general, the public has great difficulty consistently determining which individual criteria or indicators within the broader environmental categories are more 'important' than others.

7.4 Step 2: Development of "Alternatives to" (Residual Processing Systems)

The Durham/York Approved EA Terms of Reference determined that Step 2 of the "Alternatives to" evaluation methodology would establish alternative systems, each capable of managing all post-diversion residual wastes and that the following technological approaches would be considered in the development of these systems:

- Mechanical Treatment;
- Biological Treatment; and,
- Thermal Treatment.

Step 2 of the "Alternatives to" evaluation methodology, identification of alternative residuals processing systems, was completed in two steps

The first step (Step 2a) was to review the potential for additional at-source diversion in order to establish the quantities and types of post-diversion wastes that would require management.

The second step (Step 2b) was the formulation of alternative residuals processing systems.

7.4.1 Step 2a: Consideration of Additional At-Source Diversion

This section of the EA document provides a broad overview of the consideration of additional at-source diversion as part of Step 2a in the evaluation of "Alternatives to", and the conclusions that were reached in regards to potential diversion rates, and the resulting effect on the determination of the residual waste quantities that were assumed to require management at this point in the EA Study.

Additional diversion information for the EA Study was documented in the *Report on Additional At-source Diversion and Residual Quantities to be Managed* (May 30, 2006). This information was used in the development and evaluation of the "Alternatives to".

The Report on Additional At-Source Diversion and Residual Quantities to be Managed:

- Examined the potential for additional at-source diversion during the 35-year planning period; and,
- Provided projections of future waste quantities, waste diversion program performance and the composition of waste requiring management and disposal over the 35-year planning period from 2011 to 2045.

As previously noted, additional at-source diversion applies to all of the alternative systems, such that only the remaining residual waste will require management by the alternative residuals processing systems. The purpose of preparing the *Report on Additional At-Source Diversion and Residual Quantities to be Managed* (May 30, 2006) was to:

- Review diversion practices from higher performing waste diversion programs around the world, including what is being achieved and the measures in place to achieve their diversion rates;
- Examine the concept/philosophy of "Zero Waste" what it means and its applicability to Durham and York;
- Consider additional at-source diversion on a quantitative basis for Durham and York, based on municipal measures and policies, and examine the overall waste diversion potential for the two municipalities;
- Project recovery rates and the overall at-source diversion rate for both Durham and York reflecting the implementation of both municipalities' approved waste management plans that have been designed to achieve 60% diversion by 2011;
- Confirm the appropriateness of assuming increases in diversion targets over the planning period; and,
- Project the quantities of materials generated, diverted and requiring disposal over the planning period for Durham and York on a material-by-material basis.

The *Report on Additional At-Source Diversion and Residual Quantities to be Managed* (May 30, 2006) included diversion performance information for 2005. A review of current information regarding diversion performance was recently undertaken to confirm the results documented in the report on additional at-source diversion prepared in 2006. Updated information on waste diversion in Durham was obtained from the 2007 Waste Management Annual Report for Durham and the technical memorandum titled Region of Durham 70% Waste Diversion Study – Existing System Summary (March, 2009). Updated information on waste diversion in York was obtained from York staff.

Details from the *Report on Additional At-source Diversion and Residual Quantities to be Managed* (May 30, 2006) and current information regarding diversion performance, are consolidated into the following sub-sections of the EA Study document.

The purpose of this EA Study is to address the waste that remains after the application of at-source waste diversion. Examination of waste diversion initiatives themselves, although considered for planning purposes, is outside of the scope of this EA Study. To support the identification and implementation of waste diversion initiatives both Regions have developed comprehensive waste management master plans. The master plans have been adopted by their respective Regional Councils.

7.4.1.1 Current Waste Diversion Programs

Analysis of the diversion information for both Regions indicates that the performance of both Regions' waste diversion programs and systems have improved from 2005 to 2007.

Waste Diversion in Durham – 2005 and 2007

The waste diversion programs and services in place for the Region of Durham in 2005 were originally used as the basis for determining at-source diversion rates for the EA Study. Since that time, a number of initiatives have been put into place and Durham's diversion rate has increased. The waste diversion programs and services in place for Durham in 2005 were as follows:

- Curbside Blue Box Recyclables Collection;
- Curbside Household SSO Collection – for half of the area municipalities in Durham;
- Curbside Leaf & Yard Waste Collection;
- Curbside White Goods Collection;
- Curbside Bulky Waste Collection;
- Drop-off facilities for Waste, Reusable items, Recyclables, and Compostables; and,
- Drop-off facilities for Household Hazardous Wastes.

In 2005 Durham achieved a 36% diversion rate for municipally managed materials.

By 2007 several new waste management initiatives had been implemented, including:

- Extension of curbside Household SSO Collection region-wide; and,

- Establishing drop-off facilities for White Good and Waste Electronics and Electrical Equipment (WEEE).

These initiatives increased Durham's 2007 waste diversion rate to 48%.

The Region of Durham hopes to increase its waste diversion rate to 70% on or before December 2013. It plans to accomplish this by increasing participation in existing waste diversion programs and implementing new opportunities for residents to divert materials from disposal. Table 7-4 shows the quantities of waste that were managed through the various diversion programs and that were disposed in 2005 and 2007.

Table 7-4 Quantities of Waste Managed Through Durham's Waste Management Program in 2005 and 2007 (tonnes)

Program Element	Quantities Managed (2005)	Quantities Managed (2007)
Recycling	47,100	55,500
Kitchen Organics	2,900	26,200
Leaf and Yard Waste	18,300	19,400
Backyard Composting/Grasscycling	8,700	9,000
Other Diversion [1]	7,700	6,600
Disposal	148,700	116,300
Total Quantity	233,400	233,000

[1] Includes C&D (gypsum, wood, concrete/brick), scrap metal, tires, white goods, HHW

Figures 7-3 and 7-4 show the percentages of waste managed through Durham's waste management program in 2005 and 2007 respectively.

Figure 7-3 Percentages of Waste Managed through Durham's Waste Management Program in 2005

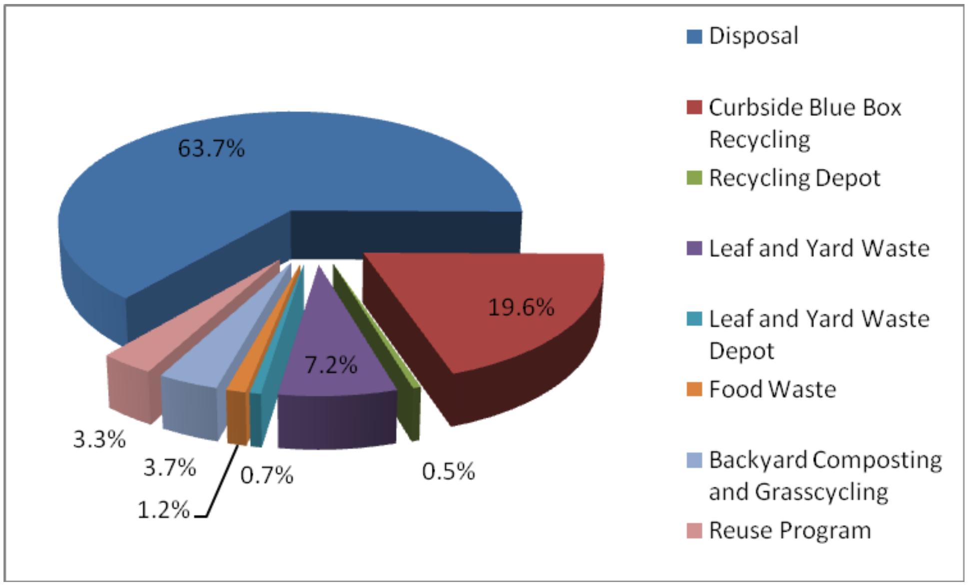
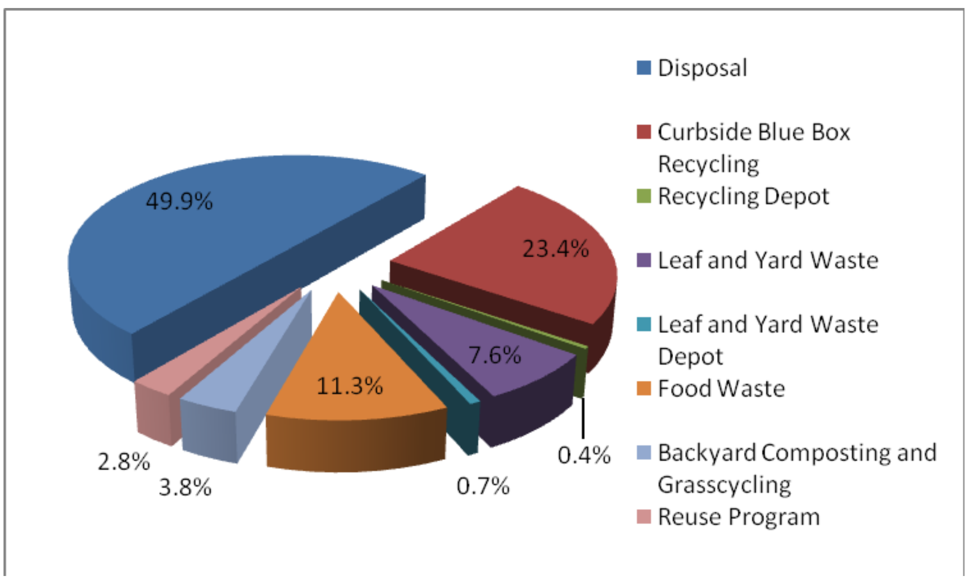


Figure 7-4 Percentages of Waste Managed through Durham's Waste Management Program in 2007



Waste Diversion in York – 2005 and 2007

The waste diversion programs and services in place for York in 2005 were originally used as the basis for determining at-source diversion rates for the EA Study. Since that time, a number of initiatives have been put into place and York's diversion rate has increased. The waste diversion programs in place in York Region in 2005 were as follows:

- Curbside Blue Box Recyclables Collection;
- Curbside SSO Collection (Markham only);
- Curbside Leaf & Yard Waste Collection;
- Curbside White Goods Collection;
- Curbside Bulky Waste Collection;
- Drop-off facilities for Waste, Recyclables, Electronics, White Goods, and Yard Waste; and,
- Drop-off facilities for Household Hazardous Wastes.

In 2005, based on available information, York achieved a 33% diversion rate for municipally managed materials.

By 2007, several new waste management initiatives had been implemented, including:

- Extension of curbside Household SSO Collection region-wide; and,
- Weekly collection of blue box recycling region-wide.

These initiatives have increased York's waste diversion rate to 46%.

York hopes to increase its diversion rate to 65% in the short term and increase this rate to over 70% by 2016. To meet these goals, the Region has adopted 11 potential waste diversion initiatives consisting of eight (8) priority and three (3) future initiatives as follows:

Priority Initiatives:

- Optimized Blue Box;
- Community Environmental Centres;
- Bag Limits/Financial Incentives;
- Enhanced Communication and Public Outreach;
- Diversion of Textiles;
- Infrastructure Development; and,
- Advocacy.

Future Considerations:

- Bi-weekly Yard Waste Collection;
- Mandatory Recycling By-law; and,
- Increasing waste diversion with small quantity Industrial, Commercial & Institutional (IC&I) waste generators.

Table 7-5 shows the quantities of waste that were managed through the various diversion programs and that were disposed in 2005 and 2007.

Table 7-5 Quantities of Waste Managed through the York's Waste Management Program in 2005 and 2007 (tonnes)

Program Element	Quantities Managed (2005)	Quantities Managed (2007)
Recycling	59,200	74,900
Kitchen Organics	9,000	60,300
Leaf and Yard Waste	24,300	28,400
Backyard Composting/Grasscycling	4,400	n/a
Other Diversion (1)	7,500	3,500
Disposal	213,200	152,300
Total Quantity	317,500	319,500

Includes scrap metal, electronics, white goods, HHW, tires, and clean fill.
Note: Numbers may not add due to rounding.
n/a = information not available

Figure 7-5 and Figure 7-6 show the percentages of waste managed through York Region's waste management program in 2005 and 2007 respectively.

Figure 7-5 Percentages of Waste Managed Through York's Waste Management Program in 2005

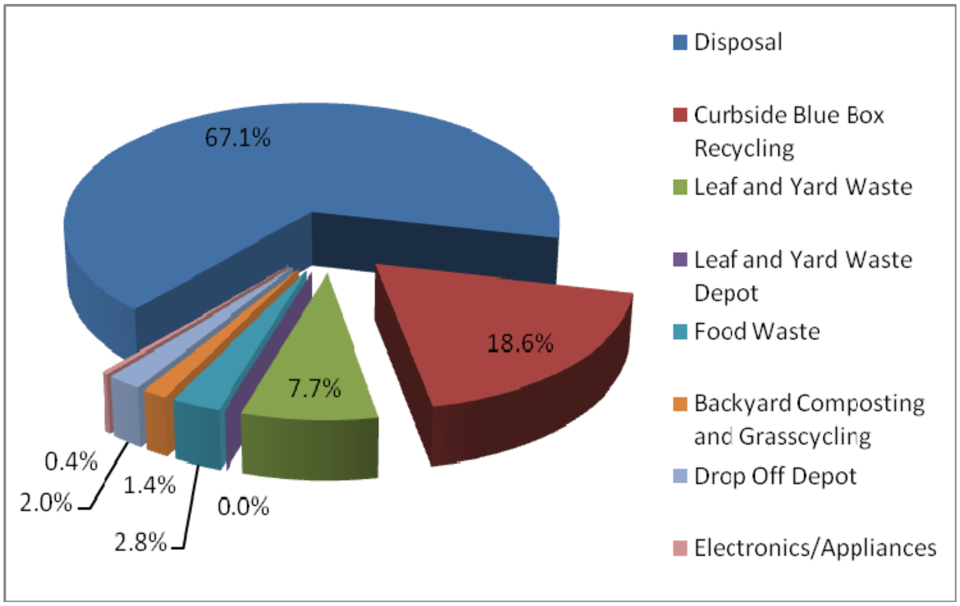
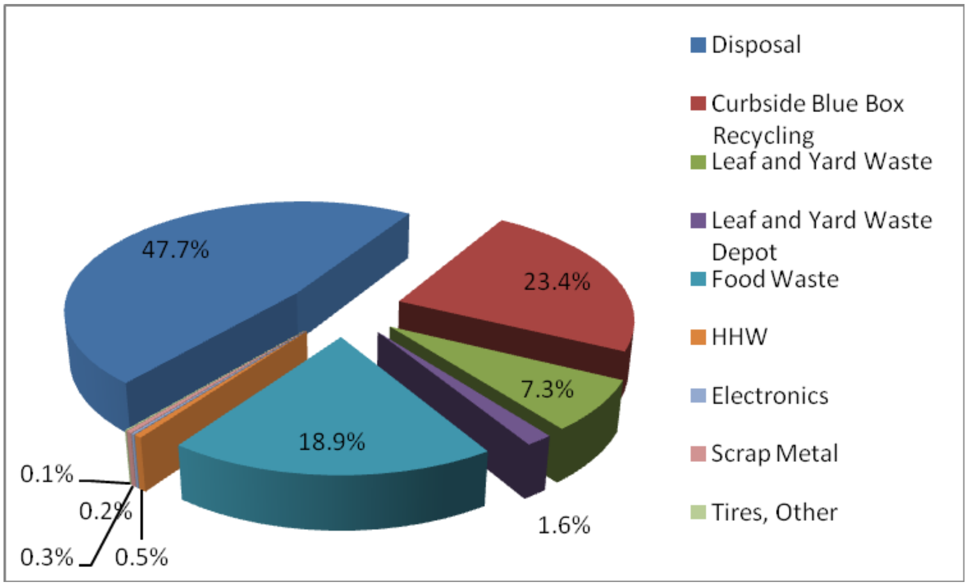


Figure 7-6 Percentages of Waste Managed Through York's Waste Management Program in 2007



7.4.1.2 Examination of Successful At-Source Diversion Programs

The following is a summary of the examination of diversion practices used by six higher performing programs from around the world as of 2005. These programs were examined to determine how they compare to Durham and York's current and projected waste management systems.

A number of municipalities around the world have succeeded in achieving above average diversion rates including, for example, Region of Peel, Ontario; Halifax, Nova Scotia; San Jose, California; Seattle, Washington; Austria; and, Flanders, Belgium.

Typically the better-performing cities and urban areas in Europe and North America are achieving waste diversion rates of approximately 45% through recycling and composting programs. Through extensive research, only a few jurisdictions were found to be achieving higher diversion rates which suggest that the 60% targets set by Durham and York are aggressive.

Research clearly shows that to go beyond 60% diversion requires the implementation of full organics diversion programs, supportive policies at the local level, and strong education and outreach programs. Jurisdictions with high diversion rates also typically have a supportive legislative and regulatory framework from senior levels of government.

Strong public support is required to achieve high diversion rates. Support is more easily achieved in areas with lower population densities. High density areas, where a larger percentage of the population live in multi-residential housing, face increased challenges in achieving high participation in diversion programs. Communities with high immigration rates may also experience language barriers in communicating program information.

It should also be noted that the trend in European jurisdictions is to measure performance of the diversion system by examining the kilograms per capita of waste that is sent for disposal. This measure captures at-source reduction and reuse and automatically factors in changes in the population.

7.4.1.3 The Zero Waste Vision

The following is a summary of the investigation into Zero Waste as documented in the *"Report on Additional At-source Diversion and Residual Quantities to be Managed"* (May 30, 2006) and a description as to how this philosophy was considered in regards to effects on the future of waste management in both Durham and York.

Zero Waste is a philosophy and a goal. Zero waste is typically defined as: no waste going to landfill or, more loosely, no waste going to disposal. The objective of Zero Waste is to get everyone to reduce the quantities of waste being generated, to support the recycling industry, and to fully participate in waste diversion initiatives.

The concept of Zero Waste has been building momentum over the past number of years; however, progress towards Zero Waste targets has been slow. No jurisdiction has been able to come close to their Zero Waste goal. The goal of Zero Waste will not be achieved, even with well thought out policy and program development, without a fundamental shift from a consumer society to a conserver society.

One of the key elements stressed by all Zero Waste programs is the required support of all levels of government: federal, provincial and municipal, if the program is truly going to have a chance of success.

Durham and York may choose to adopt a Zero Waste vision, but it would be prudent to plan on achieving a more realistic overall diversion rate (i.e., 60%, for both municipalities potentially escalating to 75% over the 35-year planning timeframe). Reaching Zero Waste in the timeframe of this EA Study cannot be reasonably expected, however the achievement of higher diversion rates will be a milestone on this path that could be achieved.

7.4.1.4 Achieving Higher Diversion Rates in Durham and York

The following is a summary of the potential increase in diversion that could be achieved by Durham and York by 2011 via the programs and policies proposed for implementation by both Regions.

In order to achieve high waste diversion rates, the following elements are required in a municipal integrated waste management system:

- Curbside collection of recyclables, kitchen organics and leaf and yard wastes;
- Additional services either through curbside, or at a minimum depots, for white goods;
- Diversion programs for household hazardous wastes, including electronics, paint, oil, etc., and construction and demolition materials, including wood, drywall, metals, etc.;

- Incentives and/or disincentives for all sectors to ensure appropriate behavior by the users of the system (e.g., container limits, user fees, landfill bans, by-law enforcement);
- Promotion and education campaigns, using a variety of mediums to reach the target audience; and,
- Advances in diversion technologies, and product stewardship which currently are under consideration or development will allow increased diversion of more materials in the later years of the study period.

It is the effective combination of these elements which will encourage:

- High participation rates by the users of the waste management system (e.g., residents, businesses and institutions); and,
- High capture rates of materials that can be diverted.

Both Durham and York's approved waste management plans contain most or all of the key elements necessary to achieve high diversion rates in both municipalities.

In December 1999, Durham adopted a *Long Term Waste Management Strategy Plan: 2000 to 2020*, which included plans on how to divert at least 50% of the residential waste from disposal by the Year 2007 or earlier. In 1993, York Regional Council approved its first strategic plan, *Vision 2021*, as an example of its goals to meet the needs of the York Region community. *Vision 2026* followed and encouraged the continued diversion of waste from landfill through programs such as recycling and composting, enhanced public awareness programs about recycling; pursuit of new technologies to reduce and handle waste; and becoming a leader in waste reduction. The Durham and York approved waste management plans are at different stages of implementation. Full implementation of both waste management plans by Durham and York in advance of the planning period (2011 to 2045) has been assumed, including a range of 'disincentives' such as continued restrictions on the amount of waste that can be set at the curb, bi-weekly garbage collection and more restrictive landfill bans and enforcement.

For the purpose of this exercise, the impact of stewardship programs on diversion beyond 2011 has been considered and is assumed to be incorporated into the diversion estimates used herein. Future programs that could increase diversion beyond the levels shown in this section include the following:

- Landfill taxes and higher disposal fees to support diversion initiatives and/or create a disincentive to dispose; and,
- Stewardship programs that promote increased container recovery rates (i.e., deposit-return programs).

The implications of these programs on waste diversion rates is not clear, although with beverage container recovery rates at their current levels compared to typical recovery rates for beverage containers in deposit provinces, the overall diversion rate would increase by only approximately one to two percentage points for both municipalities if a deposit program was implemented.

Based on the planned diversion programs and municipal diversion targets for the EA Study, it was assumed that both Durham and York would achieve a diversion rate of 60% through at-source waste diversion programs during the first 20 years of the planning period. For planning purposes, it was assumed that diversion rates will increase from 60% to 75% over the final 15 years of the study period. Differences in recovery rates in 2005 between Durham and York reflect differences in their diversion programs, diversion technologies, and sectors served by their municipal programs. It was assumed that by 2011 both Durham and York would achieve similar overall diversion rates. This is reasonable, as with the new programs implemented since 2005, both Durham and York were achieving very similar diversion rates as of 2007 (48% and 46% respectively).

The range of projected recovery rates estimated for Durham and York reflect:

- the material streams that are projected to be managed by the diversion programs;
- results of waste audits undertaken in Durham and York; and,
- the sectors that are assumed to be served by the municipal diversion programs as of 2011.

Higher Diversion Rates in Durham

The potential for increased recovery of major material streams based on planned programs was assessed, and a 60% diversion target was determined as reasonable for the outset of the planning period. Durham residents will be more aware of blue box recycling by 2011 which should lead to increased participation and capture rates as compared to those achieved in 2005. It was estimated that 25% of Durham's waste stream could be diverted from disposal via curbside blue box recycling. In addition to curbside blue box recycling, it was estimated that the Region would divert approximately 7.1% of its waste through other recycling programs (depots).

Overall, organics represent over 35% of the total materials generated within Durham. It was estimated that curbside composting would contribute to diverting another 25% of the waste stream from disposal. This includes 15% via the curbside collection of SSO, and 10% via the curbside and depot collection of leaf and yard waste.

A comparison of recovery rates for each major material stream in Durham between 2005 and 2011 is provided in Table 7-6.

Table 7-6 Comparison of Recovery Rates 2005 vs. 2011 – Durham

Material	Avg. Recovery Rate 2005 (1)	Estimated Avg. Recovery Rate 2011 (1)
Fibres	65%	74%
Plastics	12%	27%
Metals (2)	57%	74%
Glass	69%	69%
Food Waste (3)	15%	66%
Leaf and Yard Waste	70%	96%
HHW	58%	80%
Other Materials (4)	7%	24%
Overall At-Source Diversion Rate	**36%**	**60%**

(1) Average Recovery Rate is across all materials in the category including those materials not recycled (e.g., plastic film, window glass, sanitary products etc.).
(2) Metals include recyclable aluminium cans and foil, steel cans and scrap metal.
(3) Food waste includes: food waste, animal waste, and compostable paper.
(4) Other materials include: wood, white goods, electronics, textiles, bulky goods, renovation materials (bricks, concrete, and drywall) and tires.

Higher Diversion Rates in York

York Region's curbside blue box recycling program will also be well established by 2011 leading to increased participation and capture rates. The recovery rates assigned to materials were considered reasonable for some materials and quite aggressive for others. Overall, it was estimated that 25% of York's waste stream could be diverted from disposal via curbside blue box recycling. In addition to curbside blue box recycling, it was estimated that the Region would divert over 7% of its waste through other recycling programs (depots).

Overall, organics represent more than 35% of all materials generated within York Region. It was estimated that curbside composting would contribute to diverting another 25% of the waste stream from disposal. This includes 15% via the curbside collection of SSO, and 10% via the curbside and depot collection of leaf and yard waste.

A comparison of recovery rates between 2005 and 2011 is provided in Table 7-7.

Table 7-7 Comparison of Recovery Rates 2005 vs. 2011 – York

Material	Avg. Recovery Rate 2005 (1)	Estimated Avg. Recovery Rate 2011 (1)
Fibres	60%	74%
Plastics	12%	27%
Metals (2)	41%	74%
Glass	67%	69%
Food Waste (3)	12%	66%
Leaf and Yard Waste	67%	96%
HHW	61%	80%
Other Materials (4)	4%	24%
Overall At-Source Diversion Rate	**33%**	**60%**

(1) Average Recovery Rate is across all materials in the category including those materials not recycled (e.g., plastic film, window glass, etc.).
(2) Metals include recyclable aluminum cans and foil, steel cans and scrap metal.
(3) Food waste includes: food waste, animal waste, and compostable paper.
(4) Other materials include: wood, electronics/appliances, textiles, bulky goods, renovation materials (bricks, concrete, drywall, etc.) and tires.

Summary

For both Regions, the projected recovery rates for 2011 via the planned at-source diversion programs were deemed reasonable as some other municipal jurisdictions with effective and mature at-source diversion programs are achieving these rates. Most of the projected recovery rates for materials noted above are not overly aggressive (although they are slightly more aggressive for York than for Durham). In addition, the recycling and composting programs do not have to add materials that are either difficult to manage or market. Realistically, with a more aggressive approach, both Regions' at-source diversion programs could divert upwards of 64% of waste material from disposal.

Given that many of the approaches being considered for the EA Study allow for the recovery of additional materials from the post-diversion residual waste stream, the overall rate of diversion from landfill will likely be higher in the long-term.

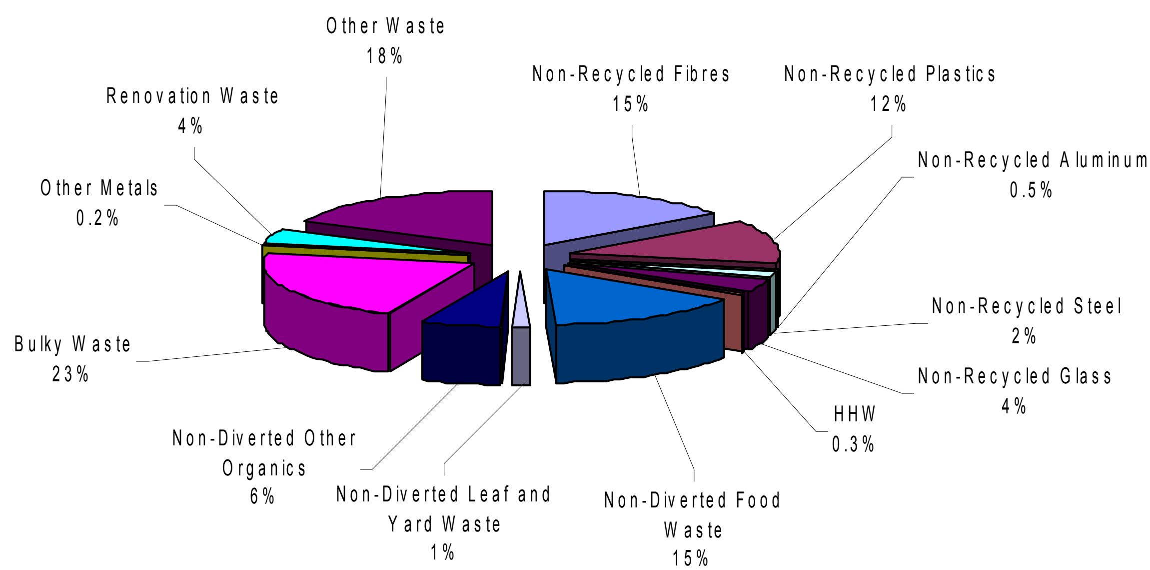
7.4.1.5 Characterization and Quantities of Post-Diversion Residual Waste

The following is a summary of the projected composition and quantity of the post-diversion residual waste to be managed by both Regions over the 35-year planning period. These projections were used to estimate the composition and amount of residual waste that would be managed by the potential residual waste management facility.

The characterization of the post-diversion residual waste was determined by examining the total waste stream and then subtracting the percentages of each material that are projected to be recovered through the various waste diversion programs. Data from Durham and York was combined with data from neighbouring regions to get a more accurate waste characterization estimate.

Although it is likely that the waste characterization will change over time due to activities such as packaging reformulation and other changes in manufacturing and consumer lifestyles, it is not possible or reasonable to project how the characterization will change over the planning period. Therefore, the characterization of the post-diversion residual wastes as presented in Figure 7-7 was applied for the entire planning period.

Figure 7-7 Characterization of Post-Diversion Residual Wastes Requiring Disposal in 2011 – Combined Durham and York



The quantity of post-diversion residual waste to be managed over the 35-year planning period was calculated using population projections, per capita waste generation rate projections, and waste diversion projections. It was assumed that per capita waste generation rates would remain constant and waste diversion would increase to 60% initially, then to 75% by the end of the planning period. Figure 7-8 and Figure 7-9 present the total waste quantities to be managed over the planning period by Durham and York respectively. Table 7-8 shows the quantities of materials generated, diverted and requiring disposal over the planning period for Durham and York combined.

Figure 7-8 Total Waste Quantities to be Managed Over the Planning Period – Durham

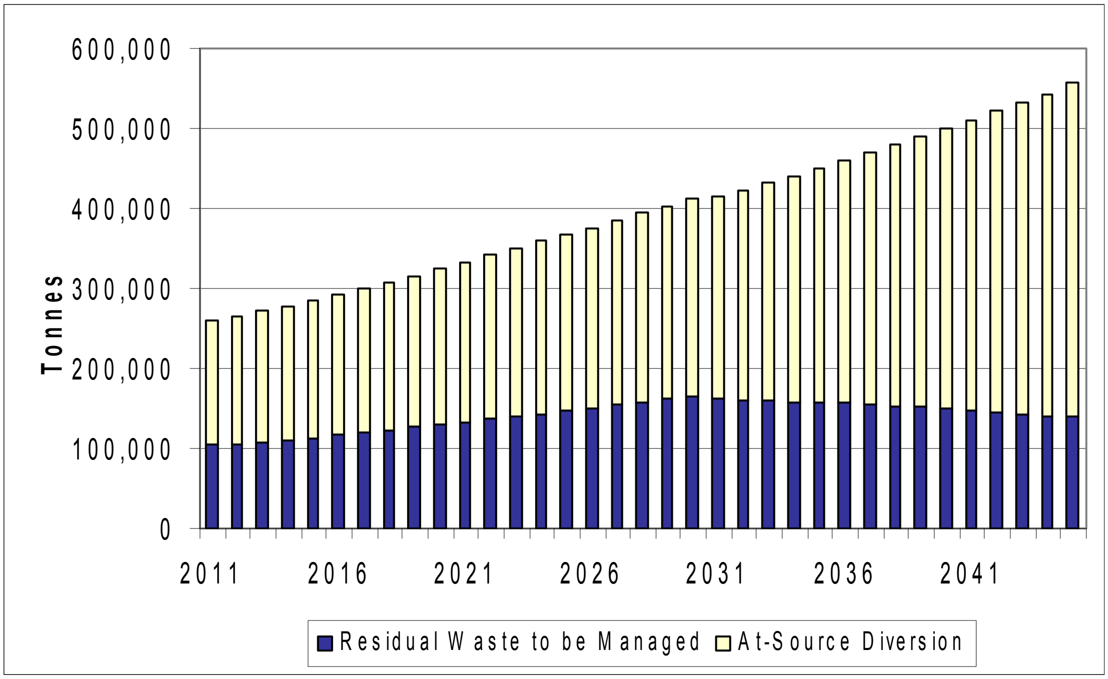


Figure 7-9 Total Waste Quantities to be Managed Over the Planning Period – York

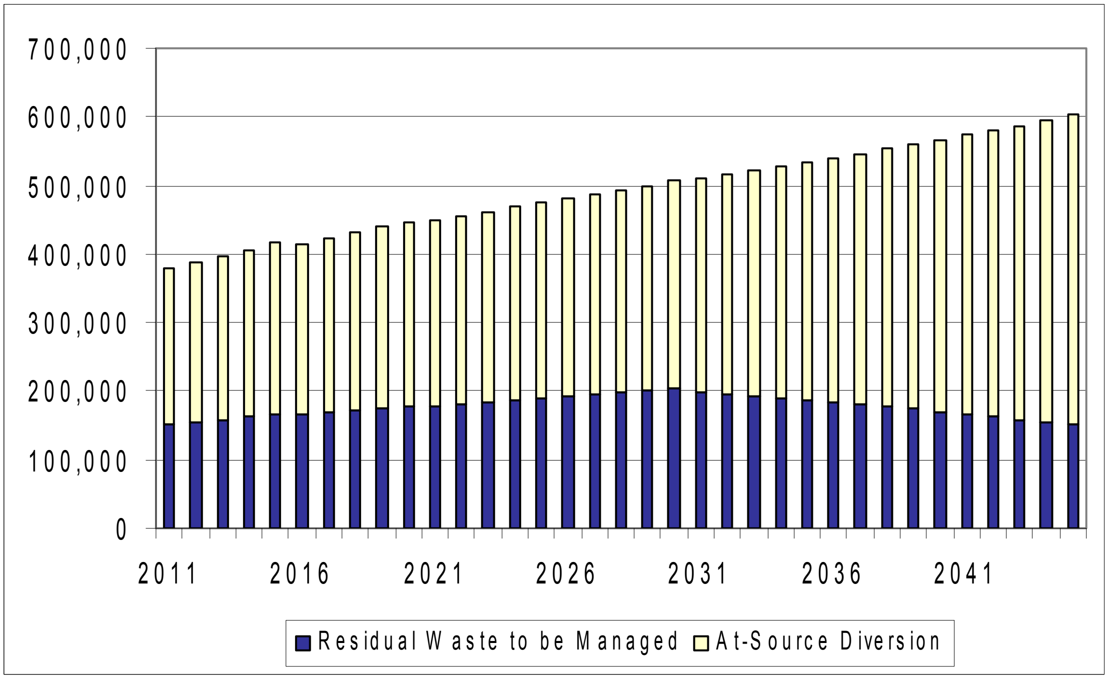


Table 7-8 Estimated Quantities of Materials Generated, Diverted and Requiring Disposal Over the Planning Period –Durham and York Combined

For the 2011 to 2045 Period	2011 (tonnes)	2045 (tonnes)
Estimated Total Material Generation (Residential)	637,300	1,159,600
Estimated Annual Quantity Diverted At-Source	382,400	869,700
At-Source Diversion Rate	60%	75%
Estimated Annual Residual Quantity Requiring Management	254,900	289,900
Average Monthly Residual Quantity Requiring Management	21,200	24,200
Approximate Average Daily Residual Quantity Requiring Management (1)	1,020	1,160
35 Year Total Residual Wastes Quantity Requiring Management	Approximately 11,142,000	

(1) Annual quantity divided by 250 days per year.

Three factors could increase the requirement for additional processing capacity:

- if the 60% diversion target for 2011, and the 75% diversion target for 2045 are not met;
- population increases over the planning period exceed current estimates; and,
- per capita waste generation rates increase over the planning period.

Over the 35-year planning period, the total quantity of residual waste that could require management could increase from 11.1 million to 14.6 million tonnes (up to 400,000 tonnes per year or more).

To develop the above projections, the following waste composition was utilized as a baseline (Table 7-9). From this baseline, projected capture rate increases were identified based on a review of other "best practices" to determine the waste composition that would arrive at the facility for processing. This waste composition was then utilized in a number of components in the EA study including the evaluation of "Alternatives to", Life Cycle Analysis, RFQ and RFP.

Table 7-9 Estimated Quantities of Materials Generated, Diverted and Requiring Disposal Over the Planning Period –Durham and York Combined

	Durham Region (2011)	York Region (2011)	Durham and York Combined (2011)	
Material Category	Total Residual Waste (Tonnes)	Total Residual Waste (Tonnes)	Total Residual Waste (Tonnes)	% of Residual Waste
Newspaper	4455	6460	10915	4.3%
Magazines/Paperbacks	1770	2610	4380	1.7%
Phone Books	20	30	50	0.0%
Cardboard	1840	2675	4515	1.8%
Boxboard/Rolls	1320	1920	3240	1.3%
Mixed Papers	3350	4900	8250	3.2%
Hardcover Books	100	100	200	0.1%
Kraft Paper	700	1000	1700	0.7%
Spiral Wound	300	500	800	0.3%
Towelling/Serviettes/Tissues	2700	3950	6650	2.6%
Molded Pulp	525	675	1200	0.5%
Gable Top Cartons	400	600	1000	0.4%
Aseptic Containers	50	100	150	0.1%
Other Paper	1200	1800	3000	1.2%
Fibre	18730	27320	46050	18.1%
PETE - Bottles	620	920	1540	0.6%
PETE -Other Packaging	200	300	500	0.2%
HDPE - Bottles & Jars	510	720	1230	0.5%
PVC Bottles	50	50	100	0.0%
LDPE & PP - Bottles	300	450	750	0.3%
Polystyrene	1275	1875	3150	1.2%
Wide Mouth Tubs & Lids	300	450	750	0.3%
Recyclable Film	2600	3700	6300	2.5%
Non-Recyclable Film	3000	4400	7400	2.9%
#7 Bottles, Other Bottles & Plastic			0	0.0%
Packaging	700	1000	1700	0.7%
Durable Plastic Products	2100	3000	5100	2.0%
Plant/Garden Packaging	1300	1900	3200	1.3%
Plastic	12955	18765	31720	12.4%
Aluminum Cans	300	450	750	0.3%
Aluminum Foil Trays	200	300	500	0.2%
Steel Cans	700	1050	1750	0.7%
Aerosol Cans	200	300	500	0.2%
Paint Cans	50	100	150	0.1%

Other Metal	950	1375	2325	0.9%
Metals	2400	3575	5975	2.3%
LCBO and Beer Glass	1700	2475	4175	1.6%
Food & beverage containers	1325	1925	3250	1.3%
Other Glass	1000	1500	2500	1.0%
Glass	4025	5900	9925	3.9%
HHW	320	460	780	0.3%
Food Waste	12625	18290	30915	12.1%
Grass	102	148	250	0.1%
Yard Waste	1470	2120	3590	1.4%
Animal Waste	6175	9025	15200	6.0%
Compostable Paper	0	0	0	0.0%
Organics	20372	29583	49955	19.6%
Textiles	2500	3650	6150	2.4%
Building Renovations	4200	6085	10285	4.0%
White Goods	0	0	0	0.0%
Sanitary Products	9000	13100	22100	8.7%
Electronics/Appliances	240	340	580	0.2%
Rubber (tires)	0	0	0	0.0%
Furniture /Bulky Goods	22325	32570	54895	21.5%
Other	6800	9800	16600	6.5%
Other Material	45065	65545	110610	43.4%
Total	103867	151148	255015	100.0%

7.4.1.6 Rationale for Assumed Waste Residuals Processing System Capacity

The following is a summary of the rationale for the waste residuals processing system capacity that was assumed for the purpose of comparing and evaluating the alternative systems.

Two assumptions were made in regards to assumed waste residuals processing system capacity:

- 250,000 tonnes per year (tpy) was used as the minimum system capacity estimate for some aspects of the comparative evaluation process. This was arrived at using the projected annual quantities of waste generated as of the beginning of the planning period in 2011, assuming that as of 2011 both municipalities will achieve a diversion rate of 60% and that over the planning period per capita waste generation rates do not change and that 75% diversion or more is achieved by 2045. This was also based on the assumption that all of the post-diversion residual waste could be required to be managed by the Undertaking.

- 400,000 tpy was used for the majority of the comparative evaluation process. This value accounts for the potential that waste diversion rates may not increase beyond 60% and waste generation rates and population may increase at a rate that is greater than expected. In addition, a 400,000 tpy facility could accept waste from other sources as contemplated in the Approved EA Terms of Reference. The 400,000 tpy estimate was used to ensure that the parameters used for comparative evaluation of the alternative systems were not underestimated. For example, should Durham and York achieve only 55% diversion by 2011 and maintain this diversion rate over the planning period, as of 2045 over 500,000 tpy of residual waste would require management.

The estimates for facility size and capacity were refined during the evaluation of "Alternative methods", such that the projected minimum requirements for residue disposal were determined as being less than 250,000 tpy while the maximum remained unchanged. Section 10.3.1 of this EA discusses the refinement to tonnage projections that occurred over the course of the EA Study.

It was recognized that such refinement would be required to address updated diversion program performance and agreements for any residual waste that could be supplied by commercial/industrial generators within the Regions and/or municipalities outside of the EA Study area. Many of the current technologies that were considered as part of the alternative systems were modular in nature and were regarded as easy to increase or decrease in size pending approval under Ontario Regulation 101/07, as amended, (or any other applicable pieces of legislation at the time of expansion).

7.4.2 Step 2b: Formulation of Alternative Residual Processing Systems

The three technological approaches capable of managing materials in the residual or post-diversion waste stream and used to formulate the alternative residual processing systems, as identified in Section 4.1.2 of the Approved EA Terms of Reference, include:

- **Mechanical Treatment,** which involves the physical processing of waste materials using equipment such as screens, conveyors and magnets to recover recyclable materials and prepare waste for further treatment or disposal.

- **Biological Treatment**, which involves the use of microorganisms such as aerobic or anaerobic bacteria to change the properties of the organic constituents of the waste stream. Essentially, biological treatment breaks down and stabilizes organic matter such as food waste and waste paper – both of which are predicted to remain in the residual waste stream but to a substantially lesser degree after curbside organics collection.

- **Thermal Treatment,** which includes approaches traditionally referenced as combustion, incineration, energy-from-waste (EFW), waste-to-energy (WTE), etc. or more contemporary/emerging technologies such as gasification or pyrolysis, in which the hydrocarbons in the waste stream are converted to thermal energy, carbon dioxide (CO_2) and water.

Approach to System Development

The three technological approaches (mechanical, biological, and thermal treatment) were reviewed for their potential to address the problem and purpose: to manage and recover resources from the waste that remain after at-source diversion.

This review was integrated into the alternative systems development process, which proceeded as follows:

- An overview of the three potential system components was developed (mechanical treatment, biological treatment, and thermal treatment) including a description of how materials are input, processed, and output by each;
- The recoverable resources and opportunities associated with each system component were identified and assessed;
- Alternative processing systems were formulated based on using the three technological system components to recover various combinations of resources; and,
- A list of alternative processing systems that addressed the purpose of the Undertaking was carried forward for detailed evaluation.

Each of the resources or opportunities associated with each system component was assessed with regards to their viability within the Ontario regulatory and commercial environment and their ability to address the purpose of the Undertaking.

To address the purpose of the Undertaking, the recovery options had to include:

- The recovery of materials from the residual waste stream;
- The recovery of energy from the residual waste stream; and,
- Minimization of the amount of material requiring landfill disposal.

The following is a list of the recoverable resources that were identified:

- Recyclable materials for markets;
- Low grade compost or soil enhancer;
- Stabilized organic material for landfilling;
- Energy produced from biogas;
- Solid recovered fuel (SRF) for use offsite;
- Energy produced from SRF;
- Energy produced from mixed waste; and,
- Construction aggregate produced from residual materials.

Conclusions were reached regarding the viability of the identified resource recovery options within the Ontario regulatory and commercial environment. The resulting viable recoverable resource and opportunities included the following products, resources and materials:

- Recyclable materials for markets;
- Energy (heat and/or electricity) produced from biogas/landfill gas;
- Energy (heat and/or electricity) produced from a solid recovered fuel; and,
- Energy (heat and/or electricity) produced from mixed waste.

The development of alternative systems was formulated on the basis of using the three specific technological components to recover various combinations of the viable resources identified above.

A total of nine alternative systems were initially identified within two main categories:

- Mechanical Biological Treatment (MBT); and,
- Thermal Treatment (TT).

Table 7-10 presents a summary of the alternatives identified and associated evaluation factors. See the *Report on Formulation of Alternative Residuals Processing Systems* (May 30, 2006) for detailed descriptions of all nine systems. The four alternatives carried forward are highlighted in grey.

Some of the identified alternative systems were very similar and others offered minimal benefit. Based on the principal of "reasonableness" established during the preparation of the EA Terms of Reference, conclusions were reached regarding combining some of these alternatives as well as not considering other alternatives any further in the evaluation process.

To address the purpose of the Undertaking, each alternative system had to be capable of:

- Recovering material from the residual waste stream;
- Recovering energy from the residual waste stream; and,
- Minimizing the amount of material requiring landfill disposal.

The systems considered capable of addressing the purpose of the Undertaking in a reasonable manner and those that were functionally different from the other systems were recommended for further consideration. See *Report on Formulation of Alternative Residuals Processing Systems* (May 30, 2006) for the detailed results of the evaluation screening.

The four systems considered capable of addressing the purpose of the Undertaking in a reasonable manner, as described in the Approved EA Terms of Reference and which were functionally different from the other systems, are as follows:

- System 1 - Mechanical and Biological Treatment with Biogas Recovery;
- System 2a - Thermal Treatment of MSW with Recovery of Materials from the Ash/Char;

- System 2b - Thermal Treatment of SRF; and,
- System 2c - Thermal Treatment of SRF with Biogas Recovery.

Each of these systems has the capacity to recover materials from the residual waste stream, recover energy from the residual waste stream and minimize the amount of material requiring landfill disposal.

These systems are described in detail in the *Report on Formulation of Alternative Residuals Processing Systems* (May 30, 2006) which provides a description of the systems and the respective:

- **Input materials** (i.e., what goes into the component). This includes the total post-diversion residual waste stream and/or the outputs from another process component depending on the process configuration.
- **Process description** (i.e., what goes on inside the component). The process description describes the different technologies that comprise the range of options for managing materials within the process.
- **Recovery of Resources** (i.e., the potential to recover resources including both recyclable materials and energy).
- **Outputs** (i.e., what comes out of the component). The outputs considered include:
    - Products, Resources and Materials (to be fed into other treatment approaches);
    - Air Emissions;
    - Water Discharges (Storm and Sanitary);
    - Solid Residues requiring disposal; and,
    - Nuisance Effects.

Details regarding the resulting four (4) functionally different system alternatives carried forward for evaluation, as drawn from the *Report on Formulation of Alternative Residuals Processing Systems* (May 30, 2006) are consolidated into the following sub-sections of the EA Study document.

Table 7-10 Summary of Alternative Systems

	Alternative Systems (Annex 1, pages 412-470)	System Components	Recyclable Materials for Markets	Energy Produced from Biogas / Landfill Gas	Energy Produced from Solid Recovered Fuel	Energy Produced from Mixed Waste	Landfilling of Residuals	Selected for System Evaluation
Mechanical & Biological Treatment (MBT)	Mechanical Treatment	- Recovery of Recyclables - Landfilling of Residuals	✓				✓	
	Biological Treatment (Aerobic)	- Aerobic Composting - Landfilling of Stabilized Residuals					✓	
	Biological Treatment (Anaerobic) with Biogas Recovery	- Anaerobic Digestion with Biogas Recovery and Use - Landfilling of Stabilized Residuals		✓			✓	
	Mechanical Biological Treatment (Aerobic)	- Recovery of Recyclables - Aerobic Composting - Landfilling of Residuals	✓				✓	
	Mechanical Biological Treatment (Anaerobic) with Biogas Recovery	- Recovery of Recyclables - Anaerobic Digestion with Biogas Recovery and Use - Landfilling of Stabilized Residuals	✓	✓			✓	✓
Thermal Treatment (TT)	Thermal Treatment of MSW	- Combustion or Gasification with Syngas Recovery and Use - Landfilling of Residuals				✓	✓	
	Thermal Treatment of MSW with Recovery of Materials from the Ash / Char	- Combustion or Gasification with Syngas Recovery and Use - Mechanical Treatment to Recover Materials from the Ash / Char - Landfilling of Residuals	✓			✓	✓	✓
	Thermal Treatment of SRF	- Mechanical (& possibly Biological) Treatment to Recover Recyclables - Mechanical (& possibly Biological) Treatment to Recover a Solid Fuel - Combustion or Gasification with Syngas Recovery and Use - Landfilling of Residuals and Ash / Char	✓		✓		✓	✓
	Thermal Treatment of SRF with Biogas Recovery	- Mechanical (& possibly Biological) Treatment to Recover Recyclables - Mechanical (& possibly Biological) Treatment to Recover a Solid Fuel - Anaerobic Digestion with Biogas Recovery and Use - Combustion or Gasification with Syngas Recovery and Use - Landfilling of Residuals, Stabilized Residuals and Ash / Char	✓	✓	✓		✓	✓

7.4.2.2 System 1: Mechanical and Biological Treatment (MBT) with Biogas Recovery

Mechanical treatment for material recovery involves mixed waste sorting for the purpose of recovering recyclables and organics recovery and treatment. It is essentially the same as a Material Recovery Facility (MRF) however instead of accepting and treating source separated recyclables; the input material is mixed waste. As a result, this technology is sometimes referred to as a 'dirty MRF'. This system combines manual and automated sorting of recyclable materials from the waste feedstock.

Examples of the key components of mechanical and biological treatment in System 1 are:

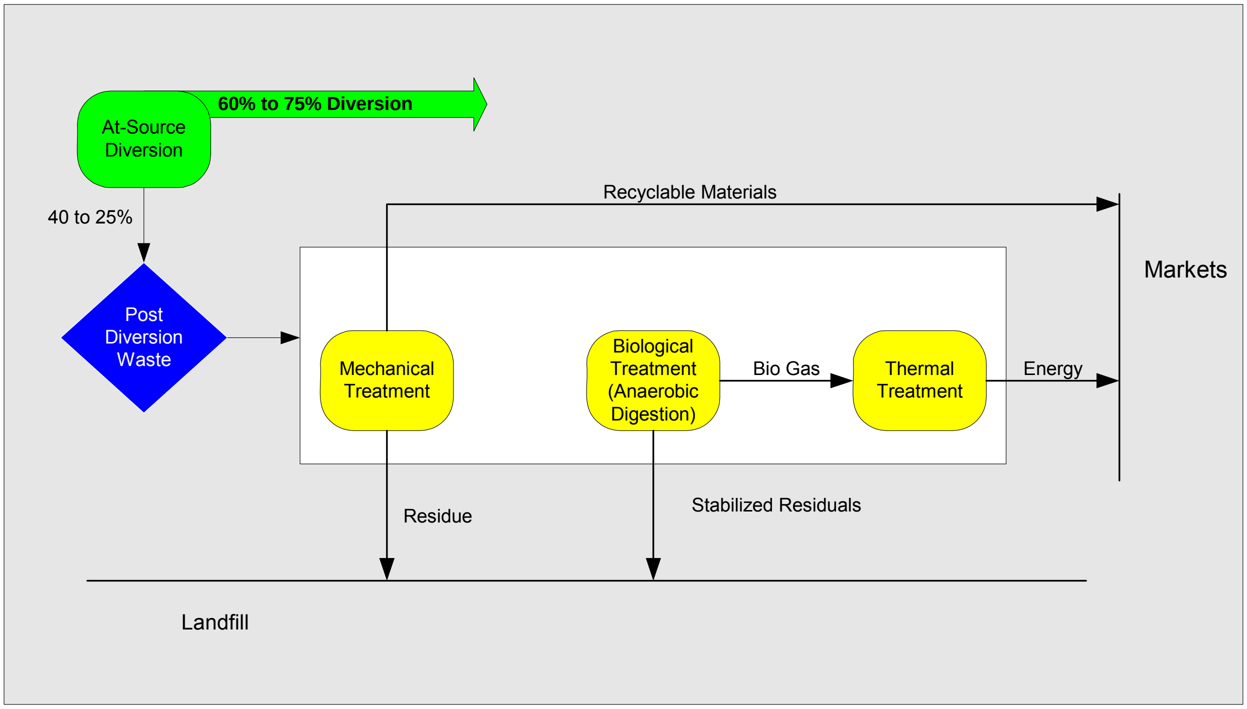
- Initial removal of large, bulky items;
- Pre-processing of bulky items;
- Manual and automated sorting of remaining recyclables and organics;
- Magnetic removal of coarse ferrous metals;
- Removal of non-ferrous metals by eddy current separation;
- Organics screening; and,
- Organics treatment through Anaerobic Digestion.

Mechanical treatment for material recovery begins with the removal and categorization of large, bulky items including construction and demolition materials. The remaining materials are pre-processed as required and sent for treatment or to end markets. Manual sorting is used to remove all plastic film after a bag breaker. Standard MRF equipment including a magnet and an eddy current separator are used to sort the ferrous and non-ferrous materials, respectively, and the organics and glass fines are screened out of the remaining waste materials. The organics can be treated either in combination with SSO or onsite through digesters. Plastics and marketable fibres are removed manually. Unmarketable fibres and other organics would be sent for further biological treatment.

Anaerobic digestion (AD) of the fraction of the residual waste stream that contains the majority of organic materials biologically converts the organic compounds in the fine material stream to biogas. The material remaining is a partially stabilized organic material that most likely is separated into solid and liquid fractions. The solid fraction consisting of a relatively stable residual material is disposed in landfill, and the liquid fraction is disposed as wastewater. An alternative approach involves the use of a "dry" anaerobic digestion process followed by biodrying of the material to remove remaining moisture prior to landfill disposal.

Other process configurations include anaerobically digesting the entire input waste stream followed by the recovery of recyclables from the digested materials. Figure 7-10 illustrates System 1.

Figure 7-10 System 1 - Mechanical and Biological Treatment with Biogas Recovery



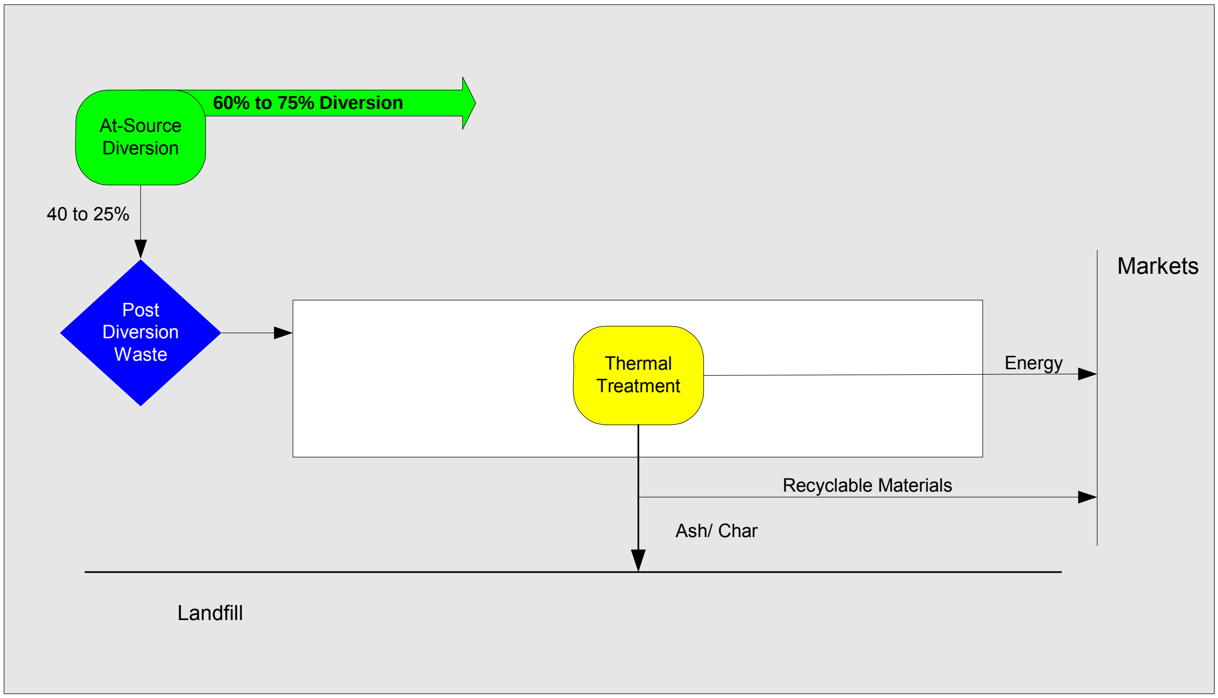
7.4.2.3 System 2a Thermal Treatment of MSW with Recovery of Materials from the Ash / Char

Thermal treatment in this system could be undertaken by either of the two main types of commercially available thermal treatment technologies: combustion and gasification, but given that the material requiring treatment in this system is mixed residual waste the most likely thermal treatment technology used in this system would be conventional combustion. Depending on the technology, incoming waste may be received on either a flat tipping floor or into a receiving pit. The waste is inspected and any unacceptable items are removed and mixed to provide uniform heating values.

Hydrocarbons in the waste stream are converted to thermal energy, carbon dioxide, and water. Ash is discharged from the bottom of the grate and is quenched. Exhaust gases from combustion are cleaned prior to being emitted to the atmosphere. The process is exothermic, requiring little to no external energy once combustion has been initiated.

After thermal treatment, mechanical treatment is utilized to recover metals (aluminum and ferrous) from the ash or char. The residual materials, including materials unacceptable for thermal processing and ash or char, are assumed to be landfilled. In the future this bottom ash may be used in construction applications as is the case in many other jurisdictions. However, as the evolution of "Alternatives to" was undertaken under conservative assumptions, this was not assumed in the system comparison. In addition, residue from the flue gas or syngas cleanup process also requires management. Figure 7-11 illustrates System 2a.

Figure 7-11 System 2a - Thermal Treatment of MSW with Recovery of Materials from the Ash / Char



7.4.2.4 System 2b Thermal Treatment of Solid Recovered Fuel

Mechanical treatment to create a SRF would involve several processes utilizing various sorting and processing equipment. These may include the following:

- Initial removal of contaminants by hand or an automated crane and grapple system;
- Mechanical screens (i.e., trommel, star, or vibratory screens) to sort material by size;
- Processing of waste to a homogenous particle size for the SRF;
- Magnetic removal of coarse ferrous metals;
- Removal of non-ferrous metals by eddy current separation;
- Sorting a light fraction from a heavy fraction by a float/sink separator;
- Separation of light combustible material by air classification and sieving processes;
- Automated separation of different types of plastic and fibre containers by Near Infrared Detector (NIR) technology;
- Bio-drying of the organic fraction of the waste; and,
- Balers to compress and tie-off captured recyclables such as plastics, ferrous, and aluminum.

Typically, the waste is received in a deep bunker or a receiving pit with storage capacity for a number of days. The bunker is outfitted with an automated crane and grapple system used for the initial removal of large contaminants for the received waste. From the feeding bunker, material would be fed to shredders by the automatic grapple. The shredders are slow speed rotary shredders that reduce the material to a particle size of less than 200 mm.

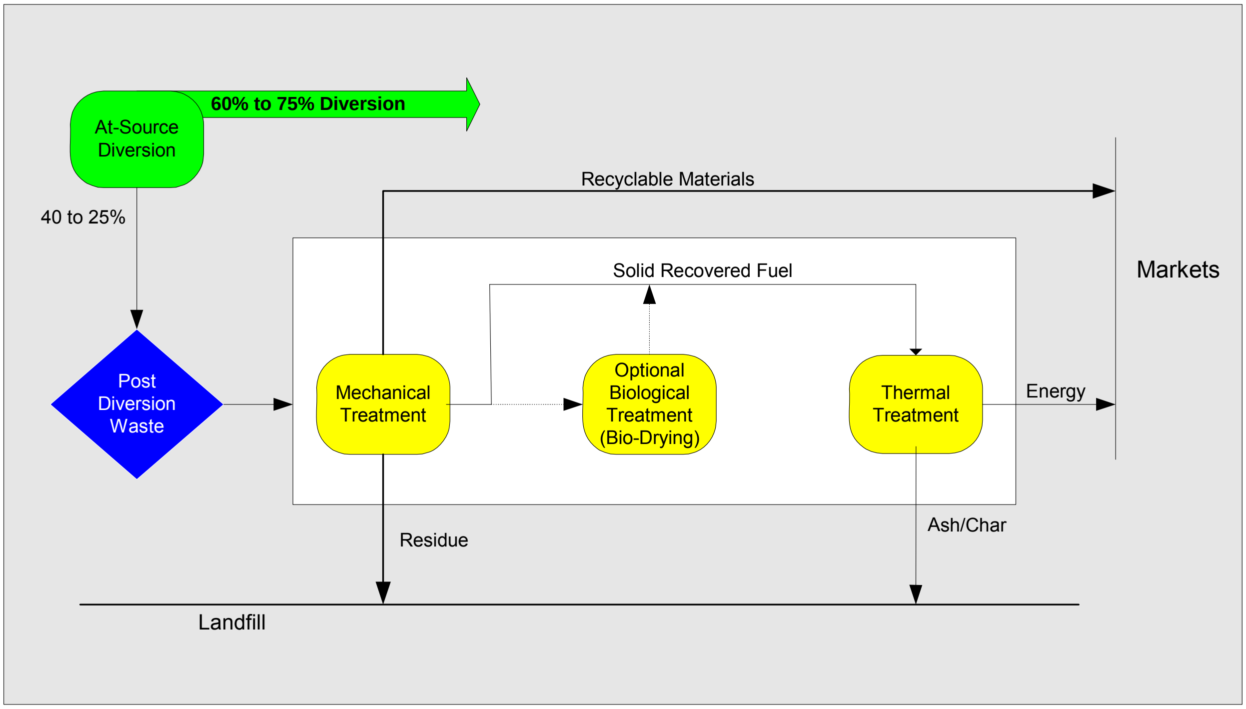
Separation of the shredded materials would be done with air classifiers and sieves while ferrous and non-ferrous metals are removed with magnets and eddy currents, respectively. The remaining SRF material are primarily wood, paper, plastics, textiles and organics that are not captured through the blue box, green bin and other diversion programs equalling approximately 50% of the input mass which is suitable for use as a fuel.

Biological treatment can be used to ‘bio-dry’ the ‘fine’ stream of materials separated from the remaining materials that would include the majority of food wastes, grit and broken glass. The drying can be achieved either from the heat generated by aerobic bacteria in biological treatment or by applying an external heat source. The purpose of drying the shredded waste is to decrease the moisture content to typically less than 12%, thus, creating a material more suitable to be included in SRF.

As mentioned under System 2a, the main thermal technologies are combustion or gasification and either technology can be used to treat the SRF generated by the MBT component of the system. Combustion is an exothermic reaction in which hydrocarbons in the waste stream are converted to thermal energy, carbon dioxide, and water. The exhaust gases are cleaned prior to release into the atmosphere and the ash is discharged and quenched. Gasification is an endothermic reaction in which solid material is thermally broken down into syngas and a solid char residue. The syngas is cleaned before it is used for the generation of energy. SRF is generally a better fuel for gasification processes, as it is more homogenous in composition and particle size.

The materials requiring landfill disposal include the residuals from the recovery of solid SRF, the unacceptable waste removed at the outset of mechanical treatment and the ash/char from the thermal treatment. In the future the ash/char may be used in construction applications. In addition, residue from the flue gas or syngas cleanup process also requires management. Figure 7-12 illustrates System 2b.

Figure 7-12 System 2b - Thermal Treatment of SRF



7.4.2.5 System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery

This System is a variation of System 2b that involves the separation of the organic material (e.g., food waste) from the rest of the post-diversion waste and the subsequent anaerobic digestion of this organic fraction of the waste stream to produce biogas. Energy is thus produced from both the SRF and the biogas. All of the other system components would be relatively the same as System 2b.

The residuals from anaerobic digestion, ash/char from the thermal treatment process and the residues from the mechanical treatment process all require landfilling. A small amount of waste from the air pollution control/gas clean-up system also requires management. Figure 7-13 illustrates System 2c.

Figure 7-13 System 2c - Thermal Treatment of SRF with Biogas Recovery

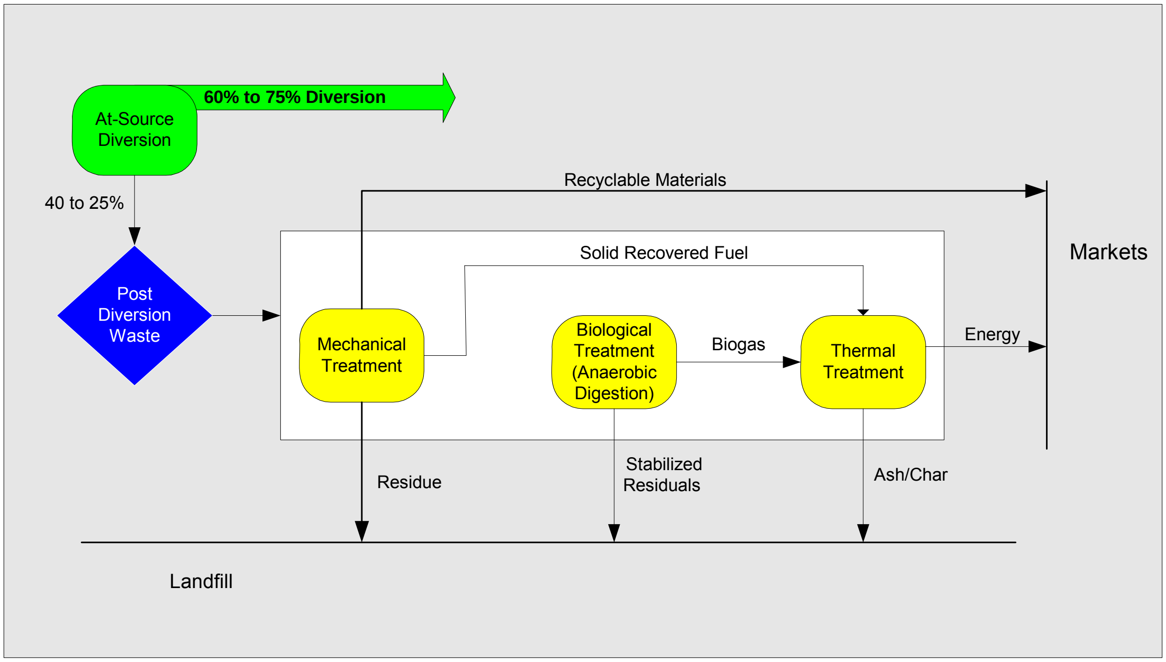


Table 7-11 provides a summary of the Alternative Systems that were carried forward for detailed evaluation, and identifies the resources that could potentially be recovered as well as acknowledging the need for managing residuals generated by each of the systems.

Table 7-11 Description of Alternative Systems Evaluated

Alternative Systems	System Reference	Potentially Recovered Resources				Residuals Management
		Recyclable Materials for Markets	Energy Produced from Biogas	Energy Produced from Solid Recovered Fuel	Energy Produced from Mixed Waste	Landfilling of Residuals
MBT with Biogas Recovery	1	•	•			•
Thermal Treatment of MSW with Recovery of Materials from the Ash/Char	2(a)	•			•	•
Thermal Treatment of SRF	2(b)	•		•		•
Thermal Treatment of SRF with Biogas Recovery	2(c)	•	•	•		•

7.4.2.6 Consideration of the "Do Nothing" Alternative

In the Approved EA Terms of Reference Section 1.1, the ability to access waste disposal capacity (i.e., Landfill in Michigan) during the 35-year planning period was discussed. The practice of exporting waste outside the municipal boundaries to a landfill site in Michigan represented the "Do Nothing" alternative for this Environmental Assessment. As a result of the agreement between the province of Ontario and State of Michigan to discontinue export of waste from Ontario to Michigan after December 31, 2010, the "Do Nothing" alternative is not a reasonably available alternative for consideration in establishing long-term waste disposal capacity. Section 4.1.2 of the Approved EA Terms of Reference also noted that a 'landfill only' alternative would not be examined in the EA as it would not meet the need and purpose of the undertaking. However, the EA process includes comparison and evaluation of a "Do Nothing" alternative in the assessment of "Alternatives to". For this study a "Do Nothing" system would be the continuation of the current method of disposal of the residual waste that remains after diversion, namely, the continued export of waste from Durham and York to landfill facilities outside of the study area. However, this "Do Nothing" alternative is not "reasonable" since it does not represent a long-term solution for the management of residual waste. In particular, for Durham Region, the "Do Nothing" alternative is the continued export of residual waste to Michigan, an alternative no longer available after December 31, 2010. The "Do Nothing" alternative for York Region, based on the capacity for which approval is being sought, does not address the need for approximately 20,000 tonnes per year of post-diversion residual waste that cannot be accommodated by these other waste disposal contractual arrangements.

The "Do Nothing" alternative is considered the bench mark against which the consequences of the "Alternatives to" being examined can be measured in order to determine, amongst other things, the extent to which each alternative addresses the problem or opportunity which prompted the EA Study. The "Do Nothing" alternative is also used to highlight the advantages of proceeding with a particular alternative. For Durham and York, the "Do Nothing" alternative cannot be compared to the other systems identified above since it is not available to reasonably address the long-term disposal requirements of the Regions' integrated waste management systems, the problem for which this EA Study was initiated to address. For this reason, it is also not practical to carry forward a systematic evaluation of "Alternatives to" that would include the "Do Nothing" alternative.

7.5 Step 3: Data Collection on the Environment Potentially Affected and Technical Components of the "Alternatives to"

Step 3 of the "Alternatives to" evaluation methodology involved the collection of data to support the application of the established comparative criteria to the alternative systems. This included studies on both the environment potentially affected by the Undertaking and on the technical components of the alternative systems. The study area was based on Durham and York. The following sub-sections provide an overview of the results of these studies, consolidating key supporting information and conclusions into the EA document.

7.5.1 Description of the Environment Potentially Affected (“Alternatives to”)

The definition of existing conditions originated during development of the EA Terms of Reference, which included a brief overview of the study area environment (see Section 5 of the Approved EA Terms of Reference). The definition of the “Environment Potentially Affected” expands on this base of information considering the scope of the alternative systems.

A number of studies were completed at Step 3 to further describe the environment of the study area. These studies are summarized below.

These reports were intended to establish baseline conditions for the purpose of applying the proposed systems evaluation criteria and identifying potential effects associated with the alternative systems within the study area identified in Figure 7-14.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Basemap

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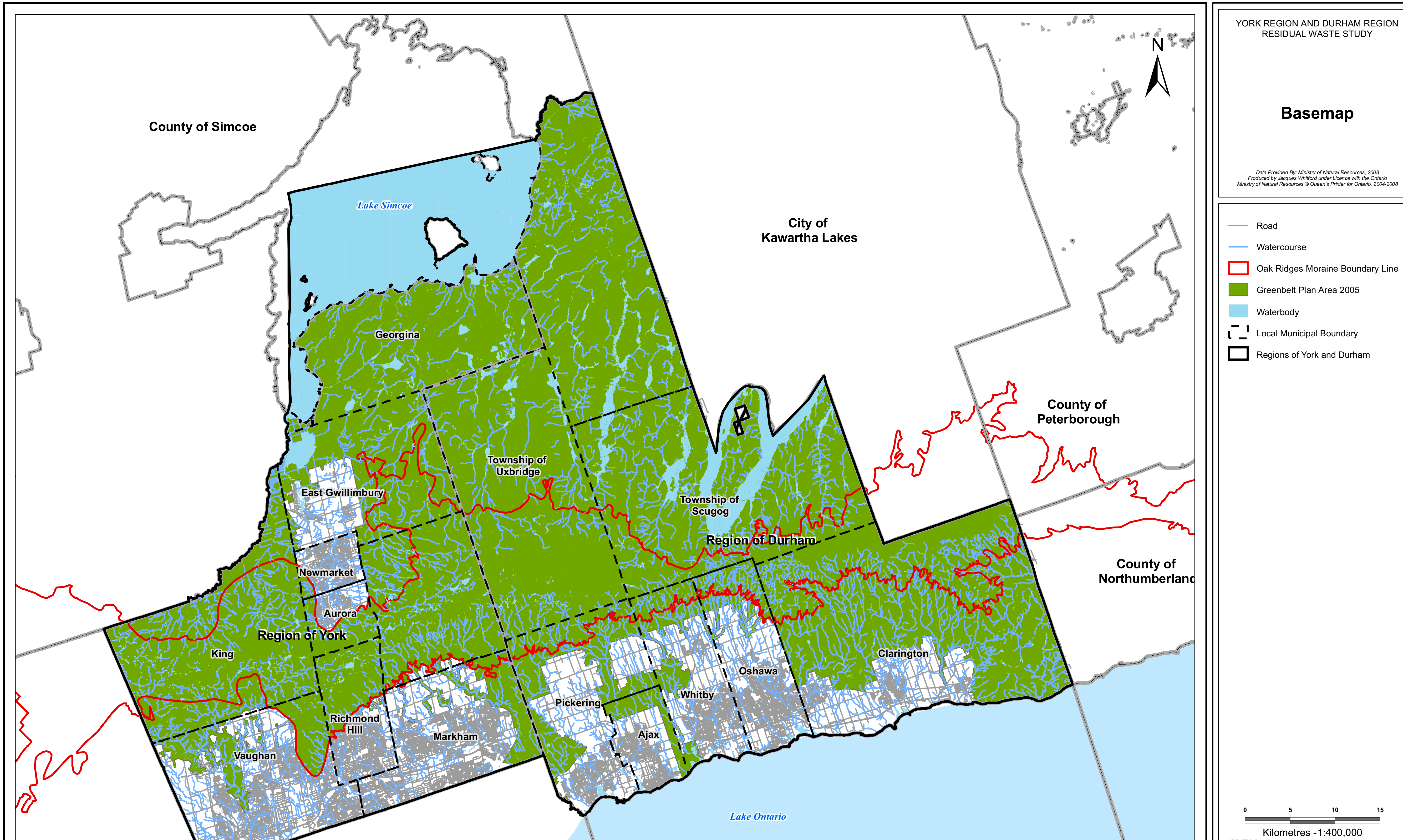

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FIGURE NO.
7-14

Last Modified: May 27, 2009 By: S.Allen

7.5.1.1 Air Environment

The following is a summary of the Report on the Environment Potentially Affected: Air Environment (May 30 2006).

The purpose of this report was to provide information on the air environment within the study area that may be potentially affected by the "Alternatives to" the Undertaking and:

- Discuss factors affecting ambient air quality;
- Profile emissions of contaminants of concern identified by various regulatory authorities;
- Provide air quality monitoring results for contaminants of concern (where available);
- Discuss some of the primary sources of air contaminants in the study area; and,
- Compare ambient air quality in the study area to other areas in Ontario.

The data used was collected from a variety of sources including:

- Environment Canada's National Pollutant Inventory;
- Ontario MOE's OnAir Air Emissions Reporting Registry;
- Environment Canada's Criteria Air Contaminants (CAC) Emission Summaries;
- Environment Canada's Canadian Climate Normals; and,
- Ontario MOE's Air Quality in Ontario Reports.

Factors that Impact Ambient Air Quality

The ambient air quality in Durham/York is determined by two important factors: meteorological conditions and air pollution sources.

Since Durham/York only covers approximately 4700 km^2, the changes in the meteorological data over the area are relatively minor. Durham/York is best described as having a continental climate that is affected mainly by the Great Lakes. The average annual precipitation is approximately 860 mm with normal monthly amounts ranging from 40.0 mm to 93.1 mm. During the summer months (June, July, and August), mean daily temperatures exceed 17°C in most years, with an extreme maximum temperature of 39°C. In winter the recorded extreme minimum was -34.5°C.

Air movement (wind) can also affect the air dispersion process and ambient air quality. Wind can disperse air emissions reducing their impact on the immediate area around emission sources, while at the same time moving air pollutants from one region to another, potentially affecting air quality elsewhere. Based on 30-year data collected at Toronto Lester B. Pearson International Airport Station, which is considered representative for Central Ontario (Toronto, Durham, and York), the annual average wind speed was 14.7 km/h and the prevailing wind blows from the northwest. The prevailing wind in Toronto, Durham and York blows approximately 45% of the time from the north, northwest and west. Approximately 26% of the time the wind blows from the south, southeast and east. Calm wind conditions almost never occurred.

Air pollution sources that impact the Durham/York Regions include regional, local, and cross-boundary sources. Trans-boundary sources of pollution are a very significant source of regionally elevated ambient air quality levels in Ontario. According to the Ontario MOE June 2005 *Report on Trans-boundary Air Pollution in Ontario*, the neighbouring U.S. states continue to be significant contributors to elevated levels of various contaminants in southern and central Ontario during the traditional smog season.

Contaminants of Concern

The focus of the Air Environment report was on air contaminants that are related to waste management operations, as well as common key air contaminants that are of concern due to potential health and environmental affects.

Municipal waste management operations include landfills, thermal treatment (incinerators and gasifiers), recycling and composting. The list of selected contaminants of concern for this Study was developed based on the Ontario MOE A-7 Guideline (February 2004), Environment Canada/MOE Criteria Air Contaminants (CACs) and Greenhouse Gases (GHG). The following are the Contaminants of Concern selected for the evaluation of existing ambient air quality:

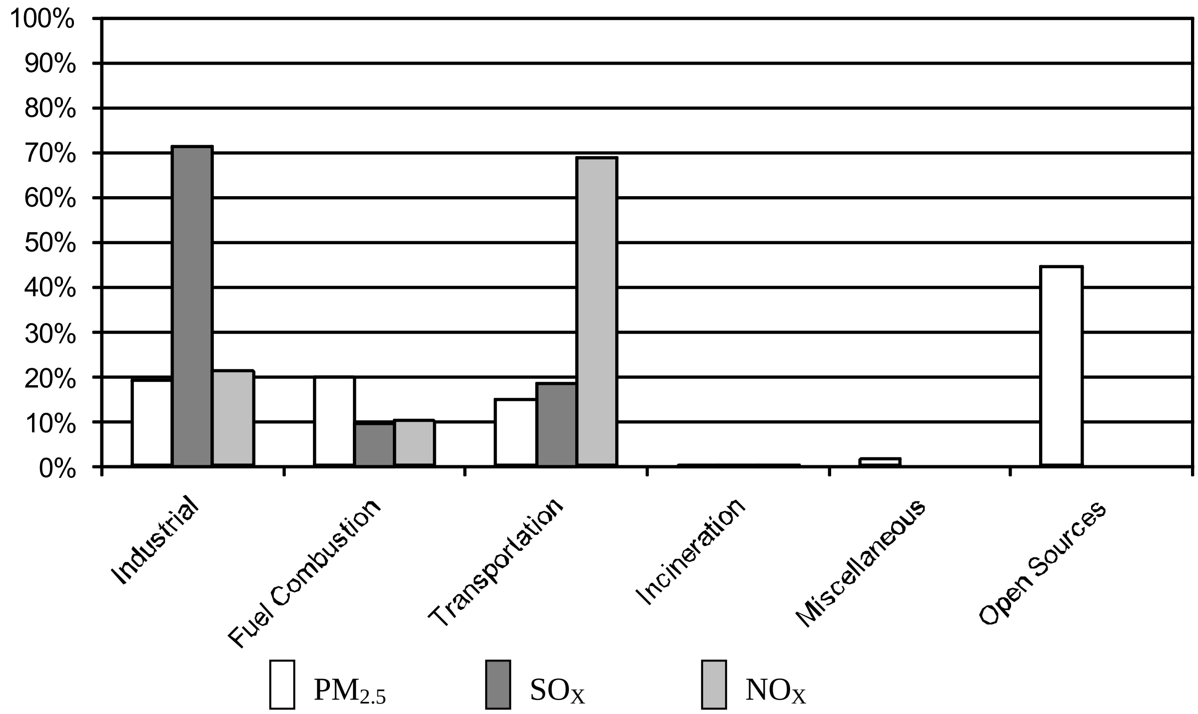
- Particulate Matter <2.5μm ($PM_{2.5}$);
- Cadmium (Cd);
- Lead (Pb);
- Mercury (Hg);
- Dioxins & Furans (PCDD/F);
- Hydrogen Chloride (HCl);
- Sulphur Dioxide (SO_2);
- Nitrogen Oxides (NOx);
- Carbon Dioxide (CO_2); and,
- Methane (CH_4).

Summary of Conclusions

The existing ambient air quality in Durham/York was described based on the air emission release profile and ambient air quality profile of the area. The results from these two profiles were then compared to various established criteria.

From the 2000 CAC database for Durham/York, it was found that industry, transportation, open sources, and fuel combustion were the major emission sources of $PM_{2.5}$, SO_2, and NO_X. Industrial sources accounted for 71% of SO_2, 21% of NO_X, and 19% of $PM_{2.5}$ emissions in the study area. Transportation accounted for 69% of NO_X, 19% of SO_2, and 15% of $PM_{2.5}$ emissions in the study area. Fuel combustion accounted for 20% of $PM_{2.5}$, 10% of NO_X, and 10% of SO_2 emissions in the study area. Open sources including roads, construction, agriculture, landfill, etc. contributed to 45% of $PM_{2.5}$ emissions. Figure 7-15 illustrates the breakdown of emissions for the various sources.

Figure 7-15 Summary of Source Category Contributions



For the other selected contaminants of concern, data obtained from the NPRI and MOE 2003 databases provided insight on emissions from 469 individual reporting facilities in Durham/York.

- Only two of the 469 facilities reported HCl above the threshold, of which one facility contributed over 99% of the total reported emissions;
- Of the 196 facilities that reported CO_2 emissions, only five facilities reported emissions above threshold;
- One individual facility contributed over 70% of total reported CO_2 emissions;
- All 186 facilities that reported CH_4 emissions in 2003 had emissions below the threshold;
- Only a few facilities reported emissions of Cd, Pb, and Hg. One individual facility contributed over 95% of the reported Cd emissions for Durham/York. In the case of Pb and Hg emissions, two facilities contributed to 85% and 98% of the total emissions respectively; and,

- Five facilities reported emissions of PCDD/F in Durham/York in 2003, of which three facilities contributed 99% of the total emissions.

According to the available data from the MOE Ambient Air Quality Stations, the existing ambient air quality in Durham/York was very good and good for the majority of the time (greater than 90%).

The average concentrations of $PM_{2.5}$, NO_X and SO_2 were well below the associated Canada-wide or MOE Schedule 3 Standards. Generally the air quality in rural areas was relatively better than the air quality in urban areas of the GTA, with the suburban areas in between.

Based on the 2003 Air Quality Index (AQI) data for the five monitoring stations outside of Durham/York, the air quality in some of the more rural areas (i.e., Peterborough) is slightly worse than in the urban (industrialized) areas of central Ontario based on the number of hours of AQI values in the 0-15 range (very good category). This is because the poor air quality at the majority of the AQI sites was related to ground-level ozone and $PM_{2.5}$. Ground-level ozone is not emitted directly into the atmosphere but is produced by petrochemical reaction of pollutants emitted in various locations across eastern North America. Generally, ground level ozone is lower in urban areas because it is removed by reaction with nitric oxide (NO) emitted locally by vehicular operation and other combustion sources.

7.5.1.2 Terrestrial / Aquatic Environment

The following is a summary of the *Report on the Environment Potentially Affected: Terrestrial/Aquatic Environment* (May 30, 2006).

The *Report on the Environment Potentially Affected: Terrestrial/Aquatic Environment* provided a description of the characteristic terrestrial and aquatic environments within the study area, and identified particular features that merit special consideration due to their designation as valued natural heritage resources or as sensitive ecological receptors. The specific aspects of the terrestrial and aquatic environment that were considered include:

- Physical and biological setting
    - Geology and physiography
    - Soils
    - Climate
    - Surface water and groundwater
    - Terrestrial and biological features
    - Aquatic biological features
- Areas with special natural heritage designations
    - Greenbelt
    - Oak Ridges Moraine Conservation Area
    - Areas of natural and scientific interest (ANSIs)

- Wetlands
- Environmentally sensitive/significant areas
- Provincial parks
- Conservation areas
- Non-governmental organization lands

- Species at risk
  - Wildlife
  - Vascular Plants and Mosses

Physical and Biological Setting

Bounded by three major bodies of water: Lake Simcoe to the north, Lake Scugog to the northeast, and Lake Ontario to the southeast, the study area encompasses three climatic regimes with some of the mildest conditions in the province. These conditions favour forests dominated by broad leaved species of trees in the south and broad-leaved, mixed woods and conifer forests in the north, although much of the area’s forests have been cleared for agricultural and human settlement. The wildlife species within the study area are typical of southern Ontario ecosystems.

As with most of southern Ontario, the study area is characterized by an extensive ground moraine comprised of glacial till that is overlain by the Oak Ridges Moraine. This prominent southern Ontario landform traverses the south-central portions of York and Durham. The Moraine serves as the headwaters region for most of the streams draining south through York and Durham to Lake Ontario and north to Lake Simcoe and the Kawartha Lakes.

Areas with Special Natural Heritage Designations

Within the study area, there are numerous areas with special natural heritage designations that range from and include:

- Areas of natural and scientific interest;
- Provincially significant wetlands;
- Environmental significant/sensitive areas;
- Conservation areas;
- Provincial parks; and,
- Areas that have been designated by the provincial government as Greenbelt lands and Oak Ridges Moraine lands.

The Official Plans for Durham and York also identify areas within their jurisdiction that are considered to be environmentally significant areas and have special policies associated with these areas. Additionally, there are nature reserves that are held by non-governmental organizations such as the Nature Conservancy of Canada and the Federation of Ontario Naturalists.

Figure 7-16 and Figure 7-17 illustrates the watersheds and natural heritage areas in the study area.

Species at Risk

Within Durham and York, there are 15 species of insects, three species of fish, eight species of amphibians and reptiles, 17 species of birds and three mammal species identified by the Natural Heritage Information Centre (2006) as being rare or at risk. Most have special designations assigned by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) or the OMNR, and a few others are identified on the basis of their apparent rarity but have not been designated a legislated status. Nearly 39% of the local flora is considered rare in Durham and/or York, and approximately 31% of the flora within the study area is non-native, reflecting the long history of settlement in the area and the considerable introduction of exotic species in and around human habitations as a result of agricultural practices. One species of moss and 563 species of vascular plants are considered rare within the study area. Of these, six have been given special status at the provincial or national level and one has been identified as being of Special Concern.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Study Area Watersheds

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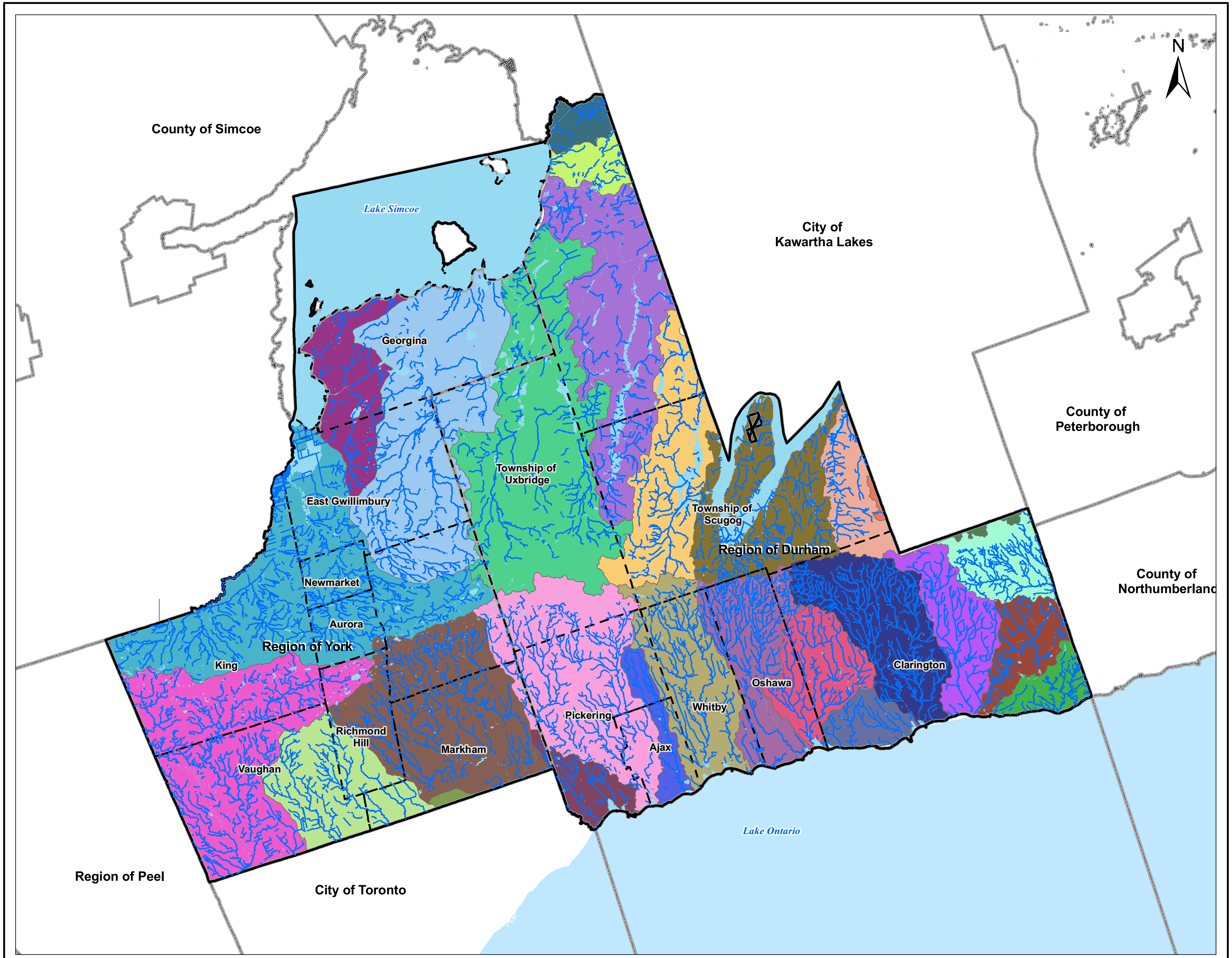

- Watercourse
- Baxter Creek
- Beaver River
- Black River
- Bowmanville / Soper Creeks
- Carruthers Creek
- Corbett / Goodman / Oshawa Creeks
- Don River
- Duffins Creek
- East Cross / Janetville Creeks
- Ganaraska River
- Georgina Creek / Maskinonge River
- Graham Creek
- Harmony / Farewell / Black Creeks
- Highland Creek
- Humber River
- Lake Scugog / Blackstock Creek
- Layton / Nonquon Rivers
- Lynde / Pringle Creeks
- Pefferlaw / Uxbridge Brooks
- Petticoat Creek / Frenchman's Bay
- Pigeon River
- Port Grandby / Wessleyville / Port Britian Creeks
- Robinson / Tooley / Darlington / Westside / Bennett Creeks
- Rouge River
- Talbot River
- West & East Holland Rivers
- White's Creek
- Wilmot / Foster Creeks

0 5 10 15
Kilometres -1:400,000

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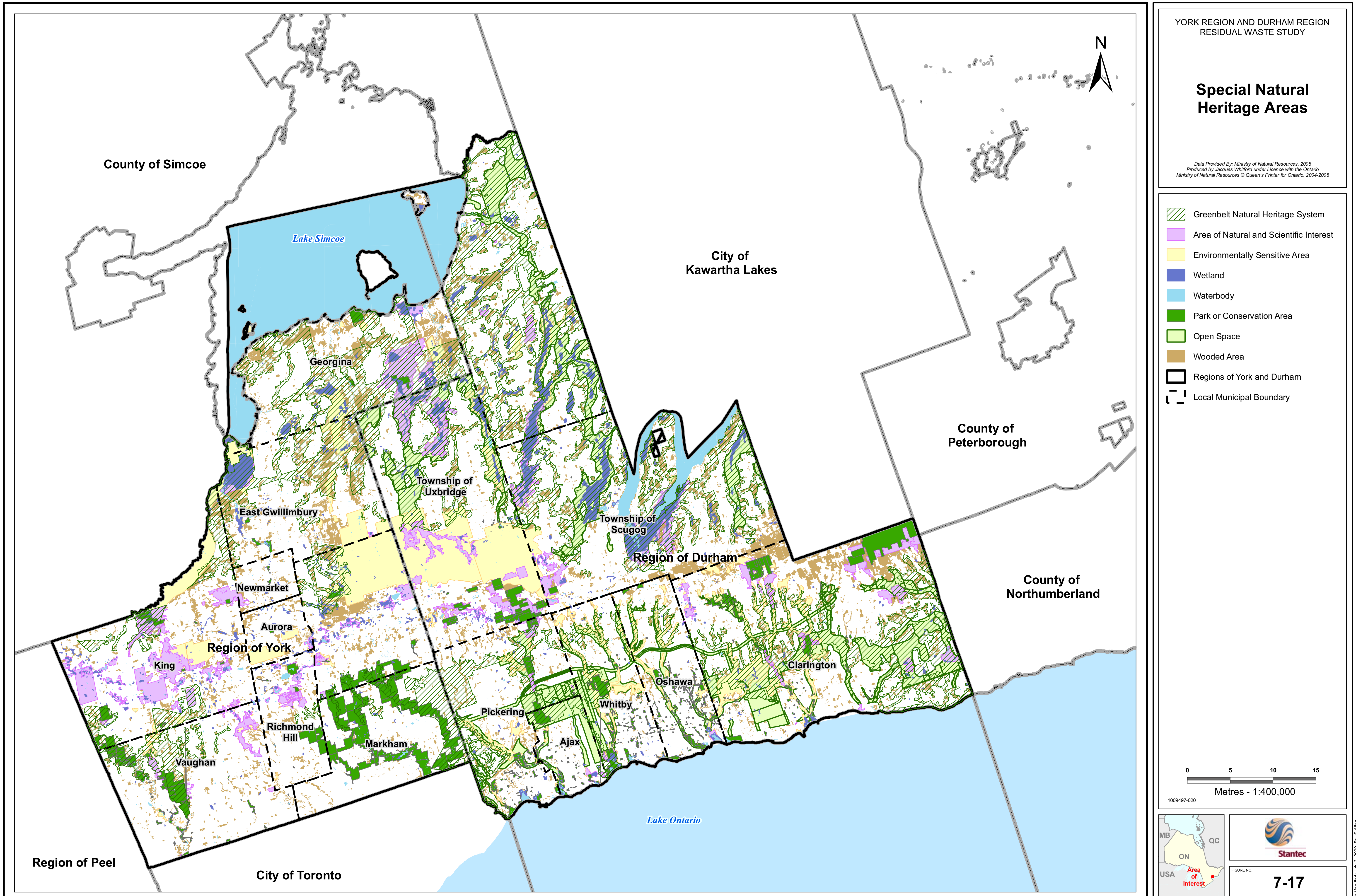
FIGURE NO.
7-16

Last Modified: July 3, 2009 By: S.Allen


YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY
Special Natural Heritage Areas
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N
Greenbelt Natural Heritage System
Area of Natural and Scientific Interest
Environmentally Sensitive Area
Wetland
Waterbody
Park or Conservation Area
Open Space
Wooded Area
Regions of York and Durham
Local Municipal Boundary
County of Simcoe
Lake Simcoe
City of Kawartha Lakes
County of Peterborough
County of Northumberland
Georgina
East Gwillimbury
Township of Uxbridge
Township of Scugog
Region of Durham
Newmarket
Aurora
Region of York
King
Richmond Hill
Markham
Vaughan
Pickering
Ajax
Whitby
Oshawa
Clarington
Lake Ontario
Region of Peel
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5
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15
Metres - 1:400,000
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Area of Interest
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FIGURE NO.
7-17
Last Modified: July 3, 2009 By: S.Allen

7.5.1.3 Agricultural Environment

The following is a summary of the *Report on the Environment Potentially Affected: Agricultural Environment* (May 2006).

The *Report on the Environment Potentially Affected: Agricultural Environment* provided information concerning:

- Land use patterns;
- Farm profiles;
- Commodities produced;
- Economic value; and,
- Land use planning strategies for agricultural lands used by Durham and York in reference to their official plans and the *Greenbelt Act*.

The purpose of this report is to provide information on the agricultural environment within the study area that may be potentially affected by the "Alternatives to" the Undertaking.

Agricultural Land Use Patterns

The study area consists, in part, of large tracts of prime agricultural land representing a majority of the total farm operations within the GTA. Agricultural operations include dairy and livestock, floriculture, poultry, fruit and vegetable, field crop industries and specialty farms. In 2001 farmland comprised 63% of the total land area of Durham and there were a total of 1,709 farms in the Region with an average farm size of 193 acres. In 2001 farmland comprised about 40% of the land area of York and there were a total of 1,020 farms with an average farm size of 173 acres.

Profile of Farms

Average farm sizes within the study area have decreased over time as large scale, land extensive operations were replaced with smaller, "miscellaneous specialty" farms. These specialty farms produce commodities that are of higher value, require less land for production, and profit from the nearby urban markets. Within the study area, most of the specialty farms are horse and pony, greenhouse product, nursery product and sod farms. In Durham, cattle operations were the prominent farm type, with 441 farms, followed by miscellaneous specialty operations (350); grain and oilseed (201); and dairy (195). In York, miscellaneous specialty operations were the dominant farm type with 331 farms, followed by cattle (148); grain and oilseed (110); and vegetable operations (105).

Commodities Produced

A range of commodities are produced in the study area, including dairy and livestock, poultry and eggs, fruit, vegetables, field crops, sod and floral products. Based on 2001 gross farm receipts, the dominant commodity group in Durham was dairy (21.9%), followed by nursery products and sod (14.4%), and cattle (9.5%). In York, the leading commodity group by gross farm receipts was vegetables (15.5%), followed closely by greenhouse products (14.6%) and poultry and eggs (13.5%).

Economic Value

In 2001, gross farm receipts in Durham were $233,673,214 and in York they were $178,853,519. The highest grossing commodity group in Durham was dairy, followed by nursery products and sod and cattle. In York, the leading commodity group by gross farm receipts was vegetable followed closely by greenhouse products and poultry and eggs. Within the GTA, Durham and York are leaders in the highest gross farm receipt brackets. York has the most farms that gross over $500,000 and Durham has the highest number of farms that are within the $250,000 to $499,999 bracket.

The study area is home to a thriving horse industry. York and Durham rank first and second in the number of horses managed in comparison to all other Ontario regions. A significant amount of money is invested in and generated from the study area's horse industries with a total capital investment between the two Regions of approximately $750 million.

In total, there are approximately 10,760 jobs in the agricultural industry within Durham, which comprises approximately 3.9% of the labour force. York's agricultural industry supports approximately 5,515 jobs, or about 1.4% of the Region's labour force.

Agricultural Land Use Planning

Both Durham and York recognize the economic, ecological and recreational benefits of preserving key agricultural lands and maintaining viable agricultural industries. Farming in the study area is advantaged by the presence of large tracts of prime agricultural soils, as well as by its proximity to the major transportation routes Highways 401 and 407 and to the large market of the GTA. The presence of a nearby and growing urban population also serves to threaten the study area's agricultural industry, and it is increasingly under the pressures of urbanization and non-agricultural land uses.

The Regional Official Plans (ROPs) of Durham and York serve as the guiding documents for growth and development within the study area and provide the policy basis for the preservation of key agricultural areas. In order to protect their agricultural lands, Durham and York have both designated agriculturally significant areas in which the primary land uses will be farming. In addition to regional protection, significant agricultural lands are also protected through the Government of Ontario's *Greenbelt Act*, which was enacted in February, 2005 and the *Places to Grow Act*. Figure 7-18 illustrates the existing agricultural environment.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Agricultural Environment

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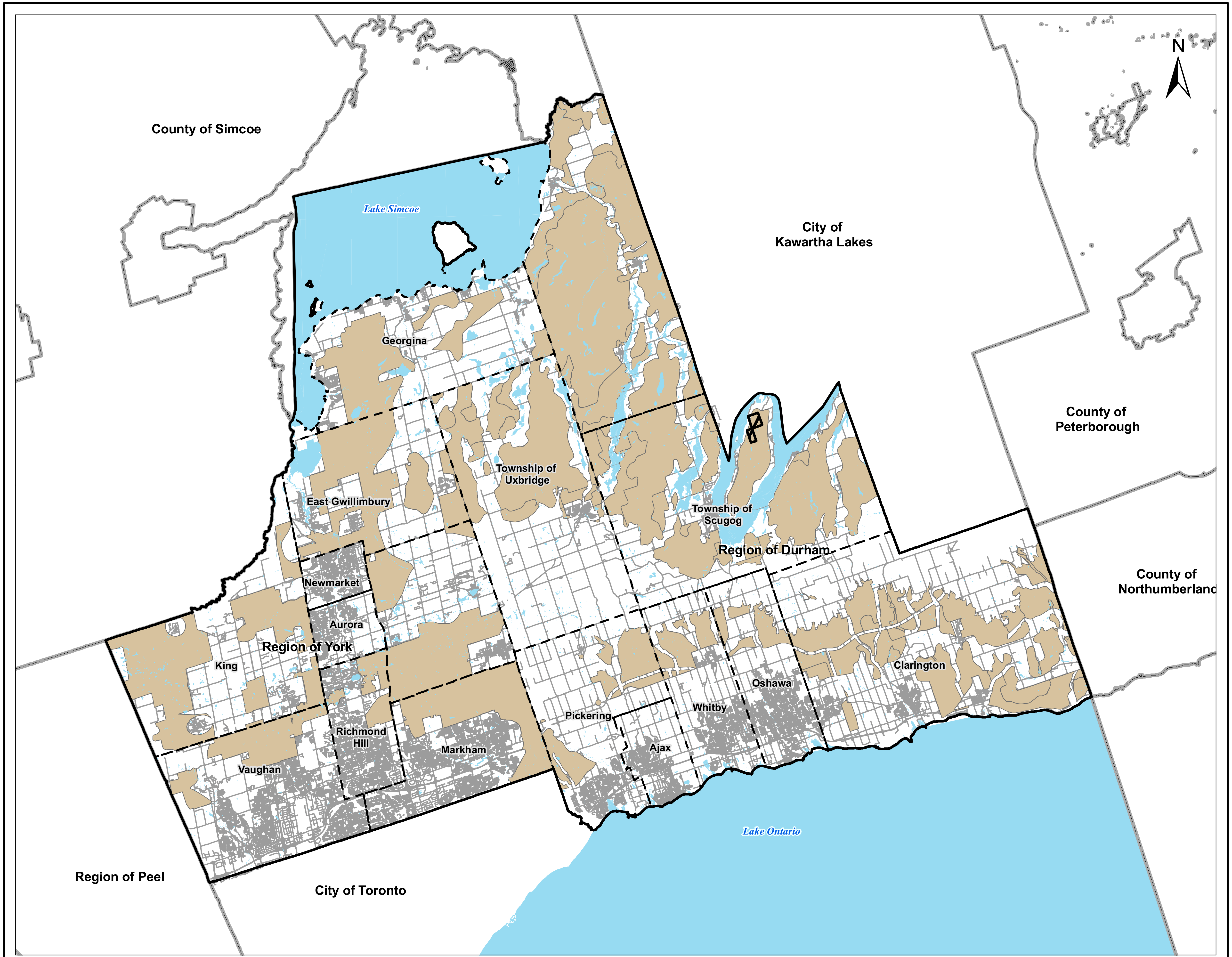


Road
Agricultural Land
Waterbody
Local Municipal Boundary
Regions of York and Durham

0 5 10 15
Kilometres -1:400,000
1009497-025

Stantec

FIGURE NO.
7-18

Last Modified: May 27, 2009 By: S.Allen

7.5.1.4 Social/Cultural Environment

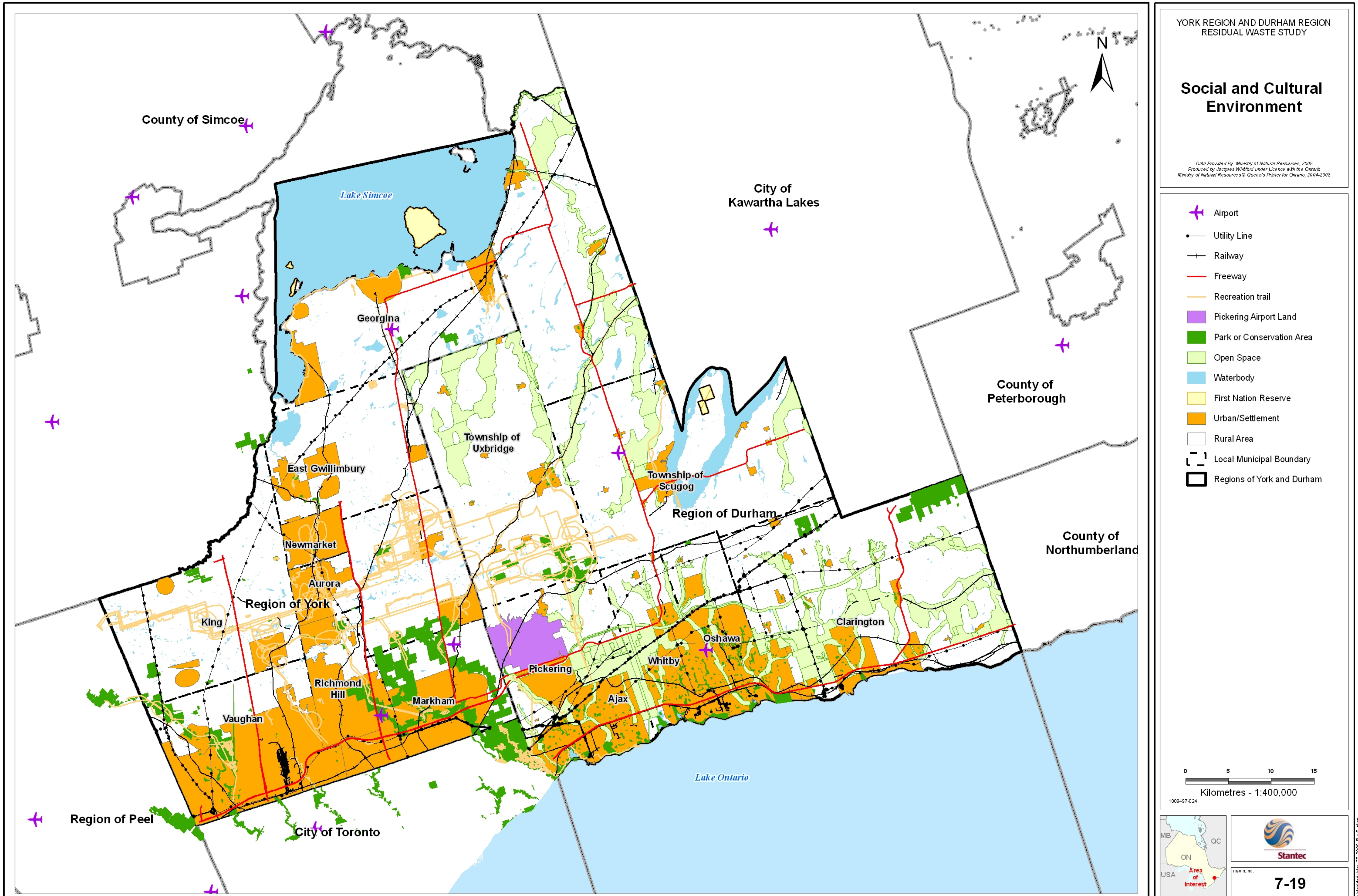
The following is a summary of the Report on the Environment Potentially Affected: Social/Cultural Environment (May 2006).

The purpose of this report is to identity the social/cultural environment that may be potentially affected by the "Alternatives to" the Undertaking.

The Report on the Environment Potentially Affected: Social/Cultural Environment identified the social/cultural environment that may be potentially affected by the "Alternatives to" the Undertaking. It highlighted characteristic features including:

- Municipal structure and waste management responsibilities;
- Settlement patterns and land use;
- Transportation systems and utility corridors;
- Population;
- Employment;
- First Nations communities;
- Education;
- Other Institutions;
- Recreation; and,
- Tourism.

Figure 7-19 illustrates the social and cultural environment of Durham and York.


YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY
Social and Cultural Environment
Data Provided By: Ministry of Natural Resources, 2008
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Airport
Utility Line
Railway
Freeway
Recreation trail
Pickering Airport Land
Park or Conservation Area
Open Space
Waterbody
First Nation Reserve
Urban/Settlement
Rural Area
Local Municipal Boundary
Regions of York and Durham
0
5
10
15
Kilometres - 1:400,000
1009497-024
MB
QC
ON
USA
Area of Interest
Stantec
FIGURE NO.
7-19
Last Modified: May 27, 2009 By: S.Allen
N
County of Simcoe
Lake Simcoe
City of Kawartha Lakes
County of Peterborough
County of Northumberland
Georgina
Township of Uxbridge
East Gwillimbury
Township of Scugog
Region of Durham
Newmarket
Aurora
Region of York
King
Clarington
Oshawa
Whitby
Pickering
Richmond Hill
Markham
Ajax
Vaughan
Lake Ontario
Region of Peel
City of Toronto

Municipal Structure and Waste Management Responsibilities

Durham operates as a two-tier government structure in which the Regional Municipality forms the upper tier and eight local municipalities serve as the lower tier. Durham shares the responsibility for solid waste management services with the local area municipalities depending on the stream of material being managed. That being said, Durham is responsible for the majority of waste management services.

York also operates as a two-tier government structure in which the Regional Municipality forms the upper tier and nine local municipalities serve as the lower tier. York is responsible for processing of recyclables and organics, management of HHW, operation of depots and transfer facilities and disposal of post-diversion residual waste. In York, the local area municipalities are responsible for the curbside collection of recyclables, organics and post-diversion wastes.

Settlement Patterns and Land Use

The Regional Official Plans (ROPs) of Durham and York serve as the guiding documents for regional growth and development. The study area consists of a distinct balance of designated urban and rural lands, and the ROPs provide the policy basis for the maintenance of this balance. The ROPs specify that urban areas will support the vast majority of population growth within the Regions. With the implementation of smarter urban design principles, including intensification, mixed uses and transit accessibility, these areas will be capable of supporting a larger population.

Early settlement in the study area consisted mainly of large farming homesteads spread throughout the Regions. As the farming population grew, rural settlements began to form throughout the study area in order to provide localized goods and services.

Urbanization increased throughout the 20th century, when manufacturing labour demands drew people from the rural areas into the urban centres in search of work. The highest degree of settlement has occurred in Oshawa and Whitby in Durham, and Markham and Vaughan in York.

The rise in automobile ownership loosened the geographical constraints of urban living and gave rise to suburban development during the mid-twentieth century. Although the majority of the study area consists of rural lands, the general trend has been towards urbanization and an ever-growing urban population.

Industrial development in the study area occurs mainly along the major transportation routes and generally in close proximity to Toronto. Highway corridors such as Highway 401 and Highway 404, as well as railways and harbours, play an important role in the location of industrial facilities. In addition, older industrial areas, such as the Yonge Street corridor in York, are being redeveloped to promote economic revitalization.

Both Durham and York have designated a significant amount of Employment Lands, which are intended and set aside for industrial, commercial and business development in order to attract industries and businesses and maximize employment opportunities. As of 2006, Durham had approximately 5,232 hectares and York had over 2,800 hectares of vacant designated Employment Lands.

As of 2006, the industrial sector was strong and relatively stable within the study area, with major strengths in the automobile, energy and businesses services sectors. The automotive industry takes advantage of Durham’s highly skilled manufacturing workforce and access to local and global automotive markets and suppliers. The energy industry benefits from Durham’s access to the North American electricity grid and Durham’s commitment to workforce development from The University of Ontario Institute of Technology, which offers degrees in support of energy related businesses. Other important industries in Durham are plastics manufacturing, telephone call centres, and steel manufacturing.

In addition to the automotive industry, other important industries in the study area include the manufacturing of fabricated metals, electronics, printing, and office furniture. The business services sector is playing an increasingly important role in York’s economy. This sector grew by over 50 percent between 1998 and 2001. Services include information and cultural industries, finance, insurance, and real estate, computer systems design, engineering, architectural, and technical services.

Within Durham and York, rural areas comprise the largest portion of the study area, and are composed of a range of land uses including prime agricultural lands, open space, aggregate extraction areas, rural settlements, and environmentally sensitive areas. A major focus of land use planning within these areas is to limit development and to protect areas of high quality soils for agricultural use.

Hamlets are scattered throughout the study area’s rural areas and act as centres for the provision of goods and services, as well as the primary residential areas for non-farming residents. The historical and cultural attributes within many of the hamlets are significant, and therefore growth within these areas is planned to occur with consideration to preserving these features.

Durham and York have an extensive array of open space and parkland, which consists primarily of conservation authority lands, environmental policy areas and regionally significant forest, wetland and waterfront areas. Both Regions are committed to maintaining a continuous system of open space, thereby preserving inherent ecological and recreational benefits.

Durham has designated a Major Open Space System, in which urban development is not permitted and the principal land uses are conservation, recreation, reforestation and agriculture and farm-related uses. Approximately 40% of Durham’s land area is covered by this system. York has established a Regional Greenlands System, which includes unique natural areas and remnants of the forested natural system that once covered the region. The objective of the Greenlands System is to preserve, as well as rehabilitate, these environmentally significant areas. Land stewardship is encouraged and development or major land use changes are avoided to the extent possible.

Transportation Systems and Utility Corridors

The study area exhibits an effective and integrated road network that facilitates the safe, convenient and economical movement of people and goods. Highway 401 is the principle highway in the area. The 401 corridor runs east-west and follows the northern shore of Lake Ontario through Durham. Highway 400 runs north-south from Toronto into York, through the City of Vaughan and the Township of King. Highway 404 also runs north-south from Toronto through the eastern portion of York and ends at Green Lane. Highway 407 runs east-west from Halton, through York, to Brock Road in Durham. Highway 7 runs parallel and is just north of Highway 407. In Brock Township, Highway 12 continues north and Highway 7 goes east. Other provincial highways in the study area include Highways 35, 48, and 115.

Within the study area, Durham and York are responsible for major arterial roadways, which provide linkages between municipalities and places of employment. The area municipalities are responsible for collector and local roads, which service residential subdivisions and commercial areas. In total, Durham manages 832 km of roadways and 209 bridge and culvert structures and York is responsible for approximately 1000 km of roadway. Both Regions also offer fairly extensive transit operations.

There are a number of electrical utilities providing power to each municipality in the study area including those outlined in Table 7-12.

Table 7-12 Summary of Durham's and York's Electrical Utility Companies

The Region of Durham	York Region
Ajax – Veridian, Hydro One	Aurora – Aurora Hydro Electric Commission
Brock – Veridian, Hydro One	East Gwillimbury – Hydro One
Clarington – Veridian, Hydro One	Georgina – Hydro One
Oshawa – Oshawa PUC	King – Hydro One
Pickering – Veridian, Hydro One	Markham – Power Stream
Scugog – Hydro One	Newmarket – Newmarket Hydro
Uxbridge - Veridian, Hydro One	Richmond Hill – Power Stream
Whitby – Whitby Hydro	Vaughan – Power Stream
	Whitchurch – Stouffville – Hydro One

Coined the "Energy Capital of Ontario", Durham produces approximately 40% of Ontario's energy and is home to two large nuclear power generating stations: Darlington Nuclear Generating Station and the Pickering Nuclear Generating Station. Darlington Nuclear is located in the Municipality of Clarington. With an output of 3,524 MW it can provide about 18% of Ontario's electricity demand. Pickering Nuclear, located on the northern shore of Lake Ontario, is one of the largest nuclear generating facilities in the world and has a total output of 4,120 MW, a capacity that can meet approximately 21% of Ontario's electricity needs. Energy is further provided by the Pickering Wind Generating Station, which is a single 1.8 MW turbine that produces sufficient energy to meet the electricity demands of approximately 600 homes.

There are hydro corridors (tracts of land containing hydroelectric pylons and cables) that run north from the Pickering Station. These hydro corridors were recently transferred to the province and are now managed by the Ontario Realty Corporation. This large electricity distribution system is operated by Hydro One.

York has recently undertaken an initiative to effectively manage its supply of energy through a combination of conservation and new generation, together with an enhanced distribution and transmission infrastructure, including the potential development of a new transformer station near the Holland Junction in King Township (Ontario Power Authority).

Population

In 2001, Statistics Canada recorded populations of 506,901 in Durham and 729,254 in York, representing increases from 1996 of 10.5% and 23.1% respectively. Private dwellings within the Regions numbered 175,738 in Durham and 229,239 in York. York comprises approximately one-third of the study area yet contains a higher population than Durham. York has approximately 414 persons per square km compared to Durham’s 201 persons per square km.

Population within the study area is not evenly distributed among the area municipalities, and the urban municipalities of Oshawa, Markham, Richmond Hill and Vaughan carry a much higher portion of the population than their rural counterparts. Forecasted population distributions indicate that these more densely populated municipalities will continue to support the highest population numbers into the future.

Employment

The labour force in Durham and York are divided amongst a variety of industries. Manufacturing and construction industries are dominant, and account for between one fifth and one quarter of the total employment in both the Regions. The business services industry and wholesale and retail trade are also major employers in the study area.

First Nation Communities

The Mississauga’s of Scugog Island First Nation is located within Durham and is one of the smallest First Nations in Canada. Located within York, are the Chippewas of Georgina Island, who are the descendants of a larger band known as the Chippewas of Lake Huron and Lake Simcoe. In addition to the First Nation communities referenced above, a number of First Nation communities in neighbouring regions of Southern Ontario, were also considered in this EA Study. In 2001, Statistics Canada reported that aboriginal populations in Durham and York were 4,305 and 2,560 respectively.

Education

There are several post-secondary institutions within the study area. There are also a large number of public, separate and private elementary and secondary schools located within the study area.

Other Institutions

There are a total of five hospitals located in Durham. There are four hospitals located in York. There are also numerous nursing and residential care facilities and other health service institutions that are located within Durham and York.

Recreation

With provincial parks, numerous conservation areas, biking and hiking trails, fishing, as well as a wide variety of sports and recreational facilities, the study area offers a range of recreational activities.

Tourism

Tourism is an integral part of the study area’s economy. The Great Blue Heron Charity Casino in Port Perry is owned by the Mississaugas of Scugog Island First Nation and was opened in 1994. Lakes Scugog, Simcoe, and Ontario provide year-round fishing opportunities and are popular summer destinations for visitors to the area. Durham and York have over 65 golf courses, major attractions, events and resources, such as wineries, that contribute to the local tourism industry.

7.5.1.5 Report on Legal/Jurisdictional Environment

The following is a summary of the *Report on the Environment Potentially Affected: Legal/Jurisdictional Environment* (May 30, 2006).

The purpose of *Report on Legal and Jurisdictional Environment* (May 2006) was to identify the legal and jurisdictional issues that may be associated with the Undertaking and:

- Discuss the Study Proponents (Durham and York) making reference to the Agreement between the two Regional municipalities for undertaking the EA Study;
- Discuss the potential that implementing the preferred Undertaking may require partnering with a private sector entity;
- Provide an outline of the types of legislation and associated approvals that would comprise part of the EA process; and,
- Describe several different business scenarios for the development and/or operation of any facility(ies) that could be identified as a result of the EA Study.

Study Proponents

Durham and York reached an Agreement on June 30, 2005 to undertake the EA Study as a joint effort. The JWMG was formed to oversee completion of the EA Study. The full agreement can be found in **Appendix A-2**.

It was identified that the EA Study may require as input, a competitive process and selection of a vendor(s) to partner with the Proponents in the development of the facility(ies) for the preferred system. The identification of a preferred vendor would likely be necessary, prior to seeking EA Approval, to allow for a sufficiently detailed description of the Undertaking (including its design, operation, maintenance, monitoring and contingency measures) and respective net effects. It was expected that the vendor, together with other potential public and/or private sector parties, would enter into “partnership” agreements with the Proponents to implement the Undertaking.

Types of Approvals

A number of pieces of legislation at the federal, provincial and municipal levels provided the legal/jurisdictional context within which this EA Study was completed and within which the resulting residual waste processing facility would ultimately be developed.

Applicable federal legislation considered included the *Canadian Environmental Assessment Act* (CEAA) and the *Fisheries Act* (FA). CEAA does not apply to the project based on comments received from the Canadian Government agencies. It was identified that the FA could apply to the Undertaking depending on the location of the proposed facility and proposed onsite activities. If the FA became applicable to the project, the EA Study would have also needed to be completed in accordance with the CEAA.

Applicable provincial legislation includes the EAA, the Environmental Protection Act (EPA), the Ontario Water Resources Act, the Planning Act, the Oak Ridges Conservation Act, and the Greenbelt Act.

The EA Study was completed in accordance with the Ontario EAA and the Approved EA Terms of Reference. It was recognized that additional approvals would also be required under the *Environmental Protection Act*, and potentially under the *Ontario Water Resources Act*, the *Planning Act* and the *Oak Ridges Moraine Conservation* and *Greenbelt Acts* pending identification of the preferred facility type and location.

Types of Agreements to Implement Facilities

It was acknowledged that the development and/or operation of a facility could proceed on the basis of several different business scenarios as follows:

- A conventional approach to implementing municipal facilities;
- Operations on the basis of “public/public partnerships”; and,
- Development and/or operations on the basis of “public/private partnerships”.

Implementation of the facility would proceed using the business scenario that best suits the co-Proponents’ residual waste management and services-delivery objectives.

7.5.2 Consideration of Environment Potentially Affected During Evaluation

Given that the evaluation of “Alternatives to” in the Durham/York EA Study did not involve any siting considerations (at this point in the EA Study), which is typical for many municipal waste management EA’s, and that most of the descriptive information was related to geography, the relevance of the studies on the environment potentially affected was limited to some very general considerations. Siting considerations were addressed during the “Alternative methods” (Section 8). The screening of the three (3) waste management technologies (i.e., mechanical, biological, thermal treatment) for feasibility, environmental suitability, and approvability occurred during the development of the Approved EA Terms of Reference. The identification, therefore, of any existing background conditions that would preclude or severely disadvantage the establishment of any of the “Alternatives to” under consideration in the EA Study was not expected. Notwithstanding, where possible, the studies were utilized during application of the comparative criteria at Steps 4 and 5.

The studies were completed with recognition that the next major step in the Study (evaluation of "Alternative Methods") would focus on siting for the preferred system. With the selection of the preferred system and the confirmation of facility siting criteria, these studies were developed to a greater level of detail and became much more relevant at this later step.

7.5.3 Technical Components of "Alternatives to" (Residual Processing Systems)

In addition to the background studies defining the existing environment potentially affected, a series of six (6) technical background studies were undertaken to facilitate the application of several of the comparative evaluation criteria. These six (6) technical background studies included:

- *Supporting Technical Document on System Mass Balances and Diversion Estimates* (May 30, 2006);
- *Supporting Technical Document on Facility Land Requirements* (May 30, 2006);
- *Supporting Technical Document on Electrical Energy Balances* (May 30, 2006);
- *Supporting Technical Document on Financial Analysis and Cost Estimates* (May 30, 2006);
- *Supporting Technical Document on Environmental Life Cycle Analysis* (May 30, 2006); and,
- *Supporting Technical Document on Generic Air Dispersion Modeling* (May 30, 2006.

Key information and conclusions from these six (6) technical background studies are provided as follows.

7.5.3.1 System Mass Balance and Diversion Estimates

The *Supporting Technical Document on System Mass Balances and Diversion Estimates* (May 30, 2006) described:

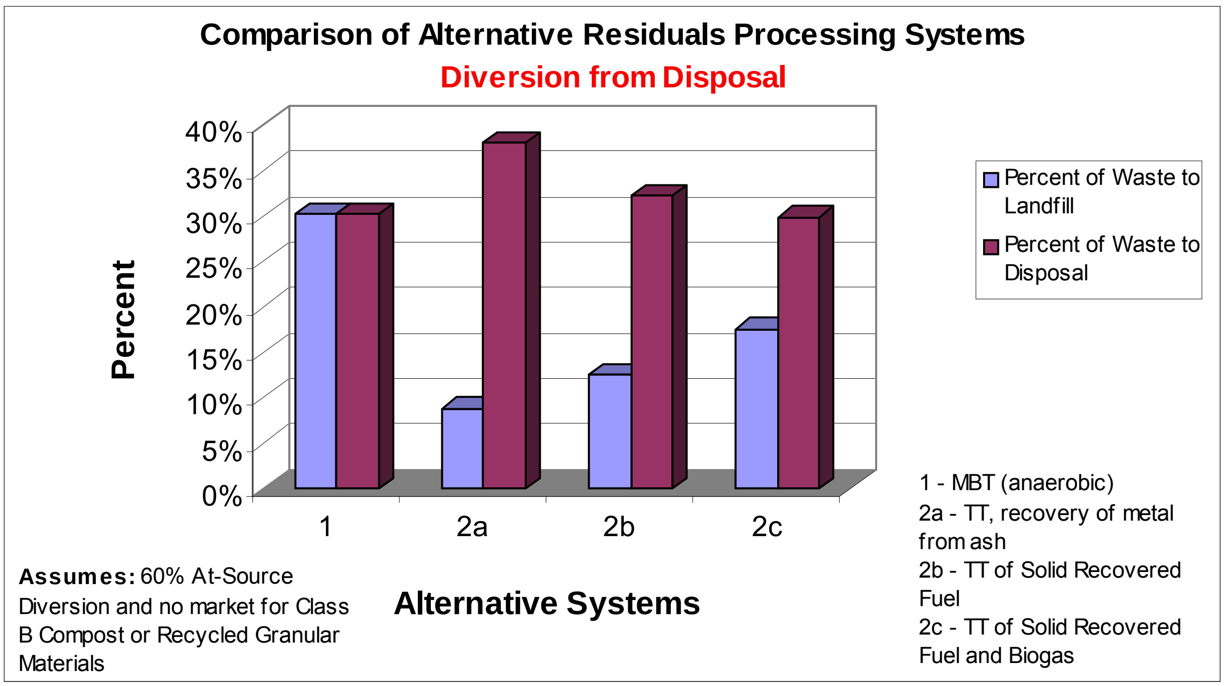
- The flow of materials into, through, and out of each of the four residuals processing systems;
- The diversion from disposal and diversion from landfill rates that could be achieved by each of the systems; and,
- The quantity of residuals requiring landfill disposal from each of the systems and the number of trucks that would be required to haul this material.

The purpose of this report was to quantify the mass balance and diversion estimates associated with the four residuals processing systems given the projected quantity and composition of post-diversion waste produced in Durham and York. This information was vital to accurately compare the capabilities of each system.

The diversion estimates produced were prepared based on current regulatory and market conditions in Ontario and likely trends to develop in the future. This way of estimating diversion rates allowed each system to be described in the short and long-term. Diversion estimates were generated based on both the 250,000 tpy minimum capacity assumption and the 400,000 tpy maximum capacity assumption.

Results showed that System 2a (Thermal Treatment of MSW with Recovery of Materials from the Ash/Char) would have the highest percentage of waste disposed (38%), but the lowest percentage of waste landfilled (9%). Figure 7-20 compares the percentage of materials that would be sent to disposal and landfill for all systems. Note, throughout this EA Study, disposal was used to refer to the management of waste via either thermal treatment or landfill.

Figure 7-20 Percent of Materials to Disposal and Landfill for All Systems



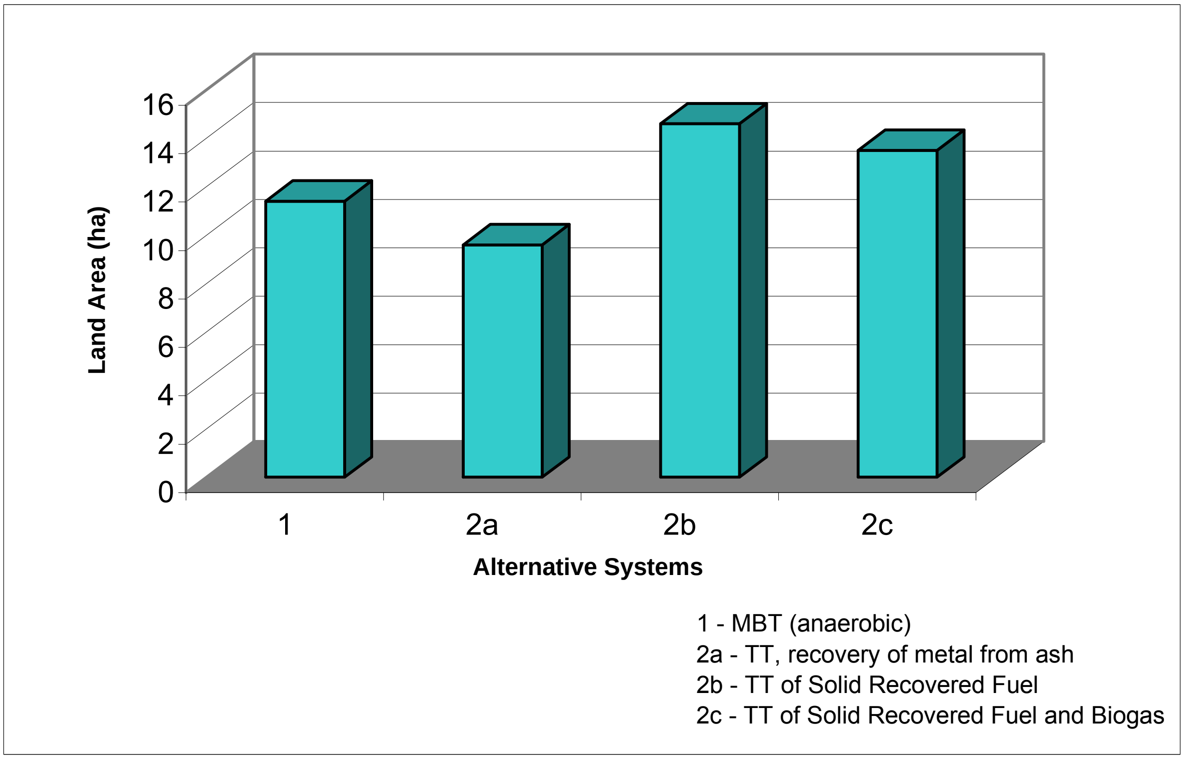
The results of this study were used to apply the Natural Environmental Criterion 4 (estimated diversion potential) and were also factored into the life cycle environmental analysis and estimation of land requirements completed for each system. In addition, the results were used in the preparation of cost estimates related to facility throughputs, revenues from recyclable materials, etc.

7.5.3.2 Facility Land Requirements

The *Supporting Technical Document on Facility Land Requirements* (May 30, 2006) identified the estimated land area that would be displaced and potentially disrupted by each of the four alternative systems. These estimates considered the predicted maximum (400,000 tpy of post-diversion residual waste) throughput quantities associated with each system and assumed buffer requirements based on current waste management facility approval regulations, policies, guidelines and practices of the Province. The report also separately identified the volume of air space required for landfill disposal of residuals from each of the four alternative systems.

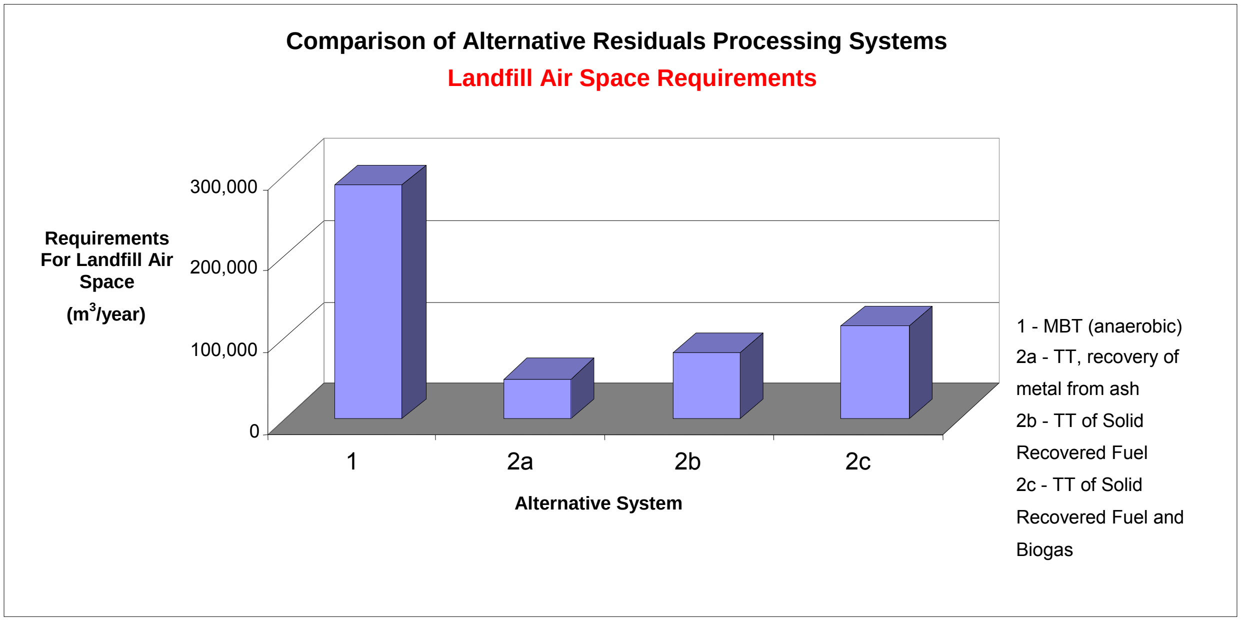
Results showed that System 2a (Thermal Treatment of MSW with Recovery of Materials from the Ash/Char) would require the least land area and System 2b (Thermal Treatment of SRF) would require the most land area. Figure 7-21 displays the comparative land area requirements of the four systems.

Figure 7-21 Comparative Land Area Requirements



In regards to the disposal of system residuals, results showed that System 2a (Thermal Treatment of MSW with Recovery of Materials from the Ash/Char) would require the least air space for landfill disposal of residuals and System 1 (Mechanical and Biological Treatment with Biogas Recovery) would require the most air space for landfill disposal of residuals. Figure 7-22 illustrates the landfill air space requirements for the four alternative systems based on an annual through put of 250,000 tpy for the system. This was based on both the tonnage of residuals requiring landfill disposal and the average in-place density of these materials.

Figure 7-22 Total Landfill Air Space Required for Minimum System Capacity in 2011



The results of this study were used to apply Natural Environmental Criteria 1 and 3 and Social/Cultural Criterion 5 related to impacts on lands and land uses (see Table 7-18).

7.5.3.3 Electrical Energy Balances

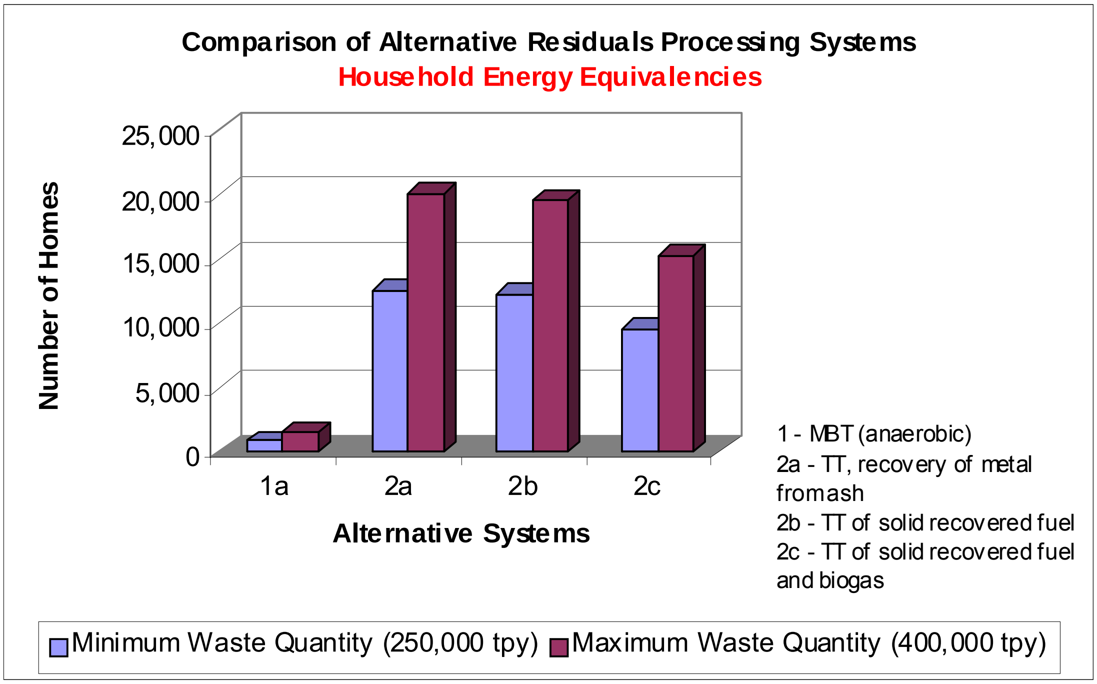
The *Supporting Technical Document on Electrical Energy Balances* (May 30, 2006) identified the electrical energy balances associated with each of the alternative systems including:

- The gross amount of electricity produced for those systems that produce electricity;
- The amount of electrical energy consumed by each system; and,
- The net amount of electrical energy available – both renewable and total – to be sold assuming that an electrical interconnection between the facility and the grid can readily be provided.

The purpose of this report was to determine the electrical energy balance for each of the four alternative systems so that this information could be included in the comparison of the systems. The assumptions and basis for all estimates were detailed in the report.

Results showed that System 2a (Thermal Treatment of MSW with Recovery of Materials from the Ash/Char) would produce the greatest net amount of saleable electricity and System 1 (Mechanical and Biological Treatment with Biogas Recovery) would produce the least net amount of saleable electricity. The net amount of electrical energy sold was used to calculate the household energy equivalencies (i.e., number of households whose annual electrical energy needs could be met) for each of the systems. Figure 7-23 illustrates these findings.

Figure 7-23 Household Energy Usage Equivalence



This information was used to apply the energy consumption/generation aspects of Natural Environmental Criterion 2 and to calculate energy revenues for consideration in applying Economic/Financial Criterion 7 (see Table 7-18). Broader life-cycle considerations with regards to energy are addressed below in Section 7.4.3.5.

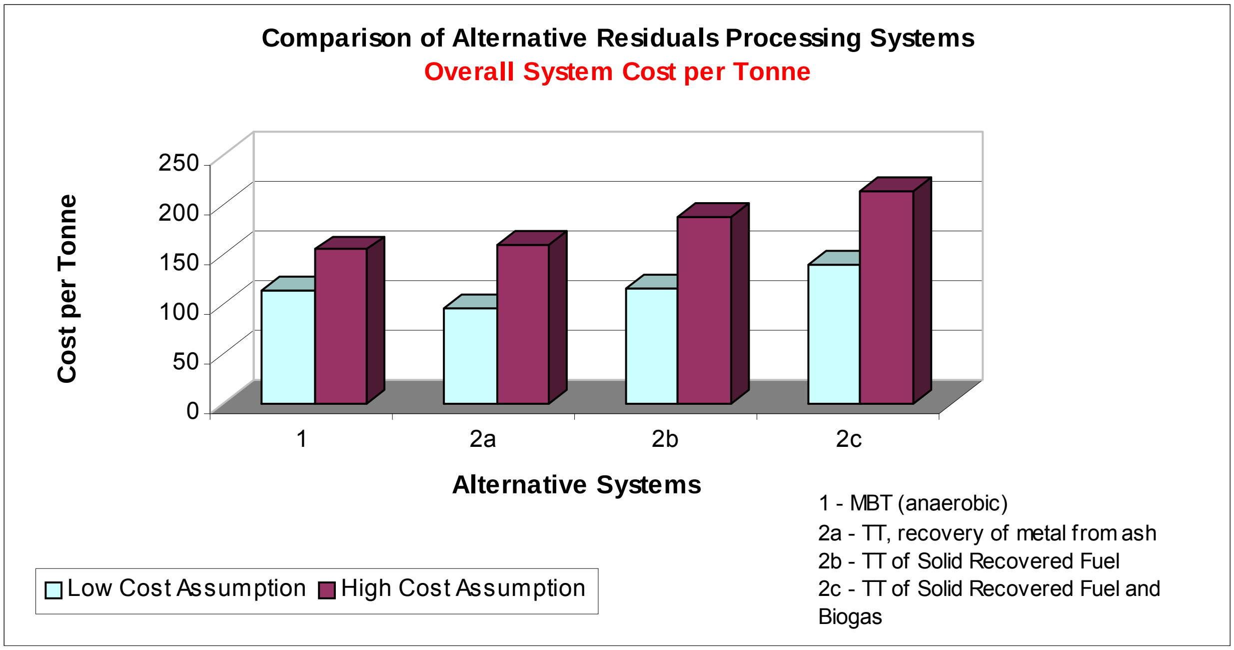
Through the assessment of the electrical energy balances it was determined that all systems were capable of generating more energy than what was required to sustain their own internal operations. As a result, to take advantage of this environmental and economic benefit the proximity to required infrastructure (considering both the electrical grid connection and distance to a heat and/or steam load) were confirmed as appropriate to be included in the siting process.

7.5.3.4 System Financial Analysis and Cost Estimates

The *Supporting Technical Document on Financial Analysis and Cost Estimates* (May 30, 2006) provided the estimated costs of each alternative system on a cost/tonne-managed basis, for the purpose of the comparative evaluation of the systems. Cost/tonne estimates included capital, operating and financing costs as well as revenues received from the sale of energy and recyclable materials. The costs were estimated in real terms (i.e., excluding inflation) at constant 2006 price levels. Two sets of estimates were provided for each item – one set prepared under a set of low cost assumptions and the other set under a set of higher cost assumptions. Cost estimates were prepared under the assumption that the initial capacity of the system would be 250,000 tpy, with flexibility to expand to 400,000 tpy in the future (by the 25th year of the planning period). The resulting cost estimates were reasonably conservative as they did not assume economies of scale associated with a large facility and assumed that all debt incurred for capital would be retired by the 25th year of the 35 year overall planning period.

Results showed that System 2a (Thermal Treatment of MSW with Recovery of Materials from the Ash/Char) would have the lowest overall system cost/tonne under the low cost assumption scenario and System 2c (Thermal Treatment of Solid Recovered Fuel with Biogas Recovery) would have the highest overall system cost/tonne under both the lower and higher cost assumptions. Figure 7-24 illustrates the overall system cost per tonne of each alternative.

Figure 7-24 Overall System Cost per Tonne



Note: to make the cost of each alternative system more easily understood, the overall system cost per tonne as indicated in Figure 7-24 was determined based on calculating the levelized cost per tonne that if charged on each tonne managed by the system would cover all net costs and financing associated with each alternative over the entire planning period. Details regarding the low and high cost estimates associated with the alternative systems that were used to determine the levelized cost per tonne are summarized in Table 7-13.

Cost estimates associated with the alternatives were used to apply Economic/Financial Criterion 7 (cost/tonne). The information on revenue amounts and sources was used to apply Economic/Financial Criterion 8 (see Table 7-18).

Table 7-13 Summary of System Costs ($ x 1,000)

System Alternative		1	2a	2b	2c
Initial Capital Costs	Low	$109,000	$245,000	$274,100	$283,900
	High	111,600	$251,000	$280,800	$290,800
Average Annual Operating Costs	Low	$24,900	$20,300	$24,400	$26,800
	High	$30,800	$22,500	$26,900	$30,200
Average Annual Revenue	Low	$ (3,890)	$ (14,780)	$ (15,350)	$ (12,600)
	High	$ (3,890)	$ (11,000)	$ (11,700)	$ (9,700)
Average Annual Costs Net of Revenues	Low	$21,000	$5,600	$9,000	$14,100
	High	$26,900	$11,500	$15,200	$20,500
Present Value of Lifecycle System Costs	Low	$381,200	$324,100	$390,000	$468,200
	High	$319,800	$329,600	$387,300	$440,100
Revenue as % of Annual Costs	Low	16%	73%	63%	47%
	High	13%	49%	43%	32%

7.5.3.5 Environmental Life Cycle Analysis

The *Supporting Technical Document on Environmental Life Cycle Analysis* (May 30, 2006) report provides the estimated life cycle implications related to air, water and energy associated with the alternative waste disposal systems. Modelling the net life cycle impacts allowed for the systematic comparison of the systems and the comparative determination of potential advantages and disadvantages of the systems from a global perspective.

Modelling the net life cycle impacts to the environment allows for the relative comparison of the system alternatives. Modelling was not undertaken to determine the actual 'amount' of emissions to air and water from a specific type of facility. A more accurate determination of the emissions for the potential EA Study residuals processing system would be determined once a preferred system and site have been selected. The emissions for all facilities within the alternative systems were assumed to be within current regulatory limits.

The life cycle analysis considers the total direct and indirect emissions and energy consumption and generation for each of the alternatives, identifying either net reductions or increases based on a number of conservative assumptions representative of existing activities. Table 7-14 provides a summary of the results of the life cycle analysis. The net effects account for the direct emissions from facilities included in the systems, and also the indirect emissions (or offsets) associated with generating energy and recovering recyclable materials.

The estimated life cycle implications used for the comparison of alternative systems were primarily determined using the Integrated Waste Management (IWM) model developed by the University of Waterloo, on behalf of, the Corporation Supporting Recycling (CSR) and the Environmental and Plastics Industry Council (EPIC). All assumptions, inputs and outputs related to the model run for this study are rationalized and documented in the *Supporting Technical Document on Environmental Life Cycle Analysis* report. Estimates of greenhouse gas emissions were developed using a report prepared for Environment Canada by ICF Consulting entitled *Determination of the Impact of Waste Management Activities on Greenhouse Gas Emissions: 2005 Update, Final Report*.

In most of the figures presented below regarding the LCA results, there are no units shown on the y-axis. This is because the graphs amalgamate the consideration of several different parameters using a range of units and orders of magnitude. The intent of the graphs is to show how the systems comparatively rank (e.g., best (lower), worse (higher) etc.). They should not be interpreted as a measure of the level of impact on the air or water environment.

The LCA analysis used conservative assumptions regarding to energy generation, which affect the outcome of the analysis of the systems. For example, if a thermal treatment facility is located within a reasonable distance to a suitable load, heat (e.g., steam or hot water) as well as electricity can be sold to customers. If such a co-generation opportunity can be found, the overall thermal efficiency of the process is significantly improved. Consideration of heat recovery would have increased the potential energy generation of Systems 2a, 2b and 2c, improving both the energy generation assumptions and improving the air emissions offsets that would result from replacing other forms of energy generated from fossil fuels.

Table 7-14 Summary of Net Annual Life Cycle Inventory

System Alternative	1	2a	2b	2c
Energy Consumed (GJ)	-606,357	-1,348,786	-1,428,480	-1,230,067
Greenhouse Gases - CO2 Equivalents (tonnes)	68,067	168,768	155,286	162,717
Acid Gases				
- NOx (tonnes)	-90.0	228	33.4	-25.3
- SOx (tonnes)	-211	-203	-267	-267
- HCl (tonnes)	-1,982	-1,987	-2,271	-2,275
Smog Precursors				
- NOx (tonnes)	-90.0	228	33.4	-25.3
- PM (tonnes)	60.4	9.58	25.2	19.0
- Volatile Organic Compounds (VOCs) (tonnes)	-48.5	-128	-114	-93.7
Heavy Metals & Organics				
- Air				
Pb (kg)	-8.92	76.7	35.6	19.1
Hg (kg)	-0.09	19.3	10.4	6.74
Cd (kg)	-0.01	9.62	5.22	3.39
Dioxins (TEQ) (g)	0.012	0.040	0.022	0.024
- Water				
Pb (kg)	-10.0	-29.8	-33.4	-36.7
Hg (kg)	0.42	0.02	0.06	0.09
Cd (kg)	24.1	7.90	7.98	8.02
BOD (kg)	192,089	7,054	11,087	11,109
Dioxins (TEQ) (g)	0.0019	0.00064	0.00064	0.00064

Results showed that System 2a (Thermal Treatment of MSW with Recovery of Materials from the Ash/Char) would have the highest relative overall emissions to air and System 1 (Mechanical and Biological Treatment with Biogas Recovery) would have the lowest relative overall emissions to air. Figure 7-25 to Figure 7-29 illustrate these results.

Figure 7-25 Relative Overall Emissions to Air

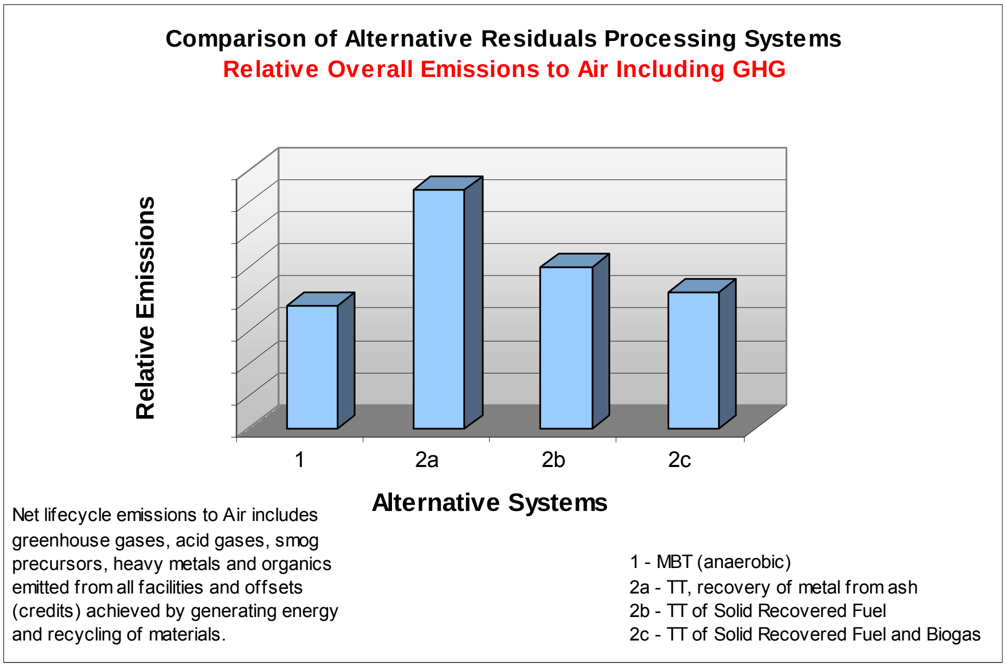


Figure 7-26 Relative Emissions: Greenhouse Gases (in CO_2 Equivalents)

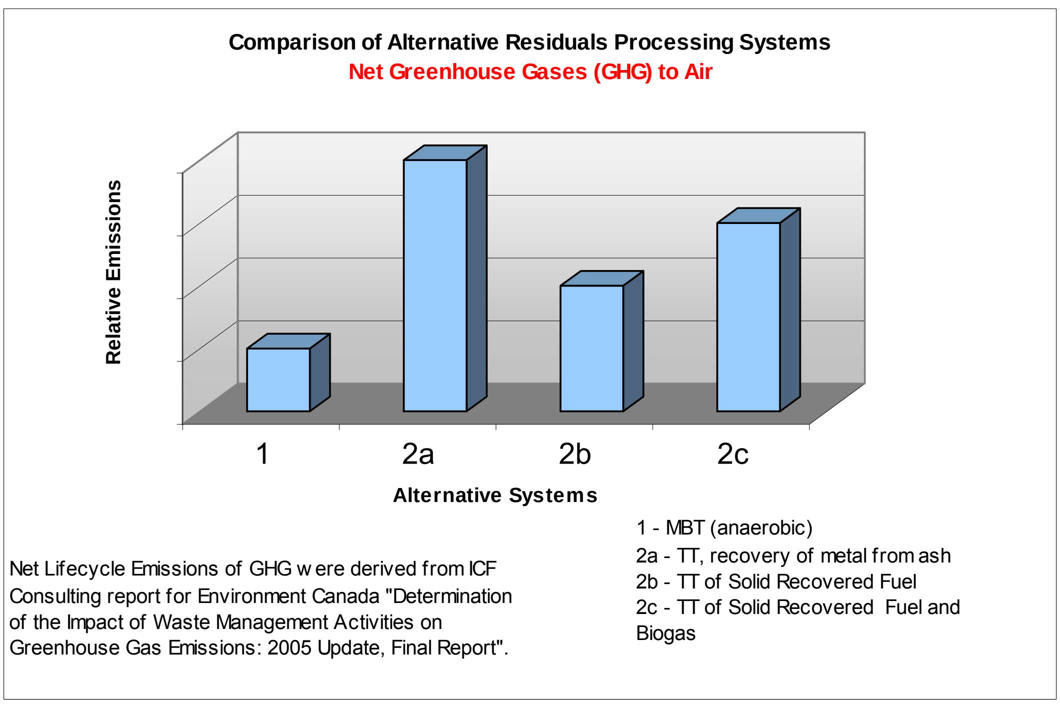


Figure 7-27 Relative Emissions: Acid Gases

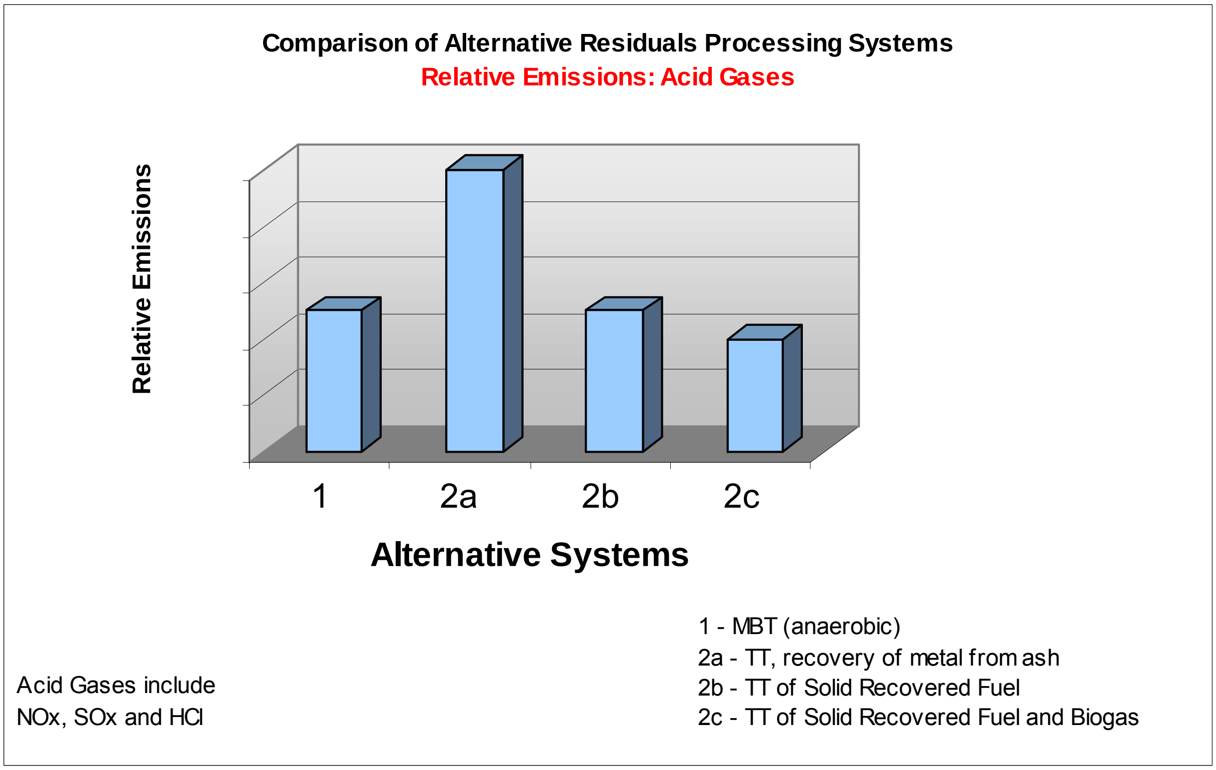


Figure 7-28 Relative Emissions: Smog Precursors

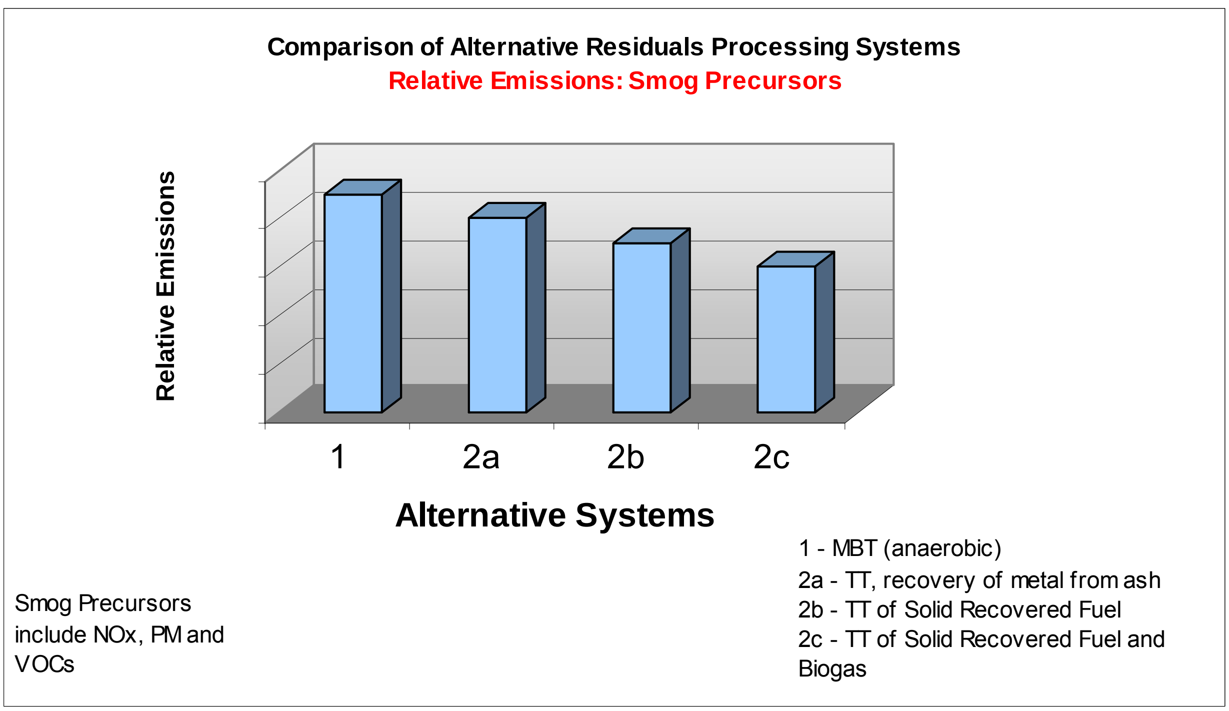
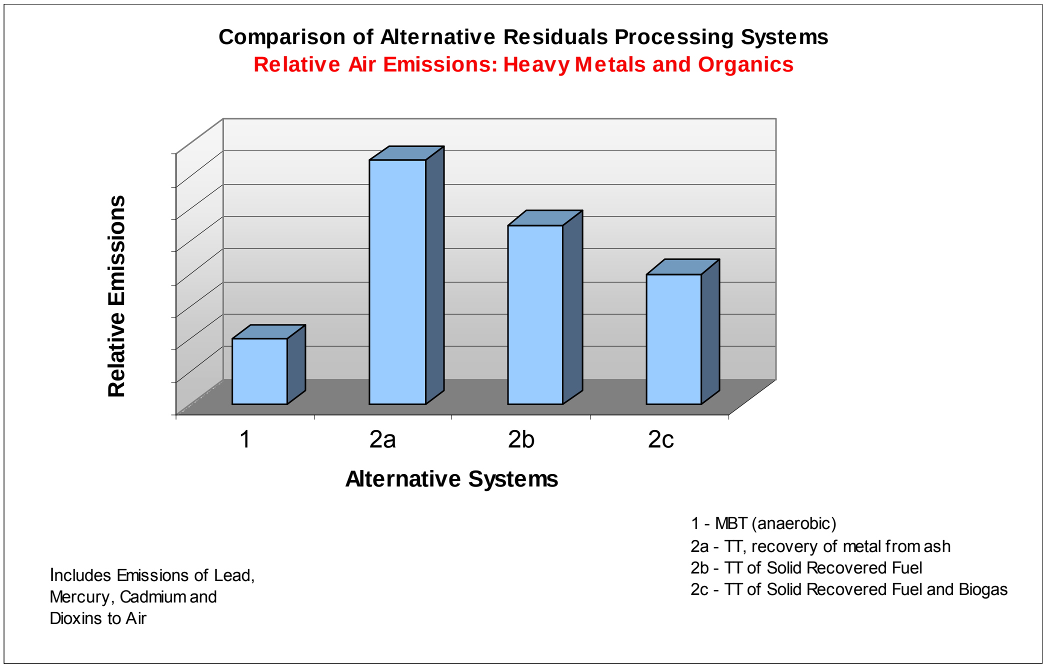
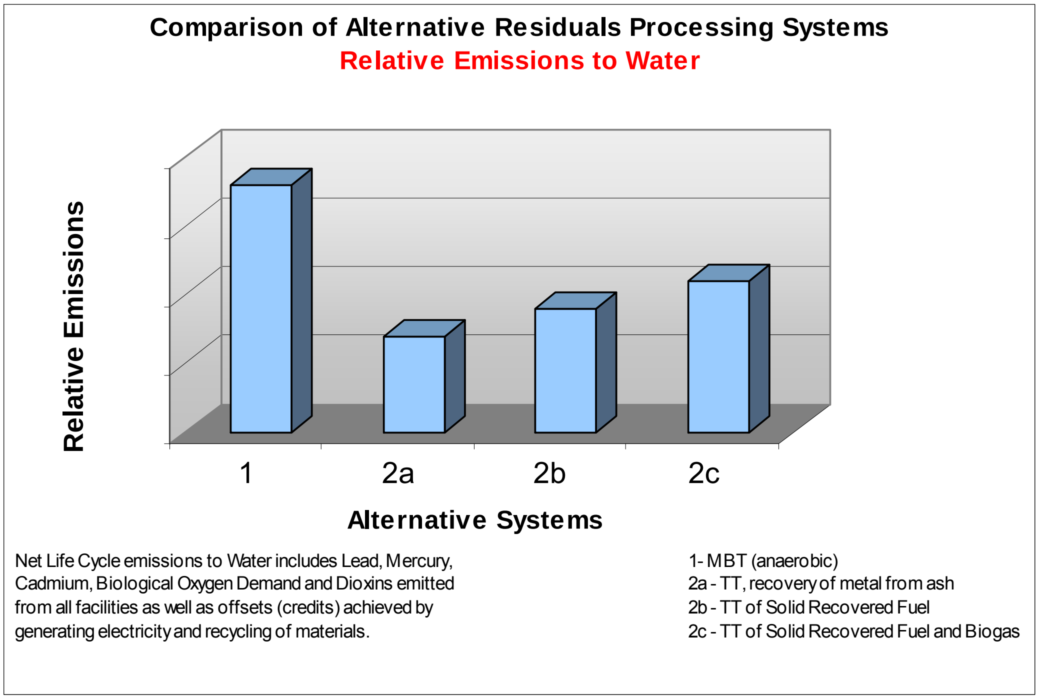


Figure 7-29 Relative Emissions: Heavy Metals and Organics



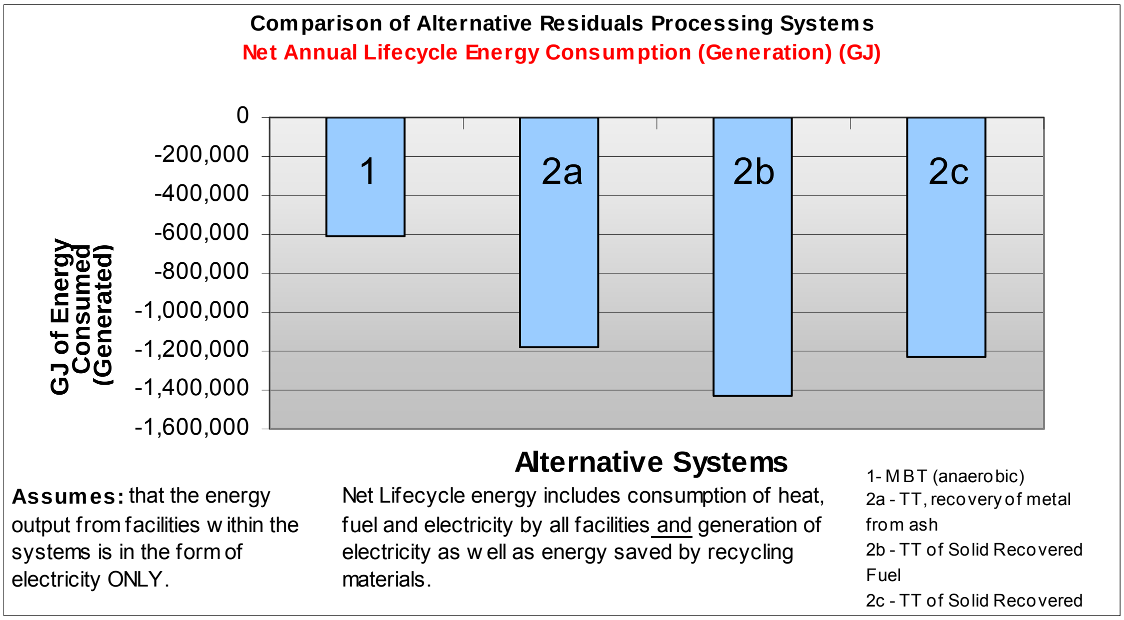
Results showed that System 1 (Mechanical and Biological Treatment with Biogas Recovery) would have the highest relative overall emissions to water and System 2a (Thermal Treatment of MSW with Recovery of Materials from the Ash/Char) would have the lowest relative overall emissions to water. Figure 7-30 illustrates these results.

Figure 7-30 Relative Emissions to Water



Results showed that System 2b (Thermal Treatment of SRF) would generate the most energy and System 1 (Mechanical and Biological Treatment with Biogas Recovery) would generate the least amount of energy. Figure 7-31 illustrates these results.

Figure 7-31 Net Annual Life Cycle Energy Consumption (Generation)



The results of this study were used to apply Natural Environmental Criterion 1 (global environmental burden) and the life cycle energy aspects of Criterion 2 (see Table 7-18).

Note: following completion of the draft report comparing the alternative systems additional LCA analysis was undertaken to compare the preferred alternative systems to a remote landfill scenario and to confirm the comparative net emission of the four alternative systems. This additional modeling was undertaken using the Municipal Solid Waste Decision Support Tool (MSW-DST) developed by RTI International in cooperation with the US EPA Office of Research and Development. These results are presented as part of a supplemental memo prepared for the *Supporting Technical Document on Environmental Life Cycle Analysis*.

The new modelling indicated that:

- Based on the MSW-DST model System 1 continues to have the lowest net GHG emissions however the difference between System 1 and Systems 2a, 2b, and 2c is significantly less that originally predicted with all systems having lower net GHG emissions than a remote landfill scenario.
- In regards to acid gas emissions, System 2a was estimated to have the lowest net emissions, with all systems having lower net acid gas emissions than a remote landfill scenario;
- In regards to emissions of smog precursors, System 2a was also estimated to have the lowest net emissions;

- Ranking of the Systems in regards to emissions of heavy metals and dioxins did not change;
- Ranking of the Systems in regards to emissions to water did not change, with System 2a having significantly less net emissions to water, and all systems having significantly less emissions to water than the remote landfill scenario; and,
- In regards to net energy generation, System 2a performed significantly better than Systems 1, 2b and 2c and the remote landfill scenario.

While the above noted additional LCA results were derived following the evaluation of the “Alternatives to” and thus were not reflected in the original systems analysis, they were used to generally confirm the selection of the preferred system and to establish the benefits of residual processing systems versus disposal at a remote landfill outside the study area.

7.5.3.6 Supporting Technical Document on Generic Air Dispersion Modelling

The *Supporting Technical Document on Generic Air Dispersion Modeling* (May 30, 2006) provided a generic analysis of the impact of air emissions from a Municipal Solid Waste (MSW) thermal treatment facility (e.g., mass burn incinerator) on the air quality in the area surrounding the facility.

The analysis was based on the possible emissions from a modern thermal treatment process with state-of-the-art air pollution control systems. In order to quantify the possible emissions from the facility, the facility was sized based on the predicted maximum waste quantity from Durham and York (400,000 tpy, 1,200 tonnes per day) and emissions data (concentrations and emission rates) obtained from thermal treatment technologies manufacturers.

The assessment was conducted in accordance with the current Ontario Regulation 419/05. The report identified the total expected air emissions of critical contaminants from a thermal treatment facility exhaust stack and compared the predicted ground level concentrations around a facility to applicable Ontario criteria.

Results showed that the concentrations of contaminants of concern in the exhaust stack of the generic MSW thermal treatment facility are within the MOE Guideline A-7 criteria. Predicted ground level concentrations resulting from a MSW thermal treatment facility exhaust stack are well below the MOE Reg. 419/05 Point-Of-Impingement (POI) criteria (typically 100 to 1,000 times less, depending on the contaminant). Overall, results showed that the operation of the selected MSW Thermal Treatment Facility would have negligible impact on the air quality in the surrounding area.

The results of this study were used in addressing issues raised during the consultative process on potential impacts of air emissions and to support discussions regarding the health risk assessments that were undertaken later in the EA Study during the evaluation of “Alternative methods”. This modelling exercise was the first of number of air modelling scenarios undertaken during this EA Study.

7.6 Steps 4, 5 and 6: Application of Evaluation Criteria to "Alternatives to"

Steps 4, 5 and 6 of the "Alternatives to" evaluation methodology involved a 'net effects analyses of the alternative residual processing systems. A 'net effects analysis', which is a requirement of the *Environmental Assessment Act*, was identified in the step-by-step methodology (see Section 7.1 of this report) included in the Approved EA Terms of Reference. Generally, the steps include:

- Application of the comparative evaluation criteria and indicators (identified in Table 7-15 below) to the alternatives and identification of the range of potential effects.
- Review of each potential effect and a determination as to whether or not mitigation measures exist that could be applied to offset or eliminate the potential effect. In the case of a positive effect, enhancement measures were considered to increase the benefit.
- Tabulation of the remaining, or 'net' effects for consideration further in the evaluation process.

The intent of this exercise was to ensure that all alternatives were reviewed in the context of best practices or best available technology – provided these measures were reasonably available and could be reasonably applied to the Undertaking.

7.6.1 Steps 4 and 5: Consideration of Potential Effects, Mitigation and Net Effects

The application of the comparative evaluation criteria and indicators identified in Table 7-13, and the identification of potential effects was largely accomplished through completion of the technical background studies documented in Section 7.5.3. The remaining considerations that were not addressed by these technical background studies were more qualitative in nature (e.g. legal considerations). For these remaining considerations system advantages and disadvantages were identified and discussed as part of the overall evaluation of the systems. The results of applying the comparative evaluation criteria and indicators are provided in Section 7.7.2 of this report. The results included in Table 7-18 in Section 7.7.2 incorporate the consideration of mitigation and therefore can be considered net effects for the purpose of moving forward to Step 6 in the evaluation process.

The intent of considering mitigation and enhancement measures was to ensure that alternatives were compared on the basis of best practices and best available technology. Given the systems-related nature of this comparative exercise and the background associated with the identification of alternative system components and formulation of systems, all of the systems that were considered and accordingly, all of the identified effects, were assumed to innately include all reasonably available mitigation measures.

In particular:

- The screening of alternative waste management approaches for environmental suitability during development of the Approved EA Terms of Reference established that any of the alternatives that were considered in the study ***must be able to meet or exceed all regulatory requirements*** and therefore be approvable under Ontario's stringent environmental legislation and standards;
- Similarly, sufficient operational data was available for existing state-of-the-art facilities. This information was used to incorporate observed net or post-mitigation effects directly into the comparison of systems;
- The cost estimates carried forward in the evaluation of alternative systems included unit costs associated with state-of-the-art facilities equipped with the best available pollution control equipment required to address Ontario's approval requirements; and,
- In considering the potential siting impacts of system facilities, appropriate buffer zones and land use preferences were incorporated into the comparative process.

Because the process of applying the evaluation criteria and identifying potential effects inherently incorporated mitigation (best practices and best available technology), the presentation of net effects in this comparative process did not warrant and did not include an effect-by-effect consideration of available mitigation.

Table 7-15 Comparative Evaluation Criteria for "Alternatives to" the Undertaking

Evaluation Criteria	Indicators or Measures for Criteria Application
Natural Environmental Considerations	
Environmental burden at a global or macro-environmental scale, including impacts to air, land and water.	• Predicted emissions released to atmosphere by system.
	• Predicted pollutants released to water resources by system.
	• Need to manage residues classified as hazardous waste associated with system.
	• Impacts to land by system.
Consumption /preservation of non-renewable environmental resources.	• Potential of system to consume non-renewable fossil fuel or displace non-renewable fossil fuel consumption for energy generation.
Potential for destruction or disruption of sensitive terrestrial and/or aquatic habitats at an eventual site.	• Total volume of landfill capacity required to manage post-processing residual waste.
	• Land use setting typically associated with establishment of facilities comprising system.
Potential to increase waste diversion rate and/or make best use of residual (post-diversion) waste materials.	• Potential of system facilities to remove any remaining materials in the post-diversion waste stream for use in a non-disposal manner.

Evaluation Criteria	Indicators or Measures for Criteria Application
	• Potential of system facilities to manage and make beneficial use of materials in the post-diversion waste stream including those materials for which diversion may decline or disappear in the future.
Social Cultural Considerations	
Potential for land use conflicts from siting of facilities required for alternative.	• Number of waste management facilities associated with alternative system.
	• Potential for land use conflicts considering location requirements of waste management facilities.
	• Types and degree of nuisance impacts associated with waste management facilities based on operational experience.
Economic/Financial Considerations	
Net system costs per tonne of waste managed – in a systems context.	• Capital and operating costs over operational period of system (2011 to 2045). • Estimated costs associated with perpetual care of component facilities in accordance with current environmental and municipal accounting requirements. • Estimated revenues associated with system once fully implemented and operational. • Potential subsidies and revenues that may be realized during establishment and future operation of system.
Sensitivity of system costs and affordability to external financial influences.	• Types of revenues and subsidies currently available to offset system costs and predicted sustainability of these sources into the future. • Degree to which system affordability relies on revenues and subsidies during long-term operation of the system.
Technical Considerations	
Technical risks associated with waste management alternative.	• Flexibility of alternative system to changes in waste quantities, composition and availability of system diversion and disposal components.
	• Reliability of alternative system and component technologies and need for contingency landfill capacity.
Legal Considerations	
Legal/Contractual risks associated with waste management alternative.	• Types and complexity of approvals required implementing components of system.
	• Degree to which system implementation and operation relies on private or public sector partnerships.

7.6.2 Step 6: Comparative Analysis of “Alternatives to” Net Effects

Step 6 of the evaluation process focussed on the identification of relative advantages and disadvantages for each of the four (4) systems. These were identified based on the net effects for each system identified at Step 5 and a comparison of these net effects established a ranking of systems under each comparative consideration.

Where appropriate, and to assist in understanding how the systems compared under the various evaluation criteria, a series of graphs were prepared and are presented (see Figure 7-20, Figure 7-21, Figure 7-22, Figure 7-23, Figure 7-24, Figure 7-25, Figure 7-30, and Figure 7-31) in Section 7.5.3. Graphs were prepared for only those considerations that could be represented numerically. These included net life cycle air and water emissions, volume of landfill air space required for facilities, life cycle energy generation and conservation, diversion from disposal and landfill, and net system costs. The process of establishing the rankings and respective graphs is described in the technical and background studies included in *Supporting Technical Document on Environmental Life Cycle Analysis* (May 30, 2006) and is discussed in Section 7.5.3.

7.7 Step 7: Identification of Preferred “Alternative to” (Residual Processing System)

Step 7 of the “Alternatives to” comparative evaluation process involved the consideration of the relative system advantages and disadvantages and identification of a preferred system. The preferred system was determined to exhibit the preferred balance of relatively compared advantages and disadvantages factoring in the environmental priorities identified by way of the Step 1 public and agency consultation process.

7.7.1 Approach to Preferred “Alternative to” Identification

The identification of the preferred system followed a qualitative comparative evaluation methodology, with consideration of the four (4) alternative residual processing systems and the results of Steps 1 to 6.

7.7.1.1 Application of the “Alternatives to” System Advantages and Disadvantages Relative Comparison Approach

Identification of the preferred residual disposal system involved the consideration of the system advantages and disadvantages identified at Step 6. The comparison was undertaken using a methodology that compared each of the alternative systems, based on their relative advantages and disadvantages, for each of the five (5) categories of the environment. This comparison of advantages and disadvantages was completed at three levels as follows:

- **Level 1**, which involved the comparison of all Short-list sites with respect to each of the indicators within a particular criterion of the environment. At this level, each system was assigned a relative Major Advantage, Advantage, Neutral (where the impact was neither an advantage nor a disadvantage), Disadvantage or Major Disadvantage ranking;

- **Level 2**, which involved the summation of the advantages and disadvantages identified at Level 1 for each indicator within a particular criterion of the environment to determine the overall advantage or disadvantage of each site at the criteria level. At this level, each system was assigned a relative Major Advantage, Advantage, Neutral (where the impact was neither an advantage nor a disadvantage), Disadvantage or Major Disadvantage ranking; and,
- **Level 3**, which involved the summation of the advantages and disadvantages identified for each criterion at Level 2 within a particular category of the environment to determine the overall advantage or disadvantage of each site at the category level. At this level, each system was assigned a relative Major Advantage, Advantage, Neutral (where the impact was neither an advantage nor a disadvantage), Disadvantage or Major Disadvantage ranking.

The purpose of this exercise was to give an indication of the relative strengths and weaknesses of the four (4) systems being evaluated. Accordingly, a system with a longer list of significant advantages or disadvantages under a particular category was considered to be an outlier (i.e., significantly advantaged or disadvantaged) in that regard whereas, a system with no or few advantages or disadvantages under a particular category was considered to reside somewhere in the midrange of effects for that consideration.

In accordance with the Approved EA Terms of Reference, it was determined that the application of advantages and disadvantages alone did not completely reflect the differences between systems in terms of the potential range of impacts associated with each of the systems. In order to overcome this issue and still maintain a qualitative approach to the evaluation, it was determined that the application of advantages and disadvantages would include: Major Advantages; Advantages; Neutral; Disadvantages; and, Major Disadvantages to better represent the significance of some of the impacts and therefore the significant differences between the systems.

Based on the above rationale, the following relative differences were established to constitute the difference between a Major Advantage and a Major Disadvantage and those that fall in between. Table 7-16 below summarizes these differences.

Table 7-16 Differentiation between Advantages and Disadvantages

Ranking	Description
MAJOR ADVANTAGE	**Description**: The system would have minimal impact based on the criteria/indicator being applied and in most cases a net benefit would result from Facility development. **Example**: A system that had significant potential to increase diversion rates and/or make beneficial use of residual materials, would be considered to have a major advantage when compared to a system that does not have such potential.
ADVANTAGE	**Description**: The system would have manageable impact based on the criteria/indicator being applied and in most cases a net benefit would result from Facility development. **Example**: A system that had some potential to increase diversion rates and/or make beneficial use of residual materials, would be considered to have an advantage when compared to a system that does not have such potential.
NEUTRAL	**Description**: The system would have no potential benefits or impacts based on the criteria/indicator being applied. **Example**: A system that had no potential to increase diversion rates and/or make beneficial use of residual materials, in which overall diversion rates would be unaffected would be considered to have a neutral effect.
DISADVANTAGE	**Description**: The system would have some impacts based on the criteria/indicator being applied and may require some mitigation measures to reduce potential impact. **Example**: A system that resulted in a minor decrease in diversion rates and/or where the quantity of residues requiring landfill disposal increased slightly, would be considered disadvantaged to a system that has the potential to increase diversion and make beneficial use of residuals.
MAJOR DISADVANTAGE	**Description**: The system would have a significant impact based on the criteria/indicator being applied and would require extensive mitigation measures to reduce potential impact. **Example**: A system that resulted in a significant decrease in diversion rates and/or where the quantity of residues requiring landfill disposal increased, would be considered to have a major disadvantage when compared to a system that has the potential to increase diversion and make beneficial use of residuals.

Generally, the system that best met the objective of the criterion was identified as having a major advantage and the system that least met the objective of the criterion would have a major disadvantage. It was not intended that specific ranges would be predetermined for the ranking; instead they were developed based on a comparison between the potential systems.

Once a range of advantages and disadvantages for each of the systems under consideration had been established, these "technical rankings" were then compared to the priorities established for each category of considerations. The purpose of this comparison was to ensure the technically preferred system was also preferred in terms of public and agency priorities.

7.7.1.2 Qualitative Approach Selected

A qualitative assessment approach was employed to consider and compare system advantages and disadvantages, identify trade-offs, and decide on preferences.

Selection of a qualitative versus quantitative approach recognized the ability of the qualitative approach to focus on the provision of a descriptive rationale for certain choices and the consideration of priorities, and broader public understanding of the decision-making process. Although much of the analysis relied on the professional skills of the EA Study Team and the assembly of relevant information by staff and municipal authorities, it was recognized throughout the evaluation that all decisions and/or trade-offs needed to be clearly documented, defensible, and appropriately linked to the results of public and agency consultation.

Although it can be easier for reviewers, with appropriate training, to follow the results of a quantitative evaluation approach, this feature is outweighed by the respective drawbacks related to broader EA concerns. In particular, the need to document a process that is easily understood and traceable for all reviewers including stakeholders that could be potentially impacted or with concerns and not just to professionals or those with special training to understand the associated arithmetic in the quantitative analysis. First, it should be noted that in developing and applying the methodology and respective data sets, much of the same professional skills used in qualitative approaches are required for quantitative approaches. The challenge arose in translating that qualitative information to data sets or numbers with defined limits representing the scope of a particular impact and further, in determining the numeric point at which different impacts are distinguished (e.g., high versus moderate versus low impact or significance).

Experience with complex quantitative approaches has shown that these processes often revert to a focus on numeric orders, magnitudes and equations that are usually difficult to link to advantages and disadvantages in terms that the general public can understand. Inevitably, these processes lead to debate among those with a background or qualifications in statistics or mathematics and these debates usually become narrowly focussed on minute detail such as a percentage point up or down which may mathematically change the final conclusion. In doing so, these approaches present the risk of losing the human side of what 'makes sense' and is considered reasonable and understandable to the general public.

Experience has shown that a well documented and rational qualitative approach can overcome the above deficiencies associated with quantitative approaches and, therefore, a qualitative approach was selected as the appropriate approach for use throughout the EA Study.

7.7.1.3 Use of Environmental Priorities

Section 7.3.2 of the EA Study document outlined the process that was followed in establishing the environmental priorities of the EA Study. For the purpose of considering the system advantages and disadvantages identified at Step 6, the following priorities were applied (see Table 7-17):

Table 7-17 Environmental Priorities

Environmental Category	Priority
Natural Environmental Considerations	Most Important
Social/Cultural Considerations	Important
Economic/Financial Considerations	Important
Technical Considerations	Important
Legal Considerations	Least Important

7.7.2 Relative Comparison of "Alternatives to" Systems

The comparative evaluation of system advantages and disadvantages was completed as outlined in Section 7.6.1 above and is summarized in Table 7-18 Relative Comparison of "Alternatives to" Systems – Major Advantages and Disadvantages below.

Table 7-18 Relative Comparison of "Alternatives to" Systems - Major Advantages and Disadvantages

NATURAL ENVIRONMENTAL CONSIDERATIONS (Most Important Priority)

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
Criterion 1: **Environmental burden at a global or macro-environmental scale, including impacts to air, land and water.**	**Predicted emissions released to atmosphere by system.**	• Lowest net emissions of GHGs (tonnes). • Lower net emissions of acid gases. • Highest net emissions of Smog Precursors (tonnes). • Lowest net emissions of Heavy Metals & Organics to Air.	• Highest net emissions of GHGs (tonnes). • Highest net emissions of Acid Gases (tonnes). • Higher net emissions of Smog Precursors (tonnes). • Highest net emissions of Heavy Metals & Organics to Air.	• Higher net emissions of GHGs (tonnes). • Lower net emissions of Acid Gases (tonnes). • Lower net emissions of Smog Precursors (tonnes). • Higher net emissions of Heavy Metals & Organics to Air.	• Higher net emissions of GHGs (tonnes). • Lowest net emissions of Acid Gases (tonnes). • Lowest net emissions of Smog Precursors (tonnes). • Lower net emissions of Heavy Metals & Organics to Air.
	SUMMARY of INDICATOR	MAJOR ADVANTAGE System received a Major Advantage as it was found to have the lowest net emissions of GHGs (2.5 times less) and Heavy Metals & Organics (net reduction overall in emissions) relative to the other systems, and lower emissions of acid gases	MAJOR DISADVANTAGE System received a Major Disadvantage as it was found to have the highest net emissions of GHGs, Acid Gases and Heavy Metals & Organics relative to the other systems, and higher emissions of smog	DISADVANTAGE System received a Disadvantage as it was found to have higher net emissions of GHGs, and Heavy Metals & Organics relative to System 1. While it had lower emissions of Acid Gases and Smog precursors, they were	DISADVANTAGE System received a Disadvantage as it was found to have higher net emissions of GHGs and Heavy Metals & Organics relative to System 1. While it had the lowest emissions of Acid Gases and Smog precursors, considering relative

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		relative to System 2a, all of which more than offset the system's highest net emissions of Smog precursors, considering relative rankings for each emission parameter separately.	precursors relative to System 2b, considering relative rankings for each emission parameter separately.	not lower relative to those of System 2c, considering relative rankings for each emission parameter separately.	rankings for each emission parameter separately, the overall emissions profile of System 2c was relatively worse than System 1.
	Predicted pollutants released to water resources by system.	• Highest net emissions of Heavy Metals & Organics to Water.	• Lowest net emissions of Heavy Metals & Organics to Water.	• Lower net emissions of Heavy Metals & Organics to Water.	• Higher emissions of Heavy Metals & Organics to Water.
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE System received a Major Disadvantage ranking as it had the highest net emissions to water relative to all other Systems.	MAJOR ADVANTAGE System received a Major Advantage ranking as it had the least overall net emissions to water relative to all other Systems.	ADVANTAGE System received an Advantage ranking as it had lower net emissions to water relative to System 1a and 2c.	NEUTRAL System received a Neutral ranking relative to other systems as it would have no potential benefits or impacts based on this indicator being applied.
Criterion 1: **Environmental burden at a global or macro-environmental scale, including impacts to air, land and water.** **(cont'd)**	**Need to manage residues classified as hazardous waste associated with system.**	• Hazardous elements remain in materials processed and/or landfilled and may be emitted by way of landfill emissions / collected by landfill pollution control systems.	• Approximately 15,500 tonnes per year (tpy) of hazardous residue from pollution control equipment requires management at a licensed facility if the quantity of residual	• Approximately 8,500 tpy of hazardous residue from pollution control equipment requires management at a licensed facility if the quantity of	• Approximately 5,500 tpy of hazardous residue from pollution control equipment requires management at a licensed facility if the quantity of residual material managed

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		• No hazardous waste stream associated with residue from facility air pollution control equipment associated with system.	material managed by the facility is 400,000 tpy. • Costs to manage hazardous wastes at an approved facility have been included in estimated system costs.	residual material managed by the facility is 400,000 tpy. • Costs to manage hazardous wastes at an approved facility have been included in estimated system costs.	by the facility is 400,000 tpy. • Costs to manage hazardous wastes at an approved facility have been included in estimated system costs.
	SUMMARY of INDICATOR	NEUTRAL • Opposing views of this consideration weigh segregation of hazardous materials and proper management versus discharging via mixed waste to landfill where they may or may not leach out of the disposed wastes. • Overall, it was determined that there would be no potential impacts or benefits for any systems based on this indicator being applied.			
Criterion 1: **Environmental burden at a global or macro-environmental scale, including impacts to air, land and water.** **(cont'd)**	**Impacts to land by system.**	• Siting process for an 11.4 ha mechanical/biological treatment facility in an urban/industrial setting will provide a high likelihood that facility location makes an appropriate use of land resources. • Primary facility site	• Siting process for a 9.6 ha thermal facility in an urban/industrial setting will provide a high likelihood that facility location makes an appropriate use of land resources. • Primary facility site would likely be	• Siting process for a 14.6 ha thermal facility in an urban/industrial setting will provide a high likelihood that facility location makes an appropriate use of land resources. • Primary facility site would likely be	• Siting process for a 13.5 ha thermal facility in an urban/industrial setting will provide a high likelihood that facility location makes an appropriate use of land resources. • Primary facility site would likely be

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		would likely be located within a designated urban boundary and/or on lands appropriately designated for the use. • Due to lack of approved landfill capacity within Durham and York, assumed that landfill capacity for residues would exist at a licensed municipal or private landfill. • A minimum of 287,000 cubic metres of landfill space will be required annually to dispose of system residues.	located within a designated urban boundary and/or on lands appropriately designated for the use. • Due to lack of approved landfill capacity within Durham and York, assumed that landfill capacity for residues would exist at a licensed municipal or private landfill. • A minimum of 50,000 cubic metres of landfill space will be required annually to dispose of system residues.	located within a designated urban boundary and/or on lands appropriately designated for the use. • Due to lack of approved landfill capacity within Durham and York, assumed that landfill capacity for residues would exist at a licensed municipal or private landfill. • A minimum of 81,000 cubic metres of landfill space will be required annually to dispose of system residues.	located within a designated urban boundary and/or on lands appropriately designated for the use. • Due to lack of approved landfill capacity within Durham and York, assumed that landfill capacity for residues would exist at a licensed municipal or private landfill. • A minimum of 114,000 cubic metres of landfill space will be required annually to dispose of system residues.
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE System received a Major Disadvantage ranking relative to all other systems as it had the highest landfill requirement for residue	MAJOR ADVANTAGE System received a Major Advantage ranking relative to all other systems as it had the lowest landfill requirement for residue disposal. In addition,	ADVANTAGE System received an Advantage ranking as it had lower landfill requirements for residue disposal relative to Systems 1 and 2c. In addition, relative to	NEUTRAL System received a Neutral ranking relative to other systems as it would have no potential benefits or impacts based on this indicator being applied. The

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		disposal. In addition, relative to System 2a, this system required relatively more land for facility development.	relative to all other systems, this system required relatively less land for facility development.	System 2a, this system required relatively more land for facility development.	system had lower landfill requirements relative to System 1. Relative to System 2a, this system required relatively more land for facility development.
SUMMARY of CRITERION 1:		**DISADVANTAGE** The Major Advantage associated with emissions to Air, is more than offset by the Major Disadvantages of this system in regards to emissions to water and land requirements. The combination of rankings of all indicators within this criterion resulted in the system being identified as disadvantaged relative to the other systems.	**MAJOR ADVANTAGE** The Major Disadvantage associated with emissions to Air, is more than offset by the Major Advantages of this system in regards to emissions to water and land requirements. The combination of rankings of all indicators within this criterion resulted in the system being identified as having a major advantage relative to the other systems.	**ADVANTAGE** The disadvantage associated with emissions to Air, is more than offset by the advantages of this system in regards to emissions to water and land requirements. The combination of rankings of all indicators within this criterion resulted in the system being identified as advantaged relative to the other systems.	**NEUTRAL** The disadvantage associated with emissions to Air, is offset by the advantages of this system in regards to land requirements. Overall considering the application of all indicators within this criterion, the system received a Neutral ranking relative to other systems as development of the system would have no potential benefits or impacts based on this criterion being applied.
Criterion 2: **Consumption/preservation of non-renewable environmental resources.**	**Potential of system to consume non-renewable fossil fuel or displace non-renewable fossil fuel consumption for**	• Net life cycle energy (i.e., electricity, heat, virgin material displacement credit, etc.) impact of 606,357 GJ	• Net life cycle energy (i.e., electricity, heat, virgin material displacement credit, etc.) impact of 1,348,786 GJ	• Net life cycle energy (i.e., electricity, heat, virgin material displacement credit, etc.) impact	• Net life cycle energy (i.e., electricity, heat, virgin material displacement credit, etc.) impact of 1,230,067GJ

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
	energy generation.	conserved annually. • Net Electrical Energy Generation from renewable sources of 10,313 MWh.	conserved annually. • Net Electrical Energy Generation from renewable sources of 86,180 MWh.	of 1,428,480 GJ conserved annually. • Net Electrical Energy Generation from renewable sources of 85,673 MWh.	conserved annually. • Net Electrical Energy Generation from renewable sources of 56,822 MWh.
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE System received a Major Disadvantage ranking relative to the other systems as it recovered the least net life-cycle energy and net electrical energy.	MAJOR ADVANTAGE System received a Major Advantage ranking relative to the other systems as it recovers the second highest net life-cycle energy and the highest net electrical energy than all of the other systems.	MAJOR ADVANTAGE System received a Major Advantage ranking relative to the other systems as it recovers the highest net life-cycle energy and the second highest net electrical energy than all of the other systems.	ADVANTAGE System received an Advantage ranking relative to the other systems it recovered higher net life-cycle energy and net electrical energy than System 1 and only moderately less net life-cycle energy and net electrical energy than Systems 2a and 2b.
SUMMARY of CRITERION 2:		MAJOR DISADVANTAGE System received a Major Disadvantage ranking relative to the other systems for this criteria, as it recovered the least net life-cycle energy and net electrical energy.	MAJOR ADVANTAGE System received a Major Advantage ranking relative to the other systems for this criteria as it recovers the second highest net life-cycle energy and the highest net electrical energy than all of the other systems.	MAJOR ADVANTAGE System received a Major Advantage ranking relative to the other systems for this criteria as it recovers the highest net life-cycle energy and the second highest net electrical energy than all of the other systems.	ADVANTAGE System received an Advantage ranking relative to the other systems for this criteria as it recovered higher net life-cycle energy and net electrical energy than System 1.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
Criterion 3: **Potential for destruction or disruption of sensitive terrestrial and/or aquatic habitats at an eventual site.**	**Total volume of landfill capacity required to manage post-processing residual waste.**	• **Significant** requirement for landfill disposal of system residues increases potential for removal or disruption of sensitive natural habitats due to typically rural setting of landfill facilities.	• **Low** requirement for landfill disposal of system residues reduces potential for removal or disruption of sensitive natural habitats due to typically rural setting of landfill facilities.	• **Low/Moderate** requirement for landfill disposal of system residues reduces potential for removal or disruption of sensitive natural habitats due to typically rural setting of landfill facilities.	• **Moderate** requirement for landfill disposal of system residues reduces potential for removal or disruption of sensitive natural habitats due to typically rural setting of landfill facilities.
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE System received a Major Disadvantage ranking relative to all other systems as it had the highest landfill requirement for residue disposal and therefore had the highest potential to affect sensitive natural habitats.	MAJOR ADVANTAGE System received a Major Advantage ranking relative to all other systems as it had the lowest landfill requirement for residue disposal and therefore had the lowest potential to affect sensitive natural habitats..	ADVANTAGE System received an Advantage ranking as it had lower landfill requirements for residue disposal relative to Systems 1 and 2c and therefore had lower potential to affect sensitive natural habitats..	NEUTRAL System received a Neutral ranking relative to other systems as it would have no potential benefits or impacts based on this indicator being applied. The system had moderate landfill requirements relative to System 1 and therefore had lower potential to affect sensitive natural nabitats.
	Land use setting typically associated with establishment of facilities comprising system.	• Estimated 11.4 ha Site Requirement	• Estimated 9.6 ha Site Requirement	• Estimated 14.6 ha Site Requirement	• Estimated 13.5 ha Site Requirement

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
	SUMMARY of INDICATOR	NEUTRAL • All facility(ies) site(s) can be located in designated urban area and on industrially designated lands with potential for impacts on sensitive habitats unlikely. • Overall, it was determined that there would be no potential impacts or benefits for any systems based on this indicator being applied.			
SUMMARY of CRITERION 3:		**MAJOR DISADVANTAGE** System received a Major Disadvantage ranking relative to all other systems as it had the highest landfill requirement for residue disposal and therefore had the highest potential to affect sensitive natural habitats. The combination of rankings of all indicators within this criterion resulted in the system being identified as having a Major Disadvantage relative to the other systems.	**MAJOR ADVANTAGE** System received a Major Advantage ranking relative to all other systems as it had the lowest landfill requirement for residue disposal and therefore had the lowest potential to affect sensitive natural habitats. The combination of rankings of all indicators within this criterion resulted in the system being identified as having a Major Advantage relative to the other systems.	**ADVANTAGE** System received an Advantage ranking as it had lower landfill requirements for residue disposal relative to Systems 1 and 2c and therefore had lower potential to affect sensitive natural habitats. The combination of rankings of all indicators within this criterion resulted in the system being identified as advantaged relative to the other systems.	**NEUTRAL** Overall considering the application of all indicators within this criterion, the system received a Neutral ranking relative to other systems as development of the system would have no potential benefits or impacts based on this criterion being applied. The system had moderate landfill requirements relative to System 1 and therefore had lower potential to affect sensitive natural nabitats.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
Criterion 4: **Potential to increase diversion rate and/or make best use of residual (post-diversion) waste materials.**	**Potential of system facilities to remove any remaining materials in the post-diversion waste stream for use in a non-disposal manner.**	• System ensures achievement of 60% diversion target and offers potential 10% increase in rate of diversion from disposal to 70%.	• System ensures achievement of 60% diversion target and in existing regulatory environment offers potential 2% increase in rate of diversion from disposal to 62%.	• System ensures achievement of 60% diversion target and in existing regulatory environment offers potential 8% increase in rate of diversion from disposal to 68%.	• System ensures achievement of 60% diversion target and in existing regulatory environment offers potential 10% increase in rate of diversion from disposal to 70%.
	SUMMARY of INDICATOR	MAJOR ADVANTAGE System received a Major Advantage ranking as it was one of the systems with the highest potential for material recovery and diversion.	ADVANTAGE System received an Advantage ranking as it had high potential for material recovery and diversion but less than that associated with the other systems.	MAJOR ADVANTAGE System received a Major Advantage ranking as it was one of the systems with the highest potential for material recovery and diversion.	MAJOR ADVANTAGE System received a Major Advantage ranking as it was one of the systems with the highest potential for material recovery and diversion.
	Potential of system facilities to manage and make beneficial use of materials in the post-diversion waste stream including those materials for which diversion may decline or disappear in the future.	• **Moderate** - If markets for compost and recycled paper fibres were to decline, this system could anaerobically digest these materials to recover energy. • If there were approved markets for Class B compost	• **High** - If markets for recycled plastics, low-value paper etc. were to decline or disappear, this system could recover significant quantities of energy from these materials. • In addition, if European practice of	• **High** - If markets for recycled plastics, low-value paper etc. were to decline or disappear, this system could recover significant quantities of energy from these materials. • In addition, if	• **High** - If markets for recycled plastics, low-value paper etc. were to decline or disappear, this system could recover significant quantities of energy from these materials. • In addition, if European practice of

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		and use of some recovered materials as aggregate, diversion from landfill disposal could increase to 84%.	curing and recycling bottom ash into aggregate materials was approved in Ontario, diversion from landfill disposal could increase to 95%.	European practice of curing and recycling bottom ash into aggregate materials was approved in Ontario, diversion from landfill disposal could increase to 89%.	curing and recycling bottom ash into aggregate materials was approved in Ontario, diversion from landfill disposal could increase to 87%.
	SUMMARY of INDICATOR	ADVANTAGE System received an Advantage ranking as it is able to make use of beneficial resoures in the post diversion waste stream but less than that associated with the other systems.	MAJOR ADVANTAGE System received a Major Advantage ranking as it was one of the systems with the highest potential ability to make beneficial use of resoures in the post diversion waste stream.	MAJOR ADVANTAGE System received a Major Advantage ranking as it was one of the systems with the highest potential ability to make beneficial use of resoures in the post diversion waste stream.	MAJOR ADVANTAGE System received a Major Advantage ranking as it was one of the systems with the highest potential ability to make beneficial use of resoures in the post diversion waste stream.
SUMMARY of CRITERION 4:		**ADVANTAGE** System received an Advantaged ranking as a result of the combination of its potential to increase the diversion rate and for recovery of additional beneficial use materials which were relatively less than that for Systems 2b and 2c.	**ADVANTAGE** System received an Advantaged ranking as a result of the combination of its potential to increase the diversion rate and for recovery of additional beneficial use materials which were relatively less than that for Systems 2b and 2c.	**MAJOR ADVANTAGE** System received a Major Advantage ranking as a result of the combination of its potential to increase the diversion rate and for recovery of additional beneficial use materials which were relatively more than that for	**MAJOR ADVANTAGE** System received a Major Advantage ranking as a result of the combination of its potential to increase the diversion rate and for recovery of additional beneficial use materials which were relatively more than that for Systems 1 and 2a.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
				Systems 1 and 2a.	
OVERALL SUMMARY OF NATURAL ENVIRONMENTAL CONSIDERATIONS **(Summary of Criteria 1 to 4)**		**DISADVANTAGE** Overall in regards to Natural Environment Considerations, System 1 received a Disadvantaged ranking. While System 1 has potential to increase diversion rates and to recover beneficial use materials, it was comparably disadvantaged relative to the other systems in regards to its environmental burden at a global scale, in regards to the ability of the System to recover energy, and in regards to its potential for destruction or disruption of sensitive terrestrial and/or aquatic habitats.	**MAJOR ADVANTAGE** Overall in regards to Natural Environment Considerations, System 2a received a Major Advantage ranking. System 2a was: comparably advantaged relative to all of the other systems in regards to its environmental burden at a global scale; advantaged relative to most other systems in regards to the ability of the System to recover energy; advantaged relative to all other systems regarding its potential for destruction or disruption of sensitive terrestrial and/or aquatic habitats; and, has potential to increase diversion rates and to recover beneficial use materials.	**MAJOR ADVANTAGE** Overall in regards to Natural Environment Considerations, System 2b received a Major Advantage ranking. System 2b was comparably advantaged relative to: most of the other systems in regards to its environmental burden at a global scale; advantaged relative to all other systems in regards to the ability of the System to recover energy; advantaged relative to most other systems regarding its potential for destruction or disruption of sensitive terrestrial and/or aquatic habitats, and was advantaged relative to most other systems regarding its potential to increase diversion rates.	**ADVANTAGE** Overall in regards to Natural Environment Considerations, System 2c received an Advantage ranking. System 2c was comparably less advantaged relative to most systems in regards to its environmental burden at a global scale; was advantaged relative to System 1 in regards to the ability of the System to recover energy and its potential for destruction or disruption of sensitive terrestrial and/or aquatic habitats; and was advantaged relative to most other systems regarding its potential to increase diversion rates.

SOCIAL / CULTURAL CONSIDERATIONS (Important Priority)

<table>
<tr><th rowspan="2">Criterion</th><th rowspan="2">Indicator</th><th>System 1</th><th>System 2a</th><th>System 2b</th><th>System 2c</th></tr>
<tr><th>Mechanical, Biological Treatment with Biogas Recovery</th><th>Thermal Treatment of MSW & Recovery of Materials from Ash/Char</th><th>Thermal Treatment of Solid Recovered Fuel</th><th>Thermal Treatment of Solid Recovered Fuel with Biogas Recovery</th></tr>
<tr><td rowspan="3">Criterion 5:

Potential for land use conflicts from siting of facilities required for alternative.</td><td>Number of waste management facilities associated with alternative system.</td><td colspan="4">• For comparative purposes it is assumed that all components of all of the alternative residual processing systems would be located at a single location within Durham/York. As a result, all systems would have the same relative impact regarding the number of waste management facilities. The 'single facility, single site' system configuration represents the most efficient system configuration and would provide the economies of scale that are being sought in the Durham/York EA Study. In general, a 'single facility, single site' configuration also represents the configuration which would be expected to have a lower potential for environmental and social impacts, as the total land area required and number of potential receptors that could be impacted by the systems, increases as the number of sites required for each system increases.</td></tr>
<tr><td>SUMMARY of INDICATOR</td><td colspan="4">NEUTRAL
There are no differences between the potential number of waste management facilities associated with each alternative system.
Overall, it was determined that there would be no potential impacts or benefits for any systems based on this indicator being applied.</td></tr>
<tr><td>Potential for land use conflicts considering location requirements of waste management facilities.</td><td>• For comparative purposes it is assumed that all components of the MBT System would be located at a single location within Durham/York.
• The MBT facility would likely be located within a designated urban boundary and/or on lands appropriately designated for the</td><td>• For comparative purposes it is assumed that all components of the Thermal System would be located at a single location within Durham/York.
• The thermal facility would likely be located within a designated urban boundary and/or on lands appropriately designated for the</td><td>• For comparative purposes it is assumed that all components of the MBT/Thermal System would be located at a single location within Durham/York.
• The MBT/Thermal facility would likely be located within a designated urban boundary and/or on lands appropriately</td><td>• For comparative purposes it is assumed that all components of the MBT/Thermal System would be located at a single location within Durham/York.
• The MBT/Thermal facility would likely be located within a designated urban boundary and/or on lands appropriately</td></tr>
</table>

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		use. • Significant quantity of residual materials (30% of total waste stream) will require landfill disposal at a facility located outside of the study area, resulting in a higher potential for land use conflicts associated with the export of waste to other communities. • Highest potential traffic related impacts, related to the haul of materials from the MBT facility to landfill.	use. • Small quantity of residual materials (9% of total waste stream) will require landfill disposal at a facility located outside of the study area, resulting in a low potential for land use conflicts associated with the export of waste to other communities. • Lowest potential traffic related impacts, related to the haul of materials from the thermal facility to landfill.	designated for the use. • Small quantity of residual materials (13% of total waste stream) will require landfill disposal at a facility located outside of the study area, resulting in a low potential for land use conflicts associated with the export of waste to other communities. • Low potential traffic related impacts, related to the haul of materials from the MBT/thermal facility to landfill.	designated for the use. • Moderate quantity of residual materials (18% of total waste stream) will require landfill disposal at a facility located outside of the study area, resulting in some potential for land use conflicts associated with the export of waste to other communities. • Low potential traffic related impacts, related to the haul of materials from the MBT/thermal facility to landfill.
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE The System received a Major Disadvantage relative to the other systems as a significant quantity of residual materials will require landfill disposal outside	MAJOR ADVANTAGE The System received a Major Advantage relative to the other systems as it had the smallest quantity of residual materials requiring landfill disposal outside of the study area, resulting in the lowest	MAJOR ADVANTAGE The System received a Major Advantage relative to the other systems as it had close to the smallest quantity of residual materials requiring landfill disposal outside of the	NEUTRAL The system received a Neutral ranking as development of the system would have no potential benefits or impacts based on these indicators being applied. The system had

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		of the study area, resulting in higher potential for land use conflicts and the highest potential traffic related impacts, related to the haul of materials.	potential for land use conflicts and the lowest potential traffic related impacts, related to the haul of materials.	study area, resulting in lower potential for land use conflicts and close to the lowest potential traffic related impacts, related to the haul of materials.	moderate landfill requirements relative to System 1 and therefore had lower potential for land use conflicts and for traffic related to haul of materials.
	Types and degree of nuisance impacts associated with waste management facilities based on operational experience.	• Relatively equivalent potential impacts for most nuisance related parameters (dust, noise, litter). • Higher potential for odour related impacts, due to biological component of the MBT system and as potential odorous materials will be hauled from the MBT facility to landfill for disposal.	• Relatively equivalent potential impacts for most nuisance related parameters (dust, noise, litter). • Lower potential for odour related impacts as there is no biological component of the Thermal system, and as the residue hauled to landfill is inert.	• Relatively equivalent potential impacts for most nuisance related parameters (dust, noise, litter). • Higher potential for odour related impacts, due to biological component of the system, however, the residue hauled to landfill is inert as all biological residues are combusted.	• Relatively equivalent potential impacts for most nuisance related parameters (dust, noise, litter). • Higher potential for odour related impacts, due to biological component of the system and as potential odorous materials will be hauled from the MBT facility to landfill for disposal.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE The System received a Major Disadvantage relative to the other systems as it had higher potential for odour related impacts.	MAJOR ADVANTAGE The System received a Major Advantage relative to the other systems as it had the lowest overall potential for odour related impacts.	ADVANTAGE The System was advantaged over Systems1 and 2c as while it had higher odour potential associated with the biological component of the system, the residue hauled to landfill would be inert.	DISADVANTAGE The System was disadvantaged relative to Systems 2a and 2b as it had higher potential for odour related impacts from some system components, although less than those associated with System 1.
SUMMARY of CRITERION 5:		MAJOR DISADVANTAGE The combination of rankings of all indicators within this criteria resulted in the System being identified as having a Major Disadvantage relative to the other systems.	MAJOR ADVANTAGE The combination of rankings of all indicators within this criteria resulted in the System being identified as having a Major Advantage relative to the other systems.	ADVANTAGE The combination of rankings of all indicators within this criteria resulted in the System being identified as having an Advantage relative to two of the other systems.	DISADVANTAGE The combination of rankings of all indicators within this criteria resulted in the System being identified as having a Disadvantage relative to two of the other systems.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
OVERALL SUMMARY OF SOCIAL / CULTURAL CONSIDERATIONS (Criterion 5)		**MAJOR DISADVANTAGE** Overall in regards to Social/Cultural Considerations, System 1 received a Major Disadvantage ranking. The System had the highest potential for land use conflicts considering location requirements of waste management facilities and higher potential for nuisance impacts related to odour.	**MAJOR ADVANTAGE** Overall in regards to Social/Cultural Considerations, System 2a received a Major Advantage ranking. The System had the lowest potential for land use conflicts considering location requirements of waste management facilities and the lowest potential for nuisance impacts related to odour.	**ADVANTAGE** Overall in regards to Social/Cultural Considerations, System 2b received an Advantaged ranking. The System had lower potential for land use conflicts considering location requirements of waste management facilities and lower potential for nuisance impacts related to odour relative to Systems 1 and 2c.	**DISADVANTAGE** Overall in regards to Social/Cultural Considerations, System 2c received a Disadvantaged ranking. The System had higher potential for land use conflicts considering location requirements of waste management facilities and higher potential for nuisance impacts related to odour relative to Systems 2a and 2b.

ECONOMIC / FINANCIAL CONSIDERATIONS (Important Priority)

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
Criterion 6: **Net system costs per tonne of waste managed in a systems context. Includes:** • Capital and operating costs over operational period of system. • Estimated costs associated with perpetual care of component facilities in accordance with current environmental and municipal accounting requirements. • Estimated revenues associated with system once fully implemented and operational. • Potential subsidies and revenues that may be realized during establishment and future operation of system.		• Net System Cost per tonne ranges from \$114 to \$155, including capital, operating, financing, perpetual care, revenues and subsidies.	• Net System Cost per tonne ranges from \$97 to \$160, including capital, operating, financing, perpetual care, revenues and subsidies.	• Net System Cost per tonne ranges from \$116 to \$188, including capital, operating, financing, perpetual care, revenues and subsidies.	• Net System Cost per tonne ranges from \$140 to \$213, including capital, operating, financing, perpetual care, revenues and subsidies.
SUMMARY of CRITERION 6:		ADVANTAGE The System received an Advantaged ranking as it was one of two systems with the lowest range of potential net costs per tonne. Note: a Major Advantage ranking was not provided to any of the systems in this category as the range of potential net costs is higher than current disposal costs for the proponent.	ADVANTAGE The System received an Advantaged ranking as it was one of two systems with the lowest range of potential net costs per tonne. Note: a Major Advantage ranking was not provided to any of the systems in this category as the range of potential net costs is higher than current disposal costs for the proponent.	DISADVANTAGE The System received a Disadvantaged ranking as it had a higher range of potential net costs per tonne than both Systems 1 and 2a.	MAJOR DISADVANTAGE The System received a Major Disadvantage ranking as it had the highest range of potential net costs relative to all other systems.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
Criterion 7: **Sensitivity of system costs and affordability to external financial influences. Includes:** • Types of revenues and subsidies currently available to off-set system costs and predicted sustainability of these sources into the future. • Degree to which system affordability relies on revenues and subsidies during long-term operation of the system.		• Net system cost assumes markets for recyclable materials recovered from mechanical component of MBT facility and biogas from anaerobic digester. Revenues offset in the range of 13 to 16% of average annual costs. • Revenue from sale of recyclables is likely least secure of all revenue streams. • System generates considerably more post-process residue that would require landfill disposal and therefore will be more susceptible to rising landfill disposal costs.	• Net system cost assumes markets for energy generated from thermal treatment of waste and for materials recovered from ash/char. Revenues off-set approximately 50 to 73% of average annual costs of facility. • Revenue from sale of electricity is likely the most secure of all revenue streams. • Minor influence on the System related to the marketplace for disposal of APC residues / ashes / chars.	• Net system cost assumes markets for energy generated from thermal treatment of a SRF and for materials recovered from the SRF facility. Revenues off-set approximately 43 to 63% of average annual costs. • Revenue from sale of electricity is likely the most secure of all revenue streams. • Minor influence on the System related to the marketplace for disposal of APC residues / ashes / chars.	• Net system cost assumes markets for energy generated from thermal treatment of a SRF and for materials and biogases recovered from facility that processes MSW into SRF. Revenues off-set approximately 32 to 47% of average annual costs. • Revenue from sale of electricity is likely the most secure of all revenue streams. • System would be more susceptible to influences in the marketplace for disposal of APC residues / ashes / chars.
SUMMARY of CRITERION 7:		MAJOR DISADVANTAGE The System received a Major Disadvantage ranking as overall it had the least secure revenue stream and as overall	NEUTRAL The System received a Neutral ranking relative to other systems as it would have no potential benefits or impacts based on these	NEUTRAL The System received a Neutral ranking relative to other systems as it would have no potential benefits or impacts based on these	DISADVANTAGE The System received a Disadvantaged ranking as relative to Systems 2a and 2b it had a less secure revenue stream and as overall system

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		system costs were more susceptible to market conditions related to landfill disposal, thus increasing the sensitivity and affecting the affordability of the system. The combination of rankings of all indicators within this criterion resulted in the system being identified as having a Major Disadvantage relative to the other systems.	indicators being applied. The revenue stream for this system is more secure and the costs for the system are less susceptible to market conditions.	indicators being applied. The revenue stream for this system is more secure and the costs for the system are less susceptible to market conditions in comparison to Systems 1 and 2c.	costs were more susceptible to market conditions related to landfill disposal, thus increasing the sensitivity and affecting the affordability of the system. The combination of rankings of all indicators within this criterion resulted in the system being identified as having a Disadvantage relative to the other systems.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
OVERALL SUMMARY OF ECONOMIC / FINANCIAL CONSIDERATIONS **(Summary of Criteria 6 and 7)**		**DISADVANTAGE** Overall in regards to Economic/Financial Considerations, System 1 received a Disadvantaged ranking. While System 1 was one of the two systems with the lowest range of net costs, these net costs were the most sensitive relative to all of the other systems in regards to the security of the system revenues and susceptibility of the systems to a change in landfill disposal costs.	**ADVANTAGE** Overall in regards to Economic/Financial Considerations, System 2a received an Advantaged ranking. System 2a was one of the two systems with the lowest range of net costs. These net costs were the least sensitive relative to all of the other systems in regards to the security of the system revenues and susceptibility of the systems to a change in landfill disposal costs.	**DISADVANTAGE** Overall in regards to Economic/Financial Considerations, System 2b received a Disadvantaged ranking. System 2b had a higher range of net costs relative to Systems 1 and 2a. These net costs are less sensitive relative to Systems 1 and 2a in regards to the security of the system revenues and susceptibility of the systems to a change in landfill disposal costs.	**MAJOR DISADVANTAGE** Overall in regards to Economic/Financial Considerations, System 2c received a Major Disadvantage ranking. System 2c had the highest range of net costs relative to all of the other systems. These net costs were more sensitive relative to Systems 2a and 2b in regards to the security of the system revenues and susceptibility of the systems to a change in landfill disposal costs.

TECHNICAL (Important Priority)

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
Criterion 8: **Technical risks associated with waste management alternative.**	**Flexibility of alternative system to changes in waste quantities, composition and availability of system diversion and disposal components.**	• The MBT component would be designed for a specified throughput • Adjustments in the process line to could accommodate some changes in waste types and quantities. • Any quantities over that design capacity would have to be managed by way of extended operating hours or by-pass to a landfill.	• Although changes to waste characteristics are not a significant issue, significant changes in quantity can be problematic. A reduction in quantity affects the assumed economics of the facility and may be corrected by way of alternate sourcing of feedstock. • An increase in waste quantities may require MSW to bypass the facility.	• The thermal treatment component is less flexible to changes in material quantity • Incorporation of mechanical, biological and thermal components allows for adjustments in the process line to accommodate some changes in waste types and quantities.	• The thermal treatment component is less flexible to changes in material quantity • Incorporation of mechanical, biological and thermal components allows for adjustments in the process line to accommodate some changes in waste types and quantities.
	SUMMARY of INDICATOR	ADVANTAGE The System received an Advantage relative to the other systems as it is comparably more flexible regarding changes to waste quantities.	MAJOR DISADVANTAGE The System received a Major Disadvantage relative to the other systems as it is the least flexible regarding changes in waste quantities.	DISADVANTAGE The System received a Disadvantage relative to System 1 as it is less flexible regarding changes in waste quantities.	DISADVANTAGE The System received a Disadvantage relative to System 1 as it is less flexible regarding changes in waste quantities.
	Reliability of	• The MBT component is considered	• The Operating experience with this technology has	• The System is dependent on several different	• The System is highly dependent on several different

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
	alternative system and component technologies and need for contingency landfill capacity.	reasonably reliable given past experience with mechanical component although experience with anaerobic digestion of mixed wastes is less common. • High dependence on landfill capacity elsewhere in the Province results in overall lowest reliability.	established a reasonable operating track record and a much-improved track record with regards to environmental protection. • Lowest dependence on landfill capacity elsewhere in Province.	types of technologies and mechanical equipment that lends itself to the highest potential for breakdown or failure. • Moderate dependence on landfill capacity elsewhere in Province.	types of technologies and mechanical equipment that lends itself to the highest potential for breakdown or failure. • Moderate dependence on landfill capacity elsewhere in Province.
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE The System received a Major Disadvantage relative to the other systems as the Anaerobic Digestion of MSW is less reliable than other system components and as the system has a high dependance on use of landfill capacity elsewhere in Ontario.	MAJOR ADVANTAGE The System received a Major Advantage relative to the other systems as Thermal Treatment of MSW is more reliable than other system components and as the system has the least dependance on use of landfill capacity elsewhere in Ontario.	DISADVANTAGE The System received a Disadvantage relative to System 2a as the system is more complex and thus less reliable and as the system is moderately dependant on use of landfill capacity elsewhere in Ontario.	DISADVANTAGE The System received a Disadvantage relative to System 2a as the system is more complex and thus less reliable and as the system is moderately dependant on use of landfill capacity elsewhere in Ontario.
SUMMARY of CRITERION 8:		**MAJOR DISADVANTAGE** The System received a Major Disadvantage	**NEUTRAL** Overall considering the application of all indicators within this	**DISADVANTAGE** The System received a Disadvantage ranking as it was less flexible	**DISADVANTAGE** The System received a Disadvantage ranking as it was less flexible

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		ranking as while overall it was more flexible, this was more than offset by the reduced reliability of the AD component of the system and as it had the highest dependance on use of landfill capacity elsewhere in Ontario. The combination of rankings of all indicators within this criteria resulted in the system being identified as having a Major Disadvantage relative to the other systems.	criterion, the system received a Neutral ranking relative to other systems as development of the system would have no potential benefits or impacts based on this criterion being applied. System 2a was the least flexible of all the systems, but was also the most reliable in regards to the system components and lowest dependance on use of landfill capacity elsewhere in Ontario.	than System 1, but had lower dependance than System 1 on use of landfill capacity elsewhere in Ontario, and as relative to System 2a, the system was less reliable. The combination of rankings of all indicators within this criteria resulted in the system being identified as having a Disadvantage relative to System 2a.	than System 1, but had lower dependance than System 1 on use of landfill capacity elsewhere in Ontario, and as relative to System 2a, the system was less reliable. The combination of rankings of all indicators within this criteria resulted in the system being identified as having a Disadvantage relative to System 2a.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
OVERALL SUMMARY OF TECHNICAL (Criterion 8)		**MAJOR DISADVANTAGE** Overall in regards to Technical Considerations, System 1 received a Major Disadvantage ranking. Relative to the other systems, System 1 is more flexible, but less reliable and is highly dependent on export landfill capacity.	**NEUTRAL** Overall in regards to Technical Considerations, System 2a received a Neutral ranking. The system received a Neutral ranking relative to other systems as development of the system would have no potential benefits or impacts based on application of these criteria. Relative to the other systems, System 2a is less flexible, but more reliable and less dependent on export landfill capacity.	**DISADVANTAGE** Overall in regards to Technical Considerations, System 2b received a Disadvantaged ranking. System 2b is less flexible than System 1 but more flexible than System 2a. It,is less reliable than System 2a and less dependent on export landfill capacity than System 1.	**DISADVANTAGE** Overall in regards to Technical Considerations, System 2c received a Disadvantaged ranking. System 2c is less flexible than System 1 but more flexible than System 2a. It,is less reliable than System 2a and less dependent on export landfill capacity than System 1.

LEGAL CONSIDERATIONS (Less Important Priority)

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
Criterion 9: **Legal / contractual risks associated with waste management alternative.**	**Types and complexity of approvals required implementing components of system.**	• System will require at a minimum, approval under the Ontario EAA and Ontario EPA. • The MBT facility would likely be located within a designated urban boundary and/or on lands appropriately designated for the use. Accordingly, potential for land use conflicts would be minimal and may facilitate obtaining the necessary approvals to implement and operate the facility. • The System has higher landfill requirements, so that while the MBT component may be more acceptable for approval within Durham and York, the use of a significant quantity of landfill space outside of the study area is likely to be less	• System will require at a minimum, approval under the Ontario EAA and Ontario EPA. • The Thermal facility would likely be located within a designated urban boundary and/or on lands appropriately designated for the use. Accordingly, potential for land use conflicts would be minimal and may facilitate obtaining the necessary approvals to implement and operate the facility.	• System will require at a minimum, approval under the Ontario EAA and Ontario EPA. • The MBT/thermal facility would likely be located within a designated urban boundary and/or on lands appropriately designated for the use. Accordingly, potential for land use conflicts would be minimal and may facilitate obtaining the necessary approvals to implement and operate the facility.	• System will require at a minimum, approval under the Ontario EAA and Ontario EPA. • The MBT/thermal facility would likely be located within a designated urban boundary and/or on lands appropriately designated for the use. Accordingly, potential for land use conflicts would be minimal and may facilitate obtaining the necessary approvals to implement and operate the facility.

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		acceptable (particularly for the host community).			
	SUMMARY of INDICATOR	DISADVANTAGE The System received a Disadvantage relative to the other systems as it requires a significant quantity of landfill space outside of the study area and is likely to be less acceptable (particularly for the host community).	NEUTRAL The system received a Neutral ranking as development of the system would have no potential benefits or impacts based on this indicator being applied.	NEUTRAL The system received a Neutral ranking as development of the system would have no potential benefits or impacts based on this indicator being applied.	NEUTRAL The system received a Neutral ranking as development of the system would have no potential benefits or impacts based on this indicator being applied.
Criterion 9: **Legal / contractual risks associated with waste management alternative.** **(cont'd)**	**Degree to which system implementation and operation relies on private or public sector partnerships.**	**Implementation:** • MBT technologies are largely proprietary and will likely require some form of contractual arrangement with the private sector vendor(s) for implementation. • System requires considerable landfill disposal capacity that must be obtained through contract with a third party.	**Implementation:** • Thermal technologies are largely proprietary and will likely require some form of contractual arrangement with the private sector vendor(s) for implementation. **Operation:** • Assumed in evaluation, that operation of thermal	**Implementation:** • Thermal and MBT technologies are largely proprietary and will likely require some form of contractual arrangement with the private sector vendor(s) for implementation. **Operation:** • Assumed in evaluation, that operation of	**Implementation**: • Thermal and MBT technologies are largely proprietary and will likely require some form of contractual arrangement with the private sector vendor(s) for implementation. **Operation:** • Assumed in evaluation, that operation of

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		Operation: • Assumed in evaluation, that operation of MBT facilities is contracted out to the private sector. However, the respective municipalities could operate publicly if the necessary staff were retained and trained on facility operations.	facilities is contracted out to the private sector. However, the respective municipalities could operate publicly if the necessary staff were retained and trained on facility operations.	MBT/thermal facilities is contracted out to the private sector. However, the respective municipalities could operate publicly if the necessary staff were retained and trained on facility operations.	MBT/thermal facilities is contracted out to the private sector. However, the respective municipalities could operate publicly if the necessary staff were retained and trained on facility operations.
	SUMMARY of INDICATOR	MAJOR DISADVANTAGE The System received a Major Disadvantage relative to the other systems as implementation and operation of System 1 will rely on private or public sector partnerships and as the system requires considerable landfill disposal capacity that must be obtained through contract with a third party.	DISADVANTAGE The System received a Disadvantage as implementation and operation of System 2a will rely on private or public sector partnerships.	DISADVANTAGE The System received a Disadvantage as implementation and operation of System 2b will rely on private or public sector partnerships.	DISADVANTAGE The System received a Disadvantage as implementation and operation of System 2c will rely on private or public sector partnerships.
SUMMARY of CRITERION 9:		MAJOR DISADVANTAGE The combination of	DISADVANTAGE The combination of rankings of all indicators	DISADVANTAGE The combination of rankings of all indicators	DISADVANTAGE The combination of rankings of all indicators

Criterion	Indicator	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
		rankings of all indicators within this criteria resulted in the system being identified as having a Major Disadvantage relative to the other systems.	within this criteria resulted in the system being identified as being Disadvantaged similar to Systems 2b and 2c.	within this criteria resulted in the system being identified as being Disadvantaged similar to Systems 2a and 2c.	within this criteria resulted in the system being identified as being Disadvantaged similar to Systems 2a and 2b.
OVERALL SUMMARY OF LEGAL CONSIDERATIONS (Criterion 9)		**MAJOR DISADVANTAGE** Overall in regards to Legal Considerations, System 1 received a Major Disadvantage ranking. System 1 had potentially more complex approvals related to the landfill component of the system and has greater reliance on private or public sector partnerships relative to the other systems.	**DISADVANTAGE** Overall in regards to Legal Considerations, System 2a received a Disadvantaged ranking. System 2a has similar types and complexity of approvals and reliance on private or public sector partnerships relative to Systems 2b and 2c.	**DISADVANTAGE** Overall in regards to Legal Considerations, System 2b received a Disadvantaged ranking. System 2b has similar types and complexity of approvals and reliance on private or public sector partnerships relative to Systems 2a and 2c.	**DISADVANTAGE** Overall in regards to Legal Considerations, System 2c received a Disadvantaged ranking. System 2c has similar types and complexity of approvals and reliance on private or public sector partnerships relative to Systems 2a and 2b.

7.7.3 Identification of Relative Advantages and Disadvantages ("Alternatives to")

For each of the four (4) alternative systems, a set of significant advantages and disadvantages was identified. A significant advantage or disadvantage was considered one that represented the best or worst of all systems considered. For example, the system with the lowest net cost per tonne was considered to have a significant advantage under this consideration.

The purpose of this exercise was to give an initial indication of the relative strengths and weaknesses of the four (4) alternative systems being evaluated. Accordingly, a system with a longer list of significant advantages or disadvantages under a particular category was considered to be an outlier (i.e., significantly advantaged or disadvantaged) in that regard whereas, a system with no or few advantages or disadvantages under a particular category was considered to reside somewhere in the midrange of effects for that consideration.

As noted in Section 7.6 above and in Section 6 of the *Evaluation of "Alternatives to" and Identification of the Preferred Residuals Processing System Recommendations* (May 30, 2006), when the actual comparative evaluation of the alternative systems was undertaken, the methodology used accounted for the relative placement of net effects for each system from best to worst.

The following summarizes the significant advantages and disadvantages associated with each of the alternative systems.

7.7.3.1 System 1 - MBT with Biogas Recovery

System 1 involves mechanical processing to recover recyclable material from the waste, anaerobic digestion of the organic fraction in the waste to recover a relatively small amount of renewable energy and the landfilling of the resulting residuals. It is essentially a stabilized landfill alternative with 77% of the residual waste stream ultimately exported to landfill.

In summary, the advantages of this system include:

- Lowest potential impacts on the air environment;[1]
- More flexible to changes in waste quantities and composition;
- Potentially lower overall system costs provided low cost landfill capacity can be obtained from a third party; and,
- Potential to increase diversion through the recovery of additional recyclables – an advantage shared with Systems 2b and 2c.

On the other hand, it has a number of disadvantages including:

- Greatest impacts to water and land;
- Greatest potential to disrupt sensitive habitat;

[1] As noted in Section 7.4.3.5 the potential impacts to the air environment were determined based on the original LCA and further LCA undertaken later in the EA Study indicated that System 1 may not be the one with the lowest impacts to the air environment.

- Lowest energy generation – both renewable and total;
- Greatest social impact on the landfill host community; and,
- Least reliable due to dependence on export landfill contracts.

7.7.3.2 System 2a - Thermal Treatment of MSW with Recovery of Materials from the Ash/Char and System 2b - Thermal Treatment of SRF

Systems 2a and 2b are both based on the recovery of energy through thermal treatment. In 2a, recyclable metals are recovered following thermal treatment of MSW, from the ash or char that would remain. In 2b, recyclable materials, including metals and some plastics, are recovered through mechanical treatment. Moisture from the organic fraction in the remaining material is then reduced through biological treatment. The material (now considered a SRF) is then subjected to thermal treatment. In both cases, only a small proportion of the residual waste stream, typically 10-15% by volume, would be exported to landfill. If the bottom ash could be used as construction material as it is in Europe, the percentage of waste to landfill would be reduced to approximately 5% by volume.

In summary, the advantages associated with Systems 2a and 2b include:

- Lowest impacts to water and land[2];
- Least potential to disrupt sensitive habitat;
- Greatest energy generation – both renewable and total;
- Lowest social impact on landfill host community due to minimizing the quantity of residual waste requiring landfill;
- Higher reliability due to minimum dependence on export to landfill; and,
- Costs, although high, are comparable in the case of System 2a, with System 1.

The disadvantages of the thermal treatment systems include:

- Highest impacts on the air environment, although current technology has the proven ability to exceed all applicable air emission standards (also see footnote below);
- Less flexibility regarding adjustments to changes in waste quantities and composition; and,
- Need to manage hazardous residues from the pollution control system. (It is debatable if this is really a disadvantage because the hazardous compounds, primarily heavy metals, are in the waste stream to begin with and are simply landfilled in System 1. With the thermal systems, these contaminants are concentrated and removed for stabilization and/or management in a secure landfill.)

[2] As noted in Section 7.4.3.5 further LCA analysis undertaken later in the EA Study indicated that System 2a would also have the lowest impacts to the air environment.

When comparing Systems 2a and 2b, alternative 2a has the advantages of:

- More proven and reliable technology[3]; and,
- Lower costs – based on experience to-date.

Alternative 2b has the advantages of:

- The potential to recover more recyclables – some plastics as well as metals; and,
- Potential improvements in air emissions, energy conversion efficiency and costs that may be provided by new technologies presently under development.

7.7.3.3 System 2c - Thermal Treatment of SRF with Biogas Recovery

System 2c includes the MBT approach used for System 1 followed by the thermal treatment of an SRF including the combustible portion of the residual waste, rather than the straight landfilling of all residues. Ultimately the inert non-recyclable materials, AD digestate and ash/char all require landfill disposal. Approximately 45% by weight of the residual stream will require export to landfill versus the 77% from System 1.

The advantages and disadvantages associated with this alternative fall between those identified for System 1 and Systems 2a and 2b.

The major advantages of the system include:

- The ability to recover additional recyclable materials and also to make beneficial use of the post-diversion waste stream.

It has the disadvantages of:

- Highest cost and lowest technical reliability due to the amount and complexity of the required processing equipment.

The following table, Table 7-19 Relative Comparison of "Alternatives to" Systems, provides the overall ranking for each system for each of the established priorities at the Category level.

[3] As noted in section 7.4.3.5 the additional LCA undertaken later in the Study indicated that System 2a would generally have lower potential impacts to the air environment than System 2b.

Table 7-19 Relative Comparison of "Alternatives to" Systems

Criterion	System 1 Mechanical, Biological Treatment with Biogas Recovery	System 2a Thermal Treatment of MSW & Recovery of Materials from Ash/Char	System 2b Thermal Treatment of Solid Recovered Fuel	System 2c Thermal Treatment of Solid Recovered Fuel with Biogas Recovery
MOST IMPORTANT PRIORITY				
NATURAL ENVIRONMENTAL CONSIDERATIONS	DISADVANTAGE	**MAJOR ADVANTAGE**	**MAJOR ADVANTAGE**	**ADVANTAGE**
IMPORTANT PRIORITY				
SOCIAL / CULTURAL CONSIDERATIONS	**MAJOR DISADVANTAGE**	**MAJOR ADVANTAGE**	**ADVANTAGE**	DISADVANTAGE
ECONOMIC / FINANCIAL CONSIDERATIONS	DISADVANTAGE	**ADVANTAGE**	DISADVANTAGE	**MAJOR DISADVANTAGE**
TECHNICAL CONSIDERATIONS	**MAJOR DISADVANTAGE**	**NEUTRAL**	DISADVANTAGE	DISADVANTAGE
LESS IMPORTANT PRIORITY				
LEGAL CONSIDERATIONS	**MAJOR DISADVANTAGE**	DISADVANTAGE	DISADVANTAGE	DISADVANTAGE

7.8 Description of Preferred "Alternative to" (Residual Processing System)

This section provides a summary of the results of the evaluation of "Alternatives to" and the identification of the preferred residual processing system.

7.8.1 Overview

The preferred "Alternative to" identified in accordance with the Approved EA Terms of Reference is a residual waste processing system capable of managing the post-diversion residual wastes projected to remain for disposal over the 35-year planning period after achievement of the 60% waste diversion targets by 2011 and up to 75% waste diversion in future years.

Inherent to this Undertaking should be the adoption of a hierarchy of integrated waste management system approaches wherein the first priority for Durham and York is the diversion of waste through at-source diversion programs which are expected to manage the majority of the waste generated by both municipalities over the long-term. The second priority is the management of the post-diversion residual waste stream first by thermal treatment and then followed by landfill for the remaining materials.

The projected quantities of waste that would be managed over the long-term by the integrated waste management system were updated at Step 2 of the evaluation of "Alternatives to" the Undertaking as part of the review of additional at-source diversion and are summarized in Table 7-20.

Table 7-20 Projected Long-Term Management of Wastes by Durham and York Integrated Waste Management Systems

For the 2011 to 2045 Period	2011 (tonnes)	2045 (tonnes)
Estimated Total Material Generation (Residential)	637,300	1,159,600
Estimated Annual Quantity Diverted At-Source	382,380	869,700
Diversion Rate (%)	60%	75%
Estimated Annual Residual Quantity Requiring Management	254,920	289,900
Average Monthly Residual Quantity Requiring Management	21,243	24,153
Approximate Average Daily Residual Quantity Requiring Management (1)	1,020	1,160
Estimated 35 Year Total Residual Wastes Quantity Requiring Management	Approximately 11,142,000	

(1) Annual quantity divided by 250 days per year

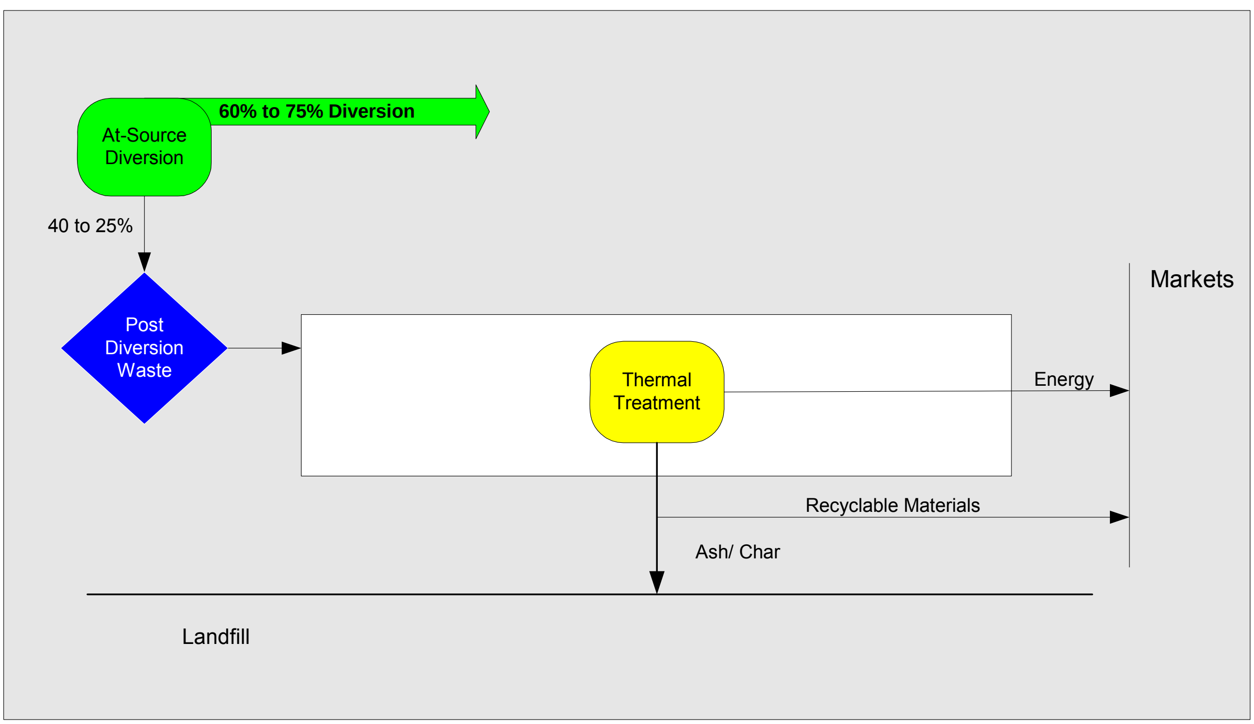
As of May 2006, it was assumed that all of the post-diversion residual waste for York and Durham would be managed by the preferred system. As noted in Section 8 (Alternative Methods) system capacity requirements were further refined later in the EA Study to reflect diversion performance in both municipalities and York's agreement with Dongara over the near-term.

As described in Section 7.7, the long-term residual waste disposal system identified as a result of the evaluation of "Alternatives to" is ***System 2a – Thermal Treatment of MSW and Recovery of Energy followed by the Recovery of Materials from the Ash/Char*** (see Figure 7-32).

More specifically, System 2a includes:

- The establishment of thermal treatment capacity to process the residual waste stream and to recover energy that would be sold to market in the form of electricity and/or heat;
- Followed by the removal of materials that may be sold to market from the ash/char residue; and,
- The landfilling of all process residues (non-combustible materials removed prior to treatment and the ash/char).

Figure 7-32 System 2a - Thermal Treatment of MSW with Recovery of Materials from the Ash/Char



A summary of the material quantities managed by this system as of 2011, assumed at the conclusion of the evaluation of "Alternatives to" is provided below in Table 7-21.

Table 7-21 Summary of Estimated 2011 Material Quantities (tonnes) to be Managed by Preferred Disposal System 2a

Approach to Management	Estimated Quantity / Proportion (2011)
Quantity of Post-Diversion Residual Waste (tonnes)	**250,000**
Quantity of Waste Processed Thermally (tonnes)	**242,500**
Percent of Total Waste Stream Thermally Processed	38%
Moisture & Mass Loss at Thermal Treatment (Primarily H_2O and CO_2) (tonnes)	186,100
Additional Materials Recovered and Recycled (tonnes)	7,800
Quantity of Residue and Ash/Char Landfilled (tonnes)	**56,100**

As noted in Section 7.4.1.6, for the purpose of comparing and evaluating systems, 400,000 tpy was assumed as a more conservative estimate of the total post-diversion residual waste processing capacity that could be required over the 35-year planning period.

As noted previously, there could be a requirement for the preferred system to manage 400,000 tpy of residual waste during the planning period if:

Projected diversion rates of 60% by 2011 and 75% or more diversion by 2045 are not achieved;

Per capita waste generation rates increase over the planning period;

The population of Durham and/or York increases more than currently estimated over the planning period; and,

Waste from other sources such as the commercial/industrial sector in Durham and/or York, or waste from other municipal jurisdictions outside the GTA requires management.

Although System 2a was identified as the Preferred Long-Term Residual Processing System, System 2b Thermal Treatment of SRF was considered to exhibit an acceptable range of advantages and disadvantages.

For some of the criteria where System 2b did not rank equivalent to 2a, (technical risks, costs and legal/contractual risks for example), the determination of the relative advantages and disadvantages was based upon the information that was readily available on both the mechanical and biological processes that are being used to recover solid fuel in other jurisdictions and on the thermal technologies that can process this fuel. Many of the technologies that would be used to thermally treat the SRF (e.g., gasification) in System 2b are regarded as ‘new technologies’, with active research and development, but much less of a track record than the technologies that are currently available to combust residual waste in System 2a. As of the time that the evaluation of “Alternatives to” was completed in 2006, minimal information was available on any new technologies implemented at the scale required by Durham and York.

Should Durham and York not meet their projected waste diversion targets within the currently planned timeframe, System 2b could be utilized to capture additional recyclables and compostables in the waste stream that have not been source separated by residents. This would contribute to the Regions' overall respective waste diversion rates.

It was therefore recommended that the final selection of System 2a as the preferred residual processing system would be based upon the results of the competitive process used during the evaluation of "Alternative Methods". It was recommended that the RFQ and RFP process (described in Section 9.0 of this EA Study document) allow for the submission of proposals to implement both System 2a and System 2b, and that the final decision on the technologies used to implement the preferred residual processing system would be based on the results of this competitive process.

7.8.2 Role of "At–Source" Diversion

The *Report on Additional "At-Source" Diversion and Residual Quantities to be Managed* (May 30, 2006) examined the potential for additional at-source diversion and provided projections of future waste quantities, diversion performance and composition of materials requiring management and disposal over the 35-year planning period from 2011 to 2045.

The projected recovery rates and the overall at-source diversion rate for both Durham and York reflect the implementation of both Regions' approved waste management plans that have been designed to achieve a 60% diversion target by 2011.

Considering Durham and York Regions' policies and proposed provincial policies, in combination with a review of the current waste characterization and the diversion potential of various waste management programs (i.e., combining at-source reduction, curbside and depot collection programs), it was concluded that it was reasonable to assume, for the purpose of waste quantity projections and assessing disposal alternatives, that both municipalities would achieve a 60% at-source diversion rate over the planning period. In the longer term, it is difficult to predict what will be achieved but diversion rates may well increase beyond 60%. For planning purposes it is assumed that the diversion rate will increase from 60% to 75% over the course of the study period.

Achievement of 60% at-source diversion will require significant improvements in the participation and capture rates for materials that can be diverted by the sectors serviced by existing and planned municipal diversion programs. The material recovery rates used in the analysis of the role of at-source diversion were reasonably aggressive, assuming high participation and capture rates, and full implementation of both Durham and York's planned waste diversion systems. This includes the assumption that both municipalities would implement various measures to maximize diversion system performance, such as incentives and/or disincentives for all sectors to ensure appropriate behaviour by the users of the system (e.g., container limits, user fees, by-law enforcement) and promotion and education campaigns, using a variety of media to reach the target audience.

Future initiatives that may still be required to achieve 60% diversion and that would be required to increase diversion to 75% include the following:

- Disposal taxes/advance disposal fees to support diversion initiatives and/or create a disincentive to dispose;
- Stewardship programs that promote increased container recovery rates (i.e., deposit/return programs);
- Extended Producer Responsibility (EPR) programs that promote systemic changes in the production of products and packaging, which reduce the overall municipal requirements to manage residual materials; and,
- The transition from a consumer to a conserver society.

It must be noted that this later grouping of initiatives fall primarily outside of municipal jurisdiction and control. The potential for additional at-source diversion associated with such initiatives was considered during the determination of the optimal size and potential throughput of the thermal treatment component of the system to be undertaken as an initial step in the evaluation of "Alternative methods" (siting).

7.8.3 Role of Thermal Processing and Energy Recovery

The role of thermal processing is to manage the majority of the post-diversion residual waste, and to recover energy from the combustible portion of the residual waste stream.

The main type of commercially available thermal treatment technologies is combustion. A detailed description of this technology is included in the *Report on Formulation of Alternative Residual Processing Systems* (May 30, 2006). Thermal treatment of MSW has been developed and operated on a commercial scale in North America and elsewhere, and is capable of meeting the requirements of Ontario's regulatory environment. In addition, new technologies such as gasification may be capable of meeting the requirements of Ontario's regulatory environment.

In combustion technologies, hydrocarbons in the waste stream are converted to thermal energy, carbon dioxide, and water. Thermal energy is used to generate steam, which can then be used to generate electrical energy. If the facility is located within reasonable proximity to a suitable load, heat (e.g., steam or hot water) as well as electricity can be sold. If such a co-generation opportunity can be found, the overall thermal efficiency of the process is significantly improved. Consideration of heat recovery would have further increased the potential advantages of the preferred system in the evaluation process.

Ash is discharged from the bottom of the grate and is quenched. Exhaust gases from combustion, primarily water and carbon dioxide, are cleaned prior to being emitted to the atmosphere. Gasification technologies involve the thermal breakdown of solid materials into a synthetic gas (syngas) and a solid char residue. The syngas (mainly comprised of hydrogen, carbon monoxide, carbon dioxide, and nitrogen) must undergo a cleaning process before it is utilized. After cleaning, the syngas may be used as fuel for reciprocating engines or gas turbines, or it can be combusted in a steam boiler to generate steam. As with the combustion technologies discussed above, electricity, heat, or both electricity and heat can be produced and sold.

The decision on the specific thermal treatment technology that would be used for implementation of the preferred disposal system was made through a competitive procurement process undertaken as part of the evaluation of "Alternative methods" of implementing the Undertaking, as described in Sections 8 and 9.

7.8.4 Role of Material Recovery

After thermal treatment, mechanical treatment will be utilized to recover metals (primarily ferrous metal and some aluminum) from the ash or char. Mechanical treatment processes are capable of recovering the majority of the metals found in the bottom ash/char from a thermal treatment facility.

The selection of an appropriate thermal treatment technology undertaken through the competitive procurement process during the evaluation of "Alternative Methods", addressed the requirement to maximize recovery of materials from the ash/char remaining after thermal processing.

It should be noted that in some jurisdictions, the ash/char that remains after the removal of metals is stabilized and marketed as a granular construction material increasing the recovery of materials through thermal treatment processes and further minimizing landfill requirements. However, the evaluation of "Alternatives to" has assumed in all cases that it would not be viable to produce and market any Granular "B" products derived from waste that would result from any alternative systems, given that the regulatory environment in Ontario (as of 2006) has not to-date encouraged this practice. In the event Ontario perspectives were to change and the marketing of ash amended Granular "B" construction material were accepted, the diversion achieved under this alternative would increase further minimizing landfill disposal requirements.

7.8.5 Role of Landfill

As noted in Section 7.8.1, it is assumed that for a facility accepting 250,000 tpy of residual waste, in the order of 56,100 tonnes of residual materials would remain after thermal processing on an annual basis, which would require landfill disposal.

This material will include:

- Unacceptable materials removed prior to thermal treatment (e.g., construction and demolition waste, some bulky goods that are either non-combustible or cannot be physically managed by the thermal treatment equipment); and,
- Ash/Char remaining after material recovery.

These materials will be largely inert, and thus would not have the characteristics of MSW that typically result in nuisance impacts and require management measures when landfilled (e.g., odours, landfill gas generation, leachate generation, etc.). Ash/char will be denser than MSW and could be used as landfill cover, occupying significantly less space than an equivalent amount of MSW, further minimizing landfill capacity requirements.

In regards to the landfilling of thermal treatment residues, Section 3.2 of the Approved EA Terms of Reference describes the Durham/York inter-municipal agreement which recognizes that if a processing facility(ies) is selected as the preferred disposal alternative, that each municipality would be responsible for managing its own share of process residues (e.g., ash, char or stabilized waste stream) and would be responsible for any approval or contractual arrangements) required to establish disposal capacity for such process residues.

Section 4.1.2 of the Approved EA Terms of Reference notes that each of the proposed processing alternatives will require landfill disposal capacity for process residues. Options to address the landfill component, depending on the amount of capacity required, may include:

- Contracting to use private sector landfill capacity;
- Identification of new landfill capacity; and/or,
- Establishment of waste supply/residuals supply agreements with neighbouring municipalities outside the GTA.

However, the actual identification of existing landfill capacity and/or siting of new landfill capacity to manage these process residues is outside the scope of this EA Study (as per section 4.1.2 of the approved EA Terms of Reference).

7.9 Public and Agency Consultation on the Preferred System

With the receipt of the draft *Report on Evaluation of “Alternatives to” and Identification of Preferred Long-term Residual Processing System Recommendations* by the JWMG on April 18, 2006 the following activities were undertaken prior to completion of the evaluation of “Alternatives to” and the identification of the preferred long-term residuals processing system:

- The report was released to the public and government review agencies for a review period of 30 days starting on April 19, 2006 and ending on May 19, 2006.
- Notification was issued of the availability of the draft report by way of direct contact with the established public and government review agency list and by way of the website and local media for the general public.
- Copies of the draft documentation were forwarded to the public and government agencies in the established contact lists and copies were placed in the local libraries, municipal offices and on the study website for public review.
- Concurrent Public Information Sessions were held in both Durham and York during the evening of May 9, 10 and 11, 2006. These sessions were attended by a total of 303 individuals, and 110 attendees completed and returned a questionnaire providing input on the draft report. The majority of attendees indicated that they strongly or somewhat agreed with the recommended residuals processing system.
- A telephone poll was conducted by Ipsos Reid during the week of May 15, 2006, reaching 200 individuals in Durham and 200 individuals in York to determine their support for the recommended residuals processing approach. The results of the survey indicated that approximately 80% of the residents of Durham and York agreed with building a Thermal Treatment Facility.

- The JWMG scheduled, advertised and held concurrent special meetings in both Durham and York during the day and evening of May 17, 2006 to receive delegations from interested parties on the draft report and its results. A total of 18 delegations were received in Durham and 16 in York. The majority of delegations supported the recommended residuals processing system, and those that did not were highly supportive of increased diversion efforts in both municipalities.

Comments received during the draft report review period were documented and included in the final report on the evaluation of “Alternatives to” dated May 30, 2006. Comments received were considered and addressed, as appropriate, during finalization of this report.

Additional details regarding the public and agency consultation on the preferred system are provided in the Record of Consultation.

The results of the consultative process indicated that:

- A significant majority of the public (approximately 80%) that participated in the consultative process agreed with the consultants’ recommendation that the preferred system is ***System 2a – Thermal Treatment of MSW and Recovery of Energy followed by Recovery of Materials from the Ash/Char***. It was recognized that new technologies categorized in System 2b – Thermal Treatment of SRF may ultimately offer important benefits and as a result the competitive process used during the evaluation of “Alternative methods” should allow for the submission of proposals to implement both System 2a and System 2b, with the final decision on the technologies used to implement the preferred residuals processing system being based on the results of this competitive process.
- The majority of those that did not agree with the recommended preferred system generally supported increased diversion activities, including EPR and expansion of the municipal diversion system. It was recommended that Durham and York continue to support a hierarchy of waste management practices whereby diversion is the priority and continues to manage an increasing percentage of the municipal waste stream over time with diversion targets of 60% at the beginning of the planning period escalating to 75% towards the latter end of the planning period.
- A minority of those that did not agree with the recommended system, preferred to continue to export waste to landfill sites outside of the Regions.

Table 7-22, provides an overview of the key comments/issues provided during the consultation on the draft report regarding the “Evaluation of “Alternatives to” and Identification of the Preferred Residuals Processing System” (May 30, 2006), and identifies how these key comments/issues were considered in the EA Study.

Table 7-22 Summary of Key Comments/Issues – Consultation on the "Evaluation of "Alternatives to" and Identification of the Preferred Residuals Processing System"

Summary of Key Comments	Consideration
Comment: Support for "Additional Diversion"	The Residual Waste Study is very clear that both Durham and York are planning on an initial goal of 60% waste diversion by 2011 and a goal of 75% in the future. The majority of those participating in the consultative process supported these goals although a minority expressed concerns about the ability of the two Regions' to achieve these goals. The implications of the report on the evaluation of "Alternatives to" is that both Durham and York adopt a formal hierarchy for their integrated waste management systems to reflect the purpose of the undertaking for the EA Study, as follows: • At-Source Diversion; • Thermal Treatment (including energy and materials recovery); and • Landfill Disposal of Residue.
Comment: Support for "Thermal Treatment" (both conventional combustion, gasification and pyrolysis)	The majority of participants in the consultative process were supportive of "Thermal Treatment" although many had a clear preference for a specific thermal treatment technology such as conventional combustion or plasma gasification. There was significant support for the recognition that while the preferred system was ***System 2a -Thermal Treatment of MSW and Recovery of Energy followed by Recovery of Materials from Ash/Char*** that new technologies categorized in System 2b – Thermal Treatment of Solid Recovered Fuel, may ultimately offer important benefits. As a result, the competitive process used during the evaluation of "Alternative Methods" allowed for the submission of proposals to implement both System 2a and System 2b. The final decision on the technologies used to implement the preferred residuals processing system was based on the results of this competitive process. It is important to note, that as part of the consultation process, a considerable amount of public education was also completed to convey the message, that the Alternatives being considered are State-of-the-Art and do not include older technologies that have given rise to the negative connotations associated with "Incineration".
Comment: References to European Experience with Thermal Treatment (suggestions to visit, examine and adopt modern incineration methods used in Europe)	The "European Experience" with thermal treatment approaches was consistently referred to during the public consultation sessions, with specific requests that those responsible for selecting and approving the preferred residual waste processing system for Durham and York become very familiar with the state-of-the-art approaches used to manage waste in European nations. European facility delegations involving, elected officials from both Regions, municipal staff and the consulting team were undertaken to address the concern that in order to be able to make an effective and educated decision some first-hand experience with these European examples, including the technology, political and policy environment, etc. would be necessary.
Issue: Implement Extended Producer Responsibility (have industry manage their own wastes)	There was broad support for Product Stewardship and Extended Producer Responsibility (EPR) from both those that did not agree with the preferred residuals waste processing system and from those that did support the system but that recognized the diversion benefits of EPR. The report on *Additional At-Source Diversion and Residual Quantities to be*

Summary of Key Comments	Consideration
	Managed (May 30, 2006), considered the current status of EPR in Ontario , along with the assumption that as the existing system under the auspices of Waste Diversion Ontario is primarily a funding mechanism, no real effect on diversion would be associated with continued WDO programs in Ontario. Extensive lobbying from all sectors will be needed in Ontario and federally, to achieve any real progress on EPR where the responsibility for end-of-life products would be solely the responsibility of the generator of the product. While progress has been made since 2006 on EPR initiatives related to WEEE and MHSW, these programs are considered as contributors to the overall diversion goals of 60 to 75% assumed by the Regions. The participation of Durham and York in municipal lobbying efforts is expected to continue and will be necessary to demonstrate the commitment of both municipalities to diversion being the first priority for the management of waste.
Issue: Preference for other alternatives based on the selective application of various criteria	A number of participants in the consultative process expressed a clear preference for other alternatives based on the selective application of a few of the criteria used in the EA Study for comparative analysis of the alternative systems. For example, some participants selected System 1 as their preferred system, based on the consideration of emissions to air including greenhouse gas emissions and greater feasibility, with the large landfill component, to accommodate diversion rates beyond 75%. Under the EAA, the 'environment' is very broadly defined to include the natural, social and economic environment in both a local and global context. The evaluation criteria that were developed and applied to select the preferred system were formulated to address the need to examine all aspects of the environment to meet the need of the EAA. The formulation of the evaluation criteria was undertaken with public and agency input during both the preparation of the EA Terms of Reference and early in the process of evaluating alternative systems. The EA Terms of Reference, including the proposed evaluation criteria were approved by the Minister of the Environment. It would not be acceptable or good EA practice to choose the preferred "Alternative to" based on applying only a select few of the comparative criteria, and to do so would not comply with the approved EA Terms of Reference.
Issue: Concern that a Thermal Treatment Facility will hinder future diversion efforts	It has been claimed that any Thermal Treatment Facility will compete for materials in the waste stream and hinder efforts to achieve higher diversion rates. It is essential to reinforce that both Durham and York are committed to an immediate goal of 60% waste diversion by 2011 and a goal of 75% in the future. Diversion was studied in detail as part of the consideration of "Alternatives to" including consideration of what is being achieved worldwide in the area of diversion and the potential to divert additional materials from the Durham/York waste stream. No comparable municipality – including both single and multi -family housing - in North America has achieved a diversion rate much beyond 50%. Some jurisdictions in Europe have achieved higher diversion rates and the majority of these also use thermal treatment to dispose of the residues that remain after diversion. The utilization of thermal treatment ash or char can add significantly to diversion rates.

Summary of Key Comments	Consideration
	If a Thermal Treatment Facility with capacity for the approximately 250,000 tpy of residual waste projected for Durham and York began operating in 2011 and continued to operate at that capacity through to the end of the study planning period, then increased diversion will be required to offset population growth, or otherwise the facility would have to be expanded to 400,000 tpy at some time during the planning period. An overall diversion rate in excess of 75% would be required to ensure that a 250,000 tpy facility was capable of managing all of the residual waste management needs for the Regions. Thermal treatment facilities are not a barrier to diversion when they are sized and operated appropriately. For example, the Region of Peel has achieved very high diversion rates and thermally processes most of its residual wastes. In practice, it is generally jurisdictions with high cost disposal facilities such as thermal facilities that have high diversion rates while jurisdictions with abundant low-cost landfill disposal facilities generally have lower diversion rates. There are a variety of contractual mechanisms that can be used to ensure a Thermal Treatment Facility has sufficient input material for economic operation and does not compete with diversion for material. For example, waste from commercial sources could be processed under short-term contracts that can be adjusted to accommodate changes in municipal quantities to ensure consistent input material is available.
Issue: Concerns regarding air emissions from a Thermal Treatment Facility and the impact on Public Health	Thermal Treatment Facilities for municipal solid waste are operated safely and are widely accepted around the world, including Europe, the United States and right here in Brampton. These facilities have extensive air emissions monitoring programs in place to ensure the safety and protection of humans and the natural environment via compliance with stringent regulatory requirements. In 1999, the Ministry of the Environment (MOE) released a study assessing the risks associated with incineration to human and ecological health. In this study, the MOE concluded that no significant health effects are likely in a typical suburban community located near an incinerator. They also predicted that water and sediment quality near an incinerator would meet ministry guidelines for the protection of aquatic life. Since the release of this document, even more stringent air emissions regulations have been released and enforced by the Province, further reducing the potential impacts related to the types of facilities studied in 1999. Given the significance of the level of concern regarding air emissions and the potential impact on human and ecological health, following the approval of thermal treatment as the preferred "Alternative to" by Regional Councils, a comprehensive review of the potential human and ecological impacts of thermal treatment, specific to the EA Study area was undertaken as part of the siting process. Input received from the analysis of the potential for human and ecological health impacts represented an important component of the assessment of the environmental effects of the Undertaking.
Issue: Greenhouse Gas Emissions	Concern was expressed by many of those that participated in the consultative process in regards to the greenhouse gas emissions (GHG) from thermal treatment and the need to address climate change. During the consultative period a study was publicly released by Friends of the Earth (FOE, UK) regarding incineration and climate change, and was referred to by some participants in the consultative process. The FOE study determined that while electricity-only incineration was less climate-damaging then landfilling of waste, it was more climate-damaging then systems with aerobic or anaerobic

Summary of Key Comments	Consideration
	mechanical-biological treatment and landfilling of stabilized residues. Interestingly, aerobic MBT systems with the use of refuse derived fuel as a coal substitute in cement kilns was found to be relatively equivalent with those systems where the stabilized residue was landfilled. The FOE study also found that the GHG per Kilowatt hour of power emitted from incinerators that recovered combined heat and power (CHP) was relatively equivalent to that emitted from CHP Gas fired power stations. In the evaluation of alternative residuals processing systems for Durham and York, it was found that System 2a ***Thermal Treatment of MSW and Recovery of Energy followed by Recovery of Materials from Ash/Char*** would have the highest net life-cycle emissions of GHG, and that System 1 ***Mechanical and Biological Treatment with Biogas Recovery*** would have the least. However, it should be noted that for the purpose of evaluating systems it was assumed that with all systems only electrical energy would be recovered. If the recovery of available heat as well as electricity had been factored into the analysis, the thermal treatment systems would have had the lowest life-cycle emissions of GHG. Given the concerns regarding GHG emissions, some additional LCA modeling was undertaken and issued in the form of a supplemental memo, to the *Supporting Technical Document on Environmental Life Cycle Analysis* (May 30, 2006). The new modeling indicated that System 2a would have lower GHG emissions than a remote landfill scenario. The findings of the LCA undertaken as part of the EA Study agreed with the FOE conclusion that recycling is better than incineration in terms of climate change, and as a result the highest priority is being placed on the recovery of materials from the waste stream to reach a 60 to75% diversion target, and the evaluation of systems assumed high recovery rates for materials managed by the municipal blue box program, including the high value plastics in the waste stream. The composition of the residual waste that would be thermally treated in System 2a (or System 2b) is largely made of materials that cannot be easily recovered by source separated diversion programs or mechanical treatment and that in the most part are difficult to recycle into new materials/products.

Summary of Key Comments	Consideration
Issue: Need for a larger facility to serve additional municipalities in the GTA (including the Wesleyville Site)	The purpose of Durham and York undertaking this EA Study is to find a local solution to waste management issues so that they are not as reliant on export alternatives outside their respective municipal boundaries. Over the course of the study, it may be apparent that opportunities exist to provide excess capacity in the early stages of the planning period to neighbouring municipalities provided it would benefit the proponents and the broader environment. Municipal solid waste originating from outside the study area, particularly from smaller neighbouring communities outside the Greater Toronto Area, would offer a potential waste stream that could be managed by surplus capacity incorporated into the undertaking, should this be determined to be beneficial. The Wesleyville site falls outside of the municipal boundaries of the Regions of Durham and York. During the evaluation of "Alternative Methods", as set out in Section 6.2 of the approved EA Terms of Reference, Step 6 *"Prospective vendors of the technology(ies) will be requested to submit their qualifications and may be invited to submit their own alternative site(s) for consideration. Prospective vendor site(s), if submitted, must clear minimum compliance requirements, such as being located in Ontario, to be included on the short list of sites. Public and agency consultation will be undertaken when the short list of alternative sites has been finalized."* Therefore, should OPG wished to have the Wesleyville site included for consideration as a potential short listed site, the EA Study allowed for this option as part of the siting process.
Issue: The timeframe provided for review and consultation on the Draft Report regarding the evaluation of "Alternatives to"	A few requests for extensions to the 30-day commenting period were received from local municipalities in Durham and York. The 30-day comment period on the Draft Report is a common timeframe used in many EA Studies and by the MOE for documents that are posted publicly in accordance with the Environmental Bill of Rights for review and comment. All parties including various agencies and the general public were invited to comment on information issued throughout the EA Study process. Comments received following the presentation of the recommendations on the preferred residuals processing system to the Joint Waste Management Group on May 30, 2006, were be documented in the Record of Consultation and were addressed where appropriate as the report proceeds through committee and Council in both Regions and as the EA Study progresses. Given the potential for restrictions for waste export across the U.S. border, an extension of the review timeframes for the Draft Report on the evaluation of "Alternatives to" was not considered by the Study Team, as there were concerns regarding the need for this study to proceed expeditiously. It should be noted that a number of attendees at the public consultation sessions expressed concern regarding the length of time required to complete the EA Study and implement the preferred alternative and expressed desire that the preferred option be implemented as soon as possible.

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Section 8 Summary

To measure and evaluate the potential effects and to maximize the potential of locating a site with optimum conditions to support a Thermal Treatment Facility operation identified as the outcome of the evaluation of “Alternatives to”, the scope of the evaluation criteria to be used in the siting process must consider a broadly defined environment. Consideration of a broadly defined environment is also a requirement of the EAA, and for the purpose of this EA Study includes:

- Public Health and Safety and the Natural Environment;
- Social/Cultural Considerations;
- Economic/Financial Considerations;
- Technical Considerations; and,
- Legal Considerations.

To identify a Preferred Site, a seven-step Facility site selection process, outlined in Figure 8-1 has been applied. This step-by-step methodology was originally presented in the Approved EA Terms of Reference.

Section 8 of the EA Study document on “Alternative methods” is structured to reflect this seven step methodology. Site selection started with a review of the entire study area to identify those areas considered to be generally suitable for the purpose of locating a Thermal Treatment Facility. These generally suitable areas were then systematically evaluated to identify a Long-list of sites followed by additional screening and comparative steps to narrow that list down to a preferred siting option. The following describes the major steps used in this evaluation process:

Step 1 - Prior to initiation of the evaluation of “Alternative methods” and after a preferred approach (“Alternative to”) had been identified by the EA Study, the proposed evaluation methodology and criteria were reviewed in consultation with the public and agencies. This review sought additional input on the proposed evaluation steps and evaluation criteria presented in the EA Terms of Reference and sought to establish and confirm the priorities to be considered during the evaluation.

Step 2 - The starting point for the area screening process was to identify the boundaries of the study area within which a suitable site could be identified. For this siting process, the study area being considered included all lands within the regional boundaries of Durham and York. Initiation of the Proposed Thermal Treatment Facility (the Facility) siting process began with the delineation of the limits of the broad area, within the Regions of Durham and York that consisted of features and land uses considered unsuitable for the establishment of a Thermal Treatment Facility. It was important to conduct this high level screening early in the planning process to focus effort within potentially suitable areas, such as designated industrial lands, and to avoid and prevent undue disruption on unsuitable areas, such as significant natural features, agricultural lands and existing residential areas.

The result of this second step was the identification of areas within the study area that were considered generally suitable for the purposes of locating a Thermal Treatment Facility.

Step 3 - To identify potential sites within the remaining areas, considered potentially suitable for the establishment of a Thermal Treatment Facility, the minimum required site size was determined. The determination of the number of sites required and a minimum site size was essential to Step 4 when initiating the identification of sites to provide a minimum site size to prospective property owners.

Step 4 - Following the identification of potentially suitable areas, and determination of the minimum site size and configuration requirements, potential siting opportunities within the potentially suitable areas that would meet the minimum site size requirements were identified.

Step 5 - Following Step 4, the number of sites was reduced to a Short-list for comparison in greater detail. For the purpose of this level of study, sites were deemed unsuitable for further consideration if they exhibited significant technical, social and/or environmental disadvantages relative to other sites on the list considering an established set of initial comparators. Sites that passed through this evaluation step did not exhibit any obvious disadvantages of significance and were included on a Short-list of alternative sites that was carried forward to Step 6 for a detailed comparative evaluation.

Step 6 - At Step 6 of the process, prospective thermal treatment technology vendors were requested to submit their qualifications through a formal RFQ process for consideration. This resulted in the identification of a short list of qualified vendors that was carried forward to the RFP process and was conducted in parallel to the EA Study process.

Step 7 - The purpose of Step 7 was to undertake a detailed evaluation of the Short-list of sites to identify a site exhibiting the preferred balance of advantages and disadvantages given the established priorities of the Regions. The assessment considered the sites as well as associated haul routes, transfer requirements and requirements for additional infrastructure to develop the site. Sites were compared based on a broad range of criteria to identify the "Preferred Site". Step 7 entailed a comparative evaluation of the Short-list sites utilizing criteria and indicators to determine potential effects.

Once the above was final and confirmed, the foundation was laid to allow for the initiation of the identification and evaluation of potential sites, ultimately leading to the identification of a preferred site.

Step 2 revealed that the areas considered as unconstrained make up a small percentage of the Durham and York study area. These areas are primarily located in Durham Region along the Highway 401 corridor and in York Region along the Highway 404 and Highway 407 corridors.

These areas consist of primarily industrial and commercial land uses, located away from city centres and suburban communities. These areas are illustrated in the following Figure 8-11.

Following the identification of potentially suitable areas and the determination of the minimum site size and configuration requirements, Step 4 was completed to identify a list of potential sites.

It was decided at the outset of this process, based on comments received from a number of agencies, that the Regions would undertake a review of both publicly owned sites, as well as willing seller sites to ensure that both public and private sector siting opportunities were explored.

This site identification process resulted in the identification of twelve (12) siting opportunities as follows:

Public Sites	"Willing Seller" Sites	
East Gwillimbury (1)	Vaughan (1)	Oshawa (2)
Clarington (2)	Pickering (1)	Clarington (3)
	Whitby (1)	Brock Township (1)

The sites identified above, were primarily located on the outer limits of urban development. Typically, when siting these types of facilities it is advantageous to locate the Facility close to where the majority of the waste is being generated. However, due to the size of the site required for this Facility and the trends in urban growth in both Durham and York (i.e., residential neighbourhoods developing in close proximity to industrial lands), the siting opportunities within the urban industrial areas were limited.

Application of the Area Screening process and Site Size requirements to the twelve public and privately owned potential sites removed five (5) sites from further consideration. The seven (7) sites that remained formed the Long-list of alternative sites.

The purpose of establishing and evaluating a Long-list of alternative sites was to reduce the number to form a Short-list that would then be compared in greater detail. It is important to conduct this level of evaluation to ensure that only sites with a reasonable chance of being selected would undergo the more detailed comparative evaluation process. For each of the Long-list sites, data was collected, reviewed and applied in accordance with the Long-list evaluation factors identified below:

- Proximity to Required Infrastructure.
- Site Accessibility.
- Potential Impacts of Haul Route(s).
- Site Size.
- Land Use Compatibility.

- Site Availability.
- Potential Impacts on Unregulated Airports.

In accordance with the Approved EA Terms of Reference, the evaluation of the Long-list of alternative sites incorporates a comparative evaluation process.

It was originally envisioned in the Approved EA Terms of Reference (Step 6) that potential technology vendors would be provided the opportunity to submit a site along with their technology during the RFQ process. Under the advisement of procurement and legal counsel, it was determined that these two processes (submission of a site and submission of technology qualifications) should be completed as two entirely separate processes. Completing these processes as part of the same competitive process could represent an unfair advantage to those vendors offering both a site and technology versus only those vendors providing a technology and thereby could jeopardize the success of the competitive process.

By "uncoupling" the RFQ and RFP processes from the siting process, it allowed for a more "fair" process to those involved and also allowed for the completion of siting activities in advance of a formal RFQ/RFP process for technology(ies). The siting component of Step 6 was addressed through the development of a Request for Expressions of Interest (REOI) to potential technology vendors to provide the opportunity for this group to offer up a site through a formal competitive process as described in the approved EA Terms of Reference.

Following consultation on the Short-list of potential sites, a detailed comparative evaluation of the sites was initiated. This assessment considered a broad range of potential impacts from the sites as well as from the haul routes, transfer requirements and requirements for additional infrastructure to develop the sites.

Step 7 utilized criteria and indicators to measure potential effects. Selection of siting preferences considered relative advantages and disadvantages based on net effects after the consideration of mitigation measures reasonably available to address the potential of an effect being realized.

The evaluation criteria applied at this Step were organized into 5 categories:

- Public Health and Safety and Natural Environment;
- Social and Cultural;
- Economic / Financial;
- Technical Suitability; and,
- Legal.

Based on the consideration of the advantages and disadvantages, the Recommended Preferred Site for the proposed Thermal Treatment Facility is Clarington 01 (Figure 8-30). This Site is considered to represent the preferred balance of advantages and disadvantages based on the priorities associated with each of the environmental considerations.

The Clarington 01 Site (the Site) consists of undeveloped land owned by the Region of Durham that is located on the west side of Osborne Road, south of Highway 401 and north of a CN Rail corridor in the Municipality of Clarington. There are commercial properties north of the Site. The lands east and west of the Site are undeveloped and are currently used for agricultural purposes. The Courtice Water Pollution Control Plant, which was completed in 2007, is situated just south of the Site and the Darlington Nuclear Generating Station is located approximately 1.8 kilometres to the east. The nearest major intersection is Highway 401 and Courtice Road, which is approximately 1.7 kilometres from the Site. The Site is approximately 12.1 hectares in area and is located in the Clarington Energy Business Park.

The following provides a list of the key advantages related to the Clarington 01 Site:

- Provides the shortest round-trip distances traveled for the transportation of waste resulting in the highest haul cost savings of all the sites;
- Provides the least potential impact to water quality when compared to all other sites;
- No on-site hazard lands or other natural features that could constrain development;
- No potential aquatic habitat onsite;
- Most compatible with surrounding land uses when compared to the other sites;
- Furthest from a designated residential area (existing or planned);
- Close to potential market for heat (both existing and future potential); and,
- Owned by Durham and property acquisition is not required.

The following provides a list of the key disadvantages related to the Clarington 01 Site where mitigation measures will potentially be required:

- Potential disadvantage with respect to the Site’s close proximity to Highway 401 and the vehicular emissions related to this transportation route;
- Potential does exist, as with most of the other sites, for the presence of species of conservation of concern;
- Site has a high potential for the presence of prehistoric and historic archaeological resources which is common for most properties located close to the lakeshore;
- Development of electrical infrastructure may be required to market electrical energy;
- Site requires extension of water and natural gas servicing which may require additional approvals; and,
- Haul route requires approximately 1.2 kilometres of roadway improvements.

8. Evaluation of "Alternative methods" of Implementing the Undertaking

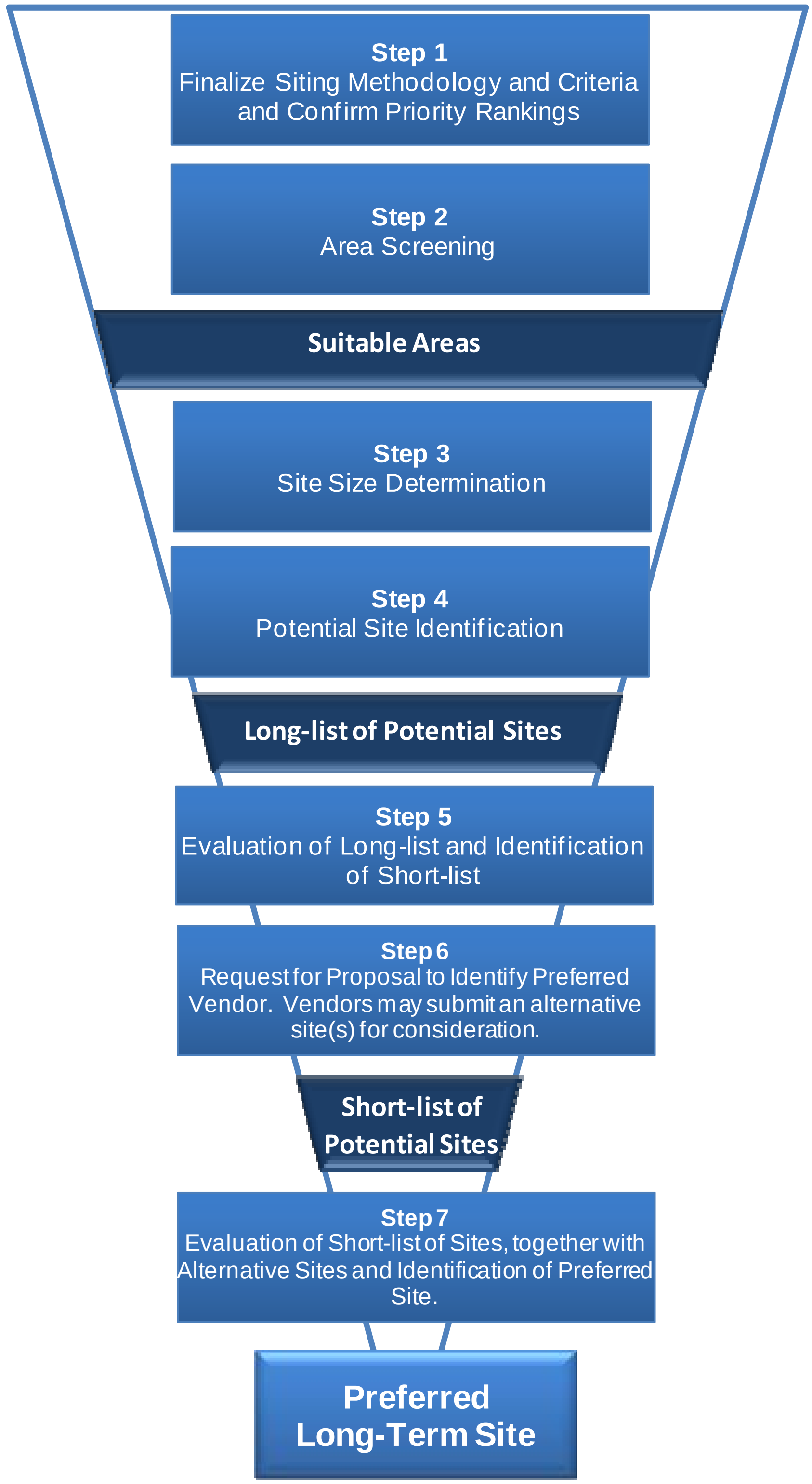
To measure and evaluate the potential impacts and to maximize the potential of locating a site with optimum conditions to support a Thermal Treatment Facility operation identified as the outcome of the evaluation of "Alternatives to", the scope of the evaluation criteria to be used in the siting process must consider a broadly defined environment. Consideration of a broadly defined environment is also a requirement of the EAA, and for the purpose of this EA Study includes:

- Public Health and Safety and the Natural Environment;
- Social/Cultural Considerations;
- Economic/Financial Considerations;
- Technical Considerations; and,
- Legal Considerations.

To identify a Preferred Site, a seven-step Facility site selection process, outlined in Figure 8-1 has been applied. This step-by-step methodology was originally presented in the Approved EA Terms of Reference and subsequently refined as the EA Study progressed. This flexibility provided in the Approved EA Terms of Reference has been discussed in Section 5 "The Planning Process" of this EA Study document.

The following subsections outline the approach taken and the results achieved in the identification of a Preferred Site for the Thermal Treatment Facility.

Figure 8-1 Overview of the Facility Siting Process



8.1 Flexibility in Application of the EA Terms of Reference

To build flexibility into the process and study methodologies approved in the EA Terms of Reference and to account for any changes that could arise during the preparation of the EA that would be required to be addressed, the following Section 9, was included in the Approved EA Terms of Reference:

> "9. FLEXIBILITY IN APPLICATION OF THE TERMS OF REFERENCE
> In the course of implementing the work proposed in this Terms of Reference, Durham and York may determine that minor adjustments to the approaches and methodologies described herein are necessary and/or appropriate. Minor adjustments may include:
>
> - *Provision and/or identification of additional information requirements;*
> - *Studies or consultation methods/events to address concerns expressed by the public as Study results become available; or,*
> - *Adjustments to the sequence of Study events which may be required depending on study results and circumstances.*
>
> *Where there is a likelihood that information or circumstances will change in the coming years as the EA is completed, this EA Terms of Reference makes reference to the intent or purpose of the consideration. Details with regards to the methods or steps to be followed to achieve the intent or purpose of the consideration are included in the background documentation that is not approved by the Minister. For example, data sources and specific indicators for the evaluation criteria are not included in the Terms of Reference but may be reviewed in the background documents if a party is interested in the types of considerations for application of the evaluation criteria.*
>
> *Where minor adjustments are contemplated, such adjustments will be undertaken at the direction of the Durham-York Joint Waste Management Group, which functions as a steering committee for the Study, and in consultation with the MOE."*

Section 9 of the Approved EA Terms of Reference describes the type of minor adjustments and process for making minor adjustments in the approaches and methodologies as outlined in the EA Terms of Reference. Where minor adjustments were contemplated, such adjustments were undertaken at the direction of the Durham-York JWMG, which functions as a steering committee for the EA Study, and in consultation with the MOE.

Throughout the course of the EA Study, it was necessary at times to make some minor adjustments to the process which was approved by the JWMG and in consultation with the MOE. These minor adjustments primarily relate to:

- The completion of additional studies to address public and stakeholder concerns. These adjustments were considered minor and have resulted in a more thorough study of the potential impacts to the broadly defined environment than was originally envisioned to be undertaken. For example, the completion of the *Generic HHERA* as a precursor to the site specific risk assessment was undertaken to assist in addressing, early in the process, questions related to the potential health impacts from a Thermal Treatment Facility located in Durham or York; and,

- The completion of additional public and agency consultation, organization of additional public meetings, committee meetings, etc. to provide a greater opportunity for public input to the process than the consultation committed to by the proponents in the Approved EA Terms of Reference.

One minor adjustment was made to the EA process, in accordance with Section 9, Paragraph 1, Bullet Point 3 of the Approved EA Terms of Reference, relating to the timing and sequencing of the Siting process and Competitive process in the assessment of "Alternative methods".

8.1.1 Alignment of the Siting and Competitive Process

It was originally envisioned in the EA Terms of Reference (Step 6) that potential technology vendors would be provided the opportunity to submit a site along with their technology during the RFQ process. In consultation with and under the advisement of procurement and legal counsel, it was determined that these two processes (submission of a site, and submission of technology qualifications) should be completed as two entirely separate processes. This advisement was identified on the basis of new information that became available to the EA Study proponent following the approval of the EA Terms of Reference. Completing these processes as part of the same competitive process was considered to represent an unfair advantage to those vendors offering both a site and technology versus only those vendors providing a technology and thereby jeopardize the success of the competitive process.

By "uncoupling" the RFQ and RFP process from the siting process, it allowed for a more "fair" process to those involved and also allowed for the completion of siting activities in advance of a formal RFQ/RFP process for technology(ies). The siting component of Step 6 was addressed through the development of a separate Request for Expressions of Interest (REOI) to potential technology vendors to provide the opportunity for this group to potentially offer up a site through a formal competitive process.

This modification was reviewed with the JWMG and in consultation with the MOE through correspondence dated January 16, 2008. In response to the Regions' request for clarification correspondence pertaining to this adjustment, the following is an excerpt from the response letter provided by the MOE on January 21, 2008:

> "In response to your inquiry, the Ministry of the Environment is of the opinion that the Regions have not deviated from Step 7 of the Durham/York Residual Waste Study EA process, *Evaluation of Alternative Methods*, in the approved Terms of Reference (ToR) to such an extent that an EA cannot be prepared in accordance with it.
>
> This is based on the information provided in your letter, dated January 16, 2008, and the ministry's understanding that Step 7 of the approved ToR has not yet been completed. Although the decision process regarding the identification of a preferred site has proceeded in advance of the decision process to identify the preferred technology, the two study paths would appear to be continuing in parallel. Provided that Step 7 has not yet been completed, and that the consideration of the preferred site and technology continue to move forward as set out in the ToR, the ministry is of the opinion that the EA can still be prepared in accordance with the approved ToR."

Ultimately, as is discussed in Section 9.0 of this EA, once a preferred Vendor had been identified, the potential impacts to the recommended Preferred Site were reconfirmed using Vendor specific data where applicable.

8.2 Step 1 – Facility Site Selection Methodology and Criteria Confirmation

The following describes the methodology and criteria applied for the site selection process and the refinements to the process resulting from the public and agency consultation.

8.2.1 Step 1 Review Process

Once the preferred "Alternative to" (i.e., Disposal System) had been identified through the EA Study, (Approved by both Regional Councils in June 2006), the evaluation criteria and methodology proposed in the EA Terms of Reference were reviewed with agencies, stakeholders and the public to:

- ensure the methodology and criteria can be suitably applied to the preferred "Alternative to";
- identify and incorporate any changes in relevant policies and legislation that may have come into effect since the EA Terms of Reference were approved, including the possibility of restrictions to the transport of residual wastes from Durham and York to the United States thereby requiring an accelerated evaluation of "Alternative methods";
- provide a final opportunity for interested parties/people to comment on the methodology and criteria prior to the initiation of the evaluation process and with the knowledge of the technology that was going to be sited (i.e., Thermal Treatment Facility);
- solicit input from the public to confirm priority rankings for each category of the environment provided by the public during the development of the EA Terms of Reference; and,
- allow the proponents to address any questions or concerns with respect to the "Alternative methods" evaluation process before its initiation.

The consultation process involved distributing the proposed evaluation process, criteria, indicators and data sources to the established list of interested public and agencies for review and comment. A series of Public Information Sessions – (i.e., three in Durham and three in York) were held and a set of two workshops; one in each of the two Regions, were held for representatives from the established Government Review Team, local Municipal Planning Departments, Conservation Authorities and other key agencies. In addition, an online poll was conducted to: test support for thermal treatment as the preferred alternative; determine issues of concern to the broader community with respect to Facility siting; and, to provide additional input on priorities regarding Facility siting. Input received from these workshop sessions was used to finalize the evaluation methodology and criteria to be utilized in the evaluation of "Alternative methods".

8.2.2 Refinements to Proposed Evaluation Process

The site selection methodology and criteria, outlined in the Approved EA Terms of Reference, were generally, accepted by the consultation participants. However, there were four (4) aspects of the site selection methodology that were refined as a result of input received during consultation.

Refinement No. 1 – Removal of Separation Distances at the Step 2: Area Screening Stage

Participants at the workshops held to consult with local agencies, on balance, were of the opinion that the proposed buffers for residential lands, institutional land uses and parks & recreational areas (300 metres) and the 120 metre buffer for natural heritage features proposed to be used in the area screening process were far too extensive resulting in the possible exclusion of potentially suitable lands. Further discussion with participants revealed that it would be reasonable to consider buffers at a subsequent step in the site selection process when a more detailed understanding of an alternative site's location, relative to surrounding land uses and features, had been established.

This refinement did not alter the intent of Step 2 in the site selection process (i.e., the delineation of "the limits of the broad area considered generally unsuitable for the purpose of locating the preferred system thereby focusing on generally suitable areas"). Alternative siting opportunities were examined more closely at Step 5 of the process where each prospective site was examined relative to the compatibility of adjacent land uses, accessibility and proximity to servicing among other factors. Further, the Short-list of prospective sites was subjected to a more detailed comparative evaluation based, in part, on criteria that considered land use compatibility, the proximity of sensitive natural heritage features and the potential effects on residential areas and institutional land uses. The separation distances between each site and incompatible features and land uses was a key component in the comparative evaluation of alternative Short-list sites and selection of the preferred siting alternative.

Refinement No. 2 – Consideration of Sites within the Greenbelt Plan Area

A number of the consultation participants, in particular, those representing Durham and York Regional and Area Municipal Planning Departments indicated during Step 1 that there may be an opportunity to consider prospective public or private sites within the Greenbelt Plan area. The overall intent of the Greenbelt Plan (i.e., the protection and enhancement of specialty and prime agricultural areas, natural heritage features and open space connections and cultural heritage resources) within the Greater Golden Horseshoe is well established through its "Protected Countryside" and other land use policies. The Greenbelt Plan, however, also acknowledges that public "infrastructure" (which includes waste management systems and electric power generation and transmission), is fundamental to the economic well-being of southern Ontario and would be permitted to occur within "Protected Countryside" areas subject to these uses conforming to the applicable policies of the Greenbelt Plan. The Greenbelt Plan also acknowledges that the expansion and development of infrastructure facilities that serve inter-regional needs will be required in the future. The Greenbelt Plan states that all infrastructure approved under the EAA is permitted within the "Protected Countryside" provided it serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt and conforms to the applicable polices of the Greenbelt Plan.

The location of a potential site within designated "Protected Countryside" areas under the Greenbelt legislation was listed as an exclusionary feature for the purpose of Step 2 of the site selection methodology. However, the Study Team decided that potentially suitable sites located in the Greenbelt Plan area would be considered for further review and public comment. Further, opportunities to expand an existing component of Durham's and/or York's solid waste management system located within the Greenbelt Plan area would also be considered in order to utilize existing resources. This approach would accommodate the possible identification of additional siting opportunities and reflect that this type of infrastructure is not prohibited under the Greenbelt Plan. It was decided that any potential sites that were considered in this manner would be brought forward for further public input and comment on this aspect as part of the consultation process for the Short-list of potential sites.

Refinement No. 3 – Completion of Steps 4.1 (Identification of Publicly Owned Sites) and 4.2 (Identification of "Willing Seller" Sites) simultaneously

It was determined at the outset of this process, based on comments received from a number of agencies that the Regions would undertake a review of both publicly owned sites, as well as "willing seller" sites to ensure that both public and private sector siting opportunities were explored. This was accomplished through discussions with Regional staff representatives and the completion of two (2) calls for "willing sellers". It was the intention of both Regions that by soliciting interest from a much broader range of property owners, that a "longer" list of sites could be developed offering a greater range of alternatives and opportunities.

Refinement No. 4 – Separation of the Siting Process from the Competitive Process

It was originally envisioned in the EA Terms of Reference (Step 6) that potential technology vendors would be provided the opportunity to submit a site along with their technology during the RFQ process. Under the advisement of procurement and legal counsel, it was determined that these two processes (submission of a site, and submission of technology qualifications) should be completed as two entirely separate processes. Completing these processes as part of the same competitive process could represent an unfair advantage to those vendors offering both a site and technology versus only those vendors providing a technology and thereby jeopardize the success of the competitive process.

By "uncoupling" the RFQ and RFP process from the siting process, it allowed for a more "fair" process to those involved and also allowed for the completion of siting activities in advance of a formal RFQ/RFP process for technology(ies). The siting component of Step 6 was addressed through the development of an REOI to potential technology vendors to provide the opportunity for this group to potentially offer up a site through a formal competitive process as described in the Approved EA Terms of Reference.

Confirmation of Net Energy Generation Potential

In the supporting documents to the approved EA Terms of Reference and in Table F-2 of the approved EA Terms of Reference, the ability of all the technologies being considered to generate sufficient energy to supply more than what is required to sustain the facilities own internal operations is discussed.

Through the evaluation of "Alternatives to", the ability to generate energy was confirmed as it also confirmed that the quantity of energy would be sufficient to market to external sources resulting in an environmental and economic benefit. As a result, to take advantage of this environmental and economic benefit, the proximity to required infrastructure (considering both the electrical grid connection and distance to a heat and/or steam load) were confirmed as appropriate to carry forward in the evaluation of "Alternative methods":

8.2.3 Confirmed Process for Evaluation of "Alternative methods"

Step 1 – Review of Evaluation Methodology and Criteria

As described in Section 8.2.1.

Step 2 - Area Screening

The starting point for the area screening process was to identify the boundaries of the Study Area in which a suitable site could be identified. For this siting process, the study area being considered included all lands within the municipal boundaries of Durham and York. The Facility siting process began with the delineation of the limits of the broad area, within Durham and York, that consisted of features and land uses considered unsuitable for the establishment of a Thermal Treatment Facility. It was important to conduct this high level screening early in the planning process to focus effort within potentially suitable areas, such as designated industrial lands, and to avoid and prevent undue disruption on unsuitable areas, such as significant natural features, agricultural lands and existing residential areas.

The result of this second step was the identification of areas within the Study Area that were considered generally suitable for the purposes of locating a Thermal Treatment Facility.

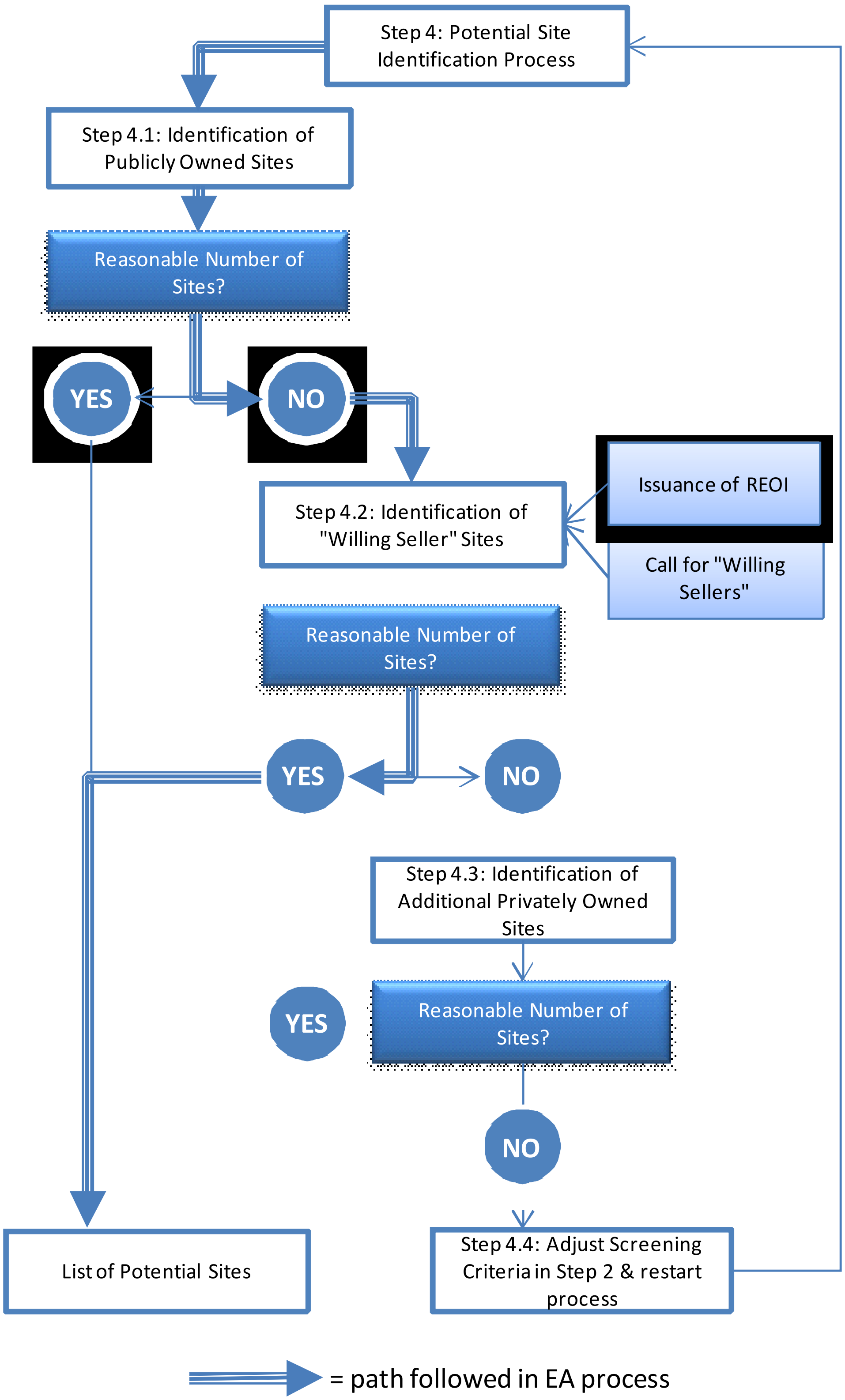
Step 3 - Site Size and Configuration Determination

To identify potential sites within the remaining areas, considered potentially suitable for the establishment of a Thermal Treatment Facility, the minimum required site size was determined. The determination of the number of sites required as well as a minimum site size were essential to Step 4 when initiating the identification of sites to provide a minimum site size to prospective property owners.

Step 4 - Methodology & Criteria: Potential Site Identification

Following the identification of potentially suitable areas, and determination of the minimum site size and configuration requirements, Step 4 sought to identify potential siting opportunities within the potentially suitable areas that would meet the minimum site size requirements. Figure 8-2 outlines the Step 4 site identification process. To establish a range of siting opportunities, it was anticipated that the first two measures in Steps 4.1 and 4.2 (i.e., identification of publicly owned and "willing seller" sites) would be pursued at a minimum.

Figure 8-2 Overview of Step 4 – Potential Site Identification



Step 5 - Evaluation of Long-list & Identification of Short-list of Sites

Following the identification of potential sites, the number of sites that were compared in greater detail was reduced to a Short-list of sites. For the purpose of this level of study, sites were deemed unsuitable for further consideration if they exhibited significant technical, social and/or environmental disadvantages relative to other sites on the list considering an established set of initial comparators. Sites that passed through this evaluation step did not exhibit any obvious disadvantages of significance and were included on a Short-list of alternative sites and were carried forward to Step 6 for a detailed comparative evaluation.

The Long-list evaluation criteria used to identify sites for the Short-list are listed in greater detail in Table 8-6.

Step 6 - Engaging Vendors of the Preferred Technology

At Step 6 of the process, prospective thermal treatment technology vendors were requested to submit their qualifications through a formal RFQ process for consideration. This resulted in the identification of a short list of qualified vendors that were carried forward to the RFP process.

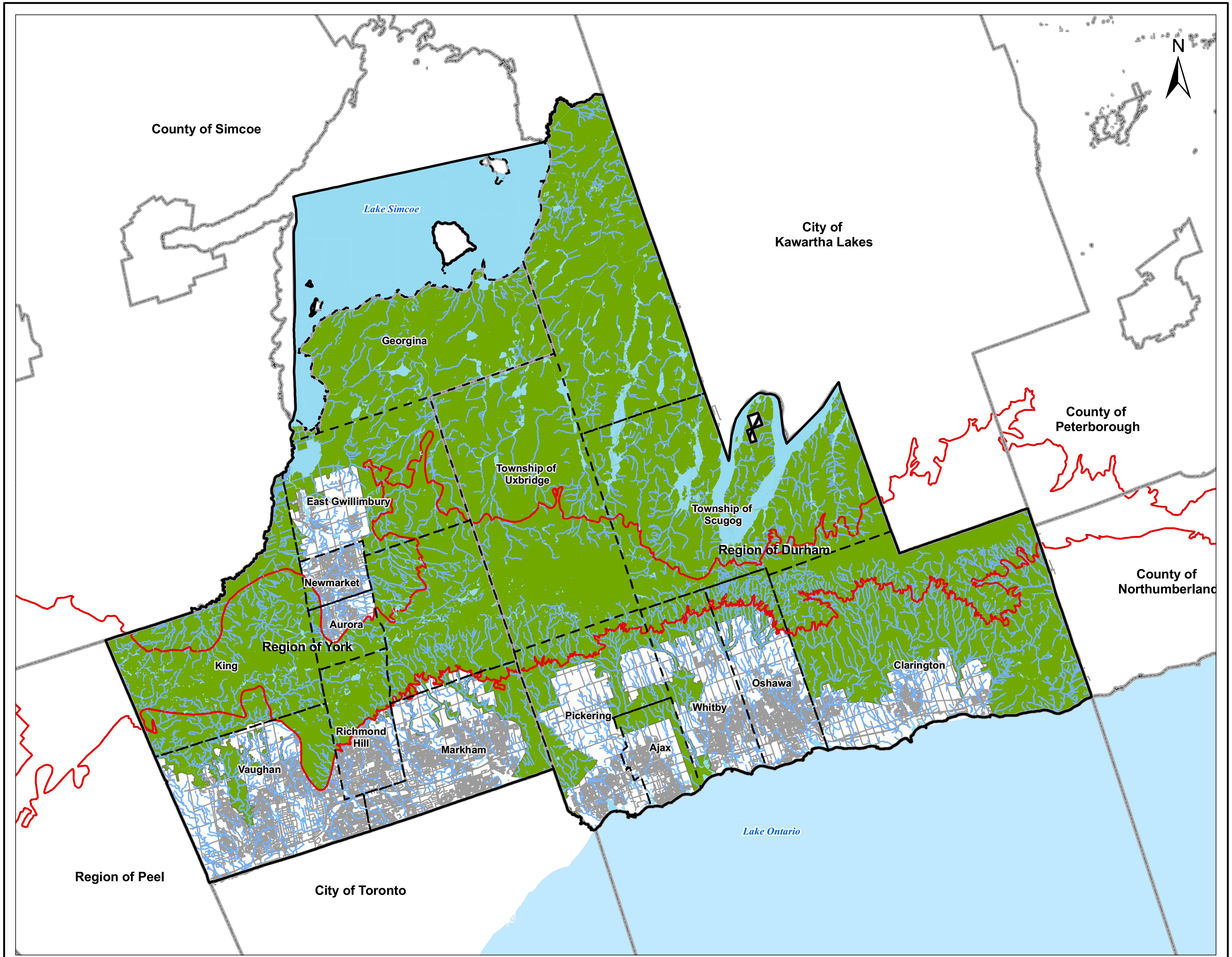
Step 7 - Evaluation of Short-list of Alternative Sites

The purpose of Step 7 was to undertake a detailed evaluation of the Short-list of sites to identify a site exhibiting the preferred balance of advantages and disadvantages given the established priorities of Durham and York. The assessment considered the sites as well as the haul routes, transfer requirements and requirements for additional infrastructure to develop the site. Sites were compared based on a broad range of criteria to identify the "Preferred Site". Step 7 entailed a comparative evaluation of the Short-list sites utilizing criteria and indicators to determine potential effects. The criteria and indicators have been included in Table 8-17.

Once the above was finalized and confirmed, the foundation was laid to allow for the initiation of the identification and evaluation of potential sites, ultimately leading to the identification of a preferred site.

8.3 Step 2 – Study Area Screening

Following the confirmation of the siting evaluation methodology and criteria at Step 1, the next step was to define the boundaries in which a suitable site could be identified. For this siting process, the Study Area considered included all lands within the regional boundaries of Durham and York (see Figure 8-3).



YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Basemap

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Road
Watercourse
Oak Ridges Moraine Boundary Line
Greenbelt Plan Area 2005
Waterbody
Local Municipal Boundary
Regions of York and Durham

0 5 10 15
Kilometres -1:400,000
1009497-019

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FIGURE NO.
8-3

Last Modified: May 27, 2009 By: S.Allen

8.3.1 Purpose of the Screening Process

Initiation of the area screening process began with the delineation of the limits of the broad area, within Durham and York that consisted of features and land uses considered unsuitable for the establishment of a Thermal Treatment Facility. It was important to conduct this high level screening early in the planning stage to ensure that only sites located within potentially suitable areas, such as designated industrial lands, underwent the detailed comparative evaluation process. This screening process ensured that unsuitable areas, such as significant natural features, agricultural lands and existing residential areas were not considered further in the siting process. The result of this process was the identification of areas within Durham and York that were considered generally suitable for the purposes of locating the preferred Thermal Treatment Facility.

8.3.2 Data Collection and Application of the Screening Criteria

In order to delineate the areas within Durham and York that would be considered unsuitable for the establishment of a Thermal Treatment Facility, a significant amount of spatial data collection was required. For each of the criteria identified in the Approved EA Terms of Reference and confirmed in Step 1, a variety of data sources were identified and incorporated into a Study Geographic Information System (GIS) database. These screening criteria were clearly defined at the outset of the evaluation of "Alternative methods" in Step 1 and were provided to stakeholders and agencies for input/comment prior to the initiation of Step 2.

In Step 2, the criteria listed in Table 8-1 and outlined in detail in Table 8-2 were used to delineate the areas within Durham and York that would be considered unsuitable for the establishment of a Thermal Treatment Facility. These criteria are consistent with established federal, provincial and municipal land use planning policies and appropriately address the treatment of particular land uses. The list of land use designations for exclusion in the siting process was developed based on a review of applicable Official Plans/Municipal Policy Plans and Federal/Provincial statutes and regulations.

The areas remaining and that are considered potentially suitable for locating a Thermal Treatment Facility are therefore considered representative of current land use regulations and policies applicable in the Study Area. Table 8-1 below outlines the preliminary exclusionary criteria that were identified in the Approved EA Terms of Reference, Appendix "F", Table F-1.

Table 8-1 Preliminary Exclusionary Criteria for the Identification of Suitable Areas

- Exclude designated[1] lands located within areas protected by Provincial/ Federal legislation.
- Exclude designated residential areas and areas within an appropriate separation distance[2] of these designations.
- Exclude designated Natural Heritage Features and Areas and areas within an appropriate separation distance of these designations. Examples include:
  - Significant Habitat of Endangered and Threatened Species;
  - Significant Areas of Natural and Scientific Interest;
  - Significant Wetlands, Woodlands, etc.;
  - Designated Hazard Land; and,
  - Conservation Areas.
- Exclude Prime Agricultural Lands.
- Exclude designated Park/Recreational Lands and areas within an appropriate separation distance of these designations.
- Exclude Institutional facilities and areas within an appropriate separation distance of these facilities or lands (e.g. schools, hospitals).
- Exclude areas around federally regulated airports as per Transport Canada Guidelines.

[1] Designated refers to land uses and related policies as set out in Federal/Provincial Statues and Regulations and applicable Municipal Official Plans/Municipal Policy Plans. These designations will be clearly defined at the outset of the evaluation of "Alternative methods".

[2] Appropriate separation distances will be defined following the identification of the preferred "Alternative to" and in consultation with the public, agencies and the MOE.

Table 8-2 Area Screening Criteria and Rationale

Criteria	Constraint	Rationale
Exclude designated lands located within areas protected by Provincial/ Federal legislation	• Remove areas protected by Provincial/ Federal legislation from further consideration.	• Areas protected by Provincial/Federal legislation are significant features that are typically a combination of geological and ecological features.
Exclude designated residential areas	• Identify designated residential areas in official plans and remove them from further consideration.	• Designated residential areas are not compatible land uses for a waste processing facility. To reduce the potential impacts from the Facility(ies) during construction and operation, the Facility should be located a suitable distance from designated residential areas.
Exclude designated Natural Heritage Features including: Significant Habitat of Endangered and Threatened Species; Significant Areas of Natural and Scientific Interest; Significant Wetlands, Woodlands, etc.; Designated Hazard Lands; and, Conservation Areas	• Identify designated Natural Heritage Features and Areas (including Significant Habitat of Endangered and Threatened Species and Species at Risk; Significant Areas of Natural and Scientific Interest; Significant Wetlands, Woodlands, etc.; Ground water Discharge/Recharge Areas; Wellhead Protection Areas and Infiltration Areas; Designated Hazard Lands; and, Conservation Areas) and remove them from further consideration.	• Designated Natural Heritage Features and Areas contain both valuable natural environmental and ecological resources and offer natural environment oriented outdoor education and recreational amenities. These functions can be compromised by waste processing Facility activities.
Exclude Prime Agricultural Lands	• Identify lands designated for agricultural use in local or regional official plans and remove from further consideration.	• The Provincial Policy Statement requires that *Prime Agricultural Areas* (i.e., those areas predominated by specialty crop lands and/or Canada Land Inventory Classes 1, 2, and 3 soils) be protected for agriculture. Permitted uses and activities in these areas are: agricultural areas; secondary uses and agriculture-related uses. Proposed new secondary uses and agriculture-related uses will be compatible with, and will not hinder, surrounding agricultural operations. • For this study, waste processing facilities are considered an inappropriate use of prime agricultural land and incompatible with prime agricultural areas as defined in local official plans.
Exclude designated Park / Recreational Lands	• Identify designated Park / Recreational Lands and remove them from further consideration.	• Park land and/or recreational establishments with a significant outdoor component are generally not compatible with waste processing facilities, in particular with the potential noise, dust and odour nuisance impacts from these facilities. Special consideration may be given to outlying recreational uses which are primarily indoor and which may directly benefit from one or more of the products from a waste processing facility.

Criteria	Constraint	Rationale
Exclude institutional facilities or lands (e.g. schools, hospitals)	• Identify institutional facilities or areas and remove them from further consideration.	• Sensitive institutional facilities tend to be located in built-up areas, which are not compatible with waste processing facilities. Depending on the type of institution and scope of the waste processing operation, the institution itself may be sensitive to and incompatible with a waste processing facility.
Exclude areas around federally regulated airports as per Transport Canada Guidelines	• Exclude regulated lands around an airport, which fall under the *Federal Aeronautics Act*.	• The Federal Aeronautics Act and Transport Canada guidelines prohibit the use of land outside an airport property boundary where such land uses are hazardous to aircraft operations (i.e., organic waste at waste processing sites that may either attract birds or adversely affect flight visibility).

To identify "unconstrained" areas, each of the exclusionary criteria was mapped separately and the resulting constraint maps were consolidated to identify those areas that are considered "unconstrained" (See Figures 8-4 through 8-10).

8.3.3 Identification of Potentially Suitable Areas

Areas considered unconstrained comprised a small percentage of the study area. These areas were located primarily along the Highway 401 corridor in Durham and along the Highway 404 and Highway 407 corridors in York and consisted primarily of industrial and commercial land uses, located away from city centres and suburban communities.

Following the application of the area screening criteria, it was determined that the following municipalities had areas where a Thermal Treatment Facility could potentially be sited:

- City of Pickering
- Town of Ajax
- Town of Whitby
- City of Oshawa
- City of Clarington
- Town of Aurora
- Town of East Gwillimbury
- Town of Markham
- Town of Richmond Hill
- City of Vaughan
- Town of Newmarket

Figure 8-11 shows the unconstrained areas within the Study Area, following the application of the area screening criteria.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Areas Protected by Provincial/Federal Legislation

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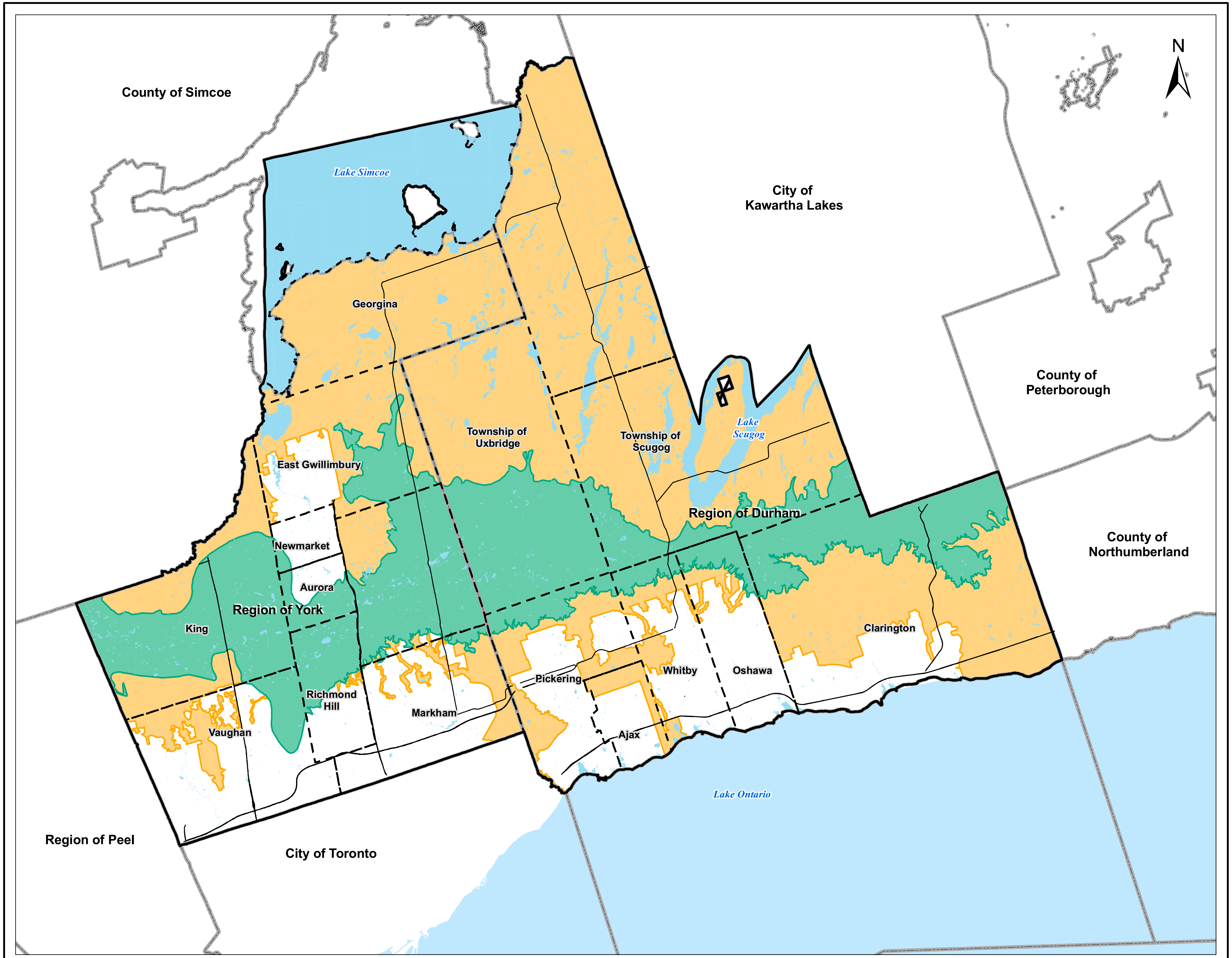

- Freeway
- Oak Ridge Moraine
- Protected Area
- Waterbody
- Local Municipal Boundary
- Regions of York and Durham
- Municipal Boundary

0 5 10 15
Kilometres -1:400,000

1009497-070

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FIGURE NO.
8-4

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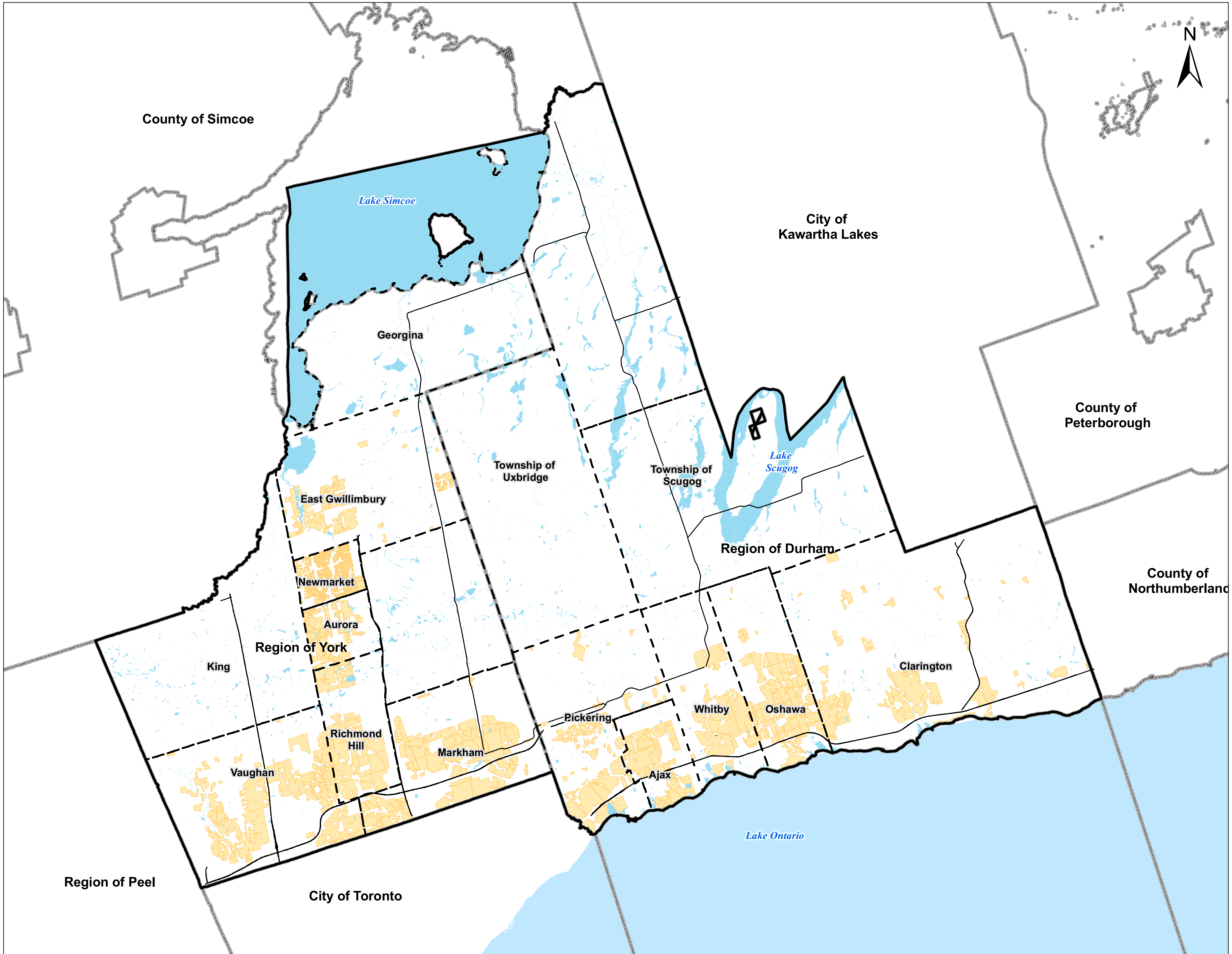
YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Designated Residential Areas



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- Freeway
- Residential Area
- Waterbody
- Local Municipal Boundary
- Regions of York and Durham
- Municipal Boundary

0 5 10 15
Kilometres -1:400,000

1009497-065

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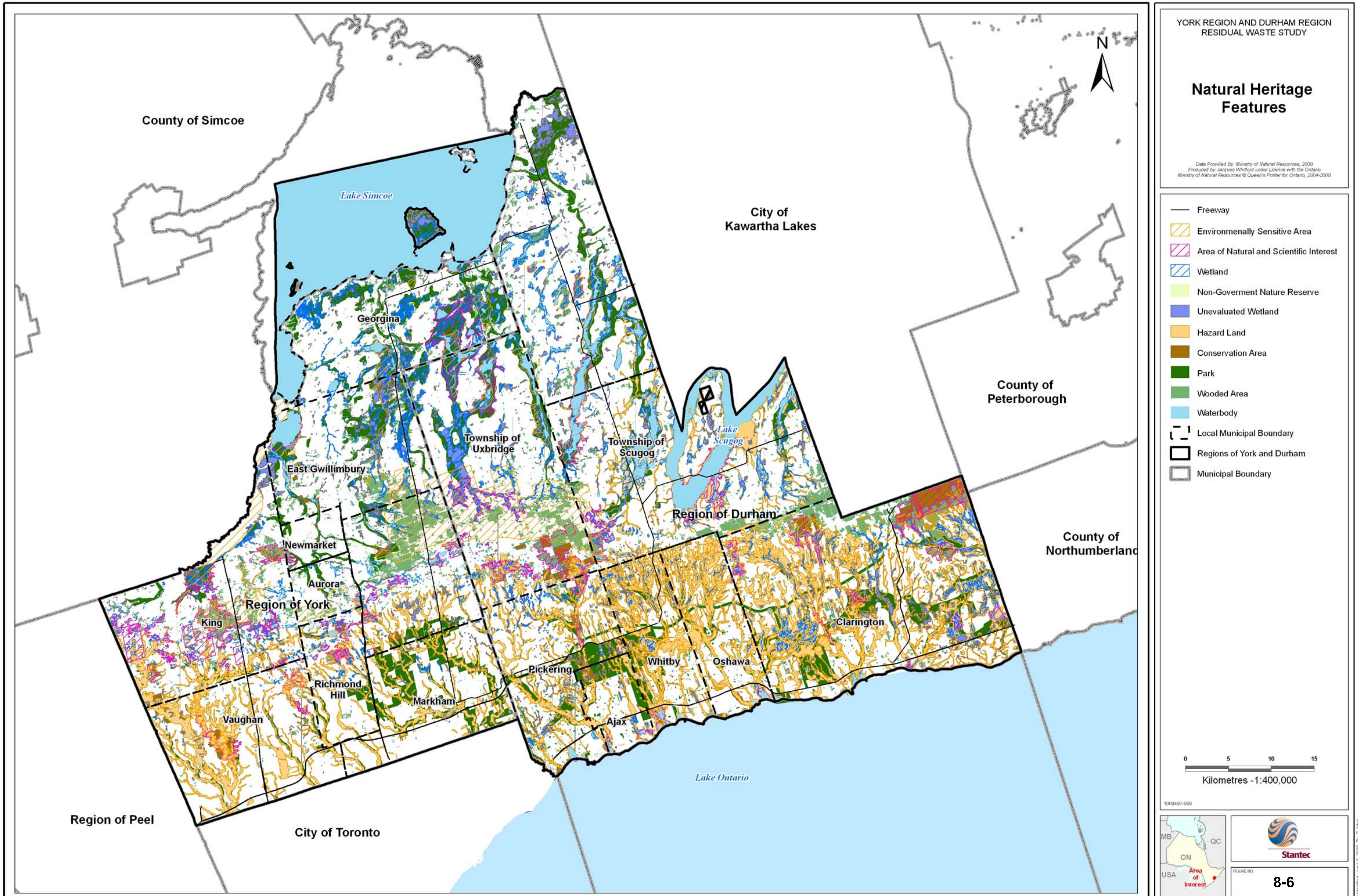
FIGURE NO.
8-5

Last Modified: June 9, 2009 By: S.Allen


YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY
Natural Heritage Features
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N
Freeway
Environmentally Sensitive Area
Area of Natural and Scientific Interest
Wetland
Non-Goverment Nature Reserve
Unevaluated Wetland
Hazard Land
Conservation Area
Park
Wooded Area
Waterbody
Local Municipal Boundary
Regions of York and Durham
Municipal Boundary
0
5
10
15
Kilometres -1:400,000
1009497-068
County of Simcoe
Lake Simcoe
City of Kawartha Lakes
County of Peterborough
County of Northumberland
Georgina
Township of Uxbridge
Township of Scugog
Lake Scugog
East Gwillimbury
Region of Durham
Newmarket
Aurora
Region of York
King
Clarington
Pickering
Whitby
Oshawa
Richmond Hill
Markham
Vaughan
Ajax
Lake Ontario
Region of Peel
City of Toronto
MB
QC
ON
USA
Area of Interest
Stantec
FIGURE NO.
8-6
Last Modified: June 9, 2009 By: S Allen

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Prime Agricultural Areas

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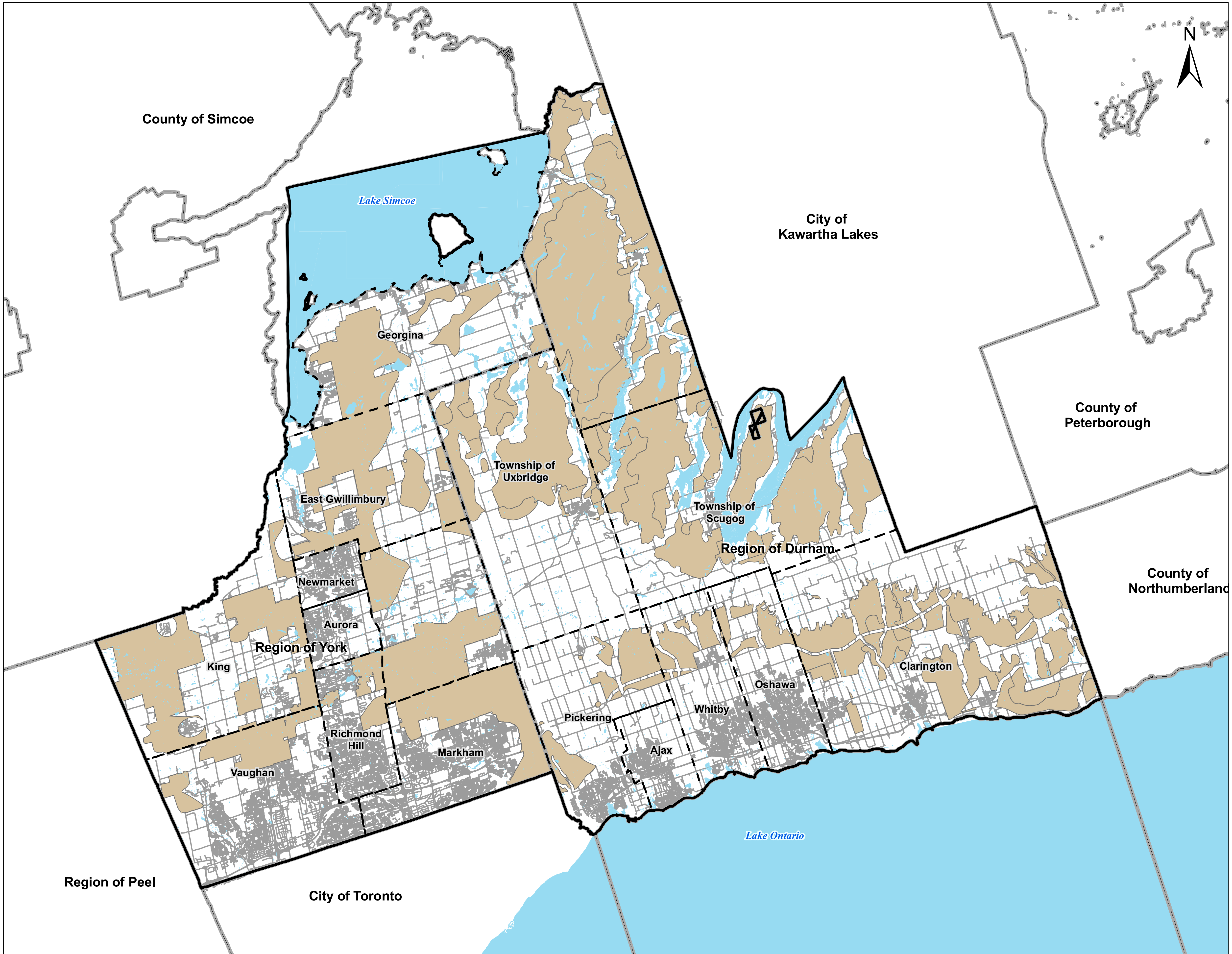

Road
Agricultural Land
Waterbody
Local Municipal Boundary
Regions of York and Durham
Municipal Boundary

0 5 10 15
Kilometres -1:400,000

1009497-066

Stantec

FIGURE NO.
8-7

Last Modified: June 9, 2009 By: S.Allen

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Park/Recreational Lands

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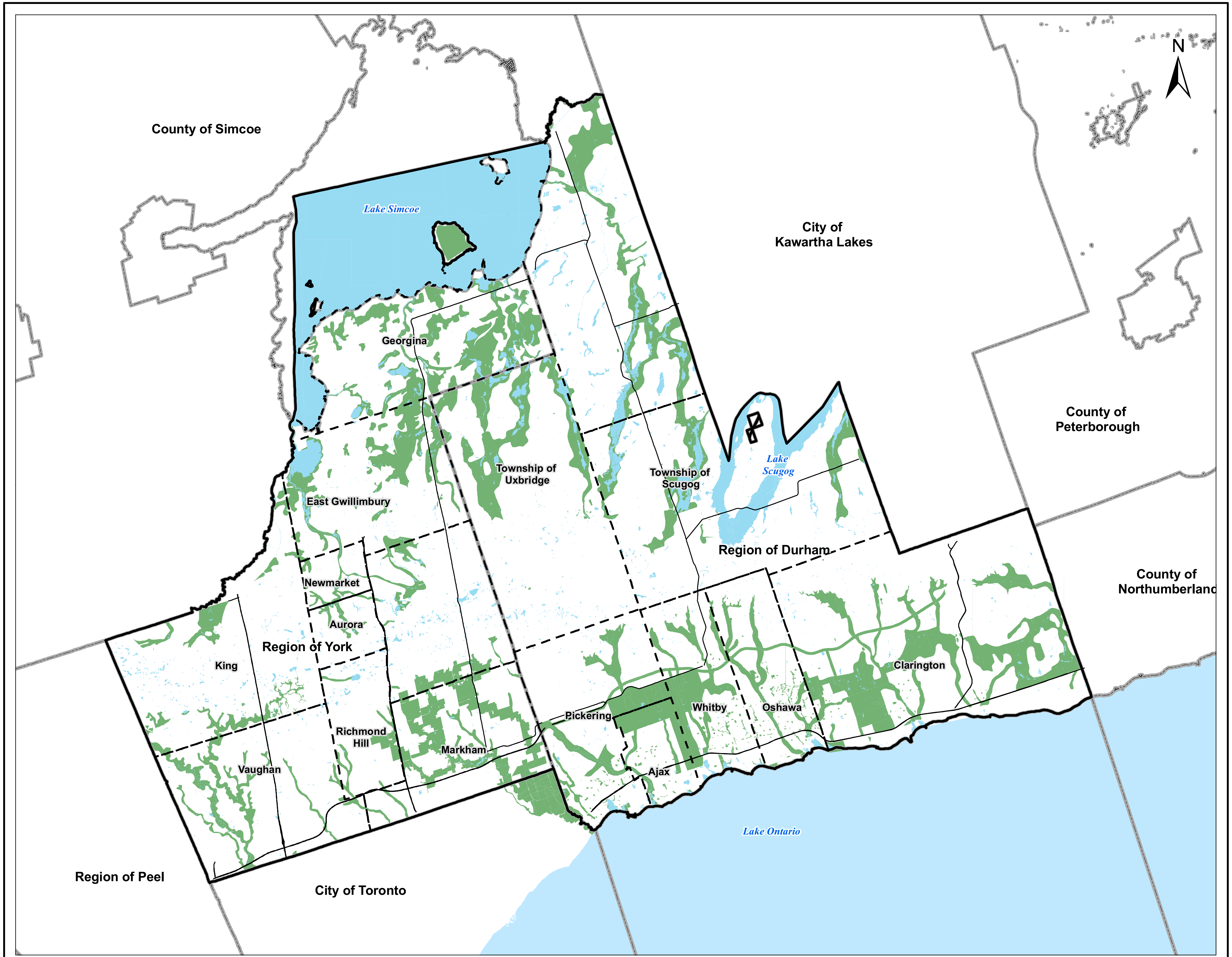

Freeway
Park/Recreational Area
Waterbody
Local Municipal Boundary
Regions of York and Durham
Municipal Boundary

0 5 10 15
Kilometres -1:400,000

1009497-067

Stantec

FIGURE NO.
8-8

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YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Institutional Facilities

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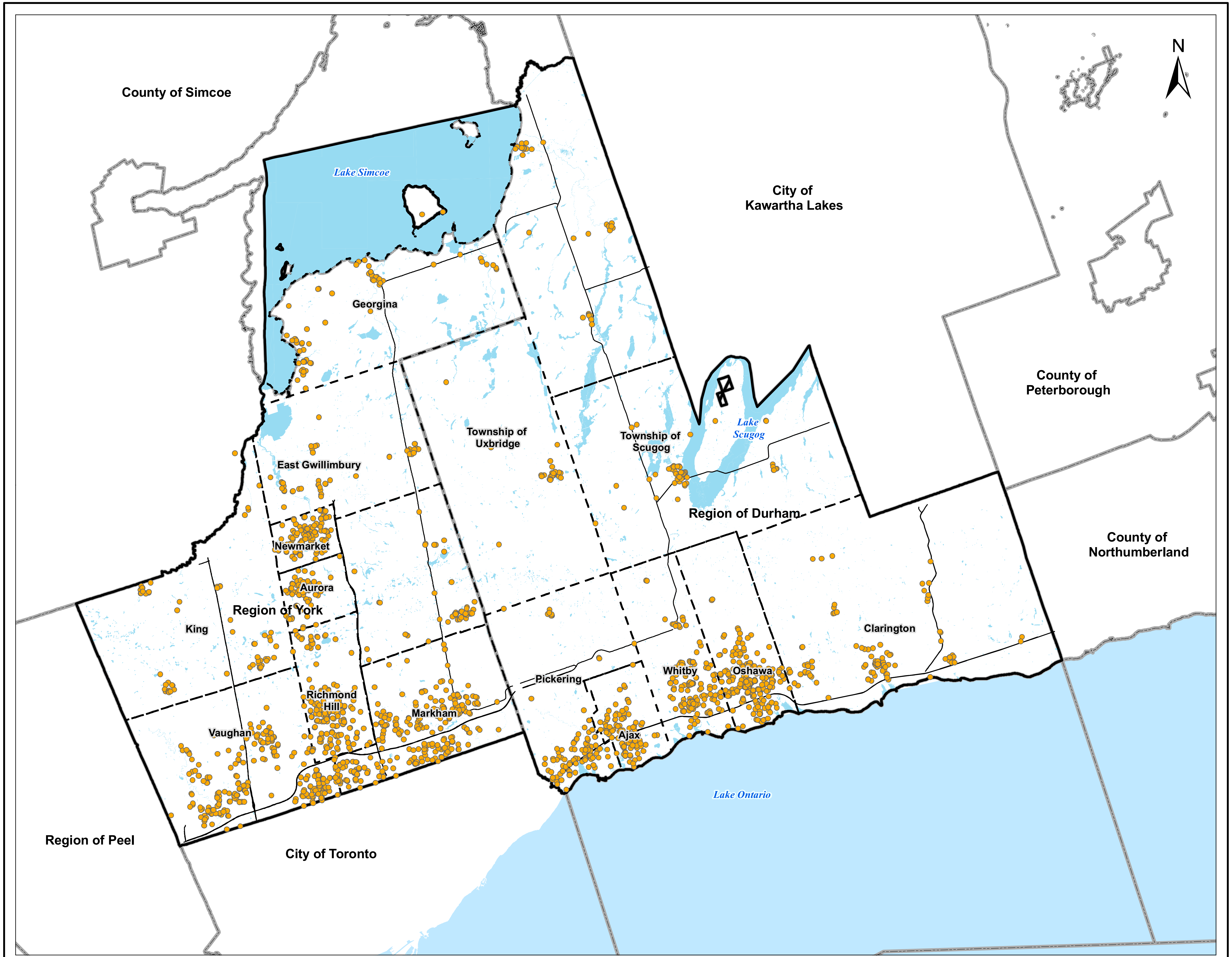

- Institutional Facility
- Freeway
- Waterbody
- Local Municipal Boundary
- Regions of York and Durham
- Municipal Boundary

0 5 10 15
Kilometres -1:400,000

1009497-069

MB QC ON USA Area of Interest

Stantec

FIGURE NO. 8-9

Last Modified: June 9, 2009 By: S.Allen

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Federally Regulated Airport Land and Flight Paths

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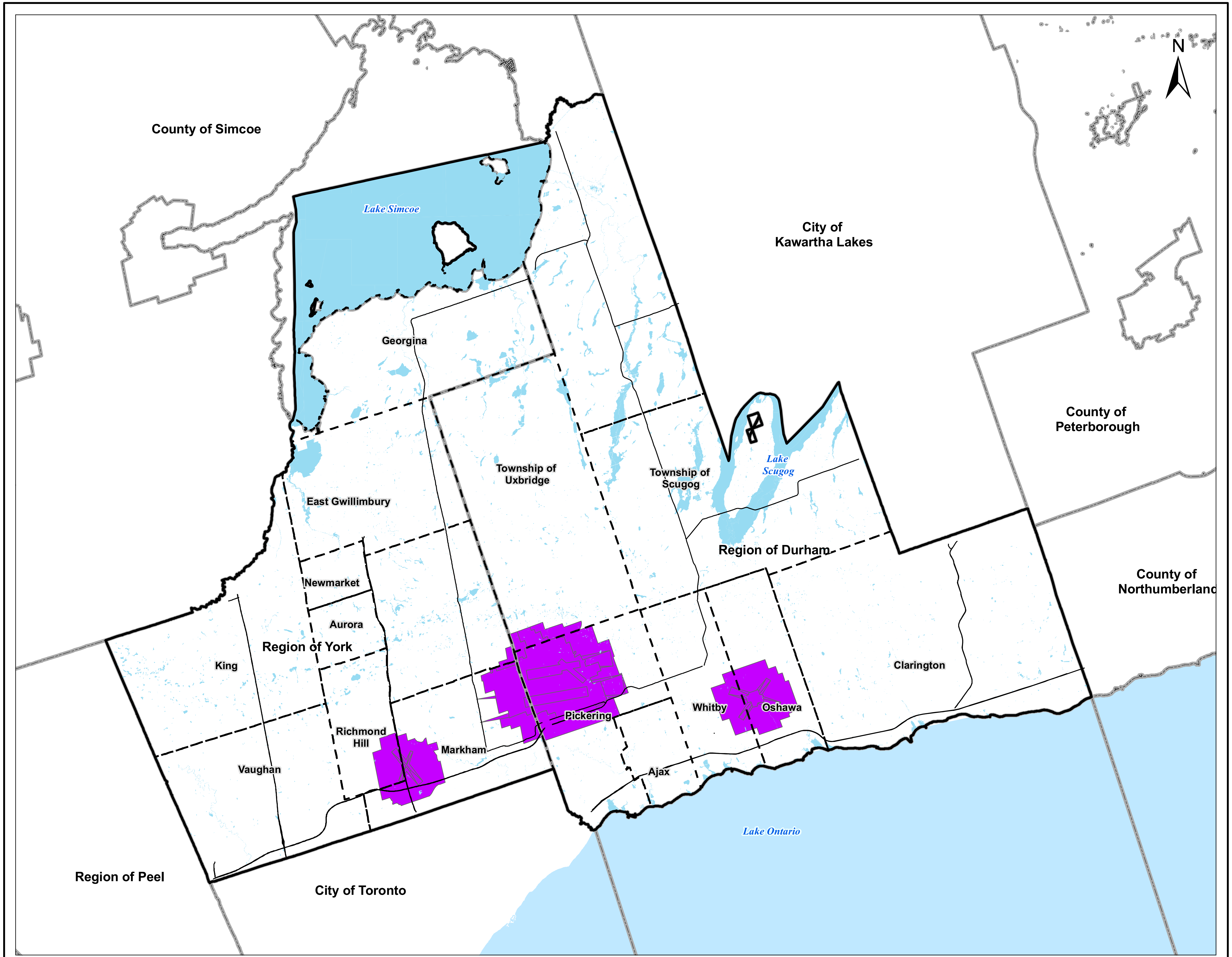

- Freeway
- Federal Airport Flight Path
- Waterbody
- Local Municipal Boundary
- Regions of York and Durham
- Municipal Boundary

0 5 10 15
Kilometres -1:400,000

1009497-064

Stantec

FIGURE NO.
8-10

Last Modified: June 12, 2009 By: S.Allen

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Application of Step 2 Area Screening Criteria

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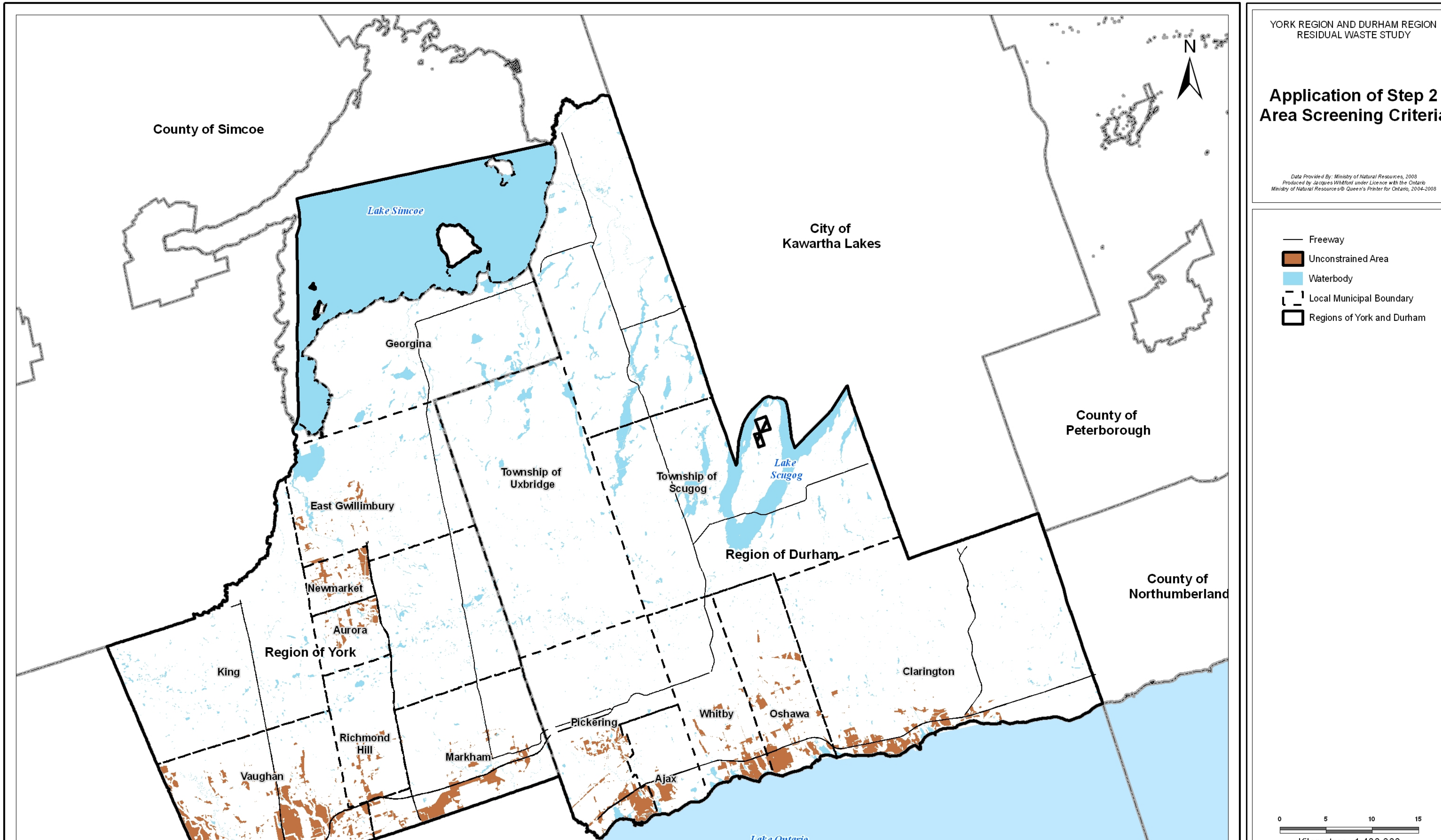


1009497-031

Stantec

FIGURE NO.
8-11

Last Modified: May 27, 2009 By: S.Allen

8.4 Step 3 – Determination of Required Site Size

To identify potential sites within the potentially suitable areas, site composition (i.e., single vs. multiple siting for the Facility) together with the size requirements for the Facility and ancillary uses were considered based on the following factors:

- type of technology to be sited (i.e., the Preferred "Alternative to") together with technology-specific requirements;
- design throughput of a Facility considering the need for contingency capacity, the management of seasonal variations in municipal waste generation and the possibility of establishing capacity for IC&I wastes or wastes from a neighbouring municipality;
- typical set back requirements from property boundaries (i.e., residences, roads, utilities, etc.), which may be specified in local municipal zoning by-laws;
- the minimum buffer area that is required around the site to secure environmental approvals;
- information provided by vendors of the preferred technology(ies) on site size requirements; and,
- conceptual layout for a Facility and onsite ancillary features (i.e., roads, weigh scale, administration facilities, etc.) that corresponds with the decisions made regarding the above considerations. This conceptual layout is important to ensure the configuration of a potential site (i.e., shape) is suitable for the Facility.

8.4.1 Single Site versus Multiple Site Approach

During the evaluation of the alternative systems, it was assumed that all systems would be represented as a single Facility in one location that comprised all residuals processing system component functions. For comparative evaluation, it was key that the same fundamental assumptions such as 'single facility, single site' be applied to all of the systems under comparison.

At that time, based on the experience of the Study Team, it was determined that:

- A 'single facility, single site' system configuration represented the most efficient system configuration and would provide the economies of scale sought in the Durham/York EA Study;
- In general, a 'single facility, single site' configuration also represented the configuration which would be expected to have a lower potential for environmental and social impacts, as the total land area required and number of potential receptors that could be impacted by the systems increases as the number of sites required for each system increases.

Additional rationale supporting this approach can be found in the Technical Memorandum in the *Thermal Facility Site Selection Process Results of Steps 1-5 Identification fohte "Short-List" of Alternative Sites* (March 2007).

8.4.2 Thermal Treatment Facility Footprint

The following is a description of how the "footprint" for the preferred thermal treatment alternative was determined for the purposes of identifying siting alternatives.

Facility Capacity

The Thermal Treatment Facility was sized based on a projected demand for the thermal treatment of residual MSW. A maximum design capacity equal to 400,000 tonnes per year (tpy) of residual waste over the course of the 35- year planning period for the Study was assumed. It was also assumed that the Facility would operate 24 hours per day and 7 days per week.

The quantity of waste requiring disposal is expected to increase throughout the 35-year planning period for the Study and the rate at which this quantity will increase depends on a number of factors including:

- whether or not Durham and York achieve a diversion rate of 60% by 2011;
- whether or not higher diversion rates are achieved during the planning period;
- whether there is potential for managing post-diversion residual waste from neighbouring non-GTA municipalities or I.C.& I. wastes;
- economic growth and other factors which could result in higher overall quantities of waste requiring disposal over the planning period; and,
- initiatives, such as extended producer responsibility, which could result in lower quantities of waste requiring disposal over the planning period.

For the purposes of determining alternative sites, it was assumed, as previously stated, that a maximum design capacity of 400,000 tpy would be required at some point during the 35-year planning period to accommodate the quantity of waste to be processed.

Facility Components

For the purposes of sizing a Facility and site, the predicted ultimate requirement of three process units (capacity of 400,000 tpy) were used in determining the Facility's footprint. The Facility was broken down into the following process components:

- Waste Receiving;
- Waste Bunker;
- Incineration;
- Air Pollution Control (APC);
- Air-Cooled Condenser;
- Ash Processing/Storage;
- Access Bay; and,
- Miscellaneous Areas (including turbine/generator, fly ash storage, switchyard and administration areas).

Figure 8-12 provides a conceptual plan of a Facility showing each of the above process components and used to determine the site-size requirements for the purposes of identifying alternative sites.

Figure 8-12 Conceptual Plan of a Thermal Treatment Facility

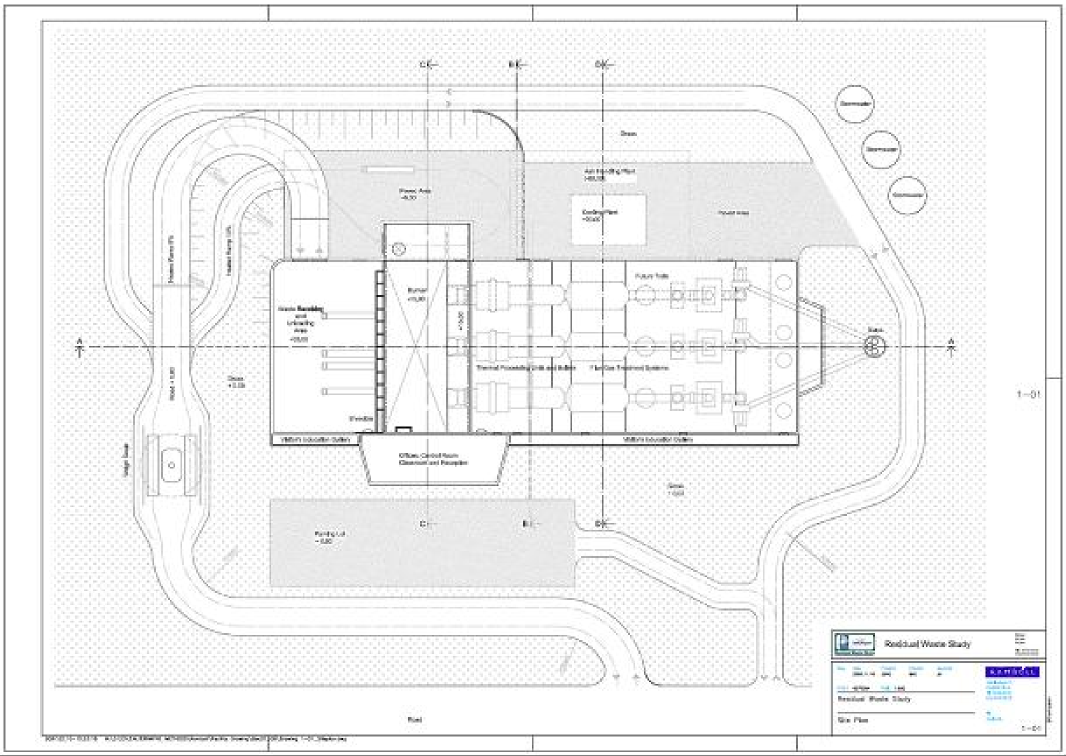
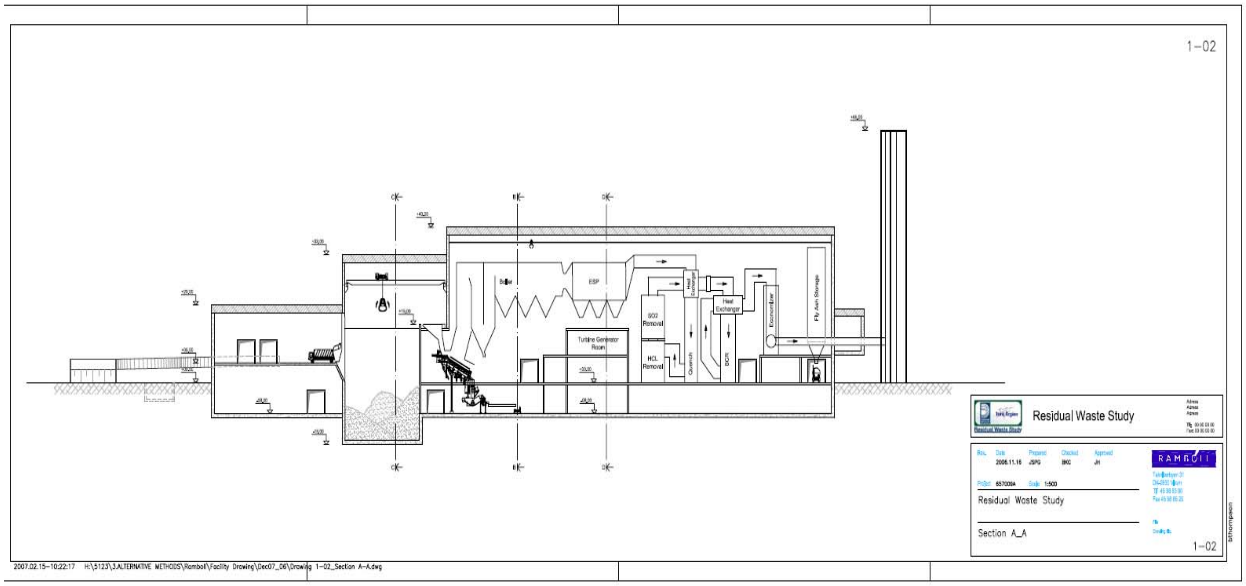


Figure 8-13 provides an elevation view of this conceptual Thermal Treatment Facility. The "footprint" area, for the purposes of the EA Study, was defined as a rectangle having length and width dimensions corresponding to the maximum length and maximum width in the Facility layout to accommodate the above process components. The area required for each of the Facility components was estimated using information from existing facilities and process technology vendor data and were considered "typical" of existing facilities.

Figure 8-13 Elevation View of Conceptual Thermal Treatment Facility



Variations in component area dimensions were expected depending on the process technology equipment manufacturer(s) ultimately chosen and Facility layout design variations. The overall footprint as outlined in Figure 8-12 is an estimated size of 220 metres (m) long by 125 metres (m) wide.

On-Site Buffer Requirements and Overall Site Size

Waste management facilities such as MRFs, transfer stations, organics processing facilities and thermal treatment facilities are known to be located on widely varying site sizes, regardless of Facility capacity. In Europe and Japan for example, where available land is scarce, many Thermal Treatment Facilities are constructed with virtually no onsite buffer and these plants exist in urban settings with no apparent adverse effects on the community.

For the purposes of the subject siting process, a range of site sizes was identified based on assumed onsite buffering around the identified footprint for a Facility.

The conceptual plan shown in Figure 8-12 and Figure 8-13 of a 400,000 tpy Facility is accommodated on a 9.1 hectare (ha) site and has a buffer of 80 m on three sides of the Facility and 40 m on the fourth side. This was used to define the minimum site size requirements.

An assumed 100 m buffer on all sides of the Facility would provide for substantial onsite truck queuing, potentially eliminating the need for truck queuing along public roadways.

In terms of offsite impacts, a 100 m buffer was recommended to be used in the site identification process to mitigate potential impacts leading to fewer complaints from nearby receptors.

The total site area based on the Facility footprint developed above (220 m x 125 m) and a buffer of 100 m on all sides of the footprint is 13.7 hectares (i.e., 420 m x 325 m).

The selection of a 100 m buffer is consistent with the MOE recommended separation distance between composting facilities and residences/public institutions. This buffer dimension was, therefore, considered conservative because odour impacts at a Thermal Treatment Facility are expected to be less than from a composting operation.

Onsite buffers also provide space for typical waste management Facility site requirements, including:

- onsite roads for waste delivery trucks and, preferably, separate roads for administrative/operating staff, maintenance personnel, Facility visitors;
- extended onsite roadway for waste delivery truck queuing at the weigh scales;
- large transfer trailer vehicle movements (turning radii);
- weigh scales and scalehouse;
- parking;
- stormwater management features (storm pond); and,
- berms and landscaping.

The site size range developed above was 9.1 – 13.7 ha. To verify the suitability of this range, research was completed on a number of representative European Thermal Treatment Facilities (see Table 8-3 below). The facilities identified are all modern and have comparable capacities to that under consideration in the subject EA Study.

Table 8-3 Additional European EFW Facility Site Sizes

Plant	Approximate Annual Capacity	Site Size	Ratio Site Size: Annual Capacity
	(tpy)	(m^2)	m^2/tpy
ASM Brescia, Italy	700,000	130,000	0.19
AEB Amsterdam, Holland	750,000	170,000	0.23
SYSAV, Sweden	600,000	140,000	0.23
Nordforbraending, Denmark	150,000	40,000	0.27
Uddevalla, Sweden	200,000	80,000	0.40

A “stand-alone” Facility with provision for expansion up to 400,000 tpy, with onsite ash processing, stormwater management facilities, parking for 100 vehicles, onsite roads for full management and queuing of waste and ash vehicles, buffer zones and set-backs would require the maximum size in the range. However, a smaller parcel of land at the lower end of the range, may still be capable of meeting the minimum Facility size and infrastructure requirements where some required infrastructure may already exist on a companion site or where the potential exists for infrastructure sharing between neighbouring sites.

8.5 Step 4 – Potential Site Identification

Following the identification of potentially suitable areas and the determination of the minimum site size and configuration requirements, Step 4 was completed to identify a list of potential sites. To establish this list of sites, siting opportunities were identified in the following order:

- Step 4.1 - Identification of Publicly Owned Sites
- Step 4.2 - Identification of “Willing Seller” Sites

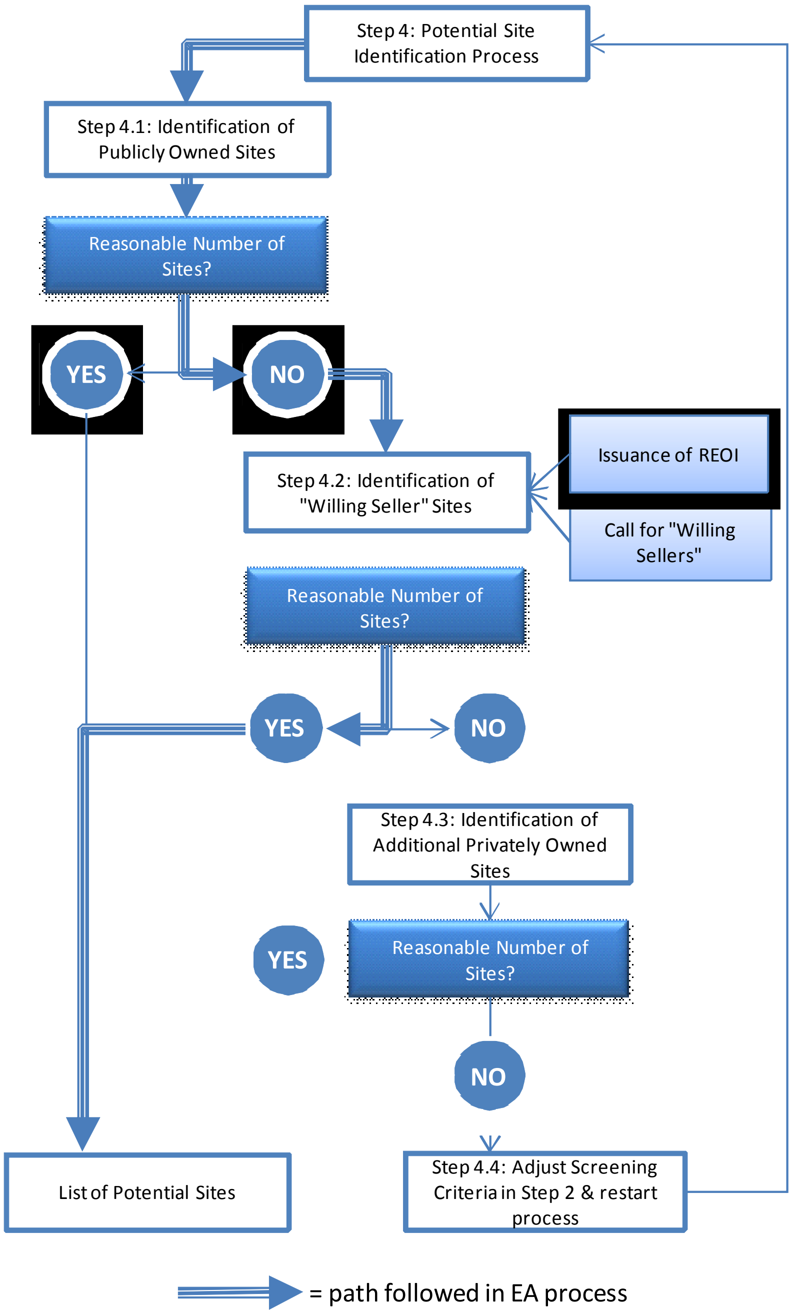
It was decided at the outset of this process, based on comments received from a number of agencies that the Regions would undertake a review of both publicly owned sites, as well as “willing seller” sites to ensure that both public and private sector siting opportunities were explored.

The Approved EA Terms of Reference also provided for additional site identification opportunities, if required, as outlined below.

- Step 4.3 - Identification of Additional Privately Owned Sites (Negotiated)
- Step 4.4 – Adjust Screening Criteria and Re-apply

There is no set guideline for what constitutes a reasonable number of sites on which to conduct preliminary investigation, however, following the completion of Steps 4.1 and 4.2 it was determined that a suitable number of sites, offering a reasonable range of alternatives and features were identified and therefore the need to identify additional sites through Steps 4.3 and 4.4 (see above) was not required. Figure 8-14 outlines the Step 4 identification process.

Figure 8-14 Overview of Step 4 – Potential Site Identification



8.5.1 Step 4.1 Identification of Publicly Owned Sites

Publicly owned sites that were considered surplus or were unused or undeveloped within the suitable areas as defined in Step 2 that appeared to meet the minimum site size requirement, (Step 3) were identified through discussions with both Durham and York Real Estate and

Economic Development departments and through contact with other public agency representatives (as demonstrated in Section 8.5.2)

8.5.2 Step 4.2 Identification of "Willing Seller" Sites

In addition to publicly owned land, sites where the owner would be interested in selling the site ("willing sellers") were also identified and considered as potential sites. In order to qualify as a "willing seller" the site must have been offered for consideration by the owner of the subject property and the owner had to be prepared to enter into an agreement with Durham and/or York.

To identify potential sites that met the "willing seller" criteria, the Regions undertook two (2) calls for "willing sellers" as described below:

November 2006 - "Call for Willing Sellers"

On November 21, 2006 Durham and York issued a "Call for Willing Sellers" (the "Call") to a wide range of agencies that may be interested in identifying a site to be considered as part of this process. Distribution included the following:

- Area Municipal Property Contacts, Planning and Public Works Directors, and Chief Administrative Officers/City Managers;
- Commercial Realtors and Real Estate Boards operating in Durham and York;
- Ontario Industrial Associations with members in Durham and York; and,
- Chambers of Commerce.

The Call identified the proposed use of the site, the initial screening criteria the site would be required to pass, minimum size of the site and some of the potential energy outputs from the Facility. As a result of this Call, five (5) sites were identified that appeared to meet the requirements of Step 2 - Area Screening Criteria and Step 3 - Site Size and Configuration Criteria. Details on these sites can be found in Section 8.5.3 of this document.

February 2007 - REOI

Based on the results of the November 2006 Call it was determined that a broader range of potentially interested parties should be contacted. On February 9, 2007 a formal REOI for "Potential Sites for a Proposed New Thermal Waste Treatment Facility for the Regions of Durham and York" was issued by the Durham Purchasing Department. The following activities were completed to advertise the REOI:

- Distribution to all those contacted in November as part of the Call;
- Distribution to major energy users within Durham and York that may provide a potential market for heat and/or steam generated at the Facility. These users were identified through a number of industrial directories and through the assistance of both Regions' Economic Development departments;

- Distribution to approximately 50 thermal treatment technology vendors who had been identified throughout the EA Study as potential respondents to a competitive process for the Facility;
- Posting on Durham's Purchasing Website; and,
- Public Notification in local newspapers.

In addition to the public notifications, two (2) information sessions were held to provide a venue for interested parties to ask questions and get more detailed information about the REOI and the study in general. The information sessions were held as follows:

- ***Information Session #1*** – Wednesday February 14, 2007 from 3 p.m. to 6 p.m. at Durham Headquarters.
- ***Information Session #2*** – Thursday February 15, 2007 from 3 p.m. to 6 p.m. at the York Waste Management Centre.

In total, 15 individuals attended the two (2) information sessions. **Appendix B** of this document contains the REOI document, the REOI notification and distribution list, and information session presentation materials. A description of the REOI information sessions can also be found in the RoC.

Issuance of the REOI to potential technology vendors also provided the opportunity for this group to potentially offer up a site through a formal competitive process as described in the Approved EA Terms of Reference (Step 6). As a result of the REOI process, an additional five (5) sites were identified. Details on these sites can be found in the following sections.

Upon the completion of Steps 4.1 and 4.2 it was determined by the Regions that additional steps would not be required, as the list of sites identified represented a range of siting alternatives sufficient to move into Step 5 of the process.

8.5.3 Alternative Sites Identified

The preceding site identification process resulted in the identification of twelve (12) alternative sites that were within the suitable areas and that appeared to meet the minimum site size requirements. The twelve (12) sites were as follows:

- five (5) sites were located in the Municipality of Clarington;
- one (1) site in the Town of Whitby;
- one (1) site in the Town of Pickering;
- two (2) sites in the City of Oshawa;
- one (1) site in the Township of Brock;
- one (1) site in the Town of East Gwillimbury; and,
- One (1) in the City of Vaughan.

These sites represented both publicly and privately owned sites in Durham and York and were considered to offer a reasonable range of opportunities and alternatives to proceed with the site evaluation process. For the purposes of the EA Study the sites were categorized as presented in Table 8-4.

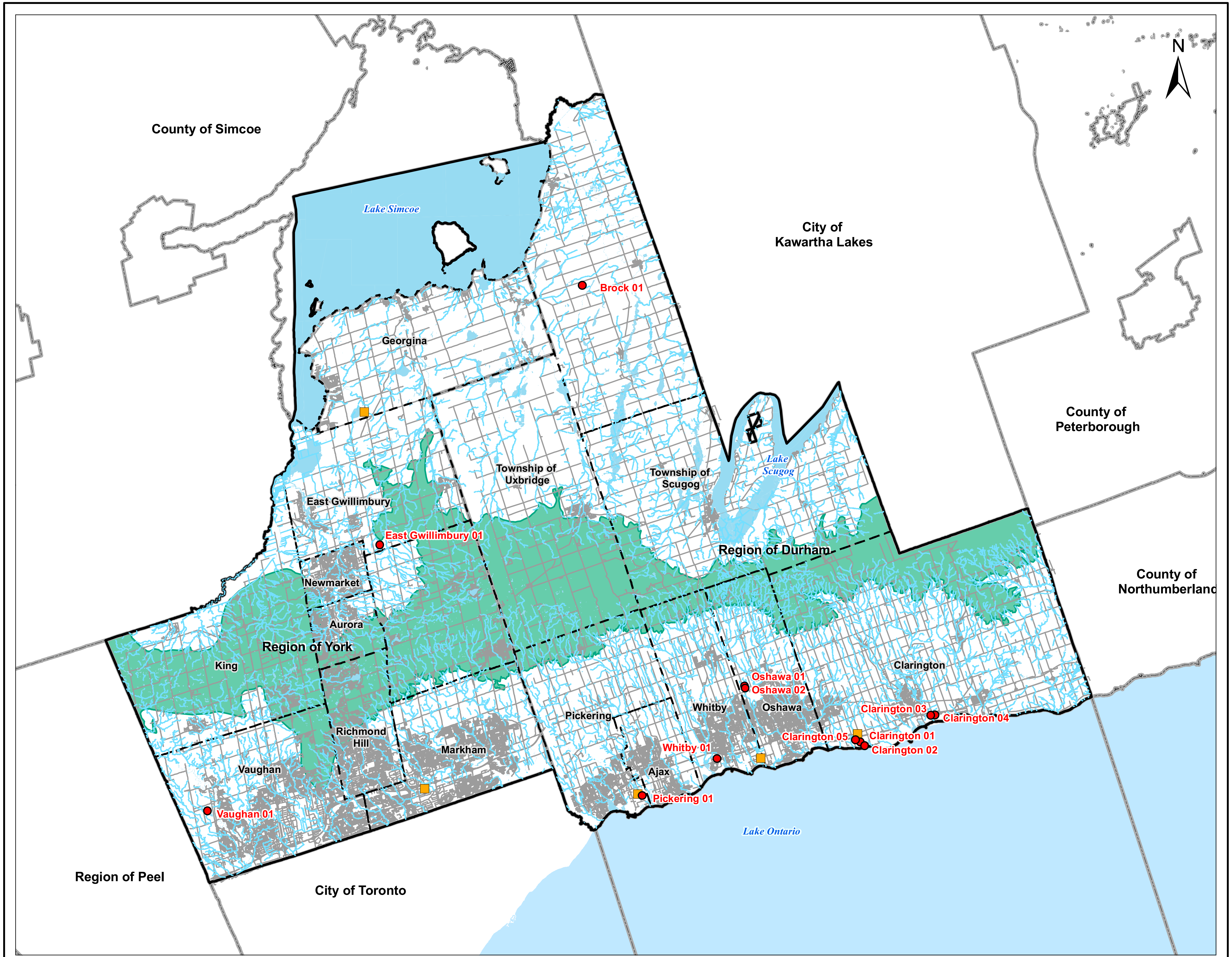
Table 8-4 Alternative Sites Identified

Site Name	Municipality	Site Location	Nearest Major Intersection
Clarington 01	Municipality of Clarington	West side of Osborne Road, North of CN Rail.	Highway 401 and Courtice Road
Clarington 02	Municipality of Clarington	South side of Osborne Road, South of CN Rail.	Highway 401 and Courtice Road
Clarington 03	Municipality of Clarington	West side of South Service Road. West of Bennett Road. South of Highway 401	Highway 401 and Bennett Road
Clarington 04	Municipality of Clarington	East/South side of South Service Road. West of Bennett Road. North of Lake Road.	Highway 401 and Bennett Road
Clarington 05	Municipality of Clarington	East side of Courtice Road, South side of Highway 401.	Highway 401 and Courtice Road
Whitby 01	Town of Whitby	East side of Montecorte Street, South of Nordeagle Avenue.	Highway 401 and Brock Street
Oshawa 01	City of Oshawa	East side of Thornton Road North, North side of Taunton Road West.	Highway 4 and Highway 52
Oshawa 02	City of Oshawa	East side of Thornton Road North, North side of Taunton Road West.	Highway 4 and Highway 52
Pickering 01	Town of Pickering	South side of Clements Road. East of Squires Beach Road.	Highway 401 and Brock Road
East Gwillimbury 01	Township of East Gwillimbury	North side of Garfield Wright Boulevard. East of Woodbine Avenue on East side of York Region Waste Management Centre.	Highway 404 and Davis Drive
Vaughan 01	City of Vaughan	East side of McGillvray Road. South of MacKenzie Drive.	Highway 27 and Rutherford Road

The following map (Figure 8-15) illustrates the locations of the alternative sites.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Alternative Sites Identified



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- Potential Site
- Transfer Station
- Watercourse
- Road
- Oak Ridges Moraine
- Waterbody
- Local Municipal Boundary
- Regions of York and Durham

0 5 10 15
Kilometres -1:400,000

1009497-030

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FIGURE NO.
8-15

Last Modified: May 27, 2009 By: S.Allen

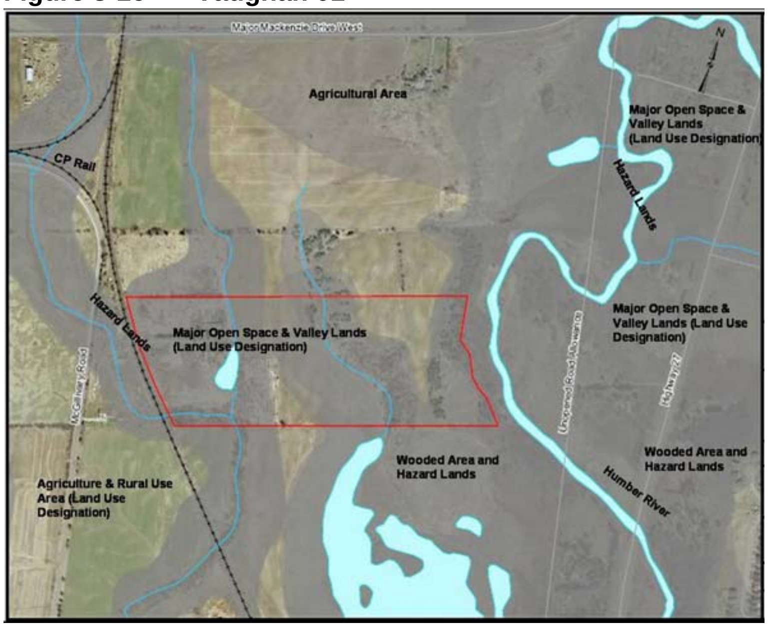
The sites identified above, are primarily located on the outer limits of urban development. Typically, when siting these types of facilities it is advantageous to locate the Facility in close proximity to where the majority of the waste is being generated. However, due to the size of the site required for this Facility and the trends in urban growth in both Durham and York (i.e., residential neighbourhoods developing in close proximity to industrial lands), the siting opportunities within the "urban" industrial areas were limited.

8.5.4 Application of Step 2 and Step 3 Screening Criteria

To confirm each identified site's ability to meet the Step 2 and Step 3 screening requirements, a more detailed examination of the sites was completed. Each site boundary was incorporated in the GIS database developed in Step 2 and then constrained areas were overlaid. The application of Step 2 - Area Screening Criteria and Step 3 Site Size and Configuration Criteria resulted in five (5) sites being removed from further consideration as follows:

- **Site Vaughan 01** – This site was heavily constrained by Natural Heritage Features including a watercourse, hazard lands and wooded areas and was therefore screened from further consideration.

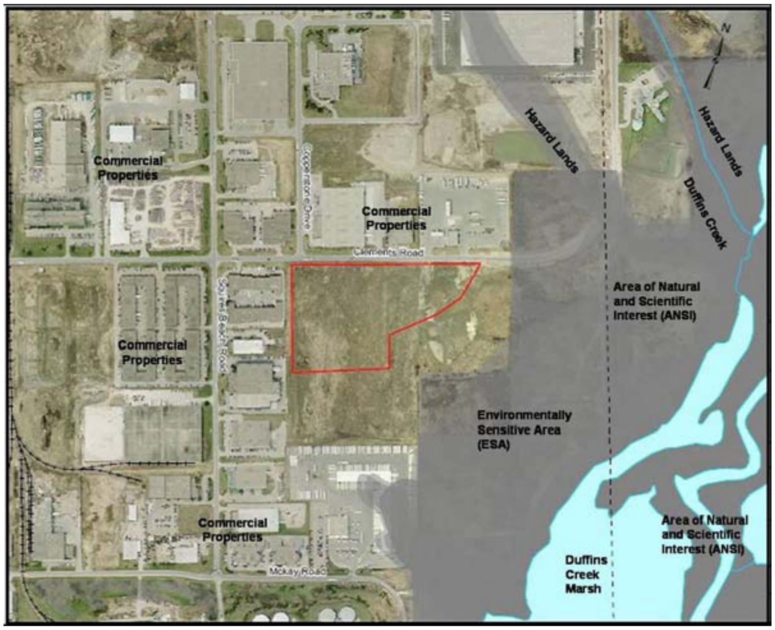
Figure 8-16 Vaughan 01



Site Address: 9751 McGillivary Rd, Vaughan, ON
Site Size: Approximately 19 hectares
Ownership: Currently listed by A. Reale Realty Ltd
Nearest Major Intersection : Hwy 27 and Rutherford Road (Approximately 2 km from site)

- **Site Pickering 01** – This site, with a total site area of 6.3 hectares, did not have sufficient area for the Facility and required onsite infrastructure and was therefore screened from further consideration.

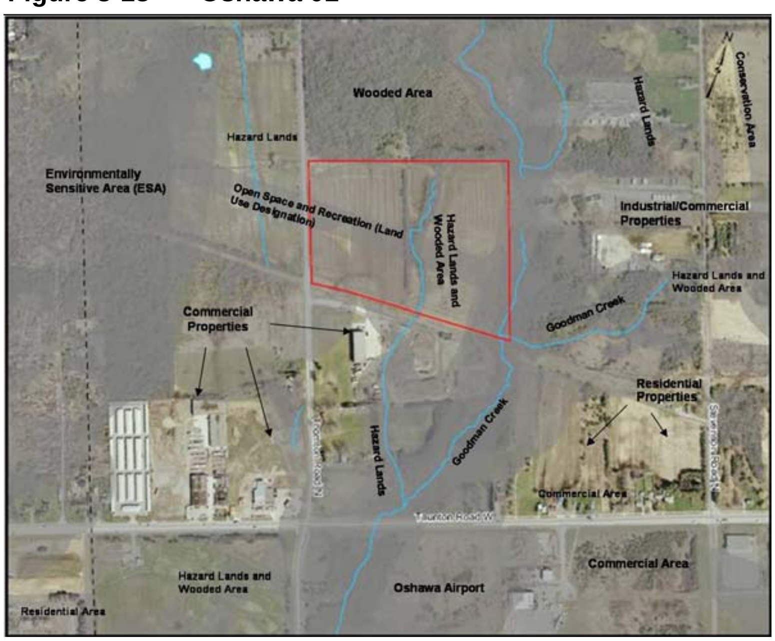
Figure 8-17 Pickering 01



Site Address: 2001 Clements Rd, Pickering, ON	
Site Size: Approximately 6.3 hectares	
Ownership: Currently listed with J.J. Barnicke	
Nearest Major Intersection : Hwy 401 and Brock Road (Approximately 2.7 km from site)	

- **Site Oshawa 01** – This site was heavily constrained by Natural Heritage Features including a watercourse, hazard lands and a designated Environmentally Sensitive Area (ESA) and was therefore screened from further consideration.

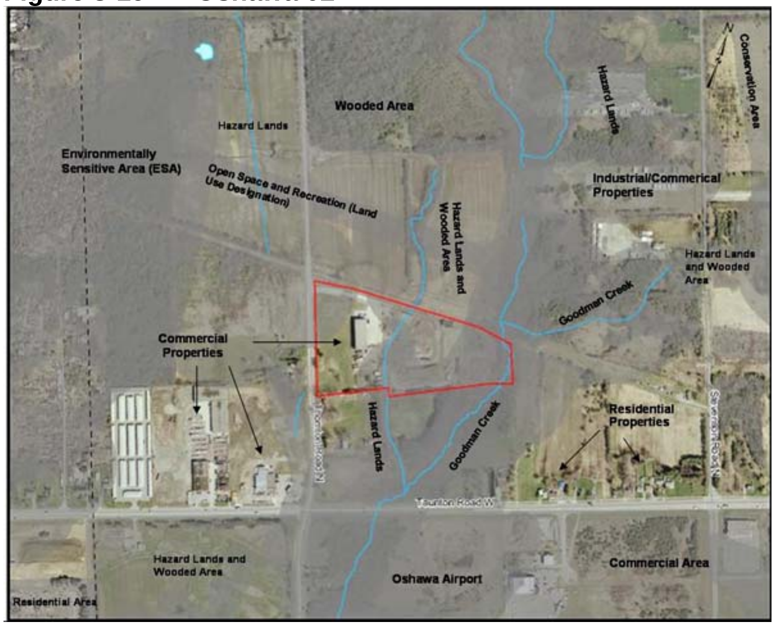
Figure 8-18 Oshawa 01



Site Address: 1600Thorton Road North, Oshawa, ON	
Site Size: 2.6 hectares	
Ownership: Skip Ambrose – 800619 Ontario Ltd.	
Nearest Major Intersection : Thorton Road North and Taunton Road West (Approximately 1 km from site)	

- **Site Oshawa 02** – This site was heavily constrained by Natural Heritage Features including a watercourse, hazard lands and a designated Environmentally Sensitive Area (ESA) and was therefore screened from further consideration.

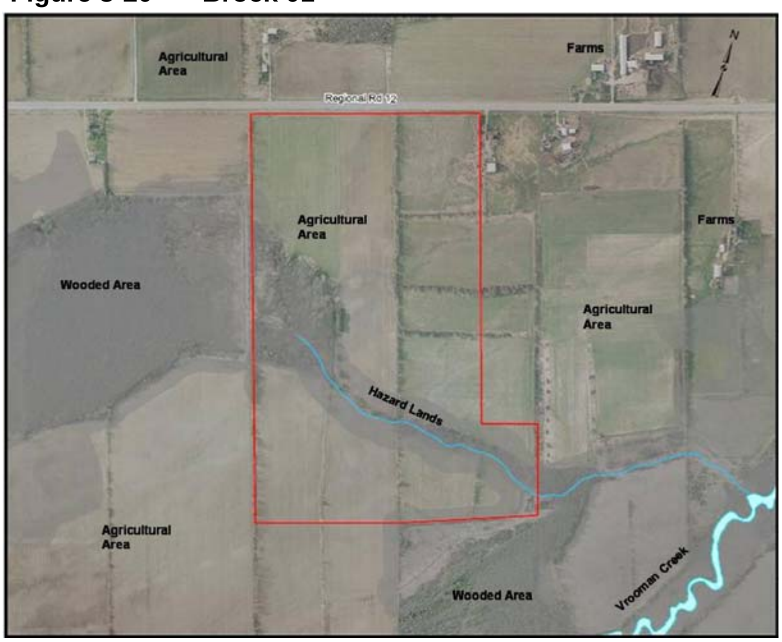
Figure 8-19 Oshawa 02



Site Address: 1515 Thorton Road North, Oshawa, ON	
Site Size: 6.9 hectares	
Ownership: Skip Ambrose – 800619 Ontario Ltd.	
Nearest Major Intersection : Thorton Road North and Taunton Road West (Approximately 0.6 km from site)	

- **Site Brock Township 01** – This site was designated Agricultural Land and was constrained by Natural Heritage Features including wetlands, hazard lands, and wooded areas and was therefore screened from further consideration.

Figure 8-20 Brock 01



Site Address: West part lot 10, Concession 11, Brock Two, Brock, ON	
Site Size: Approximately 41 hectares	
Ownership: Gordon & Doreen Scholorff	
Nearest Major Intersection : Highway 12 and Concession 12 Brock Two (Approximately 2.25 km from site)	

Removal of these five (5) sites from further consideration resulted in a Long-list of seven (7) sites carried forward into the Long-list evaluation process.

8.5.5 The Long-list of Alternative Sites

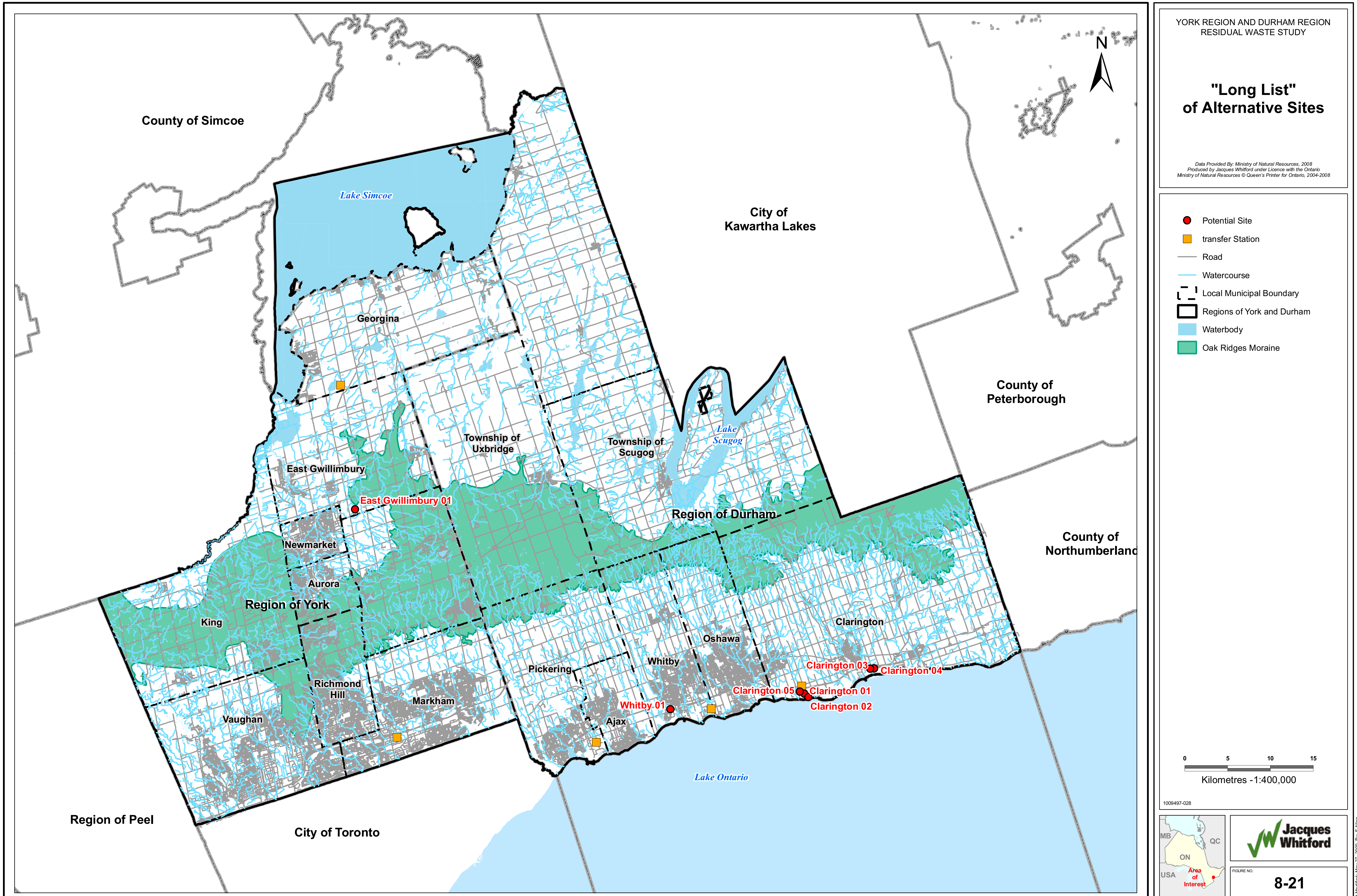
The site identification and initial Step 2 and Step 3 screening processes (Section 8.3 above) resulted in the identification of seven (7) sites that formed the Long-list of alternative sites.

These sites represented both publicly and privately owned sites in Durham and York and were considered to offer a sufficient and reasonable range of opportunities and alternatives to proceed with the site evaluation process. The Long-list of sites is outlined in Table 8-5 below:

Table 8-5 The Long-list of Alternative Sites

Site Name	Municipality	Site Location	Nearest Major Intersection
Clarington 01	Municipality of Clarington	South side of Highway 401 and South Service Road, East of Courtice Road.	Highway 401 and Courtice Road
Clarington 02	Municipality of Clarington	South side of Highway 401 and South Service Road, East of Courtice Road.	Highway 401 and Courtice Road
Clarington 03	Municipality of Clarington	West side of South Service Road. West of Bennett Road. South of Highway 401	Highway 401 and Bennett Road
Clarington 04	Municipality of Clarington	East/South side of South Service Road. West of Bennett Road. North of Lake Road.	Highway 401 and Bennett Road
Clarington 05	Municipality of Clarington	East side of Courtice Road, South side of Highway 401	Highway 401 and Courtice Road
Whitby 01	Town of Whitby	East side of Montecorte Street, South of Nordeagle Avenue.	Highway 401 and Brock Street
East Gwillimbury 01	Township of East Gwillimbury	North side of Garfield Wright Boulevard. East of Woodbine Avenue on East side of York Region Waste Management Centre	Highway 404 and Davis Drive

Figure 8-21 shows the locations of the Long-list of alternative sites.


YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY
"Long List"
of Alternative Sites
Data Provided By: Ministry of Natural Resources, 2008
Produced by Jacques Whitford under Licence with the Ontario
Ministry of Natural Resources © Queen's Printer for Ontario, 2004-2008
N
Potential Site
transfer Station
Road
Watercourse
Local Municipal Boundary
Regions of York and Durham
Waterbody
Oak Ridges Moraine
0
5
10
15
Kilometres -1:400,000
1009497-028
MB
QC
ON
USA
Area of Interest
Jacques Whitford
FIGURE NO.
8-21
Last Modified: May 27, 2009 By: S.Allen
County of Simcoe
Lake Simcoe
City of Kawartha Lakes
County of Peterborough
County of Northumberland
Georgina
Township of Uxbridge
Township of Scugog
Lake Scugog
East Gwillimbury
East Gwillimbury 01
Region of Durham
Newmarket
Aurora
Region of York
King
Clarington
Oshawa
Whitby
Pickering
Richmond Hill
Markham
Vaughan
Ajax
Whitby 01
Clarington 03
Clarington 04
Clarington 05
Clarington 01
Clarington 02
Lake Ontario
Region of Peel
City of Toronto

8.6 Step 5 – Evaluation of the Long-list of Alternative Sites

The following sections outline the evaluation process for the Long-list of alternative sites identified to-date and the results of the evaluation process.

8.6.1 Purpose and Approach for Comparatively Evaluating Long-list Alternative Sites

The purpose of establishing and evaluating a Long-list of alternative sites was to reduce the number of sites to a Short-list that was then compared in greater detail. It was important to conduct this level of evaluation to ensure that only sites with a reasonable chance of being selected underwent the more detailed comparative evaluation process. For the purpose of this investigation, sites were deemed unsuitable if they exhibited significant technical, social and/or environmental disadvantages relative to other sites on the list. Sites that passed through this evaluation step were then included on a Short-list of alternative sites and subjected to a more detailed comparative evaluation process.

It is important to note that the difference between Step 2 and Step 3 and the remaining site evaluation steps was that Step 2 and 3 were utilized to screen out lands considered unsuitable for further investigation. At Step 4 and throughout the remainder of the site evaluation process, the evaluation process converted from a screening process to one that compared the relative advantages and disadvantages of sites to identify those sites that ultimately exhibited the preferred balance of advantages and disadvantages.

8.6.2 Data Collection and Site Review

For each of the Long-list evaluation criteria, data was collected, reviewed and applied. Data collected at Step 4 was limited to published sources of information available to both Regions and limited roadside observation of the Long-list of sites.

8.6.3 Application of the Long-list Evaluation Criteria

Each site on the Long-list was evaluated using the following factors initially presented in the Approved EA Terms of Reference:

- Proximity to Required Infrastructure (distance to electrical grid connection and steam and/or heat load and distance to required sewer and water services)
- Site Accessibility (distances to major highway, rail line, transit system)
- Potential Impact of Haul Route (length, land use, road type and width, traffic volumes)
- Property Size (minimum site requirement, surplus land available)
- Land Use Compatibility (official plan designation, adjacent land use)
- Availability of Site (ownership and availability)
- Proximity to Unregulated Airports (distance)

Detailed tables regarding the consideration of these factors for each Long-list site are provided below. The following table (Table 8-6) outlines the factors for identifying sites for the Short-list.

Table 8-6 Factors for Identifying Sites for the Short-list

Item	Constraint	Rationale
Proximity to required infrastructure (dependent on technology selected)	• Example: Maximum distance (to be specified) from electrical grid interconnection point or heat load if an EFW Facility was part of the preferred "Alternative to" • Distance to required sewer and water services	Depending on the technology selected, a maximum distance can be identified from an electrical connection as sites within that range would likely be more economically feasible.
Site accessibility	• Maximum distance (to be specified) from major highway, rail line and/or transit system	Sites that are closer to a highway or railway line are preferred since the haul route impacts could be more easily mitigated. As well, preference would be to minimize the distance to an interchange with a 400 series highway.
Potential impact of the haul route (i.e., traffic, noise, land use, cost)	• Length of haul route (distance to main waste generation source(s)) • Land use along haul route • Road type, width and traffic volumes along haul route	Sites that would be less preferred would be ones that: • are located away from the main source(s) of waste generation and therefore would require longer haul routes; • traverse through densely populated areas; and, • include narrow and/or congested roads.
Property size	• Minimum size (determined in Step 3) in comparison with the actual site size (i.e., amount of surplus land available beyond the minimum site size requirement)	The minimum site size was determined in Step 3 but sites that exceed the site size would be preferred since the siting layout would be easier to develop and the potential would exist to have a greater onsite buffer area to mitigate potential impacts.
Land use compatibility	• Designated industrial or industrial type land use adjacent to the site	Sites that are located within compatible land use areas such as designated industrial areas or industrial type areas would be preferred as it would be easier to mitigate the potential impacts from the Facility.
Availability of site	• Requirement to acquire site through expropriation	Sites that can only be acquired through expropriation are less preferred.
Potential impacts on unregulated airport operation	• Proximity to unregulated airports	Transport Canada Guidelines identify a concern with waste disposal operations around airport operations. Airport Zoning By-laws govern land use around federally regulated airports. For other operations, a radius of approximately 8 km around airports is identified as a zone of concern regarding waste disposal operations. Sites within this zone should be considered with regard to their proximity to an unregulated airport.

Table 8-7 Long-list Site: Clarington 01 and 02

Factor	Constraint
Proximity to Required Infrastructure	
Maximum Distance to Electrical Grid Connection	Less than 300 metres to nearest 44kv transmission line. Interconnection will require further discussions with local power company.
Maximum Distance to Heat and/or Steam Load	Potential access to heat load at Courtice Water Pollution Control Plant (WPCP). Additional heat/steam loads may be available and will be investigated further once Short-list of sites is available publicly.
Distance to Required Sewer and Water Services	Municipal water and sewer servicing at property line.
Site Accessibility	
Maximum Distance to Major Highway	Approximately 1.5 km to Hwy 401 (interchange 425).
Maximum Distance to Rail Line	CN Rail line adjacent to south side of parcel 1 & north side of parcel 2, distance to nearest inter-modal facility unknown.
Maximum Distance to Transit System	Approximately 5 km to nearest bus stop (Prestonvale/Southfield).
Potential Impact of Haul Route	
Length of Haul Route	Total distance from Hwy 401 Interchange to site is approximately 1.5 km.
Land Use along Haul Route	Undeveloped land currently used for agricultural purposes.
Road Type	Paved.
Road Width	Two lane road – one lane in each direction.
Traffic Volumes	Traffic Volume Data not available (at that time).
Property Size	
Property Size	Parcel 1 & 2 - Approximately 12.1 hectares each – 24.2 ha.
Minimum Site Requirement	9 hectares.
Surplus Land Available	15.2 hectares.
Land Use Compatibility	
Official Plan Designation	Regional – Parcel 1: Employment Area, Parcel 2: Waterfront. Municipal – Parcel 1: Prestige Employment / Light Industrial - Holding General Industrial Zone – Site currently has a servicing constraint. Parcel 2: Waterfront Greenway (Deferred by Durham).
Designated Land Use Adjacent to Site	North – Parcel 1: Prestige Employment / Light Industrial. Parcel 2: CN Rail line & Light Industrial Area. South – Parcel 1: CN Rail line. Parcel 2: Waterfront Greenway. East – Parcel 1: Light Industrial. Parcel 2: Waterfront Greenway (Deferred by the Region of Durham). West – Parcel 1: Light Industrial. Parcel 2: Waterfront Greenway (Deferred by Durham).
Description of Land Use Adjacent to Site	North – Parcel 1: Auto Dealer Exchange. Parcel 2: CN Rail line, Auto Auction, bicycle path runs along north side of parcel.

Factor	Constraint
	South – Parcel 1: CN Rail line, Courtice WPCP (completion date of 2007), Lake Ontario approximately 0.5 km to South. Parcel 2: Lake Ontario. East –Parcel 1 & 2: Undeveloped land currently used for agricultural purposes. Parcel 1: Auto Auction, bicycle path runs along east side of property. Parcel 2: Darlington Nuclear Generating Station approximately 0.5 km to the East. West – Parcel 1: Undeveloped land currently used for agricultural purposes. Parcel 2: Courtice WPCP (completion date of 2007).
Availability of Site	
Ownership and Availability	Durham. Vacant Land.
Proximity to Unregulated Airports	
Proximity and Description	Approximately 10 km from Oshawa Municipal Airport (1200 Airport Boulevard, Oshawa, ON).**

**Note: It was determined through consultation undertaken as part of the EA process that the Oshawa Municipal Airport is a Federally regulated facility. However, identification and consideration of the Oshawa Municipal Airport as the closest unregulated airport represents a "worst-case" scenario and therefore does not change the overall evaluation results.

Table 8-8 Long-list Site: Clarington 03

Factor	Constraint
Proximity to Required Infrastructure	
Maximum Distance to Electrical Grid Connection	Less than 300 metres to nearest 44kv transmission line. Interconnection will require further discussions with local power company.
Maximum Distance to Heat and/or Steam Load	Heat/Steam loads may be available and will be investigated further once Short-list of sites is available publicly.
Distance to Required Sewer and Water Services	Municipal water and sewer servicing at property line.
Site Accessibility	
Maximum Distance to Major Highway	Approximately 1.6 km from Hwy 401 (interchange 435).
Maximum Distance to Rail Line	Adjacent to CN Rail line, distance to nearest inter-modal facility unknown.
Maximum Distance to Transit System	Approximately .75 km to bus stop at Bennett Rd./Wilmot Creek Rd.
Potential Impact of Haul Route	
Length of Haul Route	Total distance from Hwy 401 to site is approximately 1.6 km.
Land Use along Haul Route	Hwy 401. Open Space/Light Industrial/Commercial.
Road Type	Paved.
Road Width	2 lane road, one in each direction.
Traffic Volumes	Traffic Volume Data not available (at that time).
Property Size	
Property Size	Approximately 18.1 hectares.
Minimum Site Requirement	9 hectares.
Surplus Land Available	9.1 hectares.
Land Use Compatibility	
Official Plan Designation	Regional – Employment Area. Municipal – Prestige Employment Area & Light Employment Area.
Designated Land Use Adjacent to Site	North – Hwy 401, Prestige Employment Area & Light Employment Area. South – Hydro Corridor, CN Rail line and Green Space. East – Prestige Employment Area. West – Light Industrial Area. Site has a river along western edge of property.
Description of Land Use Adjacent to Site	North - Undeveloped land currently used for agricultural purposes. South - Undeveloped land currently used for agricultural purposes, Hydro Corridor, and CN Rail line.

Factor	Constraint
	East - Undeveloped land currently used for agricultural purposes. West – Commercial properties.
Availability of Site	
Ownership and Availability	1029629 Ontario Inc. Vacant Land.
Proximity to Unregulated Airports	
Proximity and Description	Approximately 8 km from Hawkefield Airstrip (Grass strip in Orono, Clarington).

Table 8-9 Long-list Site: Clarington 04

Factor	Constraint
Proximity to Required Infrastructure	
Maximum Distance to Electrical Grid Connection	Less than 300 metres to nearest 44kv transmission line. Interconnection will require further discussions with local power company.
Maximum Distance to Heat and/or Steam Load	Heat/Steam loads may be available and will be investigated further once Short-list of sites is available publicly.
Distance to Required Sewer and Water Services	Municipal water and sewer servicing at property line.
Site Accessibility	
Maximum Distance to Major Highway	Approximately 1.1 km from Hwy 401 (interchange 435).
Maximum Distance to Rail Line	Approximately 0.5 km to CN Rail line, distance to nearest inter-modal facility unknown.
Maximum Distance to Transit System	Approximately .5 km to bus stop at Bennett Rd./Wilmot Creek Rd.
Potential Impact of Haul Route	
Length of Haul Route	Total distance from Hwy 401 to site is approximately 1.1 km.
Land Use along Haul Route	Undeveloped land currently used for agricultural purposes. Commercial properties.
Road Type	Paved.
Road Width	Two lane road – one lane in each direction.
Traffic Volumes	Traffic Volume Data not available.
Property Size	
Property Size	Approximately 15 hectares.
Minimum Site Requirement	9 hectares.
Surplus Land Available	6 hectares.
Land Use Compatibility	
Official Plan Designation	Regional – Employment Area. Municipal – Prestige Employment Area - (H)M1- Holding Light Industrial – Servicing constraint to majority of property except part in North West corner.
Designated Land Use Adjacent to Site	North – Hwy 401 & Prestige Employment Area. South – Hydro Corridor, CN Rail line & Green Space. East – Light Industrial Area. West – Prestige Employment / Light Industrial Area.
Description of Land Use Adjacent to Site	North – Hwy 401, Waterfront trail flanks North of Property, undeveloped land currently used for agricultural purposes with a number of residential properties. South – Undeveloped land currently used for agricultural purposes with a Hydro

Factor	Constraint
	Corridor passing through. East – Undeveloped land currently used for agricultural purposes. West – Undeveloped land currently used for agricultural purposes.
Availability of Site	
Ownership and Availability	Currently listed with J.J. Barnicke. Vacant Land.
Proximity to Unregulated Airports	
Proximity and Description	Approximately 8 km from Hawkefield Airstrip (Grass strip in Orono Clarington).

Table 8-10 Long-list Site: Clarington 05

Factor	Constraint
Proximity to Required Infrastructure	
Maximum Distance to Electrical Grid Connection	Less than 300 metres to nearest 44kv transmission line. Interconnection will require further discussions with local power company.
Maximum Distance to Heat and/or Steam Load	Potential access to heat load at Courtice WPCP. Additional heat/steam loads may be available and will be investigated further once Short-list of sites is available publicly.
Distance to Required Sewer and Water Services	Municipal water and sewer servicing at property line.
Site Accessibility	
Maximum Distance to Major Highway	Approximately 0.1 km from Hwy 401 (interchange 425).
Maximum Distance to Rail Line	Adjacent to CN Rail line, distance to nearest inter-modal facility unknown.
Maximum Distance to Transit System	Approximately 4.2 km to nearest bus stop (Prestonvale/Southfield).
Potential Impact of Haul Route	
Length of Haul Route	Total distance from Hwy 401 to site is approximately 0.1 km.
Land Use along Haul Route	Undeveloped land currently used for agricultural purposes.
Road Type	Paved.
Road Width	Two lane road – one lane in each direction.
Traffic Volumes	Traffic Volume Data not available.
Property Size	
Property Size	Approximately 27.4 hectares.
Minimum Site Requirement	9 hectares.
Surplus Land Available	18.4 hectares.
Land Use Compatibility	
Official Plan Designation	Regional – Employment Area. Municipal – Prestige Employment / Light Industrial.
Designated Land Use Adjacent to Site	North – Prestige Employment / Light Industrial. South – CN Rail line. East – Prestige Employment / Light Industrial. West – Environmental Protection Area.
Description of Land Use Adjacent to Site	North – Hwy 401. South – CN Rail line, Lake Ontario approximately 0.6 km to South. East – Undeveloped land currently used for agricultural purposes. West – Undeveloped land currently used for agricultural purposes.

Factor	Constraint
Availability of Site	
Ownership and Availability	Thornrich Investments Ltd. Vacant Land.
Proximity to Unregulated Airports	
Proximity and Description	Approximately 10 km from Oshawa Municipal Airport (1200 Airport Boulevard, Oshawa, ON).**

**Note: It was determined through consultation undertaken as part of the EA process that the Oshawa Municipal Airport is a Federally regulated facility. However, identification and consideration of the Oshawa Municipal Airport as the closest unregulated airport represents a "worst-case" scenario and therefore does not change the overall evaluation results.

Table 8-11 Long-list Site: Whitby 01

Factor	Constraint
Proximity to Required Infrastructure	
Maximum Distance to Electrical Grid Connection	Less than 300 metres to nearest 44kv transmission line. Interconnection will require further discussions with local power company.
Maximum Distance to Heat and/or Steam Load	Heat/Steam loads may be available and will be investigated further once Short-list of sites is available publicly.
Distance to Required Sewer and Water Services	Municipal water and sewer servicing at property line.
Site Accessibility	
Maximum Distance to Major Highway	Approximately 1.5 Km to Hwy 401 (interchange 410).
Maximum Distance to Rail Line	Adjacent to CN Rail line, distance to nearest inter-modal facility unknown.
Maximum Distance to Transit System	Approximately .75 km to bus stop at Gordon St./Victoria St. W. Approximately 2 km to Go Station.
Potential Impact of Haul Route	
Length of Haul Route	Total distance from Hwy 401 to site is approximately 1.5 km.
Land Use along Haul Route	Commercial and Residential properties. Whitby GO Station. Iroquois Park.
Road Type	Paved.
Road Width	4 lane – 2 lanes in each direction.
Traffic Volumes	Traffic Volume Data not available.
Property Size	
Property Size	Parcel 1 -Approximately 12.3 hectares. Parcel 2 - Approximately 4 hectares.
Minimum Site Requirement	9 hectares.
Surplus Land Available	Parcel 1 = 3.3 hectares. Parcel 1 + Parcel 2 = 7.3 hectares.
Land Use Compatibility	
Official Plan Designation	Regional – Employment Area. Municipal – Business Park.
Designated Land Use Adjacent to Site	North – Business Park. South – Low Density Residential, Medium Density Residential, Community Commercial. East – Major Open Space, Harbour Development. West – Business Park.

Factor	Constraint
Description of Land Use Adjacent to Site	North – Sobeys Warehouse and Distribution Centre. South – Residential Subdivision, Shopping centre under construction, Lakeridge Health Whitby Hospital approximately 0.5 km to South. East – Iroquois Park- Soccer/baseball fields, commercial building. West – Automotive Assembly Operation (Automodular Assemblies).
Availability of Site	
Ownership and Availability	J.J. Barnickle on behalf of Nordeagle Developments. Vacant Land.
Proximity to Unregulated Airports	
Proximity and Description	Approximately 6.6 km from Oshawa Municipal Airport (1200 Airport Boulevard, Oshawa, ON).**

**Note: It was determined through consultation undertaken as part of the EA process that the Oshawa Municipal Airport is a Federally regulated facility. However, identification and consideration of the Oshawa Municipal Airport as the closest unregulated airport represents a "worst-case" scenario and therefore does not change the overall evaluation results.

Table 8-12 Long-list Site: East Gwillimbury 01

Factor	Constraint
Proximity to Required Infrastructure	
Maximum Distance to Electrical Grid Connection	Less than 300 metres to nearest 44kv transmission line. Interconnection will require further discussions with local power company.
Maximum Distance to Heat and/or Steam Load	Heat/Steam loads may be available and will be investigated further once Short-list of sites is available publicly.
Distance to Required Sewer and Water Services	Municipal water servicing at property line. Municipal sewer servicing currently not available.
Site Accessibility	
Maximum Distance to Major Highway	Approximately 2.6 km from Hwy 404 (interchange 51).
Maximum Distance to Rail Line	Rail line within 5kms of site; distance to nearest inter-modal facility unknown.
Maximum Distance to Transit System	Adjacent to bus route along Bales Dr./Garfield Wright Blvd.
Potential Impact of Haul Route	
Length of Haul Route	Total distance from Hwy 404 to site is approximately 2.6 km.
Land Use along Haul Route	Commercial/Industrial properties. Undeveloped land currently used for agricultural purposes.
Road Type	Paved.
Road Width	2 lane road, one in each direction.
Traffic Volumes	Traffic Volume Data not available.
Property Size	
Property Size	Approximately 11 hectares.
Minimum Site Requirement	9 hectares.
Surplus Land Available	2 hectares.
Land Use Compatibility	
Official Plan Designation	<u>Regional</u> – Agricultural Policy Area. <u>Municipal</u> - Rural Commercial/Industrial Area.
Designated Land Use Adjacent to Site	<u>North</u> – Agricultural Area. <u>South</u> – Rural Commercial / Industrial Area. <u>East</u> – Rural Commercial / Industrial Area. <u>West</u> – Rural Commercial / Industrial Area .
Description of Land Use Adjacent to Site	<u>North</u> - Undeveloped land currently used for agricultural purposes. <u>South</u> – York Household Hazardous Waste and Recycling Depot. <u>East</u> - York Regional Police Fleet.

Factor	Constraint
	West - York Waste Management Centre.
Availability of Site	
Ownership and Availability	York Vacant Land.
Proximity to Unregulated Airports	
Proximity and Description	Approximately 9.5 km from Holland Landing Airpark (18898 Holland Landing Road, Holland Landing, ON) - Small Private landing strip (1,960 ft^2 runway).

8.6.4 Overview of Long-list Site Advantages and Disadvantages

In accordance with the Approved EA Terms of Reference, the evaluation of the Long-list of alternative sites incorporated a comparative evaluation process. Table 8-13 presents the relative comparison of each of the sites based on their respective advantages and disadvantages utilizing the detailed data provided in Table 8-7 to Table 8-12.

Table 8-13 Comparison of Long-list Sites Relative Advantages and Disadvantages

Evaluation Criteria	Clarington 01	Clarington 02	Clarington 03	Clarington 04	Clarington 05	Whitby 01	East Gwillimbury 01
Proximity to Required Infrastructure	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage
Site Accessibility	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage
Potential Impact of Haul Route	Advantage	Advantage	Advantage	Advantage	Advantage	Disadvantage	Advantage
Property Size	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage
Land Use Compatibility	Advantage	Advantage	Advantage	Advantage	Advantage	Disadvantage	Advantage
Availability of Site	Advantage	Advantage	Disadvantage	Disadvantage	Disadvantage	Disadvantage	Advantage
Proximity to Unregulated Airports	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage	Advantage

8.6.5 Results of the Long-list Evaluation

Subsequent to the analysis of the detailed evaluation of the Long-list of sites, the list was revised to reflect the results of the evaluation. These changes are detailed below.

Pairing of Clarington 01 and Clarington 02 sites

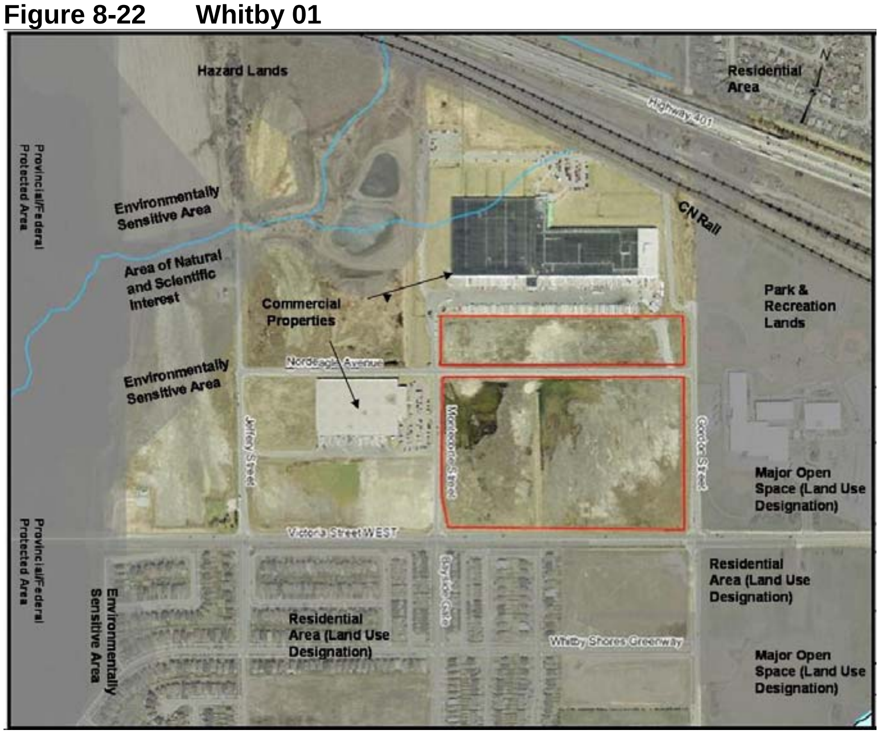
Based on a more detailed review of sites Clarington 01 and Clarington 02, it was determined that these sites would be, for the purposes of evaluation of the Short-list of sites, treated as a single site with two (2) parcels. These sites were very similar in size, location, ownership, natural features, and proximity to required infrastructure. Both sites, owned by Durham, were also directly adjacent to Regional property where the new Courtice WPCP is being constructed and where potential infrastructure sharing could take place.

Sites Considered Significantly Disadvantaged

The comparative evaluation of the Long-list of alternative sites resulted in one (1) site exhibiting a significant number of disadvantages relative to other sites on the Long-list and was therefore removed from further consideration as follows:

- Site Whitby 01 – This site is located near Natural Heritage Features including: ANSIs, ESAs, wetlands, and community parks. It is also located near, numerous potentially sensitive receptors including: residential communities, institutional facilities, and a shopping centre.

Figure 8-22 Whitby 01



Site Address: Between Montecorte St., and Gordon St. North of Victoria St. S., Whitby, ON
Site Size: Parcel 1 -Approximately 12.3 hectares Parcel 2 - Approximately 4 hectares
Ownership: J.J. Barnicke on behalf of Nordeagle Developments
Nearest Major Intersection : Hwy 401 and Brock Street (Approximately 1.5 km from site)

Pairing of the Clarington 01 and 02 sites and the removal of the Whitby 01 site from further consideration, resulted in a Short-list of five (5) sites carried forward into the Short-list evaluation process.

8.6.6 The Original Short-list Alternative Sites

There are no formal established guidelines or requirements that dictate the number of Short-list alternative sites which must be considered to identify a Preferred Site. In identifying the Short-list of siting opportunities, consideration was given to:

- maintaining a range of distinct siting opportunities;
- level of effort and potential community disruption associated with the Short-list studies; and,
- targeting expenditure of study resources on those sites with at least a reasonable and ideally the best chance of selection as the Preferred Site.

Based on the application of relative advantages and disadvantages to each of the Long-list sites, five (5) sites were carried forward for further, more extensive, comparative evaluation. These sites are referred to as the "Short-list" sites and are outlined in detail in Table 8-14.

Table 8-14 The Short-list Sites

Site Name	Municipality	Nearest Major Intersection	Ownership	Size
Clarington 01 and 02	Municipality of Clarington	Highway 401 and Courtice Road	Municipal	Parcel A: 12.1 Hectares (30 Acres) Parcel B: 12.1 Hectares (30 Acres)
Clarington 03	Municipality of Clarington	Highway 401 and Bennett Road	Private	18.1 Hectares (45 Acres)
Clarington 04	Municipality of Clarington	Highway 401 and Bennett Road	Private	15 Hectares (37 Acres)
Clarington 05	Municipality of Clarington	Highway 401 and Courtice Road	Private	27.4 Hectares (68 Acres)
East Gwillimbury 01	Township of East Gwillimbury	Highway 404 and Davis Drive	Municipal	11 Hectares (27 Acres)

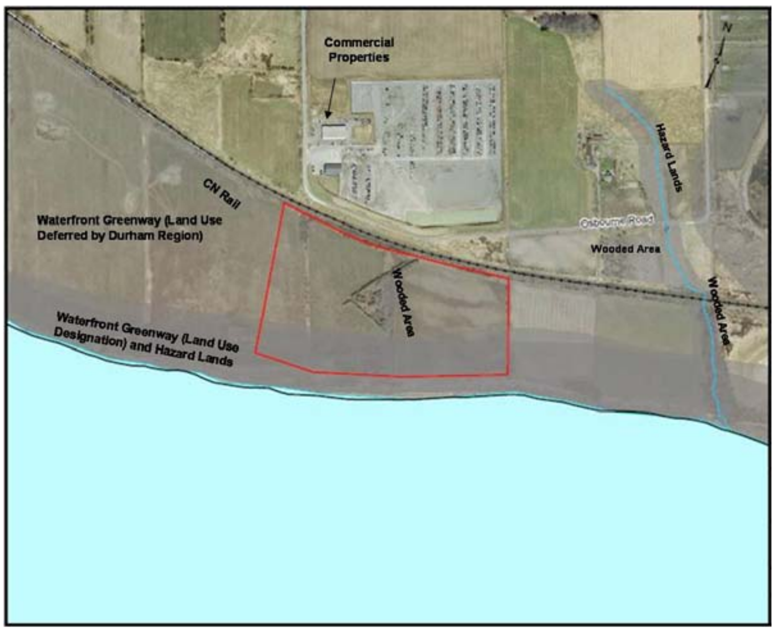
8.6.7 Revisions to Short-list

Following issuance of the draft report identifying the Short-list of sites, one site and part of a second site (two sites originally considered as one) were removed from consideration. This is further described below.

Removal of Site Clarington 02 from "Short-list" of Alternative Sites

Parcel B (Site Clarington 02) was removed from the Short-list as the land use designation for the property changed in late March 2007 such that this portion of the combined Clarington 01 and 02 site no longer met Step 2 evaluation criteria. As noted previously, based on a more detailed review of sites Clarington 01 and Clarington 02, it was determined that these sites should be, for the purpose of evaluation of the Short-list of sites, be treated as a single site with two (2) parcels. These sites are very similar in size, location, ownership, natural features, and proximity to required infrastructure. Both sites, owned by Durham, are also directly adjacent to Regional property where the new Courtice WPCP has been constructed and where potential infrastructure sharing could take place.

Figure 8-23 Clarington 02



Site Address: South of Osborne and CN Rail, Clarington, ON
Site Size: 12.1 hectares
Ownership: Durham
Nearest Major Intersection : Hwy 401 and Courtice Road (Approximately 2 km from site)

On February 14, 2007, Durham Regional Council approved Amendment No. 35 to the Regional Official Plan and changed the land use designation from Employment Area to Waterfront and relocated the Municipal Service symbol "S" to the east side of Courtice Road. Regional Council also resolved Deferral 32 to the Clarington Official Plan by approving the Waterfront Greenway designation and moving the utility symbol east of Courtice Road.

During the evaluation of "Alternative methods" resulting in the identification of the Short-list of sites, the appeal period (as per the *Planning Act*) on this amendment was underway. Council's decision did not come into full force and effect until March 21, 2007.

As this amendment lifted the deferral on the land use designation (now confirmed as Waterfront Greenway in the Clarington Official Plan) for site Clarington 02, the site no longer met the Step 2 evaluation criteria and therefore, the site could no longer be considered for further evaluations and was removed from the Short-list of Alternatives Sites. Clarington 01 was not affected by this amendment and remained on the Short-list of Alternatives Sites as a separate site.

Removal of Clarington 03 Site from Short-list of Alternative Sites

Through the REOI process discussed in Section 8.5.2, Clarington 03 site (located at 641 Lambs Road in Clarington, Ontario) was offered for consideration by Cushman & Wakefield LePage Inc., the agent representing the owner (109629 Ontario Inc.).

Figure 8-24 Clarington 03

Site Address: South of Hwy 401, West of South Service Rd., Clarington, ON
Site Size: Approximately 18.1 hectares
Ownership: 1029629 Ontario Inc.
Nearest Major Intersection : Hwy 401 and Bennett Road (Approximately 1.6 km from site)

On April 27, 2007, the Clarington 03 site was withdrawn from the Short-list of Alternative Sites, as per the email from John Morrison (Vice President, Cushman & Wakefield Lepage Inc.) to Chris Herriott (Durham Real Estate Department)

As a result, and in accordance with the Approved EA Terms of Reference, the owner of Clarington 03 could no longer be considered a willing seller and therefore, Clarington 03 was removed from the Short-list of Alternatives Sites.

8.6.8 Consultation on the Short-list of Alternative Sites

Once the Short-list had been identified through the EA Study, and was approved for public release by the JWMG in March 2007, consultation was undertaken in order to;

- Provide an overview of the Study to-date, including an update on diversion and description of thermal treatment;
- Review the process used to identify potential sites;
- Discuss the Short-list of sites, how they were identified and obtain public input; and,
- Identify the next steps in the process.

Note: withdrawal of Clarington 03 from the Short-list of Alternative Sites took place following completion of the consultation on the Short-list.

The following consultation activities were undertaken prior to proceeding with the evaluation of the Short-list of Alternative Sites:

- The draft report was posted on the Durham York Residual Waste Study website for public review;
- Notification was issued of the availability of the draft report and of the Public Information Sessions that were held, by way of direct contact with the established public and government review agency list and by way of the website and local media for the general public. In addition, notices were issued via mail and were hand-delivered to each of the properties within 1 km of each of the sites; and,
- Four facilitated Public Information Sessions were held in both Durham and York, on the evening of April 10, 2007 in York, on the evening of April 12, 2007 in Durham and in the mornings of April 14 and 21 in Durham. These sessions were attended by a total of 380 registered individuals.

This step in the consultation process involved informing and discussing with the public, the selection of a Short-List of alternative sites for development of the preferred alternative system (i.e. a thermal treatment facility). These sites were potentially located within the communities in which the public attendees reside, and therefore it was not anticipated that there would be wide-spread support for the announced sites. Rather it was anticipated that community issues/concerns with the siting of the Proposed Thermal Treatment Facility would be expressed.

While the methodology and criteria for the evaluation of the Short-list of sites had been presented earlier in the EA process, consultation at this stage of the EA afforded the Study Team an opportunity to ensure that the criteria and indicators addressed the community issues to the extent that was reasonable. Certain matters were identified as being more appropriately addressed during the more detailed assessment of the preferred Undertaking (preferred Site and Technology) as part of the site-specific technical study reports or pertained to items that would be addressed/clarified in the EA document (e.g. consideration of zero waste).Concerns expressed by the public also resulted in refinements that were made to the consultation process followed as the EA proceeded to evaluate and identify a preferred Site.

An overview of key issues along with discussion as to how these issues were taken into consideration during the EA process is provided in Section 16, Table 16-7. Detailed responses to each of the comments raised at the public information sessions are provided in the summaries/transcripts for each session which can be found in the Record of Consultation.

8.6.9 The Short-list of Alternative Sites

Figure 8-25 illustrates the locations of the Short-list of Alternative Sites described in more detail below.

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

"Short List" of Alternative Sites

Data Provided By: Ministry of Natural Resources, 2008
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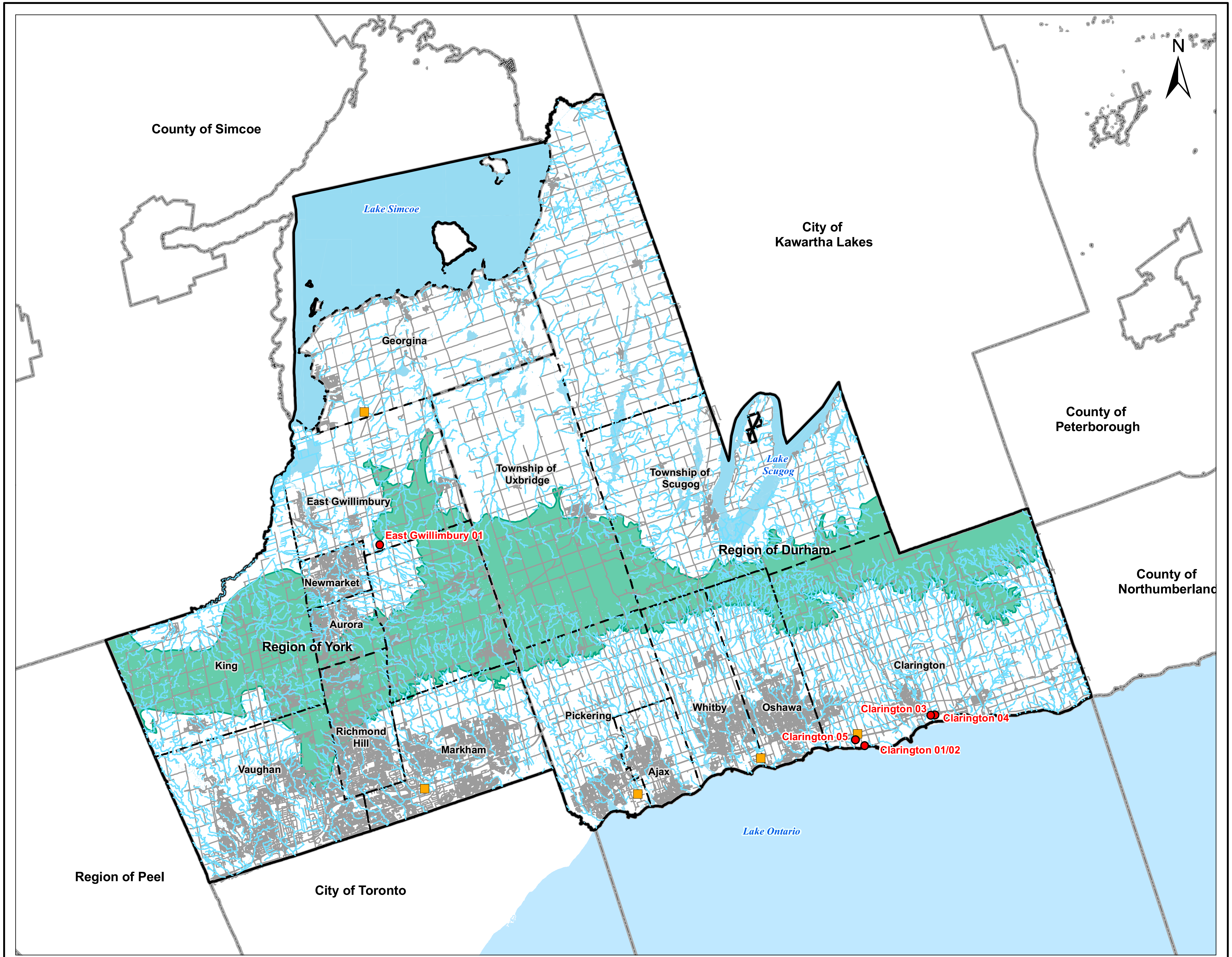

- Potential Site
- Transfer Station
- Watercourse
- Road
- Oak Ridges Moraine
- Waterbody
- Local Municipal Boundary
- Regions of York and Durham

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Kilometres -1:400,000

1009497-029

Stantec

FIGURE NO.
8-25

Last Modified: May 27, 2009 By: S.Allen

Short-list Site: Clarington 01

Site Clarington 01 is undeveloped land owned by Durham, located south of Highway 401 in the Municipality of Clarington. The site is located on the west side of Osborne Road north of a CN Rail corridor. There are commercial properties north of the site. The lands east and west of the site are undeveloped and are currently used for agricultural purposes. The Courtice WPCP, completed in 2008, is located just south of the site. The Darlington Nuclear Generating Station is located approximately 1.8 kilometres to the east. The nearest major intersection is Highway 401 and Courtice Road, which is approximately 1.7 kilometres from the site. The site is approximately 12.1 hectares in area and is located in the Clarington Energy Business Park.

Figure 8-26 Clarington 01

Site Address: West side of Osborne Rd, North of CN Rail, Clarington, ON
Site Size: 12.1 hectares
Ownership: Durham
Nearest Major Intersection : Hwy 401 and Courtice Road (Approximately 1.5 km from site)

Short-list Site: Clarington 04

Site Clarington 04 is privately owned undeveloped land, located south of Highway 401 between Bennett Road and South Service Road, in the Municipality of Clarington. The lands east and west of the site are undeveloped and are currently used for agricultural purposes. A CN Rail corridor is located south of the site. There are commercial properties located on east and west, non-adjacent sides of the property. A number of residences and farms are located north of the property on the north side of Highway 401. The nearest major intersection is Highway 401 and Bennett Road, which is approximately 1.1 kilometres from the site. The site size is 15 hectares.

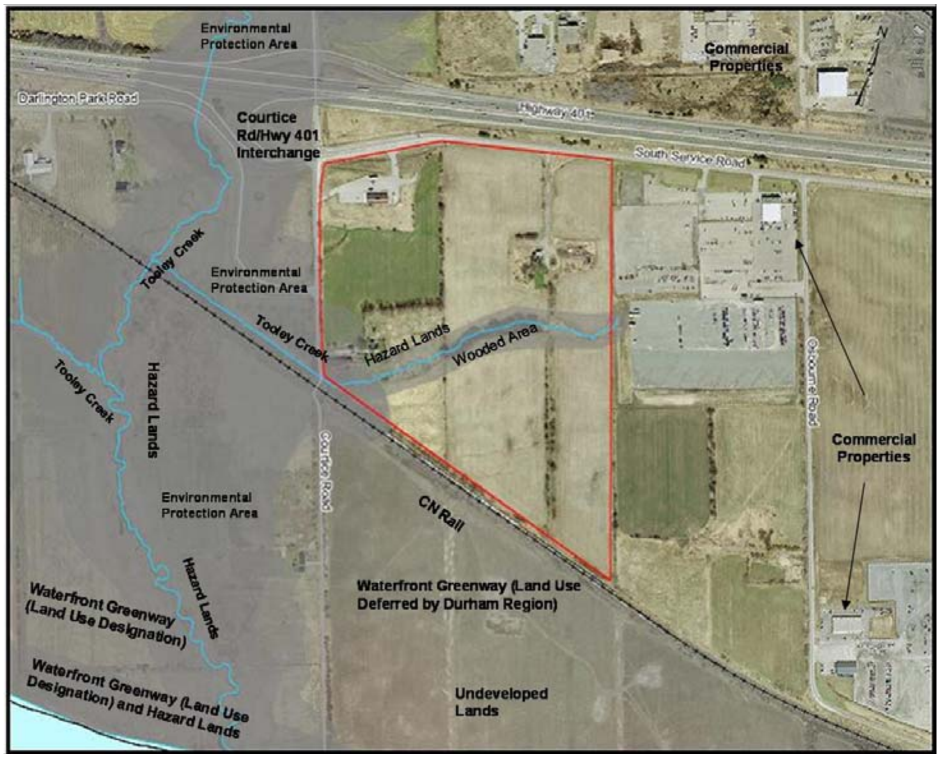
Figure 8-27 Clarington 04

Site Address: South of Hwy 401, between South Service Rd and Bennett Rd., Clarington, ON
Site Size: Approximately 15 hectares
Ownership: Currently listed with J.J. Barnicke
Nearest Major Intersection : Hwy 401 and Bennett Road (Approximately 1.1 km from site)

Short-list Site: Clarington 05

Site Clarington 05 is privately owned undeveloped land, located south of Highway 401 between Courtice Road and Osborne Road, in the Municipality of Clarington. Commercial properties are located north of the site, north of Highway 401. A CN Rail corridor is located south of the site. The lands east and west of the site are undeveloped and are currently used for agricultural purposes. The nearest major intersection is Highway 401 and Courtice Road, which is approximately 0.2 kilometres from the site. The site size is approximately 27.4 hectares. This site is located in the Clarington Energy Business Park.

Figure 8-28 Clarington 05

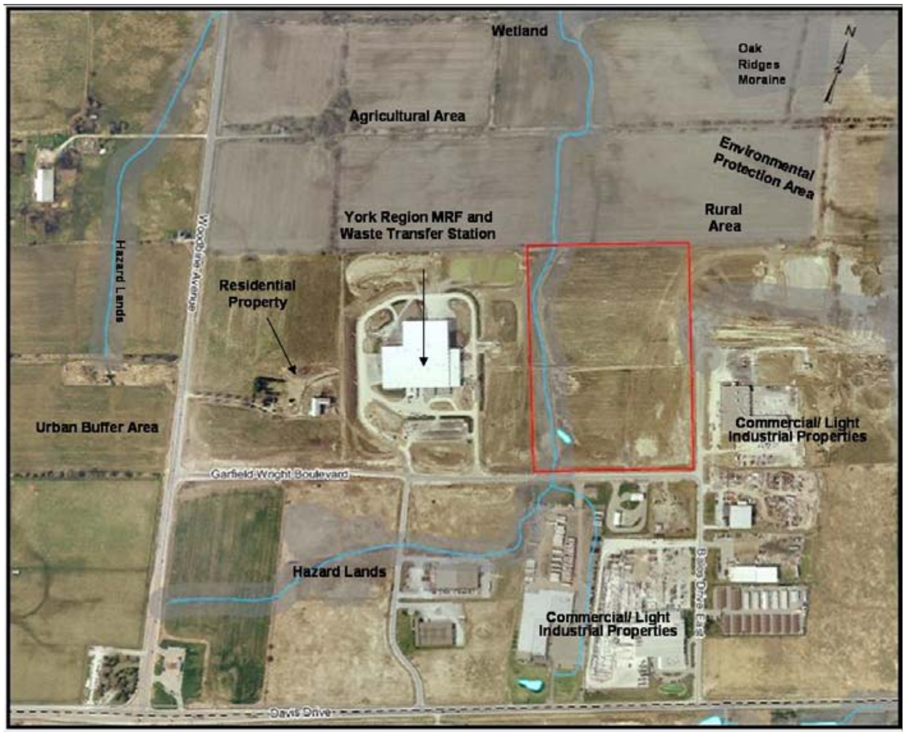


Site Address: East side of Courtice Rd, Between Hwy 401 and CN Rail, Clarington, ON
Site Size: Approximately 27.4 hectares
Ownership: Thornrich Investments Ltd.
Nearest Major Intersection : Hwy 401 and Courtice Road (Approximately 0.1 km from site)

Short-list Site: East Gwillimbury 01

Site East Gwillimbury 01 is owned by York Region and is located in the Town of East Gwillimbury, 2.6 kilometres from the nearest major intersection – Highway 404 and Davis Drive. The site is undeveloped land surrounded by commercial/ industrial properties to the west, east, and south. The York Waste Management Centre, which consists of a MRF and waste transfer station, is located immediately west of the site. York also owns the lands immediately east of the site. A household hazardous waste and recycling depot, owned and operated by York, is situated south of the site. The land north of the site is undeveloped and is currently used for agricultural purposes. The site is approximately 11 hectares in size.

Figure 8-29 East Gwillimbury



Site Address: Lot 2, Concession 4, East Gwillimbury, ON
Site Size: Approximately 11 hectares
Ownership: York Region
Nearest Major Intersection : Hwy 404 and Davis Drive (Approximately 2.6 km from site)

8.7 Step 6: Initiation of Technology Procurement Process

The description of this step is provided in Section 9.0 of this EA Study document.

8.8 Step 7: Evaluation of the Short-list Sites

Following consultation on the Short-list of potential sites, a detailed comparative evaluation of the sites was initiated. This assessment considered the sites as well as the haul routes, transfer requirements and requirements for additional infrastructure to develop the sites.

8.8.1 Overview of the Approach to Preferred Site Identification

Step 7 entailed a comparative evaluation of the identified sites using criteria and indicators to determine potential effects. There are different methods (qualitative, quantitative or a combination of both) that can be used to evaluate the sites. There is no requirement to apply any specific methodology except that the process must be rational, traceable and replicable and must consider advantages and disadvantages based on a net effects analysis of alternatives. A qualitative methodology is commonly applied to address the approval requirements of the EAA and promotes the selection of siting preferences considering relative advantages and disadvantages based on net effects after the application of reasonably available mitigation measures. At the conclusion of this step, the Preferred Site is determined based on its exhibition of the preferred balance of relatively compared advantages and disadvantages factoring in the environmental priorities identified by way of the public and agency consultation process.

The identification of the preferred system followed a qualitative comparative evaluation methodology, with consideration of the four (4) Short-list sites identified through Steps 1 to 5.

The following two sections describe how the sites were compared using a qualitative approach and the use of priorities in relative comparisons.

8.8.2 Qualitative Approach Selected

A qualitative assessment approach was employed to consider and compare site advantages and disadvantages, identify trade-offs, and decide on preferences. Selection of a qualitative versus quantitative approach recognized the ability of the qualitative approach to focus on the provision of a descriptive rationale for certain choices and the consideration of priorities, and an ability of the broader public to understand the decision-making process. Although much of the analysis relied on the professional skills of the consultant team, staff and municipal authorities to assemble the relevant information, it was recognized throughout the evaluation that all decisions and/or trade-offs would need to be clearly documented, defensible, and appropriately linked to the results of public and agency consultation.

Although it can be easier for reviewers, with appropriate training, to follow the results of a quantitative evaluation approach, this feature is outweighed by the respective drawbacks related to broader EA concerns, in particular, the need to document a process that is traceable to all potentially impacted, or with concerns, and not just those with statistical analysis backgrounds. First, it should be noted that in developing and applying the methodology and respective data sets that much of the same professional skills used in qualitative approaches is required for quantitative approaches. The challenge tends to arise in translating that qualitative information to data sets or numbers with defined limits representing the scope of a particular impact and further, in determining the numeric point at which different impacts are distinguished (e.g., high versus moderate versus low impact or significance).

Experience with complex quantitative approaches has shown that these processes often revert to a focus on numeric orders, magnitudes and equations that are usually difficult to link to advantages and disadvantages in terms that the general public can understand. Inevitably, these processes lead to debate among those with a background or qualifications in statistics or mathematics and these debates usually become narrowly focused on minute detail such as a percentage point up or down which may mathematically change the final conclusion. In doing so, these approaches present the risk of losing the human side of what 'makes sense' and is considered reasonable and understandable to the general public.

Experience has shown that a well documented and rational qualitative approach can overcome the above deficiencies associated with quantitative approaches and therefore was selected as the appropriate approach for use throughout the EA Study.

This qualitative approach was presented in the EA Terms of Reference and approved for this EA Study.

8.8.3 Consideration of Advantages and Disadvantages

Identification of the Preferred Site involved the consideration of the site advantages and disadvantages. The comparison was undertaken using a methodology that compared each of the alternative Short-list sites, based on their relative advantages and disadvantages, for each of the five (5) categories of the environment. This comparison of advantages and disadvantages was completed at three levels as follows:

- **Level 1**, which involved the comparison of all Short-list sites with respect to each of the indicators within a particular criterion of the environment. At this level, each site was assigned a relative Major Advantage, Advantage, Neutral (where the impact was neither an advantage nor a disadvantage), Disadvantage or Major Disadvantage;
- **Level 2**, which involved the summation of the advantages and disadvantages identified at Level 1 for each indicator within a particular criterion of the environment to determine the overall advantage or disadvantage of each site at the criteria level. At this level, each site was assigned a relative Major Advantage, Advantage, Neutral (where the impact was neither an advantage nor a disadvantage), Disadvantage or Major Disadvantage; and,
- **Level 3**, which involved the summation of the advantages and disadvantages identified for each criteria at Level 2 within a particular category of the environment to determine the overall advantage or disadvantage of each site at the category level. At this level, each site was assigned a relative Major Advantage, Advantage, Neutral (where the impact was neither an advantage nor a disadvantage), Disadvantage or Major Disadvantage.

The purpose of this exercise was to give an indication of the relative strengths and weaknesses of the four (4) Short-list sites being evaluated. Accordingly, a site with a longer list of significant advantages or disadvantages under a particular category was considered to be an outlier (i.e., significantly advantaged or disadvantaged) in that regard whereas, a site with no or few advantages or disadvantages under a particular category was considered to reside somewhere in the midrange of effects for that consideration.

It was determined, through the completion of this comparative process that the application of advantages and disadvantages alone did not completely reflect the differences between sites in terms of the potential range of impacts associated with each of the sites. In order to overcome this issue and still maintain a qualitative approach to the evaluation, it was determined that the application of advantages and disadvantages would identify: Major Advantages; Advantages; Neutral; Disadvantages; and, Major Disadvantages to better represent the significance of some of the impacts and therefore the potential significant differences between the Short-list sites.

Based on the above rationale, the following relative differences were established to constitute the difference between a Major Advantage and a Major Disadvantage and those that fall in between. Table 8-15 below summarizes these differences.

Table 8-15 Differentiation between Advantages and Disadvantages

Ranking	Description
MAJOR ADVANTAGE	**Description**: Development of the site would have minimal impact based on the criteria/indicator being applied and in most cases a net benefit would result from Facility development. **Example**: A site that would not require the development of additional infrastructure would be considered a major advantage when compared to a site that does require additional infrastructure development.
ADVANTAGE	**Description**: Development of the site would have manageable impact based on the criteria/indicator being applied and in most cases a net benefit would result from Facility development. **Example**: A site that would require the development of limited additional infrastructure would be considered an advantage when compared to a site that requires more significant additional infrastructure.
NEUTRAL	**Description**: Development of the site would have no potential benefits or impacts based on the criteria/indicator being applied. **Example**: All sites being considered require a particular approval with the level of complexity in obtaining the approval being consistent for all sites.
DISADVANTAGE	**Description**: Development of the site would have some impacts based on the criteria/indicator being applied and may require some mitigation measures to reduce potential impact. **Example**: A site that would require the development of some additional infrastructure would be considered a disadvantage when compared to a site that requires less additional infrastructure.
MAJOR DISADVANTAGE	**Description**: Development of the site would have a significant impact based on the criteria/indicator being applied and would require extensive mitigation measures to reduce potential impact. **Example**: A site that would require the development of significant additional infrastructure (i.e., sewer, water, roads, natural gas, etc.) that in themselves, may have potential negative environmental impact would be considered a major disadvantage when compared to a site that is already sufficiently serviced and does require additional infrastructure development.

The site that best met the objective of the criterion was identified as having a major advantage and the site that least met the objective of the criterion would have a major disadvantage. It was not intended that specific ranges would be predetermined for the ranking; instead they were developed based on a comparison between the potential sites.

Once a range of advantages and disadvantages for each of the sites under consideration had been established, these "technical rankings" were then compared to the priorities established above. The purpose of this comparison was to ensure the technically Preferred Site was also preferred in terms of public and agency priorities.

8.8.4 Use of Priorities in Relative Comparison

The environmental priorities, representative of the Durham and York communities, were established in order to guide the evaluation of the alternative sites. These priorities were derived from a series of workshops, public information sessions and polling to review the siting methodology and criteria. These are further described in the Record of Consultation.

The results of these activities were combined in order to determine the overall relative importance of the environmental categories to be to be considered in the evaluation of "Alternative methods". These have translated to the assigned priorities presented in Table 8-16 below.

Table 8-16 Priorities Assigned to Evaluation Categories resulting from Public and Agency Consultation

Category	Priority
Public Health and Safety and Natural Environment Considerations	Most Important
Social and Cultural Considerations	Important
Economic/Financial Considerations	Important
Technical Considerations	Important
Legal Considerations	Least Important

8.8.5 Consideration of Potential Effects, Mitigation and Net Effects

The Short-list evaluation process involved a net effects analysis of the four (4) Short-list siting alternatives. A net effects analysis, which is a requirement of the EAA, was identified in the step-by-step methodology and included in the Approved EA Terms of Reference. The methodology involved the following:

- First, the comparative evaluation criteria were applied to the alternatives and the range of potential effects resulting from this application were identified.
- Second, each potential effect was reviewed and a determination made as to whether or not mitigation measures existed that could be applied to offset or eliminate the potential effect. In the case of a positive effect, enhancement measures were considered to increase the benefit.
- Finally, the remaining, or 'net' effects were tabulated for consideration further in the evaluation process.

The intent of this exercise was to ensure that all alternatives were reviewed in the context of best practices or best available technology – provided these measures were reasonably available and could be reasonably applied to the Undertaking.

The results included in Table 8-40 to Table 8-44 below incorporated the consideration of mitigation and therefore were considered net effects for the purpose of identifying a preferred

Site. Step 7 of the evaluation process focused on the identification of relative advantages and disadvantages for each of the four (4) sites. These were identified based on the net effects for each site identified and a comparison of these net effects was intended to, in essence, establish a ranking of systems under each comparative consideration.

The intent of considering mitigation and enhancement measures was to ensure that alternatives were compared on the basis of best practices and best available technology. Given the nature of this comparative exercise and the background associated with the identification of alternative sites, all of the sites that were considered and accordingly, all of the identified effects, were assumed to innately include all reasonably available mitigation measures.

In particular, the screening of alternative waste management approaches for environmental suitability during development of the Approved EA Terms of Reference established that any of the alternatives that were considered in the Study ***must be able to meet or exceed all regulatory requirements*** and therefore be approvable under Ontario's stringent environmental legislation and standards;

Similarly, sufficient operational data was available for existing state-of-the-art facilities and from that information this Study was able to incorporate observed net or post-mitigation effects directly into the comparison; and,

In considering the potential siting impacts of system facilities, appropriate buffer zones and land use preferences were incorporated into the comparative process.

Because the process of applying the evaluation criteria and identifying potential effects inherently incorporated mitigation (best practices and best available technology), the presentation of net effects in this comparative process did not warrant and did not include an effect-by-effect consideration of available mitigation.

8.8.6 Comparative Evaluation Categories, Criteria, Indicators and Rationale

The evaluation criteria applied at this Step to identify a Preferred Site were assembled under five (5) categories:

1. Public Health and Safety and Natural Environment;
2. Social and Cultural;
3. Economic / Financial;
4. Technical Suitability; and
5. Legal.

The evaluation categories and criteria used in the Step 7 evaluation process are consistent with those originally established in the Approved EA Terms of Reference. Table 8-17 below provides a more detailed explanation of the evaluation categories, criteria, indicators as well as the rationale for considering and applying each indicator.

Table 8-17 Comparative Evaluation Criteria for the Evaluation of Short-List Sites

Criteria	Indicator	Rationale
Public Health & Safety and Natural Environment		
Air Quality Impacts Note: The preferred technology must at least meet all applicable air quality regulations.	Local meteorological conditions	Close proximity of the site to areas with sensitive meteorological conditions could result in negative impacts to the air environment. This indicator would take into consideration prevailing wind directions, existence of sensitive micro-climates, etc.
	Distance travelled from main source(s) of waste generation to the site.	Air impacts from transportation of waste along haul routes to the Facility are related to the distance travelled from the area of waste generation to the waste processing site. Air impacts associated with the Facility are addressed under other criteria related to sensitive uses (i.e., residential areas, institutions, etc.)
Water Quality Impacts (Surface Water and Groundwater)	Relative distance to and type of watercourses (aquatic habitat) present within close proximity of site for wastewater or surface water discharged from Facility (if applicable).	Close proximity of site to sensitive watercourses could result in negative impacts to the aquatic environment due to potential discharges from the Facility.
	Receiving body for wastewater discharge from the Facility (if applicable).	Depending on the location and nature of the receiving body for wastewater discharge, negative impacts could result to the natural environment and/or social cultural environment due to potential discharges from the Facility.
	Quality of water in the receiving body based on size and flow of watercourses.	Smaller watercourses with low flow could experience greater impacts from wastewater or surface water discharges from a Facility.
Environmentally Sensitive Areas and Species Impacts	Species of special concern, threatened and/or endangered species identified by the MNR in the area potentially impacted by the site or haul route.	Proximity of site to sensitive environmental features could result in impacts during construction and operation of a Facility and along the haul routes.

Criteria	Indicator	Rationale
	Distance from site or haul route to areas that are designated Natural Heritage Features and Areas including: Significant Wildlife and Fish Habitat; Significant Areas of Natural and Scientific Interest; Significant Wetlands, Woodlands, etc.; Designated Hazard Lands; and, Conservation Areas.	Proximity of site to sensitive features could result in impacts during construction and operation of a Facility and along the haul routes.
Aquatic and Terrestrial Ecology Impacts	Amount of woodlands, hedgerows, etc., affected or removed at the site and the degree of impact on the edge of a woodlot/hedgerow.	Negative impacts to the natural environment could result from removal of woodlands or hedgerows on a site, including edge impacts on a woodlot/hedgerow.
Social and Cultural Environment		
Compatibility with Existing and/or Proposed Land Uses	Consistency with current land use, approved development plans, and proposed land use changes.	Fewer impacts to mitigate if current and future land use plans are consistent with a waste processing Facility (i.e., avoid sites with an adjacent land use such as proposed residential development).
	Compatibility with existing land use designations.	Minimize impact on social environment with sites that are compatible with existing land use designations (i.e., industrial lands) and would not require re-zoning.
	Size of buffer zone available on the site.	Sites larger than the minimum site size would be easier to accommodate the Facility (including design opportunities) and potential impacts could be mitigated with greater distance between the site and surrounding land uses.
	Opportunity for brownfield development.	Opportunity for beneficial use of existing brownfields, which means that undeveloped land, could be avoided and used for future uses of higher community value than a waste processing Facility.
Residential Areas	Distance from site to designated residential areas within an appropriate separation distance of the site and within an appropriate separation distance of the haul route(s).	Greater distances between the Facility and residential areas is preferred to reduce the potential impacts. Determining the impacts from emissions and noise from transportation vehicles and the mitigation measures needed along the haul route.

Criteria	Indicator	Rationale
	Number and distribution of residences within an appropriate separation distance of the site and within an appropriate separation distance of the haul route(s).	Impacts on, and the need for, mitigation measures are reduced for sites that are located farther away from residents, so rural or lower density residential areas are preferred surrounding the site and along the haul route(s).
Parks and Recreational Areas	Number and type of recreational areas (i.e., parkland) within an appropriate separation distance of the site and within an appropriate separation distance of the haul route(s).	Potential nuisance impacts (noise, odours and visual) may be detrimental to park and recreational areas and greater distances to the site would minimize potential impacts and the need for mitigation measures.
Institutional Facilities or Areas	Number and type of institutions within an appropriate separation distance of the site or area and within an appropriate separation distance of the haul route(s).	The type of institutions in close proximity should be considered to determine if the waste processing Facility is an incompatible land use. If the institution(s) represents an incompatible land use, then a greater distance to the site would minimize potential impacts and the need for mitigation measures. There is also the potential that some institutional facilities could benefit from close proximity to a waste processing Facility (i.e., university or hospital could utilize the Facility for energy use or research/training).
Archaeological and Cultural Resources	Number and significance of known archaeological and cultural areas at the site based on review of documented sites and the potential for uncovered resources to be located at the site.	Cultural and archaeological resources are valuable, non-renewable and should be avoided since sites within known areas could result in disturbances during construction activities; as well consideration should be given to the potential for uncovered resources at the site based on the location and its amenities.
Traffic Impacts	Type of roadway (i.e., paved, gravel) and access to businesses and/or subdivisions & proximity of site to major arterial roads or highways.	Convenient access to the site will reduce impacts on traffic and to residents/commuters and would ease development of the site as a regional Facility.
	Existing and projected volume of traffic along haul route (i.e., high, moderate or low).	Minimizing traffic impacts will improve community acceptance of the Facility and haul routes. Generally, the higher the projected traffic volumes along the route, the lower the overall impact along the route and to the community. For example, a road that currently has a low volume of traffic (i.e., 100 vehicles per day), would experience a higher impact if traffic increased by 100 additional trucks per day. Conversely, a major road with thousands of vehicles travelling on it daily would experience far less net impact.

Criteria	Indicator	Rationale
	Conformity with Durham's Goods Movement Network.	Specific to Durham, conformity with Durham's Goods Movement Network as outlined in its Transportation Master Plan (currently under review) will ensure that waste transfer vehicles are travelling road networks that have been identified for this type of traffic.
Economic / Financial		
Capital Costs	Site development costs, including: infrastructure required, upgrades to existing infrastructure (roads, sewers, etc.), property acquisition and possible site remediation.	Sites with lower development costs would be more economically feasible.
Operation and Maintenance Costs	Distance from waste generation points, transfer stations (e.g., length of haul route), annual operating costs and maintenance costs.	Impact of the Facility on Durham and York's financial resources must be assessed and deemed affordable.
	Mitigation requirements.	Anticipated costs with respect to the mitigation of potential impacts (i.e., may include site development costs, site maintenance costs, etc).
	Monitoring requirements.	Anticipated costs to maintain required monitoring programs. (i.e., sites closer to environmentally sensitive features in a rural environment may require additional monitoring efforts than sites located in a developed urban/industrial area.)
	Distance from potential markets for sale of marketable materials (i.e., heat, electricity, recovered metals, etc.).	Sites that are closer to potential markets have the potential for reduced operating and maintenance costs.
Technical Considerations		
Compatibility with Existing Infrastructure	Distance from required infrastructure (i.e., sewers, hydro, road access, water).	Construction may take additional time and extend beyond site location if site does not have existing access to required utilities.
Design/Operational Flexibility Provided by	Area surplus to minimum requirement provided by site.	Surplus lands will enhance the potential to design a Facility capable of managing additional sources of residual wastes (e.g., IC&I wastes or other municipalities) or may be used to enhance the onsite buffer

Criteria	Indicator	Rationale
Site		area.
Legal Considerations		
Complexity of Required Approvals	Nature of approvals required.	The need for complex approvals and possibly a public hearing present a legal risk to the successful implementation on a particular site. These risks should be considered in the selection of a Recommended Preferred Site.
Complexity of Required Agreements	Nature of property acquisition (related to the need for expropriation, Region owned or willing seller site).	Sites that have fewer property acquisition issues associated with them would be less costly from the perspective of time and money. The order of preference based on property acquisition timing would be Region owned sites, willing seller sites and sites requiring expropriation.

8.8.7 Assumptions Utilized in Short-list Evaluation Process

In order to undertake the comparative Short-list evaluation process without having specifically identified the preferred technology vendor, a number of assumptions were made with respect to the ultimate Facility arrangement. Through the completion of the RFQ and RFP process, the accuracy of the assumptions carried forward and discussed in detail below, were validated. As a result, there was no need to go back, following the identification of the preferred vendor, to reassess the accuracy of the original site evaluation process. The assumptions used in the evaluation of the Short-list sites were considered to be conservative and based on the professional judgement and experience of the Study Team with input from several technology vendors where applicable.

8.8.8 Assumptions Common to all Environmental Considerations

The following sections outline the Facility size and waste supply assumptions used in the EA Study.

8.8.8.1 Facility Size Assumptions

The Proposed Thermal Treatment Facility is expected to manage between 150,000 to 400,000 tpy of waste depending on a number of variables and considerations. The significant range in capacity was due to a number of factors including:

- Guarantee of waste quantities supplied by Durham and York;
- Exercising of other long-term waste management options, including alternative processing facilities, landfill, etc. by York; and,
- Potential waste supply from other neighbouring non-GTA municipalities as well as I.C. &I. wastes.

It was the intention of both Regions to build a Facility of sufficient size to manage their residual waste management needs over the immediate and short-term planning period. However, both Regions recognized the potential need for additional capacity as a result of population growth and availability of external waste disposal contracts over the planning period. Therefore, the initial plan was to build a Facility in the range of 150,000 tpy to 250,000 tpy to satisfy the immediate and short-term need, but to seek EA approval for the larger 400,000 tpy Facility, should this expansion be either required or deemed appropriate within the planning period.

For the purpose of comparing alternative sites, two scenarios for the Facility's annual tonnage were analyzed in detail: 150,000 and 250,000 tpy of waste. A qualitative analysis of a maximum scenario with an annual tonnage of 400,000 tpy was also undertaken. Considering the evaluation described in this document is a relative comparison of sites, the difference in relative advantages and disadvantages between sites will be minimal whether the design capacity of the Facility is 250,000 tpy or 400,000 tpy.

8.8.8.2 Waste Supply Assumptions

Section 3.3 of the Approved EA Terms of Reference notes that:

"Similarly, over the course of the Study, it may become evident that opportunities exist to provide capacity beyond that required by Durham and York. This excess capacity could be used to benefit the proponents and the broader environment. Dewatered biosolids, along with residual MSW from neighbouring non-GTA municipalities that may provide disposal capacity for processing residues outside the Study Area, or additional residual [Industrial, Commercial and Institutional] IC&I wastes from Durham or York are examples of potential waste streams that could be managed by surplus capacity identified during the EA process."

As of 2007, a number of neighbouring non-GTA municipalities had expressed interest in the potential for supplying residual MSW to a Durham/York Facility. It is the intent of Durham and York Regions to develop Memorandums of Understanding (MOUs) with those municipalities that exhibit a serious interest in supplying residual MSW, such that these municipalities can be formally identified as Durham and York proceed with the necessary approvals for the Facility. Such MOUs would be replaced upon commissioning of a new Durham/York Thermal Treatment Facility with formal waste supply agreements.

It is also possible that IC&I sources of waste may have an interest in supplying waste. Again, such arrangements would be formalized as they arise through agreements.

For the purpose of comparing alternative sites, two scenarios for the Facility's annual tonnage were analyzed in detail: 150,000 and 250,000 tpy of waste. These scenarios include a range of waste supply opportunities as follows:

Scenario 1 - 150,000 tpy

- 110,000 tpy – Durham
- 20,000 tpy – York
- 20,000 tpy – Other Waste Sources

Scenario 2 - 250,000 tpy

- 110,000 tpy – Durham
- 120,000 tpy – York
- 20,000 tpy – Other Waste Sources

The primary difference between the scenarios is the waste supply from York. The 100,000 tpy difference is a result of the potential for waste to be managed at the Dongara waste pelletizing facility. York currently has a contract to process 100,000 tpy at this facility, however, facility construction is not complete and a market for the product is also under development. The Dongara contract ends in 2028 and York may choose to send its waste to the Durham/York Facility at that time.

However, as discussed in Sections 10 and 12 of this EA document, expansion of the Facility to accommodate additional waste streams would require approval under Ontario Regulation 101/07, as amended, (or the applicable piece of legislation at the time of expansion). This EA study is seeking approval for a 140,000 tonne per year facility which will provide sufficient capacity (with a small contingency) for Durham and York Region's post-diversion residual waste stream. Any additional waste streams, from Durham, York or other waste generators, will require an expansion of the Facility.

8.8.9 Environment Potentially Affected

Assumptions have been made in the identification of potential effects, the application of mitigation measures, and identification of net effects. These assumptions were specific to the indicator or criteria being applied. The following provides a summary of this process undertaken as part of the evaluation of the Short-list of sites.

8.8.9.1 Public Health & Safety and Natural Environment

Potential Air Quality Impacts

The following is a summary of the existing air quality and the potential effects associated with developing the Thermal Treatment Facility at each of the Short-list sites. The results were used to complete a relative comparison of the potential effects considering local meteorological conditions and emissions associated with the haulage of waste to each of the Short-list sites.

Review of Existing Atmospheric Environment

The proposed sites were reviewed based on regional climatology and meteorology, available regional air quality data, and potential emissions sources impacting the sites and the local area around the sites at the following distance scales:

- Local Scale: 0 to 1 kilometre from the site;
- Intermediate Scale: 1 to 20 kilometres from the site; and,
- Regional Scale: greater than 20 kilometres from the site.

The following sections provide an overview of the potential impacts at each site.

Climatology and Meteorology of the Region

The local meteorology of the general area was characterized to evaluate the short-term atmospheric dispersion and transport of emissions. The data required to predict dispersion and transport includes temperature, precipitation, wind speeds and direction. Climatological data used in the analysis was available from stations in the vicinities of the Short-list sites including Clarington and East Gwillimbury.

Temperature

The data for the stations in the vicinity of the Clarington sites was similar, with annual average temperatures ranging from 7.1 to 7.7°C from 1971 to 2000.

The annual average temperatures for the stations in the vicinity of the East Gwillimbury site were similar (6.5 to 6.9°C) and are slightly lower than those in the vicinity of the Clarington sites, which are attributable to the moderating influence of Lake Ontario at the Clarington sites.

Precipitation

The annual average total precipitation from 1971 to 2000 for the Clarington region varies from 832 to 878 mm, while in the East Gwillimbury area total precipitation varies from 850 to 901 mm/annum.

Wind Speed and Direction

The wind directionality in the areas around the Clarington and East Gwillimbury sites appears to be quite different, with the Clarington area showing a higher percentage of westerly and easterly winds and a smaller occurrence of southerly winds than at the East Gwillimbury 01 site. Wind directionality can be strongly influenced by local factors such as topography and the measurement location relative to large bodies of water. Given the distances between the monitoring stations and the Short-list sites, these data should be viewed with caution as being entirely representative of conditions at the Short-list sites. In particular, a higher percentage of southerly winds would be expected at the Clarington sites than are indicated in the Cobourg wind rose due to lake breeze effects.

Regional Air Quality

Ambient air quality monitoring is conducted at relatively few locations in the Durham/York Region. The closest ambient monitoring stations to the Short-list sites are Newmarket (East Gwillimbury 01 site) and Oshawa (Clarington sites). A summary of 2005 ambient levels for criteria air contaminants at these stations is presented in Table 8-18.

Table 8-18 Summary of Ambient Monitoring Data (2005)

Contaminant	Monitoring Station ID	Newmarket	Oshawa
Ozone (ppb)	90th percentile Hourly	50.0	47.0
	Annual	30.8	N/A
PM2.5 (ug/m3)	90th percentile Hourly	20.0	20.0
	Annual	7.7	8.1
NO2 (ppb)	90th percentile Hourly	19.0	14.0
	Annual	8.5	N/A
NOx (ppb)	90th percentile Hourly	25.0	23.0
	Annual	12.2	N/A
SO2 (ppb)	90th percentile Hourly	N/A	N/A
	Annual	N/A	N/A
CO (ppm) 4	90th percentile Hourly	0.63	N/A
	Annual	0.41	N/A

Existing Conditions – Clarington Study Area

The Clarington sites are all located within one (1) kilometre (km) of the north shore of Lake Ontario and are subject to the moderating influence on climate from the Lake. The existing air quality conditions at the Short-list sites in Clarington are expected to be influenced as follows:

Local Scale (area within 1 km of the sites)

The Clarington Short-list sites are located in relatively rural areas with limited intensive development within a one (1) km radius of each of the properties. The Clarington sites are in close proximity (adjacent) to Highway 401, which has the following annual average daily traffic (AADT) counts based on 2003 Ministry on Transportation (MTO) data:

- Bennett Road: 70,900 vehicles per day
- Courtice Road: 82,600 vehicles per day

The proximity to Highway 401 and the related mobile emissions from vehicular traffic will influence air quality at each of the Clarington sites. Based on the traffic data, the effect of vehicle traffic is expected to be slightly higher at the Clarington 01 and 05 sites (near the Courtice Road Interchange) than at the Clarington 04 site (near the Bennett Road Interchange).

The Clarington 01 and 05 sites will be located within one (1) km to the north of a new WPCP that may be a minor source of local emissions from onsite boilers.

Intermediate Scale (area within 20 km from the Sites)

For the Clarington Short-list sites, there is a significant concentration of industrial sources to the west of the sites, however, the most significant industrial source within 20 km of all of the sites is the St. Marys Cement Plant, which accounts for greater than 90% of the SO_2 emissions and about 50-55% of the particulate emissions of reporting facilities within 20 km of the Clarington sites. St Marys Cement accounts for over 88% and 90% of the CO and NOx emissions of reporting facilities within 20 km of Clarington 04 and 73% and 88% respectively for the Clarington 01 and 05 sites. St Marys Cement is located to the west of the Clarington 04 site and to the east of the Clarington 01 and 05 sites. As there is a higher incidence of westerly than easterly winds in southern Ontario, this would suggest that the Clarington 04 site may be more highly impacted by the St. Marys Cement Plant than the Clarington 01 and 05 sites.

Regional Conditions (greater than 20 km from the site)

On a larger regional scale, air quality at the Clarington sites may be impacted by other sources in the Oshawa/Whitby industrialized area, which includes steel fabrication and chemicals plants.

The sites are also subject to the general background influx of $PM_{10}/PM_{2.5}$, Ozone, and smog precursors from southwestern Ontario, as well as from the large sources in the Ohio River Basin and upper New York that migrate over the Great Lakes to Ontario. The influence of the long-range transport of contaminants is expected to be relatively consistent among all the Short-list sites.

Existing Conditions – East Gwillimbury Study Area

The existing air quality conditions at the Short-list site in East Gwillimbury are expected to be influenced as follows:

Local Scale (area within 1 km of the site)

The East Gwillimbury Short-list site is located in a relatively rural area with limited intensive development within a one (1) km radius of each of the properties. Based on an initial review of the area and surrounding potential air emissions contributors, at a local scale the Facility would not be subject to the impacts of other significant industry.

Intermediate Scale Conditions (area within 20 km of the site)

The Short-list site is located approximately 2.5 km to the east of Highway 404. The AADT traffic count (2003 MTO data) for the section of Highway 404 at Davis Drive is 33,400 vehicles/day, which is less than half of that for the Highway 401 sections adjacent to the Clarington Short-list sites. Therefore, the East Gwillimbury 01 site is expected to be significantly less impacted by vehicle emissions than the Clarington sites.

There are few significant emissions sources of criteria air contaminants within 20 km of the East Gwillimbury 01 site. The reported emissions of CACs within 20 km of East Gwillimbury 01 are significantly less than those reported within 20 km of the Clarington sites.

Regional Conditions (greater than 20 kilometre from the site)

As with the Clarington sites, the East Gwillimbury 01 site is subject to the general background influx of PM_{10}/$PM_{2.5}$, Ozone, and smog precursors from southwestern Ontario, as well as from the large sources in the Ohio River Basin and upper New York that migrate over the Great Lakes to Ontario.

Results and Findings

This section presents the four site characterizations and evaluations according to the criterion and indicators, as provided in the Approved EA Terms of Reference. Under the criterion, Potential Air Quality Impacts, the two main indicators discussed previously were applied.

Local Meteorological Conditions

Relative Comparison of Short-List site Meteorological Conditions

The Clarington sites are all located within one (1) km of the north shore of Lake Ontario and are subject to the moderating influence on climate from the lake. The East Gwillimbury 01 site is 41 km from the lake and would not see the direct moderating influence of the lake on the local climate.

The climate stations in the Clarington area indicate similar characteristics, as do the stations surrounding East Gwillimbury. Comparing the Clarington stations to the East Gwillimbury stations shows that the former are overall in a warmer or moderated climate, with annual average temperatures ranging from 7.1 to 7.7 °C for Clarington to 6.5 to 6.9 °C for East Gwillimbury. The cooler summertime temperatures at the Clarington sites compared to the East

Gwillimbury 01 site show the effect of the lake breeze and southerly flow Thermal Internal Boundary Layer (TIBL) regimes in cooling down the air compared to locations further inland.

The great similarity of the climatological station data surrounding the Clarington sites shows that the sites themselves will have a climatology which is very similar to the stations and therefore to each other, unless there is some localized terrain or other controlling influence on the sites. The Clarington sites are characterized by flat terrain so it is not expected that there are any micro-climatic conditions, which can modify the climate at the sites from that represented by the stations.

The lake breeze and TIBL regimes could lead to a higher frequency of south and southwest winds at the Clarington sites, which could result in more persistent impact at some locations. This would manifest itself in higher concentrations and depositions in some areas due to the persistence of the conditions over the day. It should be noted that the Cobourg wind rose is not reflective of this condition and as such this wind data, as applicable to the Clarington sites, should be viewed with caution.

The great similarity of the climatological station data surrounding the East Gwillimbury site shows that the site should have a climatology which is very similar to the climatological stations, unless there is some localized terrain or other controlling influence. In the area surrounding the East Gwillimbury 01 site there is more terrain variation, and in particular, both the King and Stouffville climatological stations are located in areas with moderate slopes. At the site itself, however, it is not expected that there is a significant microclimate induced by the terrain.

Conclusion/Summary

At this preliminary point in the study, and with the data currently available it is expected that the Clarington sites will likely experience elevated concentrations of criteria air contaminants relative to the East Gwillimbury 01 site, due to higher traffic emissions (and proximity to the 400 series highways) and much higher industrial emissions from sources located within 20 km of the sites. The Clarington 04 site may be more highly impacted than the Clarington 01 or 05 sites due to its location predominantly downwind of the St. Marys Cement Plant (the largest industrial emissions source within 20 km of either site).

Because of the lake effect at the Clarington sites, the potential exists for higher concentrations and depositions in some areas. Following the evaluation of the Short-list sites, additional background ambient monitoring is currently being conducted at the sites in order to verify these predictions and quantify actual concentration levels. The results of this site specific monitoring was used to confirm the identification of the Preferred Site.

Distance Travelled from Main Source(s) of Waste Generation to Site

The following information is based on the *Report on Potential Traffic Impacts, the Technical Memorandum on Haul Cost Analysis*, and the *Report on Capital Costs and Operation and Maintenance Costs*.

To estimate the distance travelled from the main source(s) of waste generation to a particular site (i.e., haul of a particular annual quantity of waste to a particular site), the various components of haul that comprise the haul scenario were first identified. A haul component is the haul of a particular annual quantity of waste from a particular location to a particular destination in a particular type of truck.

Each scenario was therefore defined in terms of a number of components, where each component is specified in terms of:

- The source and destination of the waste;
- The type of truck employed; and,
- The annual quantity of waste hauled in tpy.

The source and quantity of residual waste to be managed by the base case and alternative case is summarized in Table 8-19 below.

Table 8-19 Quantity of Residual Waste to be Managed by the Thermal Treatment Facility Size Scenarios

Source of Waste	Scenario 1 Quantity (tpy)	Scenario 2 Quantity (tpy)
Durham	110,000	110,000
York	20,000	120,000
Other Municipalities	20,000	20,000
Total	**150,000**	**250,000**

Residual waste will be transported to the Thermal Treatment Facility in packer trucks (directly hauled from the curbside) and in transfer trailer trucks (transfer hauled from transfer stations and/or Regional drop-off depots).

The following sections summarize the round trip distances travelled for each of the Short-list sites.

Clarington 01

The distance travelled by collection and transfer vehicles (round-trip) from the main source(s) of waste generation to the Clarington 01 site was estimated as 1,490 km/day for Scenario 1 (150,000 tpy) and 3,170 km/day For Scenario 2 (250,000 tpy).

Clarington 04

The distance travelled by collection and transfer vehicles (round-trip) from the main source(s) of waste generation to the Clarington 04 site was estimated as 1,690 km/day for Scenario 1 (150,000 tpy) and 3,630 km/day for Scenario 2 (250,000 tpy).

Clarington 05

The distance travelled by collection and transfer vehicles (round-trip) from the main source(s) of waste generation to the Clarington 05 site was estimated as 1,490 km/day for Scenario 1 (150,000 tpy) and 3,170 km/day for Scenario 2 (250,000 tpy).

East Gwillimbury 01

The distance travelled by collection and transfer vehicles (round-trip) from the main source(s) of waste generation to the East Gwillimbury 01 site was estimated as 3,380 km/day for Scenario 1 (150,000 tpy) and 4,470 km/day for Scenario 2 (250,000 tpy).

Conclusion/Summary

Clarington 01 and Clarington 05 are both at an advantage with respect to the other sites, when comparing the distances travelled per day by collection and transfer vehicles from the main source(s) of waste generation to the sites. Distances to the East Gwillimbury 01 site were the highest thus putting this site at a disadvantage with respect to the others. Clarington 04 received a neutral ranking because it fell in the mid range between the Clarington 01 and 05 sites and the East Gwillimbury 01 site.

Identification of Preliminary Site Advantages and Disadvantages

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-40.

Clarington 01: This site is well-suited for the location of the Proposed Thermal Treatment Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04.

Clarington 04: This site is not well-suited for the location of the Facility given it has the worst potential effects associated with industrial emissions at a local and intermediate distance, and due to its neutral ranking relative to the other sites for distance traveled by collection and transfer vehicles from main source(s) of waste.

Clarington 05: This site is well-suited for the location of the Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04.

East Gwillimbury 01: This site is well suited because even though relative to the other sites, it is the farthest distance to travel by collection and transfer vehicles from the main source(s) of waste, for the 150,000 tpy scenario, these longer travel requirements are balanced out by the benefits gained by the site having the relatively best air quality.

Clarington 04 is likely to have the greatest impact to air quality because of the combined effect of waste traveling a longer distance from main source(s) of generation to the site(s), and the expected air quality relative to the other sites.

For the purposes of consideration of the *Public Health and Natural Environmental Considerations – Potential Air Quality Impacts*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are summarized in Table 8-20 below.

Table 8-20 Summary Table – Potential Air Quality Impacts – Relative Advantages and Disadvantages

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Potential Air Quality Impacts	NEUTRAL	DISADVANTAGE	NEUTRAL	NEUTRAL

Potential Water Quality Impacts

The following is a summary of the potential water quality impacts (part of the Public Health and Safety and Natural Environment considerations) associated with the development of a Thermal Treatment Facility at each of the Short-list sites and to provide a relative comparison of the potential effects.

Stormwater Design Criteria

The Facility will be designed in such a manner as to ensure that there is no contamination of surface water runoff from solid waste or related processing activities (e.g., all waste receiving, storage and processing will be performed inside the building) that is discharged to the receiving watercourse.

The stormwater design criteria were identified as follows:

- Stormwater quantity control to attenuate post-development flows to pre-development flows; and,
- Stormwater quality control and erosion control.

This study also addressed the potential for stormwater management ponds to control the quantity and improve the quality of stormwater runoff. In order to quantify the benefits of stormwater management control ponds at a watershed scale and to assess the potential effect of the stormwater management facilities on surface runoff, a hydrological computer model, SWMHYMO[3], was utilized. This model was employed through different scenarios to provide the peak flow rates for 2, 5, 10, 25, 50, 100-year storm events on the design of the stormwater management facility to maximize benefits related to stormwater management control.

Review of Existing Conditions

The Short-list sites are situated within the Municipality of Clarington and the Town of East Gwillimbury. The peak flow rates generated within a site are highly dependent on rainfall distribution, land use cover and the soil type.

A runoff index factor combining the hydrologic soil group and land use characteristics is referred to as a soil curve number (CN). The soils data obtained from the report of Soil Survey of Ontario Durham County were combined with land use information to determine a CN for each proposed site. A CN of 74[4] was selected for all subject sites.

Clarington 01

The Clarington 01 site is located southeast of Tooley Creek and just north of Lake Ontario. It is on the west side of Osborne Road, north of the CN Railway. The major intersection is Highway 401 and Courtice Road. The site has an area of 12.1 hectares (ha) and is located within the

[3] The Storm Water Management Hydrologic Model, SWMHYMO, is a complex hydrologic model for the simulation and management of stormwater runoff in both rural and urban areas. SWMHYMO was developed and created based on the framework of OTTHYMO-83 and OTTHYMO-89 (OTTawa HYdrologic MOdel). The OTTHYMO-89 was

[4] The Clarington Short-List sites are found within the Darlington Loam soil series having a fair to good drainage (referred to Report #9 of the Ontario Soil Survey – Durham County). This soil type belongs to the hydrologic soil group 'C' with a typical curve number (CN) of 74 (referred to the design charts 1.08 & 1.09 of the MTO Drainage Management Manual, 1997). The soils in the vicinity of the East Gwillimbury site are assumed to be similar.

1,050 ha Tooley Creek watershed area. The site is located in the Central Lake Ontario Conservation Authority jurisdiction.

Clarington 04

The Clarington 04 site is approximately 2 km east of Bennett Creek, which discharges to Lake Ontario located about 1 km south of the site. The site is located south of Highway 401, between South Service Road and Bennett Road. The major intersection is Highway 401 and Bennett Road.

The site has an area of 15.0 ha which falls within the 289 ha Bennett Creek watershed area and is under the jurisdiction of the Central Lake Ontario Conservation Authority.

Clarington 05

A tributary of Tooley Creek runs east-west through the middle of the Clarington 05 site and extends to the west of the site. Lake Ontario is located about 1 km south of the site. The major intersection is Highway 401 and Courtice Road. The site has an area of 27.4 ha which falls within the 1,050 ha Tooley Creek watershed area. The site is located within the Central Lake Ontario Conservation Authority jurisdiction.

East Gwillimbury 01

The East Gwillimbury 01 site is located at Lot 2, Concession 4, East Gwillimbury, Ontario, and is close to the intersection of Highway 404 and Davis Drive. It has a total area of 11 ha located within the Black River sub-watershed. A tributary of Black River runs north-south just inside the western border of the site. Another tributary of the Black River is located approximately 400 m east of the site. The main branch of the Black River watercourse is located about 20 km east of the site.

This area falls within the jurisdiction of the Lake Simcoe Region Conservation Authority. The site falls within the tributary of the Black River Watershed which has a drainage area of 1,590 ha.

Hydrologic Parameters

The hydrologic principles and the hydrologic parameters were identified as follows:

- the soil type of each site (to determine CN[5] value);
- all hydrologic features, such as rivers, streams, ponds, etc;
- the drainage paths, length and the site spot elevations (to determine the surface runoff slope and the time of concentration);
- the SCS[6] 24-hour Type II Distribution rainfall data from Peterborough were used for the Clarington 01, 04 and 05 sites; and,
- the SCS 24-hour Type II Distribution rainfall data from Toronto Airport was used for the East Gwillimbury 01 site.

[5] The curve number (CN) is a parameter used to determine the extent of rainfall that infiltrates, rather than becoming surface runoff.
[6] SCS represents the United States Department of Agriculture Soil Conservation Service and assumed to be reasonable for use in this study.

Stormwater runoff is currently controlled by existing topography, soils and vegetation. The portion of overland flow that does not infiltrate the ground travels to nearby watercourses. To calculate the existing peak runoff rates for the various storm events, a number of hydrologic input parameters had to be determined. The pre-development drainage path lengths are the natural drainage path distance, which represents the surface stormwater flow from the highest remote point to the lowest point within the Thermal Treatment Facility site. The hydrologic input parameters for the pre-development drainage conditions are summarized in Table 8-21.

Table 8-21 Characteristics – Pre-Development Drainage Conditions

Alternative	Total Site Area (ha)	CN Value	Watercourses	Drainage Path Length (within site)
Clarington 01	12.1	74	Tooley Creek	440 m
Clarington 04	15.0	74	Bennett Creek	650 m
Clarington 05	27.4	74	Tooley Creek	525 m
East Gwillimbury 01	11.0	74	Tributary of Black River	340 m

Without onsite stormwater detention control, the increase in impervious surfaces from the Facility's buildings, paved roads, parking areas and landscaped areas would result in an increased volume and rate of stormwater runoff. To calculate the pre-development peak flow rates for the various storm events, a number of hydrologic input parameters were determined. The drainage area refers to the area contributing stormwater runoff to the stormwater management facility. The percent of the site area deemed to be impervious is calculated based on the concept Facility site plan and the stormwater drainage area of the site. The drainage path length from the stormwater pond outlet to the receiving watercourse was measured. The hydrologic input parameters for the post-development drainage conditions are summarized in Table 8-22 including the length from a potential stormwater point to the receiving watercourse.

Table 8-22 Site Characteristics – Post-Development Drainage Conditions

Alternative	SWM Pond #	Drainage Area (ha)	Impervious Site Area (%)	Drainage Path Length from SW Pond Outlet to Receiving Watercourse (m)
Clarington 01	1	10.0	45	600
Clarington 04	3	10.0	45	150
Clarington 05	2	10.0	45	250
East Gwillimbury 01	4	9.0	50	15

Results and Findings

Summaries of the hydrological analysis, conceptual cost estimates and approvals requirements are provided in this section.

Hydrological Analysis

The Clarington 01 and 05 sites and the East Gwillimbury 01 site are subject to Enhanced Level protection requirements, because both Tooley Creek and the Tributary of Black River, respectively, support a cold water fishery. The Clarington 04 site requires Normal Level protection because Bennett Creek supports a warm water fishery[7].

The storage volume required for the stormwater pond varies between 3,600 m^3 for Clarington 04 to 4,900 m^3 for Clarington 01.

The area required for the stormwater management (SWM) facility includes the stormwater pond, sediment forebay, proposed berm, and maintenance access roads. The sediment forebay is a small pool located near the inlet of the stormwater pond that improves pollutant removal by trapping larger particles before they reach the main basin.

The estimated footprints for the stormwater management facility are summarized in Table 8-23 below, and were determined based on the following criteria:

- The existing topographic contour and suitability for layout of each Short-list site;
- The adequate location for each SWM pond discharge to the downstream watercourse;
- The incorporation of the proposed configuration of the Thermal Treatment Facility on each Short-list site; and,
- The accommodation of the SWM pond, sediment forebay, proposed berm and maintenance access road.

[7] In consultation with the Central Lake Ontario Conservation Authority (CLOCA) it was determined that in July 2008, additional data was collected by CLOCA on this creek. The results of this new data confirm that Bennett Creek is a cold water fishery, not a warm water fishery as previous data suggested. See Section 8.8 for how this has been addressed in the site evaluation process.

Table 8-23 Footprint of SWM Facility

Short-List Site	SWM #	Footprint Required (ha)
Clarington 01	1	1.0
Clarington 04	3	0.9
Clarington 05	2	1.0
East Gwillimbury 01	4	1.0

All four sites can accommodate the area required for stormwater facilities. The stormwater facility can be controlled from post-development conditions to pre-development (existing) conditions.

Conceptual Cost Estimate

The conceptual cost estimate to construct the SWM facility is relatively similar for all Short-list sites:

- Clarington 01 site: $400,000;
- Clarington 04 site: $350,000;
- Clarington 05 site: $370,000; and,
- East Gwillimbury 01 site: $370,000

Approvals Requirements

Once a Preferred Site is selected, a site specific study will be prepared. When required, an application for development, interference with wetlands and alterations to shorelines and watercourses permit will be filed with the appropriate Conservation Authority according to the *Conservation Authorities Act* Regulation 179/06.

In accordance with Section 53 of the *Ontario Water Resources Act* (OWRA), it will also be necessary to obtain a C of A for a "sewage works" from the Ontario MOE.

Groundwater

A Groundwater Impact Study was completed and it was determined that the development of the Thermal Treatment Facility will not have any noticeable effects on the surrounding groundwater resources. The construction of the Facility may have some localized short-term effects that can be mitigated through an environmental management plan (EMP).

Summary and Conclusion

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-40.

Clarington 01: With respect to the distance of the SWM facility to natural features and watercourses, this site has the advantage of having the greatest distance between the SWM facility and natural features and watercourses. With respect to the type of aquatic habitat in the receiving body, the discharge is into a cold water fishery.

Clarington 04: With respect to the distance of the SWM facility to natural features and watercourses, this site has an advantage as there is a reasonable distance between the SWM facility and natural features and watercourses. With respect to the type of aquatic habitat in the receiving body, the discharge is into a warm water fishery[8].

Clarington 05: With respect to the distance of the SWM facility to natural features and watercourses, this site has an advantage as there is a reasonable distance between the SWM facility and natural features and watercourses. With respect to the type of aquatic habitat in the receiving body, the discharge is into a cold water fishery.

East Gwillimbury 01: With respect to the distance of the SWM facility to natural features and watercourses, this site has a disadvantage as the SWM facility is located very close to the natural features and the receiving watercourse which may affect the aquatic habitat stream temperature. With respect to type of aquatic habitat in the receiving body, the discharge is into a cold water fishery.

Overall, East Gwillimbury 01 is the only site with a disadvantage, in regards to the close proximity of the SWM facility to a cold water fishery.

For the purpose of considering the net effects associated with each site in regards to *Public Health & Safety and Natural Environment Considerations: Report on Potential Water Quality Impacts* (Surface Water & Groundwater), based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are summarized in Table 8-24 below.

Table 8-24 Summary Table – Public Health & Safety and Natural Environment Considerations: Potential Water Quality Impacts – Relative Advantages and Disadvantages

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Water Quality Impacts (Surface Water and Groundwater)	ADVANTAGE	NEUTRAL	NEUTRAL	DISADVANTAGE

[8] In consultation with the Central Lake Ontario Conservation Authority (CLOCA) it was determined that in July 2008, additional data was collected by CLOCA on this creek. The results of this new data confirm that Bennett Creek is a cold water fishery, not a warm water fishery as previous data suggested. See Section 8.8 for how this has been addressed in the site evaluation process.

Environmentally Sensitive Areas and Species Impacts and Aquatic and Terrestrial Ecology Impacts

The following is a summary of the existing natural environmental features potentially affected as a result of Facility development at each site with respect to environmentally sensitive areas, species impacts, aquatic and terrestrial impacts, and provide a relative comparison of the potential impacts to each of the Short-list sites.

Each of the four Short-list sites was described based upon the potential effect that the Facility would have on:

- Species of conservation concern in the area;
- Designated natural heritage features and areas considering the distance from these features to the sites; and,
- Woodlands, hedgerows, and aquatic habitat on the sites.

Study Results and Discussion

This section presents the four site characterizations and evaluations according to the criterion indicators, as provided in the Approved EA Terms of Reference. Under the criterion, *environmentally sensitive areas and species impacts, and aquatic and terrestrial ecology impacts,* the three main indicators discussed previously are applied.

Site: Clarington 01

Species of Conservation Concern

Two rare species are identified by the Natural Heritage Information Centre (NHIC) as possibly occurring within the site including Bushy Cinquefoil and another unnamed Sensitive Species

Bushy Cinquefoil is a lakeshore species preferring beach and wet prairie habitats. This type of habitat is not found on the site, thus it is unlikely this species would occur onsite. The NHIC record of this species in the general area is likely a record from the nearby Lake Ontario shoreline. The identity of the second species is not disclosed by the NHIC. It was noted that if Clarington 01 were identified as the Preferred Site, a more detailed assessment of the likelihood of the presence of this undisclosed species should be conducted. No species of conservation concern were observed during the site visit.

Natural Areas

A desktop survey using the NHIC natural areas database provided 20 natural areas within 10 km of the site and haul route.

Distances from Natural Areas

The Clarington 01 location is located 2.2 km from Darlington Provincial Park, the closest natural area to the site. The proposed haul route for Clarington 01 is 1.3 km from the nearest natural area, Darlington Provincial Park with the majority of natural areas falling farther than 3 km from the proposed haul route. Given that the distances from the site and haul route to the natural areas are greater than 1 km, it is expected that development on this site should have no impact on the natural areas identified.[9]

Hazard Lands

Hazard lands are areas that typically follow the historical high water level of a watercourse and therefore may be prone to flooding during periods of significant rainfall or during spring runoff. Hazard lands are located approximately 100 m from the northwest corner of the proposed site, in the adjacent Clarington 05 site.

Wildlife Habitat

Habitat is defined in the *Endangered Species Act*, 2007 as an area that is the habitat of a species listed on the Species at Risk in Ontario List as an extirpated, endangered, or threatened species; an area on which any other species of animal, plant or other organism depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding; and includes places in the area that are used by members of the species as dens, nets, hibernacula or other residences. Examples of wildlife habitat include winter deer yards, roosting areas, and migratory stop-over areas. Wildlife habitat does not include general areas that wildlife may frequent for food or use when passing through an area. No significant wildlife habitat was identified onsite.

Woodland Affected

Signs of Wildlife

The site showed signs of wildlife activity as various deer trails and deer beds were found in the southwest field. The surrounding hedgerows provide suitable cover and contain ideal deer and rabbit's browse species of vegetation. A raccoon was also observed along the far west hedgerow between the north and south field. No species of conservation concern were noted onsite.

Overall the bird life observed throughout Clarington 01 represented an open field bird community. The most common bird species observed were: Common Grackle, Ring-billed Gull, Song Sparrow, Savannah Sparrow and European Starling. Other species observed such as Brown Thrasher, Willow Flycatcher, Least Flycatcher and Eastern Meadowlark represent species needing old field habitat. No nests were found onsite, but five species were observed with fledged young to confirm nesting in the area; these were Red-winged Blackbird, Common Grackle, Savannah Sparrow, House Sparrow and Eastern Kingbird.

[9] In consultation with the Central Lake Ontario Conservation Authority (CLOCA) it was determined that Tooley Creek is a locally significant wetland as determined by CLOCA. The Clarington 01 site is located 0.87 km from the Tooley Creek Coastal Wetland and 2.2 km from Darlington Provincial Park, the closest natural areas to the Site. The proposed haul route for the Site is 0.9 km from the coastal wetland and 1.3 km from Darlington Provincial Park, with the majority of natural areas falling farther than 2 km from the proposed haul route. However, further site specific investigations on the Clarington 01 site and surrounding area have determined minimal to no impact on this wetland area. See Section 8.8 for how this has been addressed in the site evaluation process.

Field Results

The site is composed of four fields with a periphery of hedgerows containing a variety of common tree and shrub species representative of the area. The loss of habitat, browse, nesting and cover vegetation associated with the development of a Thermal Treatment Facility on this site would be minimal, totaling approximately 515 m of hedgerow. The area surrounding the proposed site consists of fallow and cultivated agricultural fields, which contain hedgerows with similar tree and shrub species.

The northeast and northwest hay fields had been baled and contain various weeds typically found in disturbed and agricultural areas. A small fenced-off area is located in the southwest field containing a large opening covered with wood (palates or planks). Should Clarington 01 be identified as the Preferred Site, further investigation into this covered area should be undertaken and appropriate mitigation measures taken. An access road has been constructed heading west from Osborne Road through the centre of the site and proceeds south through the southeast field to the train tracks. Finally, a small culvert and dry drainage ditch runs south from the access road. Its primary function is to allow runoff to flow from the north to south side of the access road. The drainage ditch is not connected with Tooley Creek itself, but is within the Tooley Creek Watershed. This Watershed is located within the Central Lake Ontario Conservation Authority jurisdiction.

Clarington 01 - Conclusion/Summary

It is expected that potential impacts to local wildlife and birds associated with the development of this site would be minimal. No species of conservation concern were observed on site and development could move forward at this location with little biological impact within the area. No significant wildlife habitat was noted onsite. Hazard lands are located approximately 100 m from the proposed site. It is important to note that this site lies within an area already designated and zoned for industrial and commercial development.

Site: Clarington 04

Species of Conservation Concern

No species of conservation concern are recorded by the NHIC as possibly occurring at the Clarington 04 site.

Natural Areas

A desktop survey using the NHIC natural areas database provided 19 natural areas within 10 km of the site and haul route. Some of these overlap with those of Clarington 01 and Clarington 05, given the proximity of the three sites.

Distances from Natural Areas

The Clarington 04 location is located 1.5 km from the Port Darlington Marsh, the closest natural area to the site. The proposed haul route for Clarington 04 is 1.4 km from the nearest natural area, the Port Darlington Marsh, with the majority of natural areas falling farther than 3 km from the proposed haul route. Given that the distances from the site and haul route to the natural areas are greater than 1 km, it is expected that development on this site should have no impact on the natural areas identified.

Hazard Lands

Hazard lands are located approximately 100 m from the southwest corner of the proposed site.

Significant Wildlife Habitat

No significant wildlife habitat was identified onsite.

Woodland Affected

Signs of Wildlife

No sign of terrestrial wildlife was observed onsite. The overall biodiversity represented at Clarington 04 was sharply divided into two distinct areas. The first community was an agricultural field and due to lack of diversity of this agricultural field, very few species of birds were observed. The second distinct area was characterized as an old field and was highlighted by a man-made elevated lagoon in the north-western section of this site. Many of the typical bird species of an old field community were observed at this site, including Willow Flycatcher, Eastern Kingbird, Bobolink and Savannah Sparrow. No bird nests were observed, however several species were observed with fledged young, indicating a confirmation of breeding including: Virginia Rail, Mallard, Common Grackle and Red-winged Blackbird. A bullfrog was heard calling from the lagoon. No species observed throughout this site are of conservation concern.

Field Results

Approximately two-thirds of the site was cultivated agricultural land and one-third abandoned agricultural area. A man-made lagoon is located in the southwest corner of the abandoned agricultural area and measures approximately 60 m x 27 m (1,620 m^2). The periphery of the lagoon hosts a variety of willow species, field horsetail and cattails and is habitat for amphibian and waterfowl species. The lagoon does not drain into any watercourse, but the lagoon has the potential for fish habitat and would need to be assessed. There also exists a breach along the periphery of the lagoon that occasionally leaks into the surrounding field.

Various weeds representative of disturbed areas were found in the old field. A dry drainage area containing cattails is located in the northeast corner of the abandoned agricultural area and drains into the dry ditch that runs along the South Service Road. No hedgerows or woodlots were found onsite.

Clarington 04 - Conclusion/Summary

No significant wildlife habitat was noted onsite. Hazard lands are located approximately 100 m from the proposed site. The site and proposed haul route are located at a minimum 1.4 km from any natural area, and the previously identified natural areas should not be impacted by the development of this site. No species of conservation concern were observed on site and development could move forward at this location with minimal biological impact on the area.

Site: Clarington 05

Species of Conservation Concern

One species of conservation concern, Bushy Cinquefoil, is identified by the NHIC as possibly occurring within the Clarington 05 site. Bushy Cinquefoil is a lakeshore species preferring beach and wet prairie habitats. This type of habitat is not found on the site, thus it is unlikely this species would occur onsite. Based on preferred habitat, the NHIC record of this species in the general area is likely a record from the nearby Lake Ontario shoreline. No species of conservation concern were observed during the site visit.

Natural Areas

A desktop survey using the NHIC natural areas database identified 20 natural areas within 10 km of the site and haul route overlapping with those identified for Clarington 01 and 04.

Distances from Natural Areas

The Clarington 05 site is located 1.7 km from Darlington Provincial Park, the closest natural area to the site. The proposed haul route for Clarington 05 is 1.3 km from the nearest natural area, Darlington Provincial Park, with the majority of natural areas falling farther than 3 km from the proposed haul route. Given that the distances from the site and haul route to the natural areas are greater than 1 km, it is expected that development on this site would have no impact on the natural areas identified.[10]

Hazard Lands

Hazard lands are located onsite and would be dealt with through technical analysis and the municipal planning process.

Significant Wildlife Habitat

Although signs of deer use were noted, there is no evidence to suggest that significant wildlife habitat exists on-site.

Woodland Affected

Signs of Wildlife

No species of conservation concern were noted onsite. Of all the sites surveyed, Clarington 05 is the most diverse in terms of birds, butterflies and dragonfly species. Although much of Clarington 05 is characterized as agricultural lands with crop, the hedgerows and watercourses provide habitat for dragonfly and bird species. Common bird species observed throughout the site include: Bank Swallow, Barn Swallow, European Starling, Ring-billed Gull and Red-winged Blackbird. Other common species typical of this landscape include: Eastern Meadowlark,

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[10] In consultation with the Central Lake Ontario Conservation Authority (CLOCA) it was determined that Tooley Creek is a locally significant wetland as determined by CLOCA. The Clarington 05 site is located approximately 0.3 km from the Tooley Creek Coastal Wetland and 1.7 km from Darlington Provincial Park, the closest natural areas to the Site. The proposed haul route for the Site is 0.9 km from the coastal wetland and 1.3 km from Darlington Provincial Park, with the majority of natural areas falling farther than 3 km from the proposed haul route. See Section 8.8 for how this has been addressed in the site evaluation process.

Northern Mockingbird, Warbling Vireo and Indigo Bunting. Seven bird nests were located throughout the site. Three Barn Swallows and two House Sparrow nests were located in an abandoned building. One Cedar Waxwing nest was located along a north to south hedgerow, and one Northern Mockingbird nest was located directly beside Courtice Road. Deer trails and deer beds were observed in the southwest fields.

Field Results

Clarington 05 is the most biologically-complex of the four locations proposed for the Facility. The location contains two fallow agricultural fields to the west and four cultivated corn fields to the east. Sizeable hedgerows surround most of the fields and contain a variety of trees and shrubs native to the area. The large willow trees that line both sides of the stream bank for approximately 175 m is considered a wooded area by the MNR and provides cover and habitat for a variety of wildlife. The fallow fields and hedgerows within the proposed site provide substantial deer and rabbit browse species of vegetation.

A watercourse runs through the site, a flowing drainage ditch runs along Service Road East to the north and a dry drainage ditch runs along the CN Rail tracks to the south. The watercourse flows across the centre of the proposed site and into a waterlogged area near the southwest corner of the proposed site. This stream is located within the Tooley Creek Watershed of the Central Lake Ontario Conservation Authority and has been classified as a likely coldwater stream and thus, has the potential for fish habitat. Typical wetland vegetation was found in and around the watercourse, including jewelweed, cattails, sedges, grasses, soft-stem bulrush, and reed canary grass. The depth of the stream at the time of the site visit varied between 3 cm and 20 cm and the channel width was approximately 0.5 m. No fish or amphibian species were noted during this preliminary site assessment. According to the Central Lake Ontario Conservation Authority, a permit would be required for any work carried out on the site that would directly affect this stream, and would also require a detailed fish habitat assessment and authorization under the FA. Should authorization be required under the FA, this would likely trigger the need for a screening under the CEAA.

Clarington 05 - Conclusion/Summary

Deer trails and deer beds were found in the fields along the western boundary. Development of this site would result in the removal of approximately 1,260 m of hedgerows. Development on this site would also likely trigger the need for a screening under the CEAA due to the need for authorization under the FA. In addition, erosion and sedimentation control devices would need to be employed during construction to prevent runoff or leaching into the drainage ditches that may flow into nearby streams and waterbodies. Hazard lands are located onsite..

Site: East Gwillimbury 01

Species of Conservation Concern

One species of conservation concern, Red-shouldered Hawk, is documented by the NHIC as possibly occurring within the site. Red-shouldered Hawk is a woodland nester that occurs throughout southern Ontario. Given the absence of woodland habitat on the East Gwillimbury 01 site, it is extremely unlikely that this species breeds on or immediately adjacent to the site.

There do exist woodlots east and north of the site that may provide suitable habitat for this species. This species was not observed onsite during the site visit.

Natural Areas

Under the designation of the Greenbelt Plan; the East Gwillimbury 01 site is composed of an Agricultural System and a Natural System, with a series of settlement areas. The site itself is listed as "Protected Countryside". The Greenbelt is an area of land that provides permanent protection to agricultural and natural heritage resources within its boundaries, the extent of which wraps around Lake Ontario from the Niagara Region to Durham and includes areas such as the Oak Ridges Moraine and Niagara Escarpment.

A desktop survey using NHIC natural areas database provided 35 natural areas within 10 km of the site or haul route. The NHIC also identifies two notable vegetation communities within 10 km of this site. Both were dry tallgrass prairie types, located in Holland Landing Central Prairie and ranked as S1 (critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences)).

Distances from Natural Areas

The East Gwillimbury 01 site is located 2.0 km from the Black River Headwater Complex, the closest natural area to the site. The proposed haul route for East Gwillimbury is 1.8 km from the nearest natural area, the Black River Headwater Complex, with the majority of natural areas falling farther than 5 km from the proposed haul route. Given that the distances from the site and haul route to the natural areas are greater than 1 km, it is expected that development on the site should have no impact on the natural areas identified.

Hazard Lands/Environmental Protection Area and Floodplains

Hazard Lands are defined by the Environmental Protection Area designation in the Town of East Gwillimbury Official Plan for the protection of life and property. The closest Hazard Land/Environmental Protection Area to the East Gwillimbury 01 site is the Black River Headwater Complex at a distance of approximately 2.0 kilometres. The East Gwillimbury 01 site also has a defined floodplain onsite.

Significant Wildlife Habitat

No significant wildlife habitat was observed onsite.

Woodland Affected

Signs of Wildlife

No species of conservation concern were noted onsite and no signs of terrestrial wildlife were observed.

Bird diversity located at the East Gwillimbury 01 site is the lowest among all four sites surveyed. The typical bird community was of an open field community, with species such as Song Sparrow, Savannah Sparrow, Red-winged Blackbird and Bobolink in abundance throughout the site. Along the watercourse, a single American Robin nest was located and appeared to have been vacated recently. A single Savannah Sparrow nest was located in the extreme southeast section of this site, also vacated recently. A stormwater management pond is situated offsite adjacent to the northwest corner of the site (on the York Waste Management Centre). Several species were observed in or around this pond, including Lesser Yellowlegs, Spotted Sandpiper, American Black Duck and Northern Mockingbird, although these likely represented migrants.

Field Results

The site was found to be primarily an open field with an assortment of herbaceous vegetation typically found on disturbed sites. Running along the perimeter of Bales Drive are various planted trees such as Silver Maple, Large-toothed Aspen, Red Oak and White Ash. A watercourse bed runs north-south near the western boundary of the site and terminates just south of the proposed site. The watercourse was dry during the site inspection but according to Lake Simcoe Region Conservation Authority (LSRCA), the watercourse does flow during spring runoff and periods of significant rainfall. The streambed is lined with various grasses, cattails, willows and Manitoba maples. Two culverts are located on the site: one in the northwest corner and the other in the southwest corner of the site. The watercourse is located in the East Holland River Subwatershed and according to LSRCA is classified as a coldwater stream. LSRCA was contacted and has stated that a minimum 15 m buffer on either side of the stream and a vegetation buffer must be installed for development of this site to proceed.

East Gwillimbury 01 -Conclusion/Summary

It is expected that potential impacts to local wildlife and birds associated with the development would be minimal. No hedgerows were located on site and plenty of suitable cover and foraging habitat exists to the north and the east. Overall, the site is representative of an abandoned agricultural area and no species of conservation concern were observed on the site. No significant wildlife habitat was noted onsite. The site and proposed haul route are located at a minimum 1.8 km from any natural area, and no identified natural areas should be impacted by the development of the site. If guidelines established by the LRSCA are followed, development could proceed with minimal biological impact on the surrounding area. It is important to note that this site lies within an area already designated and zoned for industrial and commercial development.

Identification of Preliminary Site Advantages and Disadvantages

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list, refer to Table 8-40.

Clarington 01: This site is well-suited for the development of a Facility given the lack of watercourses or waterbodies, the minimal hedgerow and lack of woodlots and aquatic habitat on-site.

Clarington 04: This site is well-suited for the development of a Facility given its lack of hedgerow or woodlots, and no watercourses onsite. However, the associated lagoon onsite could be identified as a constraint for development, which would require mitigation.

Clarington 05: This location is the least preferred for the proposed project given the amount of hedgerow, the MNR wooded area and watercourse found onsite.

East Gwillimbury 01: This site is well-suited for the development of a Facility given its lack of hedgerows or woodlots. However, a watercourse located on the western edge of the property could be identified as a constraint for development and would likely require mitigation measures to ensure no impact during construction and operation.

Clarington 01 is likely to be the least sensitive land developed as it is largely cultivated and fallow fields, contains no watercourses and no species of conservation concern. The site has a minimal amount of hedgerow and is surrounded by fields and hedgerows. Development in the region of the Facility could occur with the least environmental impact in comparison to the other three Short-list sites.

For the purposes of consideration of the *Public Health and Natural Environmental Considerations – Potential Environmentally Sensitive Areas and Species Impacts and Potential Aquatic and Terrestrial Ecology Impacts*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are summarized in Table 8-25 below.

Table 8-25 Summary Table – Potential Environmentally Sensitive Areas and Species Impacts and Potential Aquatic and Terrestrial Ecology Impacts – Relative Advantages and Disadvantages

Criteria	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Environmentally Sensitive Areas and Species Impacts	NEUTRAL	ADVANTAGE	DISADVANTAGE	DISADVANTAGE
Aquatic and Terrestrial Ecology Impacts	ADVANTAGE	DISADVANTAGE	MAJOR DISADVANTAGE	DISADVANTAGE

8.8.9.2 Social and Cultural Environment

Application of Short-List Evaluation Criteria Report on Compatibility with Existing and/or Proposed Land Use

The following is a summary of the site land use and surrounding land use considerations, to provide a relative comparison of the surrounding land uses and implications associated with each of the Short-list sites. Specifically, this document addressed four of the six criteria in regards to social and cultural considerations as identified in the Approved EA Terms of Reference.

A combination of Provincial Policy and Plans, Municipal and Regional planning documents, Provincial government land use guidelines and field data collection were used to complete this land use assessment. The baseline data included the following:

- Provincial Greenbelt Plan;
- MOE Guidelines – D-6 Compatibility Between Industrial Facilities and Sensitive Land Uses, D-6-1 Industrial Categorization Criteria, D-6-3 Separation Distances;
- Durham Official Plan;
- Municipality of Clarington Official Plan and Zoning By-law;
- York Official Plan;
- Town of East Gwillimbury Official Plan and Zoning By-law;
- Town of Whitchurch-Stouffville Official Plan and Zoning By-law; and,
- Previous reports and studies completed as part of the EA Study.

Application of Evaluation Criteria

This section will present the four site characterizations and evaluations according to the criterion and indicators, as provided in the Approved EA Terms of Reference. Under the criterion, Compatibility with Existing and/or Proposed Land Uses, Residential Areas, Parks and Recreational Areas, and Institutional Facilities or Areas, the eight main indicators are applied.

Consistency with Current Land Use, Approved Development Plans, and Compatibility with Existing Land Use Designations

The land uses were identified using Regional and Area Municipal Official Plans and the parcel boundaries were mapped according to boundaries assigned by the Municipal Property Assessment Corporation (MPAC). Locations of houses, parks, utilities, commercial, and industrial facilities were determined through field notes, photos gathered during the field investigation and aerial photograph images.

Provincial Greenbelt Plan Considerations

The East Gwillimbury 01 site, although within an area designated as "Protected Countryside" in the Provincial Greenbelt Plan, is located within an industrial park that was approved as a site specific industrial land use in the early 1990s. This approval pre-dates the passing of Greenbelt legislation in 2004 and 2005 and the release of the Greenbelt Plan in 2005. On this basis, this pre-existing and pre-approved land use is allowed to continue and future site specific planning approvals for this site and other sites within this pre-approved industrial park, are the subject of permissions set out in the Greenbelt Plan that do not require these sites to conform to the policies and requirements of the Greenbelt Plan.

Compatibility with Existing Official Plan Designations

The development of Public Infrastructure within Durham is not required to conform with existing Regional and area municipal land use designations and zoning. As a result, all of the Clarington sites could be considered compatible with current land use designations and zoning.

Clarington 01

Clarington 01 is partially used as agricultural land while the remainder of the site is undeveloped and not being used. The Durham Official Plan, as amended by Regional Official Plan Amendment No. 114 (approved by Regional Council on September 13, 2006), designates Clarington 01 as Employment Area. The Municipality of Clarington Official Plan (January 2007 – Office Consolidation) designates the site as a Business Park. The Municipality of Clarington Energy Business Park Secondary Plan further details the Business Park land use designation as Light Industrial 1 for the north part of Clarington 01 and Light Industrial 2 for the south part.

Land Use Designations within one (1) Kilometre of Clarington 01

The Durham Regional Official Plan land use designations within the one (1) km radius of the Clarington 01 site consist of Employment Areas, Waterfront Areas, and Major Open Space Areas. The one (1) km eastern boundary touched the Darlington Nuclear Power Plant. The Municipality of Clarington Official Plan land use designations within the one (1) km radius of the Clarington 01 site consist of Business Park, Light Industrial, Prestige Industrial, Waterfront Greenway and Environment Protection Area and Utility. Field observation of the area determined that the one (1) km radius includes commercial properties, agricultural land and several residential properties. There are park and recreation lands one (1) km east of the site.

Land Use Designations along Proposed Haul Route to Clarington 01

The existing land uses along the proposed haul route include agricultural lands, commercial properties, and one abandoned/derelict residential property. The Regional Official Plan land use designation along the haul route is Employment Area. The Municipality of Clarington Official Plan land use designation along the haul route is Business Park. Moreover, Energy Drive, an undeveloped roadway within the Energy Business Park, is proposed along the north side Clarington 01.

Clarington 04

Clarington 04 is partially being used as agricultural land while the remainder is undeveloped and not being used. The southern and eastern half of the site is being used for growing crops. The remainder of the property is covered with trees and grass. The Durham Official Plan designates Clarington 04 as Employment Area. The Municipality of Clarington Official Plan designates Clarington 04 as Prestige Employment Area.

Land Use Designations within one (1) Kilometre of Clarington 04

The Durham Regional Official Plan land use designations within the one (1) km radius of the Clarington 04 site consist of Employment Areas, Prime Agricultural Areas, Waterfront Areas and Living Areas. The Municipality of Clarington Official Plan land use designations within the one (1) km radius of the Clarington 04 site consist of Prestige Employment Area, Light Industrial, General Industrial, Prime Agricultural Area, Green Space, Environmental Protection Area, Waterfront Greenway, and Urban Residential. It is noted that both the Regional and the Municipality of Clarington Official Plan include a future Highway 401 interchange at Lambs Road which will impact the Clarington 04 site.

Field observation of the area determined that the one (1) km radius includes commercial properties, agricultural lands and several residential properties.

Land Use Designations along Proposed Haul Route to Clarington 04

The existing land uses along the proposed haul route includes agricultural lands and commercial properties. The Regional Official Plan land use designation along the haul route is Employment Area. The Municipality of Clarington Official Plan land use designations along the haul route are Prestige Employment Area and Light Industrial Area.

Clarington 05

Clarington 05 is partially being used as agricultural land with the remaining part being either undeveloped and not being used, with some former commercial operations, an abandoned/derelict residential property and a currently occupied residential property. The Durham Official Plan designates Clarington 05 as Employment Area. The Municipality of Clarington Official Plan designates Clarington 05 as Business Park. According to the Energy Business Park Secondary Plan, the Business Park designation of the Clarington 05 site consists of the following: the north and west part of Clarington 05 as Prestige Employment Node, the south east as Light Industrial 1 and the southwest corner as a combination of Open Space and Environmental Protection Area.

Land Use Designations within one (1) Kilometre of Clarington 05

The Durham Regional Official Plan land use designations within the one (1) km radius of Clarington 05 site consist of Employment Area, Waterfront Areas, and Major Open Space Areas. Municipality of Clarington Official Plan land use designations within the one (1) km radius of the site, consist of Business Park, Light Industrial, General Industrial, Prestige Industrial, Green Space, Waterfront Greenway and Environment Protection Area and Utility. Field observation of the area determined that the one (1) km radius includes commercial properties, agricultural lands and several residential properties.

Land Use Designations along Proposed Haul Route to Clarington 05

The existing land uses along the proposed haul route include agricultural lands, and possibly one abandoned/derelict residential property depending on the length of the haul route. The Durham Regional Official Plan land use designation along the haul route is Employment Area. The Municipality of Clarington Official Plan land designation along the haul route is Business Park. It is important to note that Clarington 05 could be impacted by the undeveloped proposed

Energy Drive roadway that would run through the site. In addition to the proposed Energy Drive, the South Service Road to Highway 401 will eventually function as a Collector Road with a maximum right-of-way width of 23 metres. The proposed right-of-way and minimum building setbacks will allow for the relocation of the roadway, if required by a future widening of Highway 401. Moreover, highway developments in the vicinity of Highway 401 and Courtice road also have a significant impact on Clarington 05.

East Gwillimbury 01

East Gwillimbury 01 is currently vacant and is designated by the York Official Plan (September, 2007) as Agricultural Policy Area. The Town of East Gwillimbury designates the site as Rural Commercial Industrial Area.

Despite the York land use designation noted above, an amendment would not be required to the Regional Official Plan because a plan of subdivision (Plan 65M-3843) was approved for lands around and including East Gwillimbury 01 prior to the approval of York's Official Plan. Policy 7.6.5 (Interpretation) of the York Official Plan, explains this exemption:

"To recognize existing land uses and approved land uses, in keeping with the provisions of the *Planning Act* as amended from time to time, including draft plan of subdivision approvals and official plan approvals, as they existed at the time of approval of this Plan".

An amendment to the York Official Plan may be required however, based on policies 6.8.2 and 6.8.3 (Waste Management) of the York Official Plan. They state that it is the policy of York Council to require an amendment to York's Official Plan for any new solid waste disposal facility and that any new solid waste disposal facility be designed and operated to meet the waste disposal needs of York only.

Land Use Designations within one (1) Kilometre of East Gwillimbury 01

Region of York Official Plan land use designations within the one (1) km radius of the East Gwillimbury 01 site consist of Agricultural Policy Area and Rural Policy Area. East Gwillimbury Official Plan land use designations within the one (1) km radius of the site consist of Rural Commercial Industrial Area, Agricultural Area, Countryside Area, Rural Area, Urban Buffer Area, Natural Linkage Area, Estate Residential Area and Environmental Protection Area. Field observation of the area determined that the one (1) kilometre radius included commercial, industrial and residential properties as well as agricultural lands. Lands within the one (1) km radius of the East Gwillimbury 01 site also include part of the Town of Whitchurch-Stouffville.

Land Use Designations along Proposed Haul Route to East Gwillimbury 01

The existing land uses along the proposed haul route include commercial, industrial, and residential properties as well as agricultural lands. The Region of York Official Plan land use designations along the haul routes are Agricultural and Rural Policy Areas. The East Gwillimbury Official Plan land use designations along the haul routes are Agricultural Areas, Urban Buffer Area and Rural Commercial Industrial Areas.

Development of Public Infrastructure

Durham and Municipality of Clarington

Policy 5.3.25 of the Durham Official Plan generally permits municipal facilities and/or electric power facilities to be located within any designation. Policy 21.2.2 of the Municipality of Clarington's Official Plan generally permits new utility facilities in any land use designation. The Municipality of Clarington's Zoning By-law policy 3.18 exempts any use of land by Durham for the provision of a public service.

Section 21 (Utilities) of the Municipality of Clarington Official Plan – January 2007 Office Consolidation generally permits new Utility facilities in any land use designation. Therefore, the Municipality of Clarington Official Plan would not require an amendment to permit a municipal Thermal Treatment Facility.

Region of York and Town of East Gwillimbury

The York Official Plan (September, 2007) does not include any provisions for public infrastructure and therefore, relies solely on designations within relevant official plans and local municipal zoning by-laws.

Compatibility with Existing Zoning Designations

Clarington 01

Clarington 01 is zoned as (H)M2 – Holding General Industrial Zone according to the Municipality of Clarington Zoning By-Law (84-63) of the former Town of Newcastle.

The Zoning By-laws used for this report are those most recently approved by the Municipality of Clarington's Council. The Municipality of Clarington is currently reviewing their Zoning By-laws.

The proposed Thermal Treatment Facility would be consistent with an H(M2) zoning designation and the Public Use Policy. A zoning by-law amendment would not be required to permit a municipal Thermal Treatment Facility.

Clarington 04

Clarington 04 is zoned as Industrial (M1) Zone with parts in a Holding Zone (H)M1 – Holding Light Industrial according to the Municipality of Clarington Zoning By-law.

The Zoning By-laws used for this report are those most recently approved by the Municipality of Clarington's Council. The Municipality of Clarington is currently reviewing their Zoning By-laws.

The Facility would be consistent with an H(M1) zoning designation.

In addition, based on Policy 3.18 (Public Uses), a zoning by-law amendment would not be required to permit a municipal Thermal Treatment Facility

Clarington 05

Clarington 05 is zoned as a combination of (H)M1 and (H)M2 in addition to a Service Station Commercial Exception (C6-6) Zone in the northwest corner of the property according to the Municipality of Clarington Zoning By-law.

The Zoning By-laws used for this report are those most recently approved by the Municipality of Clarington's Council. The Municipality of Clarington is currently reviewing their Zoning By-laws.

The Facility would be consistent with a H(M1) or H(M2) zoning designation, but not consistent with a C6-6 zoning designation.

As in the case of Clarington 01 and Clarington 04, based on Policy 3.18 (Public Uses), a zoning by-law amendment would not be required to permit a municipal Thermal Treatment Facility.

East Gwillimbury 01

East Gwillimbury 01 is zoned as M1-4 - Industrial Restricted (M1) Zone according to the Town of East Gwillimbury Zoning By-law (January 2006).

The Proposed Thermal Treatment Facility would be consistent with an (M1-4) zoning designation and the public use by-law.

The south part of East Gwillimbury 01's one (1) km radius also includes lands which belong to the Town of Whitchurch-Stouffville. This portion of land is zoned as Rural and Open Space Environmental.

Size of Buffer Zone Available on Site

The size of the buffer zone was determined by taking the total site area and subtracting the area required for the main building structures. The total or net area remaining is the size of the buffer zone provided on each site. This calculation assumes that some of the ancillary infrastructure associated with the subject site would be located in areas considered to be buffer around the Facility. The following Table 8-26 provides an assessment of the size of the buffer zone provided on each of the Short-list sites.

Table 8-26 Size of Buffer Zone Available on Site

Criteria/ Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Size of Buffer Zone Available on Site	Total site area – 12.1 hectares Building size – 3.1 hectares Net buffer area – 9 hectares	Total site area – 15 hectares Building size – 3.1 hectares Net buffer area – 11.9 hectares	Total site area – 27.4 hectares Building size – 3.1 hectares Net buffer area – 24.3 hectares	Total site area – 11 hectares Building size – 3.1 hectares Net buffer area – 6.9 hectares

Opportunity for Brownfield Development

The presence of former development that may have resulted in environmental contamination of the site may result in a property being considered as a brownfield property and as a result, some incentives may be available for the development of this property and environmental clean-up of the site. None of the Short-list sites are considered Brownfield properties.

Potential Impact to Residential Areas

Impacts to residential areas were considered in two manners, firstly designated residential areas and residences within a one (1) kilometre radius of the site and secondly, designated residential areas and residences along the proposed haul route to the site from a 400 series highway. Designated residential areas are defined in accordance with Regional and Area Municipal Official Plans.

Clarington 01

The nearest residential area to Clarington 01 designated as future urban residential is 3.2 km from the site. Within one (1) kilometre of the site there are three (3) residences. Two (2) residences are located northwest of Clarington 01, one of which is abandoned, and one (1) residence is located to the east of the site. There is one (1) abandoned residence located 180 metres south of the south service road on the proposed haul route.

Clarington 04

The nearest residential area to Clarington 04 designated as future urban residential is 420 metres from the site (Wilmot Creek planned expansion). Within one (1) kilometre of the site there are nine (9) residences. Six (6) residences are located south of the site (south of CN Rail) and three (3) are located north of the site (north of Highway 401). There are no residences along the proposed haul route.

Clarington 05

The nearest residential area to Clarington 05 designated as future urban residential is 2.74 km from the site. Within one (1) kilometre of the site there are nine (9) residences. Seven (7) residences are located north of Clarington 05 (north of Highway 401) and one (1) is located southwest of the site. Two (2) residences are located on the site, one (1) of which is abandoned. There are no residences along the proposed haul route.

East Gwillimbury 01

The nearest residential area to East Gwillimbury 01 designated as future estate residential is 875 metres from the site. Within one (1) kilometre of the site there are nine (9) residences located to the northwest, east, and south of the site. Four (4) of the residences, to the east of the site, form part of a larger subdivision along Callwood Crescent. Two (2) residences are located along the proposed haul route, on Davis Drive. The residence on the north side is located 250 metres from the haul route and the residence on the south side is 30 metres from the haul route.

Potential Impact to Parks and Recreational Areas

Impacts to parks and recreational areas were considered in two manners, firstly parks and recreational areas within a one (1) km radius of the site and secondly, parks and recreational areas along the proposed haul route to the site from a 400 series highway. Parks and recreational areas were defined in accordance with Regional and Local Municipal Official Plans. Consideration was also given to Provincial and Federal parks and recreational areas. A one (1) km radius from the site was determined to be sufficient to assess potential impacts based on similar types of industrial developments and other types of waste management facility developments.

Within one (1) km of Clarington 01 is a soccer park facility located in the Darlington Buffer lands. There are no recreational areas along the haul route. There are no parks or recreational areas within the one (1) km radius of Clarington 04, Clarington 05, or East Gwillimbury 01. There are no recreational areas along the haul route for these sites.

Potential Impact to Institutional Facilities or Areas

Impacts to institutional areas or facilities (e.g., schools, hospitals, etc.) were considered in two manners, firstly institutional areas or facilities within a one (1) km radius of the site and secondly, institutional areas or facilities along the proposed haul route to the site from a 400 series highway. Institutional areas or facilities were defined in accordance with Regional and Local Municipal Official Plans. A one (1) km radius from the site was determined to be sufficient to assess potential impacts based on similar types of industrial developments and other types of waste management facility developments.

There are no institutional properties located within one (1) km of any of the sites. There are no institutional properties located along the proposed haul routes.

Other Applicable Land Use Development Implications

This section provides a summary of other relevant provincial legislation (i.e., MOE Guideline D-6) and MTO development in the area of the Short-list sites.

The Proposed Thermal Treatment Facility will require a Waste C of A to initiate and maintain operations and therefore is not subject to the requirements of Guideline D-6.

MTO Developments

Future highway expansion and interchange construction may potentially impact some of the Short-list sites.

Proposed Highway 407 Extension Alignment and Potential Highway 401 Expansion

The proposed extension of Highway 407 (highway/transitway) easterly from the current terminus at Brock Road in Pickering to Highway 35/115 in Clarington with two north-south links (highway/transitway) connecting Highway 401 to the proposed extension of Highway 407, has been identified as a technically recommended route as part of an EA currently underway.

Other potential MTO developments include the future roadway expansion of the existing Highway 401 alignment through the Municipality of Clarington. The MTO could potentially see this roadway expanded to include additional traffic lanes to manage the projected increase in traffic over the long-term. The expansion of Highway 401 could potentially impact the space available onsite at Clarington 04 and Clarington 05 as described below.

Future Interchange Construction

According to Section 19.4.2 of the Municipality of Clarington Official Plan – January 2007 – Office Consolidation, it states that

"The Municipality, in consultation with the Ministry of Transportation and the Region of Durham, will plan for the eventual construction of the future interchanges as indicated on Map 14, in particular, the development of interchanges on Highway 401 at Lambs Road and Townline Road (Regional Road 55). The Municipality supports the elimination of the Bennett Road interchange once the Lambs Road interchange has been constructed. In addition, the Municipality supports the reconstruction and improvement of the Liberty Street interchange."

Clarington 04

The potential space required by the expansion of Highway 401 and the construction of the Lambs road interchange, based on the information provided by the MTO, will not negatively impact the ability to develop this site as proposed. However, it should be noted that the ultimate right-of-way does not accommodate the future function of South Service Road. Once the preliminary design study and interchange configuration are determined by the MTO, the function and location of the South Service Road will have to be evaluated with the Municipality of Clarington at that time.

Clarington 05

The preliminary right-of-way limits are based on planning level information for the Highway 407 East extension (East Durham link) and the potential expansion of Highway 401 in the area. There is a potential significant impact to the Clarington 05 site as a result of this development.

Summary and Conclusion

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed Project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-41.

Clarington 01: The development of Public Infrastructure within Durham is not required to conform with existing Regional and Area Municipal land use designations and zoning. As a result, all of the Clarington sites could be considered compatible with current land use designations and zoning. With respect to other potential development plans and/or planning policies, the Clarington 01 site is advantaged over the other Short-list sites. Clarington 01 also has the greatest distance to designated residential areas and the fewest residences within a one (1) km radius.

Clarington 04: The development of Public Infrastructure within Durham is not required to conform with existing Regional and Area Municipal land use designations and zoning. As a result, all of the Clarington sites could be considered compatible with current land use designations and zoning. However, with respect to other potential development plans and/or planning policies, the Clarington 04 site is disadvantaged largely due to the potential development/expansion implications of Highway 401 and the potential relocation of the Bennett Road interchange to Lambs road. Clarington 04 receives a major disadvantage as a result of its close proximity to the planned expansion of a dense residential subdivision (Wilmot Creek).

Clarington 05: The development of Public Infrastructure within Durham is not required to conform with existing Regional and Area Municipal land use designations and zoning. As a result, all of the Clarington sites could be considered compatible with current land use designations and zoning. However, with respect to other potential development plans and/or planning policies, the Clarington 05 site receives a major disadvantage as a result of the potential development/expansion implications of Highway 401 and the potential establishment of the Highway 407 East extension (East Durham link). The land area required to undertake these roadway modifications and expansions has a significant impact on the total developable area of the site.

East Gwillimbury 01: This site does not have the existing public infrastructure development exemptions that the Clarington sites do in the Durham Regional and Municipality of Clarington Official Plans and Zoning By-laws. In addition, a Region of York Official Plan amendment may be required to address waste management policies within the Regional Official Plan related to the processing and importation of waste from outside York. The East Gwillimbury 01 site is also located within a Greenbelt area, although not constrained by development requirements within the Greenbelt Plan. The site also receives a major disadvantage as a result of being the only site with residential properties along the proposed haul route.

For the purposes of consideration of the *Social and Cultural Considerations – Compatibility with Existing and/or Proposed Land Uses, Residential Areas, Parks and Recreational Areas, and Institutional Facilities or Areas*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are outlined in Table 8-27 below.

Table 8-27 Summary Table – Social and Cultural Considerations – Compatibility with Existing and/or Proposed Land Uses, Residential Areas, Parks and Recreational Areas, and Institutional Facilities or Areas

Criteria	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Compatibility with Existing and/or Proposed Land Uses	MAJOR ADVANTAGE	DISADVANTAGE	DISADVANTAGE	NEUTRAL
Residential Areas	ADVANTAGE	MAJOR DISADVANTAGE	NEUTRAL	DISADVANTAGE
Parks and Recreational Areas	NEUTRAL	ADVANTAGE	ADVANTAGE	ADVANTAGE
Institutional Facilities or Areas	ADVANTAGE	ADVANTAGE	ADVANTAGE	ADVANTAGE

Potential Impacts on Archaeological and Cultural Resources

The following is a summary of the results of Stage 1 Archaeological Assessments completed on each of the Short-list sites in order to identify any known archaeological or heritage resources and evaluate the archaeological potential of each of the sites.

Each of the four Short-list sites was described according to the number and significance of known archaeological and cultural areas at each site based on review of documented sites and the potential for uncovered resources to be located at each site. This was accomplished by undertaking Stage 1 Archaeological Assessments of each site and determining potential for:

- Prehistoric resources; and,
- Historic resources to be present.

Clarington 01 and 05 were grouped together due to their similarities.

Existing Conditions

The general soil characteristics at each site indicate that there were no restrictions for prehistoric or historic period use of any of the land within the Short-list sites.

Clarington 01 and 05

Prehistoric Resources

There are currently six (6) prehistoric archaeological sites registered with the Ministry of Culture within 2.5 km of the Clarington 01 and 05 sites (Ministry of Culture, 2007). Two of the sites are attributed to the Archaic archaeological period, two others to the Early Woodland period, and one to the general Woodland period. The remaining site was undetermined as to the period of occupation.

All but one of the registered prehistoric sites lie to the north or west of the two Short-list sites, the remaining site being located to the northeast. All but one of the registered archaeological sites are situated along seasonal drainage channels, in topographic settings similar to most of the Short-list sites. One of the sites is located immediately alongside one of the small streams which empty into Lake Ontario. Thus, the Clarington 01 and 05 sites are considered to have high potential for the presence of prehistoric period archaeological resources.

Historic Resources

At present there are no historic period archaeological resources in or near the area of Clarington sites 01 and 05 (Ministry of Culture, 2007). There is one registered heritage property approximately 3 km to the northeast of the Short-list sites, the 19th century Samuel McClellan House (OHF, 2007).

Based on the fact that there is some evidence to suggest the persistence of historic period archaeological resources on both sites, the Clarington 01 and 05 sites are rated as having high potential for the presence of historic period archaeological resources.

Clarington 04

Prehistoric Resources

There are currently five (5) prehistoric archaeological sites registered with the Ministry of Culture within 2.5 km of the Clarington 04 site (Ministry of Culture, 2007). One of the sites contains a number of prehistoric components, including Palaeo-Indian, Archaic and Woodland periods. Another site has components attributed to the Archaic and Middle Woodland periods. The remaining sites are undetermined as to period of occupation.

The identified sites lie both east and west of the Short-list site. Three of the registered archaeological sites appear to be focused around Bowmanville Creek and the marshy area where it enters Lake Ontario, where a variety of resources would have been available. The remaining two sites are located on seasonal drainage channels and topography similar to the Clarington 04 site. Thus the Clarington 04 site is considered to have high potential for the presence of prehistoric period archaeological resources.

Historic Resources

At present there are no historic period archaeological resources in or near the area of the Clarington 04 site (Ministry of Culture, 2007). There are no registered heritage properties within close proximity of the Short-list site (OHF, 2007). Thus it appears that there was no significant historic period development or other activity that occurred within the limits of the Clarington 04 site, and the property is rated as having low potential for the presence of historic period archaeological resources.

East Gwillimbury 01

Prehistoric Resources

At present there are six (6) prehistoric sites, or sites with a prehistoric component, within 2.5 km of the Short-list site (Ministry of Culture, 2007). One of these sites has been dated to the Late Archaic period and one to the Early Woodland period. The remainder of the sites are undetermined as to period.

All but one of the sites is located to the north of the Short-list site with the other being located to the south. The prehistoric sites in the vicinity of the East Gwillimbury 01 site are generally located on level ground on rises above stream courses, very similar to the topographic setting of the Short-list site. Due to these similar topographic settings and conditions East Gwillimbury 01 is considered to have high potential for the presence of prehistoric period archaeological resources.

Historic Resources

At present there are six (6) historic sites, or sites with a historic component, within 2.5 km of the Short-list site (Ministry of Culture, 2007). There are no registered heritage properties near the Short-list site (OHF, 2007).

Based on the available historical evidence the East Gwillimbury 01 site is rated as having low to moderate potential for the presence of historic period archaeological resources.

Identification of Preliminary Site Advantages and Disadvantages

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-41.

Clarington 01: This site has a high potential for the presence of prehistoric and historic period archaeological resources on site.

Clarington 04: This site has a high potential for the presence of prehistoric archaeological resources on site and low potential for the presence of historic period archaeological resources on site.

Clarington 05: This site has a high potential for the presence of prehistoric and historic period archaeological resources on site. The abandoned house onsite predates 1878 and would be considered a historic resource.

East Gwillimbury 01: This site has a high potential for the presence of prehistoric archaeological resources on site and low to moderate potential for the presence of historic period archaeological resources on site.

Clarington 04 is likely to be the least sensitive land for development because at present there are no historic period archaeological resources in or near the area, no registered heritage properties within close proximity to the site, and no evidence of historic period structures being on the site. Development of the proposed Thermal Treatment Facility could occur with the least archaeological and cultural impact in comparison to the other three Short-list sites.

Whatever site is chosen for the project, it will be subject to a Stage 2 Archaeological Assessment in order to determine whether there are unknown archaeological resources located on the Preferred Site. If sites are identified during the Stage 2 assessment then the next step is to accurately delimit each site (Stage 3 Archaeological Assessment).

For the purposes of consideration of the *Potential Impact to Archaeological Resources, Built Heritage and Cultural Heritage Landscapes*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are summarized in Table 8-28 below.

Table 8-28 Summary Table – Impact to Archaeological and Cultural Resources – Relative Advantages and Disadvantages

Criteria	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Potential Impact on Archaeological and Cultural Resources	DISADVANTAGE	ADVANTAGE	MAJOR DISADVANTAGE	NEUTRAL

Potential Traffic Impacts

The following is a summary of the application of the criterion under social and cultural conditions to identify the potential traffic related impacts associated with the development of the Durham/York Thermal Treatment Facility on the Short-listed sites. The purpose of the study was to:

- Assess existing traffic conditions;
- Forecast future traffic associated with the development of the lands;
- Assess future traffic conditions;
- Identify operational concerns and required mitigation measures such as road and / or intersection improvements, if any; and,
- Identify the advantages and disadvantages of the Short-list sites.

Key Assumptions

The new Facility is expected to have approximately 20 employees at the site. Although the Facility is expected to operate on a 24-hour basis, trucks are expected to enter and leave the site during regular working hours.

The traffic assessment was based on the a.m. and p.m. road peak hours on a weekday, as this is generally the simultaneous peak for both commuter and site traffic. Traffic impacts were based on the observed and forecast traffic volumes for both the weekday a.m. and p.m. peak hours. A traffic assessment study of this nature is usually based on the forecasted traffic impacts associated with the usual or typical traffic conditions that are to be experienced on a day-to-day basis at the site during the a.m. and p.m. peak hours. For the purpose of this traffic assessment, a five-year horizon period was selected to assess future traffic conditions. It is expected that the completion of the development would be achieved by 2011, thus a 2016 horizon year reflects an appropriate assessment horizon (5 years from beginning of operations).

Existing Conditions

Clarington 01 and 05 are located in the southeast quadrant of the Courtice Road/Highway 401 interchange with access/egress to/from either South Service Road or Osborne Road. Both sites are located in close proximity to Highway 401 and the Courtice Road interchange. Clarington 01 and Clarington 05 are located 1.2 kilometres and 0.5 kilometres, respectively, from a 400 series highway.

The Clarington 04 site is located in the southwest quadrant of the Bennett Road/Highway 401 interchange. The site would have access/egress fronting onto the South Service Road. The South Service Road is aligned with the west-north/south/east off-ramp, forming a four-legged intersection with Bennett Road. This provides access to Highway 401 in the eastbound direction. The Highway 401/Bennett Road interchange is a "partial cloverleaf" interchange (Parclo B2) with both ramp terminal intersections operating under stop control. Clarington 04 is located 0.4 kilometres from a 400 series highway.

The East Gwillimbury 01 site is adjacent to York Waste Management Centre. Access onto Davis Drive is available via Bales Drive. The intersection of Bales Drive and Davis Drive is unsignalized, however, recent improvements include an exclusive left turn lane on the eastbound approach on Davis Drive. Access/egress to/from Woodbine Avenue is provided via Garfield Wright Boulevard. Access to Highway 404 is provided immediately west of Woodbine Avenue (access to the Provincial freeway network). East Gwillimbury is located 2.0 kilometres from a 400 series highway.

Existing Traffic Volumes

A series of turning movement counts (TMC) was conducted during a.m. and p.m. peak periods at the following locations:

- Woodbine Avenue / Garfield Wright Boulevard (June 2007);
- Davis Drive / Bales Drive (west) (June 2007);
- Davis Drive / Bales Drive (east) (June 2007);
- Courtice Road / Highway 401 ramp terminals (north and south); and,
- Bennett Road / Highway 401 ramp terminals (north and south).

Additional traffic information was obtained from York and the Municipality of Clarington, as well as the MTO. This information included TMC and 24-hour automated traffic recorders (ATR) for the following locations:

- Highway 404/Davis Drive ramp terminal intersections (June 2007 - TMC);

- Woodbine Avenue / Davis Drive (October 2003 - TMC);
- Davis Drive east and west of Woodbine Avenue (May 2007 - ATR);
- Woodbine Avenue north and south of Davis Drive (May 2007 - ATR);
- Courtice Road south of Bloor Street (March 2006 – ATR); and,
- Signal timings (York).

Existing Traffic Operations Assessment

The Study Area intersections were analyzed on the basis of the above noted traffic volumes in Section 1.1.2.1 of the report, and existing lane configurations.

Good traffic operations were noted at the north and south Highway 401/Bennett Road unsignalized intersections for the a.m. and p.m. peak hours. Overall the Level of Service (LOS) for Clarington 01, 04, and 05 were good.

LOS is a qualifying measure of traffic operations at an intersection, which is based on vehicular delay (per vehicle) for a 15-minute analysis period. LOS is summarized on a grading system, LOS 'A' being the best service condition and LOS 'F' being the worst. For example, LOS 'C' means that vehicles experience a delay at an intersection of greater than 20 seconds but less than 35 seconds.

The analyses of the existing intersection conditions for the East Gwillimbury 01 site revealed that the intersection of Bales Drive (east)/Davis Drive currently operates with LOS E during the p.m. peak hour due to the heavy east-west volumes present on Davis Drive reducing the number of available gaps for outbound turning movements from Bales Drive (east); specifically the southbound left turn movement. It should, however, be noted that the volume-to capacity ratio at this location is well below 1.00, which implies that there is still reserve capacity available. All other intersections at this site operate well with LOS C or better.

Future Background Traffic Conditions

Future traffic conditions for the Short-list sites were projected and the impact of the siting of a Thermal Treatment Facility at each site was evaluated.

Future Background Traffic

Future background traffic data for the study area was based on growth in through traffic due to developments outside of the study area (inter-regional through trips), as well as the addition of traffic attributable to significant developments in the immediate area.

The existing boundary road network, existing traffic volumes and operations at the study intersection, as well as historical average annual daily traffic (AADT) volumes for Courtice Road, Bennett Road, Davis Drive and Woodbine Avenue were reviewed to establish an annual growth rate.

For the Clarington sites 01 and 05, a 3% per year growth rate was applied to existing traffic volumes for the purpose of forecasting them to the 2016 horizon year.

No historical traffic growth data was available for the Clarington 04 site, and a conservative growth rate of 3% per year was assumed to forecast existing traffic volumes to the horizon year 2016.

Two growth rates for the East Gwillimbury 01 site were projected. A conservative growth rate of 2% per annum was assumed for Woodbine Avenue traffic. Although traffic growth on Davis Drive east of the interchange is not expected to be as high for the next nine years, for consistency purposes, a conservative growth rate of 3% per year was applied to existing traffic volumes along Davis Drive between the west ramp terminal with Highway 404 and Bales Drive.

Future Background Traffic Assessment

The Clarington 01 and 05 intersections maintain good operations under the future background scenario. A signal warrant analysis for the Highway 401 W-N/S/E off-ramp terminal intersection showed that traffic signals are not warranted at this location, however the growth should be monitored as the results were borderline suggesting that any further increase in the intersection volumes would warrant a signalized system.

Clarington 04 site intersections retain good operations in the future attaining LOS B during both the a.m. and p.m. peak hours.

The analyses of future background traffic conditions for the East Gwillimbury 01 site reveal LOS D operations at the Bales Drive East/Davis Drive intersection in the a.m. peak hour and LOS F in the p.m. peak hour. This is attributed to the heavier east-west volumes along Davis Drive, which restrict the southbound left and right turning movements.

The Woodbine Avenue/Davis Drive intersection experiences LOS D during the p.m. peak with the southbound and eastbound left turning movements being critical.

The Woodbine Avenue/Garfield Wright Boulevard intersection will experience LOS D operations mainly due to delays to westbound left movements caused by north-south traffic on Woodbine Avenue.

Site Traffic

The following provides traffic projections for the Short-list sites.

Trip Generation

Forecasted increases in traffic resulting from the proposed development were based on trip generation information based on 150,000 and 250,000 annual tonnage scenarios.

Typical a.m. and p.m. commuter peak hours were used to analyze impacts associated with the new Facility, as traffic on adjacent roads is heaviest during these hours. Packer trucks are anticipated to begin unloading well after the typical morning peak hour, as such, no inbound trips of packer trucks to the Facility were assumed in the a.m. peak hour. A conservative assumption was made with 25% of daily truck traffic occurring during the a.m. peak hour, and 25% of daily trucks occurring during the p.m. peak hour with the exception for packer trucks as noted above. In addition, one tour bus a day was also incorporated in the trip generation calculation.

It has also been assumed that employees would generate 20 inbound and 20 outbound trips per day. A conservative assumption was made that all inbound employee trips would occur in the a.m. peak hour, and all outbound employee trips would occur in the p.m. peak hour. In addition, five inbound and five outbound trips per day were assumed to be made by visitors to the new Facility.

A Durham/York Thermal Treatment Facility is estimated to generate a total of 62 and 77 additional trips per day per direction for the Clarington 01, 04 and 05 sites (150,000 and 250,000 tpy scenarios, respectively). The East Gwillimbury 01 site would generate approximately 54 and 68 trips per day per direction for the 150,000 and 250,000 tpy scenarios, respectively.

Trip Distribution

The distribution of traffic related to the proposed uses was based on a review of the boundary road network, truck trip origins (transfer station locations), and surrounding land uses.

Freeway facilities (Highway 401 in Clarington and Highway 404 in East Gwillimbury) in the immediate area will attract truck traffic, especially transfer trailer trucks. This was reflected in the trip distribution calculation, as it was assumed that trucks would utilize the freeway network, and passenger vehicles (staff) would utilize both freeways and arterial roads.

Traffic Assignment

Access/egress to/from the Clarington 01 site would be via Osborne Road, while access/egress to/from the Clarington 05 site would be on the South Service Road approximately 400 metres east of the intersection. Access to the Clarington 04 site would be provided via South Service Road approximately 500 metres west of the intersection with Bennett Road.

At the East Gwillimbury 01 site, trucks would use Highway 404 (as this is the major connector between the site and the rest of York), while a percentage of vehicular traffic (staff) was assigned to Davis Drive based on volume distributions at adjacent intersections and surrounding land uses. Inbound trucks were assigned to the Garfield Wright Boulevard access, while outbound trucks were assigned to the westerly Bales Drive egress. This assignment would result in reduced delays to truck traffic during peak periods. During off-peak periods, any of the three accesses could be utilized.

Future Total Traffic Condition

Total future traffic on the boundary road network was based on the sum of the future background traffic and the site traffic for the proposed development. All study area intersections were analyzed with no intersection/roadway improvements implemented.

Future Total Traffic Assessment

The future total traffic analysis, which incorporated traffic associated with the Thermal Treatment Facility, revealed a few critical movements at some intersections within the Study Area (2016 horizon year). These movements are:

- For Clarington Sites 01 and 05, Eastbound left turn at the Courtice Road/Highway 401 W-N/S/E ramp terminal intersection (p.m. peak hour);

- For East Gwillimbury Site 01, Southbound left turn at the Bales Drive (east)/Davis Drive intersection (p.m. peak hour); and,
- For East Gwillimbury Site 01, Westbound left turn at the Garfield Wright Boulevard/Woodbine Avenue intersection (p.m. peak hour).

The 2016 horizon year traffic volumes at the intersection of Highway 401 south ramp terminal and Courtice Road do not warrant traffic signals at this location, although traffic volumes approach the traffic signal requirement threshold.

Haul Distances

The four Short-list sites (Clarington 01 and 05, Clarington 04 and East Gwillimbury 01) were compared in terms of waste haul distances between existing transfer stations and the new Facility. Over 80% of all waste to be hauled is originating in Durham (150,000 tpy scenario); thus, waste haul distances to the East Gwillimbury 01 site would be significantly greater. In the 250,000 tpy scenario, the proportion of waste to be hauled from the two Regions is relatively even. Table 8-29 below summarizes the one-way and round trip distances travelled for the Short-list sites.

Table 8-29 Summary of Distance Travelled

Short-List Site	Scenario 1 (150,000 tpy)		Scenario 2 (250,000 tpy)	
	One-Way Distance (km)	Round Trip Distance (km)	One-Way Distance (km)	Round Trip Distance (km)
Clarington 01	745	1,490	1,585	3,170
Clarington 04	845	1,690	1,815	3,630
Clarington 05	745	1,490	1,585	3,170
East Gwillimbury 01	1,690	3,380	2,235	4,470

Maximum Scenario

The following provides a qualitative analysis/discussion on the maximum capacity of the new Facility of 400,000 tpy as it relates to anticipated traffic operations and performance. For the purpose of this report, this scenario was reviewed in terms of potential incremental impacts as they compare to the two scenarios (150,000 and 250,000 tpy) that were analyzed in detail.

The 400,000 tpy scenario would generate an additional approximately 19 inbound tractor trailer trips per day (as compared to the 250,000 tpy scenario), which converts to approximately five additional tractor trailers entering the site during the peak hour using the conservative assumption of 25% of all daily trips occurring during the peak hour. In terms of impacts on intersection traffic operations, these additional trips would have the most impact on those intersections associated with the East Gwillimbury 01 site, as site generated traffic would experience longer delays due to heavy traffic volumes on Woodbine Avenue and Davis Drive during peak hours. It should be noted that the delays would mostly occur at the site entrance/egress locations on Woodbine Avenue and Davis Drive, and will be experienced by site traffic only. Marginal incremental increase in delay is expected at the ramp terminal intersection and the intersection of Davis Drive and Woodbine Avenue. An additional five trucks in the peak hour would result in an increase of less than 1% of total traffic on the eastbound approach at the Davis Drive and Woodbine Avenue intersection.

It is also important to take into account origins of inbound trips (additional to the 250,000 tpy scenario). At the time of preparation of this report, origin of trips associated with the additional tonnage was unknown. Should these trips originate within York, the advantage of having the new Facility in Clarington diminishes in terms of travel distances from transfer stations to the new Facility (i.e., vehicle-kilometres and tonne-kilometres). This can be seen from a comparison of haul distances between the two scenarios (150,000 tpy and 250,000 tpy) where in the latter scenario more waste is hauled from York. The difference in the total vehicle-kilometres between the East Gwillimbury 01 site and Clarington sites 01, 04, and 05 is not as pronounced in the 250,000 tpy scenario as it is in the 150,000 tpy scenario. However, if the additional waste is to be hauled from Durham, then any of the Clarington sites would have a more pronounced advantage over the East Gwillimbury 01 site.

Based on available information, it can be concluded that Clarington sites 01, 04, and 05 would have a slight advantage over the East Gwillimbury 01 site considering existing and anticipated travel patterns and traffic volumes (road capacity) as well as planned and committed improvements in the immediate Study Areas at both locations, especially the future Clarington Energy Business Park (discussed in detail in the following section).

Other Considerations

Additional traffic volumes due to the Clarington Energy Park as well as improvements to Highway 401 are discussed in this section.

Traffic Implications of Clarington Energy Park

The Town of Clarington and Durham have implemented an amendment to the Municipality of Clarington Official Plan to adopt the Energy Park Secondary Plan with appropriate zoning in the southeast quadrant of the Courtice Road and Highway 401 interchange. The proposed Thermal Treatment Facility would be situated on the subject lands, which are zoned for Energy Park Light Industrial and Energy Park General Industrial uses for the Clarington 01 site, and Energy Park Office and Energy Park Light Industrial uses for the Clarington 05 site. Either location would require a Traffic Impact Study in support of the site plan application where all future road infrastructure and permitted land uses would be used to undertake a more detail assessment of traffic operations and required improvements in addition to those outlined in the Official Plan.

Improvements to Highway 401

The MTO is initiating a transportation study for Highway 401 improvements through the Clarington Study Area. One of the potential improvements includes reconstruction of the existing interchange at Courtice Road from a partial diamond to a “partial cloverleaf” interchange (Parclo A4). The conceptual design would not preclude direct access to South Service Road (Energy Drive in the Official Plan). In fact, the new design could provide a loop ramp to Highway 401 West from Courtice Road South as opposed to a left turn from the northbound approach at the north ramp terminal intersection (eliminates delays to southwest traffic). In addition, the new conceptual design would provide greater distance between the two ramp terminals, minimizing the potential for traffic queues at one intersection extending to the adjacent ramp terminal intersection.

As part of the Highway 401 study being undertaken by the MTO, there is a possibility that the interchange at Bennett Road could be relocated further west to Lambs Road. The new interchange could require realignment of South Service Road. At the time of preparation of this report, no recommended design for the new interchange had been adopted, and as such, impacts to lands adjacent to it are not known, including the future of the South Service Road and, consequently, access to the subject site. The Clarington 04 site has numerous uncertainties including the future of the Bennett Road interchange as well as direct connection to South Service Road and site access. One of the issues with the Bennett Road interchange is a critical weave on Highway 401 Eastbound between the Bennett Road on-ramp and the off-ramp to Highway 115.

Summary of Road Improvement Costs

All three Clarington sites may require road upgrades to accommodate truck traffic. Road upgrades/improvements would be for the South Service Road (Clarington 01 site and 05) and Osborne Road (Clarington 01 site). Table 8-30 summarizes preliminary cost estimates for roadway improvements.

Table 8-30 Preliminary Cost Estimates – Roadway Improvements

Alternative Site Name	Length of Upgraded Roadway (km)	Estimated Cost
Clarington 01	1.2	$900,000
Clarington 05	0.4	$300,000
Clarington 04	0.5	$375,000
East Gwillimbury 01	0	$0

Conformity with Durham's Goods Movement Network

It is the consultant's interpretation that the flow of traffic for each of the Short-list sites in Clarington would be in accordance with Durham's Strategic Goods Movement Network.

This criterion does not apply to the East Gwillimbury 01 site as it is located in York.

Summary and Conclusions

In summary, the Short-list sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-41.Table 8-24

Summary Table – Public Health & Safety and Natural Environment Considerations: Potential Water Quality Impacts – Relative Advantages and Disadvantages

Clarington 01: With respect to intersection operation this site has a minor issue as there is one critical movement at the south ramp terminal (eastbound left turn) due to growth in background traffic and current traffic control (stop sign). With respect to planned or required road improvements no adverse impacts or issues were identified.

Clarington 04: With respect to intersection operations this site has no identified issues. With respect to site access, the Bennett Road interchange with Highway 401 may be removed in the future affecting accessibility from/to the site to/from Highway 401 and possibly requiring significant portions of the site for a new interchange at Lambs Road. This represents a disadvantage for this site.

Clarington 05: The traffic implications for this site are the same as for the Clarington 01 site discussed above.

East Gwillimbury 01: With respect to intersection operation this site has a disadvantage, as there are two critical movements at minor intersections. It should be noted that delays are experienced by site traffic only. There are no road improvements planned or required at the site.

Overall, Clarington 04 and East Gwillimbury 01 have a disadvantage in regards to potential traffic impacts.

For the purpose of considering the net effects associated with each site in regards to *Social Cultural Considerations: Potential Traffic Impacts*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are summarized in Table 8-31 below.

Table 8-31 Summary Table – Social and Cultural Considerations: Potential Traffic Impacts – Relative Advantages and Disadvantages

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Potential Traffic Impacts	NEUTRAL	DISADVANTAGE	NEUTRAL	DISADVANTAGE

8.8.9.3 Economic/Financial

Capital Costs and Operating and Maintenance Costs

The following is a summary of the capital and operating costs, unique to each Short-list site, associated with building and operating a Thermal Treatment Facility on that site. These site-specific costs are in addition to the basic costs of building and operating the Facility, which are common to all sites.

Study Approach and Key Assumptions

The site-specific capital, operating and maintenance costs, for the comparison and evaluation of the Short-list sites, were determined based on the following assumptions:

- The capital costs for site servicing requirements (water supply, sanitary sewer connection, natural gas and electrical grid connections) were based on the initial construction of a Facility processing up to 250,000 tpy.
- The capital costs for stormwater management were based on the maximum potential Facility size of 400,000 tpy, as during initial construction the incremental cost to develop the required stormwater infrastructure for this Facility size is reasonable.
- The capital costs for the purchase of the sites (if applicable) were based on purchase of the entire area of the sites. Only a portion of the sites may be required for the base size Thermal Treatment Facility at the beginning of the planning period, however, the entire site area will be required for a larger 400,000 tpy Facility.
- Estimates for the capital costs associated with necessary road upgrades to accommodate truck traffic for the sites would apply to any of the Facility site scenarios, in order to accommodate future traffic requirements in the area.
- The annual operating cost savings associated with the haul of residual waste to each of the Short-list sites, compared to hauling it to remote landfills and other facilities, was estimated for the management of 150,000 and 250,000 tpy of residual waste. The haul cost analysis depended on factors such as, where the waste is coming from and the type of truck used to deliver the waste. These factors were known for the 150,000 and 250,000 tpy Facility sizes, however as they were unknown for a 400,000 tpy Facility, an accurate prediction of the haul costs for this size of Facility could not be made.

Investigations and Research

The following site-specific capital costs items were addressed in this evaluation:

- Road improvements, derived from the *Report on Potential Traffic Impacts*;
- Water supply connection, derived from the *Report on Compatibility with Existing Infrastructure and Design/Operational Flexibility*;
- Sewer connection, derived from the *Report on Compatibility with Existing Infrastructure and Design/Operational Flexibility*;
- Natural gas connection, derived from the *Report on Compatibility with Existing Infrastructure and Design/Operational Flexibility*;
- Electrical grid connection, derived from the *Report on Compatibility with Existing Infrastructure and Design/Operational Flexibility*;
- Stormwater management infrastructure, derived from the *Report on Potential Water Quality Impacts*; and,
- Land acquisition (for privately owned) sites calculated based on Facility site sizes and investigations into property values in the Municipality of Clarington.

In general terms, these capital costs were estimated by determining an appropriate unit cost (e.g., cost per metre of road improvement) and then multiplying this unit cost by the length/size of the required infrastructure (e.g., metres of road improvement). Details regarding the methodology used to determine the appropriate unit costs are included in the relevant supporting documents that provide details on these costs.

In regards to site-specific operations and maintenance costs:

- site-specific cost savings associated with the reduced haul of waste were determined.
- the supporting documentation for the comparative evaluation of sites was reviewed to determine if there were site-specific issues related to mitigation or monitoring requirements or the distance to potential markets for the sale of products from a Thermal Treatment Facility.

Results and Findings

Capital Costs

Base Facility Capital Costs

Two sizes for the initial Facility were considered, a 150,000 and a 250,000 tpy Facility. In order to put the site-specific capital cost estimates into perspective an estimate of the base Facility capital costs that would be common to all the sites considered was determined. These costs were based on an assumed mass burn combustion technology for which recent capital cost data was available. These capital cost estimates were not specific to any one technology vendor or company. The costs ranged from approximately $155,000,000 for a 150,000 tpy Facility and $230,000,000 for a 250,000 tpy Facility.

Capital Cost for Site Services

The capital costs for site services include costs associated with road improvements, water and sewer connections, natural gas supply, electrical grid connection, storm water management, land acquisition, and other capital costs (opportunity for shared infrastructure etc.) were determined. The potential costs or savings associated with shared infrastructure had not been sufficiently well defined in order to develop site-specific cost estimates. No other site-specific capital costs were identified at this stage in the EA.

It should be noted that site specific servicing plans would be developed, and for the Preferred Site the provision of services to other potential developments would likely be considered. These broader considerations may lead to the construction of infrastructure that is different from that assumed at this point in the study. These differences (e.g., the installation of larger pipes) may lead to actual costs that are different from those identified at this point in the EA and in *Application of Short-List Evaluation Criteria – Economic/Financial Considerations - Capital costs, Operation and Maintenance Costs*.

Table 8-32 provides a summary of site-specific capital cost estimates for each site under a low-cost set of assumptions including:

- The Facility is designed to have zero process waste water discharge and a sewer connection is not required (alternatively additional Facility capital costs may be incurred to build a Facility with zero waste water discharge);
- A portion of the natural gas supply pipeline costs would be recovered by Enbridge through gas rates and only half of the estimated pipeline costs would be incurred directly by Durham/York;
- An additional 44KV transmission line is not required to connect the Clarington sites to the electrical grid; and,
- Land is priced at the lower price per acre estimate.

Table 8-32 Summary of Estimated Site Specific Capital Costs – Lower Cost Assumptions

Item	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Road Construction	$900,000	$375,000	$300,000	$0
Water Connection	$2,300,000	$2,235,000	$2,588,000	$50,000
Sewer Connection	$0	$0	$0	$0
Natural Gas Connection	$675,000	$750,000	$600,000	$50,000
Base Electrical Connection	$3,350,000	$3,350,000	$3,350,000	$3,350,000
Additional 44kV Transmission Line	$0	$0	$0	$0
Storm Water Management Facility	$400,000	$350,000	$370,000	$370,000
Land Acquisition @$50,000 per acre	$0	$1,853,000	$3,384,000	$0
Other Site Specific Costs	$0	$0	$0	$0
Total Site Specific Capital Costs	**$7,625,000**	**$ 8,913,000**	**$ 10,592,000**	**$ 3,820,000**

Table 8-33 provides the corresponding site-specific capital cost estimates under more conservative higher capital cost assumptions including:

- Sanitary sewer connections are required at all sites;
- An additional 44kV transmission line is required to connect the Clarington sites to the electrical grid; and,
- Higher land price estimates.

Table 8-33 Summary of Estimated Site Specific Capital Costs – Higher Cost Assumptions

Item	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Road Construction	$900,000	$375,000	$300,000	$0
Water Connection	$2,300,000	$2,235,000	$2,588,000	$50,000
Sewer Connection	$300,000	$2,125,000	$1,150,000	$7,570,000
Natural Gas Connection	$1,350,000	$1,500,000	$1,200,000	$50,000
Base Electrical Connection	$3,350,000	$3,350,000	$3,350,000	$3,350,000
Additional 44kV Transmission Line	$2,700,000	$4,500,000	$2,500,000	$0
Storm Water Management Facility	$400,000	$350,000	$370,000	$370,000
Land Acquisition @$60,000 per acre	$0	$2,223,000	$4,061,000	$0
Other Site Specific Costs	$0	$0	$0	$0
Total Site Specific Capital Costs	**$11,300,000**	**$16,658,000**	**$15,474,000**	**$11,390,000**

Operating Costs

Base Facility Operating and Maintenance Costs

Table 8-34 provides a first order estimate of the base annual Facility operating and maintenance costs that would be common to all the sites presently being considered, for a Thermal Treatment Facility processing 150,000 tpy and 250,000 tpy of residual waste. These operating costs were based on recent data (i.e., as of 2007) for mass burn combustion technologies. These operating and maintenance cost estimates were not specific to any one technology vendor or company.

This information is provided to put the identified site-specific costs into perspective. These are gross annual costs and will be offset in part, by revenues from the sale of energy and recovered metals.

Table 8-34 Base Facility Operating Cost Estimates

Annual Operating Costs	150,000 tpy Facility	250,000 tpy Facility
Labour & Administration	$2,245,000	$3,337,000
Utilities & Supplies	$3,143,000	$4,672,000
Routine Maintenance	$2,694,000	$4,005,000
Major Repair Fund	$898,000	$1,335,000
Total Direct O & M Cost	**$8,980,000**	**$13,349,000**
Bottom Ash Haul & Disposal*	$1,800,000	$3,000,000
APC Residue Haul & Disposal**	$1,350,000	$2,250,000
Total Annual Operating Cost	**$12,130,000**	**$18,599,000**

* Estimated at $50/tonne ** Estimated at $300/tonne

Annual Haul Costs

Operating costs are presently incurred to haul residual waste from existing transfer stations and collection areas to remote landfill sites such as Green Lane. The development of a Thermal Treatment Facility in Durham or York will result in a reduction in annual haul costs relative to the cost of haul to these remote facilities.

Table 8-35 and Table 8-36 summarize the relative cost savings for the haul of 150,000 and 250,000 tpy of residual waste.

Table 8-35 Relative Cost Savings: Annual Haul Costs for 150,000 tpy Residual Waste

Short-List Site	Durham Cost Savings	York Cost Savings	Other Municipalities Cost Savings	Overall System Cost Savings
Clarington 01	$2,492,000	$268,000	-$43,000	$2,717,000
Clarington 04	$2,451,000	$251,000	-$26,000	$2,676,000
Clarington 05	$2,492,000	$268,000	-$43,000	$2,717,000
East Gwillimbury 01	$1,980,000	$294,000	-$95,000	$2,179,000

Table 8-36 Relative Cost Savings: Annual Haul Costs for 250,000 tpy Residual Waste

Short-List Site	Durham Cost Savings	York Cost Savings	Other Municipalities Cost Savings	Overall System Cost Savings
Clarington 01	$2,492,000	$1,468,000	-$43,000	$3,917,000
Clarington 04	$2,451,000	$1,365,000	-$26,000	$3,790,000
Clarington 05	$2,492,000	$1,468,000	-$43,000	$3,917,000
East Gwillimbury 01	$1,980,000	$1,961,400	-$95,000	$3,846,400

Mitigation and Monitoring Requirements

A series of reports have been prepared to support the comparative evaluation of the Short-list sites. These reports address issues such as air quality, surface water/groundwater, environmentally sensitive areas, land use, traffic, infrastructure requirements and approvals/agreements.

The technical analysis documented in these reports has not identified any unique or site-specific mitigation or monitoring requirements that would have an impact on the operating or maintenance costs for a Thermal Treatment Facility. Conventional mitigation requirements have also been addressed in the capital cost analysis, which include the potential costs associated with stormwater management and road improvements.

Distance from Potential Markets

There are three primary marketable products from a Thermal Treatment Facility:

- Electricity;
- Thermal energy (heat); and,
- Recyclable materials (metals).

For the purpose of considering operation and maintenance costs all of the Short-list sites were considered equal with respect to the sale of electricity and recyclable materials. However, the proximity of the sites to potential markets for the thermal energy or heat loads varies from site to site:

The Clarington 01 and 05 sites are located in the Clarington Energy Park, just north of the Courtice WPCP and could potentially market heat to industries that are located in the energy park and/or the Courtice WPCP.

The Clarington 04 site is located approximately 1 km east of the Port Darlington WPCP, and could potentially market some heat to this facility, although this is a less viable market than the Courtice WPCP. There is limited potential to market heat to industrial and/or commercial developments in the surrounding area.

The East Gwillimbury 01 site is located immediately east of the York Waste Management Centre on Garfield Wright Boulevard. There is limited potential to market heat to surrounding businesses and industries.

Identification of Preliminary Site Advantages and Disadvantages

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-42.

Clarington 01: The site-specific capital cost requirements for this site fall approximately mid-way in the range of low to high capital costs for the other sites, being generally lower than the other Clarington sites and higher than those for East Gwillimbury 01. This site has one of the highest range of haul cost savings and it is close to potential markets for heat.

Clarington 04: This site is disadvantaged in that the range of site-specific capital cost requirements for this site is one of the highest. While this site does have one of the highest range of haul cost savings, the potential markets for heat close to the site are limited.

Clarington 05: This site is disadvantaged in that the range of site-specific capital cost requirements for this site is one of the highest. In regards to operating/maintenance costs however, this site has the advantage of one of the highest range of haul cost savings and it is close to potential markets for heat.

East Gwillimbury 01: This site is advantaged in that the range of site-specific capital cost requirements for this site is the lowest. In regards to operating/maintenance costs however, this site has the disadvantage of having the lowest range of haul cost savings and limited potential markets for heat.

Clarington 01 is the only site with an overall advantage in regards to economic and financial considerations.

In regards to *Economic and Financial Considerations: Capital Costs, Operation and Maintenance Costs*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are summarized in Table 8-37 below.

Table 8-37 Summary Table –– Economic and Financial Considerations: Capital Costs, Operation and Maintenance Costs - Relative Advantages and Disadvantages

Criteria	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Capital Costs	NEUTRAL	DISADVANTAGE	DISADVANTAGE	ADVANTAGE
Operation and Maintenance Costs	ADVANTAGE	NEUTRAL	ADVANTAGE	DISADVANTAGE
SUMMARY	ADVANTAGE	DISADVANTAGE	NEUTRAL	NEUTRAL

8.8.9.4 Technical Considerations

Compatibility with Existing Infrastructure and Design/Operational Flexibility

The following is a summary of the compatibility of each of the Short-list sites with respect to existing infrastructure and an examination of the flexibility of the Facility design and operation offered by each of the Short-list sites.

Results and Findings

Electrical Grid Connection

A Facility processing either 150,000 tpy or 250,000 tpy would supply either 11 MW or 19 MW, respectively to the grid.

A 44 kV circuit is required for an interconnection with the electrical grid. Such a circuit runs along at least one side of each of the Short-list sites. There are two parallel circuits that run along the north side of the Clarington 05 site. It may be possible to connect directly to these existing circuits. For the three Clarington sites, capacity constraints may be encountered due to potential wind power development projects in the area. If capacity constraints are identified, it may be necessary to construct a new transmission line, parallel to the existing circuit from the Facility back to the Wilson transformer station.

Water Connection

Water demand for the initial Facility was estimated to be 100 litres per second (or 1,600 gallons per minute) requiring a 300 mm (or 12”) diameter watermain. It is possible that additional water supply for fire protection could be provided using the onsite stormwater ponds. Clarington 01 would require 4000 m of 300 mm pipe. There are no potential construction issues. Clarington 04 would require 2000 m of 400 mm pipe, a portion of which would be required to cross Highway 401. Clarington 05 has no potential construction issues, but would require 4500 m of 300 mm pipe. The site at East Gwillimbury requires the least amount of pipe, 50 m of 300 mm pipe, and has no potential construction issues.

Sewer Connection

Wastewater sewer discharge requirements were provided by Thermal Treatment Facility operators for typical processes that include certain ‘wet’ APC technologies and domestic discharges generated by plant staff for a 250,000 tpy Facility. Wastewater discharge was estimated to be 63 litres per second (or 1000 gallons per minute) requiring a 300 mm diameter force main or a 450 mm (18”) diameter gravity sewer.

It is noted that it may be possible, depending on the type of air pollution control (APC) system selected, to design a Facility with no process wastewater discharge. If this proves to be the case, sewer servicing would only be required for the domestic wastewater generated by the plant staff, which could potentially be treated using a septic system in lieu of discharging into the municipal sewer.

However, in the interest of maintaining maximum flexibility in the choice of the APC technology option available for the design of the Facility at this stage, sewer servicing requirements were considered as potential infrastructure for the Short-list sites. These requirements were considered for the comparison of the Short-list sites.

Clarington 01 requires the least amount of pipe, 300 m of 450 mm pipe, and does not have any potential construction issues. Clarington 04 requires 2500 m of 450 mm pipe. The piping would have to cross the CPR tracks and a water crossing. Clarington 05 would need 1300 m of 450 mm pipe, but does not have any potential construction issues. East Gwillimbury 01 requires the largest amount of pipe at 7000 m and construction would involve a new pumping station and force main, and crossing Highway 404 and several watercourse crossings.

Natural Gas

Thermal Treatment Facilities operate on the principle of self-sustaining combustion of the wastes, so natural gas is required only as an auxiliary fuel during brief periods of Facility start up and shut down. Natural gas may also be required, depending on the design of the APC system, to reheat the flue gas prior to its further treatment in a selective catalytic reactor (SCR). Information from several operators of existing facilities was obtained regarding both peak hourly and annual natural gas flow requirements. Based on this information, it was determined that a 250,000 tpy Thermal Treatment Facility could require a peak gas flow of approximately 10,200 standard cubic meters per hour (6,000 standard cubic feet per minute) and 415 kilopascals (60 pounds per square inch) of pressure at the plant. At a minimum, it was determined that connection to at least a 100 mm (4”) gas main was required. The nearest connection points to the existing infrastructure required to supply the gas demand for a 250,000 tpy Facility were determined for each of the sites.

Clarington 01 would require 3 km of 200 mm (8”) pipe. The pipeline would cross Highway 401 and several small watercourses. Clarington 04 would require the largest amount of pipe, 4 km of 150mm (6”) pipe and would also have to cross Highway 401 and several small watercourses. Clarington 05 would require 2.6 km of 200 mm (8”) pipe crossing Highway 401 and several small watercourses. The site at East Gwillimbury could use the existing 100 mm (4”) pipe at the site and would not have any potential construction issues.

Road Access and Road Improvements

All of the Short-list sites have good road access and are in reasonable proximity to 400 series highways. The final sections of access roads from the various Highway 401 off-ramps to the Clarington sites will require upgrades to the road infrastructure to accommodate future truck traffic. No potential construction issues have been identified with these required road upgrades. The road access from Highway 404 to the East Gwillimbury 01 site is acceptable, and does not require improvements. Clarington 01, Clarington 04, and Clarington 05 would require 1200 m, 500 m, and 400 m, respectively, of roadway improvements.

Potential Heat Loads

Clarington 01 and 05

The Clarington 01 and 05 sites are located in the Clarington Energy Business Park, just north of the Courtice WPCP. A 150,000 or 250,000 tpy Thermal Treatment Facility would be capable of supplying sufficient heat loads to meet the heating requirements of the Courtice WPCP. Utilizing process heat from the Thermal Treatment Facility would offset natural gas and biogas usage. The Courtice WPCP is a reasonable size to generate sufficient biogas quantities to be viable for electricity generation in a cogeneration facility.

The Clarington Energy Park is in the planning stages and therefore the potential exists to build a district heating system into the development of the Clarington Energy Business Park to supply heat at cost savings to potential Energy Park occupants.

Clarington 04

The Clarington 04 site is located approximately 1 km east of the Port Darlington WPCP and the Bowmanville water supply plant. A Class EA on expanding the WPCP is presently underway. A 150,000 or 250,000 tpy Thermal Treatment Facility would be capable of supplying sufficient heat loads to meet the heating requirements of the Port Darlington WPCP. However, the Port Darlington WPCP is much smaller than the Courtice WPCP, and is not a reasonable size to generate sufficient biogas quantities to be viable for electricity generation in a cogeneration facility.

There is some potential for other industrial and/or commercial development around Clarington 04 but it is limited and would not serve to utilize more than a small percentage of the available heat energy.

East Gwillimbury 01

The East Gwillimbury 01 site is located immediately east of the York WMC on Garfield Wright Boulevard.

At the East Gwillimbury 01 site, existing buildings around the proposed thermal treatment location, including the WMC, the police garage and other industries have small heat loads and established heating systems (rooftop units), the replacement of which would not make economical sense because of the limited capacity opportunity.

Synergy with Municipal Infrastructure

Clarington 01 and 05

The Clarington 01 and 05 sites have the following potential for synergy with municipal infrastructure:

Potential thermal treatment of 14,800 to 24,700 tpy of dewatered biosolids, for a Thermal Treatment Facility sized at 150,000 to 250,000 tpy respectively. Some biosolids from the Courtice WPCP could be dewatered and treated at a facility located at either of these sites. Both sites are also within a reasonable distance for it to be cost effective to haul dewatered biosolids from the Duffin Creek facility;

The short distance, less than 500 m, between the Courtice WPCP and the potential Thermal Treatment Facility may allow other synergies, including biogas pipeline conveyance to the Thermal Treatment Facility for generation of electricity.

Infrastructure such as water, sewer and natural gas, necessary to the Thermal Treatment Facility, could be sized to provide servicing to other potential Clarington Energy Business Park buildings thereby providing cost savings by cost sharing.

Clarington 04

The Clarington 04 site has the following potential for synergy with municipal infrastructure:

- Potential thermal treatment of 14,800 to 24,700 tpy of dewatered biosolids, for a Thermal Treatment Facility sized at 150,000 to 250,000 tpy respectively. Biosolids from the Port Darlington WPCP could be dewatered and treated at a facility located at this site. Clarington 04 is also within a reasonable distance for it to be cost effective to haul dewatered biosolids from the Duffin Creek facility;
- The longer distance of 1 km from the Thermal Treatment Facility to the Port Darlington WPCP would likely prohibit the conveyance of biogas by pipeline to the Thermal Treatment Facility; and,
- At this time the extent of the potential for new development around the Clarington 04 site is not known, and thus the potential for any shared infrastructure cannot be determined.

East Gwillimbury 01

The East Gwillimbury 01 site has the following potential for synergy with municipal infrastructure:

- It is possible to use the scales, some of the onsite roads and visitor parking areas at the MRF located at the adjacent York WMC;
- It is possible to consider incinerating the Material Recovery Facility (located at the WMC) residues at the new Thermal Treatment Facility thereby eliminating transportation costs; and,
- Some dewatered biosolids from the Duffin Creek facility could also be hauled to a facility located at the East Gwillimbury site and thermally treated. The haul distances to this site are much greater than the haul distances to the Clarington sites.

Design/Operational Flexibility

The primary site-specific factor that has the potential to affect the design and operational flexibility of the Facility is the size and configuration of the site.

For each of the Short-list sites, the surplus areas were determined based on consideration of lands excluded due to site constraints, stormwater management requirements and the area required to accommodate a 400,000 tpy Thermal Treatment Facility plus roads, parking, and weigh scales. This surplus area of land would be available to accommodate variations in the potential Facility design and would provide operational flexibility for the Facility.

Assumptions

Thermal Treatment Facility sizing estimates were based on the Durham/York need and opportunity for thermal treatment of residual MSW over the 35-year planning period. The ultimate capacity of the Thermal Treatment Facility could be as much as 400,000 tpy of MSW, operating 24 hours per day and 7 days per week.

The site sizing estimate was based on a "stand-alone" Facility with provision for a design capacity of up to 400,000 tpy, onsite ash processing, storm water management features, parking for 100 vehicles, onsite roads for full management and queuing of waste and ash vehicles and adequate buffer zones and set-backs.

Minimum Required Site Size

The minimum required site size for the actual footprint of the Facility process components plus roads, parking, and weigh scales, but excluding any allowance for an additional buffer zone, is approximately 7.26 ha (220 m x 330 m).

Surplus Area at Each of the Short-List Sites

The Clarington sites have surplus lands that would be available to accommodate variations in the potential Thermal Treatment Facility design and would provide operational flexibility for the Facility. Clarington 01 has 3.9 ha of surplus land, Clarington 04 has 6.7 ha, and Clarington 05 has 5.5 ha of surplus land. The East Gwillimbury 01 site has the least amount of surplus land (0.5 ha).

Summary and Conclusions - Technical Considerations

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-43.

Clarington 01: This site has disadvantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. Sanitary sewer servicing provides advantages as the connection is quite close to the site. The site has major advantages considering the potential heat loads available in proximity to the site and the potential synergies with municipal infrastructure, largely due to the close proximity of the site to the Courtice WPCP. In regards to design and operational flexibility, this site has an advantage based on 3.9 hectares of surplus lands, outside of the required area for the processing components and the required site infrastructure.

Clarington 04: In regards to compatibility with existing infrastructure, this site has the most disadvantages in regards to connections to the electrical grid, water servicing, sanitary sewer servicing, natural gas connections and requirements for upgrades for the access roads to the site. This site has no real advantages in regards to the potential heat loads available in proximity to the site and in regards to synergy with municipal infrastructure, as the heat requirements for the Port Darlington WPCP are relatively low and this WPCP is located 1 km away from the Clarington 04 site. In regards to design and operational flexibility, this site has an advantage based on 6.7 hectares of surplus lands, outside of the required area for the processing components and the required site infrastructure.

Clarington 05: In regards to compatibility with existing infrastructure, this site has disadvantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. This site also has a disadvantage in regards to sanitary sewer servicing as the connection is 1.3 km from site. The site has major advantages in regards to the potential heat loads available in proximity to the site and in regards to synergy with municipal infrastructure, largely due to the close proximity of the site to the Courtice WPCP. In regards to design and operational flexibility, this site has an advantage based on 5.5 ha of surplus lands, outside of the required area for the processing components and the required site infrastructure.

East Gwillimbury 01: In regards to compatibility with existing infrastructure, this site has the most advantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. This site has a disadvantage in regards to sanitary sewer servicing, requiring the construction of 7 km of force main. The site also has a disadvantage in regards to potential heat loads, as the potential use of heat is limited in the vicinity of the site. In regards to synergy with municipal infrastructure, there are some potential advantages in shared infrastructure with the York WMC located adjacent to the site. In regards to design and operational flexibility, this site has some (0.5 ha) of surplus lands, outside of the required components for the processing area and the required site infrastructure.

Clarington 04 is the only site without an overall advantage in regards to technical considerations.

For the purpose of considering the net effects associated with each site in regards to *Technical Considerations: Compatibility with Existing Infrastructure and Design/Operational Flexibility*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-List sites are summarized in Table 8-38 below.

Table 8-38 Summary Table – Technical Considerations: Compatibility with Existing Infrastructure and Design/Operational Flexibility– Relative Advantages and Disadvantages

Criteria	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Compatibility with Existing Infrastructure	ADVANTAGE	DISADVANTAGE	NEUTRAL	ADVANTAGE
Design /Operational Flexibility Provided by Site	ADVANTAGE	ADVANTAGE	ADVANTAGE	NEUTRAL
OVERALL	ADVANTAGE	NEUTRAL	ADVANTAGE	ADVANTAGE

8.8.9.5 Legal Considerations

Legal Considerations

The following is a summary of the complexity of approvals and agreements that will be required, together with a relative comparison of the approvals and agreement requirements and implications associated with each of the Short-list sites.

Investigations and Research

This report addressed approvals and agreement requirements that could potentially apply to the implementation of a Durham/York Thermal Treatment Facility. It is based on discussions with the applicable regulatory authorities and also reflects the knowledge base within the Study Team of the approvals and regulatory environment at a federal, provincial and local level that has been developed through years of work undertaking similar projects in Ontario.

Potential Approval Requirements

The following sections provide an outline of potential approvals that may be required at one or more of the Short-list sites in order to establish the Proposed Thermal Treatment Facility and supporting infrastructure requirements.

Federal Legislation

The *Canadian Environmental Assessment Act* (CEAA)

The most likely scenario under which the Facility would require approval under the *CEAA* would be if the site required the issuance of a federal approval (e.g., approval under the FA related to an alteration of a watercourse for construction of the Facility). There is a possibility that FA approval would be required for some of the Short-list sites, which may trigger approval under CEAA.

The *Fisheries Act* (FA)

The need for approvals under Section 35 of the FA for a Durham/York Thermal Treatment Facility would depend on the location of the Preferred Site together with the proposed onsite activities. The preliminary assessment of infrastructure and design requirements for all of the Short-list Sites, indicates that it is unlikely that any harmful change to fish habitat would be required.

The *Canadian Environmental Protection Act* (CEPA)

There are no site-specific issues related to the Short-list of sites in regards to meeting CEPA requirements.

***Transportation of Dangerous Goods Act* (TDGA)**

There are no site-specific issues related to the TDGA. Once a preferred technology vendor has been chosen, it is recommended that an investigation into the applicability of this legislation, as it relates to the transportation of fly ash be undertaken.

Migratory Birds Convention Act (MBCA)

None of the Short-list sites include migratory routes on the sites themselves. However, once a Preferred Site has been identified, it is recommended that an investigation as to the potential for migratory bird habitat be undertaken to confirm that there are no triggers under the MBCA.

Canada-U.S. Air Quality Agreement

The proposed Durham/York Thermal Treatment Facility would not be regarded as an activity or project that would be likely to cause significant transboundary air pollution for the listed substances under the Agreement. There are no site-specific issues related to the *Canada-U.S. Air Quality Agreement*.

Provincial Legislation

The Ontario Environmental Assessment Act (EAA)

Durham and York are in the process of completing an individual environmental assessment under the EAA. Although Durham and York had the opportunity to complete a simpler environmental screening process, they decided to complete an individual EA to ensure the planning process is as rigorous and transparent as possible.

The complexity of the approvals required under the EAA will vary depending on the Short-list sites that are under consideration. The Class EA approval requirements for the infrastructure required for the sites are documented in the *Report on Compatibility with Existing Infrastructure and Design/Operational Flexibility*.

- **Clarington 01**: At a minimum a Schedule B, Class EA would be required for water and potentially for sanitary sewer servicing. It was recommended that these requirements be addressed within the current EA documentation if this site were to be selected as the Preferred Site. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system.

- **Clarington 04**: At a minimum a Schedule B, Class EA would be required for water and potentially for sanitary sewer servicing. It was recommended that these requirements be addressed within the current EA documentation if this site were to be selected as the Preferred Site. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system.

- **Clarington 05**: At a minimum a Schedule B, Class EA would be required for water and potentially for sanitary sewer servicing. It was recommended that these requirements be addressed within the current EA documentation if this site were to be selected as the Preferred Site. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system.

- **East Gwillimbury 01**: At a minimum a Schedule B, Class EA is potentially required for sanitary sewer servicing. It was recommended that these requirements be addressed within the current EA documentation if this site were to be selected as the Preferred Site. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system.

The Ontario *Environmental Protection Act* (EPA)

Unlike the EAA which considers a very broadly defined environment and which requires a planning/decision-making process which takes into account potential impacts on all aspects of the environment, the EPA, R.S.O. 1990, c. E.19 is more focused on the natural environment (i.e., air, land, water, flora and fauna) and the technical/scientific analysis of projects on a case by case basis with regards to environmental suitability.

There are two parts of the EPA with particular relevance to the establishment of a Facility utilizing an alternative waste disposal technology currently being considered by Durham and York. These are:

Part II, which regulates emissions to the natural environment and, in particular, the air.

Part V, which regulates the establishment and operation of all waste management facilities in the Province.

To address the requirements of the EPA and to obtain the required approval instruments for the Preferred Site, supporting technical studies and design plans must be completed to a level of detail demonstrating mitigation of adverse effects on the natural environment and to show that the applicable environmental standards and criteria will be met.

The requirements of the EPA would have to be addressed for a Durham/York Thermal Treatment Facility, and C of As for Air, Noise and Waste would have to be obtained. While there may be minor variations in the nature and extent of the studies required to support the EPA approvals that would be site specific, the overall EPA requirements would be the same regardless of the choice of site.

The Ontario Water Resources Act (OWRA)

Once a Preferred Site has been identified for implementation of the long-term waste disposal facility, a site-specific determination will be required to assess the need for obtaining OWRA approvals.

Municipal servicing for sanitary sewer, water and surface water management for all of the sites will require approval under the OWRA and the issuance or amendment of relevant C of As from the MOE. Dewatering requirements for all of the sites is unknown. Specific dewatering requirements for the Preferred Site will be identified following a detailed geotechnical and hydrogeological investigation that will identify the need for a Permit to Take Water. The approval requirements for sanitary sewer, water and surface water management are documented in the *Report on Potential Water Quality Impacts (Surface Water and Groundwater)* and the *Report on Compatibility with Existing Infrastructure and Design/Operational Flexibility*. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system.

The Ontario *Energy Board Act* (OEBA)

The Ontario Energy Board regulates and issues licenses to generators of electricity. Certain generators (those that have an agreement with the Ontario Power Authority (OPA) under the standard offer program) are exempt from the licensing requirements. The standard offer program allows small generators to sell electricity under contract with the OPA at a guaranteed price per kilowatt hour.

The power generated by the proposed Durham/York Thermal Treatment Facility would not likely be eligible for one of the existing standard offer programs both in terms of the source of electricity generated and the amount generated as the project would generate more than 10MW of electricity. Therefore, regardless of the preferred location for the Thermal Treatment Facility, it is likely that a generator license would be required.

There are no site-specific issues related to the need for the issuance of a generators license by the Ontario Energy Board.

Endangered Species (ES) Act

None of the Short-list sites were found to have Species at Risk on the sites themselves, but some such species have been documented by the MNR NHIC as occurring in the area (see the *Report on Potentially Environmentally Sensitive Areas and Species Impacts and Potential Aquatic and Terrestrial Ecology Impacts*). Once a Preferred Site has been identified, it is recommended that an investigation as to the potential for Species at Risk is completed to confirm there are no triggers under ES Act.

Ontario Heritage Act (OHA)

The results of Stage 1 archaeological assessments undertaken for each of the Short-list sites indicates the potential presence of archaeological resources, which varies from site to site and considers the likelihood of resources existing within the vicinity of each site. As a result, a Stage 2 Archaeological Assessment will be undertaken on the Preferred Site to determine whether there are archaeological resources located within the project development area or site.

The *Planning Act*

The *Planning Act* establishes the regulatory basis upon which land use planning in Ontario is undertaken. The Ontario *Planning Act* governs land use and development throughout the province and requires that municipalities establish planning instruments such as official plans, zoning by-laws, etc. to manage land use within their jurisdictions.

Set out below is a high level analysis of the planning approval requirements, which would be applicable for each site absent the aforementioned municipal facility exemptions. These analyses do not consider the general municipal facility exemption from official plan and zoning by-law compliance in Durham Region discussed above. This analysis has been undertaken to assess the general compatibility of a Thermal Treatment Facility with the existing or proposed land uses of the surrounding lands as assessed by examining the official plan designation and zoning.

The following is a summary of planning approvals related issues for Clarington 01, Clarington 04, and Clarington 05:

- Would not require an amendment to Durham's Official Plan;
- Would not require an amendment to the Clarington (Municipal) Official Plan;

- Zoning By-law amendment would not be required; and,
- Will require Site Plan Approval prior to issuance of a building permit.

The following is a summary of planning approvals related issues for East Gwillimbury 01;

- May require an amendment to York's Official Plan;
- Would not require an amendment to the East Gwillimbury (Municipal) Official Plan;
- Zoning By-law amendment would not be required; and,
- Will require Site Plan Approval prior to issuance of a building permit.

Conservation Authorities Act (CAA)

The CAA, 1990 establishes the regulatory basis for the administration of Conservation Authorities within the province of Ontario.

All of the sites require stormwater management facilities, and approvals under Regulation 179/06 of the CAA. Once a Preferred Site is selected, detailed design of the required stormwater facility will be prepared and an application for a development, interference with wetlands and alterations to shorelines and watercourses permit will be filed with the appropriate Conservation Authority. All discharges of treated stormwater into a surface water body containing a known fish habitat will be done so in accordance with Conservation Authority guidelines and requirements and therefore will likely not trigger requirements under the FA.

The local conservation authorities also require approval for any work within or causing alterations to regulated areas. There are multiple watercourse crossings along the potential sanitary service route for the East Gwillimbury 01 site, which would require approval from the LSRCA. There is also one watercourse crossing east of Lake Road required for the potential sanitary service route to the Clarington 04 site that would require approval from the Central Lake Ontario Conservation Authority. Note: sanitary sewer servicing may be required pending final design of the Facility and air pollution control system.

Public Transportation and Highway Improvement Act (PTHIA)

All crossings under 400 series highways are subject to approval from the MTO. To address the requirements of the PTHIA and to obtain the required approvals and permits from MTO, supporting Traffic Impact Study(s), Stormwater Management Report(s), design plans, and other supporting documentation will be completed in consultation with MTO. Application for any such approvals would be submitted after the completion of the EA, which will address the requirements of the Class EA for Provincial Transportation Facilities.

Any applicable requirements under the PTHIA, which is administered by the MTO, will be met. The potential sanitary sewer crossing of Highway 404 for the East Gwillimbury 01 site and the Highway 401 watermain crossing for the Clarington 04 site will be subject to MTO approval. Note: sanitary sewer servicing for East Gwillimbury 01 may be required pending final design of the Thermal Treatment Facility and APC system.

Building Code Act, 1992

The *Building Code Act, 1992* requires a building permit to be issued by a chief building official prior to construction of any buildings. The Building Code is applicable to any Thermal Treatment Facility that would be built for the project, regardless of which site it is built upon.

Other Applicable Legislation

Sewer Use Bylaw

York maintains a Sewer Use By-Law (No.S-0064-2005-009) that sets limits on the strength and composition of sewage entering the municipal system. Durham maintains a Sewer System By-law (#90-2003) that imposes limits and conditions upon the usage of the Regional sewer system.

Discharges to the sanitary sewer system from a Durham/York Thermal Treatment Facility would have to meet the requirements of the applicable sewer use bylaw based on the selection of the Preferred Site.

Electrical Grid Connection

All of the Short-list of sites will require approval from the local hydro authority (Hydro One for the Clarington sites and PowerStream for East Gwillimbury) for the connection to the electrical grid.

Natural Gas Connection

Enbridge would be responsible for the permitting, approval and construction of the necessary natural gas pipelines to the Preferred Site. Enbridge would apply for all necessary permits, including those necessary from the Conservation Authority to address the watercourse crossings associated with constructing the gas pipeline to serve any of the Clarington sites.

In the case of the four Short-list sites the preliminary assessment of the pipeline requirements as documented in the *Report on Compatibility with Existing Infrastructure and Design/Operational Flexibility* indicates that it is unlikely that the pipeline required to provide service to any of the sites would trigger an EA.

Potential Agreements Required

Durham/York Agreement

Durham and York entered into a Residual Waste Management EA Study Agreement on June 30, 2005. This agreement addresses the completion of the EA Study and terminates upon completion of the EA Study.

It is anticipated that prior to proceeding with submission of the EA Study to the Minister of the Environment for approval, that Durham and York will enter into a new agreement that addresses both the selection of a technology provider and proceeding with all necessary legislative approvals as identified in this report.

In addition, implementation of a Durham/York Thermal Treatment Facility will require the development of an agreement that reflects the preferred business model selected by both municipalities. This may take the form of a new municipal utility and would require an agreement that sets out the allocation of assets and liabilities associated with the development and operation of the new Facility.

The Durham/York agreement would address the future relationships between the two municipalities including that of host community. However, there are no potential components of any future agreement that are known at this time that would vary pending the selection of the Preferred Site.

Waste Supply Agreements

A number of neighbouring non-GTA municipalities have expressed interest in the potential for supplying residual MSW to a Durham/York Facility. It is also possible, that Industrial, Commercial and Institutional (IC&I) generators of waste may also have an interest in supplying waste. If capacity were available at the Facility, such arrangements would be formalized as they arise through agreements. However, inclusion of these materials must be in accordance with Section 3.1 of the Approved EA Terms of Reference.

No site-specific issues relative to waste supply agreements have been identified.

Disposal of Bottom Ash

Durham and York lack landfill disposal capacity, and thus the bottom ash that is anticipated to be generated by a Durham/York Thermal Treatment Facility would require landfill disposal at municipal or private sector landfill sites located outside of the Regions. It is anticipated that for a Thermal Treatment Facility processing 250,000 tpy of residual waste, approximately 56,000 tonnes of residue/bottom ash will require disposal, if another beneficiary use of the ash wasn't available.

There are two potential options that could be considered for the disposal of bottom ash:

- A reciprocal agreement(s) with one or more municipalities with which Durham and York may enter into waste supply agreements, for acceptance of the bottom ash for disposal in their municipally owned landfill(s); or,
- Use of landfill capacity. For example the bottom ash could be disposed of in the Green Lane Landfill through York's existing contract for waste disposal that ends in 2022.

No site-specific issues relative to bottom ash disposal agreements have been identified.

Disposal of Fly Ash

A Thermal Treatment Facility processing 250,000 tpy of residual MSW is anticipated to generate just under 10,000 tonnes of fly ash annually. This material contains all of the pollutants captured by the APC (or flue gas cleaning) system and requires management as a hazardous material.

There are two potential options that could be considered for the disposal of fly ash:

- Durham/York could enter into an agreement to utilize a proprietary technology available on the market that is capable of stabilizing the materials within the fly ash, such that the material would no longer be classified as hazardous; or,
- An agreement for disposal of this material at an appropriate landfill facility, such as the Clean Harbours landfill near Sarnia or other licensed facility, would be required.

No site-specific issues relative to fly ash disposal agreements have been identified.

Land Acquisition

Land acquisition is undertaken through negotiation and agreements, culminating in the purchase of the property and transfer of title. Land acquisition is entirely site specific.

Both East Gwillimbury 01 and Clarington 01 are currently municipally owned, by York and Durham respectively. Clarington sites 04 and 05 are privately owned properties, and as such if either site is selected as preferred, land acquisition would be required.

Easements may also be required for the development of the required infrastructure necessary to serve the new Durham/York Thermal Treatment Facility. It is assumed that all linear infrastructure will be developed within existing right-of-ways.

Host Community Agreements

In April 2007, Durham and York Councils approved of a series of sixteen general Principles for the Host Community Agreement that address their commitments with respect to the permitting, siting and operations of a Facility and also upon a series of general principles that York and Durham would request the lower tier municipality that has been chosen to host the Thermal Treatment Facility to adopt.

These principles would be applied consistently to the negotiation of the Host Community Agreements for the municipality containing any of the Short-list of sites under consideration.

Power Purchase Agreement - Electricity

The power generated by the proposed Durham/York Thermal Treatment Facility would not be eligible for the existing standard offer program through the OPA. No site-specific issues relative to the Power Purchase agreement have been identified.

Heat Purchase Agreement – Hot Water or Steam

A Durham/York Thermal Treatment Facility processing 250,000 tpy of residual MSW is anticipated to generate low-grade heat in the order of 4,400 MJ/hour for each tonne of waste processed. A Heat Purchase Agreement would be required to address the sale of this hot water or steam.

There are site-specific options related to the potential sale of heat.

- The **Clarington 01 and 05** sites are in locations compatible for sale of hot water or steam to the Courtice WPCP facility that is owned by Durham. A Heat Purchase Agreement would be required addressing the sale of heat to the nearby Courtice WPCP.
- The **Clarington 04** site is in a location compatible for sale of hot water or steam to the existing Port Darlington WPCP that is owned by Durham. A Heat Purchase Agreement would be required addressing the sale of heat to the nearby Port Darlington WPCP.
- The **Clarington 01 and 05** sites are also compatible with the distribution and sale of hot water or steam to other occupants of the industrial park in which these sites are located. The Durham/York public utility for the Thermal Treatment Facility could potentially own

and operate a district heating system within the industrial park, and would be responsible for direct sale of thermal energy to industrial clients. Heat Purchase Agreements would be required addressing the sale of heat to industrial clients within the industrial park.

Identification of Preliminary Site Advantages and Disadvantages

In summary, the sites are listed below with associated advantages and disadvantages based on the evaluation of their suitability for the proposed project. For a detailed analysis of the advantages and disadvantages of the Short-list sites, refer to Table 8-44.

In regards to the overall complexity of required approvals, all of the sites are relatively equivalent, each having a disadvantage in that they all have some additional complexity of approvals beyond the minimum required approvals for a Durham/York Facility (individual EAA, EPA approvals for Air, Noise and Waste). It is presumed below that all Durham sites are equal with respect to planning approvals given the general municipal facility exemption from compliance with the Regional and Municipal Official Plans and the Municipal zoning by-law.

- **Clarington 01:** This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sewer and water services, Conservation Authority approvals for the watercourse crossing for gas service and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. This site is advantaged in that there is no added complexity of agreements in that the site is already municipally owned.
- **Clarington 04:** This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for the extension of sewer and water services, Conservation Authority approval for the watercourse crossing for sanitary sewer service, and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. Approvals/Permitting from the MTO will also be required for the extension of the necessary watermain infrastructure under Highway 401. This site also is disadvantaged, given the added complexity of agreements to purchase the site, which is privately owned.
- **Clarington 05:** This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sewer and water services, Conservation Authority approvals for the watercourse crossing for gas service and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. This site is disadvantaged, given the added complexity of agreements to purchase the site, which is also privately owned.
- **East Gwillimbury 01:** This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sanitary sewer services, Conservation Authority approvals for the watercourse crossing for sanitary sewer service and MTO Approvals/Permitting for extension of the necessary sanitary sewer infrastructure under Highway 404. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system. An amendment to the York Official Plan may be required to address Policies 6.8.2 and 6.8.3. This site is advantaged in that there is no added complexity of agreements in that the site is already municipally owned.

Overall, Clarington 01 and East Gwillimbury 01 exhibit the least disadvantages when considering both the complexity of required approvals and agreements in comparison with the other sites.

For the purpose of considering the net effects associated with each site in regards to *Legal Considerations - Complexity of Required Approvals and Complexity of Required Agreements*, based on the results of the assessment described above, the relative advantages and disadvantages of the Short-list sites are summarized in Table 8-39 below.

Table 8-39 Summary Table – Legal Considerations, Complexity of Required Approvals and Complexity of Required Agreements – Relative Advantages and Disadvantages

Criteria	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Complexity of Required Approvals	DISADVANTAGE	DISADVANTAGE	DISADVANTAGE	DISADVANTAGE
Complexity of Required Agreements	ADVANTAGE	DISADVANTAGE	DISADVANTAGE	ADVANTAGE
OVERALL	NEUTRAL	DISADVANTAGE	DISADVANTAGE	NEUTRAL

Summary of Short-list Site Relative Advantages and Disadvantages

The results of the application of the Short-list evaluation criteria and identification of site advantages and disadvantages are summarized in Table 8-40 Public Health and Safety and Natural Environmental Considerations, Table 8-41 Social and Cultural Considerations, Table 8-42 Economic/Financial Considerations, Table 8-43 Technical Considerations, and Table 8-44 Legal Considerations.

Table 8-40 Public Health and Safety and Natural Environmental Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Potential Air Quality Impacts Note: The preferred technology must at least meet all applicable air quality regulations.	Local meteorological conditions	• Proximity to 400 series highway will influence local air quality. • Potential air quality impact from intermediate distance industrial sources. • Potential adverse impact from lake effect • Location specific air monitoring currently underway to confirm results.	• Proximity to 400 series highway will influence local air quality. • Greatest potential air quality impact from major intermediate distance industrial sources. • Potential adverse impact from lake effect. • Location specific air monitoring currently underway to confirm results.	• Proximity to 400 series highway will influence local air quality. • Potential air quality impact from intermediate distance industrial sources. • Potential adverse impact from lake effect. • Location specific air monitoring currently underway to confirm results.	• Greater distance to nearest 400 series highway. • Lowest industrial emissions from local and intermediate distance sources. • No potential adverse impact from lake effect. • Location specific air monitoring currently underway to confirm results.
	SUMMARY of INDICATOR	DISADVANTAGE Site received a Disadvantage ranking relative to East Gwillimbury 01 as a result of its proximity to 400 series highways and potential air quality impacts from intermediate distance industrial sources.	MAJOR DISADVANTAGE Site received a Major Disadvantage ranking relative to other sites being identified as disadvantaged as a result of it having the greatest potential air quality impact from major intermediate distance sources when compared to Clarington 01 and 05.	DISADVANTAGE Site received a Disadvantage ranking relative to East Gwillimbury 01 as a result of its proximity to 400 series highways and potential air quality impacts from intermediate distance industrial sources.	NEUTRAL Site received a Neutral ranking relative to other sites as development of the site would have no potential benefits or impacts based on this indicator being applied.
	Distance travelled from main source(s) of waste generation to the site. (Measured as total kilometres travelled per day by collection and transfer vehicles (round-trip) from source of waste generation to Facility and back)	• 150,000 tpy scenario – 1,490 km/day	• 150,000 tpy scenario – 1,690 km/day	• 150,000 tpy scenario – 1,490 km/day	• 150,000 tpy scenario – 3,380 km/day
	SUMMARY of INDICATOR	ADVANTAGE Site received an advantage ranking as it has the shortest distanced travelled (shared with Clarington 05)	NEUTRAL Site received a neutral ranking due to its greater distance than the other Clarington sites, but still less than half that of the East Gwillimbury site.	ADVANTAGE Site received an advantage ranking as it has the shortest distanced travelled. (shared with Clarington 01)	DISADVANTAGE Site received a disadvantage due to the length of the distance. However, it was the considered opinion of the proponents that although a greater distance, the distance did not justify a Major Disadvantage ranking.

Table 8-40 Public Health and Safety and Natural Environmental Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
SUMMARY of CRITERION:		NEUTRAL This site is well-suited for the location of the Proposed Thermal Treatment Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04.	DISADVANTAGE This site is not well-suited for the location of the Facility given it has the worst potential effects associated with industrial emissions at a local and intermediate distance, and due to its neutral ranking relative to the other sites for distance traveled by collection and transfer vehicles from main source(s) of waste. Clarington 04 is likely to have the greatest impact to air quality because of the combined effect of waste traveling a longer distance from main source(s) of generation to the site(s), and the expected air quality relative to the other sites.	NEUTRAL This site is well-suited for the location of the Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04.	NEUTRAL This site is well suited because even though relative to the other sites, it is the farthest distance to travel by collection and transfer vehicles from the main source(s) of waste, for the 150,000 tpy scenario, these longer travel requirements are balanced out by the benefits gained by the site having the relatively best air quality.
Water Quality Impacts (Surface Water and Groundwater)	Relative distance to and type of watercourses (aquatic habitat) present within close proximity of site for wastewater or surface discharge from Facility (if applicable).	• 600 metres to receiving watercourse • receiving watercourse is a cold water fishery • Stormwater management facility will be designed in accordance with Conservation Authority requirements to mitigate potential impacts to the receiving watercourse.	• 150 metres to receiving watercourse • receiving watercourse is a coldwater fishery • Stormwater management facility will be designed in accordance with Conservation Authority requirements to mitigate potential impacts to the receiving watercourse. [11]	• 250 metres to receiving watercourse • receiving watercourse is a cold water fishery • Stormwater management facility will be designed in accordance with Conservation Authority requirements to mitigate potential impacts to the receiving watercourse.	• 15 metres to receiving watercourse • receiving watercourse is a cold water fishery • Stormwater management facility will be designed in accordance with Conservation Authority requirements to mitigate potential impacts to the receiving watercourse.
	SUMMARY of INDICATOR	ADVANTAGE Site received an advantage ranking as a result of its relative distance to a cold water fishery	NEUTRAL Site received a neutral ranking as a result of it falling between the shortest and longest distance to a cold water fishery.	NEUTRAL Site received a neutral ranking as a result of it falling between the shortest and longest distance to a cold water fishery.	DISADVANTAGE Site received disadvantage ranking as a result of its relative distance to a cold water fishery
	Receiving body for wastewater discharge from the Facility (if applicable)	• Wastewater discharge to be managed at a WPCP and ultimately discharged to Lake Ontario in accordance with regulatory requirements.	• Wastewater discharge to be managed at a WPCP and ultimately discharged to Lake Ontario in accordance with regulatory requirements.	• Wastewater discharge to be managed at a WPCP and ultimately discharged to Lake Ontario in accordance with regulatory requirements.	• Wastewater discharge to be managed at a WPCP and ultimately discharged to Lake Ontario in accordance with regulatory requirements.

[11] In consultation with the Central Lake Ontario Conservation Authority (CLOCA) it was determined that in July 2008, additional data was collected by CLOCA on this creek. The results of this new data confirm that Bennett Creek is a cold water fishery, not a warm water fishery as previous data suggested. This change does not necessitate an overall change to the relative rankings of the sites.

Table 8-40 Public Health and Safety and Natural Environmental Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	SUMMARY of INDICATOR	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.
	Quality of water in the receiving body based on size and flow of watercourses	• The stormwater management facility will be controlled from post-development to pre-development (existing) conditions.	• The stormwater management facility will be controlled from post-development to peak pre-development (existing) conditions.	• The stormwater management facility will be controlled from post-development to pre-development (existing) conditions.	• The stormwater management facility will be controlled from post-development to pre-development (existing) conditions.
	SUMMARY of INDICATOR	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.
	Groundwater Impacts (not specified indicator, provided for information)	• Development of Thermal Treatment Facility will not have any noticeable effects on the surrounding groundwater resources.	• Development of Thermal Treatment Facility will not have any noticeable effects on the surrounding groundwater resources.	• Development of Thermal Treatment Facility will not have any noticeable effects on the surrounding groundwater resources.	• Development of Thermal Treatment Facility will not have any noticeable effects on the surrounding groundwater resources.
	SUMMARY of INDICATOR	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.
SUMMARY of CRITERION:		ADVANTAGE Site received an advantage ranking as a result of its relative distance to a cold water fishery All other indicators in the evaluation where neutral.	NEUTRAL Site received a neutral ranking as a result of it falling between the shortest and longest distance to a cold water fishery. All other indicators in the evaluation where neutral.	NEUTRAL Site received a neutral ranking as a result of it falling between the shortest and longest distance to a cold water fishery. All other indicators in the evaluation where neutral.	DISADVANTAGE Site received disadvantage ranking as a result of its relative distance to a cold water fishery. All other indicators in the evaluation where neutral. Overall, East Gwillimbury 01 is the only site with a disadvantage, in regards to the close proximity of the SWM facility to a cold water fishery.
Environmentally Sensitive Areas and Species Impacts	Species of special concern, threatened and/or endangered species identified by MNR in the area potentially impacted by the site or haul route.	• 2 - Species of Conservation Concern documented by the NHIC as possibly occurring in the vicinity of the site • 0 - Species of Conservation Concern Observed Onsite	• 0 - Species of Conservation Concern documented by the NHIC as possibly occurring in the vicinity of the site • 0 - Species of Conservation Concern Observed Onsite	• 1 - Species of Conservation Concern documented by the NHIC as possibly occurring in the vicinity of the site • 0 - Species of Conservation Concern Observed Onsite	• 1 - Species of Conservation Concern documented by the NHIC as possibly occurring in the vicinity of the site • 0 - Species of Conservation Concern Observed Onsite

Table 8-40 Public Health and Safety and Natural Environmental Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	SUMMARY of INDICATOR	DISADVANTAGE Site received a disadvantage ranking as result of 2 species of conservation concern possibly being located in the vicinity of the site. It is the considered opinion of the proponents that any site with possible species of conservation concern located in the vicinity of the site being ranked at a minimum disadvantaged.	ADVANTAGE This site is the only site with no possible species of conservation concern located within its vicinity and therefore it received an advantage ranking.	DISADVANTAGE Site received a disadvantage ranking as result of 1 species of conservation concern possibly being located in the vicinity of the site. It is the considered opinion of the proponents that any site with possible species of conservation concern located in the vicinity of the site being ranked at a minimum disadvantaged.	DISADVANTAGE Site received a disadvantage ranking as result of 1 species of conservation concern possibly being located in the vicinity of the site. It is the considered opinion of the proponents that any site with possible species of conservation concern located in the vicinity of the site being ranked at a minimum disadvantaged.
	Distance from site or haul route to areas that are designated Natural Heritage Features and Areas including: Significant Wildlife and Fish Habitat; Significant Areas of Natural and Scientific Interest; Significant Wetlands, Woodlands, etc.; Designated Hazard Lands; and, Conservation Areas	• 20 Natural Areas within 10 km • 1.3 km to Closest Natural Area[12] • No Hazard Lands Onsite	• 19 Natural Areas within 10 km • 1.4 km to Closest Natural Area • No Hazard Lands Onsite	• 20 Natural Areas within 10 km • 1.3 km to Closest Natural Area[13] • Hazard Lands Onsite	• 35 Natural Areas within 10 km • 1.8 km to Closest Natural Area • Floodplain Onsite
	SUMMARY of INDICATOR	ADVANTAGE The number of natural areas and distance to the closest natural area are relatively consistent among all sites. This site was applied a relative advantage ranking as a result of the lack of floodplains or hazards lands onsite.	ADVANTAGE The number of natural areas and distance to the closest natural area are relatively consistent among all sites. This site was applied a relative advantage ranking as a result of the lack of floodplains or hazards lands onsite.	DISADVANTAGE The number of natural areas and distance to the closest natural area are relatively consistent among all sites. This site was applied a relative disadvantage ranking as a result of the hazards lands onsite.	DISADVANTAGE The number of natural areas and distance to the closest natural area are relatively consistent among all sites. This site was applied a relative disadvantage ranking as a result of the floodplain onsite.

[12] In consultation with the Central Lake Ontario Conservation Authority (CLOCA) it was determined that Tooley Creek is a locally significant wetland as determined by CLOCA. The Clarington 01 site is located 0.87 km from the Tooley Creek Coastal Wetland and 2.2 km from Darlington Provincial Park, the closest natural areas to the Site. The proposed haul route for the Site is 0.9 km from the coastal wetland and 1.3 km from Darlington Provincial Park, with the majority of natural areas falling farther than 2 km from the proposed haul route. However, further site specific investigations on the Clarington 01 site and surrounding area have determined minimal to no impact on this wetland area.

[13] In consultation with the Central Lake Ontario Conservation Authority (CLOCA) it was determined that Tooley Creek is a locally significant wetland as determined by CLOCA. The Clarington 05 site is located approximately 0.3 km from the Tooley Creek Coastal Wetland and 1.7 km from Darlington Provincial Park, the closest natural areas to the Site. The proposed haul route for the Site is 0.9 km from the coastal wetland and 1.3 km from Darlington Provincial Park, with the majority of natural areas falling farther than 3 km from the proposed haul route. See Section 8.8 for how this has been addressed in the site evaluation process.

Table 8-40 Public Health and Safety and Natural Environmental Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
SUMMARY of CRITERION:		NEUTRAL The disadvantage associated with species of special concern is offset by the distance to natural areas and the lack of onsite hazard lands.	ADVANTAGE Site was advantaged with respect to both indicators and as a result received an advantage for this criterion.	DISADVANTAGE Site was disadvantaged with respect to both indicators and as a result received a disadvantage for this criterion.	DISADVANTAGE Site was disadvantaged with respect to both indicators and as a result received a disadvantage for this criterion.
Aquatic and Terrestrial Ecology Impacts	Amount of woodlands, hedgerows, etc., affected or removed at the site and the degree of impact on the edge of a woodlot/hedgerow.	• No Wooded Areas Present Onsite • Minimal Hedgerows Present Onsite • No Aquatic Habitat onsite	• No Wooded Areas Present Onsite • No Hedgerows Present Onsite • Potential Aquatic Habitat onsite	• Wooded Areas Present Onsite • Hedgerows Present Onsite • Potential Aquatic Habitat onsite	• No Wooded Areas Present Onsite • No Hedgerows Present Onsite • Potential Aquatic Habitat onsite
	SUMMARY of INDICATOR	ADVANTAGE Site received an advantage ranking as a result of having the least potential impact when compared to other sites. However, the presence of minimal hedgerows prevented this site from being considered a major advantage.	DISADVANTAGE Site received a disadvantage as a result of the potential aquatic habitat onsite.	MAJOR DISADVANTAGE Site received a major disadvantage as a result of the potential aquatic habitat onsite, wooded areas onsite and hedgerows onsite.	DISADVANTAGE Site received a disadvantage as a result of the potential aquatic habitat onsite.
SUMMARY of CRITERION:		ADVANTAGE Site received an advantage ranking as a result of having the least potential impact when compared to other sites. However, the presence of minimal hedgerows prevented this site from being considered a major advantage.	DISADVANTAGE Site received a disadvantage as a result of the potential aquatic habitat onsite.	MAJOR DISADVANTAGE Site received a major disadvantage as a result of the potential aquatic habitat onsite, wooded areas onsite and hedgerows onsite.	DISADVANTAGE Site received a disadvantage as a result of the potential aquatic habitat onsite.

Table 8-40 Public Health and Safety and Natural Environmental Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	OVERALL EVALUATION: **PUBLIC HEALTH AND SAFETY AND NATURAL ENVIRONMENTAL CONSIDERATIONS**	ADVANTAGE This site is well-suited for the location of the Proposed Thermal Treatment Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04. The site received an advantage ranking as a result of its relative distance to a cold water fishery. The disadvantage associated with species of special concern is offset by the distance to natural areas and the lack of onsite hazard lands. The site also received an advantage ranking as a result of having the least potential impact when compared to other sites. However, the presence of minimal hedgerows prevented this site from being considered a major advantage. Given these factors above, and the fact that on each criteria, Clarington 01 was the only site to receive at least a neutral or advantage ranking, with no disadvantages identified, its overall ranking is advantaged.	NEUTRAL Clarington 04 is likely to have the greatest impact to air quality because of the combined effect of waste traveling a longer distance from main source(s) of generation to the site(s), and the expected air quality relative to the other sites. However, its advantaged with respect to potential impacts to environmentally sensitive areas and species impacts and its neutral ranking with respect to potential water quality impacts resulted in overall ranking of neutral.	MAJOR DISADVANTAGE This site received a major disadvantage as a result of the potential aquatic habitat onsite, wooded areas onsite and hedgerows onsite. This site was also disadvantaged as a result of the potential impacts to environmentally sensitive areas and species impacts. Overall this site received no advantage rankings and was the only site to receive a major disadvantage on any criteria.	DISADVANTAGE This site received a disadvantage ranking on three of the four criteria, with the fourth being a neutral. There were no advantages identified with this site and as a result the site received a disadvantage ranking.

Table 8-41 Social and Cultural Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Compatibility with Existing and/or Proposed Land Uses	Consistency with current land use, approved development plans, and proposed land use changes.	• Site is currently undeveloped with portions being utilized as agricultural land. • Proposed Facility considered to be public infrastructure and therefore is permitted in any Regional and Area Municipal Official Plan land use designation or local zoning by-law.	• Site is currently undeveloped with portions being utilized as agricultural land. • Proposed Facility considered to be public infrastructure and therefore is permitted in any Regional and Area Municipal Official Plan land use designation or local zoning by-law. • Potential impact to northwest corner of property due to future development plans related to the expansion of Highway 401 and potential relocation of Bennett Road Interchange to Lambs Road.	• Site is currently undeveloped with portions being utilized as agricultural land, commercial land and residential. • Proposed Facility considered to be public infrastructure and therefore is permitted in any Regional and Area Municipal Official Plan land use designation or local zoning by-law. • Highway 407 East extension (East Durham link) and the potential expansion of Highway 401 impacts the ability to develop approximately one third of the north portion of the site.	• Site is currently undeveloped and vacant. • Regional Official Plan amendment may be required due to Waste Management Policies 6.8.2 and 6.8.3. • No Area Municipal Official Plan or zoning by-law amendments required. • Site currently located in Greenbelt Area, although not constrained by development requirements within Greenbelt Plan.
	SUMMARY of INDICATOR	MAJOR ADVANTAGE Site has a major advantage as it has the least limitations for land use.	DISADVANTAGE Site is disadvantaged due to the potential impact of highway improvements on the property.	MAJOR DISADVANTAGE Site has a major disadvantage due to the potential impact of highway development of north portion of site.	DISADVANTAGE Site is disadvantaged due to potential amendments needed to the Official Plan and its location in the Greenbelt Area.
	Size of buffer zone available on the site.	• Total site area – 12.1 hectares • Building size – 3.1 hectares • Net buffer area – 9.0 hectares	• Total site area – 14.8 hectares • Building size – 3.1 hectares • Net buffer area – 11.9 hectares	• Total site area – 27.2 hectares • Building size – 3.1 hectares • Net buffer area – 24.3 hectares	• Total site area – 11.5 hectares • Building size – 3.1 hectares • Net buffer area – 6.9 hectares
	SUMMARY of INDICATOR	ADVANTAGE Site received an advantage ranking due to its buffer size that was adequate and similar to the other sites.	ADVANTAGE Site received an advantage ranking due to its buffer size that was adequate and similar to the other sites.	MAJOR ADVANTAGE Site ranked as having a major advantage due to greater site size and corresponding buffer compared to the other sites.	ADVANTAGE Site received an advantage ranking due to its buffer size that was adequate and similar to the other sites.
	Opportunity for Brownfield development.	• Site not considered Brownfield property.	• Site not considered Brownfield property.	• Site not considered Brownfield property.	• Site not considered Brownfield property.
	SUMMARY of INDICATOR	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.

Table 8-41 Social and Cultural Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
SUMMARY of CRITERION:		MAJOR ADVANTAGE The site is compatible with surrounding land uses and provides ample on-site buffer area.	DISADVANTAGE Expansion of Highway 401 and potential relocation of Bennett Road Interchange to Lambs Road will impact developeable area of site.	DISADVANTAGE The Highway 407 East extension (East Durham link) and the potential expansion of Highway 401 impact the ability to develop approximately one third of the north portion of the site.	NEUTRAL Potential Regional Official Plan amendment addressed under Legal considerations. Site not constrained by development requirements within Greenbelt Plan but is the only site located with the Greenbelt area.
Residential Areas	Distance from site to designated residential areas within an appropriate separation distance of the site and within an appropriate separation distance of the haul route(s).	• The nearest residential area designated as future urban residential is 3.2 km from site.	• The nearest urban residential area designated is 420 m from site (Wilmot Creek planned expansion).	• The nearest residential area designated as future urban residential is 2.74 km from site.	• The nearest estate residential area is 875 m from site.
	SUMMARY of INDICATOR	ADVANTAGE Site received a ranking of Advantage due to distance to a future urban residential development.	MAJOR DISADVANTAGE Site received a ranking of Major Disadvantage due to close proximity to a planned expansion of dense subdivision.	ADVANTAGE Site received a ranking of an Advantage due to distance to a future urban residential development.	NEUTRAL Site received a ranking of neutral as located near an estate residential area less than 1 km away. This distance falls within those sites that advantaged and disadvantaged.
	Number and distribution of residences within an appropriate separation distance of the site and within an appropriate separation distance of the haul route(s).	• Total of two (2) residences within 1km. • Two (2) are located northwest of property (one of which is abandoned) and one (1) is located to the east within 1km. • One (1) abandoned residence located 180 m south of south service road on proposed haul route.	• Total of nine (9) residences within 1km. • Six (6) are located south of the site (south of CN Rail) and three (3) are located north of the site (north of Highway 401) within 1km. • No residences located along proposed haul route	• Total of nine (9) residences within 1km. • Seven (7) residences are located north of site (north of Highway 401) and one (1) is located southwest of site. Two (2) are located on site, one (1) of which is abandoned within 1km. • No residences located along proposed haul route	• Total of Nine (9) residences distributed on the north western, eastern and southern parts of the one (1) kilometre radius circle within 1km. • Four (4) of the residences on the east form part of a larger subdivision along Callwood Crescent, which is located 875 m from site within 1km. • Two (2) residences along proposed haul route on Davis Drive.
	SUMMARY of INDICATOR	ADVANTAGE Site considered to have an advantage due to the lesser number of residences near the site compared to other sites.	DISADVANTAGE Site considered to be disadvantaged due to the number of residences located within 1 km.	DISADVANTAGE Site considered to be disadvantaged due to the number of residences located within 1 km.	MAJOR DISADVANTAGE Site considered to be at a major disadvantage due to residences along haul route and proximity to residences.

Table 8-41 **Social and Cultural Considerations - Application of Short-list Evaluation Criteria**

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
SUMMARY of CRITERION:		ADVANTAGE Site has the fewest number of existing residences within 1 km radius and greatest distance from planned future development.	MAJOR DISADVANTAGE Wilmot Creek planned expansion directly to south will be dense subdivision development.	NEUTRAL The larger distance to the nearest designated residential area is offset by the higher number of residences within 1 kilometre of site.	DISADVANTAGE Site is disadvantaged as a result of the designated residential area and residences within 1 kilometre of site and 2 residences along the proposed haul route.
Parks and Recreational Areas	Number and type of recreational areas (i.e., parkland) within an appropriate separation distance of the site and within an appropriate separation distance of the haul route(s).	• One (1) kilometre to nearest park facility (Soccer fields in Darlington Buffer lands). • There are no recreational areas along haul route.	• There are no parks and recreational areas within the one (1) kilometre radius. • There are no recreational areas along haul route.	• There are no parks and recreational areas within the one (1) kilometre radius. • There are no recreational areas along haul route.	• There are no parks and recreational areas within the one (1) kilometre radius. • There are no recreational areas along haul route.
	SUMMARY of INDICATOR	NEUTRAL Although there are no recreational areas along the haul route, the site received a neutral ranking as a result of its proximity to the Darlington soccer fields. Through additional research it was confirmed that this proximity had minimal to no potential impact, however, the relatively lower ranking was still appropriate.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.
SUMMARY of CRITERION:		NEUTRAL Although there are no recreational areas along the haul route, the site received a neutral ranking as a result of its proximity to the Darlington soccer fields. Through additional research it was confirmed that this proximity had minimal to no potential impact, however, the relatively lower ranking was still appropriate.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.
Institutional Facilities or Areas	Number and type of institutions within an appropriate separation distance of the site or area and within an appropriate separation distance of the haul route(s).	• No institutional facilities within1 km radius of site. • No institutional facilities along proposed haul route.	• No institutional facilities within 1 km radius of site. • No institutional facilities along proposed haul route.	• No institutional facilities within 1 km radius of site. • No institutional facilities along proposed haul route.	• No institutional facilities within 1 km radius of site. • No institutional facilities along proposed haul route.

Table 8-41 Social and Cultural Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	SUMMARY of INDICATOR	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.
SUMMARY of CRITERION:		ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.
Archaeological and Cultural Resources	Number and significance of known archaeological and cultural areas at the site based on review of documented sites and the potential for uncovered resources to be located at the site.	• Site has a <u>high</u> potential for the presence of prehistoric archaeological resources. • Site has a <u>high</u> potential for the presence of historic period archaeological resources.	• Site has a <u>high</u> potential for the presence of prehistoric archaeological resources. • Site has a <u>low</u> potential for the presence of historic period archaeological resources.	• Site has a <u>high</u> potential for the presence of prehistoric archaeological resources. • Site has a <u>high</u> potential for the presence of historic period archaeological resources. • Abandoned house onsite is considered a historic resource which predates 1878.	• Site has a <u>high</u> potential for the presence of prehistoric archaeological resources. • Site has a <u>low to moderate</u> potential for the presence of historic period archaeological resources onsite.

Table 8-41 Social and Cultural Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	SUMMARY of INDICATOR	DISADVANTAGE Site received a disadvantage ranking as a result of high potential for both historic and prehistoric archaeological resources.	ADVANTAGE Site received an advantage ranking as the high potential for prehistoric resources is more than offset by low potential for historic resources This site has a high potential for the presence of prehistoric archaeological resources on site and low potential for the presence of historic period archaeological resources on site. Development of the proposed Thermal Treatment Facility could occur with the least archaeological and cultural impact in comparison to the other three Short-list sites.	MAJOR DISADVANTAGE Site received a major disadvantage ranking as a result of high potential for both historic and prehistoric archaeological resources. The major disadvantage as compared to Clarington 01 is the presence of the abandoned house on the site which is also a historic resource.	NEUTRAL Site received a neutral ranking as the high potential for prehistoric resources is partially offset by low to moderate potential for historic resources. The low to moderate ranking falls in between the advantaged Clarington 04 and disadvantaged Clarington 01.
SUMMARY of CRITERION:		DISADVANTAGE Site received a disadvantage ranking as a result of high potential for both historic and prehistoric archaeological resources.	ADVANTAGE Site received an advantage ranking as the high potential for prehistoric resources is more than offset by low potential for historic resources This site has a high potential for the presence of prehistoric archaeological resources on site and low potential for the presence of historic period archaeological resources on site. Development of the proposed Thermal Treatment Facility could occur with the least archaeological and cultural impact in comparison to the other three Short-list sites.	MAJOR DISADVANTAGE Site received a major disadvantage ranking as a result of high potential for both historic and prehistoric archaeological resources. The major disadvantage as compared to Clarington 01 is the presence of the abandoned house on the site which is also a historic resource.	NEUTRAL Site received a neutral ranking as the high potential for prehistoric resources is partially offset by low to moderate potential for historic resources. The low to moderate ranking falls in between the advantaged Clarington 04 and disadvantaged Clarington 01.

Table 8-41 Social and Cultural Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Potential Traffic Impacts	Type of roadway (i.e., paved, gravel) and access to businesses and/or subdivisions & proximity of site to major arterial roads or highways.	• Majority of haul route on 400 series highway. • Paved municipal roadway to point of access for site. • Haul Route length from 400 series highway – 1.2 km.	• Majority of haul route on 400 series highway. • Paved municipal roadway to point of access for site. • Haul Route length from 400 series highway – 0.5 km. • Unknown whether potential new 401 interchange would provide direct access to site.	• Majority of haul route on 400 series highway. • Paved municipal roadway to point of access for site. • Haul Route length from 400 series highway – 0.4 km.	• Majority of haul route on 400 series highway. • Paved municipal roadway to point of access for site. • Haul Route length from 400 series highway – 2.0 km.
	SUMMARY of INDICATOR	NEUTRAL Site received a neutral ranking as the transportation network can accommodate additional facility related traffic, however, no beneficial impacts were identified to support an advantage ranking.	DISADVANTAGE Site received a disadvantaged ranking as a result of the potential 401 interchange and how the site could be potentially accessed.	NEUTRAL Site received a neutral ranking as the transportation network can accommodate additional facility related traffic, however, no beneficial impacts were identified to support an advantage ranking.	NEUTRAL Site received a neutral ranking as the transportation network can accommodate additional facility related traffic, however, no beneficial impacts were identified to support an advantage ranking.
	Existing and projected volume of traffic along haul route (i.e., high, moderate or low).	• Good existing traffic conditions. • Site can generally accommodate future Facility without improvements to the study area intersections. • Future Traffic analysis including Thermal Treatment Facility identified one (1) Critical Movement affecting general vehicle travel: Eastbound left turn at Hwy 401 exit ramp and Courtice Road.	• Good existing traffic conditions. • Site can generally accommodate future Facility without improvements to the study area intersections. • Future Traffic analysis indicates no Critical Movements.	• Good existing traffic conditions. • Site can generally accommodate future Facility without improvements to the study area intersections. • Future Traffic analysis including Thermal Treatment Facility identified one (1) Critical Movement affecting general vehicle travel: Eastbound left turn at Hwy 401 exit ramp and Courtice Road.	• Good existing traffic conditions except intersection of Bales/Davis Drive. • Site can generally accommodate future Facility without improvements to the study area intersections. • Future Traffic analysis including Thermal Treatment Facility identified two (2) Critical Movements affecting waste truck travel: Southbound left turn from Bales Drive onto Davis Drive and Westbound left turn from Garfield Wright Boulevard onto southbound Woodbine Avenue.
	SUMMARY of INDICATOR	NEUTRAL Site received a neutral ranking as the transportation network can accommodate additional facility related traffic, however, no beneficial impacts were identified to support an advantage ranking. Although one critical movement identified, this potential impact can be mitigated.	NEUTRAL Site received a neutral ranking as the transportation network can accommodate additional facility related traffic, however, no beneficial impacts were identified to support an advantage ranking.	NEUTRAL Site received a neutral ranking as the transportation network can accommodate additional facility related traffic, however, no beneficial impacts were identified to support an advantage ranking. Although one critical movement identified, this potential impact can be mitigated.	DISADVANTAGE Site received a disadvantaged ranking as a result of the intersection at Bales and Davis Drive.
	Conformity with Durham's Goods Movement Network	• Conforms with Durham's Goods Movement Network.	• Conforms with Durham's Goods Movement Network.	• Conforms with Durham's Goods Movement Network.	• Not applicable to York.

Table 8-41 Social and Cultural Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	SUMMARY of INDICATOR	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.
SUMMARY of CRITERION:		NEUTRAL Site received a Neutral ranking on all indicators and as a result receives an overall neutral ranking for the criterion. The traffic implications for this site are the same as for the Clarington 05 site.	DISADVANTAGE Site received a disadvantaged ranking as a result of the potential 401 interchange and how the site could be potentially accessed. All other indicators were neutral.	NEUTRAL Site received a Neutral ranking on all indicators and as a result receives an overall neutral ranking for the criterion. The traffic implications for this site are the same as for the Clarington 01 site.	DISADVANTAGE Site received a disadvantaged ranking as a result of the intersection at Bales and Davis Drive. All other indicators were neutral.
OVERALL EVALUATION: **SOCIAL AND CULTURAL CONSIDERATIONS**		ADVANTAGE Site has ranking of advantage due to compatibility with land uses, adequate buffer space and distance from residential areas.	DISADVANTAGE Site has ranking of disadvantage due to impact of highway improvements, and the proximity of a future development of a dense subdivision.	DISADVANTAGE Site has ranking of disadvantage due to high potential for archaeological resources and impact of highway resources.	NEUTRAL Site has neutral ranking due to disadvantages of traffic conditions and proximity of residences which was offset by the advantages from the lack of institutions, parks and recreational areas near the site or along haul route.

Table 8-42 Economic/Financial Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Capital Costs	Site development costs, including: infrastructure required, upgrades to existing infrastructure (roads, sewers, etc.), property acquisition and possible site remediation.	• Site-specific capital costs range from $7.6 to $11.3 million.	• Site-specific capital costs range from $8.9 to $16.7 million.	• Site-specific capital costs range from $10.6 to $15.5 million.	• Site-specific capital costs range from $3.8 to $11.4 million.

Table 8-42 Economic/Financial Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	SUMMARY of INDICATOR	NEUTRAL Site received a neutral ranking as a result of it falling between the lowest and highest site development costs rankings.	DISADVANTAGE Site received a relative disadvantage ranking as result of it having the highest site development costs.	DISADVANTAGE Site received a relative disadvantage ranking as result of it having the highest site development costs.	ADVANTAGE Site received a relative advantage ranking as result of it having the lowest site development costs.
SUMMARY of CRITERION:		NEUTRAL Site received a neutral ranking as a result of it falling between the lowest and highest site development costs rankings.	DISADVANTAGE Site received a relative disadvantage ranking as result of it having the highest site development costs.	DISADVANTAGE Site received a relative disadvantage ranking as result of it having the highest site development costs.	ADVANTAGE Site received a relative advantage ranking as result of it having the lowest site development costs.
Operation and Maintenance Costs	Distance from waste generation points, transfer stations (e.g., length of haul route), annual operating costs and maintenance costs.	• Annual haul cost savings of $2.72 to $3.92 million.	• Annual haul cost savings of $2.68 to $3.79 million.	• Annual haul cost savings of $2.72 to $3.92 million.	• Annual Haul cost savings of $2.18 to $3.85 million.
	SUMMARY of INDICATOR	ADVANTAGE Site received an advantage ranking as it presents the greatest haul cost saving (shared with Clarington 04 & Clarington 05)	ADVANTAGE Site received an advantage ranking as it presents the greatest haul cost saving (shared with Clarington 01 & Clarington 05)	ADVANTAGE Site received an advantage ranking as it presents the greatest haul cost saving (shared with Clarington 01 & Clarington 04)	NEUTRAL Site received a neutral as a result of it having the lowest relative haul cost savings, however, since there is a recognized savings the site did not warrant a disadvantage ranking.
	Mitigation requirements	• No site-specific mitigation requirements identified.	• No site-specific mitigation requirements identified.	• No site-specific mitigation requirements identified.	• No site-specific mitigation requirements identified.
	SUMMARY of INDICATOR	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.
	Monitoring requirements	• No site-specific monitoring requirements identified.	• No site-specific monitoring requirements identified.	• No site-specific monitoring requirements identified.	• No site-specific monitoring requirements identified.

Table 8-42 Economic/Financial Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	SUMMARY of INDICATOR	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.	NEUTRAL Minimal difference in indicator at all sites, resulting in neutral effect.
	Distance from potential markets for sale of marketable materials (i.e. heat, electricity, recovered metals, etc.).	• Comparable to other sites in distance to electricity and recyclables markets. • Close to potential market for heat.	• Comparable to other sites in distance to electricity and recyclables markets. • Limited potential market for heat.	• Comparable to other sites in distance to electricity and recyclables markets. • Close to potential market for heat.	• Comparable to other sites in distance to electricity and recyclables markets. • Limited potential market for heat.
	SUMMARY of INDICATOR	ADVANTAGE The proximity to a potential market for heat resulted in this site receiving a relative advantage over other sites.	DISADVANTAGE The proximity to a potential market for heat resulted in this site receiving a relative disadvantage over other sites.	ADVANTAGE The proximity to a potential market for heat resulted in this site receiving a relative advantage over other sites.	DISADVANTAGE The proximity to a potential market for heat resulted in this site receiving a relative disadvantage over other sites.
SUMMARY of CRITERION:		ADVANTAGE Site received an advantage as a result of advantages associated with haul cost savings and proximity to a market for heat.	NEUTRAL Site received a neutral as a result of advantages associated with haul cost savings offset by limited market for heat.	ADVANTAGE Site received an advantage as a result of advantages associated with haul cost savings and proximity to a market for heat.	DISADVANTAGE Site received a disadvantage as a result of no advantages to offset disadvantage related to limited market for heat.
OVERALL EVALUATION: ECONOMIC/FINANCIAL CONSIDERATIONS		ADVANTAGE The site-specific capital cost requirements for this site fall approximately mid-way in the range of low to high capital costs for the other sites, being generally lower than the other Clarington sites and higher than those for East Gwillimbury 01. This site has one of the highest range of haul cost savings and it is close to potential markets for heat. Clarington 01 is the only site with an overall advantage in regards to economic and financial considerations.	DISADVANTAGE This site is disadvantaged in that the range of site-specific capital cost requirements for this site is one of the highest. While this site does have one of the highest range of haul cost savings, the potential markets for heat close to the site are limited	NEUTRAL This site is disadvantaged in that the range of site-specific capital cost requirements for this site is one of the highest however, this disadvantage is offset by one of the highest range of haul cost savings and it is close to potential markets for heat.	NEUTRAL This site is advantaged in that the range of site-specific capital cost requirements for this site is the lowest, however, these advantages are offset by having the lowest range of haul cost savings and limited potential markets for heat.

Table 8-43 Technical Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Compatibility with Existing Infrastructure	Distance from Required Infrastructure (i.e. sewers, hydro, road access, water) • Electrical Grid Connection	• Electrical grid connection along one side of site. • Potential capacity constraints may require new transmission line to Wilson transformer station.	• Electrical grid connection along one side of site. • Potential capacity constraints may require new transmission line to Wilson transformer station.	• Electrical grid connection along two sides of site. • Potential capacity constraints may require new transmission line to Wilson transformer station.	• Electrical grid connection along one side of site.
	SUMMARY of INDICATOR	DISADVANTAGE Site is disadvantaged due to potential capacity constraints similar to other sites.	DISADVANTAGE Site is disadvantaged due to potential capacity constraints similar to other sites.	DISADVANTAGE Site is disadvantaged due to potential capacity constraints similar to other sites.	ADVANTAGE Site has an advantage as it does not have potential capacity constraints.
	• Water Connection	• Secondary connection required. • Requires 4,000 m of 300 mm pipe.	• Secondary connection required. • Requires 2,000 m of 400 mm pipe. • Requires crossing Highway 401.	• Secondary connection required. • Requires 4,500 m of 400 mm pipe.	• No secondary connection required. • Requires only 50 m of 300 mm pipe.
	SUMMARY of INDICATOR	DISADVANTAGE Site is disadvantaged due to requirement for extended piping and secondary connections similar to other sites.	DISADVANTAGE Site is disadvantaged due to requirement for extended piping and secondary connections similar to other sites.	DISADVANTAGE Site is disadvantaged due to requirement for extended piping and secondary connections similar to other sites.	ADVANTAGE Site has an advantage as it requires the least amount of pipe and does not require a secondary connection.

Table 8-43 Technical Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	• Sewer Connection	• Potentially requires 300 m of 450 mm gravity sewer.	• Potentially requires 2,500 m of 450 mm gravity sewer. • Potentially requires rail crossing and a watercourse crossing.	• Potentially requires 1,300 m of 450 mm gravity sewer.	• Potentially requires 7,000 m of 300 mm force main. • Potentially pumping station and force main required, crossing Highway 404, plus several watercourse crossings.
	SUMMARY of INDICATOR	ADVANTAGE Site is advantaged due to the least amount of piping required for gravity sewer.	DISADVANTAGE Site is at a disadvantage due to the potential requirement for extended lengths of piping for gravity sewer. Consideration will need to be given to potential requirement for rail and watercourse crossings.	DISADVANTAGE Site is at a disadvantage due to potential requirement for extended lengths of piping for gravity sewer.	MAJOR DISADVANTAGE Site has a major disadvantage due to potential requirement for forcemain and pumping stations as well as crossing of major highway and several watercourses.
	• Natural Gas Connection	• 3 km of 200 mm (8") pipe. • Requires crossing Highway 401 and several small water courses.	• 4 km of 150 mm (6") pipe. • Requires crossing Highway 401 and several small water courses.	• 2.6 km of 200 mm (8") pipe. • Requires crossing Highway 401 and several small water courses.	• Existing 100 mm (4") pipe at site.
	SUMMARY of INDICATOR	DISADVANTAGE Site is disadvantaged due to the requirement for piping and crossing of a highway and watercourses similar to other sites.	DISADVANTAGE Site is disadvantaged due to requirement for piping and crossing of a highway and watercourses similar to other sites.	DISADVANTAGE Site is disadvantaged due to requirement for piping and crossing of a highway and watercourses similar to other sites.	ADVANTAGE Site has an advantage due to the existing natural gas connection at site.
	• Road Access	• Good access from Highway 401. • 1,200 m of access road requires upgrading.	• Good access from Highway 401. • 500 m of access road requires upgrading.	• Good access from Highway 401. • 400 m of access road requires upgrading.	• Good access from Highway 404. • No road upgrades required.
	SUMMARY of INDICATOR	DISADVANTAGE Similar to other sites, site has a disadvantage ranking due to requirement for road upgrading.	DISADVANTAGE Similar to other sites, site has a disadvantage ranking due to requirement for road upgrading.	DISADVANTAGE Similar to other sites, site has a disadvantage ranking due to requirement for road upgrading.	ADVANTAGE Site is advantaged as no road upgrades are required.

Table 8-43 Technical Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	• Heat Loads	• Courtice WPCP can use some of available heat load. • Sufficient biogas from WPCP to generate electricity cost effectively. • District heating could be provided to adjacent Energy Park.	• Less viable for Port Darlington WPCP to use available heat load. • Insufficient Biogas from WPCP to generate electricity cost effectively. • Limited potential for use of heat energy in adjacent areas.	• Courtice WPCP can use some of available heat load. • Sufficient biogas from WPCP to generate electricity cost effectively. • District heating could be provided to adjacent Energy Park.	• Limited potential for use of heat in adjacent areas/buildings.
	SUMMARY of INDICATOR	MAJOR ADVANTAGE Site has major advantage due to proximity to Courtice WPCP for heat load and biogas and to the adjacent Energy Park which could by provided with district heating.	DISADVANTAGE Site has a disadvantage compared to other sites as it there is limited potential for use of heat energy in adjacent areas (including Port Darlington WPCP) and insufficient biogas from WPCP to generate electricity.	MAJOR ADVANTAGE Site has major advantage due to proximity to Courtice WPCP for heat load and biogas and to the adjacent Energy Park which could be provided with district heating.	DISADVANTAGE Site is disadvantaged due to limited potential for use of heat in adjacent areas/buildings.
	• Synergy with Municipal Infrastructure	• Potential to thermally treat dewatered biosolids from Courtice WPCP. • Some synergy with Courtice WPCP due to proximity and size of WPCP. • Potential to share major infrastructure with Energy Park.	• Potential to thermally treat dewatered biosolids from Port Darlington WPCP. • Little synergy with Port Darlington WPCP, greater distance and smaller WPCP.	• Potential to thermally treat dewatered biosolids from Courtice WPCP. • Some synergy with Courtice WPCP due to proximity and size of WPCP. • Potential to share major infrastructure with Energy Park.	• Potential to share scales, some access roads and parking area with York Recycling Facility. • Potential to thermally treat Recycling Facility residues.
	SUMMARY of INDICATOR	MAJOR ADVANTAGE Site has major advantage, similar to CL05 due to synergy with Courtice WPCP, potential to share major infrastructure with Energy Park and potential to thermally treat dewatered biosolids from Courtice WPCP.	ADVANTAGE Site is advantaged due to potential to thermally treat dewatered biosolids from Courtice WPCP.	MAJOR ADVANTAGE Site has major advantage, similar to CL01 due to synergy with Courtice WPCP, potential to share major infrastructure with Energy Park and potential to thermally treat dewatered biosolids from Courtice WPCP.	ADVANTAGE Site is advantaged due to potential to share infrastructure with York Recycling facility and to thermally treat Recycling Facility residue.

Table 8-43 Technical Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
SUMMARY of CRITERION:		ADVANTAGE The disadvantages associated with electrical, water, gas and road infrastructure, are more than offset by the advantage associated with sewer infrastructure and major advantages associated with adjacent WPCP and Energy Park.	DISADVANTAGE The disadvantages associated with electrical, water, sewer, gas and road infrastructure, as well as the disadvantage associated with less viable heat loads are not offset by the potential to thermally treat biosolids at adjacent WPCP.	NEUTRAL The disadvantages associated with electrical, water, sewer, gas and road infrastructure, are offset by major advantages associated with adjacent WPCP and Energy Park.	ADVANTAGE The major disadvantage associated with potential sewer infrastructure and disadvantage with limited potential heat loads; are more than offset by the advantages associated with electrical, water, gas and road infrastructure, and advantage of potential synergies with York Recycling facility.
Design /Operational Flexibility Provided by Site	Area surplus to minimum requirement provided by site	• Useful Area 12.1 ha • Surplus Area 3.9 ha	• Useful Area 13.8 ha • Surplus Area 5.5 ha	• Useful Area 14.8 ha • Surplus Area 6.7 ha	• Useful Area 8.7 ha • Surplus Area 0.5 ha
	SUMMARY of INDICATOR	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	NEUTRAL Site received a neutral ranking when compared to the other sites, however, since the site does have surplus area it was determined that it did not warrant a disadvantage ranking.
SUMMARY of CRITERION:		ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	NEUTRAL Site received a neutral ranking when compared to the other sites, however, since the site does have surplus area it was determined that it did not warrant a disadvantage ranking.

Table 8-43 Technical Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
	OVERALL EVALUATION: TECHNICAL CONSIDERATIONS	ADVANTAGE This site has disadvantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. Sanitary sewer servicing provides advantages as the connection is quite close to the site. However, these disadvantages are offset by the major advantages considering the potential heat loads available in proximity to the site and the potential synergies with municipal infrastructure, largely due to the close proximity of the site to the Courtice WPCP. In regards to design and operational flexibility, this site has an advantage based on 3.9 hectares of surplus lands, outside of the required area for the processing components and the required site infrastructure.	NEUTRAL In regards to compatibility with existing infrastructure, this site has the most disadvantages in regards to connections to the electrical grid, water servicing, sanitary sewer servicing, natural gas connections and requirements for upgrades for the access roads to the site. This site has no real advantages in regards to the potential heat loads available in proximity to the site and in regards to synergy with municipal infrastructure, as the heat requirements for the Port Darlington WPCP are relatively low and this WPCP is located 1 km away from the Clarington 04 site. However, the advantage associated with the design and operational flexibility of the site based on 6.7 hectares of surplus lands, outside of the required area for the processing components and the required site infrastructure do offset these disadvantages to a degree. Clarington 04 is the only site without an overall advantage in regards to technical considerations.	ADVANTAGE This site has disadvantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. This site also has a disadvantage in regards to sanitary sewer servicing as the connection is 1.3 km from site. However, the site has major advantages in regards to the potential heat loads available in proximity to the site and in regards to synergy with municipal infrastructure, largely due to the close proximity of the site to the Courtice WPCP. In regards to design and operational flexibility, this site has an advantage based on 5.5 ha of surplus lands, outside of the required area for the processing components and the required site infrastructure.	ADVANTAGE This site has the most advantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. However, this site has a disadvantage in regards to sanitary sewer servicing, requiring the construction of 7 km of force main. The site also has a disadvantage in regards to potential heat loads, as the potential use of heat is limited in the vicinity of the site. In regards to synergy with municipal infrastructure, there are some potential advantages in shared infrastructure with the York WMC located adjacent to the site. In regards to design and operational flexibility, this site has some (0.5 ha) of surplus lands, outside of the required components for the processing area and the required site infrastructure.

Table 8-44 Legal Considerations - Application of Short-list Evaluation Criteria

Criterion	Indicator	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Complexity of Required Approvals	Nature of approvals required.	• EAA: Schedule 'B" Class EA requirements extension of sewer and water services. • CAA: Watercourse crossing for gas service. Approval for stormwater management. • PTHIA: Extension of natural gas infrastructure under Hwy 401.	• EAA: Schedule 'B" Class EA requirements extension of sewer and water services. • CAA: Approval required for watercourse crossing for sanitary sewer service. Watercourse crossing for gas service. Approval for stormwater management. • PTHIA: Extension of watermain infrastructure under Hwy 401. Extension of natural gas infrastructure under Hwy 401.	• EAA: Schedule 'B" Class EA requirements extension of sewer and water services. • CAA: Watercourse crossing for gas service. Approval for stormwater management. • PTHIA: Extension of natural gas infrastructure under Hwy 401.	• EAA: Schedule 'B" Class EA requirements extension of sewer services. • CAA: Potential Approval for multiple watercourse crossings for sanitary sewer service. Approval for stormwater management. • PTHIA: Potential extension of sewer infrastructure under Hwy 404. • Regional Official Plan amendment maybe required due to Waste Management Policies 6.8.2 and 6.8.3.
	SUMMARY of INDICATOR	DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.
SUMMARY of CRITERION:		DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	DISADVANTAGE Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.
Complexity of Required Agreements	Nature of property acquisition (related to the need for expropriation, Region owned or willing seller site).	• Assume all linear infrastructure developed within existing right-of-way.	• Site is Privately owned, land acquisition required. • Assume all linear infrastructure developed within existing right-of-way.	• Site is Privately owned, land acquisition required. • Assume all linear infrastructure developed within existing right-of-way.	• Assume all linear infrastructure developed within existing right-of-way.

	SUMMARY of INDICATOR	ADVANTAGE Site received an advantage as site is owned by the Region of Durham and property acquisition would not be required.	DISADVANTAGE Site is relatively disadvantaged as property would have to be acquired.	DISADVANTAGE Site is relatively disadvantaged as property would have to be acquired.	ADVANTAGE Site received an advantage as site is owned by the Region of York and property acquisition would not be required.
SUMMARY of CRITERION:		ADVANTAGE Site received an advantage as site is owned by the Region of Durham and property acquisition would not be required.	DISADVANTAGE Site is relatively disadvantaged as property would have to be acquired.	DISADVANTAGE Site is relatively disadvantaged as property would have to be acquired.	ADVANTAGE Site received an advantage as site is owned by the Region of York and property acquisition would not be required.
	OVERALL EVALUATION: **LEGAL CONSIDERATIONS**	NEUTRAL Although the site is owned by the Region of Durham, the level of complexity required in obtaining additional approvals resulted in this site receiving a neutral ranking. This site and East Gwillimbury 01 are advantaged over the others due to public ownership but this advantage does not constitute an advantage overall. This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sewer and water services, Conservation Authority approvals for the watercourse crossing for gas service and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. This site is advantaged in that there is no added complexity of agreements in that the site is already municipally owned. Overall, Clarington 01 and East Gwillimbury 01 exhibit the least disadvantages when considering both the complexity of required approvals and agreements in comparison with	DISADVANTAGE The combination of this site being disadvantaged both in the required approvals and required agreements resulted in an overall disadvantage ranking This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for the extension of sewer and water services, Conservation Authority approval for the watercourse crossing for sanitary sewer service, and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. Approvals/Permitting from the MTO will also be required for the extension of the necessary watermain infrastructure under Highway 401. This site also is disadvantaged, given the added complexity of agreements to purchase the site, which is privately owned.	DISADVANTAGE The combination of this site being disadvantaged both in the required approvals and required agreements resulted in an overall disadvantage ranking This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sewer and water services, Conservation Authority approvals for the watercourse crossing for gas service and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. This site is disadvantaged, given the added complexity of agreements to purchase the site, which is also privately owned.	NEUTRAL Although the site is owned by the Region of Durham, the level of complexity required in obtaining additional approvals resulted in this site receiving a neutral ranking. This site and Clarington 01 are advantaged over the others due to public ownership but this advantage does not constitute an advantage overall. This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sanitary sewer services, Conservation Authority approvals for the watercourse crossing for sanitary sewer service and MTO Approvals/Permitting for extension of the necessary sanitary sewer infrastructure under Highway 404. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system. An amendment to the York Official Plan may be required to address Policies 6.8.2 and 6.8.3. This site is advantaged in that there is no added complexity of agreements in that the

	the other sites.			site is already municipally owned. Overall, Clarington 01 and East Gwillimbury 01 exhibit the least disadvantages when considering both the complexity of required approvals and agreements in comparison with the other sites.

Where possible, the following decision making guidelines were applied in the summation of advantages and disadvantages to determine the overall Category rankings:

- An advantaged criteria would offset a disadvantaged criteria within the same category;
- The combining of a major disadvantage with an advantage typically resulted in an overall disadvantage;
- Multiple advantages or disadvantages within a category did not constitute an overall major advantage or major disadvantage for the category; and,
- When two (2) criteria rankings were identified, and one (1) was Neutral, the summary of the two (2) criteria reflected the other criteria (i.e., an advantage or disadvantage).

In certain circumstances, professional judgment was applied by the Study Team to ensure the degree of advantage or disadvantage of a particular impact or benefit was taken into account. The following Table 8-45 provides an overview of how the individual criteria rankings were combined to determine the overall advantages and disadvantages of each of the categories of the environment.

Table 8-45 Summary of Short-list Sites Advantages and Disadvantages

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Public Health and Safety and Natural Environmental Considerations				
Air Quality Impacts	NEUTRAL This site is well-suited for the location of the Proposed Thermal Treatment Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04.	DISADVANTAGE This site is not well-suited for the location of the Facility given it has the worst potential effects associated with industrial emissions at a local and intermediate distance, and due to its neutral ranking relative to the other sites for distance traveled by collection and transfer vehicles from main source(s) of waste. Clarington 04 is likely to have the greatest impact to air quality because of the combined effect of waste traveling a longer distance from main source(s) of generation to the site(s), and the expected air quality relative to the other sites.	NEUTRAL This site is well-suited for the location of the Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04.	NEUTRAL This site is well suited because even though relative to the other sites, it is the farthest distance to travel by collection and transfer vehicles from the main source(s) of waste, for the 150,000 tpy scenario, these longer travel requirements are balanced out by the benefits gained by the site having the relatively best air quality.
Water Quality Impacts (Surface Water and Groundwater)	ADVANTAGE Site received an advantage ranking as a result of its relative distance to a cold water fishery All other indicators in the evaluation where neutral.	NEUTRAL Site received a neutral ranking as a result of it falling between the shortest and longest distance to a cold water fishery. All other indicators in the evaluation where neutral.	NEUTRAL Site received a neutral ranking as a result of it falling between the shortest and longest distance to a cold water fishery. All other indicators in the evaluation where neutral.	DISADVANTAGE Site received disadvantage ranking as a result of its relative distance to a cold water fishery. All other indicators in the evaluation where neutral. Overall, East Gwillimbury 01 is the only site with a disadvantage, in regards to the close proximity of the SWM facility to a cold water fishery.
Environmentally Sensitive Areas and Species Impacts	NEUTRAL The disadvantage associated with species of special concern is offset by the distance to natural areas and the lack of onsite hazard lands.	ADVANTAGE Site was advantaged with respect to both indicators and as a result received an advantage for this criterion.	DISADVANTAGE Site was disadvantaged with respect to both indicators and as a result received a disadvantage for this criterion.	DISADVANTAGE Site was disadvantaged with respect to both indicators and as a result received a disadvantage for this criterion.

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Aquatic and Terrestrial Ecology Impacts	ADVANTAGE Site received an advantage ranking as a result of having the least potential impact when compared to other sites. However, the presence of minimal hedgerows prevented this site from being considered a major advantage.	DISADVANTAGE Site received a disadvantage as a result of the potential aquatic habitat onsite.	MAJOR DISADVANTAGE Site received a major disadvantage as a result of the potential aquatic habitat onsite, wooded areas onsite and hedgerows onsite.	DISADVANTAGE Site received a disadvantage as a result of the potential aquatic habitat onsite.
OVERALL:	ADVANTAGE This site is well-suited for the location of the Proposed Thermal Treatment Facility given the distance travelled by collection and transfer vehicles from main source(s) of waste is less than Clarington 04 and significantly less than for East Gwillimbury 01. Industrial emissions from local and intermediate distance sources are less than Clarington 04. The site received an advantage ranking as a result of its relative distance to a cold water fishery. The disadvantage associated with species of special concern is offset by the distance to natural areas and the lack of onsite hazard lands. The site also received an advantage ranking as a result of having the least potential impact when compared to other sites. However, the presence of minimal hedgerows prevented this site from being considered a major advantage. Given these factors above, and the fact that on each criteria, Clarington 01 was the only site to receive at least a neutral or advantage ranking, with no disadvantages identified, its overall ranking is advantaged.	NEUTRAL Clarington 04 is likely to have the greatest impact to air quality because of the combined effect of waste traveling a longer distance from main source(s) of generation to the site(s), and the expected air quality relative to the other sites. However, its advantaged with respect to potential impacts to environmentally sensitive areas and species impacts and its neutral ranking with respect to potential water quality impacts resulted in overall ranking of neutral.	MAJOR DISADVANTAGE This site received a major disadvantage as a result of the potential aquatic habitat onsite, wooded areas onsite and hedgerows onsite. This site was also disadvantaged as a result of the potential impacts to environmentally sensitive areas and species impacts. Overall this site received no advantage rankings and was the only site to receive a major disadvantage on any criteria.	DISADVANTAGE This site received a disadvantage ranking on three of the four criteria, with the fourth being a neutral. There were no advantages identified with this site and as a result the site received a disadvantage ranking.
Social and Cultural Considerations				

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Compatibility with Existing and/or Proposed Land Uses	MAJOR ADVANTAGE The site is compatible with surrounding land uses and provides ample on-site buffer area.	DISADVANTAGE Expansion of Highway 401 and potential relocation of Bennett Road Interchange to Lambs Road will impact developable area of site.	DISADVANTAGE The Highway 407 East extension (East Durham link) and the potential expansion of Highway 401 impact the ability to develop approximately one third of the north portion of the site.	NEUTRAL Potential Regional Official Plan amendment addressed under Legal considerations. Site not constrained by development requirements within Greenbelt Plan but is the only site located with the Greenbelt area.
Residential Areas	ADVANTAGE Site has the fewest number of existing residences within 1 km radius and greatest distance from planned future development.	MAJOR DISADVANTAGE Wilmot Creek planned expansion directly to south will be dense subdivision development.	NEUTRAL The larger distance to the nearest designated residential area is offset by the higher number of residences within 1 kilometre of site.	DISADVANTAGE Site is disadvantaged as a result of the designated residential area and residences within 1 kilometre of site and 2 residences along the proposed haul route.
Parks and Recreational Areas	NEUTRAL Although there are no recreational areas along the haul route, the site received a neutral ranking as a result of its proximity to the Darlington soccer fields. Through additional research it was confirmed that this proximity had minimal to no potential impact, however, the relatively lower ranking was still appropriate.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.	ADVANTAGE Site was assigned a relative advantage ranking as there were no parks and recreational areas within 1 km of the site, nor are there any recreational areas along the haul route.
Institutional Facilities or Areas	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.	ADVANTAGE There is no difference in the application of the indicator at all sites, however, it is the considered opinion of the proponent that the lack of institutional facilities in the area is an equal advantage among all sites.

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Archaeological and Cultural Resources	DISADVANTAGE Site received a disadvantage ranking as a result of high potential for both historic and prehistoric archaeological resources.	ADVANTAGE Site received an advantage ranking as the high potential for prehistoric resources is more than offset by low potential for historic resources This site has a high potential for the presence of prehistoric archaeological resources on site and low potential for the presence of historic period archaeological resources on site. Development of the proposed Thermal Treatment Facility could occur with the least archaeological and cultural impact in comparison to the other three Short-list sites.	MAJOR DISADVANTAGE Site received a major disadvantage ranking as a result of high potential for both historic and prehistoric archaeological resources. The major disadvantage as compared to Clarington 01 is the presence of the abandoned house on the site which is also a historic resource.	NEUTRAL Site received a neutral ranking as the high potential for prehistoric resources is partially offset by low to moderate potential for historic resources. The low to moderate ranking falls in between the advantaged Clarington 04 and disadvantaged Clarington 01.
Potential Traffic Impacts	NEUTRAL Site received a Neutral ranking on all indicators and as a result receives an overall neutral ranking for the criterion. The traffic implications for this site are the same as for the Clarington 05 site.	DISADVANTAGE Site received a disadvantaged ranking as a result of the potential 401 interchange and how the site could be potentially accessed. All other indicators were neutral.	NEUTRAL Site received a Neutral ranking on all indicators and as a result receives an overall neutral ranking for the criterion. The traffic implications for this site are the same as for the Clarington 01 site.	DISADVANTAGE Site received a disadvantaged ranking as a result of the intersection at Bales and Davis Drive. All other indicators were neutral.
OVERALL:	ADVANTAGE Site has ranking of advantage due to compatibility with land uses, adequate buffer space and distance from residential areas.	DISADVANTAGE Site has ranking of disadvantage due to impact of highway improvements, and the proximity of a future development of a dense subdivision.	DISADVANTAGE Site has ranking of disadvantage due to high potential for archaeological resources and impact of highway resources.	NEUTRAL Site has neutral ranking due to disadvantages of traffic conditions and proximity of residences which was offset by the advantages from the lack of institutions, parks and recreational areas near the site or along haul route.
Economic/Financial Considerations				
Capital Costs	NEUTRAL Site received a neutral ranking as a result of it falling between the lowest and highest site development costs rankings.	DISADVANTAGE Site received a relative disadvantage ranking as result of it having the highest site development costs.	DISADVANTAGE Site received a relative disadvantage ranking as result of it having the highest site development costs.	ADVANTAGE Site received a relative advantage ranking as result of it having the lowest site development costs.

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
Operation and Maintenance Costs	ADVANTAGE Site received an advantage as a result of advantages associated with haul cost savings and proximity to a market for heat.	NEUTRAL Site received a neutral as a result of advantages associated with haul cost savings offset by limited market for heat.	ADVANTAGE Site received an advantage as a result of advantages associated with haul cost savings and proximity to a market for heat.	DISADVANTAGE Site received a disadvantage as a result of no advantages to offset disadvantage related to limited market for heat.
OVERALL:	ADVANTAGE The site-specific capital cost requirements for this site fall approximately mid-way in the range of low to high capital costs for the other sites, being generally lower than the other Clarington sites and higher than those for East Gwillimbury 01. This site has one of the highest range of haul cost savings and it is close to potential markets for heat. Clarington 01 is the only site with an overall advantage in regards to economic and financial considerations.	DISADVANTAGE This site is disadvantaged in that the range of site-specific capital cost requirements for this site is one of the highest. While this site does have one of the highest range of haul cost savings, the potential markets for heat close to the site are limited.	NEUTRAL This site is disadvantaged in that the range of site-specific capital cost requirements for this site is one of the highest however, this disadvantage is offset by one of the highest range of haul cost savings and it is close to potential markets for heat.	NEUTRAL This site is advantaged in that the range of site-specific capital cost requirements for this site is the lowest, however, these advantages are offset by having the lowest range of haul cost savings and limited potential markets for heat.
Technical Considerations				
Compatibility with Existing Infrastructure	ADVANTAGE The disadvantages associated with electrical, water, gas and road infrastructure, are more than offset by the advantage associated with sewer infrastructure and major advantages associated with adjacent WPCP and Energy Park.	DISADVANTAGE The disadvantages associated with electrical, water, sewer, gas and road infrastructure, as well as the disadvantage associated with less viable heat loads are not offset by the potential to thermally treat biosolids at adjacent WPCP.	NEUTRAL The disadvantages associated with electrical, water, sewer, gas and road infrastructure, are offset by major advantages associated with adjacent WPCP and Energy Park.	ADVANTAGE The major disadvantage associated with potential sewer infrastructure and disadvantage with limited potential heat loads; are more than offset by the advantages associated with electrical, water, gas and road infrastructure, and advantage of potential synergies with York Recycling facility.
Design/Operational Flexibility Provided by Site	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	ADVANTAGE Site received an advantage ranking as a result of the significant surplus area.	NEUTRAL Site received a neutral ranking when compared to the other sites, however, since the site does have surplus area it was determined that it did not warrant a disadvantage ranking.

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
OVERALL:	ADVANTAGE This site has disadvantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. Sanitary sewer servicing provides advantages as the connection is quite close to the site. However, these disadvantages are offset by the major advantages considering the potential heat loads available in proximity to the site and the potential synergies with municipal infrastructure, largely due to the close proximity of the site to the Courtice WPCP. In regards to design and operational flexibility, this site has an advantage based on 3.9 hectares of surplus lands, outside of the required area for the processing components and the required site infrastructure.	NEUTRAL In regards to compatibility with existing infrastructure, this site has the most disadvantages in regards to connections to the electrical grid, water servicing, sanitary sewer servicing, natural gas connections and requirements for upgrades for the access roads to the site. This site has no real advantages in regards to the potential heat loads available in proximity to the site and in regards to synergy with municipal infrastructure, as the heat requirements for the Port Darlington WPCP are relatively low and this WPCP is located 1 km away from the Clarington 04 site. However, the advantage associated with the design and operational flexibility of the site based on 6.7 hectares of surplus lands, outside of the required area for the processing components and the required site infrastructure do offset these disadvantages to a degree. Clarington 04 is the only site without an overall advantage in regards to technical considerations.	ADVANTAGE This site has disadvantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. This site also has a disadvantage in regards to sanitary sewer servicing as the connection is 1.3 km from site. However, the site has major advantages in regards to the potential heat loads available in proximity to the site and in regards to synergy with municipal infrastructure, largely due to the close proximity of the site to the Courtice WPCP. In regards to design and operational flexibility, this site has an advantage based on 5.5 ha of surplus lands, outside of the required area for the processing components and the required site infrastructure.	ADVANTAGE This site has the most advantages in regards to connections to the electrical grid, water servicing, natural gas connections and requirements for upgrades for the access roads to the site. However, this site has a disadvantage in regards to sanitary sewer servicing, requiring the construction of 7 km of force main. The site also has a disadvantage in regards to potential heat loads, as the potential use of heat is limited in the vicinity of the site. In regards to synergy with municipal infrastructure, there are some potential advantages in shared infrastructure with the York WMC located adjacent to the site. In regards to design and operational flexibility, this site has some (0.5 ha) of surplus lands, outside of the required components for the processing area and the required site infrastructure.
Legal Considerations				
Complexity of Required Approvals	<u>DISADVANTAGE</u> Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	<u>DISADVANTAGE</u> Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	<u>DISADVANTAGE</u> Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.	<u>DISADVANTAGE</u> Site received a Disadvantage ranking, shared by all other sites, as it requires a number of additional complex approvals. There is minimal difference in the known approval requirement differences between all sites considered.
Complexity of Required Agreements	ADVANTAGE Site received an advantage as site is owned by the Region of Durham and property acquisition would not be required.	DISADVANTAGE Site is relatively disadvantaged as property would have to be acquired.	DISADVANTAGE Site is relatively disadvantaged as property would have to be acquired.	ADVANTAGE Site received an advantage as site is owned by the Region of York and property acquisition would not be required.

Criterion	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
OVERALL:	NEUTRAL Although the site is owned by the Region of Durham, the level of complexity required in obtaining additional approvals resulted in this site receiving a neutral ranking. This site and East Gwillimbury 01 are advantaged over the others due to public ownership but this advantage does not constitute an advantage overall. This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sewer and water services, Conservation Authority approvals for the watercourse crossing for gas service and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. This site is advantaged in that there is no added complexity of agreements in that the site is already municipally owned. Overall, Clarington 01 and East Gwillimbury 01 exhibit the least disadvantages when considering both the complexity of required approvals and agreements in comparison with the other sites.	DISADVANTAGE The combination of this site being disadvantaged both in the required approvals and required agreements resulted in an overall disadvantage ranking This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for the extension of sewer and water services, Conservation Authority approval for the watercourse crossing for sanitary sewer service, and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. Approvals/Permitting from the MTO will also be required for the extension of the necessary watermain infrastructure under Highway 401. This site also is disadvantaged, given the added complexity of agreements to purchase the site, which is privately owned.	DISADVANTAGE The combination of this site being disadvantaged both in the required approvals and required agreements resulted in an overall disadvantage ranking This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sewer and water services, Conservation Authority approvals for the watercourse crossing for gas service and MTO Approvals/Permitting for extension of natural gas infrastructure under Hwy 401. This site is disadvantaged, given the added complexity of agreements to purchase the site, which is also privately owned.	NEUTRAL Although the site is owned by the Region of Durham, the level of complexity required in obtaining additional approvals resulted in this site receiving a neutral ranking. This site and Clarington 01 are advantaged over the others due to public ownership but this advantage does not constitute an advantage overall. This site has the added complexity of approvals related to the potential Schedule B Class EA requirements for extension of sanitary sewer services, Conservation Authority approvals for the watercourse crossing for sanitary sewer service and MTO Approvals/Permitting for extension of the necessary sanitary sewer infrastructure under Highway 404. Note: sanitary sewer servicing may be required pending final design of the Facility and APC system. An amendment to the York Official Plan may be required to address Policies 6.8.2 and 6.8.3. This site is advantaged in that there is no added complexity of agreements in that the site is already municipally owned. Overall, Clarington 01 and East Gwillimbury 01 exhibit the least disadvantages when considering both the complexity of required approvals and agreements in comparison with the other sites.

When considering the advantages and disadvantages identified above, in the context of priorities established by the community as described above, Table 8-46 below shows the overall relative comparison of each site.

Table 8-46 Overall Relative Comparison of Sites

Environmental Category	Clarington 01	Clarington 04	Clarington 05	East Gwillimbury 01
PRIORITY: HIGH				
Public Health and Safety and Natural Environment Considerations	Advantage	Neutral	Major Disadvantage	Disadvantage
PRIORITY: MEDIUM				
Social and Cultural Considerations	Advantage	Disadvantage	Disadvantage	Neutral
Economic/Financial Considerations	Advantage	Disadvantage	Neutral	Neutral
Technical Considerations	Advantage	Neutral	Advantage	Neutral
PRIORITY: LOW				
Legal Considerations	Neutral	Disadvantage	Disadvantage	Neutral
Overall:	**ADVANTAGE**	**DISADVANTAGE**	**DISADVANTAGE**	**NEUTRAL**

Upon examination of the relative comparison of the sites, Clarington 01 comes out with an overall advantage compared to the other sites. It is the only site to have a relative advantage in the categories considered “high” and “medium” priorities. Each of the other sites has a relative disadvantage in at least one of the categories.

8.9 Recommended Preferred Site, Clarington 01

Based on the consideration of the advantages and disadvantages and the priorities associated with each of the environmental considerations noted above in Table 8-46, the Recommended Preferred Site to manage the post-diversion,wastes from the Thermal Treatment Facility is Clarington 01.

Recommended Preferred Site Description

Site Clarington 01, illustrated below in Figure 8-30, is undeveloped land owned by Durham, south of Highway 401 in the Municipality of Clarington. The site is located on the west side of Osborne Road north of a CN Rail corridor. There are commercial properties north of the site. The lands east and west of the site are undeveloped and are currently used for agricultural purposes. The Courtice WPCP is just south of the site. The Darlington Nuclear Generating Station is located approximately 0.5 kilometres to the east. The nearest major intersection is Highway 401 and Courtice Road, which is approximately 1.7 kilometres from the site. The site is approximately 12.1 hectares in area and is located in the Clarington Energy Business Park.

Summary of Recommended Preferred Site Advantages Identified

The following provides a list of the key advantages related to the Clarington 01 site:

- Provides the shortest round-trip distances traveled for the transportation of waste resulting in the highest haul cost savings of all the sites;
- Provides the least potential impact to water quality when compared to all other sites;
- No onsite hazard lands or other natural features that could constrain development;
- No potential aquatic habitat onsite;
- Most compatible with surrounding land uses when compared to the other sites;
- Furthest from a designated residential area (existing or planned);
- Close to potential market for heat (both existing and future potential); and,

Owned by Durham and property acquisition is not required.

Summary of Recommended Preferred Site Disadvantages Identified

The following provides a list of the key disadvantages related to the Clarington 01 site where mitigation measures will be required:

- Potential disadvantage with respect to the site's close proximity to Highway 401 and the vehicular emissions related to this transportation route;
- Potential does exist, as with most of the other sites, for the presence of species of conservation of concern;
- Site has a high potential for the presence of prehistoric and historic archaeological resources which is common for most properties located close to the lakeshore;
- Development of electrical infrastructure may be required to market electrical energy;
- Site requires extension of water and natural gas servicing which may require additional approvals; and,
- Haul route requires approximately 1.2 kilometres of roadway improvements.

8.10 Public and Agency Consultation on the Preferred Site

On September 25, 2007, the JWMG received the Consultant Team's recommendation on the preferred site and consequently, the public and agency consultation period began and was completed as follows:

- The Study Team's draft report and supporting documentation was released to the public and government review agencies for a period of 76 days starting on September 26, 2007 and ending on December 10, 2007.

- Notification was issued of the availability of the draft report by way of direct contact with the established public and government review agency list and by way of the website and local media for the general public.
- Copies of the draft documents were forwarded to the public and government agencies in the established contact lists and copies placed in the local libraries, municipal offices and on the study website for public review.
- Three (3) Public Information Sessions were held, two in Durham and one in York during October, 2007. These sessions were held to allow the public an opportunity to ask questions of the consultants and Regional staff. A total of 379 individuals attended these sessions.
- A telephone poll was conducted during December 2007, reaching individuals in Durham and York Regions to gauge awareness and opinions regarding building a Thermal Treatment Facility. Overall three-quarters agreed (strongly or somewhat) with building a Facility;
- Comments received during the draft report review period were documented and included in the final report on the Preferred Recommended Site to be submitted to both Regional Councils for approval. Comments were considered and addressed, as appropriate, during finalization of this report.
- Peer Review Consultants, working on behalf of Clarington, provided extensive comments on the Consultant Team's report, and their comments were addressed in the Consultation Summary Report on the Preferred Recommended Site.

Additional details regarding the public and agency consultation on the preferred site are provided in the Record of Consultation.

Generally, a variety of concerns were expressed that related to matters including the HHERA and the site evaluation process, consistent with those raised earlier in the siting process. The issues raised largely related to matters that were to be addressed during the more detailed assessment of the preferred Undertaking (preferred Site and Technology) as part of the site-specific technical study reports, or pertained to items that would be addressed/clarified in the EA document (e.g. consideration of zero waste).

An overview of key issues along with discussion as to how these issues were taken into consideration during the EA process is provided in Section 16, Table 16-7. Detailed responses to each of the comments raised at the public information sessions, are provided in the summaries/transcripts for each session which can be found in the Record of Consultation.

The net effect of considering and addressing many of the public and peer review comments received was to enhance the detail, readability and traceability of the EA final document. Based on the consideration of the comments received, the overall result of the evaluation process continued to be, the identification of Clarington 01 as the Study Team's Proposed Thermal Treatment Facility Preferred Recommended Site (the Site).

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Clarington 01 Site

Produced by Jacques Whitford under Licence with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2004-2008

- Courtice Water Pollution Plant
- Collector
- Expressway / Highway
- Railway
- Watercourse
- Clarington 01 Site

0 50 100 150

Metres - 1:7,500

1009497-054

Stantec

FIGURE NO.

8-30

Last Modified: June 10, 2009 By: S.Allen

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Section 9 has no figures.

Section 9 Summary

At the completion of the site identification phase of the EA Study, it was necessary to assess the potential environmental effects of a Proposed Thermal Treatment Facility (the Facility) located on the Proposed Thermal Treatment Facility Site (the Site). However, the major components of thermal treatment technologies are proprietary and can differ from vendor to vendor. As a result, it was necessary to proceed through a competitive public procurement process to identify and engage a vendor of the preferred thermal treatment technology.

To engage a vendor qualified and capable of providing for the design, construction and operation of the Facility, a two stage competitive process was utilized involving a Request for Qualification (RFQ) followed by a Request for Proposal (RFP). This process was conducted in parallel with the EA Study process.

Based on the submission evaluation process, five (5) proponents were pre-qualified to submit detailed proposals in response to the RFP.

On August 22, 2008 the RFP was issued to the five pre-qualified proponents. The RFP, which closed on February 19, 2009, resulted in four (4) submissions for the design, construction and operation of the Facility.

Based upon current best practices and considering the magnitude and complexity of the Project, the entire RFP process was subjected to rigorous due diligence rules and procedures consistent with common best practices applied by major provincial and federal infrastructure procurement agencies across Canada to ensure integrity and an ability to withstand any challenge regarding any impropriety.

The evaluation team assessed proposals on the basis of pre-approved evaluation criteria included in the RFP document that considered the technical, project delivery, cost, and commercial elements of the proposals.

Based on their consensus evaluation, the evaluation team unanimously recommended Covanta Energy Corporation (Covanta) as the preferred vendor. Negotiations between Covanta and the Regions are ongoing as of the date of submission of the EA. Some of the details relating to the vendor identification process remain confidential in accordance with standard public procurement practices and could not be included in the EA Study documents. In terms of the RFP process, Covanta not only achieved the highest aggregate score of any of the bidders, but also achieved the highest score in each of the three elements outlined in the RFP.

In accordance with the results of the RFP process, Covanta is to be the single source, full service contractor to design, permit, build, startup, commission and operate a Thermal Treatment Facility with an initial design capacity of 140,000 tonnes per year (tpy) that is expandable to a maximum design capacity of 400,000 tpy for the Regions. Covanta is the largest provider of thermal treatment services in North America with 35 operating facilities in the United States, including 24 that were designed and built directly by Covanta. The Covanta Team includes: Aecon Group, Inc. (Construction Services); Sigma Energy Solutions (Engineering); McMillan Associates (Architects); CH2M Hill (Environmental Consultant); and

Miller Waste Systems (Waste Disposal/Transportation). This team will be supplemented with additional expertise as required during the detailed design and construction processes.

9. Vendor Identification Process

At the completion of the site identification phase of the EA Study, it was necessary to assess the potential impacts of the Proposed Thermal Treatment Facility (the Facility) on the Proposed Thermal Treatment Facility Site (the Site). However, the major components of thermal treatment technologies are proprietary and can differ from vendor to vendor and as a result, in order to undertake these impacts assessments at a sufficient level of detail to support the EA, it was necessary to proceed through a competitive process to identify and engage a vendor of the preferred thermal treatment technology.

To engage a vendor qualified and capable of providing for the design, construction and operation of the Facility, a two stage competitive public procurement process was utilized involving a request for qualifications (RFQ) process, followed by a request for proposal (RFP) process. Both the RFQ and RFP documents were available to any interested members of the public. This two stage competitive process was conducted in parallel to, and separate from the EA Study process.

Stage 1: Request for Qualifications (RFQ)

As the first step in identifying the Preferred Technology Vendor, Durham and York solicited qualifications from technology vendors through the issuance of a RFQ. The information provided by respondents was used to identify the Qualified Respondents who were subsequently invited to submit proposals in response to a RFP.

Stage 2: Request for Proposals (RFP)

Following the completion of the RFQ stage, Qualified Respondents were invited to submit detailed proposals in response to a Request for Proposals for the design, construction and operating contract of the Facility. The Regions evaluated the detailed proposals received from the Qualified Respondents and recommended a preferred vendor to Durham and York Regional Councils. Staff then obtained authorization from the Regional Councils to proceed with the development and negotiation of a contract with the identified Preferred Technology Vendor.

The RFQ and RFP processes followed a “state-of-the-art” process that applied common best practices used by major provincial and federal infrastructure procurement agencies across Canada. This process included adherence to a strict anti-lobbying clause included within the documentation for both processes, which was also reported to Durham and York Regions, and local staff and Councils. Due diligence and communications were strictly monitored throughout both stages of the competitive process.

9.1 Stage 1: Request for Qualifications (RFQ) Process

In 2007, the Regions initiated the development of the RFQ. The procurement document was developed with input from the Regions’ technical, financial, procurement, and legal advisors each responsible for developing components of the procurement documents based on their areas of expertise. Once complete, and authorization had been received from Regional Councils to release the document, the RFQ was issued in July 12, 2007. Notification of availability of the RFQ was issued through a number of public sources including the Region’s website, the Durham/York study website, advertisements on procurement sites (e.g., Merx, Biddingo, etc.) as well as notification to industry and business associations. The following describes the vendor pre-qualification process.

9.1.1 RFQ – Proponent Submissions

The RFQ issued by Durham on behalf of both York and Durham, closed on October 11, 2007 (see **Appendix B** for the RFQ). Nine (9) respondents provided eleven (11) submissions for consideration as listed below (in no particular order):

- City of Amsterdam Entity of Afval Energie Bedrijf (Waste and Energy Company AEB);
- Dongara Pellet Plant LP; Algonquin Power Systems Inc.; MCW Light Heat Cool; The State Group;
- Veolia Environmental Services Waste to Energy Inc.; AMEC/Black & McDonald;
- Greey CTS Inc.; Entech – Renewable Energies P/L; HighPoint Financial Services Inc.; Aecon Construction Group Inc.;
- Covanta Energy Corporation;
- WRSI/DESC Joint Venture; Fisia Babcock Environmental GmbH; Kiewit Industrial Company; Morgan Stanley Biomass LLC; Babcock & Wilcox;
- ATCO Power Canada Ltd.; Thermoselect; Morrison Hershfield; EllisDon; Wabi;
- Wheelabrator Technologies Inc. (A Waste Management Company); and,
- Urbaser SA (3 submissions).

9.1.2 Evaluation of Submissions

Three (3) teams (procurement, financial and technical) composed of staff from both Regions and the consulting firms of Deloitte & Touche LLP, Jacques Whitford and GENIVAR, were assembled to evaluate the submissions. An independent third party fairness monitor and legal advisor were consulted as required during the evaluation process (see Section 9.1.2.6).

Subject to the approval of Durham Council and York Council, a RFQ Respondent was deemed to be a qualified respondent (“Qualified Respondent”) if its RFQ Submission:

1. Met all the mandatory criteria; and
2. Obtained the minimum grade of 60% on each of the following criterion:
    a. Criterion 1: Reference Facilities;
    b. Criterion 2: Thermal Treatment Facility;
    c. Criterion 3: References; and,
    d. Criterion 4: Financial Requirements.

All decisions on whether a RFQ Submission met the above two requirements were matters within the sole discretion of the evaluation committee to determine. The Regions reserved the right to request additional information from RFQ Respondents at any time(s) after the Closing Date, including during the evaluation stage, and to request that RFQ Respondents attend a clarification meeting(s). Only Qualified Respondents authorized by both Durham Council and York Council were invited to respond to a detailed RFP in the second stage of the procurement process.

RFQ Respondents were advised that any and all determinations and decisions made by, or on behalf of, the Regions relating to the RFQ and any RFQ Submissions, including whether the RFQ Submissions met the mandatory criteria and the extent to which scoring and points were awarded under rated criteria, were final and not open to appeal. The Regions reserved the right to permit a short cure period following the Closing Date during which any RFQ Submissions, which contained minor irregularities, could be corrected.

The RFQ Respondent was responsible to provide all information requested.

9.1.2.1 Evaluation of Mandatory Requirements

RFQ Respondents that met the following Mandatory Criteria proceeded to the evaluation of the Rated Requirements.

Mandatory Criterion 1: Successful Completion of Form 1: RFQ Submission Form

RFQ Respondents submitted a complete and signed Form 1: RFQ Submission Form.

Mandatory Criterion 2: Ability to Bond

The RFQ Respondent provided evidence of the ability to provide Bonding for an amount not less than $115 million, demonstrated by providing a letter of reference recently signed by a licensed surety that confirmed the capability of receiving such bonding from the surety.

9.1.2.2 Evaluation of Rated Requirements

RFQ Respondents were advised that the primary basis for the evaluation of the rated requirements was the degree to which the RFQ Submission demonstrated the ability to meet the stated criterion, as further defined below.

9.1.2.3 Technical Requirements

Three technical criteria were used in the evaluation: reference facilities, Thermal Treatment Facility, and references. The following describes the technical criteria used in the evaluation.

Criterion 1: Reference Facilities

Criterion 1 consisted of several measures that were used to assess RFQ submissions. These measures are described below:

1a) Capacity and Availability

Each of the Reference Facilities were required to be of the scope and nature of the Thermal Treatment Facility. A Reference Facility that was put forward for consideration must:

- Have utilized the Thermal Treatment Technology of the Proposed Facility (as declared in Form 1); and,
- Have a minimum total capacity of 150,000 tonnes of MSW per year; and,
- Be operating at the time of submission and be in full operation for at least two (2) consecutive years prior to the time of submission, with the most recent year operating at a minimum 90% annual availability (based on the total hours that the thermal processing line(s) operated divided by 8760 hours/year).

1b) Involvement of RFQ Respondent in Reference Facilities

RFQ Submissions were evaluated based on the extent to which the corporate team members declared in Form 1 were involved in the design, construction and operational phases of the Reference Facilities.

1c) Compliance and Mitigation Program for the Reference Facilities.

RFQ Submissions were evaluated based on the extent to which the Reference Facilities complied with regulatory requirements and the measures to mitigate potential impacts to the natural environment and human health.

1d) Description of Reference Facility Process and Operations

RFQ Submissions were evaluated based on the degree to which the process and operation of the Reference Facilities demonstrated a successful application of the Thermal Treatment Technology associated with the Proposed Thermal Treatment Facility (the Facility).

1e) Integration of Reference Facilities into Host Community

RFQ Submissions were evaluated based on the successful integration of the Reference Facilities into the host community (i.e., into the local area in which the facilities are sited).

Criterion 2: Thermal Treatment Facility

Criterion 2 consisted of several measures that were used to assess RFQ submissions. These measures are described below:

2a) Proposed Project Team

i) Related Corporate Experience of RFQ Respondent

RFQ Respondents were evaluated based on the extent to which the experience of the corporate team member was relevant to their proposed roles (as declared in Form 1), and demonstrated a record of success for that role.

ii) Organization of RFQ Respondent

RFQ Respondents were evaluated on the suitability of the organizational structure, and the degree to which the proposed structure demonstrated an ability to successfully undertake a project of the scope and magnitude of the Thermal Treatment Facility.

iii) Human Resources Capabilities

RFQ Respondents demonstrated the capability to provide human resources with the credentials and experience necessary to successfully undertake a project of the nature and scope of the Thermal Treatment Facility.

2b) Thermal Treatment Facility

Durham/York recognized that there may be technical differences between the Reference Facilities for which the RFQ Respondent had been responsible for designing, developing and/or operating and the Facility. These differences may be based on the RFQ Respondents' experiences and/or the differences between the residual municipal wastes that would be supplied by the Regions and the materials processed by the Reference Facilities. Criterion 2b)ii) was intended to allow RFQ Respondents to describe the concept that they would consider for the development of the Proposed Facility and to note differences between the Proposed Facility and their Reference Facilities.

Ability of Proposed Facility to Meet Objectives

RFQ Respondents demonstrated that the Proposed Facility would successfully meet the Objectives.

ii) Description of Proposed Facility

RFQ Respondents were evaluated on the extent to which the Proposed Facility would provide a reliable, proven, practical and effective, long term waste management solution.

Criterion 3: References

Criterion 3 consisted of several measures that were used to assess RFQ submissions. These measures are described below:

3a) References for Reference Facilities

RFQ Respondents were evaluated on the extent to which the references supported the information provided and demonstrated a track record of success.

3b) References for RFQ Respondents

RFQ Respondents were evaluated on the extent to which the references supported the information provided and demonstrated a track record of success.

9.1.2.4 Financial Requirements

Criterion 4 used in the evaluation of the RFQ involved financial considerations. Several measures were used to assess the financial requirements and these are described below.

Criterion 4: Financial Requirements

4a) Financial Condition

RFQ Respondents were evaluated on the extent to which they had the financial strength to construct and operate the Thermal Treatment Facility as proposed in the RFQ.

4b) Financial Capacity

RFQ Respondents were evaluated on the extent to which:

- They demonstrated the capacity to access a minimum of $75 million of capital per year over a two year period, in a timely manner for the purposes of meeting construction and financing obligations and ongoing operating requirements; and,
- Any known or committed projects would not impair their capability to meet an annual construction financing obligation of $75 million over a two-year period and ongoing quarterly operating requirements in the order of $2 million.

4c) Track Record of Experience

RFQ Respondents were evaluated on the extent to which they demonstrated a successful track record of historic borrowing for infrastructure projects that are of the scope and magnitude of the Thermal Treatment Facility (e.g., a minimum of $75 million of capital per year over a two-year period and ongoing quarterly operating requirements in the order of $2 million).

9.1.2.5 Failure to Comply

Failure to have complied with any mandatory requirements of this RFQ resulted in disqualification of a RFQ Respondent and/or the rejection of its RFQ Submission.

A summary of the Technical Requirements is provided below in Table 9-1.

Table 9-1 Scoring of Rated Criteria

Criteria	Max	Min to Qualify
Technical Requirements		
Criterion 1: Reference Facilities 1a: Capacity and Availability 1b: Involvement of RFQ Respondent in Reference Facilities 1c: Compliance and Mitigation Program for the Reference Facilities 1d: Description of Reference Facility Process and Operations 1e: Integration of the Reference Facilities into the Host Community		
Total for Criterion 1	100	60
Criterion 2: Thermal Treatment Facility 2a: Proposed Project Team 2a i: Related Corporate Experience of RFQ Respondent 2a ii: Organization of RFQ Respondent 2a iii: Human Resource Capabilities 2b: Thermal Treatment Facility 2b i: Ability of Proposed Facility to Meet Objectives 2b ii: Description of Proposed Facility		
Total for Criterion 2	100	60
Criterion 3: References 3a: References for Reference Facilities 3b: References for RFQ Respondent		
Total for Criterion 3	100	60
Financial Requirements		
Criterion 4: Financial Requirements Criterion 4a: Financial Condition Criterion 4b: Financial Capacity Criterion 4c: Track Record and Experience		
Total for Criterion 4	100	60

9.1.2.6 Fairness Monitor Review of RFQ Process

In February 2007, KPMG was retained to monitor from a fairness perspective the Regions' process to identify and qualify a number of respondents to the RFQ who would then be eligible to submit proposals to design, build and operate a Thermal Treatment Facility.

Prior to the release of the RFQ, a contingency of Regional councilors visited several Thermal Treatment Facilities in Europe and were accompanied by two staff member who were involved in the procurement process. KPMG indicated the involvement of these staff members in the tour did not constitute a fairness variance because the trip occurred before the issuance of the RFQ and the development of the RFQ was already in its final stages.

Prior to receiving submissions on October 11, 2007, the following took place:

- A process framework (the "RFQ Selection Framework") was developed, which documented the process to be followed in soliciting and evaluating statements of qualifications.

- Access to secondary level RFQ information (such as addenda to the RFQ, questions from potential respondents together with the answers from the Regions) was provided via the Region's website.
- A total of 102 potential respondents registered by placing themselves on the bidders list for the RFQ. Placement on the bidders list was not a mandatory requirement for submitting a response.
- Three addenda to the RFQ were issued and made available via the website.
- Questions and answers were posted to the website. As questions were received they were reviewed by a Question and Answer Team (the "Q&A Team") and distributed to technical and/or financial personnel to draft a proposed answer. Draft answers were reviewed by the Q&A Team for clarity, completeness and consistency. Questions and answers were then assembled periodically into question and answer sets, and posted to the website.
- On October 9, 2007, members of the teams formed to evaluate the RFQ submissions (the "Evaluation Teams") attended a briefing session, which provided an overview of the RFQ Selection Framework, and an opportunity to review any questions the members of the teams might have had regarding the evaluation.
- Detailed evaluation score sheets were developed by each of the Evaluation Teams prior to the review of submissions.

In accordance with the RFQ Selection Framework, all evaluation team members and advisors involved in the evaluation were required to review the submissions and confirm by completing a form that they had reviewed the RFQ submissions and either (i) do not have any relationships to declare or (ii) have relationships to declare, as detailed on that form. Additionally, they were required to confirm that they have read and agree to be bound by the RFQ Selection Framework document.

KPMG's role was solely that of an observer to the RFQ process. KPMG did not develop the RFQ or participate in the evaluation of submissions.

KPMG's work was based on the following:

- Discussions and meetings with the Region staff and advisors to discuss the RFQ documents, procurement process, evaluation and related matters;
- Review of the RFQ document prior to issue;
- Review of the evaluation process, including the RFQ Selection Framework, evaluation criteria and evaluation tools;
- Review of addenda, and questions and answers issued prior to the RFQ deadline;
- Review of clarification questions issued to the Proponents;
- Review of the evaluation reports;
- Review of the following:

- Evaluation of mandatory requirements
- Evaluation of technical submission
- Evaluation of the financial capacity

KPMG's Methodology to Assess Fairness

KPMG's approach to fairness monitoring was based on a set of fairness principles, developed by KPMG, which described the foundation of a fair process. These principles were developed based on KPMG's experience in conducting transaction and procurement processes and monitoring fairness. The fairness principles were discussed with the Region at the onset of process, and it was agreed that the fairness monitoring would be based on these principles:

1. All potential Proponents have the same opportunity made available to them to access information;
2. The information made available to Proponents should be sufficient to ensure that the Proponents have the opportunity to fully understand the opportunity;
3. All potential Proponents have reasonable access to the opportunity;
4. The criteria established in the invitation documents truly reflect the needs and objectives in respect of the project;
5. The evaluation criteria and the evaluation processes and procedures are established prior to the evaluation of submissions;
6. The evaluation criteria, invitation documents, and evaluation processes are internally consistent;
7. The pre-established evaluation criteria and evaluation process are followed; and,
8. The evaluation criteria and process are consistently applied to all submissions.

In applying these fairness principles, the following guidelines were used to help determine the fairness of the evaluation processes:

- **Variances** – A variance from the Fairness Principles is deemed to have occurred if a circumstance(s), situation (s) or event(s) occurs during the process that is addressed in a manner that is inconsistent with or departs from one or more of the Fairness Principles.
- **Violations – Individual Variances** – A violation from the fairness principles is deemed to have occurred if an individual variance is deemed to have resulted in a process where one or more Proponents(s) (potential, successful or unsuccessful) enjoyed a material advantage over any other or conversely, was subject to a material disadvantage and the material advantage or disadvantage affected the results of the process. If so, a *violation* of the Fairness Principles would have occurred and, consequently, the overall process would be deemed to be unfair in that respect.

- **Violations – Collective Variances** – A violation from the fairness principles is deemed to have occurred if individual variances, when considered collectively, resulted in a process where one or more Proponent(s) (potential, successful or unsuccessful) enjoyed a material advantage over any other or conversely, was subject to a material disadvantage and the material advantage or disadvantage affected the results of the process. If so, a *violation* of the Fairness Principles would have occurred and, consequently, the overall process would be deemed to be unfair in that respect.

Conclusions

KPMG indicated in a letter to Regional staff containing the above information that KPMG was satisfied the RFQ process was fair to all proponents.

9.1.3 Recommended Short List of Pre-Qualified Proponents

Based on the submission evaluation process described above, the following five (5) proponents (listed in no particular order) were pre-qualified to submit detailed proposals in response to the RFP:

- Veolia Environmental Services Waste to Energy Inc.; AMEC/Black & McDonald;
- Covanta Energy Corporation;
- WRSI/DESC Joint Venture; Fisia Babcock Environmental GmbH; Kiewit Industrial Company; Morgan Stanley Biomass LLC; Babcock & Wilcox;
- Wheelabrator Technologies Inc. (A Waste Management Company); and,
- Urbaser SA.

9.1.4 Confirmation of Preferred "Alternative to"

As discussed in Section 7.8.1 the determination of System 2a versus System 2b would be left to the RFQ/RFP process. The completion of the RFQ process advanced the understanding of the preferred technology to a point where the preferred system/technology had been identified. Through the RFQ process it was determined that only vendors offering a System 2a alternative met the minimum qualifications requirements and therefore it was determined, prior to the release of the RFP, that the preferred "Alternative to" was System 2a. In other words, all potential vendors qualified through the RFQ process were providing the same technology and were provided the opportunity to prepare proposals to a technical standard that would ensure a "best-in-class" facility. This technical standard specified in the RFP, ensured all bidders meeting the minimum requirements would be designing and building a facility capable of meeting or exceeding all regulatory requirements in the Province of Ontario at a minimum.

The technical specifications provided in the RFP were prepared to ensure consistency with the results of the "Alternatives to" evaluation and the RFQ but were also prepared to a level of detail to ensure all vendors would be building a very similar facility consistent with the findings of the EA and the commitments made to date in the process. The RFP was strictly utilized to obtain more detailed design and price proposals.

9.2 Stage 2: Request for Proposals (RFP) Process

York and Durham Regional Councils authorized the issuance of the RFP to the pre-qualified proponents listed above on August 22, 2008 (see **Appendix B** for a copy of the RFP).

The original closing date for submissions of January 15, 2009 was extended to February 19, 2009 to accommodate the vendors who had expressed the need for additional time due to the complexity of the project.

On February 19, 2009 responses were received from the following four proponents:

- Covanta Energy Corporation;
- Green Conversion Systems LLC (formerly WRSI/DESC Joint Venture; Fisia Babcock Environmental GmbH; Kiewit Industrial Company; Morgan Stanley Biomass LLC; Babcock & Wilcox);
- Wheelabrator Technologies Inc. (A Waste Management Company); and,
- Urbaser SA.

Veolia Environmental Services Waste to Energy Inc.; AMEC/Black & McDonald did not submit a proposal in response to the RFP citing economic risks as the primary decision making factor.

9.2.1 Overview of Unsuccessful Submissions Received

The following provides an overview of the unsuccessful submissions received in response to the RFP. The successful bidder, Covanta Energy Corporation is discussed in detail in Section 10 of this EA document. In order to maintain the fairness of the procurement process and to uphold the duty of confidentiality owed to all proponents, the proprietary technical, financial and commercial information contained within said proposals cannot be disclosed. Until a final Project Agreement is executed with Covanta Energy Corporation, the RFP procurement process is ongoing. To disclose information regarding the evaluation of the proposals submitted would be prejudicial to the successful conclusion of the RFP.

9.2.1.1 Vendor A

Vendor “A’ has proposed to develop and operate a single line 426 tonne per day (140,000 tpy) mass burn thermal processing line to process the Regions’ residual waste.

I. Technical Description

a. Waste Receiving, Handling and Storage

The waste receiving, handling and storage design proposed has the following features:

- Two overhead cranes that are sized for the 250,000 tpy facility as required by the Technical Requirements.

- An enclosed tipping floor and truck tipping bays with roll up door system.
- An enclosed waste storage pit sized for four (4) days capacity at the 250,000 tpy expansion facility, as required by the Technical Requirements.
- During normal operations, Odour on the tipping floor will be controlled by a ventilation system that will draw air from above the waste storage pit to maintain negative air pressure when the tipping floor truck roll-up doors are open. The air drawn from the tipping floor will be directed to the combustion unit to be used as combustion air.

b. Furnace/Boiler Design

- Waste will be fed to a single reciprocating water-cooled stoker grate sized to thermally process residual waste at an average waste higher heating value (HHV) of 13 MJ/kg, as required by the Technical Specifications.
- Based on the firing diagram provided, the design MCR heat input is 231 GJ/hr (64.1 MW). This heat input can be maintained while firing waste with an HHV range between 12.3 and 15 MJ/kg.
- Proponent did not include the required technical data in Form 5 of the RFP at the Temporary Overload (TOL) or Maximum Continuous Turndown (MCTD) conditions.
- Proponent has guaranteed a processing line/boiler availability of 93.5%.
- Waterwall construction is used and the boiler is integral with the furnace. The boiler system consists of four (4) vertical passes, operating at typical steam conditions for an EFW boiler.
- Flue gas recirculation (or "FGR") has been proposed for this facility. FGR involves taking a portion of the flue gas after it has passed through the flue gas treatment system and re-injecting it into the furnace section of the boiler. The use of FGR reduces the amount of excess ambient or fresh air needed to complete the combustion process.

c. Flue Gas Treatment Design

- The Flue Gas Treatment (FGT) system proposed includes (in the order the equipment is arranged in the facility from the waste feed chute to the stack):
  - Selective Non-Catalytic Reduction (SNCR) system with aqueous urea injection for NOx control;
  - powdered activated carbon (PAC) injection for mercury and dioxins control;
  - a dry scrubbing system for acid gas control;
  - and a fabric filter baghouse for particulate and heavy metals removal.
- Proponent has guaranteed to meet the Regions' air emissions limits in the RFP and Technical Requirements.

- Proponent has included a dedicated continuous emissions monitoring system and dioxin sampler as required by the Technical requirements. However, proponent did not include a continuous analyzer to measure hydrogen chloride (HCl) emissions at the stack as required.

d. Energy Recovery

i. Electricity Generation

- Proponent has proposed a turbine-generator (T-G) set with a nameplate capacity of 15 MW (final design to be determined).
- Proponent provided gross and net Electricity Production Guarantees as required in Form 4 of the RFP.
- An air cooled condenser (ACC) has been proposed as the steam condenser cooling method.
- Proponent did not provide the required electrical connection details from the onsite switchyard to the 44kV line located on the east side of Osbourne Road.

ii. District Heating Capability

- Proponent has provided a plan for the use of thermal energy in a future district energy system including an extraction Turbine-Generator capable of providing low pressure steam and a thermal load of 7.4 MW, as well as physical space for the heat exchangers, pumps and other equipment as required by the RFP and Technical Requirements.
- Proponent provided gross and net Electricity Production Guarantees in Form 4 of their proposal that reflect the impact on the T-G electrical efficiency of providing up to 7.4 MW of thermal energy to the future district energy system.

e. Residue Handling

- Proponent is proposing to separate the bottom ash and grate siftings from the boiler and FGT fly ash as required by the Technical Requirements.
- Proponent will meet the Residue Quality Guarantee of less than 3% unburned combustible matter and 25% moisture in the bottom ash, and the Residue Quantity Guarantee of 30% Total Residue.
- Bottom ash and grate siftings will be quenched in a water bath before being transferred by a series of vibrating pan and belt conveyors to the Residue Storage Building. Proponent has provided sufficient storage for up to four days of bottom ash storage for the 250,000 tonne/year facility, as required by the Technical Specifications.

- No re-use of bottom ash is specified in the proposal. There is mention of using bottom ash as alternate daily cover in an unspecified landfill, but no details are provided.

- Fly ash will be collected, combined and conveyed via drag chain conveyors to an air tight steel storage silo. The fly ash will be wetted down and mixed in a pug-mill mixer. Lime may also be added to the pug mill, if necessary, to aid in stabilizing the fly ash. The treated fly ash will be discharged into open-top containers stationed below the pug-mill mixer before tarping and shipping to an unspecified non-hazardous landfill. It should be noted that the Proponent has limited experience with the proposed fly ash stabilization process. No indication was provided that the MoE will accept this stabilization process.

f. Balance of Plant

- Proponent has proposed a Zero Water Discharge Facility in accordance with the Technical Requirements. No discharge, other than from sanitary wastewater sources, will be sent to the Courtice Water Pollution Control Plant (WPCP).

- The source of boiler make-up water will be potable city water that will pass through a single-pass reverse osmosis (RO) system to remove suspended solids.

- Proponent took exception to including a back-up diesel generator in their proposal as required by the Technical Requirements. As an alternative, Proponent has proposed to install a battery powered UPS system to safely shutdown the facility in the event of a loss of power. The turbine has also been designed to shed load and continue processing waste in the event the utility tie is lost. In the event of a prolonged outage, Proponent proposes to rent a generator to supply power to the plant.

- Proponent is supplying two 100% electric-driven boiler feedwater pumps in their facility design versus one electric-driven pump and one steam-driven pump as required in the Technical Requirements. Proponent stated that the use of two electric-driven pumps will still meet boiler code and all applicable insurance requirements.

- Proponent provided a detailed Noise Management and Control Plan in their proposal.

- The proposed design provides for the recovery of ferrous and non-ferrous metals as required by the Technical Requirements.

g. Expansion Capability

- Proponent has sized the utilities (water, sewer, gas, electric) for the ultimate 400,000 tonne/year facility as required by the Technical Requirements.

- Proposal provides for the expansion of the processing capacity of the facility in two phases: 1) Expansion by 110,000 tpy to increase capacity from 140,000 tpy (or base facility) to 250,000 tpy; and 2) Expansion by 150,000 tpy to increase capacity from 250,000 tpy to 400,000 tpy. The conceptual layout of the two expansions indicates that process interruptions should be minimal. The waste storage pit has been designed for four days storage at the 250,000 tpy facility capacity, and includes a knockout-wall for the expansion to 400,000 tpy.

- The conceptual design drawings provided indicate that an additional stack may be required for the expansion of the facility from 250,000 tpy to 400,000 tpy.

h. Innovation

- Proponent identified the use of a water-cooled combustion grate as a major innovation in their proposal. The use of the water-cooled grates in the higher temperature zones of the combustion unit may offer the following benefits:

  a. Increased service life of the grate bars;
  b. Optimized use of combustion air for completing combustion and burnout;
  c. Heat from the water cooling loop is recovered in an heat exchanger increasing energy efficiency; and
  d. May minimize CO and NOx formation in the flue gas.

i. Operation and Maintenance

- Proponent has provided a generic narrative for their Operations and Maintenance Plan that outlines their Key Operating Principles for the proposed facility. The proposal includes a preventative maintenance schedule and costs associated with the refurbishment and/or replacement of some facility equipment, but the list provided is limited to mostly on-site mobile equipment (e.g. loaders) and not major processing equipment.
- Proponent indicates in their proposal that a computerized maintenance monitoring system (CMMS) will be incorporated in the design to track preventative and major maintenance at the facility. The proposal does not cite the product name of the CMMS that will be used.
- Proponent provides a Communication and Community Relations Plan in their proposal. This Plan outlines their public education strategies, as well as how they will handle public complaints/concerns

j. Construction and Permitting Plan

- Proponent has provided a guaranteed construction schedule of 1,308 days (or approximately 3 years and 7 months).
- The proposed Early Works Schedule is very detailed and provides estimated timelines for a large number of other permit approvals (not just air and solid waste), as well as a schedule for their involvement in the EA process. This schedule implies that it will take

less than 12 months to prepare, submit and obtain approval for the Certificate of Approval for air and noise.

- The construction schedule provided appears to be reasonable, but lacks sufficient detail to determine whether there is contingency built into the schedule to handle delays or upsets during the construction, commissioning and start-up phases of the project.

II. Conclusions

Proponent has provided detailed technical and environmental proposals that are generally in compliance with the Technical Requirements of the RFP and generally accepted industry practices. The Proponent and its technology partner have extensive experience in the design, engineering, construction and operation of waste processing facilities in the U.S. and Europe. There are concerns that the Performance Guarantees offered in the proposal for throughput capacity and electricity production are limited to a very narrow range of waste HHVs, and any deviation from the assumed design HHV of 13 MJ/kg will result in a significant adjustment or reduction to the stated guarantees. Proponent has not provided substantial detail in their Operations and Maintenance Plan regarding scheduled preventative and major maintenance, but the information that was provided is consistent with generally accepted EFW industry practices. The Project Schedules provided are detailed, but some of the timelines (i.e. CofA permitting) are probably overly optimistic or lack contingency to adjust for schedule upsets.

The following Table 9-2 provides an overview of the vendors ability to meet the RFP general design and operating requirements.

Table 9-2 Vendor A – General Design and Operating Requirements

General Design and Operating Requirements		Response	Comments
1.0	The Company has offered equipment of a design, type and arrangement that meets the experience and technical requirements of the RFP, and a base-line Facility capable of processing MSW up to a guaranteed initial processing rate of 140,000 tonnes per year (426 tonne/day @ 13 Mj/kg)?	Yes	Vendor has offered a facility that features single (1) processing line capable of processing up to 436 tpd of the Regions' residual waste at a average waste HHV of 13 MJ/kg.
2.0	Proposal includes short-term expansion capabilities for processing an additional minimum 110,000 tonnes per year, and an ultimate capacity of 400,000 tonnes per year?	Yes	
3.0	Bid includes either a single (e.g. 1 x 426 tonnes per day) or dual line system (e.g. 2 x 213 tonnes per day)	Yes	Vendor has proposed a single (1) 436 tpd processing lines (or approx. 1 x 18 Mg/hr)

General Design and Operating Requirements		Response	Comments
4.0	Each chute-to-stack system will maintain or exceed 90% availability (i.e. the amount of time the unit will actually be available to process waste versus the number of hours in the year)?	Yes	Vendor has guaranteed an overall facility availability of 93.5% (or ~9,190 hrs/yr)
5.0	Facility will be designed to be a zero wastewater discharge facility?	Yes	Process or contact water only. Non-contact water (e.g. cooling tower blowdown, etc.), stormwater and sanitary cited as exceptions that will be sent back to the headworks of the WPCP.
6.0	Minimum design useful life of the Facility is thirty (30) years?	Yes	
7.0	Proposal includes a plan/capability to satisfy the future district energy demands of the Clarington Energy Park and the Courtice WPCP?	Yes	Vendor has proposed an extraction/condensing steam turbine generator capable of providing up to 12.2 Mg/hr of medium pressure steam for the future hot water DH system.
8.0	Facility proposed will be operational by the end of 2013 (assuming a Jan. 1, 2010 start date)?	Yes	Vendor has proposed a 1,308 day (~ 3.6 years) construction schedule, which would meet the 2013 requirement assuming an early 2010 start date.
9.0	Units capable of operating at a maximum continuous turndown (MCTD) point of 75% or better?	Yes	
10.0	Proposal satisfies the minimum Air Emission Criteria outlined in Appendix C-2 in the RFP and Table 4-1 of the Technical Requirements?	Yes	Vendor has proposed emission limits that MEET the requirements of the RFP.
11.0	Proposal complies with the Facility Expansion Capability Requirements outlined in Section 4.4 of the Technical Requirements? If not, what exceptions have been taken?	Yes	
12.0	Are all utilities (i.e. water, sewer, gas, electric) sized for the ultimate facility capacity of 400,000 tonnes per year?	Yes	
Structural/Civil Design Requirements			
13.0	Does the proposal include a detailed layout of the proposed Facility, including: dimensionally defined layout of buildings and critical equipment; defined area for future expansion; and a clearly defined area for the future district energy system?	Yes	A single Site Plan was provided that also indicates the location of the expansion units. No general arrangement drawing provided for the turbine-generator area
14.0	Does the proposed facility include a totally enclosed maneuvering and tipping area, a totally enclosed processing building, a totally enclosed boiler building, a totally enclosed turbine area, a totally enclosed air pollution control equipment area, a totally enclosed ash handling building, and a totally enclosed administration and maintenance area?	Yes	

General Design and Operating Requirements		Response	Comments
15.0	Is the pit storage area, pit walls, bay framing totally enclosed with reinforced concrete?	No	Open structural steel provided above the pit and tipping floor areas.
16.0	Does the site access roads and tipping floor entrance have sufficient space to accommodate on-site queuing of the anticipated waste delivery vehicles during peak delivery times for full expanded facility (1,218 tonnes per day)?	Yes	
17.0	Are all main building enclosures a minimum of 30 meters set back from the property line?	Yes	
Architectural Design Requirements			
18.0	Has the Proposer provided colour renderings (4 minimum per submission) and key site plan, material sample boards, and description of treatment material types and finishes that depict the actual proposed architectural treatment for the facility?	Yes	
19.0	Has the vendor provided a minimum of 5 offices (minimum 14 square meters each in size) for the Regions' staff and MoE staff?	Yes	
20.0	Does the proposed facility design include a Visitor Education Centre capable of holding up to 100 people?	Yes	
21.0	Has a central control room been provided in the proposal?	Yes	
Mechanical/Equipment Design Requirements			
A. Solid Waste Handling			
22.0	Is the tipping floor designed for a minimum of four (4) days storage at the expanded Facility capacity of 250,000 tonnes per year (or minimum storage of 2,740 tonnes)?	Yes	
23.0	Tipping Floor slab is reinforced concrete with a 80 mm thick minimum wear layer of high strength unreinforced concrete	Yes	
24.0	Does the tipping bay have individual tipping bays and tipping bay doors?	Yes and No	Tipping bays available for up to six (6) waste delivery vehicles. Unclear if individual tipping bay doors were provided.
25.0	Has an odour control plan been provided in the proposal?	Yes	
26.0	Does the proposal include at least two (2) refuse cranes capable of handling solid waste ranging in density from 180 to 500 kg/cubic meter?	Yes	

General Design and Operating Requirements		Response	Comments
27.0	Pulpit designed for full hopper viewing and sized to accommodate a minimum of two crane operators and control consoles and allow operation of all cranes at the same time.	Yes	A separate crane pulpit was not provided. The crane pulpit will be located in the control room, which is an accepted industry practice.
B. Combustion System			
28.0	Has the furnace been designed to provide at least a one second retention time at an incineration temperature of 1000^{o}C in the combustion zone (measured from the final combustion air injection port)? Has the Proposer proposed a method to continuously monitor and record the temperature in the furnace?	Yes	Referenced in Proposal that design complies with requirements - no specific protocol or calculations provided as back-up.
29.0	Has the Proposer provided a firing diagram that at a minimum shows the acceptable operating range of the proposed grates over the range of waste HHVs and throughputs?	Yes	
30.0	Has the Proposer provided refractory or inconel cladding in the furnace section that extends upward from the grate to the top of the fireball?	Yes	
31.0	Auxiliary burners provided are of a low NOx design and capable of preheating the furnace to 1,000^{o}C during boiler start up?		Does not specify whether Low NOx Burners are used.
32.0	Is the maximum gas velocities through the furnace and the convection sections of superheater and economizer 6.0 m/sec?	Yes	Max gas velocity = 5.1 m/s.
33.0	Minimum and maximum steam pressures are between approximately 4 MPa and 6 MPa?	Yes	Boiler design is 6 Mpa.
34.0	Minimum of 800 mm between each superheater section?		Insufficient detail
35.0	Maximum continuous rating (MCR) of 426 tpd @ 13 Mj/kg?	Yes	
36.0	Does each proposal include a minimum of one underfire air fan, one secondary air fan or overfire air fan, and one induced draft fan that are equipped with variable frequency drives (VFDs)?	Yes	All three fans include VFDs.
C. Air Pollution Control Equipment			
37.0	Has the Proposer guaranteed emission levels equal to or less than the values listed in Appendix C-2 of the RFP and Table 4-1 of the Technical Requirements?	Yes	Vendor has guaranteed to MEET the Regions' RFP requirements.

General Design and Operating Requirements		Response	Comments
38.0	Has the Proposer provided a means of reducing acid gases, NOx control, mercury and dioxin control, and a high efficiency particulate collection system?	Yes	
39.0	Has the Proposer provided continuous emissions monitors as required in the Technical Requirements, including a continuous dioxins sampling system?	Yes	
40.0	Is the minimum flue gas temperature exiting the acid gas scrubber 150^{o}C?	Yes	
41.0	If a pulse jet type baghouse is proposed, is the net air-to-cloth ratio no greater than 1.2:1 m/min under the maximum flue gas flow conditions w/ one module offline?	Yes	
42.0	If a reverse air type baghouse is proposed, is the net air-to-cloth ratio no greater than 0.6:1 m/min under the max flue gas flow conditions with one module offline?	No	Not applicable.
43.0	Does the baghouse proposed include a filter bag leak detection system?		Continuous Opacity monitor and pressure drop monitoring included in lieu of a bag leak detection system.
44.0	Is the stack designed for an exit gas velocity (each flue) of 15-18 meters per second?		Not specified in original proposal. Clarified in follow-up letter.
D. Ash Handling System			
45.0	Does the proposed facility include separate collection of bottom ash and fly ash (i.e. boiler ash and air pollution control fly ash)?	Yes	Bottom ash handled separately from Fly ash
46.0	Is the system designed for a minimum number of transfer points?	Yes	
47.0	Is the bottom ash building designed for a minimum of four (4) days storage for 1,218 tonne per day facility?	Yes	
48.0	Proposer has furnished two (2) 50% capacity fly ash storage silos with a combined storage capacity for four (4) days at 761 tonne/day?	Yes	
49.0	Has the vendor provided a ferrous and non-ferrous recovery system capable of at least 80 percent recovery of all material greater than 2.5 cm and less than 15 cm?	Yes	
E. Power Generation			
50.0	Has a regenerative cycle turbine with multiple extractions for in-plant usage been provided that is designed to accept all of the steam produced by the Facility at MCR?	Yes	Single extraction point - extraction
51.0	Have Energy balances been provided for all boilers at MCR (426 tonnes at 13 MJ/kg)?	Yes	

General Design and Operating Requirements		Response	Comments
52.0	Does the turbine-generator has a design backpressure of 127 mm Hg or less at all outdoor ambient dry bulb temperatures?	Yes	
53.0	Does the design package include the necessary provisions and space to incorporate a future district heating system, including an overview of the proposed concept to recover thermal energy and an implementation plan describing the plant modifications and equipment required for the future district heating system?	Yes	
54.0	Does the proposed Facility have a means of dumping steam while continuing to process MSW @ MCR?	Yes	Bypass provided.
55.0	If a alternative cooling system is proposed, has the vendor proposed a vapor plume abatement type cooling system?		Not applicable.
56.0	Design assumes that the make-up water requirements for the alternative cooling system will be supplied by effluent water from the nearby Courtice WPCP		Not applicable.
57.0	Has at least one (1) 100% capacity electric feed pump and one (1) 100% steam driven feed pump to supply feed water at plant MCR been provided?	No	Two (2) 100% electric feed pumps provided.
58.0	Have two (2) 100% or three (3) 50% base Facility capacity vertical turbine canned condensate pumps, motor drives, and associated accessories been provided?	Yes	Two (2) x 100% pumps
59.0	Have a minimum of two (2) full capacity air compressors w/ aftercoolers, two (2) air receivers, one (1) air dryer w/ bypass capabilities, and associated accessories been included in proposed design?	Yes	
60.0	Has a complete, automated electronic inbound & outbound scale system been included?		Not specified
Electrical And I&C Design Requirements			
61.0	Does the proposed design utilizes VFD's on the FD, ID, ACC (if applicable) and SA fans?	Yes	FD/ID and SA fans included with VFD. Not specified whether VFDs included for ACC fans.
62.0	Does the proposal include all system metering, controls, and protection required by Hydro One and this independent system operator?	No	Vendor has taken exception to this requirement of the RFP on the grounds that sufficient detail regarding Hydro One's requirements are not known at this time.

General Design and Operating Requirements		Response	Comments
63.0	Has a 44 kV transmission line between the Facility step up substation and Hydro One interconnection point been included?	No	Vendor has taken exception to this requirement of the RFP on the grounds that sufficient detail regarding Hydro One's requirements are not known at this time.
64.0	Does the generator design provided meet the specifications listed in section 9.8 of the Technical Requirements?	Yes	
65.0	Is the instrumentation and control system for all equipment integrated into a DCS?	Yes	
66.0	Has a real time display of Facility emissions been furnished in the proposed design?	Yes	

* Proposer may propose conditions other than these, subject to the Regions' approval. For any deviations, the Proposer shall have demonstrated operating experience at the proposed conditions and provide information on facilities that utilize the proposed technology.

9.2.1.2 Vendor B

Vendor 'B' has proposed to develop and operate a single line 426 tonne per day (140,000 tpy) mass burn thermal processing line to process the Regions' residual waste.

III. Technical Description

a. Waste Receiving, Handling and Storage

The waste receiving, handling and storage design proposed has the following features:

- A circular waste receiving building, tipping floor and waste storage pit has been proposed. This arrangement requires the use of stacked cranes where two separate cranes operate on their own dedicated set of rails with one crane running underneath the other crane. This crane arrangement is not typical and results in higher capital and operating costs, as well as potential operating issues due to potential crane collisions and refuse build-up on the lower crane. Proponent did not provide a detailed description of the crane operations in their proposal.
- An enclosed tipping floor with up to six tipping bays for waste delivery vehicles has been proposed;
- The circular waste storage pit is 22 meters in diameter and 15 meters deep, and has been sized for four (4) days capacity at the ultimate facility capacity of 400,000 tpy (or approximately 4,100 tonnes). The waste pit is very deep which will increase capital costs initially, but should also reduce costs and the impact on facility operations during the facility expansions;
- During normal operations, Odour on the tipping floor will be controlled by a ventilation system that will draw air from above the waste storage pit to maintain negative air pressure when the tipping floor truck roll-up doors are open. During prolonged

shutdowns of the single processing line, the Proponent has proposed to bale and wrap the incoming waste to prevent the escape of odours.

b. Furnace/Boiler Design

- Waste will be fed to a single reciprocating water-cooled stoker grate sized to thermally process residual waste at an average waste higher heating value (HHV) of 13 MJ/kg, as required by the Technical Specifications.
- Proponent has guaranteed a processing line availability of 90%.
- The proposed design can process waste across the range of waste HHVs specified in the Technical Requirements (11-15 MJ/kg). The firing diagram provided shows that the design MCR heat input is 234 GJ/hr (65 MW) for the single unit. This heat input can be maintained by the unit while firing waste over a range of 12.1 to 15 MJ/kg.
- Proponent has stated that the proposed design will allow for a one (1) second residence time at 1,000oC from the last air injection point.
- Waterwall construction is used and the boiler is integral with the furnace. The boiler consists of three vertical passes, a horizontal convective pass and a vertical economizer pass.
- The proposed steam conditions (53 bar (5 MPa) and 400oC) are typical for similarly designed EFW facilities.

c. Flue Gas Treatment Design

- The Flue Gas Treatment (FGT) system proposed includes (in the order of the equipment's arrangement in the facility from the waste feed chute to the stack):
    - Selective Non-Catalytic Reduction (SNCR) system with aqueous ammonia injection for additional NOx control;
    - powder activated carbon (PAC) injection for mercury and dioxins control;
    - a venturi dry injection scrubbing device for acid gas control;
    - and a fabric filter baghouse for particulate and heavy metals removal.

- The proposed venturi dry injection scrubber system proposed requires the use of dry hydrated lime ($Ca(OH)_2$), which is slightly more expensive than (CaO). However, the use of lime may be maximized by recirculating the fly ash and lime back into the venturi scrubber as proposed. The venturi scrubber is operated in a completely dry mode with no temperature reduction or humidification, which could reduce the devices ability to effectively reduce acid gas emission spikes during normal operations. Proponent has provided a list of eight reference plants that utilize a similar dry scrubbing device. It should be noted that three of these reference facilities contain a reactor that is likely used for temperature reduction and humidification, and the remaining five facilities have not operated for longer than 10 years. No detailed emissions or compliance data for these reference facilities was provided.

- Proponent has included a dedicated continuous emissions monitoring system and dioxin sampler as required by the Technical requirements. In addition, the proposal includes an in-situ analyzer for the continuous measurement of particulates, as well as continuous monitors for organic matter and hydrogen fluoride (HF)

d. Energy Recovery

i. Electricity Generation

- Proponent has proposed a turbine-generator (T-G) set with a nameplate capacity of 15.5 MW.
- Proponent only provided Electricity Production Guarantees for net electricity production in Form 4 of the RFP.
- An air cooled condenser (ACC) has been proposed as the steam condenser cooling method.
- In accordance with the Technical Requirements, Proponent provided the physical equipment required for the electrical interconnect with Hydro One.

ii. District Heating Capability

- Proponent has provided a plan for the use of thermal energy in a future district energy system as required by the RFP and Technical Requirements. Proponent has included an extraction T-G capable of providing approximately 16.3 Mg/hr of medium pressure steam and a thermal load of 7.4 MW for the future district energy system, as well as physical space for the heat exchangers, pumps and other required equipment, as required by the Technical Specifications.
- Proponent provided Electricity Production Guarantees in Form 4 of their proposal that reflect the impact on the T-G electrical efficiency of providing up to 7.4 MW of thermal energy to the future district energy system.

e. Residue Handling

- Proponent is proposing to keep the bottom ash and grate siftings separate from the boiler and FGT fly ash as required by the Technical Requirements.
- Proponent will meet the Residue Quality Guarantee of less than 3% unburned combustible matter and 25% moisture in the bottom ash, and the Residue Quantity Guarantee of 30% Total Residue.
- Bottom ash and grate siftings will be quenched in a water bath before being transferred by a series of vibrating pan and belt conveyors to the Residue Storage Building. Proponent has provided sufficient storage for up to four days of bottom ash storage for the 250,000 tonne/year facility, as required by the Technical Specifications.

- Proponent proposes to transport bottom ash (total quantity of 22,646 tpy) by rail to a US based landfill. The details of the rail haul agreement are not finalized.
- Fly ash from the convective passes of the boiler and the FGT equipment will be collected, combined and conveyed to air tight storage bins. The fly ash will be stabilized by mixing it with Portland Cement. The stabilized fly ash will be stored in the Residue Storage Building for transport via rail to a non-hazardous landfill in the US. It is unknown whether the MoE or the US Environmental Protection Agency will accept the treated fly ash as a non-hazardous material, or what additional testing requirements they may enforce to demonstrate compliance.

f. Balance of Plant

- Proponent has proposed a Zero Water Discharge Facility in accordance with the Technical Requirements. No discharge, other than sanitary sewer uses, will be sent to the Courtice Water Pollution Control Plant (WPCP).
- Proponent has proposed to use effluent water from the WPCP as process water make-up. The proposal includes an on-site water treatment facility that consists of an ultrafiltration unit (or UF), reverse osmosis system, and electro de-ionization unit (or EDI) to treat effluent to boiler make-up quality standards.
- Proponent provides a description of the noise attenuation methods that will be incorporated into the facility design, including: silencers on boiler safeties; acoustic attenuation on the induced draft fan; and other equipment modifications to reduce noise. In addition, Proponent has proposed a baseline noise study prior to facility construction and an on-going noise monitoring program during operations.
- The proposed design provides for the recovery of ferrous and non-ferrous metals as required by the Technical Requirements. It appears that a belt magnet has been provided as opposed to a drum magnet as preferred in the Technical Requirements.

g. Expansion Capability

- Proponent has sized the utilities (water, sewer, gas, electric) for the ultimate 400,000 tonne/year facility as required by the Technical Requirements.
- The proposal provides for the expansion of the processing capacity of the facility in two phases: 1) Expansion by 110,000 tpy to increase capacity from 140,000 tpy (or base facility) to 250,000 tpy; and 2) Expansion by 150,000 tpy to increase capacity from 250,000 tpy to 400,000 tpy. The design concept allows for phased expansion of facility with minimal disruption to existing operations. As noted previously, the circular waste storage pit is sized for the ultimate facility capacity of 400,000 tpy.
- The conceptual design drawings provided indicate that each additional processing line will have a dedicated stack (or three (3) individual stacks total for the 400,000 tpy facility).

h. Innovation

- Proponent has proposed a water treatment system that consists of UF and EDI units that will allow for use of effluent from the WPCP to meet the process water requirements of the facility. The use of effluent for make-up water, particularly boiler make-up water, will significantly reduce the potable water requirements of the proposed facility. This innovation will help reduce facility operating costs.

i. Operation and Maintenance

- Proponent has provided some generic detail in their Operations and Maintenance Plan for the proposed facility. However, the lack of specific detail for many of the major equipment/components of the facility does not meet generally accepted industry standards. In addition, the detail provided in their life cycle and rehabilitation plan is inadequate.
- Proponent has proposed to operate the facility over four (4) six-hour operating shifts versus the normal three eight-hour or two twelve-hour shifts for these types of facilities. This may increase the risk for operational upsets that could occur during a shift change-over due to minor adjustments made by the new operator, or due to extra focus on "turning the plant over" rather than monitoring operating conditions carefully.

j. Construction and Permitting Plan

- Proponent has provided a guaranteed construction schedule of 1,446 days (or approximately 4 years).
- The proposed Early Works Schedule acknowledges all applicable provincial and municipal approvals, and provides adequate approval for the EA process. The Permitting Plan assumes that the air, noise and waste permitting process will take approximately two years from start to finish, which is a reasonable assumption.
- The construction schedule implies that construction will commence before the issuance of the Certificate of Approval or other permits, which is not the case.

IV. Conclusions

Proponent has provided detailed technical and environmental proposals that are generally in compliance with the Technical Requirements of the RFP, and generally accepted industry practices. Proponent and its proposed Team Members have demonstrated experience in the design, engineering, construction and operation of waste processing facilities in Europe, particularly biological treatment processes. The proposed boiler and turbine cycle designs are conservative, but include features that should improve operating and energy efficiency without the risk of increased operations and maintenance impacts. Proponents Operations and Maintenance Plan provides some generic overview of their procedures regarding preventative and major maintenance of major facility components, but lacks sufficient detail to be consistent with generally accepted industry standards and practices. The timelines provided in the Construction and Early Work Schedules appear to be reasonable, but the start and stop dates provided in the proposal will be subject to change.

The following Table 9-3 provides an overview of the vendors ability to meet the RFP general design and operating requirements.

Table 9-3 Vendor B – General Design and Operating Requirements

General Design and Operating Requirements		Response	Comments
1.0	The Company has offered equipment of a design, type and arrangement that meets the experience and technical requirements of the RFP, and a base-line Facility capable of processing MSW up to a guaranteed initial processing rate of 140,000 tonnes per year (426 tonne/day @ 13 Mj/kg)?	Yes	Vendor has offered a facility that features single (1) processing line capable of processing up to 436 tpd of the Regions' residual waste at a average waste HHV of 13 MJ/kg.
2.0	Proposal includes short-term expansion capabilities for processing an additional minimum 110,000 tonnes per year, and an ultimate capacity of 400,000 tonnes per year?	Yes	
3.0	Bid includes either a single (e.g. 1 x 426 tonnes per day) or dual line system (e.g. 2 x 213 tonnes per day)	Yes	Vendor has proposed a single (1) 436 tpd processing lines (or approx. 1 x 18 Mg/hr)
4.0	Each chute-to-stack system will maintain or exceed 90% availability (i.e. the amount of time the unit will actually be available to process waste versus the number of hours in the year)?	Yes	Vendor has guaranteed an overall facility availability of 90% (or ~7,884 hrs/yr)
5.0	Facility will be designed to be a zero wastewater discharge facility?	Yes	Vendor has also proposed in their facility design to use Courtice WPCP effluent as process and boiler make-up water.
6.0	Minimum design useful life of the Facility is thirty (30) years?	Yes	
7.0	Proposal includes a plan/capability to satisfy the future district energy demands of the Clarington Energy Park and the Courtice WPCP?	Yes	Vendor has proposed an extraction/condensing steam turbine generator capable of providing up to 16.3 Mg/hr of medium pressure steam for the future hot water DH system.
8.0	Facility proposed will be operational by the end of 2013 (assuming a Jan. 1, 2010 start date)?	Yes	Vendor has proposed a 1,446 day (~ 3.9 years) construction schedule, which would meet the 2013 requirement assuming an early 2010 start date.
9.0	Units capable of operating at a maximum continuous turndown (MCTD) point of 75% or better?	Yes	
10.0	Proposal satisfies the minimum Air Emission Criteria outlined in Appendix C-2 in the RFP and Table 4-1 of the Technical Requirements?	Yes	Vendor has proposed emission limits that MEET the requirements of the RFP.

General Design and Operating Requirements		Response	Comments
11.0	Proposal complies with the Facility Expansion Capability Requirements outlined in Section 4.4 of the Technical Requirements? If not, what exceptions have been taken?	Yes	
12.0	Are all utilities (i.e. water, sewer, gas, electric) sized for the ultimate facility capacity of 400,000 tonnes per year?	Yes	
Structural/Civil Design Requirements			
13.0	Does the proposal include a detailed layout of the proposed Facility, including: dimensionally defined layout of buildings and critical equipment; defined area for future expansion; and a clearly defined area for the future district energy system?	Yes	
14.0	Does the proposed facility include a totally enclosed maneuvering and tipping area, a totally enclosed processing building, a totally enclosed boiler building, a totally enclosed turbine area, a totally enclosed air pollution control equipment area, a totally enclosed ash handling building, and a totally enclosed administration and maintenance area?	Yes	Vendor has proposed an open round-shaped waste storage pit for ease of traffic flow in the tipping gallery.
15.0	Is the pit storage area, pit walls, bay framing totally enclosed with reinforced concrete?	No	The pit is totally open.
16.0	Does the site access roads and tipping floor entrance have sufficient space to accommodate on-site queuing of the anticipated waste delivery vehicles during peak delivery times for full expanded facility (1,218 tonnes per day)?	Yes	
17.0	Are all main building enclosures a minimum of 30 meters set back from the property line?	Yes	
Architectural Design Requirements			
18.0	Has the Proposer provided color renderings (4 minimum per submission) and key site plan, material sample boards, and description of treatment material types and finishes that depict the actual proposed architectural treatment for the facility?	Yes	
19.0	Has the vendor provided a minimum of 5 offices (minimum 14 square meters each in size) for the Regions' staff and MoE staff?	Yes	

General Design and Operating Requirements		Response	Comments
20.0	Does the proposed facility design include a Visitor Education Center capable of holding up to 100 people?	Yes	
21.0	Has a central control room been provided in the proposal?	Yes	
Mechanical/Equipment Design Requirements			
A. Solid Waste Handling			
22.0	Is the tipping floor designed for a minimum of four (4) days storage at the expanded Facility capacity of 250,000 tonnes per year (or minimum storage of 2,740 tonnes)?	Yes	The pit design as stated in the proposal provides more than four (4) days storage.
23.0	Tipping Floor slab is reinforced concrete with a 80 mm thick minimum wear layer of high strength unreinforced concrete	Yes	
24.0	Does the tipping bay have individual tipping bays and tipping bay doors?	Yes	Tipping bays available for up to six (6) waste delivery vehicles. Individual tipping bay doors were provided.
25.0	Has an odour control plan been provided in the proposal?	Yes	A detailed odour control system and monitoring plan was provided in their proposal.
26.0	Does the proposal include at least two (2) refuse cranes capable of handling solid waste ranging in density from 180 to 500 kg/cubic meter?	Yes	Vendor has proposed a two-tier crane design.
27.0	Pulpit designed for full hopper viewing and sized to accommodate a minimum of two crane operators and control consoles and allow operation of all cranes at the same time.	Yes	
B. Combustion System			
28.0	Has the furnace been designed to provide at least a one second retention time at an incineration temperature of 1000°C in the combustion zone (measured from the final combustion air injection port)? Has the Proposer proposed a method to continuously monitor and record the temperature in the furnace?	Yes	Referenced in Proposal that design complies with requirements - no specific protocol or calculations provided as back-up.
29.0	Has the Proposer provided a firing diagram that at a minimum shows the acceptable operating range of the proposed grates over the range of waste HHVs and throughputs?	Yes	
30.0	Has the Proposer provided refractory or inconel cladding in the furnace section that extends upward from the grate to the top of the fireball?	Yes	

General Design and Operating Requirements		Response	Comments
31.0	Auxiliary burners provided are of a low NOx design and capable of preheating the furnace to 1,000°C during boiler start up?	Yes	
32.0	Is the maximum gas velocities through the furnace and the convection sections of superheater and economizer 6.0 m/sec?	Yes	
33.0	Minimum and maximum steam pressures are between approximately 4 MPa and 6 MPa?	Yes	Boiler design is ~5 MPa.
34.0	Minimum of 800 mm between each superheater section?		Insufficient detail. No exceptions taken in proposal.
35.0	Maximum continuous rating (MCR) of 426 tpd @ 13 Mj/kg?	Yes	
36.0	Does each proposal include a minimum of one underfire air fan, one secondary air fan or overfire air fan, and one induced draft fan that are equipped with variable frequency drives (VFDs)?	Yes	
C. Air Pollution Control Equipment			
37.0	Has the Proposer guaranteed emission levels equal to or less than the values listed in Appendix C-2 of the RFP and Table 4-1 of the Technical Requirements?	Yes	Vendor has guaranteed to MEET the Regions' RFP requirements.
38.0	Has the Proposer provided a means of reducing acid gases, NOx control, mercury and dioxin control, and a high efficiency particulate collection system?	Yes	
39.0	Has the Proposer provided continuous emissions monitors as required in the Technical Requirements, including a continuous dioxins sampling system?	Yes	
40.0	Is the minimum flue gas temperature exiting the acid gas scrubber 150°C?	Yes	
41.0	If a pulse jet type baghouse is proposed, is the net air-to-cloth ratio no greater than 1.2:1 m/min under the maximum flue gas flow conditions w/ one module offline?	Yes	
42.0	If a reverse air type baghouse is proposed, is the net air-to-cloth ratio no greater than 0.6:1 m/min under the max flue gas flow conditions with one module offline?		Not applicable.
43.0	Does the baghouse proposed include a filter bag leak detection system?		Not specified.
44.0	Is the stack designed for an exit gas velocity (each flue) of 15-18 meters per second?		Not specified in original proposal. Clarified in follow-up letter.
D. Ash Handling System			

General Design and Operating Requirements		Response	Comments
45.0	Does the proposed facility include separate collection of bottom ash and fly ash (i.e. boiler ash and air pollution control fly ash)?	Yes	Bottom ash handled separately from Fly ash
46.0	Is the system designed for a minimum number of transfer points?	Yes	
47.0	Is the bottom ash building designed for a minimum of four (4) days storage for 1,218 tonne per day facility?	Yes	
48.0	Proposer has furnished two (2) 50% capacity fly ash storage silos with a combined storage capacity for four (4) days at 761 tonne/day?	Yes	
49.0	Has the vendor provided a ferrous and non-ferrous recovery system capable of at least 80 percent recovery of all material greater than 2.5 cm and less than 15 cm?	Yes	
E. Power Generation			
50.0	Has a regenerative cycle turbine with multiple extractions for in-plant usage been provided that is designed to accept all of the steam produced by the Facility at MCR?	Yes	
51.0	Have Energy balances been provided for all boilers at MCR (426 tonnes at 13 MJ/kg)?	Yes	
52.0	Does the turbine-generator has a design backpressure of 127 mm Hg or less at all outdoor ambient dry bulb temperatures?	Yes	Design backpressure of 75 mm Hg (abs) proposed.
53.0	Does the design package include the necessary provisions and space to incorporate a future district heating system, including an overview of the proposed concept to recover thermal energy and an implementation plan describing the plant modifications and equipment required for the future district heating system?	Yes	
54.0	Does the proposed Facility have a means of dumping steam while continuing to process MSW @ MCR?	Yes	
55.0	If a alternative cooling system is proposed, has the vendor proposed a vapor plume abatement type cooling system?		Not applicable.
56.0	Design assumes that the make-up water requirements for the alternative cooling system will be supplied by effluent water from the nearby Courtice WPCP		Not applicable.

General Design and Operating Requirements		Response	Comments
57.0	Has at least one (1) 100% capacity electric feed pump and one (1) 100% steam driven feed pump to supply feed water at plant MCR been provided?	Yes	
58.0	Have two (2) 100% or three (3) 50% base Facility capacity vertical turbine canned condensate pumps, motor drives, and associated accessories been provided?	Yes	
59.0	Have a minimum of two (2) full capacity air compressors w/ aftercoolers, two (2) air receivers, one (1) air dryer w/ bypass capabilities, and associated accessories been included in proposed design?	Yes	
60.0	Has a complete, automated electronic inbound & outbound scale system been included?	Yes	
Electrical and I&C Design Requirements			
61.0	Does the proposed design utilizes VFD's on the FD, ID, ACC (if applicable) and SA fans?	Yes	
62.0	Does the proposal include all system metering, controls, and protection required by Hydro One and this independent system operator?	Yes	
63.0	Has a 44 kV transmission line between the Facility step up substation and Hydro One interconnection point been included?	Yes	
64.0	Does the generator design provided meet the specifications listed in section 9.8 of the Technical Requirements?	Yes	
65.0	Is the instrumentation and control system for all equipment integrated into a DCS?	Yes	
66.0	Has a real time display of Facility emissions been furnished in the proposed design?	Yes	

* Proposer may propose conditions other than these, subject to the Regions' approval. For any deviations, the Proposer shall have demonstrated operating experience at the proposed conditions and provide information on facilities that utilize the proposed technology.

9.2.1.3 Vendor C

Vendor 'C' has proposed to develop and operate a single line 426 tonne per day (140,000 tpy) mass burn thermal processing line to process the Regions' residual waste.

V. Technical Description

a. Waste Receiving, Handling and Storage

The waste receiving, handling and storage design proposed has the following features:

- Two overhead cranes equipped with grapples will be provided in the design. The cranes are sized for the 250,000 tpy facility as required by the Technical Requirements.
- An enclosed tipping floor with up to seven (7) waste truck tipping bays will be provided.
- An enclosed waste storage pit sized for approximately four (4) days capacity at the 250,000 tpy expansion facility, as required by the Technical Requirements.
- Odour on the tipping floor will be controlled by a ventilation system that will draw air from above the waste storage pit to maintain negative air pressure when the tipping floor truck roll-up doors are open. The air drawn from the tipping floor will be directed to the combustion unit to be used as combustion air. During prolonged shutdowns of the single processing line air from the tipping floor and above the waste pit will be drawn through dust and activated carbon filters to remove odours. A detailed Odour Control Plan was not included in the proposal.
- Proponent has proposed to rent a mobile baling machine to temporarily bale the waste in the event the storage capacity of the pit is exceeded (e.g. during prolonged shutdowns for scheduled boiler maintenance).

b. Furnace/Boiler Design

- Waste will be fed to a single reciprocating forward moving grate that is sized to thermally process approximately 17.75 tonnes/hour of residual waste at an average waste higher heating value (HHV) of 13 MJ/kg.
- Based on the firing diagram provided, the design MCR heat input is 231 GJ/hr (64.1 MW). This heat input can be maintained while firing waste with an HHV range between 11 and 15 MJ/kg.
- Proponent has guaranteed a processing line/boiler availability of 8,000 hours per year (or approximately 91%). However, Proponent has provided limited Form 4 Throughput Capacity Guarantees and no Electricity Production Guarantees in their original submission to the Regions.
- The furnace proposed is a center flow design. Three empty vertical radiant passes are provided with a fourth horizontal convective pass that contains pendent tube bundles. The economizer is located in a metal casing but the rest of the boiler is encased by waterwall tubes. This approach tends to increase furnace temperatures for all the flue gas before exiting the furnace increasing the residence time above 850oC. The combustion air distribution will normally be about 55% primary air and 45% secondary for a total excess air percentage of 90-100%, which is typical for EFW facilities. Secondary air is introduced in a manner designed to improve mixing and complete combustion.
- Steam production is expected to be 77.2 tph at 400oC and 56.5 bar (absolute). These are within the normal range of steam conditions for a typical EFW facility.

- The economizer exit temperature is 170oC, cooler than many similar North American facilities.

c. Flue Gas Treatment Design

- The FGT system includes (in the order of the equipment arrangement in the facility from the waste feed chute to the stack):
    - Selective Non-Catalytic Reduction (SNCR) system with aqueous ammonia injection for NOx control;
    - a hot-side fabric filter baghouse (Baghouse 1) for particulate reduction;
    - powder activated carbon (PAC) injection for mercury and dioxins control;
    - a two-stage wet HCl scrubber that includes a Quench Scrubber and an HCl Absorber;
    - a counter-current flow SO_2 Scrubber system;
    - and a second fabric filter baghouse (Baghouse 2) for additional particulate and heavy metals removal.
- The proposed FGT design also includes a cross flow gas-to-gas heat exchanger mounted to the top of the HCl scrubber. This system is designed to reheat the flue gas after it exits the SO_2 scrubber to keep it from condensing in Baghouse 2 and causing a water vapour plume at the stack exit. The heat exchanger components will be made of plastic or high alloy metal to address corrosion issues. In the event the heat exchanger is not successful in maintaining the desired inlet temperatures a by-pass is proposed around Baghouse 2. However, such a bypass may not be allowed by the permitting agencies.
- Proponent's proposed guarantees meet the Region's air emission limits in the RFP and Technical Requirements.
- Proponent has included a dedicated continuous emissions monitoring system and dioxin sampler as required by the Technical requirements. In addition, a continuous mercury monitor has been included to monitor the mercury loading to the first baghouse and wet scrubbers. It is not clear whether this analyzer will be used solely for process control purposes, or for regulatory compliance as well.

d. Energy Recovery

i. Electricity Generation

- Proponent did not provide Electricity Production Guarantees in their original submission to the Regions as required in Form 4 of the RFP.
- An air cooled condenser (ACC) has been proposed as the steam condenser cooling method.
- Proponent has provided a connection design to the Hydro One power system for the facility via the 44kV substation. It will include the dead-end structure and other equipment sized for the first phase of facility operation. A set of 13.8kV power cables

installed in underground duct banks will be terminated in 13.8kV switchgear. Main switch gear will include a main breaker and feeder breakers. Three feeder breakers are proposed with one for the current unit and two will be provided when the facility is expanded.

ii. District Heating Capability

- Proponent has provided a plan for the use of thermal energy in a future district energy system as required by the RFP and Technical Requirements. Proponent has included an extraction T-G that allows for steam take-offs that could be used to provide up to 10 MW of thermal energy for the future district energy system and has provided the physical space for the heat exchangers, pumps and other required equipment that would be used in the district energy system.
- Proponent did not provide details for the Future District Energy Output in their original submission to the Regions as required in Form 4 of the RFP.

e. Residue Handling and Recovered Materials

- Proponent is proposing to keep the bottom ash and grate siftings separate from the boiler and FGT fly ash as required by the Technical Requirements.
- Proponent will meet a Residue Quality Guarantee of less than 3% unburned combustible matter and 18% moisture in the bottom ash (versus the minimum of 25% moisture required by the RFP), but did not provide a Total Residue Guarantee as required.
- Bottom ash and grate siftings will be quenched in a water bath before being transferred to the proposed Bottom Ash Processing Building. Bottom ash will be stored for a period of two to three days in this building before going through a washing and processing system.
- The bottom ash processing system is intended to remove remaining ferrous and non-ferrous metals from the ash residue stream, and to convert the bottom ash into a marketable aggregate for construction. Proponent has experience with this process, however there are no markets identified for this material in their proposal. There is also no clear indication in the proposal of how the bottom ash will be disposed of in the event a market for this material is not identified.
- Fly ash from the convective passes of the boiler will be collected and pneumatically conveyed to a boiler fly ash storage silo. The fly ash from the FGT will also be collected and conveyed to a storage silo. The Proponent proposes to produce reusable by-products from the FGT equipment residues, including hydrochloric acid (HCl) and gypsum. The HCl recovered from the wet scrubber will be purified and concentrated (up to 20% strength) in the HCl-Rectification unit. Gypsum can also be recovered from the SO2 scrubber residue through a cleaning and desiccation process. However, there are no clear markets defined for these by-products in their proposal.

- Proponent did not provide ferrous metal and non-ferrous metal recovery guarantees as required in Form 4 of their proposal. However, the bottom ash processing system proposed is designed to maximize metal recovery. The proposal includes four stages of ferrous magnets and a bulky ferrous system (i.e. grizzly scalper) that are designed to optimize the product quality and rate of capture. The design also features eddy current separation to capture non-ferrous metal.

f. Balance of Plant

- Proponent has proposed a Zero Discharge Facility in accordance with the Technical Requirements. No discharge, other than from sanitary wastewater sources, will be sent to the Courtice Water Pollution Control Plant (WPCP). Proponent did not provide a detailed water balance in their proposal as required in the Technical Requirements, so the water usage requirements and discharge quantities (if any) could not be confirmed.
- Proponent discusses the possibility of using effluent from WPCP (termed "greywater" in their proposal) as make-up water to the process. However, there is no commitment in their proposal to use any water other than City water as process make-up.
- Proponent states that LEED certification of the facility will be sought to the highest practical extent possible.
- Proponent did not provide a Noise Management and Control Plan in their proposal as required. Proponent claims that they will inform the public about extended periods of noise during the construction phase of the project.

g. Expansion Capability

- Proponent has not provided sufficient detail regarding how the utilities (water, sewer, gas, electric) were sized. The Technical Specifications required onsite sizing to the 400,000 tpy facility size.
- Proposal provides for expanding the processing capacity of the facility in two equally sized phases: 1) Expansion by 140,000 tpy to increase capacity from 140,000 tpy (or base facility) to 280,000 tpy; and 2) Expansion by another 140,000 tpy to increase capacity from 280,000 tpy to 420,000 tpy. The proposed expansion plan does not meet the RFP requirements of a 110,000 tpy expansion followed by a 150,000 tpy.
- Insufficient detail is provided in the proposal to determine whether the proposed expansion plan will result in significant process interruptions.

h. Innovation

- The HCl and gypsum recovery systems were considered as innovative processes in the proposal. However, with the lack of a defined market and limited quantities for these products identified in the proposal, the commercial benefits of these innovations are unknown.

i. Operation and Maintenance

- Proponent has provided a generic Operations and Maintenance Plan for the proposed facility but the details in the Plan regarding the preventative and major maintenance of major facility equipment are not yet developed. However, the proposal does include a detailed schedule and the associated costs for the refurbishment and/or replacement of major facility equipment for the facility over twenty years of operations. Proponent also states that a computerized maintenance monitoring system (CMMS) will be incorporated into their design to track preventative and major maintenance at the facility, but no specific product name or detail is provided.
- Proponent provides a very detailed Community Relations Plan that includes the recommended formation of a Citizens Advisory Panel (CAP). There are no details or recommendations provided in the proposal on how the CAP should be formed.

j. Construction and Permitting Plan

- Proponent has provided a guaranteed construction schedule of 1,422 days (or approximately 3 years and 11 months).
- The proposed Early Works Schedule includes Proponents Permitting Plan. Proponent assumes that the preparation of the Certificate of Approval application, MoE review, negotiations and final issuance of the permit will occur in less than a year.
- The construction schedule provided does not include sufficient contingency (i.e. additional time and project milestone overlap) to accommodate upsets or delays during the construction, commissioning and start-up of the facility.

VI. Conclusions

Proponent has failed to provide some of the technical data required by the RFP, and they did not provide substantial commercial guarantees in their original submission to the Regions. The boiler and turbine cycle design appear to be conservative with regards to the proposed steam temperature and pressure, and the result of this conservative design appears to be a highly reliable boiler. The FGT system proposed is very complex, but should allow them to meet the air emission limit guarantees offered in their proposal. Proponent has only provided a very generic description of their Operations and Maintenance Plan in the proposal, but they also provided a detailed schedule and associated costs for major refurbishments and replacements that are consistent with generally accepted industry standards and practices. The lead times and construction timelines provided in the Project Schedule are reasonable, but lack sufficient contingency to handle upsets and delays. The Early Works Schedule provided, particularly their permitting schedule, is very optimistic.

The following Table 9-4 provides an overview of the vendors ability to meet the RFP general design and operating requirements.

Table 9-4 Vendor C – General Design and Operating Requirements

General Design and Operating Requirements		Response	Comments
1.0	The Company has offered equipment of a design, type and arrangement that meets the experience and technical requirements of the RFP, and a base-line Facility capable of processing MSW up to a guaranteed initial processing rate of 140,000 tonnes per year (426 tonne/day @ 13 Mj/kg)?	Yes	Vendor has offered a facility that features single (1) processing line capable of processing up to 436 tpd of the Regions' residual waste at a average waste HHV of 13 MJ/kg.
2.0	Proposal includes short-term expansion capabilities for processing an additional minimum 110,000 tonnes per year, and an ultimate capacity of 400,000 tonnes per year?	Yes	
3.0	Bid includes either a single (e.g. 1 x 426 tonnes per day) or dual line system (e.g. 2 x 213 tonnes per day)	Yes	Vendor has proposed a single (1) 436 tpd processing lines (or approx. 1 x 17.8 Mg/hr)
4.0	Each chute-to-stack system will maintain or exceed 90% availability (i.e. the amount of time the unit will actually be available to process waste versus the number of hours in the year)?	Yes	Vendor has guaranteed an overall facility availability of 8,000 hrs/yr (or ~ 91%)
5.0	Facility will be designed to be a zero wastewater discharge facility?		No detail provided. No water balance provided.
6.0	Minimum design useful life of the Facility is thirty (30) years?	Yes	
7.0	Proposal includes a plan/capability to satisfy the future district energy demands of the Clarington Energy Park and the Courtice WPCP?	No	Vendor has included a description in their proposal that states the facility is capable of providing up to 10 MW of thermal energy. Sufficient detail was not provided in the proposal.
8.0	Facility proposed will be operational by the end of 2013 (assuming a Jan. 1, 2010 start date)?	Yes	Vendor has proposed a 1,422 day (~3.9 years) construction schedule, which would not meet the 2013 requirement assuming an early 2010 start date.
9.0	Units capable of operating at a maximum continuous turndown (MCTD) point of 75% or better?	Yes	
10.0	Proposal satisfies the minimum Air Emission Criteria outlined in Appendix C-2 in the RFP and Table 4-1 of the Technical Requirements?	Yes	Vendor has guaranteed to MEET the Regions' RFP requirements.
11.0	Proposal complies with the Facility Expansion Capability Requirements outlined in Section 4.4 of the Technical Requirements? If not, what exceptions have been taken?		No detail provided.
12.0	Are all utilities (i.e. water, sewer, gas, electric) sized for the ultimate facility capacity of 400,000 tonnes per year?		Insufficient detail. No exceptions taken in proposal.
STRUCTURAL/CIVIL DESIGN REQUIREMENTS			

General Design and Operating Requirements		Response	Comments
13.0	Does the proposal include a detailed layout of the proposed Facility, including: dimensionally defined layout of buildings and critical equipment; defined area for future expansion; and a clearly defined area for the future district energy system?	Yes	
14.0	Does the proposed facility include a totally enclosed maneuvering and tipping area, a totally enclosed processing building, a totally enclosed boiler building, a totally enclosed turbine area, a totally enclosed air pollution control equipment area, a totally enclosed ash handling building, and a totally enclosed administration and maintenance area?	Yes	
15.0	Is the pit storage area, pit walls, bay framing totally enclosed with reinforced concrete?	Yes	
16.0	Does the site access roads and tipping floor entrance have sufficient space to accommodate on-site queuing of the anticipated waste delivery vehicles during peak delivery times for full expanded facility (1,218 tonnes per day)?	Yes	
17.0	Are all main building enclosures a minimum of 30 meters set back from the property line?	Yes	
ARCHITECTURAL DESIGN REQUIREMENTS			
18.0	Has the Proposer provided color renderings (4 minimum per submission) and key site plan, material sample boards, and description of treatment material types and finishes that depict the actual proposed architectural treatment for the facility?	Yes	
19.0	Has the vendor provided a minimum of 5 offices (minimum 14 square meters each in size) for the Regions' staff and MoE staff?		Insufficient detail.
20.0	Does the proposed facility design include a Visitor Education Center capable of holding up to 100 people?	Yes	The proposal states that a Education Center is included. No detail provided.
21.0	Has a central control room been provided in the proposal?		Insufficient detail.
MECHANICAL/EQUIPMENT DESIGN REQUIREMENTS			
A. Solid Waste Handling			
22.0	Is the tipping floor designed for a minimum of four (4) days storage at the expanded Facility capacity of 250,000 tonnes per year (or minimum storage of 2,740 tonnes)?	Yes	The pit design as stated in the proposal provides more than four (4) days storage.
23.0	Tipping Floor slab is reinforced concrete with a 80 mm thick minimum wear layer of high strength unreinforced concrete	Yes	

General Design and Operating Requirements		Response	Comments
24.0	Does the tipping bay have individual tipping bays and tipping bay doors?	Yes	Tipping bays available for up to seven (7) waste delivery vehicles. Individual tipping bay doors were provided.
25.0	Has an odour control plan been provided in the proposal?	Yes	
26.0	Does the proposal include at least two (2) refuse cranes capable of handling solid waste ranging in density from 180 to 500 kg/cubic meter?	Yes	
27.0	Pulpit designed for full hopper viewing and sized to accommodate a minimum of two crane operators and control consoles and allow operation of all cranes at the same time.	Yes	
B. Combustion System			
28.0	Has the furnace been designed to provide at least a one second retention time at an incineration temperature of 1000°C in the combustion zone (measured from the final combustion air injection port)? Has the Proposer proposed a method to continuously monitor and record the temperature in the furnace?	Yes	Referenced in Proposal that design complies with requirements - no specific protocol or calculations provided as back-up.
29.0	Has the Proposer provided a firing diagram that at a minimum shows the acceptable operating range of the proposed grates over the range of waste HHVs and throughputs?	Yes	
30.0	Has the Proposer provided refractory or inconel cladding in the furnace section that extends upward from the grate to the top of the fireball?	Yes	
31.0	Auxiliary burners provided are of a low NOx design and capable of preheating the furnace to 1,000°C during boiler start up?	Yes	
32.0	Is the maximum gas velocities through the furnace and the convection sections of superheater and economizer 6.0 m/sec?	Yes	
33.0	Minimum and maximum steam pressures are between approximately 4 MPa and 6 MPa?	Yes	Boiler design is <6 Mpa.
34.0	Minimum of 800 mm between each superheater section?		Insufficient detail. No exceptions taken in proposal.
35.0	Maximum continuous rating (MCR) of 426 tpd @ 13 Mj/kg?	Yes	
36.0	Does each proposal include a minimum of one underfire air fan, one secondary air fan or overfire air fan, and one induced draft fan that are equipped with variable frequency drives (VFDs)?	Yes	
C. Air Pollution Control Equipment			

General Design and Operating Requirements		Response	Comments
37.0	Has the Proposer guaranteed emission levels equal to or less than the values listed in Appendix C-2 of the RFP and Table 4-1 of the Technical Requirements?	Yes	Vendor has guaranteed to MEET the Regions' RFP requirements.
38.0	Has the Proposer provided a means of reducing acid gases, NOx control, mercury and dioxin control, and a high efficiency particulate collection system?	Yes	
39.0	Has the Proposer provided continuous emissions monitors as required in the Technical Requirements, including a continuous dioxins sampling system?	Yes	
40.0	Is the minimum flue gas temperature exiting the acid gas scrubber 150°C?	Yes	
41.0	If a pulse jet type baghouse is proposed, is the net air-to-cloth ratio no greater than 1.2:1 m/min under the maximum flue gas flow conditions w/ one module offline?	Yes	
42.0	If a reverse air type baghouse is proposed, is the net air-to-cloth ratio no greater than 0.6:1 m/min under the max flue gas flow conditions with one module offline?		Not applicable.
43.0	Does the baghouse proposed include a filter bag leak detection system?		Not specified.
44.0	Is the stack designed for an exit gas velocity (each flue) of 15-18 meters per second?		Not specified in original proposal. Clarified in follow-up letter.
D. Ash Handling System			
45.0	Does the proposed facility include separate collection of bottom ash and fly ash (i.e. boiler ash and air pollution control fly ash)?	Yes	Bottom ash handled separately from Fly ash
46.0	Is the system designed for a minimum number of transfer points?		No detail provided.
47.0	Is the bottom ash building designed for a minimum of four (4) days storage for 1,218 tonne per day facility?		No detail provided.
48.0	Proposer has furnished two (2) 50% capacity fly ash storage silos with a combined storage capacity for four (4) days at 761 tonne/day?		No detail provided.
49.0	Has the vendor provided a ferrous and non-ferrous recovery system capable of at least 80 percent recovery of all material greater than 2.5 cm and less than 15 cm?		No detail provided.
E. Power Generation			
50.0	Has a regenerative cycle turbine with multiple extractions for in-plant usage been provided that is designed to accept all of the steam produced by the Facility at MCR?	Yes	
51.0	Have Energy balances been provided for all boilers at MCR (426 tonnes at 13 MJ/kg)?	No	Insufficient detail provided.

General Design and Operating Requirements		Response	Comments
52.0	Does the turbine-generator has a design backpressure of 127 mm Hg or less at all outdoor ambient dry bulb temperatures?	Yes	Design backpressure of 127 mm Hg (abs) proposed.
53.0	Does the design package include the necessary provisions and space to incorporate a future district heating system, including an overview of the proposed concept to recover thermal energy and an implementation plan describing the plant modifications and equipment required for the future district heating system?		Insufficient detail provided.
54.0	Does the proposed Facility have a means of dumping steam while continuing to process MSW @ MCR?		Insufficient detail provided.
55.0	If a alternative cooling system is proposed, has the vendor proposed a vapor plume abatement type cooling system?		Not applicable.
56.0	Design assumes that the make-up water requirements for the alternative cooling system will be supplied by effluent water from the nearby Courtice WPCP		Not applicable.
57.0	Has at least one (1) 100% capacity electric feed pump and one (1) 100% steam driven feed pump to supply feed water at plant MCR been provided?	Yes	One (1) 100% electric driven boiler FW pump, and one (1) 100% steam driven FW pump.
58.0	Have two (2) 100% or three (3) 50% base Facility capacity vertical turbine canned condensate pumps, motor drives, and associated accessories been provided?	Yes	
59.0	Have a minimum of two (2) full capacity air compressors w/ aftercoolers, two (2) air receivers, one (1) air dryer w/ bypass capabilities, and associated accessories been included in proposed design?	Yes	
60.0	Has a complete, automated electronic inbound & outbound scale system been included?	Yes	
Electrical And I&C Design Requirements			
61.0	Does the proposed design utilizes VFD's on the FD, ID, ACC (if applicable) and SA fans?	Yes	
62.0	Does the proposal include all system metering, controls, and protection required by Hydro One and this independent system operator?	Yes	
63.0	Has a 44 kV transmission line between the Facility step up substation and Hydro One interconnection point been included?	Yes	
64.0	Does the generator design provided meet the specifications listed in section 9.8 of the Technical Requirements?	Yes	
65.0	Is the instrumentation and control system for all equipment integrated into a DCS?	Yes	

General Design and Operating Requirements		Response	Comments
66.0	Has a real time display of Facility emissions been furnished in the proposed design?	Yes	

* Proposer may propose conditions other than these, subject to the Regions' approval. For any deviations, the Proposer shall have demonstrated operating experience at the proposed conditions and provide information on facilities that utilize the proposed technology.

9.2.2 Evaluation of Submissions

Based upon current best practices and considering the magnitude and complexity of the Project, the entire RFP process was subjected to rigorous due diligence rules and procedures consistent with common best practices applied by major provincial and federal infrastructure procurement agencies across Canada to ensure integrity and an ability to withstand any challenge regarding any impropriety.

The Region engaged KPMG to monitor from a fairness perspective, the RFP Process from its commencement to the announcement of the preferred proponent. KPMG's approach to monitoring the fairness of the evaluation process was based on a set of fairness principles that KPMG had developed describing the foundation of a fair process. KPMG's role was solely that of an observer to the RFP process (see Section 9.2.1.3 for more details).

A multi-disciplinary evaluation committee evaluated the four proposals and the committee consisted of representatives from Durham Works and York Transportation and Works Departments and the Durham Finance Department. Technical consultants, HDR Corporation, and financial consultants, Deloitte & Touche LLP, assisted the evaluation team in their deliberations. Staff from Durham Purchasing and Legal Services provided day to day advice, guidance and assistance to the evaluation team. In order to ensure absolute confidentiality and to maintain the integrity of the process, all staff and consultants involved in the process signed confidentiality agreements.

A participation agreement was signed by each of the qualified proponents that set out the terms and conditions for access to the Data Room and confirmed their agreement to abide by the provisions of the procurement process, including the RFP.

RFP information (such as addenda to the RFP, questions from potential respondents together with the answers from the Regions) was provided to qualified proponents via the Region's Data Room. Access to the Data Room was limited to members of proponent team members, consultants and advisors that had signed the Participation Agreement.

Questions and answers were posted to the Data Room. As questions were received, they were reviewed by the Procurement Team Leader and distributed to technical, legal and/or financial personnel to draft a proposed answer. Draft answers were reviewed by the Procurement Team Leader for clarity, completeness and consistency. Questions and answers were then assembled periodically but on a frequent basis into question and answer sets, and posted to the Data Room. In total, 91 Request for Information Forms were submitted and Addenda 1 through 35 were issued (see Table 9-5 for Addenda).

Table 9-5 Addenda Issued During the RFP Process

Addendum Number	Subject	Purpose of Addendum
1	Appendix C2 – Air Emission Criteria	A clarification of the measurement unit from *g/Rm3 (original RFP) to µg/Rm3 (Addendum #1)
2	Dual vs. Single Line System	The Preferred Proponent was given the option to bid either a dual or single line system.
3	Geotechnical Site Investigations	The Geotechnical Report that was available in the Data Room was the only geotechnical information supplied to the Proponents. Further information required by the Proponent was their responsibility and was to be obtained at their own cost and risk.
4	Airport Zoning Regulations	Direction to the location of additional details regarding Airport Zoning Regulations.
5	Waste Composition Data	The Regions provided two 2007 waste audits for additional information.
6	Revised RFP Closing Date	The closing date for the RFP was amended from January 15, 2009 to February 19, 2009.
7	Facility Capacity and Potential Future Expansion	Clarification regarding the operational date and future expansion scenarios.
8	Heating Values for Municipal Solid Waste	Provided additional clarification and specific revisions regarding heating values for municipal solid waste as the basis for design and guarantee requirements for throughput capacity for the energy from waste Facility.
9	Equipment Orders	The Regions were not prepared to commit funds to, or otherwise assume the risks of, equipment orders made in advance of the issuance of the Notice to Proceed under the Project Agreement.
9A	Revision to Addendum #9	Clarification of the target operational date.
10	Potential District Heating System	Provided additional clarification and specific revisions regarding the Regions' intentions and the requirements of the RFP pertaining to utilization of the Facility as an energy source for a potential district heating system within the future Clarington Energy Park.
11	Early Works Activities	Provided additional clarification and specific revisions regarding delineation of the roles and responsibilities of the DBO Contractor, the Regions and the Region's Consultants in the context of the approvals processes and the Early Works activities associated with development of the proposed energy from waste Facility.
12	Clarification Questions and Answers	Questions submitted by Proponents and answers provided by the Regions regarding renderings of architectural details; availability of sites for construction parking and laydown and for soil removal and storage; location of the visitors' centre; Early Works permits and applications requirements.
13	Canadian Aviation Regulations	Height limitations for Facility and stack.
14	Breakdown of Fixed Construction Price	Form 2A is for information purposes only and is not binding in any way.
15	Revised Schedule	Dates changes for the Issuance of the 2nd Draft Agreement and Early Works Agreement and the Final Project Agreement and Final Early Works Agreement
16	500 KwH per tonne reference	The reference to 500 KwH per tonne in Section 4.5.1.1.1 of the RFP is a NET number.
17	Water and Sewer Use By-laws	A link to the Region's Water Supply System and the Establishment of Water Rates and Water Charges (By-law 89-2003 plus amending By-laws) and the Establishment of Sewer Surcharge Rates and Sewer Charges (By-law 90-2003 plus amending By-laws) was

Addendum Number	Subject	Purpose of Addendum
		provided.
18	Technical Requirements – Revision 1	Technical Requirements – Revision 1 was posted in the Data Room.
19	Milestone Payment Schedule	Revised Form 2C provided.
20	Courtice Water Pollution Control Plant Information	Provided a representation of the quantity and quality of effluent from the Courtice WPCP.
21	Handling of Household Hazardous Waste and Radioactive Waste	Further clarification and definition of the Vendor's handling responsibilities with respect to Household Hazardous Waste and Radioactive Waste as defined in the Project Agreement definition for "Hazardous Substance".
22	Communications and Community Relations Plan	Wording in original RFP regarding communications and the community relations plan revised.
23	Minimum Net Continuous Capability at Generator Terminals	The minimum net continuous capability at generator terminals was amended to a 0.85 power factor, KVA.
24	Transmission Capacity for the EFW Facility	Clarification regarding the transmission and breaker capacity.
25	Collection Hoppers	Rotary valves were determined to be acceptable and information was inserted into Section 8.13.1 of the RFP
26	Hydrostatic Tests	Clarification regarding the hydrostatic test pressure in Section 11.3 of the RFP.
27	Appendix 1 Technical Requirements	Proponents may provide comments or recommended changes up to and including December 12, 2008.
28	Region's Water Quality Reports	A link to the Water Quality Reports was provided.
29	Form 4 Performance Guarantees	Revision to Form 4.
30	Form 4 Performance Guarantees	Revision to Form 4. Addendum #30 supersedes Addendum #29.
31	Forms 2A, 3, 3A, and 3B	Clarification regarding annual property taxes and revised Forms 2A, 3, 3A, and 3B.
32	Ineligible Team Members	Identified entities that are not eligible to participate as a member of a Project Team or in the preparation of a Proposal.
33	Odour and Noise Plans	Proponents must present Odour and Noise Control Programs and provide organization charts for identifying key positions and interactions of personnel.
34	Revisions to sections 5.3.3, 5.3.4, and 5.3.5 of the RFP.	Revisions to the Evaluation of Technical Elements (Section 5.3.3), Evaluation of Project Delivery Elements (Section 5.3.4), and Evaluation of Cost and Commercial Elements (Section 5.3.5).
35	Submission of Proposals	Proponents were required to submit one original and ten copies of their proposals. Each copy was to contain an electronic version.

In accordance with the provisions of Section 2.9.2 of the RFP, the Regions considered various questions from Proponents that were marked by the Proponents as "commercial in confidence" and determined based on the nature of the question and the supporting justification whether the question warranted confidential treatment. Where the request to treat the question as confidential was justified, the response was circulated only to the Proponent that had made the inquiry. When the Region did not believe that confidential treatment was warranted, as provided for the in the RFP, the Proponent was given an opportunity to withdraw the question and if the question was not withdrawn, the question and the answer were posted to the Data Room.

Commercial in confidence meetings were held with each Proponent to (a) provide the Regions' representatives with familiarity of the designs and concepts proposed by proponents; (b) providing proponents with some comments and feedback from the Regions on the general acceptability of particular solutions proponents might have been considering for various aspects of their Proposals, and (c) provide an opportunity to each proponent to raise issues or concerns. An initial meeting was held with each proponent for one day each from October 5 to October 9, 2008, inclusive. A second round of commercial in confidence meetings was offered to the proponents, and four of the teams (Green Conversion, Covanta, Wheelebrator and Veolia) elected to participate. These meetings were held on November 4 and 5, 2008. The Regions used reasonable efforts to distribute to all proponents any new information provided by the Regions to any proponent during the meeting, save and except information that was considered by the Regions to qualify as “Commercial in Confidence” according to the provisions of the RFP Selection Framework.

After closing, but prior to the committee’s evaluation, Durham Purchasing requested confirmation from all qualified proponents that they would sign the Project Agreement substantially in the form provided within the RFP.

9.2.2.1 Evaluation of Mandatory Criteria

RFP Respondents who met the following Mandatory Criteria (Table 9-6) proceeded to the evaluation of Rated Requirements.

Table 9-6 RFP Mandatory Requirement

Stage 1: Mandatory Requirement	
Criteria	Description
Closing Time	To be eligible for consideration, the Proposal had to be received on or before the Closing Time at the delivery address

9.2.2.2 Evaluation of Rated Criteria

The assessment criteria utilized in the evaluation process of the Technical Elements were developed in consultation with the technical advisors to ensure that the EFW facility selected could be considered “best in class”. The individual component scoring was based on the extensive experience of the technical advisors.

The assessment scoring for each component of the Technical Elements cannot be judged in isolation of one another as they are interconnected and reliant on each other to demonstrate a viable design and operation. The assessment is therefore not a selection of components chosen from various proposals to create a facility from basic principles. The principles used to guarantee a viable and “best in class” facility were as follows:

a. Stating guarantees in a form without substantive details in overlapping areas of the evaluation was deemed insufficient to support a “best in class” assessment. In some cases, the lack of completeness in the submission could not back the guarantee claims made;

b. The evaluation criteria and process was designed to ensure that there were adequate ‘checks and balances’ in the evaluation to ensure a uniform, integrated facility design was submitted. The RFP was designed to ensure that a bid with one or two good features did not ‘win’ by skewing the scoring;

c. Category weightings were determined based on the actual measurability of the criteria. Where actual quantitative design details could identify clear advantages, those criteria were given higher weightings. Other criteria, where evaluation was more qualitative than quantitative, were given lower weightings such as Air and Water versus Noise and Odour. The latter two categories as more based on qualitative 'plans', allowing for more subjective review than the actual measurable air and water categories; and,

d. Two key areas of consideration in the RFP were the Operation and Maintenance and Facility Design. These two areas are significantly related to annual operating performance of the facility and the credibility of the environmental guarantees offered in the Environmental subsection.

A holistic evaluation of the facilities is only possible at the main category level as listed below:

a. Technical Elements total points available: 45
b. Project Delivery Elements total points available: 20
c. Cost & Commercial Elements total points available: 35

Any attempt to evaluate the selection of a "best in class" facility at an intermediate level discounts the application of the evaluation principals. The interconnectivity of the facility components also precludes determining the environmental impacts of the EFW based on a component scoring. The compatible and viable design, operation, maintenance and monitoring are critical to validation of guarantees in the proposals. The assessment process also guarantees the best overall environmental performance through realistic guarantees, proven design, reliable operation, preventative maintenance, confirmatory monitoring, quality assurance and when necessary timely emergency response.

The above evaluation principals were validated given that the winning Covanta proposal presented a "best in class" facility substantiated by an assessment whereby they earned the highest overall score, the highest score in each of the three categories and achieved the greatest number of first place rankings in the individual components.

Scorings of the proposals was based upon a maximum of 100 points. A breakdown of the individual criteria, provided to the proponents, is provided in Tables 9-4 and 9-5. Prior to the evaluation process the Evaluation Team and the Fairness Monitor (KPMG) "locked-down" the detailed scoring factors that would be applied during the evaluation. In addition, the Evaluation Team and KPMG agreed that the proposal with the highest aggregate score would be recommended to the respective Regional Councils.

The evaluation of the four proposals utilized templates with prescribed scoring based on the submission narratives, forms and models. Each assessment component was scored out of ten possible points and multiplied by the weighting as illustrated in the following sub-sections.

9.2.2.3 Technical Considerations

On Wednesday, May 28, 2008 Durham Regional Council passed a resolution requiring the successful proponent to ensure that the design and installation of the Thermal Treatment Facility incorporated the most modern and state-of-the-art emission control technologies. These technologies were required to:

- Meet or exceed the lower of the Ontario Guideline A-7 and European Union (EU) air emission monitoring and measurement standards;
- Commit to Maximum Achievable Control Technology (MACT) for air emission standards and monitoring;
- Include provisions or continuous sampling of dioxins in addition to stack testing, as defined by EU2000/76/EC and MOE A-7 guidelines;
- Demonstrate the ability to design, build and operate a Thermal Treatment Facility of 140,000 tpy of operating capacity at project start-up, based upon:
    - Durham Region providing 100,000 tpy of post-diversion waste commencing at project start-up;
    - York Region providing 20,000 tpy of post-diversion waste commencing at project start-up; and,
    - Surplus capacity totalling 20,000 tpy of operating capacity to be shared equally between the two Regions;
- Demonstrate an ability to accommodate future expansion (scalability) as required to accommodate post-diversion residual waste volume growth up to maximum capacity of 400,000 tonnes per year; and,
- Demonstrate an ability to meet the requirements of up to a 25-year design, build and operate contract, with terms and conditions to be set out within RFP documentation.

As directed by Regional Council, the RFP was issued based on discussions with the Province at the time regarding air emission criteria and power purchase principles and with the understanding that the project must support Durham's aggressive residual waste diversion and recycling program, to achieve and/or exceed, on or before December 2010, a 70% diversion rate for the entire Region, with these programs continuing beyond 2010.

The RFP and subsequent addenda required proponents to meet the Council resolutions and additionally provide:

- A single or dual line system with a minimum of 90% operational availability;
- A zero process water discharge facility; and
- Maximum energy production both as superheated steam used to generate electricity and potentially district heating for use in the Courtice WPCP and the Clarington Energy Park.

Any district heating outside of the Energy Park could be considered on the basis of a larger area district heating feasibility plan.

A total of 45 points were assigned to Technical Elements.

Of the 45 Technical Element points, up to 25 points were allocated to environmental considerations. The RFP required all proponents to provide guarantees that they would meet the air emission table limits adopted by Durham Council. The evaluation matrix assigned additional points to any proposal with lower air, water, odour and noise emissions; a demonstrated plan for ease of Facility expansion with minimum process disruption; superior management of ash; and a greater energy production and recyclable material recovery;

Design, Construction and Operational Considerations accounted for up to 15 Technical Element points. Evaluation focused on provision of guarantees for process availability with an expectation that the Facility would operate continuously for a minimum of 90% of the time. Proposals were also evaluated on the ability to accelerate the required construction schedule and guarantee the projected time lines. Evaluators assigned additional points for continuous operation above 90% or for a shorter construction timeframe. This category examined the robustness of the proposed system; the technical feasibility of the proposed process equipment; and that the proponent had proposed only proven, reliable Air Pollution Control Equipment. Evaluators appraised proposed Facility operations and maintenance plans to ensure that plans provided for annual maintenance and, multi-year maintenance including major equipment replacement and maximum residual value at the end of the contract. The evaluators also awarded points for high quality Environmental Management Systems compliant with ISO 14001:2004; Health and Safety Plans and Training Plans.

The final five (5) points in the Technical Elements were awarded for innovations in Environmental Performance, Design, Construction and Operational Considerations.

The above three categories could not be considered in isolation as environmental considerations would impact the design, construction and operational considerations along with potential innovations. Within the technical elements section, the Covanta proposal scored top marks in more individual sections than any of the other proposals. This is reflected in the overall scoring and ranking of the four proposals. There were instances where the successful proponent did not score the top marks for an environmental section but for reasons of net environmental benefits, increased or unknown risk, design and operational reasons, the Covanta proposal was rated the best overall. The RFP evaluation process does not recommend individual components of the EFW facility but the entire proposed package. Each proponent's system components are integral to the whole and operate most efficiently within the know configuration.

Table 9-7 Technical Elements (Total of 45 Points)

Air – RFP Form 4 Section 8 – points awarded based on number of pollutant elements and the degree of reduction below with guaranteed emission limits below those defined in Table 4-1 of Appendix 1 and Appendix C-2 of the RFP. Weighting – 0.6	**0** - Does not meet Technical Requirements – Appendix C2. **1-4** Not applicable **5 - 10** Meets minimum emission requirements of Appendix C2 and Guarantees Table in Form 4 of RFP submission. The vendors may score additional points in the evaluation by providing Environmental Performance Guarantees in addition to the requirements specified in Appendix C2 for the following air contaminants: • Total Particulates • Oxides of Nitrogen (or NOx); • Sulfur Dioxide (or SO_2); • Hydrogen Chloride (or HCl); • Hydrogen Fluoride (or HF) • Carbon Monoxide (or CO) • Mercury • Cadmium • Lead • Cd+ Th • Sum of As, Ni, Co, Pb, Cr, Cu, V, Mn and Sb) • Dioxins and • Organic Matter. Each of the above-mentioned air contaminants shall be weighted equally in the scoring, according to the following criteria: **Additional Points** 0.096153846 **points** 0-20% additional reduction of the specified air contaminants below the limits specified in Appendix C-2 . 0.192307692 **points** 21-35% additional reduction of the specified air contaminants below the limits specified in Appendix C-2. 0.288461538 **points** 36-50% additional reduction of the specified air contaminants below the limits specified in Appendix C-2. 0.384615385 **points** >50% additional reduction of the specified air contaminants below the limits specified in Appendix C-2.
Water – points awarded based on decreased use of potable water for facility processes – e.g., less reliance on purchased potable water for process make-up water.	This evaluation only deals with process water for the facility and does not cover internal office use water. **0** - Has process effluent from plant combustion process. **1** - Zero process discharge with potable water use only for the entire facility. (i.e. no attempt to include any alternative water supply). **2-4** - Zero process discharge with up to 50% of process water requirements from sources other than potable water (eg. storm water, WPCP effluent). **5-7** - Zero process discharge with greater than half (51% or more) of process water requirement from other sources. ie minimal reliance on purchased potable water. **8-10** - Zero process discharge with 80 - 100% use of alternative water sources beyond potable water for process water.

Weighting – 0.35	**SCORING GUIDELINES** 0 – Does Not Meet 1 – Just Meets Minimum Requirements 2-4 – Progressing Towards Expectations 5-7 – Meets Expectations 8-10 – Exceeds Expectations
Ash management – points awarded based on bottom ash quality and increased diversion through the beneficial reuse and/or stabilization of process residues (i.e. less reliance on landfill and greater marketability of bottom ash up to and including and process guarantees). Substantive evidence required to support claims. Weighting – 0.3	**0** - Ash quantity and quality does not meet the specifications (Form 4, Section 4) and no fly ash management plan. **1** - Long-term landfill contract for bottom ash disposal in-place and management plan for fly ash handling and disposal. **2-4** - Beneficial reuse of between 50% and 75% of bottom ash. Management plan for fly ash handling and disposal. **5-7** - Beneficial reuse of between 50% and 75% of bottom ash AND 100% fly ash stabilization. **8-10** - Beneficial reuse of 76% to 100% of bottom ash AND 100% fly ash stabilization. Beneficial reuse – lowest benefit is use as daily landfill cover at standard tipping and disposal cost rates; increased points if proponent provides guaranteed preferential pricing for bottom ash as daily landfill cover; highest benefit is use as other marketable products – ie asphalt – must be able to substantiate use through existing examples, sample test analysis data **SCORING GUIDELINES** 0 – Does Not Meet 1 – Just Meets Minimum Requirements 2-4 – Progressing Towards Expectations 5-7 – Meets Expectations 8-10 – Exceeds Expectations
Odour – points awarded based on comprehensive detailed plans for i) odour control during both construction and operation phases. Defined process for managing (receiving, logging,	Potential sources of odour. Mitigation measures Regulatory Controls **0 -** Odour control plan not provided or odour control plan fails to meet minimum requirements set out in RFP Section 4.5.3.1.14 and Tech Spec. **1-** Plan meets minimum requirements of the technical specifications. (ie negative air pressure in bunker and tipping floor; proper doors and enclosures, etc as per Tech Spec requirements.) **2-4** Generic plan with more details. (not only meets the Tech Spec requirements but moves towards odour control during scheduled and unscheduled shut downs for the entire facility. **5-7** Tailored generic plan (ie. more project specific) version with details as per 2-4 scoring. Plan clearly reflects MOE requirements

investigating and resolving) complaints. Weighting – 0.125	for typical waste management facilities with specific reference to incineration – plan takes into account odour control during shut downs, seasonal variations/effects, day-to-day operations. **8-10** Detailed plan and process with annotated Table of Contents, describing how the operator deals with MOE regulators and public complaints. Integrates odour control plan with facility operations protocol, equipment and system controls. Descriptive procedures for tracking, analyzing, assessing, reporting and mitigating odour control concerns. **<u>Addendum to ask for Odour Control Plan in RFP Section 4.5.3.1.14</u>**
Noise – points awarded based on comprehensive detailed plans for i) noise control during both construction and operation phases and ii) defined process of managing (receiving, logging, investigating and resolving) complaints. Weighting – 0.125	Potential sources of noise. Mitigation measures Regulatory Controls **0 -** Noise control plan not provided or noise control plan fails to meet minimum requirements set out in Section 4.5.3.1.15 and Tech Spec 4.4.14. **1-** Plan meets minimum requirements of the specifications. No separation of construction versus operation phases of project – simply acknowledges local and provincial minimum noise level requirements and time constraints. **2-4** Generic plan with more details. Identifies separate plans for construction and operations phases of project. Identifies requirements of Technical Specifications for facility construction. **5-7** Tailored generic plan (ie. more project specific) version with details as per 2-4 scoring. Clear distinction of noise related concerns during construction and operations phases. Clearly identifies processes and plans for minimizing noise during daily operations; design incorporates noise mitigation techniques (building enclosures, berms, insulation, and other noise mitigation features). **8-10** Detailed plan and descriptive processes with annotated Table of Contents for both Construction and Operations phases identifying how the operator will deal with MOE regulators and public complaints. Descriptive procedures for tracking, analyzing, assessing, reporting and mitigating noise control concerns. Plan recognizes and takes into account the interaction with the future prestige Energy Park plan as opposed to a heavy industrial area. **<u>Addendum to ask for Noise Control Plan in RFP Section 4.5.3.1.15</u>** **<u>Section 4.5.2.2.7 already requests a Nuisance Plan to be submitted under this clause for the Construction Phase</u>**
Energy Recovery – points awarded based on energy recovery above the minimum design criteria – e.g. higher electrical generation while still meeting the minimum district heat requirements. Weighting – 0.5	**0 -** Does not produce net minimum 500 kW hours per tonne required and cannot meet district heat requirements as per Tech Spec. and Form 4. **1-** Just meets minimum net 500 kW hours per tonne and provides an acceptable plan for district heat requirements as per Tech Spec. and Form 4. **2-4** - Minimum net electrical guarantee between 501-600 kW hours per tonne and provides an acceptable plan for district heat requirements as per Tech Spec. and Form 4. **5-7** - Net electrical guarantee between 601-700 kW hours per tonne and provides an acceptable plan for district heat requirements as per Tech Spec. and Form 4. **8-10** - Net electrical guarantee more than net 700 kW hours per tonne and provides an acceptable plan for district heat requirements as per Tech Spec. and Form 4.
Recovered Materials	**0 -** Does not meet the Tech Specs for the metal recovery systems. No or unacceptable Marketing Plan.

Management – points awarded based on improved methods and efficiencies of recovery and comprehensive marketing plans, up to and including potential guaranteed floor pricing. Weighting – 0.1	**1 -** Has a ferrous recovery system for bottom ash and a Marketing Plan to sell recovered material. **2-4** - Has a ferrous and non-ferrous recovery system and a Marketing Plan To sell each individual recovered material. **5-7** - Guaranteed floor price for some materials and recovery of some additional materials (eg. some presort for selected recyclable materials) and supporting Marketing Plans for each item. **8-10** - Comprehensive recovery of pre and post materials. Guaranteed floor price for all materials.
Capacity and Expansion Capability – points awarded based on ease of incremental expandability to ultimate 400,000 tpy Facility capacity. Weighting – 0.4	**0 -** Initial plant designed to less than 140,000 tpy capacity or does not show expansion capability to minimum 250,000 tpy and to ultimate 400,000 tpy. On-site utilities are not scalable to ultimate 400,000 tpy. **1 -** Initial Plant designed to 140,000 tpy meeting the specified requirements with expansion capability designed to meet the first expansion to a minimum 250,000 tpy. On-site utilities are scaled to 400,000 tpy ultimate phase however Ultimate 400,000 tpy facility not clearly or only conceptually identified. **2-4** - Expansion plans to meet the first expansion to the minimum 250,000 tpy requires minimal modification of the building envelope with shutdowns between two to six months. On-site utilities designed initially or scalable to meet ultimate 400,000 tpy facility. **5-7** - Clearly detailed plans for the expansion to the minimum 250,000 tpy facility indicating no process interruptions beyond regularly scheduled shutdowns (ie. Less than two months). On-site utilities designed initially or scalable to meet ultimate 400,000 tpy facility. **8-10** - Detailed site plan for expansion from 140,000 tpy to 250,000 tpy to 400,000 tpy which accommodates traffic, storm water management, avoids teardown, describes the efficiency of the phased implementation program and an approach to streamlined approvals.
Guarantees – points awarded based on the extent that the reduced project Construction Period Guarantee (Form 4 Section 1) and increased points for greater Guaranteed Facility Availability guarantee (Form 4 Section 7).	**GUARANTEES** (Reduce project length and greater availability.) **Schedule** (Construction activity schedule as per Form 4 with relative scoring based on detailed/validated justification of the timeline) **0 -** Do not provide construction duration guarantee **1-3** Construction duration that goes beyond 34 months from Notice to Proceed **4-5** Construction duration >32 to 34 months. **6-7 -** Construction duration 30 to 32 months. **8-9 -** Construction duration 28 to <30 months. **10 -** Less than 28 months.

Weighting – 0.1	**Availability** (Availability as per Form 4 with relative scoring based on detailed/validated justification) **0 -** Less than 90% availability. **5 -** At least 90% availability**.** **6-7 -** 90% to 92% availability. **8-9 -** 92.1% to 94% availability. **10 -** Greater than 94% availability
Facility design – points awarded based on the extent that the facility design proposal exceeds the minimum Technical Requirements, and for additional details/clarity of the design concept – i.e., level of detail in the basis of design and in required drawings. Weighting – 0.7	**0 -** The Facility design does not meet the minimum design criteria set forth in the Technical Requirements and bidder fails to provide the minimum required information and drawings required in Form 5 of the RFP. **1** The Facility design meets critical (i.e. facility throughput and environmental performance) required design criteria set forth in the Technical Requirements and Form 5, any information missing is either not applicable or inconsequential **2-4** The Facility design meets critical (i.e. facility throughput and environmental performance) and most of the other required design criteria (including reliability and energy recovery as a minimum) set forth in the Technical Requirements and Form 5, any information missing is either not applicable or inconsequential **5-7** The Facility design meets critical (i.e. Facility throughput and performance) and the majority (eg. 85%-90%) of the required design criteria set forth in the Technical Requirements and Form 5, and any information missing is either not applicable or inconsequential. **8 – 10** The Facility design exceeds the minimum design criteria set forth in the Technical Requirements using proven technologies/methods with an emphasis on maximizing one to all of the following performance parameters: 1) facility throughput; and/or 2) reliability; and/or 3) energy recovery; and/or 4) environmental performance.
Facility operations and maintenance – points awarded based on the level of detail and extent to which Annual, Five Year and Life Cycle O& M plans meet or exceed the Technical Requirements and generally accepted industry standards. Weighting – 0.6	**Refers to RFP Section 4.5.3** (Generic through to detailed and comprehensive plans that include facility annual, five year and life cycle maintenance plans to be submitted as Appendices 28, 29A and 29B) **0 -** Missing or substantially incomplete Operations and Maintenance Plans provided so not meet the requirements set out in the RFP and the Technical Requirements (Reference Appendices 28, 29 A&B). **1-4** The O&M plan meets critical proposal submission requirements (4.5.3.1/.1 to .9) and requirements as set forth in the Technical Requirements and Form 3, any information missing is either not applicable or inconsequential **5-7** The O&M Plan meets the general industry standards of care for main elements of the facility (listed below) and plan is sufficiently detailed to demonstrate a credible plan integrated with the overall proposal **8-10 -** The O&M Plan that exceeds the minimum requirements set forth in Section 4.5.3 of the Technical Requirements and the current industry standard, including a detailed maintenance/capital replacement plan for the facility AND minimizes project costs and maximizes revenues. (in particular, 4.5.3.1 / 10 / 11 / 13). Based on HDR's evaluation of how well the submission meets or exceeds the Technical Requirements Appendix Includes but not limited to:

	• Buildings, grounds, structures and infrastructure • Electrical systems and instrumentation • Mechanical equipment, pumps etc • Mobile equipment • Lab / monitoring and sampling equipment • HVAC • Communication • Computer equipment • Control facilities
Innovation - Points awarded based on innovation elements based on degree of identification and control of risks; environmental, economic , and social benefits; added value and demonstrated ability within the proposal to actually implement. Weighting – 0.5	**0 -** No innovations beyond scope of the contract. **1 -** Innovative, but unproven and no commercial benefit. Plan is sufficiently well elaborated to confirm high likelihood of implementation within time frame of the project. **2-4 -** Innovative and proven technology with identified and controllable risks and minor commercial or environmental benefit; Plan is sufficiently well elaborated to confirm high likelihood of implementation within time frame of the project. **5-7 -** Innovation would provide minimal risk and moderate economic or social/ environmental benefit. Plan is sufficiently well elaborated to confirm high likelihood of implementation within time frame of the project **8-10 -** Innovation would provide virtually no risk and substantial economic or social/ environmental benefit. Plan is sufficiently well elaborated to confirm high likelihood of implementation within time frame of the project WPCP effluent use by facility Advantageous market plan for fly-ash Advantageous market plan for bottom-ash New process for air pollution control with lower capital and operational cost Any innovation that would lessen flow thru costs or operating costs

9.2.2.4 Project Delivery Considerations

The principals of Project Management ensure that a Plan-Do-Check system has been implemented with sufficient checks and balances to ensure a facility is designed, built and operated in an efficient and effective manner to optimize output while protecting the environment and the safety of the employees and the community.

Twenty (20) points were assigned to Project Delivery considerations: Up to six (6) points were assigned to Schedule and Cost Control systems, including information on: project management; project milestones; budget forecasting; and, cost control measures.

An additional six (6) points could be assigned based on construction impact controls including Quality Assurance (QA)/Quality Control (QC); construction impact mitigation; environment, health and safety and community relations plans.

Up to two (2) points were assigned to Team Organization and Qualifications and the review included assessment of documentation relating to the proponent's project management qualifications, the accountability framework, corporate experience and track record on similar projects.

The final six (6) points available under Project Delivery related to the proponent's plan to facilitate approvals and examined the proposed time allocation and schedule for obtaining all necessary approvals and permits including the CofAs from the MOE.

Within the project management section, the Covanta proposal scored top marks in more individual sections than any of the other proposals. The Covanta proposal provided the best combination of personnel qualifications and management plans necessary to design, build and operation the EFW facility.

Table 9-8 Project Management Elements (Total of 20 Points)

Critical path management – points awarded based on comprehensive details and reasonableness of plans for maintaining construction schedule and meeting schedule guarantee Budget forecasting and cost control measures – points awarded based on comprehensive detail of plan for maintaining cost control and meeting milestone targets Weighting – 0.6	**SCHEDULE AND COST CONTROL** • **Critical path management** • **Budget forecasting and cost control measures** • **Contingency Plan** **<u>Refers to RFP Section 4.5.2.2 and Form 4 Schedule Guarantee</u>** **0** - Missing or substantially incomplete plans that do not meet the requirements of the proposal Submission Requirements. **1-4** Provides systems and plans as specified in Submission Requirements but do not provide sufficient details and/or clear linkages to milestone payment schedule and schedule guarantees. Minimal or no contingency / alternative plans identified. **5-7** Provides systems and plans as specified in Submission Requirements that are clear and consistent and linked to milestone payment schedules and schedule guarantees. Provides industry accepted software with proven experience; identifies general "contingency" plan to minimize impacts on schedule, budget and performance; such as currency risk, labour requirements; licensing, but with minor inconsistencies. **8-10** Provides systems and plans as specified in Submission Requirements that are clear, consistent and specific to the project and their proposal. The systems and plans are linked to milestone payment schedule and schedule guarantees. Provides industry accepted software with proven experience; identifies critical elements of the plans and presents comprehensive and consistent alternatives to minimize impacts on schedule, budget and performance; such as currency risk, labour requirements; licensing, • Cost management & control System • "Contingency" plan specific Management Plan • Plan and schedule for Early Works • Budget forecast needs to align to schedule. • Cost control adds robustness to the overall plan. • Give sufficient detail, so we are comfortable.
<u>METHODS</u> – (6 Points) Points awarded based on comprehensive detail in each of the following plans and their integration within the submission: • Quality Assurance/Quality	**METHODS** • Quality Assurance/Quality Control Plans • Construction Impact Mitigation, Complaint Mitigation Methods • Environmental and Management Plan consistent with ISO 14001 • Health and Safety Plan (including emergency management) • Community Relations Plan **0** - Unacceptable Plan.

Control Plans • Construction Impact Mitigation, Complaint Mitigation Methods • Environmental and Management Plan consistent with ISO 14001 • Health and Safety Plan (including emergency management) • Community Relations Plan Weighting – 0.6	**1-4** Plan meets minimum requirements of the specifications. No breakout of construction and operations. Minor variances between other proposal elements and plans. (e.g. includes mention of pre-sort) **5-7** - Generic plan with more details specific to the proposed facility. Identifies breakout of construction and operations. **8-10** - Detailed plan that integrate fully with the project and other elements of the submission including plans/schedules/methods. Detailed construction/operation phase.
Team Organization and Qualifications Points awarded based on completeness and clarity of organizational plan, roles and responsibilities • Project management qualifications • Experience and track record • Accountability framework Weighting - 0.2	**TEAM ORGANIZATION AND QUALIFICATIONS** **Refers to RFP Section 4.7** **0 -** Has not included requested information as per 4.7.3 and 4.7.4 or information is incomplete or unacceptable because it does meet the minimum requirements. 1 Provided information requested: • Organizational Structure for design-build and operation phases (two charts but no link) • Confirmation that there is no change in the proposed teams from the RFQ or subsequent approved requests for changes • Confirmation that there is no change in the key personnel proposed in the RFQ or subsequent approved requests for changes • Confirmation that disclosed information request is provided (as per 4.7.3) 2 Demonstrated and clear links between the team members and the major components of the two phases (design–build and operations) • Clear lines of authority consistent with a project of similar scope and magnitude
Permits/Approval Plan Points awarded based on demonstrated understanding of Early Works Agreement schedule and plan; increased points for clarity and input in the	**PERMITS AND APPROVALS PLAN** This is an evaluation of their Early Works Agreement details, Appendix 24 of Project Agreement and Section 4.5.2.2.9 of the RFP • Permitting Schedule • Coordination with Project Schedule

four areas below: • Permitting schedule • Coordination with project schedule • Understanding and experience with local approval requirements • Minimized reliance on Regional Staffing resources Weighting - 0.6	• Understanding and Experience With Local Approval Requirements • Degree of Support Required From Regions **0** Failure to identify critical known approvals through to Notice to Proceed (Early Works Agreement). **1-4** Identified critical known approvals shown with realistic timeline estimates. **5-7** Identified critical known approvals shown with realistic timeline estimates and contingency plan. Plan illustrates knowledge of requirements for various permit and approval categories and the operator's role in obtaining each permit. **8-10** Identified critical known approvals shown with realistic timeline estimates and contingency plan. Plan reflects different requirements for various permit and approval categories and the operator's role in obtaining each permit. Additionally, the plan indicates that the proponent has made contacts with important Regulatory Agencies. Timelines are evaluated with linkages between approvals and pressures on approvals identified. Plan provides realistic scheduling of work to acquire approvals. Early Works work plan provides schedule and dates. Demonstrated experience with Canadian/Ontario and local approval processes with appropriate jurisdictions in projects of a similar scope and complexity. Minimizes input required from Regions

9.2.2.5 Cost and Commercial Considerations

The RFP required proponents to provide a detailed computer model that allocated capital and operating costs through the lifecycle of the contract, consistent with RFP requirements and the submitted proposal, and including detailed capital, operating, maintenance and lifecycle costs as well as performance guarantee.

A total of 35 points could be assigned to Cost and Commercial Considerations:

- Up to five (5) points were assigned based upon the Evaluation Team's assessment of the integrity of the financial model and reasonableness of cost inputs; including consideration of whether the Model was consistent with RFP requirements, the proposal submitted, and with benchmarks based upon projects of a similar scope and nature;
- Up to 20 points were assigned for the value for money components including the magnitude of the Net Present Value (NPV) cost, timing of cash flows, and the sensitivity of costs to the Regions;
- The final 10 points under Cost and Commercial Elements were assigned based upon the financial capacity and condition of the project guarantor, acceptance of construction inflation, and other guarantees provided within the proposal.
- The Proposals were evaluated by the Evaluation Committee in two stages. First, Proposals were reviewed on a preliminary basis to determine whether compliance with the mandatory requirement was achieved (stage 1). Second, those Proposals that passed the stage 1 evaluation were then evaluated on a substantive basis as more particularly described below.

The evaluation of Cost and Commercial Elements was completed based on a collective assessment of evaluation factors to determine a single collective score under each element of RFP "Section 4.6 Part 3 – Cost and Commercial Consideration," (i.e., RFP Section 4.6.1 Capital and Operating Costs, Section 4.6.2 Value for Money, and Section 4.6.3 Guarantees). Because the assessment included qualitative and quantitative analyses, the lowest priced proposal was not necessarily awarded the highest score. Since it was assumed that all proposals would meet minimum requirements, proposals which exceeded minimum requirements were awarded the highest scores.

Table 9-9 RFP Substantive Requirement - Cost and Commercial Elements

Stage 2: Substantive Evaluation – Cost and Commercial Elements	
Criteria	Description
Cost and Commercial Elements (Total of 35 points)	
Capital and Operating Costs (5 points) Evaluation Factors: • Reasonableness of all cost inputs, including methodology and approach used to determine Unitary Major equipment Repair and	Considerations: • A qualitative assessment of the factors will be completed on a collective basis by assessing the degree to which capital costs, maintenance costs, life-cycle costs and operating costs including in the Model are consistent with: 1. RFP requirements; 2. Proposal details; and 3. Projects of a similar scope and magnitude.

Stage 2: Substantive Evaluation – Cost and Commercial Elements	
Criteria	Description
Facility Refurbishment Costs • Integrity of the Model	
Value for Money (20 points) Evaluation Factors: • Magnitude of NPV costs to the Regions • Timing of cash flows and costs to the Regions • Sensitivity of costs to the Regions	Considerations: • An assessment of the factors will be completed on a collective basis by assessing the stability and magnitude of both nominal and NPV costs, including: 1. Comparison to the lowest NPV Proposal; 2. Comparison to the lowest Total Annual Operating Fee; 3. Degrees of fluctuation in nominal and NPV costs due to sensitivity analyses; and, 4. Impacts to value for money considerations, based upon alternative/innovative options provided by the Proponent (only considered where a new and complete model is provided for any and each alternative proposal as per section 4.6.2.4).
Guarantees (10 points) Evaluation Factors: • Financial capacity and condition of the Project Guarantor • Construction inflation • Other guarantees	Considerations: • A qualitative assessment of the factors will be completed on a collective basis by assessing: 1. The condition and capacity of the Parent Guarantor; 2. The degree to which the Proponents construction costs are fixed in the Proposal; and 3. The degree to which the guarantees in Form 4 will benefit the Regions.

9.2.2.6 Fairness Monitor Review of RFP Process

KPMG's role was solely that of an observer to the RFP process. KPMG provided oversight throughout the process, including the evaluation, to ensure fairness, consistency and that the evaluation adhered to the pre-determined evaluation criteria. KPMG was involved throughout the entire Thermal Treatment Facility procurement process in order to assure both Regional Councils and the bidders/vendors that an open, fair, consistent and accountable process was conducted.

KPMG's work was based on the following:

- Discussions and meeting with the Region staff and advisors to discuss the RFP documents, procurement process, evaluation and related matters;
- Review of the RFP document prior to issue;
- Review of the RFP Selection Framework and the Process and Principles for Evaluation of RFP-604-2008 Proposals;
- Review of the evaluation process, including the evaluation criteria and evaluation tools;
- Review of addenda, and questions and answers issued prior to the RFP deadline;
- Review of clarification questions issued to Proponents during the evaluation;
- Review of the evaluation reports, and;

- Attendance at certain events and meetings, including all commercial in confidence meetings, the evaluation briefing session, the RFP closing and compliance review, and select meetings of the Evaluation Team (including meetings to develop and finalize the evaluation criteria and supporting scoresheets and meetings to assess the Proposals and reach final consensus scores).

KPMG's Methodology to Assess Fairness

KPMG's approach to fairness monitoring was based on a set of fairness principles that are described above in Section 9.1.2.6. The fairness principles used by KPMG in the RFQ process are the same as those that were used in the subsequent RFP process.

Conclusions

Based on its approach and information available, KPMG indicated in a letter to Regional staff containing the above information that KPMG is satisfied that the RFP process was fair to all Proponents.

9.2.3 Recommended Preferred Vendor

Based on its consensus evaluation, the evaluation team unanimously recommended Covanta Energy Corporation (Covanta) to Regional Councils as the preferred proponent. Covanta not only achieved the highest aggregate score, but also achieved the highest score in each of the three elements outlined in the RFP (technical; project delivery; and cost and commercial considerations).

Covanta is proposing to be the single source, full service contractor to design, permit, build, startup, commission and operate the Facility for the Regions of Durham and York. Covanta is the largest provider of thermal treatment services in North America with 35 operating facilities in the United States, including 24 that were designed and built directly by Covanta. Covanta would serve as the overall project coordinator with the responsibility for directing the design, engineering, procurement of equipment, and construction of the new Facility. The Covanta Team includes: Aecon Group, Inc. (Construction Services); Sigma Energy Solutions (Engineering); McMillan Associates (Architects); CH2M Hill (Environmental Consultant); and Miller Waste Systems (Waste Disposal/Transportation). Martin GmbH (Martin) will serve as Covanta's thermal treatment technology partner. Martin supplied the technology that is currently used at 22 of Covanta's facilities, as well as numerous facilities in Europe.

The following outlines key components of the Covanta proposal:

- APC, including a Flue Gas Treatment Design that includes: Covanta's proprietary Very Low NOx (or FLN™) system (further described below); a Selective Non-Catalytic Reduction (SNCR) system with aqueous ammonia injection for additional NOx control; powdered activated carbon (PAC) injection for mercury and dioxins control; a spray dryer absorber (SDA) for acid gas control; and a fabric filter baghouse for particulate heavy metals removal.

- Dual boiler system with a design capacity of 140,000 tpy, incorporating continuous emissions monitoring systems and dioxin samplers for both systems with flue gas trains fed into a common flue.
- Zero process water discharge to sewer with water sourced from municipal supply. Captured rainwater would be used for site irrigation and the plan incorporates the use of drought-tolerant species to minimize irrigation needs.
- Bottom ash and stabilized fly ash sent for landfill disposal in New York. Corporate wide material recovery and marketing division to maximize revenues from recovered non-ferrous and ferrous materials. Covanta has provided a letter from Miller Waste guaranteeing long-term disposal capacity over the life of the contract.
- Odour on the tipping floor would be controlled by a ventilation system that draws air from outside at all times through the receiving area and above the waste storage pit and finally directed to the combustion units for use as combustion air. Dual combustion systems offer the additional advantage of minimizing shut-down times for the odour control system since at least one system would operate all of the time.
- Noise during regular operations mitigated by confining all operations to enclosed areas. Covanta would limit construction activities that create noise to comply with local noise by-laws and would implement a community complaints system to address local concerns during both construction and operational phases.
- Energy recovery is optimized for both electricity generation and potential future district heating scenarios. Covanta has proposed a 20 MW generator capable of maintaining some electricity output even if one boiler unit is shut down. The turbine generator incorporates an extraction turbine as well as physical space for the heat exchangers, pumps and other required equipment for the future district energy system. Covanta provided the highest net electricity production and performance guarantees of any vendor, with and without a future district heating system.
- Expandable Facility with an initial capacity of 140,000 tpy would be provided by dual 70,000 tpy boiler units. Covanta provided a clear plan delineating expansion in from the initial capacity of 140,000 tpy to a final capacity of 400,000 tpy. The final expansion includes additional process buildings and an additional stack. Covanta has sized the utilities (water, sewer, gas, and electric) for the ultimate 400,000 tpy Facility.
- Guarantees from Covanta included the shortest construction period of all proponents and 90% plant availability.
- Facility Design meets or exceeds critical design criteria and Covanta’s proposal meets critical throughput and environmental performance requirements.
- Operations and Maintenance plans included detailed plant management charts and provided comprehensive details relating to waste handling; environmental monitoring; power generation; contingency operations; and a preventative maintenance plan to facilitate operation and provide for the turn-over of the plan in an acceptable condition at

the end of the operating term. Covanta also provided a financial model to support these plans.

- Construction planning and critical path analysis indicated a potential process start-up date by the end of 2013, dependent upon the completion of the EA and EPA processes.
- Innovations include – Covanta's proprietary VLN^{TM} System that reduces the formation of NOx emissions by staging combustion and reducing the amount of Excess Air required in the furnace. This also reduces parasitic electricity demands. The proposed high pressure/high temperature boiler design results in higher steam cycle efficiency enabling Covanta to maximize energy recovery.

The Covanta proposal received the highest score under Cost and Commercial considerations and included:

- Provision of a detailed financial model including capital, maintenance, life-cycle, and operating costs deemed consistent with the RFP requirements and with benchmarks based upon projects of a similar scope and nature. The detail and costing were supported by rationale that demonstrated consistency with accepted industry practices, including provision of adequate backup documentation;
- The lowest total annual operating fee, highest available electricity revenues and the lowest overall project NPV;
- The lowest construction price and a commitment to accept adjustments for inflation commencing April 30, 2009 and up to the Notice to Proceed (NTP) date, that would be indexed based upon independent third party data from Engineering News Record for (Toronto, Ottawa) as follows: 0% of the Construction Cost Index (CCI); 30% of the Material Cost Index (MCI); and 70% of the Building Cost Index (BCI).;
- Corresponding to the best technical guarantee for energy recovery, Covanta provided the highest annual revenues, primarily from electricity sales (based upon an assumed 8 cents per kilowatt hour (kWh)). Electricity revenues remain the highest with and without consideration of future district heating requirements; and,
- Sensitivity analysis performed on the Covanta financial submission demonstrated that the Covanta proposal would remain the lowest cost proposal under each sensitivity scenario investigated as defined within the RFP documentation.

Covanta's submission includes a commitment to:

- A Total Annual Operating Fee of $14.67 million (as of February 19, 2009), excluding consideration of revenues from electricity or ferrous and non-ferrous recoveries;
- An electricity production guarantee of 767 kilowatt hours per tonne of waste (kWh/T) and a guarantee of 90% Facility availability; and,
- A Construction Price of $235.76 million (as of February 19, 2009).

The Covanta electricity production and availability guarantees noted above result in approximately a minimum of $8.59 million in annual electricity revenues to the Facility, assuming a fixed power purchase price of 8 cents per kWh/T. Any increase in waste throughput beyond 140,000 tpy would increase annual power production.

9.3 Confidentiality and the Procurement Process

The conclusion of the evaluation team recommending Covanta as the preferred proponent is described, along with a summary of the assessment of Covanta's bid. It is noted in this Section that in each of the three elements outlined in the RFP (technical, project delivery and cost and commercial considerations), Covanta scored higher than the other bidders and that the fairness monitor indicated that the process was fair to all bidders.

In preparing for the submission of the EA every effort has been made to include as much information as possible. There are, however, other factors that place limits on the nature of the information that is capable of being disclosed in these particular circumstances.

An integral component of the process of public procurement in Canada is the need to keep strictly confidential information that is integrally related to the evaluation of the bids apart from the fact that Covanta placed first in the three elements outlined in the RFP. To make further disclosure would put the procurement process in jeopardy.

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Section 10 Summary

The Undertaking, as defined by this Environmental Assessment, is a Thermal Treatment Facility, capable of processing post-diversion residual waste and recovering materials and energy of sufficient quality and quantity to export to the marketplace (recovered metals, electricity and eventually the possibility of district heating and cooling) with an approved capacity of 140,000 tonnes per year. It is anticipated that over the 35 year planning period the maximum design capacity of the facility could be up to 400,000 tonnes per year. The expansion of this facility beyond the approved capacity of 140,000 tonnes per year would subject to environmental screening requirements under Ontario Regulation 101/07, as amended, (or the applicable piece of legislation at the time of expansion). The Facility will be designed, built and operated on the Clarington 01 Site, located in the Municipality of Clarington, Regional Municipality of Durham.

At the approved design capacity of 140,000 tpy, there will be two completely independent waste processing trains at the Facility. Each train will consist of a feed chute, stoker, integrated furnace/boiler, acid gas scrubber, a fabric filter baghouse and associated ash and residue collection systems. Steam produced in the boilers will drive an electrical power generating system consisting of one turbine-generator set, switchgear and an air cooled condenser, to produce electricity for delivery to the grid and for in-plant use and potentially to provide district heating and/or cooling to the neighbouring Courtice Water Pollution Control Plant and Clarington Energy Business Park.

Figure 10-4 illustrates a simplified conceptual process flow for the Facility and its operations.

The Facility description provided in Section 10.6 of the EA Study document describes each component of the facility including:

- Facility Process Flow;
- Air Pollution Control (APC);
- Residue Handling;
- Energy Production;
- Potable, Process and Waste Water;
- Facility Structures;
- Process Control Systems; and,
- Process Mass and Energy Balance.
- Electrical System Design

It is anticipated that at some point during the 35-year planning period there may be a need to expand the Facility in order to accommodate the processing of additional post-diversion residual wastes as a result of a number of factors including:

- whether or not Durham and York achieve their planned waste diversion targets;
- whether or not higher diversion rates are achieved during the planning period;

- whether there is potential for managing post-diversion residual waste from neighbouring non-GTA municipalities as well as IC&I waste;
- economic growth and other factors which could result in higher overall quantities of waste requiring disposal over the planning period; and,
- initiatives such as extended producer responsibility which could result in lower quantities of waste requiring disposal over the planning period.

The design of the Facility is such that it can accommodate the initial design capacity and many aspects of the expansion requirements. However, expansion beyond the approved capacity of 140,000 tpy would be addressed as part of the approval under O.Reg. 101/07 (or the applicable piece of legislation at that time). The Facility design also includes provisions for future supply of hot water district heating with 100% availability to the nearby Courtice Water Pollution Control Plant and the future Clarington Energy Business Park.

10. Identification and Description of the Undertaking

The following section describes the Undertaking and its components.

10.1 The Undertaking

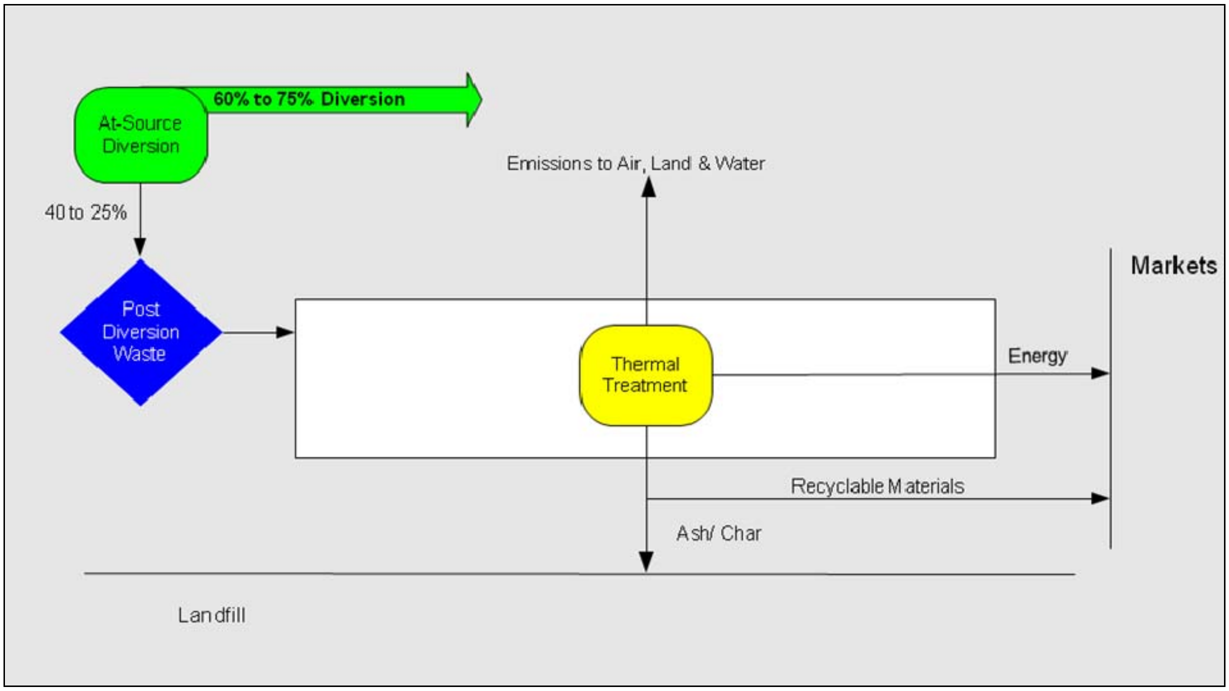
The Undertaking, as defined by this Environmental Assessment, is a Thermal Treatment Facility, capable of processing post-diversion residual waste and recovering materials and energy of sufficient quality and quantity to export to the marketplace (recovered metals, electricity and eventually the possibility of district heating and cooling) with an approved capacity of 140,000 tonnes per year. It is anticipated that over the 35 year planning period the maximum design capacity of the facility could be up to 400,000 tonnes per year. The expansion of this facility beyond the approved capacity of 140,000 tonnes per year would subject to environmental screening requirements under Ontario Regulation 101/07, as amended, (or the applicable piece of legislation at the time of expansion). The Facility will be designed, built and operated on the Clarington 01 Site, located in the Municipality of Clarington, Regional Municipality of Durham.

10.2 Approach to Identification of the Undertaking

The selection of the preferred post-diversion residual processing system, the preferred site, and the preferred vendor as documented in Sections 7, 8 and 9 of this EA Study was made following a complete analysis and evaluation of all reasonable alternatives.

As discussed in Section 7.7, the Recommended Long-Term Residual Waste Disposal System identified as a result of the evaluation of “Alternatives to” is *System 2a – Thermal Treatment of MSW and Recovery of Energy followed by the Recovery of Materials from the Ash/Char*. Although System 2a was identified as the Preferred Long-Term Residual Processing System, *System 2b - Thermal Treatment of Solid Recovered Fuel (SRF)* was considered to exhibit an acceptable range of advantages and disadvantages and was carried forward for consideration in the evaluation of “Alternative methods” during the competitive process described in Section 9.0. It was recommended that the RFQ and the RFP from qualified vendors allow for the submission of proposals to implement both System 2a and System 2b, and that the final decision on the technologies used to implement the preferred residual processing system would be based on the results of these competitive processes. This resulted in the final decision to proceed with *System 2a – Thermal Treatment of MSW and Recovery of Energy followed by the Recovery of Materials from the Ash/Char* as the preferred technology as noted in Section 7.0 and illustrated in Figure 10-1 below.

Figure 10-1 Preferred "Alternative to" – Thermal Treatment with Recovery of Materials and Energy



As discussed in Section 8.9, the Recommended Preferred Site to locate the Proposed Thermal Treatment Facility (the Faclity) is Clarington 01. Clarington 01, illustrated in Figure 10-2, is owned by Durham and is about 12.1 hectares being comprised largely of undeveloped land and is located in the Clarington Energy Business Park south of Highway 401 in the Municipality of Clarington. The Site is located on the west side of Osborne Road north of a CN Rail corridor. There are commercial properties north and southeast of the Site while the lands east and west of the Site are mostly undeveloped and are currently used for agricultural purposes. The Courtice WPCP, is located just south of the Site and the Darlington Nuclear Generating Station is located approximately 1.8 kilometres to the east. The nearest major intersection is Highway 401 and Courtice Road, which is approximately 1.7 kilometres from the Site.

The combination of the recommended long-term post-diversion residual waste disposal system *System 2a – Thermal Treatment of MSW and Recovery of Energy followed by the Recovery of Materials from the Ash/Char* and the Site, with Covanta Energy selected as the Preferred Vendor to Design, Build and Operate the Facility, comprises the Undertaking.

The design concept for the Undertaking is based on the requirements set out by the Regions in the RFP document and the Proposal submitted by Covanta. The preliminary design and description of the Facility and development of the Site has been undertaken in sufficient detail as to allow for the assessment of Facility-specific impacts on the Site and surrounding area. This description is intended to provide a sufficient conceptual level of detail on which to base a decision regarding EA-level approval of the Undertaking and to guide the development of more detailed design as the Undertaking proceeds into the permitting phase of the approvals process.

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Clarington 01 Site

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- Courtice Water Pollution Plant
- Collector
- Expressway / Highway
- Railway
- Watercourse
- Clarington 01 Site

0 50 100 150

Metres - 1:7,500

1009497-079

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FIGURE NO.

10-2

Last Modified: June 10, 2009 By: S.Allen

10.3 Refinements to the Original Description of the Undertaking

As stated in Section 3.2 of the Approved EA Terms of Reference, the description of the Undertaking may be "refined or altered" based upon the findings at various steps in the EA Study together with input received from the public and/or stakeholders over the course of the EA Study. The "final description of the undertaking" as outlined in sections 10.1 and 10.2 above, is comprised of refinements based on EA Study findings and public/stakeholder input and is included in this EA Study document in accordance with the Approved EA Terms of Reference.

Following are summary outlines of the key refinements to the description of the Undertaking that were made over the course of the EA Study.

10.3.1 Waste Requiring Management Considered in the EA

In the Approved EA Terms of Reference, the following is the description of the Undertaking that was provided:

> ***"3.2. Description of the Undertaking***
> *…The undertaking that would be the subject of an EAA approval in accordance with this EA Terms of Reference would be a residual waste processing facility(ies), which would be capable of managing the minimum annual 316,000 tonnes/year of residual wastes projected to remain after the achievement of the Regions' diversion objectives. This amount includes the receipt of a quantity of additional post-diversion waste from other sources. Over the 35-year planning period (starting in 2011 and ending in 2045) it is projected that a minimum of 13,300,000 tonnes of residual wastes will require management. Background Document 2-11 provides additional details on the development of these estimates."*

The minimum quantity of 316,000 tpy was calculated, for the purposes of the Approved EA Terms of Reference, assuming (Table 10-1):

Table 10-1 Original Waste Supply Assumption in EA Terms of Reference

Source of Waste	Contribution
Durham & York (calculated at 60% waste diversion in 2011)	255,920 tonnes/year
Waste Quantities from Other Sources	60,000 tonnes/year
Total:	315,920 tonnes/year

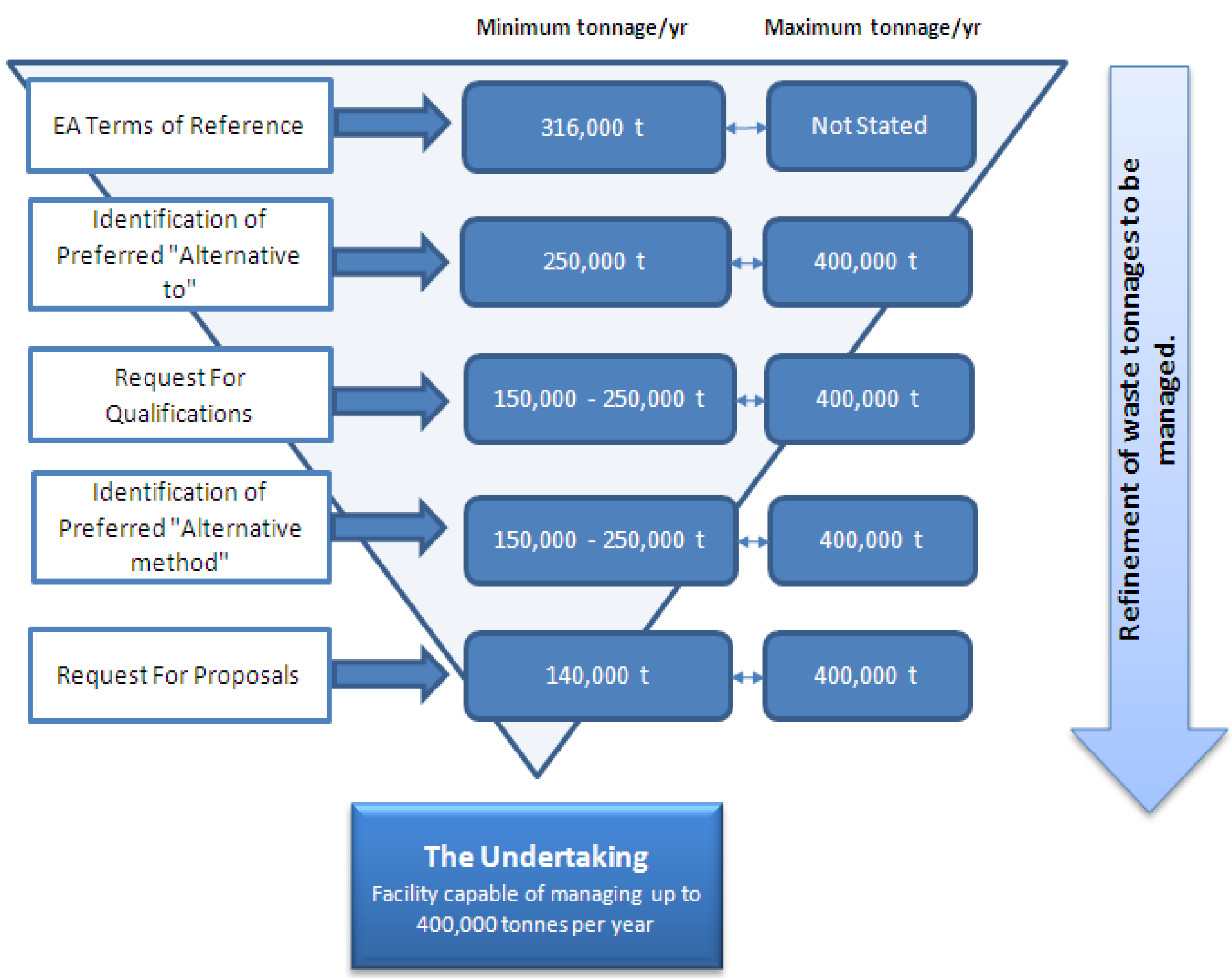
During the EA Study, the estimates of the minimum annual quantity of post-diversion residual waste were refined as both Regions proceeded to further develop their waste diversion programs. Discussion on the tonnage refinements is provided in Sections 7 and 8 of this document. In particular, Section 7.0 provides the detailed rationale supporting the maximum potential need of 400,000 tpy.

Throughout the EA Study process, the quantity of 400,000 tpy was consistently identified and included in the evaluation as the maximum capacity of the Facility that may be required at some point during the 35-year planning period. The minimum capacity required has varied, based on diversion system performance, updated diversion targets and municipal decisions (e.g., York's agreement with another company to process a portion of York's residual waste stream) that have occurred over the course of the EA Study. The Undertaking for which approval is being sought is therefore an Energy-from-Waste Facility with an initial approved capacity of 140,000 tonnes per year and a projected maximum design capacity of 400,000 tpy.. This approval will provide sufficient capacity (with a small contingency) for Durham and York Regions post-diversion residual waste stream. Any additional waste streams, from Durham, York or other waste generators, will require an expansion of the facility which, as described above, will be the subject of an additional approval under the EAA.

At the time of submission of this EA Study document, no agreements have been reached with neighbouring non-GTA municipalities for the supply of other post-diversion residual waste materials.

Figure 10-3 provides a graphical representation of waste tonnages that were considered at each step in the evaluation process of the EA and refinements to the minimum residual waste quantities as the initial needs of the Proponents changed.

Figure 10-3 Waste Tonnage/Facility Expansion Considered in EA



10.3.2 Consideration of Energy Generation Potential in the EA

The approved EA Terms of Reference included recovery of energy as a key element in the purpose of the Undertaking.

> ***"3.1. Purpose of the Undertaking***
>
> *The purpose of the undertaking is:*
>
> *to process - physically, biologically and/or thermally - the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources - both material and energy - and to minimize the amount of material requiring landfill disposal.*
>
> *In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered."*

In regards to consideration of alternatives in the Approved EA Terms of Reference, only those technologies that were capable of recovering materials and/or energy were identified for consideration during the EA Study. However, as the EA Study progressed and alternative technologies were reviewed and evaluated, it became apparent that some systems and technologies were able to generate energy beyond that required to meet internal energy demands. This energy-generation potential became an opportunity to reduce the financial impact of the Facility through the sale of energy and reduce the environmental impact of residual waste management by offsetting other forms of energy generation in Ontario. The following provides an overview of how energy generation was considered in the EA Study process.

- The review of "Alternatives to" identified, through the evaluation process that the preferred system is capable of recovering energy and that the energy recovered would be greater than that required to sustain internal facility energy requirements. Systems were considered to be "advantaged" over other systems in this process if the energy generated could be marketed thereby offsetting facility operating costs.
- A full Life Cycle Analysis (LCA) was completed on each system and identified the net benefit of energy generation in comparison to other forms of generation currently supplying energy to the Ontario market.
- The review of "Alternative methods" included criteria related to the proximity of electrical infrastructure and the potential for district heating opportunities to support the needs of the Facility.
- Both the RFQ and RFP considered the ability of the Facility to generate energy; the quantity of energy produced; and the overall operating cost implications of this revenue source. The revenue generation potential from the sale of electricity is a guaranteed amount by Covanta.
- An energy assessment has been completed to assess the energy generation potential of the preferred vendor Facility on the Site. This assessment includes quantities of potential energy generated together with an updated LCA.

10.3.3 Beyond Compliance Objectives

The Approved EA Terms of Reference included a statement in the Purpose of the Undertaking as follows:

> ***"3.1. Purpose of the Undertaking***
>
> *…In proceeding with this undertaking only those approaches that will meet or exceed all regulatory requirements will be considered."*

To ensure that the approach undertaken could not only meet the regulatory requirements of the day, but also, where possible, be able to do better, the following initiatives were incorporated into the process and the Undertaking:

- ***Air Emissions standards*** – the air emissions standards that will govern this Facility are the lower of Ontario A-7 limits and EU standards. These limits were incorporated into the RFP process to ensure that parties responding to the RFP designed their proposed facilities to not just meet, but go beyond current Ontario regulatory requirements where possible.
- ***Air Emissions monitoring*** – the Facility is being fitted with a continuous dioxin sampling system to assess, monthly, the dioxin emissions from the Facility. This degree of monitoring is only currently being used in select state-of-the-art facilities in the world.
- ***Stormwater Discharge*** – the Facility and associated stormwater management works are being designed for "Enhanced Protection" which will ensure water being discharged from the Site will meet the highest water quality standard for stormwater.
- ***Process Water Discharge*** – the Facility is being designed for zero process water discharge to allow for recirculation of water within the system and limit the potential impacts to water resources.
- ***Environmental Management*** - the Facility will be consistent with International Standards Organization 14001:2004 Environmental Management Standards (ISO 14001).

The above beyond compliance emissions objectives have been committed to by the Regions (through its Endorsement of the EA Study document).

10.4 Waste to be Managed and Service Area

As outlined in Section 3.1 of the Approved EA Terms of Reference:

> *"Specifically, the waste to be managed will be:*
>
> - *Municipal Solid Waste (MSW) from residential sources generated within Durham and York Regions remaining after at-source diversion;*
> - *A portion of post-diversion Industrial, Commercial and Institutional (IC&I) waste traditionally managed by the respective Regions at Regional waste disposal facilities; and,*
> - *Municipal post-diversion residual waste from neighbouring non-Greater Toronto Area (GTA) municipalities that may provide disposal capacity for processing residues. For example, the City of Peterborough, the County of Peterborough and the County of Northumberland. A condition for including waste from neighbouring non-GTA municipalities in the total amount of material that would be managed by this undertaking, is the ability of these municipalities to provide disposal capacity (landfill space) for processing residues as neither Durham nor York currently have sufficient long-term disposal capacity for such residues."*

The approval being sought in this EA is for facility capable of processing 140,000 tpy. This will provide sufficient capacity (with a small contingency) for Durham and York Regions post-diversion residual waste stream. Any additional waste streams, from Durham, York or other waste generators, will require an expansion of the facility which, as described above, will be the subject of an additional approval under O.Reg. 101/07 (or the applicable piece of legislation at the time).

10.5 Preliminary Implementation and Operation Schedule

The following (Table 10-2) provides an initial schedule for implementation of the Undertaking.

Table 10-2 Implementation and Operation Schedule

Task	Timeline
Contractual Negotiations	April 2009 to end of January 2010
Engineering and Architectural Design	May 2009 to end of March 2010
Secure additional permits and approvals	June 2009 to end of September 2010
Detailed Design	January 2010 to end of June 2011
Procure Facility Components	January 2010 to end of May 2012
Construction	June 2010 to October 2012
Start-up and Commissioning	June 2012 to end of April 2013

The construction schedule is 33 months from the Notice to Proceed (assumed to be upon EA approval, identified on a preliminary basis as January 2010) to the Facility being mechanically complete at the end of September 2012, with another seven months of commissioning prior to the guaranteed Contractual Completion Date of the Facility.

10.6 Description of the Proposed Facility

The initial design capacity, and the capacity for which approval is being sought is for a Facility capable of processing up to 140,000 tpy. At this capacity, there will be two completely independent waste processing trains at the Facility (each 70,000 tpy). Each train will consist of a feed chute, stoker, integrated furnace/boiler, acid gas scrubber, a fabric filter baghouse and associated ash and residue collection systems. Steam produced in the boilers will drive an electrical power generating system consisting of one turbine-generator set, switchgear and an air cooled condenser, to produce electricity for delivery to the grid, for in-plant use and potentially to provide district heating and/or cooling to the neighbouring Courtice WPCP and Clarington Energy Business Park. Figure 10-4 illustrates a simplified process flow for the initial design capacity Facility and its operations.

It is anticipated that at some point during the 35-year planning period there may be a need to expand the Facility in order to accomodate processing of additional post-diversion wastes. The expansions are currently planned in two phases, in order to address circumstances that could arise over the planning period: The expansions would potentially occur as follows:

- Potential Phase 1 expansion to 250,000 tpy; and,
- Potential Phase 2 expansion to the maximum design capacity of 400,000 tpy.

The design of the initial Facility is such that it can accomodate the initial design processing capacity and many aspects of the Phase 1 expansion (250,00 tpy) requirements. The Phase 2 expansion (400,000 tpy), however, would require more effort to design and construct.

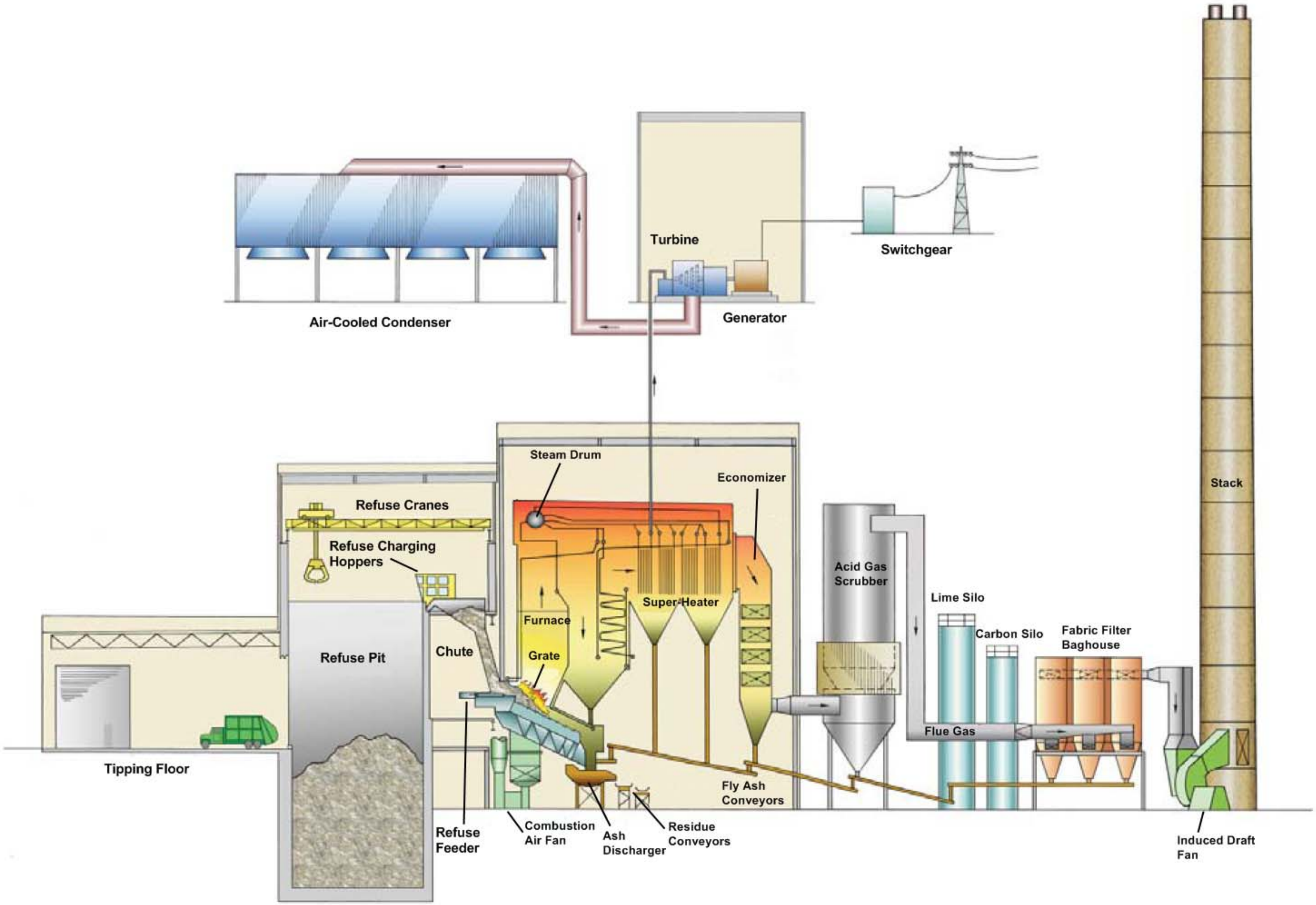
The Phase 2 expansion (400,000 tpy) Facility would include the two completely independent waste processing trains installed for the 140,000 tpy Facility, a single independent 110,000 tpy train (installed in the Phase 1 expansion) and a single independent 150,000 tpy train (installed in the Phase 2 expansion) Each train in the expanded Facility would utilize identical processing technologies and APC equipment, appropriately sized to the process train throughput.

The emissions from the Phase 1 expansion (250,000 tpy) would exhaust from a second flue installed in the stack built for the 140,000 tpy Facility, while the emissions from the Phase 2 expansion (400,000 tpy) would be exhausted from a new independent stack, identical in height to that of the 140,000 tpy Facility stack.

Although the initial approved capacity will be 140,000 tpy, a discussion regarding the ability of the facility to expand, the eventual need for the facility to expand, and the potential impacts of the expanded facility have been included in this EA document. This information is being included to recognize the projected maximum design of the facility and to demonstrate, that based on the information available to date (and subject to confirmation at the time of expansion (See Section 12.3 of this EA document) the facility could be expanded to 400,000 tpy.

Figure 10-5 and Figure 10-6 outline the Site layouts for both the 140,000 tpy and the 400,000 tpy Facilities as supplied by the Vendor.

Figure 10-4 Conceptual Facility Process Flow



Note: This is a conceptual diagram and is not entirely representative of the actual facility to be built.

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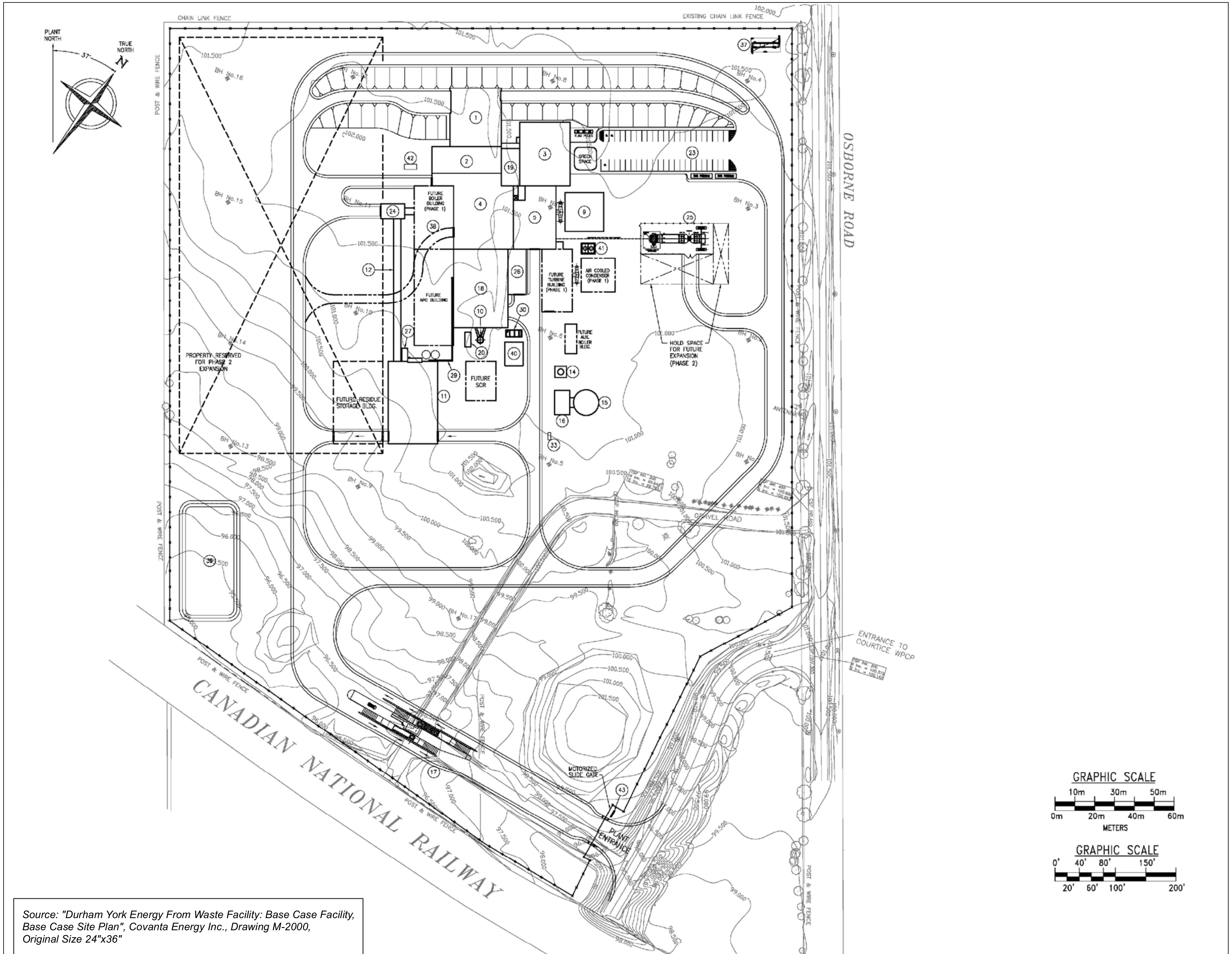
RESIDUAL WASTE STUDY

Durham/York Thermal Treatment Facility Site Layout (140,000 tpy Scenario)



GRAPHIC SCALE

10m 30m 50m

0m 20m 40m 60m

METERS

GRAPHIC SCALE

0' 40' 80' 150'

20' 60' 100' 200'

Source: *"Durham York Energy From Waste Facility: Base Case Facility, Base Case Site Plan", Covanta Energy Inc., Drawing M-2000, Original Size 24"x36"*

LEGEND

1. TIPPING FLOOR
2. REFUSE BUILDING
3. ADMINISTRATION BUILDING
4. BOILER BUILDING
5. TURBINE BLDG.
6. NOT USED
7. NOT USED
8. NOT USED
9. AIR COOLED CONDENSER
10. STACK
11. RESIDUE STORAGE BUILDING
12. INCLINED BELT CONVEYOR GALLERY ENCLOSURE
13. NOT USED
14. AMMONIA STORAGE TANK & CONTAINMENT
15. FIRE WATER STORAGE TANK
16. FIRE WATER PUMP HOUSE
17. TRUCK SCALE AREA
18. FDG/APC BUILDING/BAGHOUSE BLDG.
19. CONTROL/ELECTRICAL ROOMS
20. CEMS BUILDING
21. NOT USED
22. NOT USED
23. PARKING LOT
24. GRIZZLY BUILDING
25. SWITCHYARD
26. MAINTENANCE AND STORAGE BUILDING
27. RESIDUE PROCESSING ELECTRICAL BUILDING
28. NOT USED
29. FLY ASH TRANSPORT CONVEYORS
30. SETTLING BASIN
31. NOT USED
32. NOT USED
33. MAINT. TRUCK DIESEL OIL STORAGE TANK
34. NOT USED
35. NOT USED
36. RETENTION POND
37. GAS METERING STATION
38. GRAVEL ACCESS ROAD
39. NOT USED
40. ID FAN VFD BUILDING
41. CLOSED COOLING WATER HEAT EXCHANGER
42. EMERGENCY DIESEL GENERATOR ENCLOSURE
43. PLANT ENTRANCE SIGN

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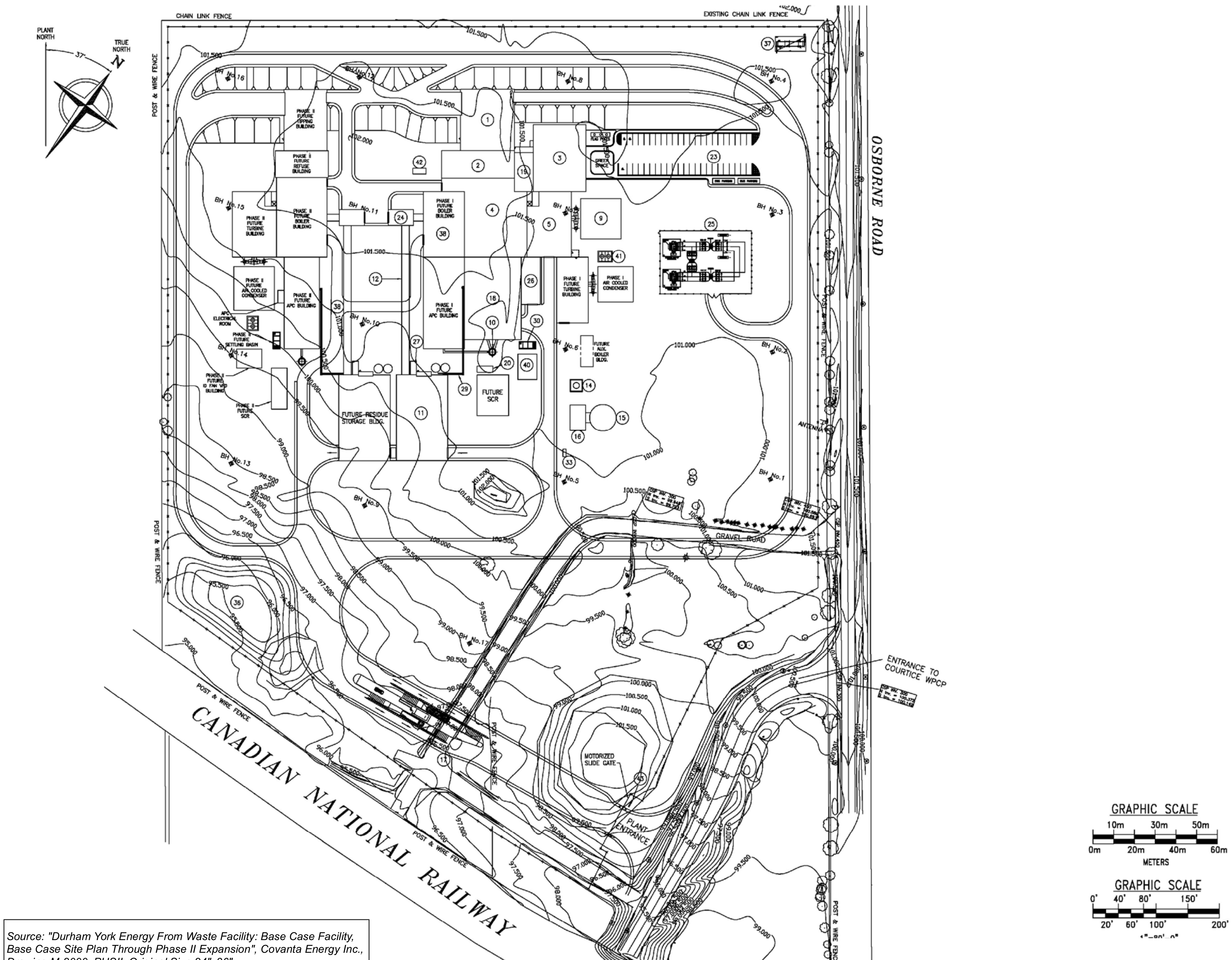
FIGURE NO.

10-5

Last Modified: June 3, 2009 By: L. Kendell

YORK REGION AND DURHAM REGION
RESIDUAL WASTE STUDY

Durham/York Thermal Treatment Facility Site Layout (400,000 tpy Scenario)



Source: "Durham York Energy From Waste Facility: Base Case Facility, Base Case Site Plan Through Phase II Expansion", Covanta Energy Inc., Drawing M-2000_PHSII, Original Size 24"x36"

LEGEND

1. TIPPING FLOOR
2. REFUSE BUILDING
3. ADMINISTRATION BUILDING
4. BOILER BUILDING
5. TURBINE BLDG.
6. NOT USED
7. NOT USED
8. NOT USED
9. AIR COOLED CONDENSER
10. STACK
11. RESIDUE STORAGE BUILDING
12. INCLINED BELT CONVEYOR GALLERY ENCLOSURE
13. NOT USED
14. AMMONIA STORAGE TANK & CONTAINMENT
15. FIRE WATER STORAGE TANK
16. FIRE WATER PUMP HOUSE
17. TRUCK SCALE AREA
18. FGD/APC BUILDING/BAGHOUSE BLDG.
19. CONTROL/ELECTRICAL ROOMS
20. CEMS BUILDING
21. NOT USED
22. NOT USED
23. PARKING LOT
24. GRIZZLY BUILDING
25. SWITCHYARD
26. MAINTENANCE AND STORAGE BUILDING
27. RESIDUE PROCESSING ELECTRICAL BUILDING
28. NOT USED
29. FLY ASH TRANSPORT CONVEYORS
30. SETTLING BASIN
31. NOT USED
32. NOT USED
33. MAINT. TRUCK DIESEL OIL STORAGE TANK
34. NOT USED
35. NOT USED
36. RETENTION POND
37. GAS METERING STATION
38. GRAVEL ACCESS ROAD
39. NOT USED
40. ID FAN VFD BUILDING
41. CLOSED COOLING WATER HEAT EXCHANGER
42. EMERGENCY DIESEL GENERATOR ENCLOSURE
43. PLANT ENTRANCE SIGN

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FIGURE NO.
10-6

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A summary of the proposed configuration for both the 140,000 tpy and 400,000 tpy Facilites is presented in Table 10-3.

Table 10-3 Conceptual Facility Configuration

Element	Proposed Initial Design Capacity Facility (140,000 tpy capacity)	Maximum Design Capacity Facility (400,000 tpy capacity)
Daily Facility Capacity	436 tonnes @ 13.0 Mj/kg HHV	1,245 @ 13. MJ/kg HHV
Annual Facility Capacity	140,000 tonnes @ 13.0 Mj/kg HHV	400,000 tonnes @ 13.0 Mj/kg HHV
Number of Combustion Trains	2	4
Combustion Train Capacity	218 tpd @ 13.0 Mj/kg HHV	2x218 tpd, 342 tpd , 467 tpd @ 13.0MJ/kg
Number of Tipping Positions	4	7
Number of Refuse Cranes	2	4
Number of Stacks	1	2
Number of Turbine-Generators	1	3
Turbine Generator Rated Capacity (approx)	20 MW	20 MW, 15 MW, 21 MW
Type of Turbine-Generator	Full Condensing with 4 Uncontrolled Extractions	TBD
Condenser Cooling Method	Air Cooled	TBD
Stack Height (metres)	87.6 m above boiler floor	87.6 m above boiler floor
APC Equipment (each Train)	VLN, Scrubber, Baghouse, SNCR, Mercury and Dioxin Control	VLN, Scrubber, Baghouse, SNCR, Mercury and Dioxin Control
Metal Recovery	Ferrous and Non-Ferrous	Ferrous and Non-Ferrous

10.6.1 Conceptual Facility Process Flow

The following is a description of the conceptual facility process flow for the proposed initial design capacity Facility (140,000 tpy).

10.6.1.1 Waste Delivery, Receiving, Storage, and Handling

Vehicle Arrival

Refuse will be delivered to the Facility in standard packer vehicles or fully enclosed transfer trailers with capacities up to 92 m^3. It is assumed that refuse trucks will utilize Highway 401 and then both South Service Road and Osborne Road to access/leave the Site. Trucks will enter and exit the Facility through a gate at the entrance located off of Osborne Road. A large sign at the entrance will provide directions/instruction to all vehicles arriving at the premises. A 2.5 m high security fence will be provided around the entirety of the Site to ensure the Site is secure at all times.

Although the Facility is expected to operate 24-hours a day, 7 days a week, refuse trucks are expected to enter and leave the Site during regular working hours, Monday through Saturday.

Table 10-4 presents the anticipated number of trucks expected to arrive on site both at the 140,000 tpy and at the 400,000 tpy scenario on a daily basis.

Table 10-4 Daily Truck Trips

Type/Use	Proposed Initial Design Capacity Facility (140,000 tpy capacity)	Maximum Design Capacity Facility (400,000 tpy capacity)
Waste Supply	25	59
Additional Trucks	9	18
TOTAL	**34**	**77**

Scale-House

Upon entering the Site, refuse trucks will proceed to the scale house where they will be weighed by automatic truck scales. A bypass lane will be provided in the event of a vehicle break-down and to handle vehicles that do not require weighing.

The scale-house will be equipped with two scales. One scale will be dedicated to weighing the incoming solid waste while an additional scale will be used to weigh outgoing un-tared vehicles. Each scale will include a digital weigh meter, a scoreboard readout, a printer and a personal computer for recording the daily total of the net weight delivered. The system will have the capability of being a completely automatic system. The scale system will include provisions for recording the time and date as well as vehicle gross, net and tare weights. Traffic over the scales will be controlled by Regions' personnel.

The scale-house will include a computerized record keeping system to maintain an accurate accounting of all refuse delivered to the Facility and all residues, recovered ferrous and non-ferrous metals and unprocessed waste removed from the Facility. The scale house itself will enclose the scale operators, scale equipment and record keeping system. It will be located between the scales to provide maximum visibility of vehicles and the scales. The scale house will be heated and air conditioned and provided with a restroom.

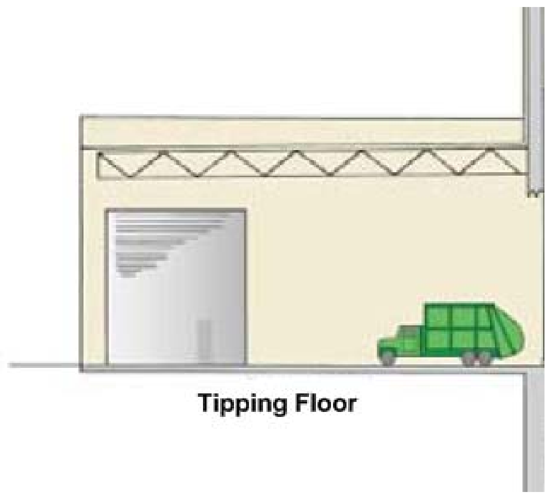
Posted at the scale-house will be a clearly visible notice of prohibited wastes along with a clear warning of potential hauler bans and other penalties for violators. Further, the truck scale will have sensors for medical and other unacceptable, volatile wastes. If unacceptable or hazardous waste is detected by the sensors, the driver will not be permitted to discharge his load and will be directed to leave the site.

Tipping Building

After being weighed, incoming refuse trucks will proceed directly to the tipping building entrance (Figure 10-7). At the 140,000 tpy Facility and the 250,000 tpy Phase 1 expansion, there would be a single tipping building, while in the 400,000 tpy Facility an additional tipping building would be built.

The tipping building will be totally enclosed with two motor operated entrance/exit doors. The doors will be triggered automatically by inbound and outbound vehicles to open and close as required. The doors will be approximately 4.85 metres in width and 4.5 metres in height. These doors will remain closed except for when vehicles are entering or exiting the tipping building. The typical flow of solid waste trucks will be through entrance and exit doors located on opposite sides of the tipping building.

Figure 10-7 Conceptual Schematic Diagram of the Tipping Floor



Normally, upon fully entering the tipping building, the trucks will discharge their refuse directly into the refuse pit. However, from time to time, trucks may discharge their refuse onto the open tipping floor if instructed to do so by the personnel managing the area. This is periodically done during random load inspections. Where waste is discharged onto the tipping floor, a front-end-loader would then push the material into the pit, as required. Waste discharged onto the tipping floor would be for inspection purposes only. No waste would be stored on the tipping floor for an extended period of time.

Multiple tipping bays will be provided at the pit to allow simultaneous discharge of waste from multiple vehicles. Barriers will be provided at each tipping bay to prevent vehicles from backing into the storage pit. The distance from the tipping bay back-up barrier to the opposite wall of the tipping building will be sufficient to facilitate truck maneuvering. After discharging their load, the trucks leaving the tipping buildings would be weighed on a second scale as they exit the property.

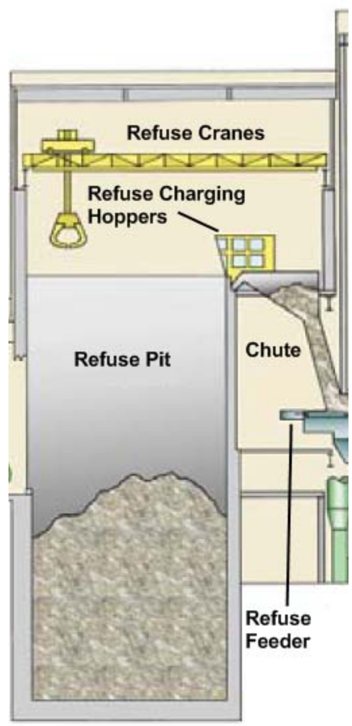
Standard operations and maintenance procedures require both dry and wet cleaning methods of the tipping floor, either using a broom sweeper or by wash down with hoses. When water is used and there is some residual waste remaining on the tipping floor, the resulting waste water can contain solid debris and suspended solids and this water would not be a practical source of process water, The tipping floor therefore is sloped toward the pit to permit the wash down water to flow into the pit, which is sealed and completely self contained.

The small amount of water that enters the refuse pit either with the incoming waste or as a result of tipping floor wash down will not adversely impact waste characteristics and the mixing of waste in the pit will avoid the accumulation of water in the bottom of the pit and prevent any possible negative impact on the facility.

The refuse pit will be sized for the 250,000 tpy Phase 1 expansion. Its size will allow continued operation of the system over weekends and holidays. Four days of storage will be provided and distributed above and below the tipping floor level. The refuse pit storage capacity will be based upon a density of 415 kg/m^3. In an emergency situation the entire pit is capable of being emptied.

The refuse pit will be serviced by two overhead traveling bridge cranes with polyp type (orange peel) grapples (Figure 10-8). These cranes will mix the refuse and transfer it from the pit to the charging hoppers of the furnaces. The mixing of the waste is essential in preventing sharp swings in the heating value of the refuse being fired and in limiting the buildup of leachate at the bottom of the pit. In addition to mixing and transferring the waste, the crane operators will also identify and remove any unacceptable materials that they discover (i.e., items not suitable for combustion etc.). Mobile equipment (front-end loaders) will be used to transfer these undesirable items to a safe location where they can then be disposed of at a landfill.

Figure 10-8 Conceptual Schematic Diagram of the Refuse Pit and Associated Equipment



Each of the two cranes will be designed to handle full capacity operation of the expanded Facility. One of the cranes will be used to keep the tipping bays cleared and combustion units properly charged. The second crane will provide backup and can be used during peak delivery times to assist in refuse pit management. Both cranes will span the entire length and width of the refuse storage pit, furnace charging hopper, and charging floor. Power supply for cross travel will be by the festoon cable method. A bucket type grapple will also be provided to assist in cleaning out the bottom of the pit, when necessary.

The cranes will be operated remotely from the control room. The vantage point of the crane operators will look over the refuse pit with a view of the tipping floor to the operators' side. Each crane will have a separate control station that will be equipped with television monitors to allow observation into each of the combustion units charging hoppers. The stations will also be equipped with a communication system that will allow the crane operator to have voice communication with the Facility tipping floor, the scale house and the front-end loader operator. The cranes will have semi-automatic controls that raise a loaded grapple and locate it over a pre-selected charging hopper. Load discharge, return to pit and filling of the grapple will be manual. The operator will have the ability to override the automatic operation at any time. The weight of each load will be recorded automatically by load cells mounted on the refuse crane.

The cranes will load the refuse into the charging hopper which will be properly dimensioned and contoured to avoid bridging. Below each charging hopper will be a waste delivery chute which will be of sufficient size to accept and pass solid waste objects without jamming. The upper chute, below the charging hopper, will be provided with a hydraulically or pneumatically actuated shut-off gate. From the waste delivery chute, the waste will be hydraulically fed by a refuse feeder onto the grate in the combustion zone of the furnace.

Unacceptable and Hazardous Waste Handling

In addition to the hazardous waste screening that is performed at the scale-house, and the identification and removal of unacceptable waste from the pit by the crane operators, on a routine periodic basis, solid waste trucks will be directed to empty their loads on the tipping floor specifically for inspection. The trucks will normally be selected on a random basis but will also be selected based on areas of pick-up or type of industry being served. Haulers having a history of bringing hazardous or unacceptable waste will be checked more frequently if necessary.

If hazardous or unacceptable materials are discovered the material may be returned to the vehicle providing it is not hazardous to do so or that it remains in the container that is not leaking and is not an immediate threat as it stands. If unacceptable waste is found, either on the tipping floor or in the pit and it cannot be returned to the delivery vehicle, it will be removed with a front end loader and set aside for disposal at the appropriate landfill. In the event that the material is determined to be hazardous but not an immediate threat, it will be set aside in an area that is away from traffic and personnel and where it can be isolated. Danger signs and warnings will be posted.

In cases where the material is considered to be a possible immediate threat, such as explosives or ruptured drums, the material will be left in place, roped off if possible and personnel and traffic prevented from operating in that area. The appropriate governmental emergency response personnel will be contacted immediately. Suspected hazardous wastes will be sampled and tested by an approved laboratory. If necessary, a specialist contractor will determine the status of any suspect waste and identify handling procedures. If the waste is determined to meet any of the hazardous waste identification criteria established by the controlling regulatory authorities, it will be properly packaged, labeled and monitored pending transfer from the site. Removal of all hazardous materials from the facility will be accomplished in as expeditious a manner as possible in accordance with provincial and federal procedures and utilizing only appropriately licensed hazardous waste transporters.

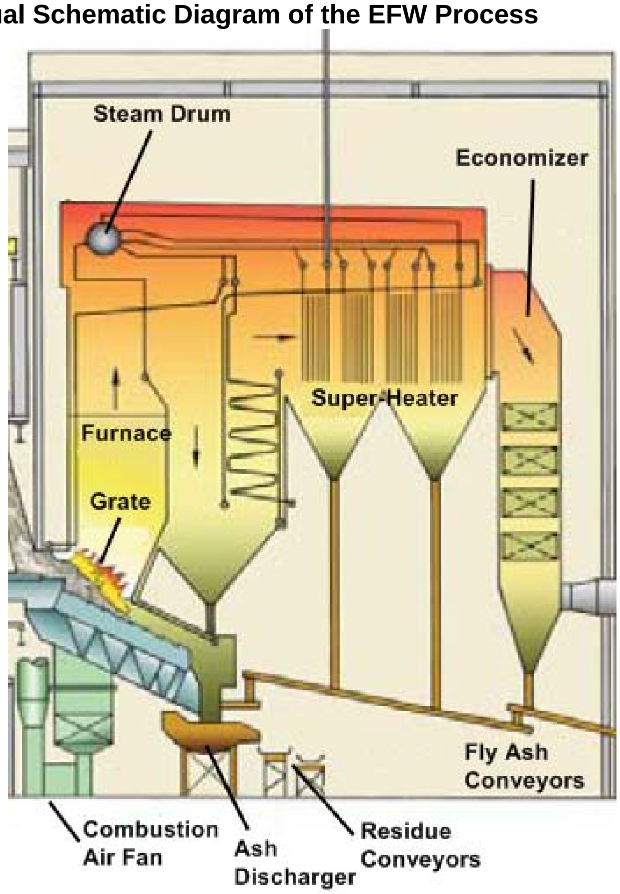
Unacceptable wastes, including oversize bulky wastes, such as certain white goods and large timbers not eliminated in the above screening process, will be placed in containers for removal and disposal at the appropriate landfill.

10.6.1.2 Combustion

Stoker

Each of the waste processing trains will begin with the stoker. After being fed into the refuse charging hoppers, the refuse will be evenly distributed onto the surface of the Martin GmbH® stoker grate from the bottom of the feed chutes by hydraulic feed rams (Figure 10-9). The feed rams will be designed to provide an even distribution of refuse over the entire width of the grate. The proprietary reverse-reciprocating action of the Martin GmbH® stoker grate will agitate the fuel bed continuously in a manner which causes the refuse to burn from the bottom of the refuse bed, resulting in thorough burning of combustible matter. The residue will then be cooled in a quench bath. See section 10.5.3 for a detailed description of conceptual residue handling.

Figure 10-9 Conceptual Schematic Diagram of the EFW Process

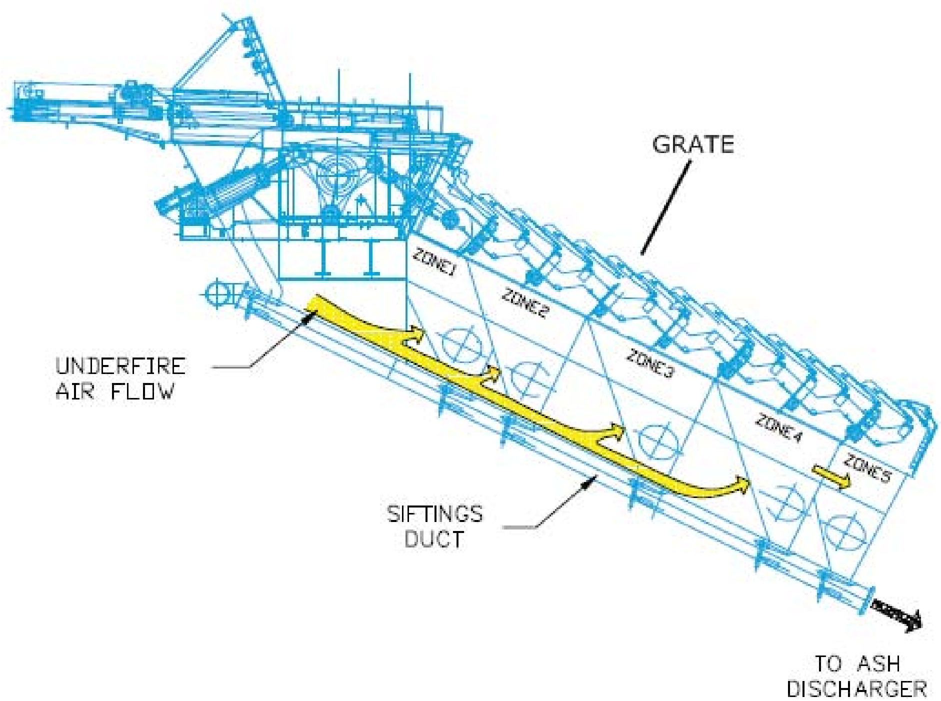


Refuse combustion will be initiated with a small fire that will quickly spread across the Martin GmbH stoker. Stoker action, feed ram, combustion air, hydraulic oil, residue discharger and other equipment will be individually adjusted to suit prevailing refuse disposal and energy demand conditions.

The grate bars of the Martin® stoker will be machined on their sides to achieve intimate contact between adjacent bars. Combustion air will be admitted to the refuse layer through specially designed air slots that will also be machined into the stoker grate bars. This feature will ensure that consistent air distribution and proper combustion conditions will be maintained across the surface of the stoker at all times. It will also minimize the dropout of siftings between the grate bars and ensures high stoker combustion efficiency and low emissions of hydrocarbons, carbon monoxide (CO) and organic compounds relative to other stoker designs.

A series of five plenum chambers along the length of each grate run will admit primary combustion air at rates precisely controlled to suit the combustion conditions of each burning zone as the refuse moves from feed end to discharge (Figure 10-10). Dampers will control the air rate to the first four zones. Underfire air flow to the fifth zone will be taken from the fourth zone. The dampers will be designed to individually regulate the amount of air fed into the various zones of each grate run.

Figure 10-10 Conceptual Diagram of the Grate - Combustion Air Distribution and Sifting Discharge



The Covanta Very Low Nox (VLN™) system, an integral component of all new Martin® stokers, will vary the combustion process offered in Martin® stokers as follows:

- Reduce the overall excess air rate from approximately 90-110% excess air to 50-55% excess air;
- Reduce the amount of secondary air; and,
- Provide for the addition of an internal recirculated gas system at a higher elevation in the furnace.

The combination of these process changes will reduce the NOx generated in the furnace as well as increase the overall boiler efficiency. When combined with a selective non-catalytic reduction system (SNCR), the Covanta VLN™ process will achieve NOx emissions estimated to be more than 40% below the current MOE Ontario Guideline A-7 requirements. For a full description of air pollution control systems that will be employed at the Facility, refer to Section 10.5.2.

The secondary or overfire air system will consist of two rows of closely spaced overfire air nozzles, one row in the front wall above the stoker feeder ram(s) and the second row in the rear wall above the rear arch. The overfire air system will be designed to provide approximately 13% of the total combustion air for combustion above the stoker grate.

The internal recirculation gas (IRG) air system will consist of a dedicated IRG air fan and a row of closely spaced IRG nozzles. The IRG system will be designed to provide approximately 26% of the total combustion air flow.

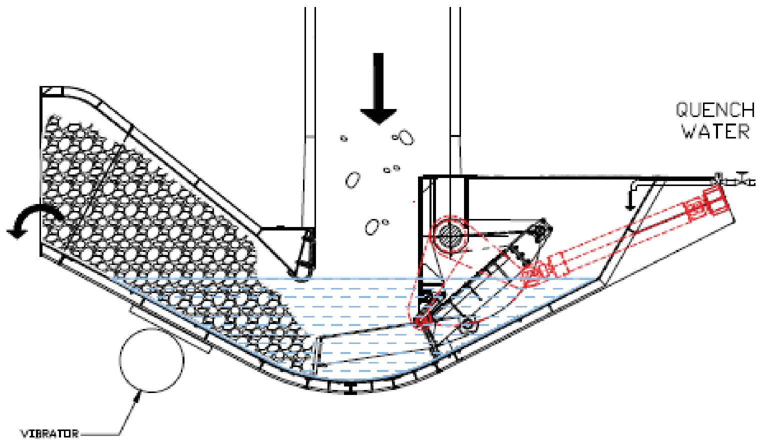
The overfire air and IRG nozzle design will be such that complete penetration of the gas stream above the stoker is achieved for flame shaping and thorough burnout of combustion products including organics. Actual testing at Martin® installations shows flame patterns wherein the completion of combustion is maintained within the confines of the furnace and away from the furnace walls without stratification. Resulting carbon monoxide levels at the furnace outlet are 45 mg/dNm3 at 11% O_2 or less in normal operation.

The recirculated flue gas will be taken from above the stoker's clinker roller/weir and directed to the IRG fan inlet. To ensure maximum burnout of refuse with low heating value and high moisture content, steam-heated combustion air heaters will be located at the underfire air fan outlets to heat the incoming air from -1ºC to 93-150ºC.

Each stoker will be furnished with one Martin® residue discharger (Figure 10-11). The residue discharger will receive the burned material as it falls over the residue discharge roller and cools it in quench bath(s). Each stoker will also include an automatic grate siftings removal system under each grate run which periodically sweeps the undergrate plenums and conveys the siftings to the residue discharger. Manual cleaning of the stoker undergrate plenums will not be required.

The air required for combustion will be taken from the tipping floor and refuse pit area and directed to the combustion air fan inlets. The resulting negative pressure inside the tipping area will draw fresh air through the area creating a constant air change and keeping the tipping floor relatively dust and fume free. Design will also prevent the escape of odours from the Facility. The tipping floor doors will be closed during periods when trucks are not delivering waste to the tipping floor. During a single boiler shutdown fans on that unit and all fans on the operating unit will continually draw air from the refuse storage area to prevent the escape of odours. During unusual periods when both boiler units are shutdown and the facility cannot produce its own power, power will be purchased from the utility to operate the fans to provide the negative pressure. That being said, both units would only be scheduled for a simultaneous shutdown every 2-3 years for either a scheduled turbine generator outage or total plant shutdown to service equipment that can only be serviced when both boiler units are not operating.

Figure 10-11 The Martin Ash Discharger

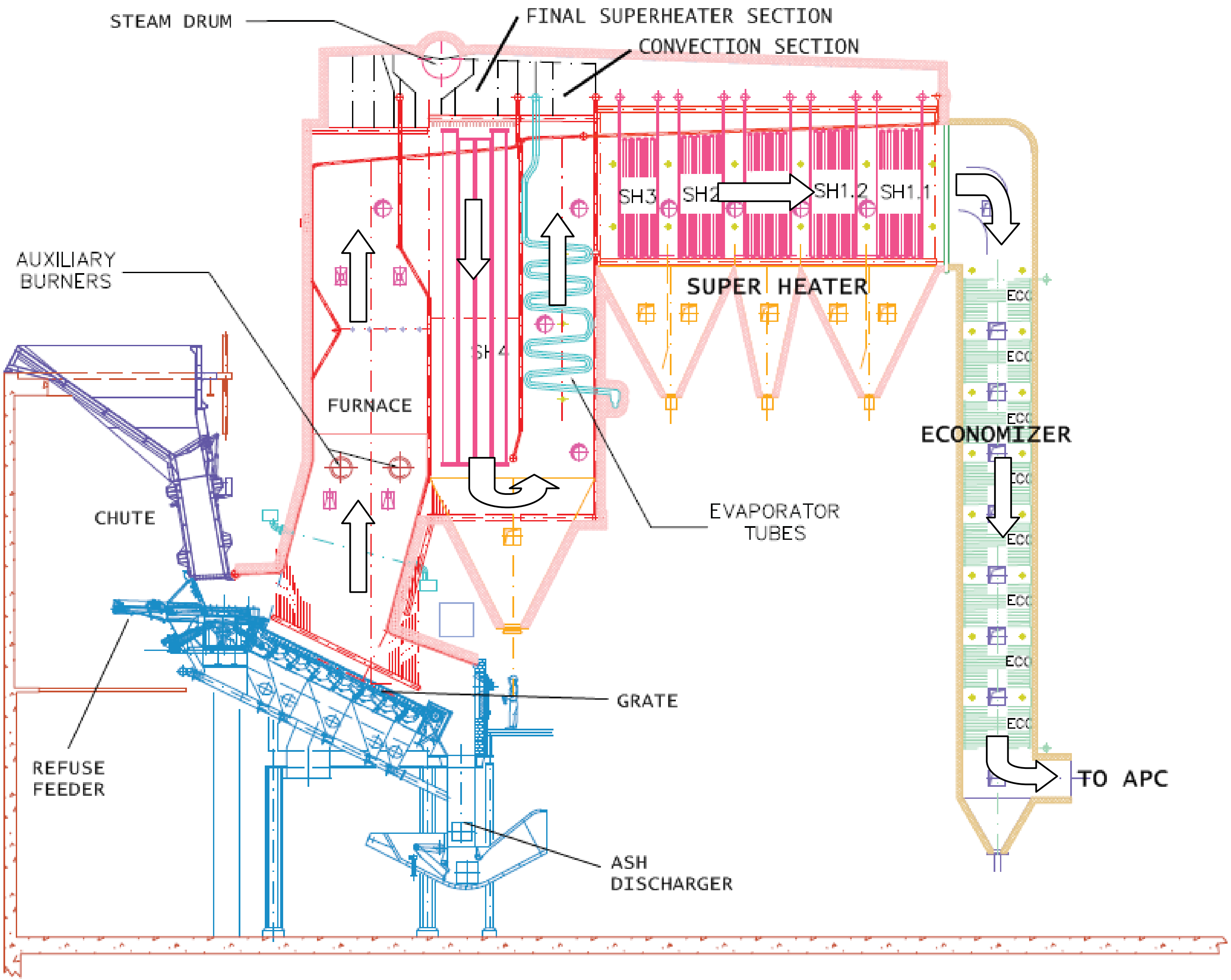


Boiler Furnace

For each train, the boiler furnace/combustion chamber will be located above the stoker grate and will be constructed of gas-tight, continuously welded waterwalls down to the grate surface. In the combustion chamber, unburned gases will be directed into a high temperature combustion zone. This permits the maximum burnout of non-aqueous condensable matter and eliminates odours. The combustion chamber exit temperature will be sufficiently high to destroy odorous vapours. At the furnace throat, overfire air nozzles will provide additional oxygen to combust unburned gases such as carbon monoxide and hydrocarbons.

Following combustion in the furnace, the products of combustion (flue gases) will pass through screen tubes at the outlet of the furnace and flow downward through a platen style superheater section and its membrane water wall enclosure, thereby lowering gas temperature. At the bottom of this pass, the flue gas will be turned upward and flow through the boiler convection section (Figure 10-12). As the flue gas leaves the convection surface, it enters and flows across the boiler superheater tube surface wherein the boiler steam will be superheated. This transfer of heat continues to lower flue gas temperature. Finally the flue gas passes across the boiler economizer tube surfaces to lower its temperature to the design temperature for entry to the APC system.

Figure 10-12 Cross-Section of Conceptual EFW Process Equipment



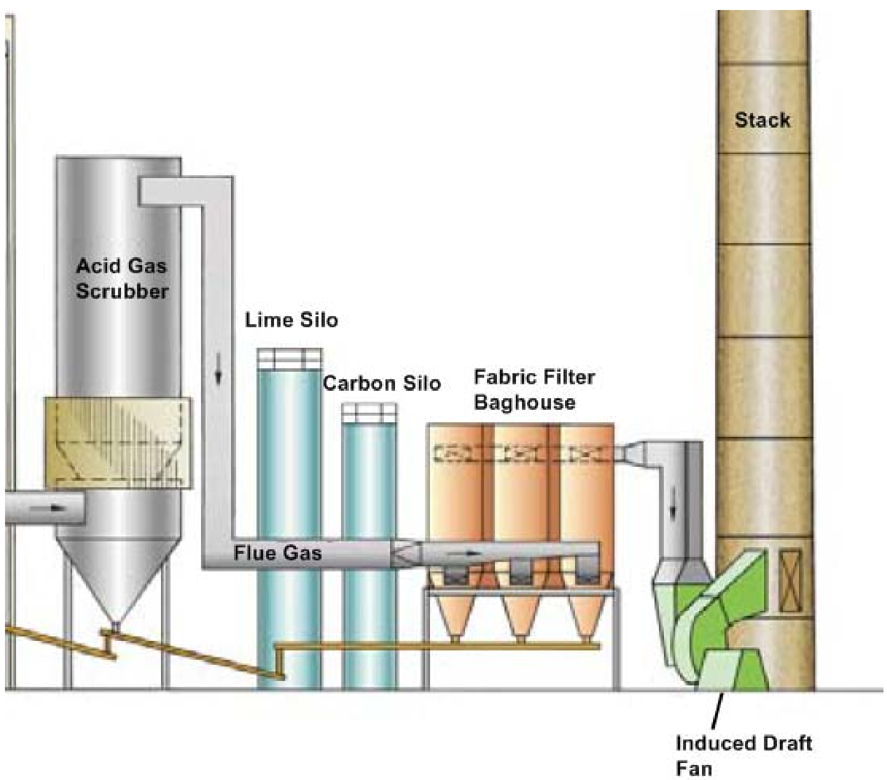
The furnace will be designed and operated to minimize the concentration of combustion-related pollutants such as CO and hydrocarbons. The boiler design will incorporate state-of-the-art features including combustion air distribution and control, location and sizing of heating surfaces and appropriate cleaning methods during operations.

Automatic systems will control efficient refuse combustion, steam and electricity generation, and residue processing, despite possible wide variations in refuse composition. Plant personnel will monitor the equipment and take action necessary to maintain efficient operation. One of the important parameters monitored is the furnace temperatures. The temperatures are continuously monitored by three thermocouples in the furnace roof and one each on both sides of the furnace located just above the auxiliary burners. All furnace temperature data is printed out daily with data loggers and included as part of the daily record prepared for each day. The data is also backed up in the control room computer. Performance will be monitored and controlled from the air-conditioned, main control room.

10.6.1.3 Air Pollution Control

The following section discusses the air pollution control systems that are present at the back-end of the Facility (Figure 10-13). For a full detailed discussion of the complete APC system refer to Section 10.5.2.

Figure 10-13 Conceptual Schematic Diagram of Back-End APC Equipment



After the waste combustion gases pass through the economizer, they enter the APC. Flue gas leaving the economizer of each unit will be treated by an air pollution control system that will include the following series of equipment and processes to treat the flue gas in the following order:

- ***Activated carbon injection system.*** Mercury, dioxin, and furan control will be accomplished using a system that injects activated carbon into the flue gas after the economizer.
- ***Acid gas scrubber.*** The scrubber will remove a large percentage of the acid gases, such as SO_2 and HCl. The acid gas scrubber will either be a semi-dry design or a circulating dry design.
    a. In the semi-dry scrubber design, flue gas flows through the cylindrical vertical chamber of the scrubber where it will be intimately mixed with a mixture of lime and water droplets. The water droplets will be evaporated creating a mechanism to neutralize the acid gases and to form a dry entrained particulate.
    b. In the circulating dry scrubber design economizer flue gas is reacted with hydrated lime. Water is injected to maintain optimal humidity for the removal of acid gases. In order to maintain a fluidized bed within the scrubber vessel, ash and lime is recirculated and re-injected into the scrubber.

  Acid gas removal performance will be controlled by adjusting the quantity of lime injected. Scrubber outlet temperature will be controlled by adjusting the quantity of dilution/spray water added to the scrubber.
- ***Fabric filter baghouse.*** Solid phase particulate, fly ash particulate, carbon, scrubber reaction products and un-reacted lime will be collected and removed from the flue gas by the baghouse. The filter cake which accumulates on the fabric filters also provides a substrate of un-reacted lime carried over from the scrubber, allowing additional reaction with acid gases and further reduction of acid gas emissions.

After leaving the air pollution control system, the flue gas will pass through an induced draft fan and discharge to the atmosphere through the stack.

One steel shell stack with a common insulated steel-flue will be furnished and installed for the initial Phase. The stack will include the breaching to accommodate the addition of the flue associated with the Phase 1 expansion throughput capacity. The stack will disperse flue gases from the furnace/boilers that burn the solid waste. A second stack will be constructed to support the Phase 2 expansion up to the maximum design capacity.

The stack will be designed for an exit gas velocity of approximately 18 metres per second with initial boilers operating at maximum continuous rating. The stack height will be 87.5 meters and measures to reduce or control noise to appropriate levels will be considered in its design.

The stack will be designed for all conditions, loads and effects to which it may be subjected, including basic design, corrosion, wind loading, thermal load, earthquake loading, dead loading, reaction forces and vibration effects from vortices produced. Walls of the flues will be insulated to minimize acid condensation. All stack materials will conform to American Society for Testing Materials (ASTM) specifications and have demonstrated compatibility with and suitability for design requirements.

Access will be provided from ground level to the upper level maintenance platforms located on the stack or the breeching. All ladders, walkways and platforms will be designed and installed in accordance with Ontario Provincial Standard Specification (OPSS) standards. The entire length of any ladder will be enclosed in a safety cage or provided with a safety climbing belt device. Test ports will be located in the flue gas duct between the baghouse and the stack. Ample working space will be provided on all testing platforms. Obstruction marking and strobe lighting will be provided in accordance with Transport Canada regulations.

Throughout the Facility, Continuous Emissions Monitors (CEMs) will be installed to monitor the internal operations of the Facility components to ensure the emissions leaving the Facility are at appropriate levels. At this point, it is anticipated that the network of CEMs will monitor and record:

- The baghouse outlet for opacity, moisture, CO, O_2, NOx, SO_2, HCL and hydrogen fluoride (HF). Opacity measurements would be used as the filter bag leak detection system.
- The economizer outlet for $O_{2,}$ SO_2 and CO.
- Flue gas temperatures at the inlet of the boiler convection section and at the baghouse inlet.
- The temperature and pressure of the feedwater and steam for each boiler.
- The mass flow rate of steam at each boiler.

A long-term continuous sampling device will also be installed to monitor dioxin/furan emissions over a fixed period of time, commonly two weeks or one month.

10.6.2 Conceptual Air Pollution Control (APC)

Air pollution control occurs throughout various stages of the combustion process as well as at the back-end of the Facility where additional APC equipment and processes are employed. These controls are described at a high level in Section 10.5.1 to show how they appear in the overall process flow. The following is a detailed description of each part of the APC system.

The air pollution control system will consist of a NOx control system, an activated carbon injection system (mercury, dioxin and furan control), an acid gas scrubber (acid gas control), and a high efficiency fabric filter baghouse (particulate control). One air pollution control system will be installed for each combustion train in the Facility. There will not be any type of dump stack that would enable release of untreated flue gas into the atmosphere. Insulation and lagging will be provided to prevent undue condensation, buildup of fly ash and spent salts of reaction, and corrosion.

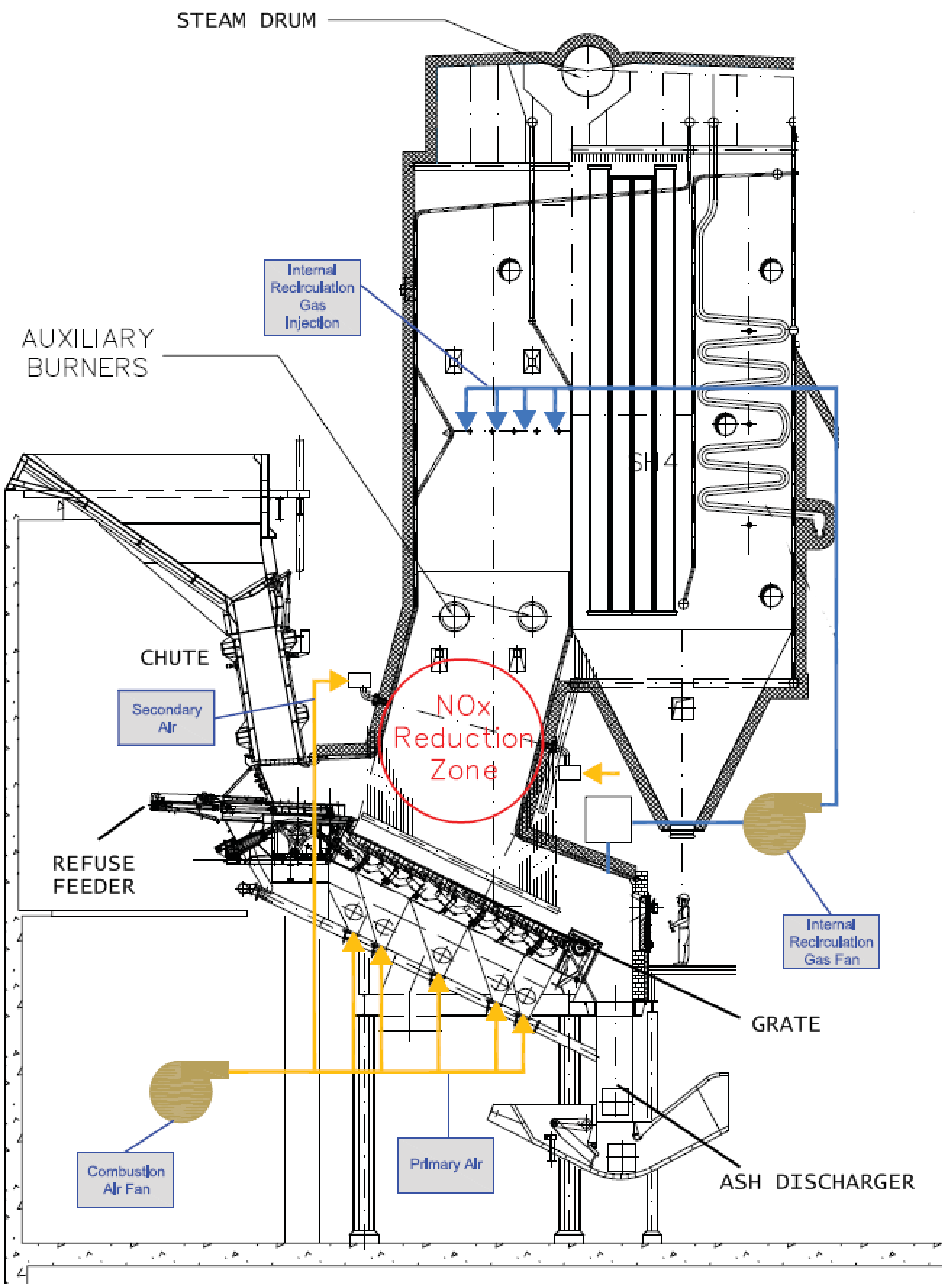
NOx Control System

Two systems will work in conjunction to control NOx emissions: Covanta's VLN^{TM} system and an aqueous ammonia SNCR system.

The Covanta VLN™ process utilizes a unique combustion air system design, combined with an advanced combustion monitoring and control system, to achieve substantial reduction in NOx formation (Figure 10-14). NOx levels achieved by the VLN™ process without any supplemental

NOx control system, such as SNCR, will almost meet the current MOE Ontario A-7 Guideline requirement. When combined with a SNCR system, the Covanta VLN™ process will achieve NOx emissions more than 40% below this requirement.

Figure 10-14 Conceptual Schematic Diagram of Covanta VLN™ Process



The VLN™ process employs a unique combustion air system design, which in addition to the conventional primary and secondary air systems, also features an internal recirculation gas (IRG) injection system located in the upper furnace. IRG is an internal stream drawn from the rear of the combustor, above the burnout zone of the grate. This gas contains an oxygen concentration near that of air, since very little combustion occurs in the burnout zone. A single fan supplies the primary and secondary air streams, while a second hot gas fan is used for the internal IRG stream. This fan also has the capability of taking in fresh air, if the quantity of internal circulation gas from the combustion zone is insufficient for the gas flow requirements, or the gas temperature exceeds approximately 204°C.

Similar to a conventional EFW process, the quantity of primary air in the Covanta VLN™ process is adjusted to minimize excess air during the combustion of the waste on the grate; however, secondary air flow in the VLN™ process is significantly less than that of a conventional EFW facility.

The distribution of flows between the primary air, secondary air and IRG gas streams is controlled to yield the optimal combustion gas composition and temperature profile to minimize NOx and control combustion. The control methodology takes into account the heating value of the waste and the fouling condition of the furnace. The flow of IRG is set to achieve complete coverage of the furnace cross-section to ensure good mixing with the combustion gases. IRG completes the combustion process, and yields uniform flue gas temperature and velocity profiles, which improves the performance and reliability of downstream boiler equipment. The IRG nozzles are located on the side waterwalls of the upper furnace; their positioning in the furnace is critical to the VLN™ process performance.

In addition to Covanta's VLN™ system, an aqueous ammonia SNCR system will be provided for additional NOx control. Ammonia will be injected directly into the first pass of the boiler resulting in the conversion of NOx to nitrogen and water vapor. The system will be designed to utilize aqueous ammonia with a concentration less than 19%. Injection nozzles for the SNCR system will be provided on one level with provisions for a second level of injection. Automatic control of reagent injection rate will be provided with feedback from Facility NOx CEMS instrumentation.

Combining SNCR with the VLN™ process and integrating the SNCR controls with the VLN™ combustion controls yields the following synergistic effects which enhance the performance of the SNCR system:

- Minimization of the number of SNCR nozzles;
- Reduction in the amount of carrier fluid needed with the ammonia;
- Maximization of the NOx reduction; and,
- Minimization of the ammonia slip and consequential reduction in the amount of un-reacted ammonia that exits in the boiler.

Activated Carbon Injection System (Mercury, Dioxin and Furan Control)

A mercury, dioxin and furan control system that uses activated carbon injected into the flue gas after the economizer will be provided to control mercury, dioxin and furan emissions. The carbon particles act to adsorb pollutants on their surface and then the carbon particles themselves are captured in the bag-house. One activated carbon injection system will be provided for each train at the Facility.

The activated carbon system will consist of one storage silo having a pneumatic truck unloading station. The silo will have a minimum of four days storage. Silos will be equipped with vibrators and other provisions designed to prevent the activated carbon from plugging under its own weight, thereby restricting flow (bridging) or forming a central core channel with material stuck to the silo walls (rat-holing).

Activated carbon feed systems will be supplied for each generator line, capable of modulating the flow of activated carbon by means of weigh feeders in accordance with prescribed inputs and activated carbon feed measurement requirements. Injection of the dry activated carbon will achieve effective dispersion. Injection will be into the ductwork located between the economizer and the acid gas scrubber.

The system will be able to meet the maximum anticipated carbon usage required to meet mercury and dioxin emission standards under minimum and maximum throughput.

Acid Gas Scrubber

Each combustion train will be equipped with a dedicated acid gas scrubber designed to reduce acid gas emissions. The acid gas scrubber will either be a semi-dry design or a circulating dry design. For the semi-dry scrubber design, flue gas flows through the cylindrical vertical chamber of the scrubber where it will be intimately mixed with a mixture of lime and water droplets. The water droplets will be evaporated creating a mechanism to neutralize the acid gases and to form a dry entrained particulate. The circulating dry scrubber reacts the economizer flue gas with hydrated lime. Water is injected to maintain optimal humidity for the removal of acid gases. In order to maintain a fluidized bed within the scrubber vessel, ash and lime is recirculated and re-injected into the scrubber.

The treated and cooled flue gas then flows to the high efficiency baghouse where the fly ash particulate, scrubber reaction products and unreacted lime will be collected and removed from the flue gas. The filter cake which accumulates on the fabric filters also provides a substrate of unreacted lime carried over from the scrubber, allowing additional reaction with acid gases and further reduction of acid gas emissions.

Lime for the APC system will be delivered to the Facility in self-unloading trucks and stored in a storage silo. The lime will either be slaked and fed as slurry to atomizers that inject a fine mist of droplets into the flue gas or injected dry. The hot flue gases react with the water droplets and lime and at the same time dry the reaction products. Acid gas removal performance will be controlled by adjusting the quantity of lime injected. Scrubber outlet temperature will be controlled by adjusting the quantity of dilution/spray water added to the scrubber. The dry reaction products will be collected with the fly ash in the fabric filter baghouse.

The spray-dry acid gas scrubbers will use either hydrated lime, pebble lime or a lime/water mixture injected into a reaction chamber to neutralize the acid gases depending on the design selected. Injection of lime slurry into the spray-dry acid gas scrubber will be by atomizing dual fluid nozzles or rotary atomizers. Atomization and spraying of water will result in complete evaporation of the water without wetting of walls and causing deposit formations. Minimum flue gas residence time in spray-dry acid gas scrubbers will be ten seconds.

The acid gas scrubbers will be insulated and have hopper accessories equal to those required for the baghouses. Special attention will be given to the design to avoid cold spots at structural supports and other penetrations through the insulation barrier. The spray-dry acid gas scrubber vessel will be constructed of carbon steel as required by the manufacturer. The bottom of the scrubber vessel will have a sloped cone hopper with angle of the cone selected to prevent buildup of solids on the hopper walls and also to avoid bridging over all discharge points. Hoppers will be provided with pneumatically operated double flap valves and knife gate isolation valves.

The lime storage system will consist of one storage silo having a pneumatic truck unloading station. The silo will be sized for four days storage. Silos will be equipped with vibrators and other provisions designed to prevent the lime from plugging under its own weight, thereby restricting flow (bridging) or forming a central core channel with material stuck to the silo walls (rat-holing).

Fabric Filter Baghouse

Solid phase particulate, fly ash particulate, carbon, scrubber reaction products and unreacted lime will be collected and removed from the flue gas by the baghouse. A baghouse will be provided for each combustion/steam generator/acid gas scrubber in the Facility. The baghouses will be designed to clean the expected acid gas scrubber outlet gases.

The baghouse will be pulse jet type baghouse consisting of multi-compartment units with fabric filter bags. The bag frames will be carbon steel. Net air-to-cloth ratio for pulse jet baghouses will be no greater than 1.2 to 1 m/min. Fabric material will be fiberglass with the weave or felt design and fabric coatings, Gortex or similar material or Ryton as approved. The selection of bag material and fabric coatings will be optimized for the basis for the intended service. The CEM opacity system will be used as the filter bag leak detection system to monitor bag condition.

The baghouse will be insulated with design considerations to prevent corrosion, buildup of fly ash and spent salts, and erosion. Special attention will be given to the design to avoid cold spots at structural supports and other penetrations through the insulation barrier. Hopper accessories will include hopper heaters, vibrators, and high level alarms. Hoppers will be provided with knife gate isolation valves. Baghouse collection screw conveyors will have rotary valves to provide a seal for bag house hoppers. Hoppers will be sufficiently sized and sloped at an angle to prevent buildup of fly ash. Adequate poke holes and other means will be proved to aid clearing of a bridged hopper.

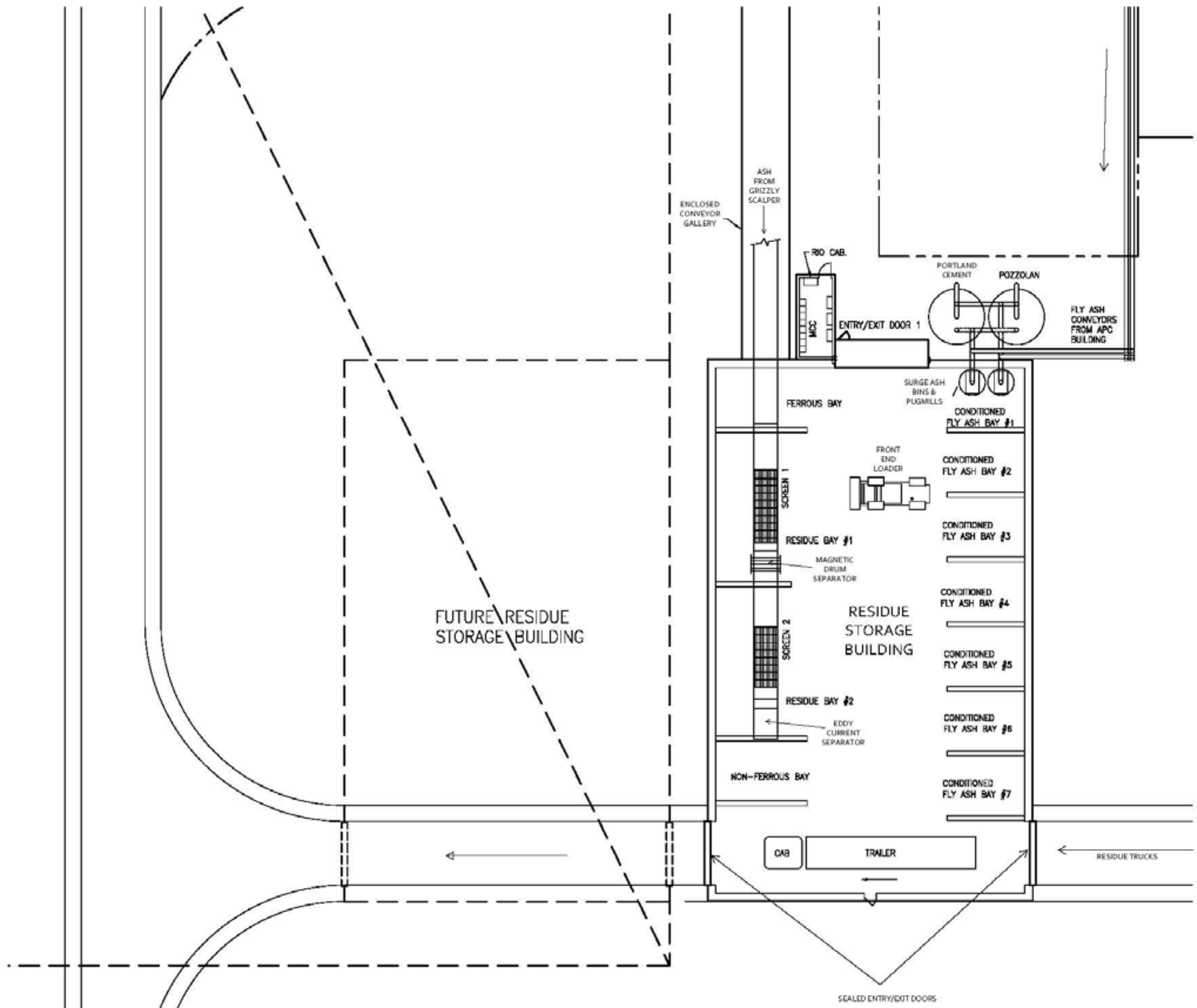
10.6.3 Conceptual Residue Handling

10.6.3.1 Bottom Ash Management

For each combustion train, a complete residue conveying system will be furnished and installed.

From the quench chamber following the stoker, a hydraulically driven ram will push the residue up an inclined draining/drying chute where a low amplitude electromagnetic vibrator mounted on the chute will vibrate the residue (Figure 10-11). This vibratory motion acts to separate excess water from the residue, which drains back into the quench bath (the quench bath will be designed such that it is capable of using wastewater from other facility operations). The bottom ash containing enough moisture to prevent dusting (15 to 25% by weight) will then fall to a heavy duty vibrating pan conveyor with integral grizzly scalper (coarse screening device) that services all of the boilers. The vibratory conveyor/grizzly scalper will remove large materials from the bottom ash before it is transferred by an enclosed inclined conveyor for transport to the residue storage building (Figure 10-15) (the large materials will be collected and then transported independently via front-end loader to the residue storage building).

Figure 10-15 Conceptual Layout of Residue Storage Building



Within the residue storage building a magnetic drum and a vibratory screen will be used to separate ferrous material from the bottom ash, and an eddy current separator will be used to remove the non-ferrous metal from the bottom ash. After separation, each material will be directed into dedicated storage bunkers that will store four days worth of each material. A front end loader will stack and recast the materials. The front end loader will also load residue trucks inside the residue building that will take the residue to its final location. Similar to waste delivery trucks the residue trucks will enter and exit through two motor operated doors, triggered automatically by inbound and outbound vehicles to open and close as required. To minimize any dust escaping to the environment during the conveying, separating, and truck loading process, the residue building will be totally enclosed and have a filtered ventilation system complete with a filtration unit (baghouse). The ventilation system will also draw air from the grizzly area and along the enclosed conveyor gallery. The residue storage building will not be connected to any other structure to prevent dust from infiltrating other parts of the Facility.

Following appropriate testing to ensure the material is not hazardous as defined and regulated by the Province, the bottom ash will be transported to a licensed landfill facility. At the time of this submission, it is anticipated that the bottom ash will be utilized as daily cover material. Covanta's Research and Development group are continually investigating new and more beneficial uses for this material.

Fly ash will be collected and managed separately from bottom ash.

10.6.3.2 Fly Ash Management

The fly ash handling system for each combustion train will collect the fly ash from the convection pass, superheater, economizer and the APC system of that train. Fly ash will be collected via intermediate conveyors which will discharge into one of two redundant ash surge bins. (Figure 10-15) The fly ash conveyors will be water and dust proof. Each ash surge bin will feed an ash conditioner/mixer (pugmill) that will combine and thoroughly mix the ash with Portland cement, pozzolan and water to fix any potentially harmful elements in the fly ash. The conditioned fly ash will then be discharged into the first of seven dedicated conditioned fly ash bunkers in the residue building.

Each bunker will hold three days worth of conditioned fly ash. To maintain a consistent and manageable product, the conditioned fly ash will be turned regularly. After three days, the fly ash will be transferred to the adjacent three-day storage bunker. This process will be repeated as required for a total curing period of up to 21 days (3 days in each of the 7 bunkers). After the fly ash has cured, it will be loaded into transportation vehicles by the front end loader. The conditioned fly ash will be kept separate from the bottom ash in the residue building.

In Ontario, fly ash is designated as hazardous and therefore must be managed in accordance with Ontario regulatory requirements.

10.6.3.3 Ferrous and Non Ferrous Recovery System

A ferrous recovery system and non ferrous recovery system will be provided for the Facility to recover materials from the bottom ash. This system will consist of conveyors, magnets, screens and other equipment required for a complete, operational system. The system will be located in the residue building.

The ferrous recovery system will be designed to remove up to 80% of the ferrous metals greater than 25 mm and less than 150 mm in size in all dimensions. The system will consist of the following equipment:

- Rotary drum magnet located above the feeder conveyor to recover the magnetic ferrous material;
- Vibrating screen to agitate and remove loose dirt and scale; and
- All necessary chute work and product distribution conveyors.

The vibratory screen follows the magnet to ensure that recovered ferrous is of good quality.

The non-ferrous metal recovery system will be designed to remove up to 60% of the non-ferrous metals greater than 10 mm and less than 50 mm in size in all dimensions.

The system will consist of the following equipment:

- Vibratory screen to separate the residue into two streams;
- A vibratory feeder to ensure an even and uniform flow of residue onto the eddy current separator;
- An eddy current separator; and all necessary chute work and associated diverter gates.

The eddy current separator will be arranged to minimize possible damage from tramp ferrous metal. Separate storages areas will be provided for ferrous and non-ferrous metals. Storage areas may be incorporated into ash processing buildings and processing areas.

Materials recovered at the Facility will be sold to the marketplace as recovered recyclable materials through contracts to be established once the facility has been constructed.

10.6.4 Conceptual Energy Production

The high pressure, superheated steam generated in the boilers will be fed to a turbine-generator, where electricity will be produced. The proposed turbine-generator system consists of one unit, sized to handle the steam flow of the Facility. Uncontrolled steam turbine extractions will supply air heaters, the low pressure feedwater heaters and a deaerator as well as the future district heating system.

Exhaust steam from the turbine will enter an air cooled condenser which will be designed to accept the full turbine exhaust flow at the maximum continuous rating steam flow. An independent closed cooling water loop with air-cooled heat exchangers will be provided for auxiliary cooling. The steam generating equipment will be designed to be operated independently of the turbine-generator by bypassing the turbine and routing the superheater outlet steam directly to the air-cooled condenser.

The condensate formed in the condenser will be pumped via condensate pumps through an air ejection condenser, gland steam condenser and low pressure feedwater heaters, where it will be heated prior to delivery to the deaerator. From the deaerator, heated feedwater will be pumped to the boilers' economizers. Two 50% capacity electric motor driven boiler feedwater pumps and one 100% capacity steam turbine driven boiler feedwater pump will be provided.

The electrical connection will consist of a step-up transformer, circuit breakers and other equipment and auxiliaries to convert the generator output voltage of 13.8 kV to 44 kV. The step-up transformer high voltage winding will terminate in a 44 kV air-insulated substation where it connects to the Hydro One 44 kV transmission line system. Interconnection services will be limited to a 44 kV overhead transmission line from the Facility substation east to the Hydro One 44 kV transmission line on the east side of Osborne Road. The system will meet design and operational requirements for interconnection and delivery of electricity to Hydro One. A 200-300 kW emergency diesel generator will be provided for emergency back-up power.

The Vendor will assume responsibility for designing and providing an interconnection in compliance with Hydro One and the Independent Electricity System Operators (IESO) requirements, and will obtain required Hydro One and IESO approvals of the Facility related interconnection operation and protective equipment. The complete electrical system will meet the requirements of the Canadian Electrical Code and local building codes.

Energy generated that exceeds the energy required to sustain facility operations will be sold to the Ontario Power Authority (OPA) through a Power Purchase Agreement (PPA). This agreement is currently being negotiated however key components including the price per kilowatt hour have been confirmed. Upon EA approval, the PPA with OPA will be signed.

10.6.5 Conceptual Potable, Process and Waste Water

The proposed water and wastewater systems will be designed to provide suitable quality water for each process use. The Facility will be designed to be a zero wastewater discharge Facility, with the exception of the Facility's sanitary uses.

Potable water will be used for fire protection, boiler feed water makeup, minimal wash-down water, feed hopper cooling and irrigation. Two 130-kW diesel powered fire pumps will be used for emergency fire fighting purposes. For boiler feed, makeup water will be directed to a two-pass reverse osmosis unit. Boiler feed makeup water will be stored in a storage tank and pumped as needed to the deaerator.

The process wastewater generated throughout the Facility will be collected and reused wherever possible. Floor trenches will drain to a settling basin and collected wastewater will be used for quenching residue in the ash dischargers. Boiler blowdown and reject water will be used as scrubber slaking and dilution water, fly ash conditioning water and supplementary water supply to the settling basin. Sanitary wastewater will be discharged to the sewer.

A chemical feed system will be provided to minimize corrosion of the condensate and feedwater systems and to minimize corrosion, scaling and deposition in the boilers. The corrosion inhibitor system will utilize either ammonia or a filming amine that will be injected into the deaerator outlet piping. The oxygen scavenger system will utilize either sodium bisulphite or equivalent that will be injected into the deaerator. The boiler water treatment system will utilize either phosphate or chelant chemicals that will be injected into the boiler drum or economizer inlet pipe to prevent scale formation inside the drum and associated piping.

10.6.6 Conceptual Facility Structures

The major structures of the Facility comprise the refuse receiving, maneuvering, and tipping area structure, storage structure, boiler structure, maintenance building, control room, turbine building, residue building, pumphouses, air pollution control building, and administration building Figure 10-5 and Figure 10-6 outline the Site layouts for both the 140,000 and the 400,000 tpy scenarios as supplied by the Vendor and shows the location of the Facility structures.

The vehicle receiving, maneuvering, vehicle loading and unloading and storage areas which includes the refuse pit and boiler refuse feed chutes, and the service area which includes the control room, maintenance and personnel areas, and turbine area, will be combined into a common or contiguous, enclosed structure.

The residue building will be designed to provide approximately four days of storage for the Facility Maximum Continuous Rating (MCR) throughput conditions. The residue building will be equipped with roll-up doors to allow vehicles to drive through. All residue storage areas will be roofed (i.e., protected from rain), drained, and complete with a ventilation system with filtration to control dust. The boilers, refuse storage area, residue storage area, APC area and turbine/generator will be fully enclosed.

The following table (Table 10-5) provides approximate footprints of the major Facility structures.

Table 10-5 Conceptual Footprint of Facility Structures

Facility Structure	Footprint	
	Proposed Initial Design Capacity Facility (140,000 tpy capacity)	Maximum Design Capacity Facility (400,000 tpy capacity)
Administration Area	818 m^2	NA
Tipping Floor	800 m^2	650 m^2
Refuse Enclosure	628 m^2	350 m^2
Boiler Enclosure	956 m^2	600 m^2, 950 m^2
APC Enclosure	1100 m^2	875 m^2, 750 m^2
Turbine Generator Enclosure	676 m^2	475 m^2, 675 m^2
Residue Storage Building	1030 m^2	1030 m^2
Storage and Maintenance Shop	204 m^2	185 m^2
Continuous Emission Monitoring Systems (CEMS) Building	24 m^2	24 m^2
Induced draft (ID) Fan VFD Building	110 m^2	110 m^2, 110 m^2

10.6.7 Conceptual Process Control Systems

The instrumentation and control systems will be designed to achieve safe, reliable and economical generation of power and steam and efficient operation of the Facility as a whole.

Plant controls will be operated from the Central Control Room including boiler, turbine, feedwater and condensate system, condensing system and water treatment system. The following equipment will be controlled locally:

- Waste handling crane –Voice communication between the control room and the crane pulpit will be provided via plant intercom;
- Residue handling system – The residue handling system between the furnace and the residue storage pit will be automatic. Other residue handling systems will be controlled locally with operating status of all equipment indicated in the control room; and,
- Chemical addition systems will be automatic and locally controlled.

Start-up of the Facility will be accomplished from the control room. When in operation, each combustion train will be automatically controlled. The operator will set desired steam flow and the control system will perform the remainder of the control functions. The control system will ensure that all process conditions are maintained within safe limits, and that emissions, and other regulatory requirements are within limits specified in the environmental permits. Control of each individual combustion train will be independent of the others.

When a turbine generator set is in operation, its system will be automatically controlled. The turbine system will be controlled to consume all steam produced by the boilers.

The operator will be able to supersede the automatic controls and operate the Facility manually from the control room.

Critical plant control systems will be organized hierarchically with the primary point of control centered around a Distributed Control System (DCS) consisting of redundant digital microprocessor-based process controllers (RDPC). Control will be segregated into those systems which are solely operated from the main control room, those systems or loops which employ local logic and provide parametric indication and/or alarm in the control room, and those loops or systems which are local control only.

The control philosophy for the plant involves functions such as closed loop control to be performed by the DCS. All malfunctions of equipment which would interrupt the process will be alarmed on the operator interface to the DCS. Sufficient operator screens will be included to provide for a dedicated alarm window to be available at all times,

A data logging system will be included in the DCS software to provide a log of plant parameters. Readings will be stored in computer memory such that computer operation difficulties and electric supply disruptions will not result in a loss of data. Hard copy logs will be created, printed, and saved in electronic form at any scheduled interval desired as well as upon operator demand.

Trends in selected plant parameters will be available for display on video monitors in the control room. If will be possible for the operator to select parameters to be trended. The control system will be capable of displaying trends automatically when a parameter is approaching its normal operating limit.

The process control systems include the following components (Table 10-6).

Table 10-6 List of Conceptual Process Control Systems

Process Control Component	Description of Component
Central Control Room	Overall plant operation, control and monitoring activities will be accomplished from an enclosed, environmentally controlled central control room. The control room will be located within the Facility near the turbine operating deck, the boiler firing aisle, and the administration area in order to provide the best possible access to all operating activities. Except for controls dedicated to specific equipment the Facility operations will be controlled by a distributed control system (DCS).
Ash and Residue Handling Control System	The ash handling control system including the ferrous and non-ferrous systems interlocks downstream and upstream components to prevent inadvertent material build-up when starting or stopping a segment of the train. This system will be capable of being controlled and monitored by the DCS from the control room.
Refuse Crane Control System	The refuse cranes will be equipped with a semi-automatic control system to allow for automatic lift and movement of the bucket from any position in the pit to a pre-selected hopper. Emptying of the bucket, return to location of loading in the pit, descent and filling of the bucket will be manually controlled. Manually overriding the automatic control and then the resuming automatic mode again will be possible at any time.
Refuse Combustion And Steam Generation Control System	The Martin GmbH® combustion control system automatically controls the hydraulic ram feeder stroke and frequency, grate speed and underfire air flow to achieve the desired steam flow or furnace temperature. Numerous other control systems provide complete monitoring control over the combustion and steam generation process.
Boiler Drum Level Control System	In order to achieve a stable drum water level, a material balance type of control system will be utilized. This system will maintain feedwater flow proportional to steam flow, trimmed by the drum level.
Steam Temperature Control System	The steam temperature control maintains uniform superheated steam temperature at the boiler outlet and minimizes temperature deviations during transients.
Deaerator Pressure And Level Control System	The deaerator level control system will utilize a standard single element control loop. The deaerator tank level signal will be compared to the set point and the level controller will modulate the deaerator makeup water control valve to compensate for the changes in level.
Continuous Blowdown Level Control System	The level in the continuous blowdown tank will be automatically maintained by a local pneumatic controller which will modulate a level control valve located in the discharge line.
Low Pressure Feedwater Heater Control System	The level in each low pressure feedwater heater will be automatically maintained by a single element control loop which will modulate a level control valve in the heater drain line.
Condenser Control System	The level in the condensate receiver will be automatically controlled by the condensate receiver level controller which will operate the level and the recirculation control valves in split range mode.
Furnace Pressure Control System	Furnace pressure control will be maintained utilizing a single element controller which will modulate the induced draft fan via the VFD. Furnace pressure will be measured by two transmitters mounted on opposite sides of the furnace, and the average of the two measurements will be used as process input to the pressure controller.
Air Pollution Control	Temperatures and pressure for each boiler will be continuously monitored in the

Process Control Component	Description of Component
System	ductwork between the economizer and the scrubber and downstream of the scrubber. To ensure efficient acid gas removal, the lime concentration of the slurry or hydrated lime fed to the scrubber will be automatically adjusted in response to the flue gas SO_2 content. Scrubber outlet temperature will be controlled using the dilution (or spray) water control valve. The lime and water flow to the scrubber will be automatically controlled so that the temperature of the flue gases and the SO_2 concentration is maintained at the set point. The quantity of activated carbon injected into the flue gas will be automatically controlled to the required feed rate. A continuous emission monitoring (CEM) system will be provided to continuously monitor and record the following parameters: • Baghouse outlet: opacity, moisture, CO, O_2, NOx, SO_2, HCl, HF; • Economizer outlet: O_2, SO_2, CO; • Flue gas temperatures at the inlet of the boiler convection section and at baghouse inlet or each boiler; • Temperature and pressure of the feedwater and steam for each boiler; and • Mass flow rate of steam for each boiler.
Turbine Instrumentation And Control System.	The turbine control system will allow the turbine to operate under the following modes: • When the turbine-generator is operating in parallel with the utility's power grid, the electronic governor controls the turbine to maintain a constant pressure in the main steam header. The turbine-generator output follows boiler steam production. This mode is referred to as "inlet pressure" control; • When the in-plant electrical system is separated from the utility's power grid, the electronic governor automatically and safely transfers the unit from inlet pressure control mode to load demand control mode without shutdown or abnormal effects to the system. The turbine-generator then follows the in-plant electrical demand. This model is referred to as "in-plant load demand" control. Excess steam will be routed to the air cooled condenser that has been isolated to simultaneously accept temperature controlled main steam and turbine exhaust steam; and • When the turbine-generator has been operating separately from the utility's power grid and paralleling is desired, the electronic governor allows the transfer from in-plant demand control to inlet pressure control without shutdown or abnormal effects to the system.

10.6.8 Conceptual Process Mass and Energy Balance

The furnace/boiler combustion units will be normally operated at unit MCR; however, they will be capable of operating at a Maximum Continuous Turndown (MCTD) point, safely and for extended periods, without supplemental fuel firing.

Consideration of the mass and energy balance has included the Facility boiler and turbine cycles, including energy in the refuse, residue, combustion air, flue gas, boiler feedwater, steam condensate, boiler blowdown, makeup water and other miscellaneous items.

The following table (Table 10-7) outlines typical combustion unit performance data. Each combustion unit can be turned down to approximately 80% of its rated heat input capacity and still meet the design superheater outlet steam temperature.

Table 10-7 Typical Combustion Unit Performance Data

Performance Indicators	Conceptual Performance Parameters	
	Proposed Initial Design Capacity Facility (140,000 tpy capacity)	Maximum Design Capacity Facility (400,000 tpy capacity)
Facility Size, tonnes/day (t/d)	436	1,245
Unit Throughput, t/d	218	2x218, 342, 467
Unit Throughput, t/hr	9.08	2x9.08, 14.25, 19.46
Unit HHV, Mj/kg	13.0	13.0
Unit Gross Heat Release, GJ/hr (approx)	118	2x118, 185, 253
Unit Gross Steam Flow , Mg/hr (approx)	33.5	2x33.5, 52, 72
Working Pressure at Superheater Outlet, bar	91	91
Steam Temperature at Superheater Outlet , ^{o}C	499	499
Steam Enthalpy at Superheater Outlet Kj/kg	3,384	3,384
Economizer Outlet Gas Temp, ^{o}C	166	166
Feedwater Temperature, ^{o}C	135	135
Continuous Blowdown (Design)	2%	2%
Minimum Air Heater Inlet Temp., ^{o}C	-18.3	-18.3
Air Heater Outlet Temp. ^{o}C HHV>12.8 Mj/kg HHV>12.1 to 12.8 Mj/kg HHV 12.1 Mj/kg or less	 93 121 149	 93 121 149
Excess Air, % (approx)	50 – 55	50 – 55
Unit Efficiency, % (approx)	78	78, 79, 79

10.6.9 Conceptual Electrical System Design

The Facility will initially consist of two waste steam generators and one steam turbine generator with a gross output of approximately 20MW. The steam turbine generator (STG) will be connected to the main plant 13.8 kV switchgear. The step-up transformer and low voltage substation transformers will also connect to the main plant 13.8 kV switchgear. The step-up transformer will connect to the Hydro One 44 kV transmition system. The main plant switchgear will be sized to have "future" breakers added to accommodate the Phase 1 expansion of the Facility. The step-up transformer will be sized to accept the output of the Phase 1 expansion steam turbine generator.

During startup of the Facility, power will be supplied from the Hydro One 44 kV transmission system by back feeding power through the step-up transformer to the main plant 13.8 kV switchgear. Once the main plant switchgear is energized, power will be distributed throughout the electrical auxillary system to support startup and operation of the Facility. During normal operation, or during island operation, the Facility electrical auxillary system power requirements (including those required for administrative operations) will be supplied from the inplant steam turbine generator via the main plant 13.8 kV switchgear and 600V substations.

The steam turbine generator will be able to be synchronized to the Hydro One system during start up via the generator breaker in the main plant switchgear or when recovering from island operation via the transformer breaker in the main plant switchgear. Once the generator is synchronized to the main plant switchgear, the net power production is delivered to the Facility 44 kV substation via the step-up transformer and exported at 44 kV (nominal) to the Hyfro One transmission system.

The Facility auxillary electrical systems will be arranged and the combustion process equipment will be grouped so that a single electrical equipment or a circuit failure will not prevent operation of more than one unit. Electrical equipment and circuits will be capable of being isolated for maintenance without affecting more than one unit.

Common auxillary systems with redundant process equipment will have the equipment split between two sources to minimize the impact of a single circuit outage. The Facility will include, as necessary, medium voltage power distribution; low voltage power distribution; lighting; grounding; raceway and cable; control, security and communication systems.

The main circuits for power distribution will be constructed to minimize the chance of physical damage. During normal operation the steam turbine generator supplies power to the Facility main plant 13.8 kV switchgear, which powers the Facility electrical auxillary system and exports excess power to the Hydro One system via the step-up transformer. Should the normal source of power to the 13.8 kV switchgear be interrupted due to a sudden loss of the turbine generator, power will be back fed through the step-up transformer to the main plant switchgear allowing the Facility to continue processing waste. In the event of a complete loss of power to the Facility (loss of the steam turbine generator and the Hydro One connection), an auto start of the Facility standby diesel generator will occur. The diesel generator will provide power to plant auxillaries required to assure an orderly shutdown of the plant.

Critical power requirements will be met by batteries and/or battery backup uninterruptible AC power systems. Adequate protection for generator, transformers, and all electrical equipment will be provided in accordance with IEEE guidelines.

10.7 Facility Expansion Capability

It is anticipated that at some point during the 35-year planning period there may be a need to expand the Facility in order to accommodate processing of additional post-diversion residual wastes. The specific need to undertake an expansion will be considered, initially through the review of the proponents' integrated waste management systems and a redetermination and/or confirmation of projected long-term disposal capacity requirements. Once a need has been determined by the Proponents, consultation will be undertaken with the MOE to confirm the requirements to undertake an expansion. Based on initial planning completed as part of this EA process and in consideration of the type of facility and expansion requirements, it is likely that he expansions would take place in two phases, in order to address circumstances that could arise over the planning period, as follows:

- Initial Approved Processing Design Capacity of 140,000 tpy in order to accommodate:
    - Approximately 110,000 tpy of post-diversion residual waste delivered to the Facility from Durham;
    - Approximately 20,000 tpy of post-diversion residual waste delivered to the Facility from York; and,
    - Approximately 10,000 tpy available as a contingency.
- Potential Phase 1 Expansion to 250,000 tpy in order to accommodate:
    - Approximately 130,000 tpy of post-diversion residual waste delivered to the Facility from Durham; and,
    - Approximately 120,000 tpy of post-diversion residual waste delivered to the Facility from York.
- Potential Phase 2 Expansion to the maximum design capacity of 400,000 tpy in order to accommodate:
    - Approximately 200,000 tpy of post-diversion residual waste delivered to the Facility from Durham; and,
    - Approximately 200,000 tpy of post-diversion residual waste delivered to the Facility from York.

The potential increase in post-diversion residual waste tonnages for both Durham and York could occur over the 35-year planning period based on projected or unanticipated population increases over this period, either Municipality not being able to meet or sustain projected diversion performance over this period and/or increases in overall waste generation rates. In addition, either Phase 1 or 2 expansions could accommodate waste from other non-GTA neighbouring municipalities as well as IC&I sources. These expansion quanities are estimates and include a small contingency similar to that identified in the 140,000 tpy initial design capacity.

The quantity of waste requiring disposal is expected to increase throughout the 35-year planning period for the EA Study and the rate at which this quantity will increase depends on a number of factors including:

- whether or not Durham and York achieve their planned waste diversion targets;
- whether or not higher diversion rates are achieved during the planning period;
- whether there is potential for managing post-diversion residual waste from neighbouring non-GTA municipalities or waste from IC&I sources;
- economic growth and other factors which could result in higher overall quantities of waste requiring disposal over the planning period; and,
- initiatives such as extended producer responsibility which could result in lower quantities of waste requiring disposal over the planning period.

The design of the Facility is such that it can accommodate the initial design processing capacity and many aspects of the Phase 1 expansion (250,000 tpy) requirements, with only minimal need for redesign and construction of additional components. An expansion to the maximum design capacity however, would require more effort to design and construct. A conceptual overview of the Facility components and accommodation for expansion is outlined in Table 10-8 below. Provisions for the equipment and buildings for the Phase 1 expansion will be included in or adjacent to the initial Facility building set. Provisions for the equipment and buildings for the Phase 2 expansion will be located to the west of the initial and Phase 1 contiguous buildings. The Facility design includes provisions for future supply of hot water district heating with 100% availability to the nearby Courtice WPCP and the future Clarington Energy Business Park.

Table 10-8 Provisions for Expansion of Facility Components

Facility Component	Provisions for Phase 1 Expansion (250,000 tpy)	Provisions for Phase 2 Expansion (400,000 tpy)
Tipping Floor Building	No Change Required.	+1 (Space allotted, no provisions included.)
Two Overhead Refuse Cranes	No Change Required.	+2 (Space allotted, no provisions included.)
Refuse Storage Pit	No Change Required.	+1 (Space allotted, no provisions included.)
Boiler House Modifications	Designed to allow for ease of expansion.	+1 (Space allotted, no provisions included.)
Electrical Generating Capability	Need to add Phase 1 turbine and turbine generator building adjacent to initial building.	Need to add Phase 2 turbine and turbine generator building adjacent to initial building. (Space allotted, no provisions included.)
Exhaust Stack	Stack shell sized for the addition of a third boiler train flue.	+1 (Space allotted, no provisions included.)
Residue Removal and Storage	No Change Required.	+1 (Space allotted, no provisions included.)
Ferrous and Non-Ferrous Recovery	No Change Required.	+1 (Space allotted, no provisions included.)
Control Room	Has space for installation of additional consoles etc associated with expansion.	Has space for installation of additional consoles etc. associated with expansion.
Utilities	Water and Wastewater lines will have capacity to support throughput capacity.	Water and Wastewater lines will have capacity to support throughput capacity.
Condenser System	Provisions made for an additional condenser unit.	+1 (Space allotted, no provisions included.)
Fire Protection	Fire pumps and water supply system sized for 400,000 tpy. Additional sprinklers and detectors added as part of expansion.	Fire pumps and water supply system sized for 400,000 tpy. Additional sprinklers and detectors added as part of expansion.
Chemical Storage	No change required.	Provisions for storage of acids, caustic, lime etc. In bulk will be able to support a processing rate of

Facility Component	Provisions for Phase 1 Expansion (250,000 tpy)	Provisions for Phase 2 Expansion (400,000 tpy)
		400,000 tpy or space will be provided on the site for additional storage.
Administration Building	No Change Required.	No Change Required.
Roadways and Parking	No Change Required.	Space provided, no provisions included.

Notes: +1 ___ (one similar component or unit added)
+2 ___ (two similar components or units added)

10.8 Conceptual Facility Construction Overview

Construction activities at the Site would include land preparation, structural assembly and commissioning. It is expected that site preparation and structural phases would last approximately 30 months.

Site preparation activities include:

- Establishment of lines and grades;
- Site clearing and grubbing;
- Initial and finish grading;
- Site drainage and control;
- Boundary fencing;
- On and offsite vehicular and automobile access;
- All provisions for acceptance of deliveries; and,
- All landscaping, retention ponds, stormwater management, erosion and sedimentation control.

The structural phase activities would include:

- Foundations and footings;
- Structural steel erection;
- Major equipment delivery and installation;
- Process equipment installation;
- Piping, electrical work; and,
- Initial Startup/testing.

10.9 Conceptual Facility Operation Overview

The following table (Table 10-9) outlines some of the key aspects of the operation of the Facility.

Table 10-9 Facility Operation

Component	Description
Waste Receiving	• Trucks discharge to tipping floor or receiving pit. • Unacceptable and Hazardous Waste Screening.
Waste Processing Operations	• Waste mixed and fed into charging hopper. • Refuse combustion.
Power Generation	• The high pressure, superheated steam generated in the boilers will be fed to a turbine-generator, where electricity will be produced.
Safety & Emergency Programs	• Appropriate safety and emergency procedures will be developed as part of the EPA permitting process.
Material Recovery	• Ferrous Recovery – rotary drum magnet, rotary trommel or vibrating screen, chutes and product distribution conveyors. • Non-Ferrous Recovery – Vibratory screens and feeders, eddy current separator, chutes and diverter gates.
Maintenance	• Routine and preventative. • Refurbishment and replacement of major equipment. • Contracted Services i.e., pest & vermin control, specialized material & equipment testing, environmental testing, groundskeeping, janitorial services, elevator services.

Operating Schedule

The Facility at the initial design capacity will generally be operated 24 hours a day, 7 days a week with refuse receiving hours Monday through Saturday. Refuse will be received largely from Monday to Friday, however on occasion it may be received on Saturdays based on collection day extensions (due to statutory holidays during the week) or transfer station capacity. It has been assumed that waste will be supplied over 250 days per year.

Staffing

The Facility will be operated by a staff of approximately 33 full-time personnel who fall into the following major groups or departments; Management and Administration, Operations and Maintenance.

The Management/Administration group is responsible for the day-to-day management of the Facility. The Operations Group will consist of four four-person operating teams who work twelve hour shifts composed of a shift supervisor, control room operator, refuse crane operator and an auxiliary operator. Included in this group are the loader operators. The Maintenance Group, consisting of approximately seven people, is responsible for the mechanical, electrical and plant preventative maintenance for the Facility.

10.10 Facility Contingency Plans

Contingency plans for the Facility will be put into place if operations are curtailed and alternate disposal requirements are needed.

Based on current operating conditions, maintenance schedules and storage and handling capabilities, the Facility Manager will provide the Regions with information that will allow for advanced planning of alternate disposal requirements in the unlikely event that they would be required. Conversely, the Facility Manager will be advised of any anticipated changes that the Regions may be aware of concerning traffic flow, type of waste and amounts of waste to be delivered. This will allow the opportunity to reschedule personnel, modify maintenance plans and adjust operation conditions.

When operation of the Facility is curtailed, waste will be stored in the Facility tipping building, as four days of storage is provided and distributed above and below the tipping floor level. When necessary, the preferred vendor is currently proposing that waste will be hauled to one of three permitted disposal facilities in the United States on a short-term basis. Should the Facility be out of service for an extended period of time, these same facilities would be utilized to dispose of the waste. These facilities are already permitted to receive this waste material and the contractual agreement with Covanta already secures this capacity. Should capacity at these facilities be required, waste will be redirected from the Regions' transfer stations to these alternate facilities. The Design and Operations report for the facility to be prepared as part of the approvals process under the EPA will provide the detailed procedures for managing and redirecting waste should contingency capacity be required. The MOE will be notified should use of this contingency capacity be required.

10.11 Facility Decommissioning

Post-closure use of the Site will likely still be of an industrial nature since the Site would likely be part of a fully developed energy park and will still be zoned industrial. At the time of closure and decommissioning, an appropriate plan will be developed, considering:

- Current regulatory requirements;
- Best-practices with respect to equipment and materials salvage;
- Best-practices with respect to hazardous materials management;
- Best use of materials including reuse and recycling of Facility components; and,
- Applicable impact management measures identified in this EA.

10.12 Facility Design, Construction and Operation Roles and Responsibilities

The following provides an overview of the roles and responsibilities of the primary parties involved in the design, construction and operation of the Facility.

Regions' Responsibilities

- The Regions reserve the right to utilize and/or market any energy outputs from the Facility including electrical power and thermal energy for a future district energy system.The Regions shall receive the benefit of the sale of the energy produced by the Facility.
- The Regions will provide a minimum 140,000 tonnes of waste to the Facility per year.

- The Regions will retain the benefit of any and all greenhouse gas emissions, renewable energy or carbon credits.

Design, Build and Operate (DBO) Contractor Responsibilities

- The DBO Contractor will manage the work associated with electrical interconnection with the grid and thereafter manage the sale of electricity in accordance with the terms of the Power Purchase Agreement which will be finalized subject to negotiations among the Regions and the Province of Ontario.
- The DBO Contractor will be responsible for the sale of marketable by-products of the Facility's operations (e.g., slag or bottom ash, metals, glass, paper, plastic, gypsum and sulphuric acid), and the disposal of all non-marketable by-products.
- The DBO Contractor will ensure that the Facility shall comply with the Regions' air emission criteria based upon Province of Ontario's and European Union's Air Emission Requirements and that all other applicable municipal, regional, provincial and federal regulations are met.
- The DBO Contractor will provide for the management and disposal of all process by-products and residues, including bottom ash, fly ash, bypass and rejected wastes.
- The DBO Contractor will enter into an Early Works Agreement with the Regions under which it will develop conceptual design options for the architectural features of the Facility, and assist the Regions in completing the EA process to secure the required approvals for the Project.
- The DBO Contractor will create a scale model of the final approved Facility's exterior and key internal components for public viewing, which shall be maintained at a designated area within the Facility, accessible to the public.
- The DBO Contractor will provide detailed monthly and annual reports, annual service plans, a five (5) year maintenance plan and a life cycle plan to the Regions during the operations period.
- The DBO Contractor will make accommodations for inspection by the Regions, their consultants and any governmental inspections.
- The DBO contractor will provide office space for Regional and MOE staff as required.
- The DBO Contractor will accommodate educational and other tours of designated areas of the Facility and provide appropriate health and safety briefings associated therewith.

The DBO Contractor will:

- Develop, maintain and adhere to an emergency management plan, which plan will be reviewed and approved by the Municipality of Clarington Fire and Emergency Services Department.
- Enter into agreements with the Municipality of Clarington Fire and Emergency Services Department for onsite training of emergency responders, and be responsible for the costs of such training and any specialized equipment identified as being reasonably necessary; and
- Ensure that the Facility is consistent with International Standards Organization 14001:2004 Environmental Management Standards (ISO 14001).

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Section 11 Summary

Following the identification of the Undertaking, an EA level impact assessment was conducted to identify the potential effects, impact management measures and net effects of the Undertaking on the environment together with a summary of recommended environmental management measures. The discussion has been organized into two subsections. The first considers the Undertaking at an approved design capacity of 140,000 tpy (140,000 tpy scenario). The second subsection provides a summary discussion of the potential effects of the Undertaking assuming a maximum design capacity of 400,000 tpy (400,000 tpy scenario).

A more definitive assessment of the Undertaking was completed for the 140,000 tpy scenario since there is a clear understanding of the process design components and related potential effects of the Facility at this initial stage of development. The assessment of potential effects at the maximum design capacity of 400,000 tpy is, by necessity, more general since many of the design and performance elements of the Facility, used in this potential effects assessment, are not specifically known at this time.

Several site-specific assessments and analyses of potential environmental effects have been carried out for the Undertaking. The site-specific assessments and analyses of potential environmental effects have been documented in the following Technical Study Reports that are appended to this EA:

- *Air Quality Assessment - Technical Study Report;*
- *Surface Water and Groundwater Assessment - Technical Study Report;*
- *Facility Energy and Life Cycle Assessment – Technical Study Report;*
- *Geotechnical Investigation - Technical Study Report;*
- *Acoustic Assessment - Technical Study Report;*
- *Visual Assessment - Technical Study Report;*
- *Natural Environment Assessment - Technical Study Report;*
- *Social/Cultural Assessment - Technical Study Report;*
- *Stage 2 Archaeological Assessment and Built Heritage Assessment - Technical Study Report;*
- *Traffic Assessment - Technical Study Report;*
- *Economic Assessment - Technical Study Report;* and,
- *Site-Specific Human Health and Ecological Risk Assessment (HHERA) - Technical Study Report.*

The background information drawn from the Technical Study Reports is described, as necessary, to facilitate an understanding of the environmental effects, a description of the methodologies applied, a summary of the potential effects, proposed impact management measures, and conclusions associated with the assessment of the Undertaking. Each of the Technical Study Reports has considered the potential effects during the construction and operation of the Facility. Potential effects during construction have been assessed for only the initial construction activities. As stated, potential effects associated with operating the Facility have been assessed for both the approved design capacity scenario of 140,000 tpy and a maximum (400,000 tpy) design capacity scenario.

There are both potential advantages and disadvantages associated with the Undertaking at its approved design capacity of 140,000 tpy and at the maximum design capacity of 400,000 tpy. These advantages and disadvantages reflect the net effects that may exist after the application of impact management measures which would likely last throughout the operational period until closure of the Facility. The following provides a qualitative discussion of the potential advantages and disadvantages of the Undertaking based on the net (or residual) effects.

For many aspects of the environment there are neither advantages nor disadvantages, as no net effect of the Undertaking on the environment has been identified. The following is a summary of the aspects of the environment for which minimal to no effects are anticipated for the 140,000 tpy and 400,000 tpy scenarios:

Approved Design Capacity of 140,000 tpy:

- In regards to air quality, intermittent vehicle and dust emissions are addressed through a variety of good construction practices. Emissions during Facility construction would be the same as any other medium-sized construction site in southern Ontario. Given the results of the assessment of air emissions, no Human Health or Ecological risk has been identified related to construction.
- During operation, air emissions are predicted to meet applicable ambient air quality criteria and would meet or, more commonly, would be below the current air contaminant limits placed on municipal waste incinerators. The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions.
- The results of the air emissions modeling and HHERA indicate that there would be no adverse health effects to human receptors exposed either by way of inhalation or via other environmental media to emissions from the Facility or from the operation of vehicles directly related to the Facility. In addition, there would be no adverse ecological effects associated with the emissions from the Facility.
- No adverse effects at offsite locations are expected from Facility-based odour given the proposed Facility design.
- Provisions included in the Facility design for stormwater management (SWM) on the Site will meet enhanced design guidance criteria found in the MOE *SWM Planning and Design Manual*, and proposed measures to reduce runoff potential provide an enhanced level of receiving water protection.
- No effects to local groundwater resources are expected during construction or operations. The Site will be serviced via municipal infrastructure (sewer and water).
- The Facility would be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. The predicted potential noise levels at all nearby points of reception are less than the applicable criteria for the operational scenario assessed for the Facility.

- Effects to local wildlife and habitat are anticipated to be minimal given that: no populations of species of special concern, threatened and/or endangered species; no ANSI, PSWs or ESAs; and, no significant wildlife habitat, woodlands or wetlands are potentially affected by the Facility. In addition, no permanent watercourses are located onsite and no fish habitat or species are located onsite.
- The Facility is compatible with existing and planned land uses. During construction, minimal net effects are anticipated in the short-term to the closest social/cultural receptors related to noise/vibration, dust and visual effects. During operations, there will be minimal to no effect from most physical parameters (odour, noise, dust, vermin/vectors, litter and traffic) on residential properties, public facilities or institutions or cultural/recreational resources. It is anticipated the Facility would have a minimal effect on the landscape, while having an overall medium level visual effect on some receptors within proximity to the Facility. Existing land use designations and proposed land use changes indicate that the area around the Site is currently occupied by a mixture of commercial/industrial land uses and undeveloped land and is designated for a mixture of prestige employment and light industrial land uses which would be compatible with the Facility.
- Stage 2 Archaeological Assessment identified no archaeological artifacts or sites of significance on the Site and there are no significant built heritage features on or near the Site.
- The Facility is anticipated to result in minimal disruption to the local traffic network. The only improvements proposed that would be specific to the Facility would be road/pavement improvements to the South Service Road and Osborne Road to accommodate construction and operational vehicles. Future development of the Clarington Energy Business Park (CEBP) will generate significantly more traffic in the area that would likely necessitate some traffic control measures (traffic signals, loop ramps, etc.).
- The Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating) associated with the Facility. In regards to the effect of the Facility on property value outside the CEBP, current European experience indicates that Thermal Treatment Facilities have no effect on the value or salability of property in areas around such facilities, while North American experience indicates that short-term effects may result from the perception of the impacts of proposed facilities that could be addressed through a Community Relations Plan.

Maximum Design Capacity of 400,000 tpy:

- In regards to air quality, similar to the 140,000 tpy scenario, intermittent vehicle and dust emissions are addressed through a variety of good construction practices. Emissions during Facility construction would be the same as any other medium-sized construction site in southern Ontario. Given the results of the assessment of air emissions, no risk to Human Health or Ecological Risk has been identified related to construction.
- During operation, air emissions are predicted to meet applicable ambient air quality criteria and would meet or, more commonly, would be below the current air contaminant

limits placed on municipal waste incinerators. The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions.

- The results of the air emissions modeling and HHERA indicate that during normal operations there would be no adverse health effects to human receptors exposed either by way of inhalation or via other environmental media to emissions from the Facility or from the operation of vehicles directly related to the Facility. In addition, there would be no adverse ecological effects associated with the emissions from the Facility.
- No adverse effects at offsite locations are expected from Facility-based odour given the proposed Facility design.
- Provisions are included in the Facility design for SWM on the Site to meet enhanced design guidance criteria found in the MOE *SWM Planning and Design Manual*, and proposed measures to reduce runoff potential provides an enhanced level of receiving water protection. During construction of the expanded Facility, the existing SWM pond should provide adequate stormwater retention and drawdown requirements. It is recommended that pond capacity expansion is undertaken in the early stages of the 400,000 tpy scenario construction.
- No effects to local groundwater resources are expected during construction or operations. The Site will be serviced via municipal infrastructure (sewer and water).
- The Facility would be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. There is a minor predicted increase in potential operational noise at some of the PORs for the maximum design capacity of 400,000 tpy compared to the approved design capacity of 140,000 tpy. However, based on the results of the acoustical modelling considering ambient noise levels and predicted noise levels from the maximum design capacity (400,000 tpy scenario) Facility and traffic sources, the predicted noise levels at all nearby PORs are less than the applicable criteria (Class 2 noise limits).
- Effects to local wildlife and habitat are anticipated to be minimal given that: no populations of species of special concern, threatened and/or endangered species; no ANSI, PSWs or ESAs; and, no significant wildlife habitat, woodlands or wetlands are potentially affected by the Facility. In addition, no permanent watercourses are located onsite and no fish habitat or species are located onsite.
- The Facility is compatible with existing and planned land uses. During construction, minimal net effects are anticipated in the short-term to the closest social/cultural receptors related to noise/vibration, dust and visual effects. During operations, there will be minimal to no effect from most physical parameters (odour, noise, dust, vermin/vectors, litter and traffic) on residential properties, public facilities or institutions or cultural/recreational resources. It is anticipated the Facility would have a minimal effect on the landscape, while having an overall medium level visual effect on some receptors within 1 km proximity to the Facility. Existing land use designations and proposed land use changes indicate that the area around the Site will continue to be occupied by a mixture of commercial/industrial land uses which would be compatible with the Facility.

- Stage 2 Archaeological Assessment identified no archaeological artifacts or sites of significance on the Site and there are no significant built heritage features on or near the Site.
- The Facility is anticipated to result in minimal disruption to the local traffic network. The only improvements proposed that would be specific to the Facility would be road/pavement improvements to the South Service Road and Osborne Road to accommodate construction and operational vehicles. No traffic control measures are required on the adjacent road network to accommodate traffic during operations of the Facility at 400,000 tpy. The future total traffic analysis without the development of the CEBP (assuming growth in background traffic based on historical traffic data) revealed acceptable operations at all study area intersections. Traffic control measures including signal changes may be required by the year 2023 with the full build-out of the CEBP.
- The Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating) associated with the Facility. In regards to the effect of the Facility on property value outside the CEBP, current European experience indicates that Thermal Treatment Facilities have no effect on the value or salability of property in areas around such facilities, while North American experience indicates that short-term effects may result from the perception of the impacts of proposed facilities that could be addressed through a CRP.

Potential advantages of the Undertaking for the 140,000 tpy and 400,000 tpy scenarios include:

Approved Design Capacity of 140,000 tpy:

- An overall reduction in the environmental burden associated with residual waste disposal given that Life Cycle Analysis indicates that the Facility would result in:
  - A net reduction in overall GHG emissions, considering both direct emissions, indirect emissions/offsets associated with recovery of energy and metals and avoided methane emissions from landfill;
  - An overall net reduction in emissions of Acid Gases and Smog Precursors;
  - A net reduction in emissions to water; and,
  - Annual energy benefits of between 94,000 MWh and 107,000 MWh of electricity generated/saved and 7.8 million m^3 of natural gas saved if the Facility provides heating or heating/cooling to the CEBP.
- Recovery of approximately 14,750 tonnes annually of ferrous and non-ferrous metals from the post-diversion residual waste stream that would have otherwise been landfilled, particularly as the majority of these metals would be recovered from materials (e.g., mattress boxsprings) that are not acceptable in the Ontario Blue Box program.
- The Facility is expected to have a positive effect on the economic environment in the region during construction and operations as:
  - During construction, the Facility will result in an increase in full-time employment for the labour force directly employed to construct the Facility, the local capital

investment in the Facility that could result in 1,000 or more full-time equivalent positions and induced employment resulting from the purchase of goods and services by the labour force.

- o During operations, the Facility will result in an increase in full-time employment for the 33 full-time positions required to manage and operate the Facility and the 100 to 114 indirect/induced full-time equivalent employment positions resulting from the $10 to $14 million per year that would potentially be spent on local/regionally sourced labour, goods and services.
- o The Municipality of Clarington could benefit from the potential investment by Durham in infrastructure near the Facility and in Payment in Lieu of taxes that have been set out in the proposed Host Community Agreement.
- o There is minimal potential for the Facility to disrupt the use and enjoyment of local businesses or agriculture, with the only anticipated effect being short-term noise and visual effects during construction. Local businesses stand to benefit from the up to $118 million that is anticipated to be spent during construction and the $10 to $14 million per annum that would be spent during operations on local/regionally sourced labour, goods and services.

Maximum Design Capacity of 400,000 tpy:

- An overall reduction in the environmental burden associated with residual waste disposal given that LCA indicates that the Facility would result in:
  - o A net reduction in overall GHG emissions, considering both direct emissions, indirect emissions/offsets associated with recovery of energy and metals and avoided methane emissions from landfill;
  - o An overall net reduction in emissions of Acid Gases and Smog Precursors;
  - o A net reduction in emissions to water; and,
  - o Net energy production, with the Facility providing a local source of electrical and heat energy. At maximum capacity the Facility could potentially produce approximately 3,180,000 GJ/yr of energy when only electrical energy is recovered, 3,513,000 GJ/yr when, in addition, heat is also recovered for district heating at a high efficiency, and 3,593,000 GJ/yr when heat recovery for district cooling is added (also at a high efficiency).
- Recovery of approximately 42,160 tonnes annually of ferrous and non-ferrous metals from the post-diversion residual waste stream that would have otherwise been landfilled, particularly as the majority of these metals would be recovered from materials (e.g., mattress boxsprings) that are not acceptable in the Ontario Blue Box program.
- The Facility is expected to have a positive effect on the economic environment in the region during construction and operations as:
  - o During construction, the Facility will result in an increase in person-years of employment for the labour force directly employed to construct the Facility, increases

in indirect employment and induced employment resulting from the purchase of goods and services by the labour force.

- o The Municipality of Clarington could benefit from the potential investment by Durham in infrastructure near the Facility The value of property taxes (or payment in lieu of taxes) paid to the Municipality of Clarington as a result of the Project under a 400,000 tpy operating scenario has yet to be determined, but would likely be the same as or greater than that paid under the 140,000 tpy scenario.
- o There is minimal potential for the Facility to disrupt the use and enjoyment of local businesses or agriculture, with the only anticipated effect being short-term noise and visual effects during construction. Local businesses stand to benefit from the investment in construction and during operations on local/regionally sourced labour, goods and services.

Potential disadvantages of the Undertaking for the 140,000 tpy and 400,000 tpy scenarios include:

Approved Design Capacity of 140,000 tpy:

- There is some potential for short-term construction related net effects from noise levels associated with pile driving (if required) and increased short-term offsite vehicle traffic. Also, some short-term visual disturbances could affect receptors within approximately 1 km of the Site.
- The presence of the Facility cannot be readily shielded from the adjacent roadways, and could result in a change to the existing local landscape for the duration of the operational period for the Facility. It is anticipated the Facility would have a minimal visual effect on the landscape, while having an overall medium level visual effect on some receptors within proximity to the Facility. While the stack could be visible from various vantages in the Region, the dimensions of the stack and the surrounding topography make it unlikely that the stack would be visible in areas of higher population densities.

Maximum Design Capacity of 400,000 tpy:

- Some potential exists for noise and vibration effects during the construction phase of the 400,000 tpy scenario Facility. Generally, vibration effects would be confined to a couple of hundred metres, but noise is not. There are two construction activities that are likely to create elevated sound levels that are difficult to mitigate. These are similar to the approved design capacity scenario and include pile driving activities associated with the construction at the Facility (if required) and potentially increased short-term (i.e., 1-hour) offsite vehicle traffic associated with construction. However, this would depend on the future road network. These activities would only be a concern during worst-case conditions. They are temporary and of short duration relative to the Facility construction, and would cease upon completion construction activities.
- The overall visual effect of the 400,000 tpy scenario, in addition to other planned and disclosed future projects, including the approved 140,000 tpy scenario, would likely result in minor visual effects. This is because it is expected that the landscape sensitivity and magnitude rankings would decrease over time because of the increased development in the area. Overall, the visual difference of the 400,000 tpy scenario Facility compared to the 140,000 tpy Facility would not be considerable.

- During potential “process upset” conditions, a limited number of chemicals resulted in slightly elevated potential risks above two government benchmarks for human health. The two slight exceedances of benchmark risk levels were seen when the Facility was operating under “process upset” conditions, where two out of three exhaust streams affected by a process upset such as start-up or equipment malfunction, for the entire one hour period, and at the time of the worst meteorological conditions. The probability of this hypothetical situation actually occurring is expected to be very low. Regardless, in the event that a 400,000 tpy expansion of the Facility is contemplated, special consideration would be given at that time to ensure that “process upset” conditions do not result in an undue risk to people living and working in the area surrounding the Facility.

11. Assessment of the Undertaking

This section of the EA Study document identifies at an appropriate EA level, the potential effects, impact management measures and net effects of the Undertaking as described in Section 10, on the environment together with a summary of recommended environmental management measures. It is understood and contemplated that environmental management measures recommended in this EA will in many cases be refined, updated, modified and/or superceded as a result of subsequent EPA and OWRA approval processes. This discussion has been organized into two subsections. The first considers the Undertaking at an approved design capacity of 140,000 tonnes per year (tpy). The second subsection provides a summary discussion of the potential effects of the Undertaking assuming a maximum design capacity of 400,000 tpy.

A more definitive assessment of the Undertaking was completed for the 140,000 tpy scenario since there is a clear understanding of the process design components and related potential effects of the Facility at this initial stage of development. The assessment of potential effects at the maximum design capacity of 400,000 tpy is, by necessity, more general since many of the design and performance elements of the Facility, used in this potential effects assessment, are not specifically known at this time.

Several factor and site-specific assessments and analyses of potential environmental effects have been carried out for the Undertaking as described in Chapter 10. The factor and site-specific assessments and analyses of potential environmental effects are documented in the following technical study reports that are appended to this EA Study document:

- *Air Quality Assessment - Technical Study Report* (**Appendix C-1**);
- *Surface Water and Groundwater Assessment - Technical Study Report* (**Appendix C-2**);
- *Facility Energy and Life Cycle Assessment - Technical Study Report* (**Appendix C-3**);
- *Geotechnical Investigation - Technical Study Report* (**Appendix C-4**);
- *Acoustic Assessment - Technical Study Report* (**Appendix C-5**);
- *Visual Assessment - Technical Study Report* (**Appendix C-6**);
- *Natural Environment Assessment - Technical Study Report* (**Appendix C-7**);
- *Social/Cultural Assessment - Technical Study Report* (**Appendix C-8**);
- *Stage 2 Archaeological Assessment and Built Heritage Assessment - Technical Study Report* (**Appendix C-9**);
- *Traffic Assessment - Technical Study Report* (**Appendix C-10**);
- *Economic Assessment - Technical Study Report* (**Appendix C-11**); and,
- *Site-Specific Human Health and Ecological Risk Assessment (HHERA) - Technical Study Report* (**Appendix C-12**).

The information used in the assessment of the Undertaking in both design capacity scenarios was taken, as required, from these Technical Study Reports. Summaries of the analytical methodologies and results, as they relate to the design capacity-based development scenarios, are provided in two subsections. For the reason stated above, however, the level of detail with which the analyses were completed at the 140,000 tpy approved design capacity scenario is greater than that for the analyses of the maximum design capacity of 400,000 tpy. The analyses documented in three of the Technical Study Reports were completed for only the 400,000 tpy scenario due to the nature of the required work. The "Geotechnical Investigation", "Natural Environmental" and "Stage 2 Archaeological and Built Heritage" assessments assumed a potential disturbed area "footprint" equal to the maximum design capacity scenario to complete the local disturbance-oriented investigations inherent to these types of studies.

The results of all technical study reports will be updated, as required, as part of the subsequent applications for approval under the *Environmental Protection Act*.

The background information drawn from the Technical Study Reports for each factor is described in this section, as necessary, to facilitate an understanding of the environmental effects, a description of the methodologies applied, a summary of the potential effects, proposed impact management measures, and conclusions associated with the assessment of the Undertaking. Each of the Technical Study Reports has considered the potential effects during the construction and operation of the Facility. Potential effects during construction have been assessed for only the initial construction activities. As stated, potential effects associated with operating the Facility have been assessed for both the approved design capacity scenario of 140,000 tpy and a maximum potential (400,000 tpy) design capacity scenario. Potential effects associated with the closure of the Facility and with a subsequent post-closure period have been summarized, as required, in some of the technical reports.

The information provided in each of the Technical Study Reports has been tabulated in a series of net effects tables for the Undertaking at the approved design capacity of 140,000 tpy for both the construction and operational periods based on the relevant and applicable environmental categories, criteria, and indicators that are generally consistent with those that have been applied through the EA Study. Some adjustments to the criteria and indicators applied in the evaluation of "Alternatives to" (as discussed in Section 7) and "Alternative methods" (as discussed in Section 8) were required to undertake this site-specific assessment of the Undertaking based on the key Facility and site-specific attributes of the Undertaking and to take into consideration the HHERA.

As stated previously, the assessment of potential effects of the Undertaking at the maximum design capacity of 400,000 tpy was, by necessity, completed on a more general basis. Documentation of these assessments, in subsection 11.2, is provided in a more general, summary format.

The methodologies for the various investigations and assessments are consistent with the work plans that were prepared by the Study Team.

The work plans for all the site-specific studies were presented to the JWMG and the SLC and were made available publicly on the website. The methodologies for the *Air Quality Assessment, Human Health and Ecological Risk Assessment, Surface Water and Groundwater Assessment and Natural Environment Assessment* were discussed with appropriate review agencies, prior to undertaking the work. All of the site-specific assessments followed appropriate and relevant guidance documents.

This approach is also consistent with the Approved EA Terms of Reference.

Consultation on the assessment of the Undertaking and the results of the site-specific Technical Study Reports has been carried out with First Nations, regulatory agencies and the public through a variety of venues including meetings with regulatory agencies; two Public Information Centres, two Government Review Team meetings, numerous JWMG meetings and SLC meetings. In addition to these meetings, Project information letters were distributed by Canada Post within the study area and by-hand within approximately 1 km of the Site. As they were available, draft components of the EA Study and supporting documents have been made available for review and comment through postings on the Project website. A more detailed summary of the consultation activities undertaken as part of the assessment of the Undertaking is described in Section 16.0 and in the Record of Consultation.

11.1 Approved Design Capacity Scenario

The information provided in each of the Technical Study Reports has been tabulated in a series of net effects tables for the Undertaking at the approved design capacity of 140,000 tpy for both the construction and operating periods based on the relevant and applicable environmental categories, criteria, and indicators that are generally consistent with those that have been applied through the EA Study. Some adjustments to the criteria and indicators applied in the evaluation of "Alternatives to" (as discussed in Section 7) and "Alternative methods" (as discussed in Section 8) were required to undertake this site-specific assessment of the Undertaking based on the key Facility and site-specific attributes of the Undertaking and to take into consideration the HHERA. The criteria and indicators used in the assessment, together with the rationale for their use, are presented in Table 11-13 in subsection 11.1.12. The potential effects assessment of the Undertaking at the approved design capacity scenario is provided in Tables 11-14 and 11-15.

The following sections contain summary descriptions of the methodologies applied and the information, obtained from the Technical Study Reports, used in the assessment of the Undertaking assuming the approved design capacity scenario of 140,000 tpy.

11.1.1 Air Quality

This section provides a summary of the methodology and key results of the Technical Study Report titled *Air Quality Assessment - Technical Study Report* attached as **Appendix C-1.** This technical document was prepared to confirm the potential air quality related effects associated with the Proposed Thermal Treatment Facility (the Facility) at the Proposed Thermal Treatment Facility Site (the Site) located in the Municipality of Clarington. The report forms part of the supporting documentation and materials for the "Description of the Undertaking" completed as part of the EA Study.

11.1.1.1 Assessment Methodology

For the purposes of the technical assessment, it was assumed that the approved design capacity of the Facility would be 140,000 tpy. At this capacity, there will be two completely independent waste processing trains at the Facility. Each train will consist of a feed chute, stoker, integrated furnace/boiler, acid gas scrubber, a fabric filter bag house and associated ash and residue collection systems. Steam produced in the boilers will drive a turbine-generator to produce electricity for delivery to the grid, for in-plant use and potentially to provide district heating to the neighbouring Courtice WPCP and Clarington Energy Business Park.

Potential air quality issues associated with the Facility were evaluated in the context of the Facility emissions, other existing and planned industrial emissions sources in the Air Quality Study Area (AQSA), and the regulatory framework. The regulatory framework in Ontario identifies ambient air quality criteria for an extensive list of contaminants, applies emissions caps to selected industries and provides emissions limits for selected types of emission sources. There are also provincial, federal and international interests with respect to greenhouse gas (GHG) emissions.

The following table (Table 11-1) lists potential air-emissions issues related to the Facility. These issues were established on the basis of public input, review by the MOE, and professional judgment.

For the purpose of this Technical Study Report, an AQSA was defined to suit the assessment needs. The AQSA was defined as an area approximately 20 km to the east and west of the Site, 15 km to the south (extending into Lake Ontario) and 25 km to the north of the Site. The overall dimensions of the AQSA were 40 km by 40 km.

Based on past experience, it is anticipated that a primary pathway for contaminants to reach human and ecological receptors would be via airborne dispersion and deposition of contaminants during the operational period of the Facility. As a result, the key objectives of the study of the atmospheric environment were:

- to provide the data required to conduct the assessment of the potential environmental effects of the Facility on air quality, local climate and climate change; and,
- to provide concentration and deposition data to the Human Health and Ecological Risk Assessment (HHERA) Team.

Table 11-1 Key Issues for Air Quality

Project Phase	Key Issue	Relevance to Project
Construction	Emissions to atmosphere	Construction activities (e.g., site preparation, vehicle emissions) would result in emissions.
Operational	Facility emissions to atmosphere with potential effects on community and residential receptors	The Facility will produce sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter (PM), metals, polycyclic aromatic hydrocarbons (PAH) and VOC emissions. An emissions inventory was developed for the Facility and compared to AQSA emissions. Dispersion modelling was conducted to assess the ambient concentrations of contaminants.
	Production of ozone	Ambient nitrogen oxide (NO_x) emissions interact with anthropogenic and biogenic volatile organic compound (VOC) emissions to produce ground level ozone (O_3) downwind of emission sources. Southern Ontario has typically high ground level O_3 levels due primarily to trans-boundary impacts from the United States.
	Secondary particulate formation	Particulate Matter less than 2.5 microns in diameter ($PM_{2.5}$) and precursor fine particulate matter emissions would occur.
	Odour emissions	Waste processed by the Facility may have odour emissions.
	Contribution to GHG emissions	Combustion sources produce CO and nitrous oxides.

The assessment of the Facility's effect on air quality was performed by conducting dispersion modelling to predict the downwind concentrations of air contaminants and comparing these predictions to objectives, guidelines and regulatory standards. There are several steps to building a plume dispersion and deposition model. The preparation of a representative emissions inventory is critical to a successful modelling prediction and directly influences the human health and ecological risk results.

The assessment of air emissions related to operations at the Facility consisted of the following elements:

- compilation of emissions inventories of point and mobile sources for the Facility;
- assessment of baseline ambient air quality conditions for COPC using existing, published, data sources together with site-specific measurements;
- dispersion and deposition modelling of the Facility to provide input to the HHERA, and to support the assessment of potential environmental effects for the EA Study; and,
- comparison of dispersion model predictions to ambient air quality criteria as well as evaluation of the incremental change in air quality associated with the Facility.

For the purposes of providing input to the evaluation of the potential effects of the Facility, or the Undertaking in the EA Study, the subject technical analysis of air quality emissions was completed using the following indicators:

- ambient air quality in proximity to the Site considering ambient air quality criteria, objectives, and standards;
- Facility emissions considering applicable air quality criteria;
- incremental change in O_3 precursor emissions;
- incremental change in GHG emissions; and,
- odour emissions and off-Site detectability.

Three timeframes were considered for potential environmental effects as follows:

The Construction Period: The time during which the Facility would be constructed and commissioned (an approximate 30 month period currently estimated to start in June 2010).

The Operational Period: The time during which the Facility would be operated (approximately 30 years).

***The Post-closure Period*:** The time after the Facility would be closed (after operations cease). Activities are normally limited to de-commissioning, post-closure monitoring and property maintenance.

Air quality effects were modeled assuming the application of design-based mitigation measures and the predicted “net effects” of the Facility were described.

A wide range of substances with varying magnitudes can be emitted from facilities such as the subject Facility. The expected emissions, based on the Facility-specific design and operations, aspects, formed the basis for selecting the substances for evaluation. A comprehensive list of contaminants of potential concern (COPCs) was developed for this study by including contaminants based on the following:

- contaminants included in MOE Ontario Guideline A-7 (2004): Combustion and Air Pollution Control (APC) Requirements for New Municipal Incinerators;
- contaminants requested to have guaranteed emissions limits placed on them by Durham/York in the Project RFQ;
- contaminants contained in the generic risk assessment report (*Energy-from-Waste Generic Risk Assessment Feasibility Study*, 2007) which were based on stack testing of the Region of Peel Algonquin Power EFW Incinerator;
- review of contaminants included in the National Pollutant Release Inventory (NPRI) results for waste incinerators; and,
- contaminants with O. Reg. 419/05 criteria that may be emitted during construction, operational and post-closure periods.

Utilizing this approach, a list of 118 COPCs was developed. The selected COPCs were known or expected to have a potential for being emitted from Facility operations. The expected substances that would likely be emitted were then reviewed and grouped to represent the specific regulatory criteria and potential effects on human health. The list of COPCs includes the following major contaminant groupings:

- Criteria Air Contaminants (CACs) – substances with regulatory limits including SO_2, NO_2, CO, PM and ammonia (NH3); and,
- Hazardous Air Pollutants (HAPs) - Substances that are capable of causing environmental or health effects including VOCs, PAHs, and metals).

The list of COPCs was used as a guide in developing the emissions inventory for the Facility. In order to take a conservative approach, a contaminant may be included on the list of COPCs because it was considered in developing the emissions inventory, even though the contaminant may not be emitted from the Facility (e.g., styrene). The subsequent dispersion modelling assessed the contaminants on the list of COPCs that were estimated to have appreciable emissions.

Other contaminants such as GHGs (CO_2, CH_4, etc.) were also considered for specific applications such as calculating GHG emissions.

11.1.1.2 Potential Air Quality Effects

The following mitigation measures were assumed in the analysis of potential effects on air quality from Facility-based and associated vehicular traffic emissions:

1. Construction Period:

a. The employment of controlled entrances and exits at the construction site to minimize the offsite tracking of mud and the generation of dust.

b. Temporary and permanent grassing in disturbed areas to control the generation of dust.

c. Dust control during dry periods.

d. Implementation of an idling protocol as required.

e. Adherence to an equipment maintenance program.

2. Operational Period:

a. Very low $NO_{x,}$ (VLN) system in the Facility's stoker.

b. Selective non catalytic reduction (SNCR) for additional NO_x control.

c. Activated carbon injection after the economizer for mercury and dioxin/furan control.

d. Acid gas scrubber for the removal of gases such as SO_2 and HCl.

e. A fabric-filter baghouse to remove solid particulate matter.

f. Design and use of odour control measures for pre-processing operations at the Facility such as enclosed loading, negative air pressure inside the Facility and fully-enclosed feedstock delivery trucks.

Based on the implementation of these mitigation measures, the following net effects of Facility-based emissions on air quality were identified:

- Emissions during Facility construction will be the same as any other medium-sized construction site in southern Ontario.
- Downwind ambient concentrations of air contaminants from the Facility are predicted to meet all applicable ambient air quality criteria during normal Facility operation. During “process upsets” (including start-up and shut-downs) downwind concentrations of all contaminants from Facility emissions are predicted to meet applicable ambient air quality criteria.
- Emissions from the stack will meet or will be below the air contaminant limits placed on municipal waste incinerators in accordance with MOE Ontario Guideline A-7 (2004).
- The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions determined further to the air quality modeling.
- The incremental direct contribution of the Facility to total Ontario annual GHG emissions would be 0.06% and the incremental direct contribution to total Canadian annual GHG emissions would be 0.018% based on projected 2010 GHG emissions levels. Note, this determination of GHG emissions considered only the direct emissions of the Facility and not the GHG emissions offsets resulting from recovery of energy and materials nor the avoided landfill methane (CH_4) that would otherwise have been emitted if 140,000 tpy of post-diversion residual waste was landfilled. The net GHG emissions of the Facility have been determined and reported in the *Facility Energy and Life Cycle Assessment – Technical Study Report* (**Appendix C-3**).
- There is not expected to be adverse effects at offsite locations from Facility-based odour.

11.1.1.3 Net Effects, Monitoring, and Environmental Management

The following environmental management and monitoring protocols and programs are recommended for the Facility to address air quality:

- Provision of a continuous emission monitoring (CEM) system to monitor and record:
    - The baghouse outlet for opacity, moisture, CO, O_2 , NOx, SO_2, HCL and HF. Opacity measurements will be used to as the filter bag leak detection system.
    - The economizer outlet for O_2, SO_2 and CO.
    - Flue gas temperatures at the inlet of the boiler convection section and at the baghouse inlet.
    - The temperature and pressure of the feedwater and steam for each boiler.
    - The mass flow rate of steam at each boiler.
- A long-term continuous dioxin and furan sampling device will be installed to monitor the adsorption of dioxins and furans onto the exchangeable adsorption-resin-filled cartridge.
- Emissions (stack) testing and monitoring protocol as required for the C of A under the EPA.

- NPRI emissions reporting that will entail a combination of monitoring or direct measurement, mass balance, process-specific emissions factors and engineering estimates.
- Proposed ambient air quality monitoring in the immediate vicinity of the Facility for a 3-year period as per the Host Community Agreement with the Municipality of Clarington.

11.1.2 Surface Water, Groundwater and Stormwater

This section presents the results of the technical study report titled *Surface Water and Groundwater Assessment - Technical Study Report* prepared for use in the EA Study as well as for other regulatory requirements as they relate to the approved design capacity scenario of 140,000 tpy (see **Appendix C-2**).

11.1.2.1 Assessment Methodology

The surface water and groundwater assessment describes the baseline surface and groundwater conditions in the study area, water demand, and wastewater servicing and stormwater management (SWM) planning related to the Facility.

For the purposes of the surface water and ground water assessment, the design parameters for the Facility, including the footprint for the main treatment plant as well as ancillary structures at the Site, assumed development for the approved processing capacity of 140,000 tpy for the Facility. The potential effects associated with the maximum design capacity of 400,000 tpy are discussed in Section 11.2.

The hydrological and hydrogeological investigation characterized the existing ground and surface water quality and quantity conditions present at the Site, identified potential effects caused during construction, operation, and post-closure of the Facility and identified mitigation measures to minimize the potential effects at, and in the vicinity of, the Site. The surface water and groundwater assessment considered the following factors:

- Site location;
- Regional and local lithological conditions;
- Meteorological influences;
- Groundwater levels;
- Spatial distribution of surface water features;
- Existing ground and surface water quality;
- SWM design criteria;
- Facility water demand;
- Facility wastewater discharge; and,
- Facility infrastructure design.

The standards, methods, and approaches used in the surface and ground water assessment are sourced primarily in major government and industry technical guidance documentation and regulations. A number of resources were used in the analysis of groundwater, surface water quantity and quality, and local fluvial geomorphology and soil loss and erosion conditions.

The modeling performed included:

- Existing water balance;
- Storm class post-development runoff assessments;
- Stormwater quantity and quality control;
- Channel conveyance capacity assessments;
- Preliminary stormwater pond capacity and discharge considerations; and,
- Existing and post-development soil loss.

Field investigations completed for this study included:

- Site reconnaissance;
- Discharge swale survey;
- Receiving water flow characterization;
- Receiving water quality sampling; and,
- Geomorphological assessment of receiving waters.

Without detailed design information for the Facility, some assumptions regarding development function and processes were necessary. In addition, further assumptions regarding the physical environment were needed. The assumptions used for this assessment included:

1. During the construction phase all incident precipitation to the Site would be controlled via erosion and sediment control features and contained within onsite SWM facilities.
2. During the operation phase, all incident precipitation would be controlled, conveyed and contained using adequately sized SWM features.
3. The Facility would not discharge any wastewater effluent to the surrounding surface water features.
4. The Facility infrastructure is assumed to extend to about 7.6 metres below the surface of the ground (mbg).
5. Regional bedrock geology adequately describes the conditions present onsite.
6. The hydrological soil group present onsite is a “B”.
7. The Facility would occupy all 12.4 ha of the subject property.
8. Approximately 45% of the post-construction Site would be comprised of impervious cover.
9. Approximately 2% of the existing Site can be considered impervious.
10. One stormwater end-of-pipe facility would be located in the southwest corner of the property.
11. The Facility’s water supply requirements would be 115,068 L/day (42,000 m^3/yr) and would be facilitated by the municipal water supply system. This water supply requirement is based on 140,000 tpy of waste material.

12. Wastewater, not including stormwater, from the Facility would be 8,219 L/day (3000 m^3/yr) and would be conveyed via municipal sewage infrastructure to the Courtice WPCP located due south of the Site. This wastewater generation level is also based on 140,000 tpy of waste material.
13. Proximal water well records are a reliable method of describing onsite groundwater levels.
14. Development and operation of the Facility would not generate any federal triggers (e.g., federal funding, federal lands, federal approvals) that would require completion of the applicable environmental assessment process established under the CEAA.

Regulatory Requirements

The surface and ground water assessment also considered potential provincial and federal regulatory requirements for the construction, operation, and post-closure periods for a number of the Facility's components arising from differing levels of regulatory authority including, for instance:

- Applicable groundwater regulatory requirements including the Water Taking and Transfer Regulation (MOE, 2004a) under O. Reg. 387/04, and the Permit To Take Water (PTTW) Manual (MOE, 2005).
- Applicable surface water regulatory requirements including, a *Policy for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation* developed by the Central Lake Ontario Conservation Authority (CLOCA) under O. Reg. 42/06.
- The requirements of the Provincial Policy Statement (PPS).
- Applicable water balance guidance documents including the *SWM Planning and Design Manual* (MOE, 2003) and the *Hydrogeological Technical Information Requirements for Land Development Applications* (MOE, 1995).
- Applicable wastewater regulatory requirements at the provincial level are approved by the MOE under the OWRA C of A process and effluent quality criteria are compared to Provincial Water Quality Objectives (PWQOs). Wastewater that must be transferred offsite for treatment and disposal (because it cannot be managed onsite or sent via a sewer system to a wastewater treatment plant) is regulated under Reg. 347. Wastewater trucked offsite would be governed by the MOE waste management protocol (e.g., waste transfer manifest).
- At the municipal level, effluent would be required to meet the requirements of Part 2 of the Durham Sewer Use By-law 43-2004 (if wastewater was to be discharged outside of the range indicated by the Sewer Use By-law a special discharge agreement would be required).
- Applicable regulatory requirements for the "taking" of water are contained in the OWRA which stipulates that a PTTW is required when the removal/extraction of more than 50,000 L/day from groundwater or surface water sources is proposed. Specific requirements are also contained in the OWRA Water Taking and Transfer Regulation (O. Reg. 387/04). If the construction of building foundations interferes with the water table and dewatering is required, a Category 2 PTTW may be required. The local

Municipality would govern the use of, and connection to, the local watermain. Stormwater is considered wastewater, under the OWRA and therefore SWM facilities are deemed to be sewage works that are regulated under Section 53 of the OWRA. Section 30 of the OWRA prohibits the discharge of polluting materials into any water body. As a result, a C of A (Industrial Sewage Works) is required for SWM facilities

- MOE's SWM Planning and Design Manual (MOE, 2003) provides guidance for SWM planning, design and implementation for construction, operational and closure phases. The Provincial Policy Statement (PPS) defers to the MOE's stormwater manual for stormwater guidance.
- The following MNR documents provide additional details on the requirements for assessing flooding, flood proofing, erosion and slope stability impacts and performing hydrologic and hydraulic analysis:
  - Understanding Natural Hazards, 2001 (MNR 2001);
  - Technical Guide - River and Stream Systems: Flood Hazard Limit, 2002 (MNR, 2002);
  - Technical Guide - River and Stream Systems: Erosion Hazard Limit, 2002 (MNR 2002); and,
  - Great Lakes - St. Lawrence System and Large Inland Lakes. Technical Guides for Flooding, Erosion and Dynamic Beaches in Support of Natural Hazards Policies 3.1 of the Provincial Policy Statement (MNR 2001).
- The CLOCA exerts control over SWM pursuant to the provisions of O. Reg. 42/06, the Development, Interference with Wetlands & Alteration to Shorelines & Watercourses Regulation.

11.1.2.2 Potential Surface Water and Groundwater Effects

Surface Water

In terms of the existing watercourses and receiving water bodies, the Site is located within the Tooley Creek watershed which in its lower reaches supports cold water fisheries. Tooley Creek is a small meandering watercourse receiving a majority of its flow from agricultural and rural runoff and groundwater inputs in its northern reaches. Water courses in the area are characterized by a range of flow conditions dictated by the heterogeneity of the underlying materials. The high infiltration potential of the Oak Ridges Moraine (ORM) in the north represents an area of groundwater recharge and subsequently leads to continual baseflow additions to surrounding streams. Infiltration potential decreases with proximity to Lake Ontario (where Tooley Creek outlets), representing a shift to more silt and clay dominant materials.

Potential water quality effects stemming from the Facility potentially include the discharge of stormwater runoff and the accidental release of contaminants. These potential effects would require mitigation.

Stormwater

In terms of stormwater related to the development of the Facility, the surface water and groundwater assessment documents the examination of the pre-development water balance and runoff flows arising from the Site. Stormwater runoff from the Site drains towards the southwest until reaching an east-west running swale located immediately north of the CN Rail corridor easement. Runoff is subsequently conveyed approximately 1000 m west to Tooley Creek.

The Facility footprint would likely occupy most of the approximately 12.4 ha Site, of which approximately 45% would be impervious surfaces. Without appropriate stormwater mitigation measures, increased runoff could adversely affect receiving surface and groundwater resources. The grubbing and excavation of previously vegetated lands could also result in increased soil loss through erosion and bank instability. Total infiltration on the Site may be reduced because the level of impervious surfaces would increase. In addition, the decrease in vegetation coverage and soil moisture may decrease the Site's evapotranspiration and cause an increase in runoff volumes.

It may be prudent to consider the use of Oil and Grit Separators (OGS) within the subsurface stormwater conveyance network. Upstream of the end-of-pipe facility, OGS can provide spill control and pre-treatment for stormwater discharged to the SWM pond. The design specifications and total suspended solids removal efficiencies can vary significantly between OGS features. The potential for installation, number of OGS needed and type used will be considered during detailed design.

Process Water and Sanitary Waste

The Site is located in an area with previously installed municipal watermain and sewermain infrastructure. The Facility would require a maximum of 42,000 m^3/yr or 115,068 L/day of water demand based on the current proposed waste handling capacity of 140,000 tpy. Preliminary assessments suggest that this demand can be met by connection to the 300 mm Osborne Road watermain.

A full hydraulic assessment should be carried out during detailed design to ensure the firewater and Facility demands can be met. If the Facility water demand cannot be met by this single connection, a secondary 300 mm watermain located approximately 3.5 km away would be accessed to fulfill the extra demand.

The maximum annual wastewater discharge is proposed to be 3,000 m^3/yr or, assuming a continuous 365 day operation, 8,219 L/day (0.1 L/s). This wastewater generation threshold is based on the Facility receiving 140,000 tpy of waste material. To the extent possible, wastewater generated onsite would be reused within Facility operations. Preliminary Facility design suggests that onsite wastewater treatment would be minimal (solids removal) and that wastewater discharge would be to the sanitary sewer. There is an existing 1,800 mm diameter sanitary sewer stub located north of the CN Rail tracks on Osborne Road adjacent to the Site.

The Courtice WPCP, located immediately south of the Site, would treat the Facility's wastewater.

Groundwater

The Site is situated above an east-west band of glaciolacustrine deposits generally contributing little to groundwater resources and subsequently baseflow contributions. However, the geotechnical investigation conducted on the subject lands suggested that subsurface materials were sandy-silts to silty sands which may facilitate more infiltration than regionally suggested. In general, watercourse inputs in the lower, or southern, portion of the Tooley Creek watershed result from runoff.

Groundwater does not demonstrate artesian conditions and therefore aquifer depressurization would not be necessary within the top 7.6 m of excavation. Due to the maximum proposed depth of the Facility infrastructure (7.6 metres below ground) it is likely that groundwater would be encountered during excavation. In order to construct the required infrastructure foundation below grade in the requisite dry conditions, dewatering would be necessary. Further hydrogeological investigation should be conducted during detailed design. . An additional borehole program including the installation of monitoring wells is recommended to determine dewatering requirements, inform foundation and stormwater infrastructure design and fulfill permitting requirements.

The Site can be serviced with municipal water supply infrastructure and therefore an onsite groundwater well will not be required for the operation of this Facility.

Construction and operational phase dewatering and permitting requirements would be determined during the detailed design phase.

11.1.2.3 Impact Management

Existing Water Courses/Receiving Water Bodies

Potential mitigation and impact management measures to minimize potential effects on existing water courses and receiving water bodies may include:

- In the unlikely event of a spill, emergency response and spill containment plans proposed for the Facility would ensure that the surrounding water resources would not be impacted.
- Facility wastewater containment pits, enclosed chemical storage areas, outdoor spill containment protocols and a controllable SWM pond outlet have all been proposed for the Site.
- Mitigation and emergency spill response measures have specifically targeted the topic of accidental contaminant release.
- The Site's SWM pond has been designed according to specific Facility based topography, climatic regime and receiving water classification.
- An enhanced level of protection has been recommended to address aquatic habitat conditions in Tooley Creek.
- Lot level and conveyance controls have also been recommended to reduce runoff velocities and trap/deposit mobile sediment. Based on the treatment train approach utilized in the SWM plans, suspended sediment levels in runoff discharging offsite would be minimal.

Stormwater

Potential mitigation and impact management measures to minimize potential effects from stormwater runoff may include:

- Maintenance of SWM objectives to maintain stormwater volumes, rates, and quality comparable to pre-development flow conditions, to the extent possible.
- Appropriate SWM design would reduce peak discharges, attenuate flows, and improve water quality through the introduction of infiltration, settling and storage features. Stormwater would receive the highest level of environmental protection to preserve water quality in receivers.
- Erosion and sediment controls (ESC) would be implemented during the construction phase to reduce potential soil loss and runoff velocities. During the construction phase, stormwater would be routed via conveyance swales and/or stormsewers draining catchbasins to a SWM pond in the southwest corner of the Site. The pond would discharge to the CN Rail swale and stormwater would subsequently be conveyed to Tooley Creek. In addition to the pond, lot level, and conveyance controls such as surface stabilization measures, sediment traps, and swales enhanced with rock check dams would be used.
- Grading plans would be designed to maintain existing drainage patterns which would ensure all captured stormwater would be routed through SWM features onsite.
- Post-construction, stormwater conveyance would be accomplished through a combination of previously implemented swales and underground stormsewers. All stormwater from the developed Site would continue to be routed to the southwestern SWM pond for quality and quantity control purposes. Pond design would entirely capture the 100-year design storm event for flood control purposes and provide a minimum 24-hour draw down for the 25 mm design storm event to ensure adequate water quality improvement.
- The considerations for infiltration, evapotranspiration and runoff water quality enhancements would protect receiving water resources from the potential negative impacts of the Facility.
- Consider the use of Oil and Grit Separators (OGS) within the subsurface stormwater conveyance network.
- During detailed design, additional hydrogeological assessment should be carried out in the location of the SWM pond. This investigation will be used to determine groundwater levels and soil conditions and avoid groundwater: surface water interactions with the stormwater pond.

Process Water and Sanitary Waste

Potential mitigation and impact management measures to minimize potential effects from process and sanitary waste are not required as the existing infrastructure currently provides adequate capacity. However, a full hydraulic assessment could be carried out during detailed design to ensure the fire fighting water and Facility demands can be met.

Ground Water

Potential mitigation and impact management measures to minimize potential effects to groundwater may include:

- Dewatering and excavation pumping is expected in order to establish a sufficiently dry environment to construct the Facility foundations. Once the foundation is in place, lateral groundwater flow would once again saturate the area and pressure would be placed on the concrete infrastructure. The concrete foundation and floor slabs must be designed to withstand the pore pressure that would be exerted by the surrounding groundwater table. To relieve some of the groundwater pressure, perimeter drains designed to encompass the foundation and convey groundwater towards the lower southwest corner of the property may be installed.
- It is recommended that a series of groundwater monitoring wells be installed within the Site to assess the construction related effects on both groundwater quantity and quality.

11.1.2.4 Conclusions

Summary of major findings includes:

- Due to low slopes and vegetation cover on the Site, soil erosion from overland flow is considered minimal;
- The swale located within the CN Rail corridor adjacent to the Site is estimated to have the capacity to convey the 5-year storm event runoff from the Site. Any capacity upgrades considered for the CN Rail swale to accommodate larger runoff events must be approved and completed by CN Rail;
- The Facility's water demand and wastewater discharge requirements can be accommodated through a connection to the municipal service systems;
- The Facility foundation would penetrate the local water table, however it is not anticipated that excavations would extend to a deeper underlying confined aquifer;
- The total required stormwater pond volume for permanent pool, extended detention, and flood control volumes is approximately 9,588 m^3. Pond design criteria would meet or exceed design guidance criteria found in the MOE SWM Planning and Design Manual;
- Increase in runoff potential would be mitigated with peak flow attenuation, baseflow augmentation and SWM design that provides an enhanced level of receiving water protection; and,
- Accident and malfunction planning, spill management redundancy and stormwater control from source to discharge would protect surface water and groundwater resources.

Recommended environmental management activities include:

- Monitoring of stormwater end-of-pipe Facility discharge quality (required as part of C of A); and,
- Groundwater quantity and quality monitoring at and surrounding the Facility during construction.
- Further hydrogeological investigation is recommended during detailed design to fulfill permitting and dewatering requirements as well as inform foundation and stormwater infrastructure design;

11.1.3 Geotechnical Investigation

This section summarizes the results of the Technical Study Report titled *Geotechnical Investigation - Technical Study Report* prepared for use in the EA Study as well as for other regulatory requirements (see **Appendix C-4**).

11.1.3.1 Assessment Methodology

The geotechnical investigation was carried out to determine the general subsurface conditions at the Site and to provide geotechnical parameters and recommendations to assist with design for the development of the Site. The potential effects of the Facility on subsurface conditions and ground water are considered in the *Surface Water and Ground Water Assessment - Technical Study Report* in **Appendix C-2.**

The geotechnical investigation consisted of drilling a series of boreholes to assess the subsurface soil and groundwater conditions within the area of the Site in accordance with accepted standards and practices. In total, seventeen boreholes were put down to depths ranging from 5.1 m to 12.2 m within the proposed development area using a track-mounted drill rig equipped for geotechnical testing.

All field drilling and sampling operations were logged and the borehole locations and elevations were documented. The locations of the boreholes were determined by measuring the distances from the Site boundaries. Soil samples were recovered, assessed, and tested according to accepted practices and procedures and were returned to the laboratory and classified in general accordance with the Unified Soil Classification (USC) system, ASTM D 2487, Standard Practice for Classification of Soils for Engineering Purposes. Soil descriptions are given in the appended Borehole Records.

11.1.3.2 Existing Subsurface Conditions

The Geotechnical Investigation determined the following in regard to the existing subsurface conditions of the Site:

- In general, the subsurface conditions encountered at the test locations consisted of a surficial layer of sod/topsoil underlain with native glacial till including soil stratification. Variations in the soil stratification may occur and should be expected between borehole locations and elsewhere on the Site.
- A layer of sod and black to dark brown sandy silt and/or silty sand (topsoil) trace clay was encountered in all borehole locations on the ground surface.
- Glacial till consisting of mainly brown silty sand with traces of gravel and clay, was encountered in all borehole locations.
- Groundwater was encountered in ten of the boreholes during drilling and/or upon completion of drilling at depths ranging from 0.9 to 7.2 m below the existing ground surface. The groundwater level that was encountered at the time of measurement may not have become fully static at the time of measurement. It should be noted that groundwater levels are subject to fluctuations due to particular precipitation events and the time of year (seasonal variation).

11.1.3.3 Impact Management

The following is a summary of the impact management measures to be considered during the detailed design and construction of the Facility:

- The surficial layer of sod and topsoil should be removed in all building and pavement areas. These materials can be stockpiled for use in site landscaping or can be removed from the Site.
- Fill materials placed under footings or slabs-on-grade is considered to be engineered fill. Site till excavated from above the groundwater table can be used as engineered fill as long as it is maintained at a suitable moisture content to permit the specified compaction. Site till excavated from below the groundwater table can also be used as engineered fill but provision for drying will likely be necessary. All site till materials are considered susceptible to softening with increased moisture contents and this should be considered when planning the development of the Site.
- Engineered fill imported to the Site should meet the OPSS requirements for Select Subgrade Material.
- Prior to placing engineered fill, the exposed till surface should be compacted to at least 100 percent of the standard Proctor dry density. All engineered fills should be compacted in lifts that are compatible with the compaction equipment used to a minimum of 100 percent of standard Proctor dry density.
- Where engineered fill is used under spread/strip footings and slab-on-ground construction, the engineered fill should be placed within the stress zone of influence of the proposed footings. The placement of the engineered fill should extend horizontally to include the conventional 1H:1V downward splay from the perimeter of the footings.
- It is recommended that inspection by experienced geotechnical personnel be carried out during excavation and engineered fill placement to ensure that all unsuitable soils are removed, that approved fill materials are used, and that the required compaction is carried out.
- Based on the conditions encountered at the borehole locations, use of spread/strip footing foundations and slab on ground construction is practical for the Site.
- Spread/strip footings constructed on the native soils or on engineered fill, comprised and placed in accordance with the above recommendations may be designed using a net allowable bearing pressure of 250 kPa. If the base of any footing excavations becomes disturbed, the disturbed material should be excavated and replaced with a clean granular material compacted to the requirements for engineered fill. Associated total and differential settlements should be less than 25 mm and 20 mm, respectively. All footings founded on soil which will be subjected to freezing conditions should have a soil cover of at least 1.2 metres for frost protection.
- Excavation to the anticipated required depth at some locations may require excavation below the groundwater table. A sump and pump arrangement is recommended to temporarily control the groundwater during excavation and fill placement.

- For slab areas, all surficial sod/topsoil or any other deleterious materials encountered should be removed followed by cuts to design subgrades. Any organic materials and/or soft deformable area detected shall be excavated and replaced with compacted suitable site till or OPSS Select Subgrade Material.
- Slabs-on-ground should be constructed on a compacted bedding layer with a minimum thickness of 150 mm of free-draining gravel such as OPSS Granular A. A modulus of subgrade reaction of 30 MPa/m can be used for design of slabs on ground. Perimeter foundation drains, with a positive outlet, should be provided at locations where slabs are below exterior finished grade.
- The Site is also suitable for caisson foundations. The caissons should be constructed to a depth of at least 3.0 m below existing surface and a net allowable bearing pressure of 450 kPa can be used.
- For the purpose of earthquake design the term relevant to geotechnical conditions is the Site Classification for Seismic Site Response. Based on the conditions encountered in the boreholes, and in accordance with Table 4.1.8.4A of the 2006 Ontario Building Code, Site Class “D” soil profile should be applied to this Site.
- Tills encountered onsite are considered to be Type 3 and excavations should be sloped at a 1H:1V from the bottom of the excavation. If sufficient room is not available to slope the excavated walls, shoring will be required to maintain the stability of the excavation.
- Based on the information obtained from the investigation, it is considered unlikely that the presence of groundwater will be a factor with respect the planned scope of development. Should excavations remain open for extended periods, water seepage and infiltration from perched pockets or zones in the fill materials or native soils can be expected. However, the quantity of seepage and accumulation should be manageable using conventional sump pits and contractors pumps. Section 11.1.2 (surface water and groundwater) discusses potential groundwater effects and mitigation in additional detail (Section 11.1.2)
- The site slopes of any excavations should be protected from exposure to precipitation and associated ground surface runoff to prevent further softening and loss of strength and could lead to additional sloughing and caving.
- The fine grained nature of the silty and clayey site soils make them conductive to deterioration from trafficking, particularly during wet weather. Therefore, construction should be well planned to minimize rendering material which is initially suitable to a deteriorated unsuitable condition.
- Surface water drainage should be provided at the up gradient side of the Site to prevent water from flowing onto active working areas. Suitable erosion protection and sediment control measures (e.g., silt fences, check dams) should be provided as required.
- The pavement designs for the Site should be carried out when the Site traffic loadings have been determined. All of the materials used in the construction of Site pavements should be produced and placed in accordance with the respective OPSS requirements.

11.1.3.4 Conclusions

This *Geotechnical Investigation Technical Study Report* identifies the geotechnical soil, bedrock and groundwater conditions encountered at the time of the field program and provides general geotechnical interpretation for the development of the Site. Further geotechnical investigation would be required as more information on the Site development is determined.

11.1.4 Acoustic and Vibration

This section summarizes the technical study report titled *Acoustic Assessment - Technical Study Report* prepared for use in the EA Study as well as for other regulatory requirements as they relate to the approved design capacity scenario of 140,000 tpy (see **Appendix C-5**).

11.1.4.1 Assessment Methodology

The acoustic assessment includes consideration of:

- the existing ambient acoustical environment;
- sound from the Facility construction;
- sound from the Facility operations;
- potential impacts of sound on wildlife in addition to human receptors; and,
- mitigation measures to limit and manage potential effects.

The assessment was undertaken and prepared in accordance with the Ontario MOE and MTO guidelines (i.e., Noise Pollution Control (NPC) series of documents (NPC-205/232/233, 1995a, 1005b and 1195c) MTO 2006)), and Health Canada (HC) noise guidelines in support of an Individual EA conducted under the Ontario EAA.

Acoustic assessments conducted in Ontario are primarily based on the MOE NPC guidelines, and supporting documents and standards. MOE procedures provide minimum setback distances to noise-sensitive Points of Reception (PORs) that are required to meet the noise criteria for certain source types. PORs include the following existing lands and lands zoned for future use:

- permanent, seasonal, or rental residences;
- hotels and motels;
- hospitals, retirement homes, and long-term care facilities;
- schools and daycares;
- churches and places of worship; and,
- other noise-sensitive land uses such as campgrounds.

Critical Points of Reception (PORs) within the Acoustic Study Area (ASA) were evaluated for inclusion in the modelling. A total of 53 different land users are located in the area however, only residential and farm lands were considered as critical receptors for detailed modelling purposes. Three (3) residential receptors, one to the east, one on the west and one to the north of the Site were considered as receptors of interest.

In accordance with MOE noise screening guidelines, facilities with incineration and co-generation capabilities must meet a minimum setback distance of 1,000 metres (m) from the nearest POR. In terms of the Facility, some noise-sensitive receptors are located within 1,000 m of the Facility and Site. The MOE requires detailed acoustic assessments for significant facilities to determine if they meet the screening criteria. Therefore, a detailed acoustic assessment of the Facility has been conducted. An Acoustic Assessment Report Checklist is included in the *Acoustic Assessment - Technical Study Report* (see **Appendix C-5**).

Source sound power levels were estimated for the significant noise sources in the Facility based on:

- measured data from similar equipment;
- manufacturer's information; and,
- published resources.

Conservative assumptions were used throughout the analysis to ensure a robust and representative worst-case assessment (i.e., maximum environmental effects). The acoustic assessment of the Facility is based on detailed modelling such that mitigation measures can be specified where necessary to ensure compliance with applicable MOE noise guidelines.

The Facility operations do not involve sources of significant vibration emissions, such as stamping presses, forging hammers, or shaker tables. As such, a detailed vibration assessment has not been completed for the Facility operations. However, ground-borne vibration emissions may be significant for certain Facility construction activities, such as the pile-driving activity (if required). Therefore, an assessment of vibration impacts has been conducted for Facility construction activities of concern.

11.1.4.2 Potential Acoustic and Vibration Effects

Based on ambient noise measurements conducted in the Acoustic Study Area (ASA) near the critical receptors, the existing minimum background 1-hour sound exposure levels generally occurred at night (i.e., 23:00 h to 07:00 h) and ranged from 47 dBA (A-weighted decibels) near Courtice Road, and 38 dBA near the Baseline Road and is dominated by:

- Traffic noise (e.g., Highway 401, Courtice Road);
- The sounds of nature (e.g., birds, insects, rustling trees and grasses); and,
- Local industry.

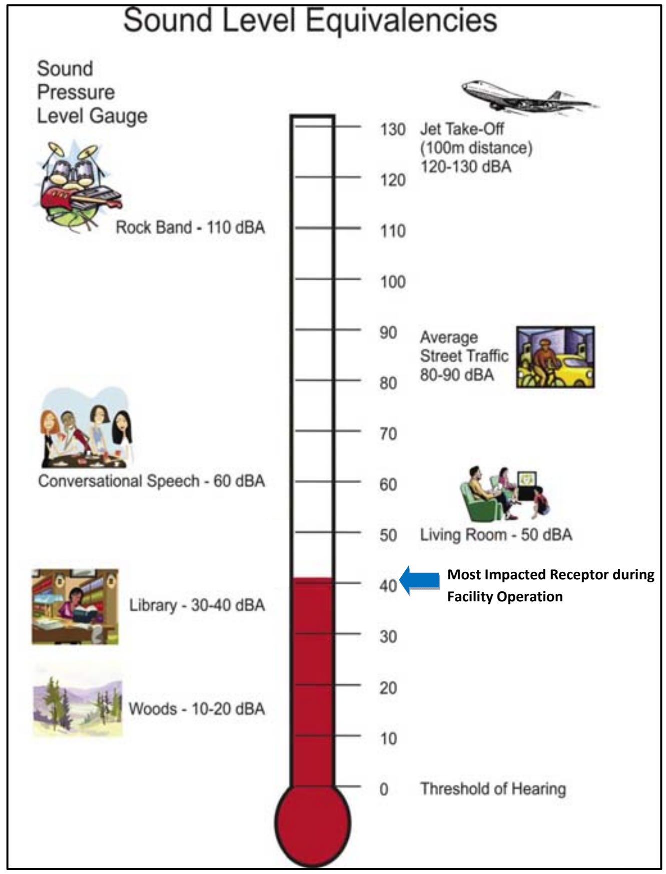
As a result, the measured ambient noise levels were applied for most receptors. The Facility was also assessed against Health Canada's (HC) proposed noise criteria.

Acoustical modelling of significant sources was conducted using a computerized noise model, CADNA/A, using the algorithms from ISO 9613. The results were assessed for compliance at the nearest PORs based on the relevant noise criteria. As found in all large industrial operations, there are numerous minor noise sources related to the Facility such as small trucks, forklifts, standby equipment, and small fans or pumps. These sources are typically excluded from the analysis where their number and size are sufficiently small to render them acoustically insignificant.

At this stage in the design process, the number and nature of these smaller noise sources are not known. In any case, the contribution of these smaller sources is expected to be insignificant due to the setback distances involved between the process areas and the closest receptors.

PORs around the Facility were all assessed as Class 2 (suburban) based on the surrounding land use, level of activity and traffic during the daytime and the decrease in activity and traffic during the evening.

The adjacent diagram illustrates the predicted sound level equivalences from the Facility during operation compared to other common noise sources.



Based on the results of the acoustical modelling considering ambient noise levels and predicted noise levels from the Facility and traffic sources, the predicted noise levels at all nearby PORs are less than the applicable criteria (Class 2 noise limits) for the operational scenario assessed for the Facility.

Noise from the Facility has some potential to create effects on wildlife within 300 to 500 m of construction activities and 250 to 300 m of operational process units. However, it is expected that wildlife would either naturally avoid these areas due to the human presence and activity, or would adjust to the noise. In all areas, occasional short-term loud sounds, particularly associated with construction activities, may produce retreat or startle responses in some wildlife.

Some potential exists for noise and vibration impacts during the construction phase of the Facility including land preparation, structural assembly, and commissioning.

It is expected that the site preparation and structural phases would be approximately 30 months, which thereby classifies them as long duration construction operations according to HC guidelines. However, individual parts of the work would be shorter in duration. For example, the Site preparation may be about two months, pile driving for the building foundation would likely be less than a month (if required), and paving about a week, so the noise level would not be at the maximum for an extended period of time.

There are two construction activities that are likely to create elevated sound levels and that are difficult to mitigate. These are:

- Pile driving activities associated with the construction at the Facility (if required); and,
- Increased short-term (i.e., 1-hour) offsite vehicle traffic associated with the construction of the Facility.

These activities would only be a concern during worst-case conditions. They are temporary and of short duration relative to the Facility construction, and would cease upon the completion of construction activities.

In terms of the potential effects of noise and vibration on area wildlife, the acoustic assessment based its assessment on those species identified in the *Natural Environment Assessment - Technical Study Report* prepared for the EA Study, including those species identified in Table 11-2.

Table 11-2 Selected Mammal and Bird Species Identified in Area

Mammals	Birds	
• White-tailed Deer • Raccoon • Eastern Cottontail • Striped Skunk • Woodchuck • Red Fox • Coyote	• Common Grackle • Ring-billed Gull • Song Sparrow • Savannah Sparrow • European Starling • Brown Thrasher • Willow Flycatcher	• Red-winged Blackbird • House Sparrow • Eastern Kingbird

During construction, in all areas, occasional short-term loud sounds, particularly associated with construction activities, could produce retreat or startle responses in some wildlife.

Sound levels from the operation of the Facility are expected to be localized, and not large enough to impact wildlife in adjacent non-operational areas. As such, most wildlife would be expected to continue their patterns outside the main site areas unimpeded.

In addition, wildlife that frequents the area is currently subjected to intermittent sounds, such as traffic, and industrial and farming activities. Thus, they are expected to be more accustomed to the presence of noise in their environment. It is anticipated that wildlife that is less tolerant of noise would relocate to other neighbouring habitat that is more acceptable.

As well, industry noise could be characterized as being a relatively constant sound. This type of sound emission is considered to be less disruptive than intermittent or impulsive sound sources. Based on the literature, the parameters and limits used to evaluate human reaction to these disruptive sounds tend to follow the magnitude of those for animals. The acoustical modelling is considered conservative, since all noise sources are assumed to be in operation during a worst-case hour of operation and in a downwind position relative to the receptor. As a result, achieving the applicable guideline criteria for humans (i.e., 40 to 45 dBA) would be expected to provide an acceptable level of protection for most wildlife.

11.1.4.3 Impact Management

During operation current standards for building Facility equipment and process units incorporate efficiencies and design enhancements that reduce sound emissions. Where necessary, mitigation measures can be included in the Facility design to ensure applicable noise criteria are met at PORs as predicted. Such mitigation measures may include the use of equipment control options such as:

- enclosures;
- local or property-line barriers;
- mufflers and silencers; and,
- acoustic baffles or insulation.

Selection and design of specific mitigation measures would be subject to the detailed design of the proposed equipment.

During construction, if pile driving is required, the short-term noise effects of pile driving could be reduced through alternative technologies, controls, and scheduling. Construction vehicle traffic is predicted to be acceptable against applicable criteria, but short-term (i.e., 1-hour) effects during peak demand are possible. These peaking issues can be reduced through scheduling and planning of vehicle trips.

A monitoring program and contingency plan is recommended to address any issues that may arise during the construction and post-closure periods of the Facility. Post-closure noise effects would be assessed against the applicable criteria at the time of closure.

11.1.4.4 Conclusions

From an acoustical perspective, there are two main activities that may create elevated sound levels that cannot be mitigated, or may have some net effect after mitigation measures are in place:

- Short-term pile driving activities associated with the construction phase of the Facility (if required); and,
- increased short-term offsite vehicle traffic associated with the construction phase of the Facility.

The construction activities are a concern during worst-case conditions, but are temporary and of short duration relative to the Facility day-to-day operations. The pile driving activity is associated with the construction period and would cease upon completion of construction of the Facility. Its effects can be reduced through alternative technologies (e.g., vibratory pile driving), controls, and scheduling. Construction vehicle traffic effects can be reduced through scheduling and planning of vehicle trips.

Sound levels from the operation of the Facility are expected to be localized, and not large enough to impact wildlife in adjacent non-operational areas. As such, most wildlife would be expected to continue their patterns outside the main Site areas unimpeded.

11.1.5 Visual

This section summarizes the results of the technical study report titled *Visual Assessment - Technical Study Report* that has been prepared for use in the EA Study as well as for other regulatory requirements as they relate to the approved design capacity scenario of 140,000 tpy (see **Appendix C-6**).

11.1.5.1 Assessment Methodology

The visual analysis conducted for the Facility used techniques that illustrate potential visual effects and are generally based on the planning approach and graphic communication techniques, as demonstrated in *Guidelines for Landscape and Visual Impact Assessment* (1st Edition The Landscape Institute, 2002). The Visual Assessment considered the three phases of Facility development (i.e., construction, operation and post-closure/decommissioning).

The visual assessment included the following:

- The sensitivity of the landscape and the identified receptors to the potential change in the visual aesthetics that could result from the development of the Facility;
- The magnitude of the potential effects on the landscape and the identified receptors resulting from the development of the Facility; and,
- The anticipated overall level of effect on each identified receptor.

The initial phase of the Visual Assessment was a baseline study which describes the existing environment potentially affected within approximately 1 km of the Site, referred to as the Project Site and Vicinity Study Area (PSVSA) and within 5 km of the Site, or the Local Community Study Area (LCSA).

Visual Sensitivity and Magnitude

In terms of visual sensitivity, impacts on a landscape are related to the potential effects of a development on the physical characteristics, quality and unique features of the landscape (i.e., topography, geology, vegetation and cultural features). Visual impacts are related to the effects on the views of the landscape from visual receptors (i.e., residents, workers, tourists) and on the amenities experienced by the visual receptors. The sensitivity of a viewscape depends upon its nature, quality and condition while the sensitivity of viewers depends on their distance from the development and viewing opportunities (i.e., permanent resident, passerby or tourist). Therefore, a permanent resident could have a higher sensitivity than people who may only have a passive interest in the landscape, such as passing motorists. Sensitivity of a viewer also depends on their subjective level of interest or feelings for the subject matter.

Landscape and visual impacts may potentially arise from the following:

- Construction of the Facility, including permanent loss of existing landscape features;
- Operation of the Facility including permanent structures, landscaping and visible lighting; and,
- Decommissioning/Post-Closure of the Facility, including potential activities such as demolition, waste removal and remediation/restoration.

Magnitude and Sensitivity

In terms of the magnitude of the potential visual effect, impacts on a visual landscape are described as having a minimal, medium or high effect. The severity of the effect is dependent upon the magnitude of change and the sensitivity of the landscape or viewer to the change. Table 11-3 below provides a summary of the definitions of magnitude and sensitivity.

Table 11-3 Definitions of Visual Impact Magnitude and Sensitivity

		Magnitude	Sensitivity
Minimal	Landscape	Almost imperceptible change in components or character of the landscape.	A landscape which is not valued for its scenic quality and tolerant of substantial change.
	Visual	Few viewers affected by minor changes in view of landscape.	A viewer with passing interest in their surroundings, e.g., motorists.
Medium	Landscape	Moderate change in landscape components and character.	A moderately valued landscape, perhaps a locally important landscape, tolerant of some change.
	Visual	Many viewers affected by moderate changes in views.	A viewer with moderate interest in their environment, e.g., users of recreational facilities.
High	Landscape	An obvious change in landscape components over an extensive area.	A landscape of particularly distinctive character or nationally valued for its scenic quality.
	Visual	Many viewers affected by obvious changes in view.	A viewer with proprietary interest and prolonged viewing opportunities, e.g., resident.

Level of Effect

The level of impact is described as being minimal, medium, or high and impacts can either be positive or negative. The levels of impact may be used to standardize results of the assessment. Table 11-4 provides the definitions of the levels of anticipated impact.

Table 11-4 Definition of Levels of Visual Impact

	High Magnitude of Landscape Change	Moderate Magnitude of Landscape Change	Low Magnitude of Landscape Change
High Landscape or Viewer Sensitivity	High	Medium/High	Minimal/Medium
Moderate Landscape or Viewer Sensitivity	Medium/High	Medium	Minimal
Low Landscape or Viewer Sensitivity	Minimal/Medium	Minimal	No impact

Effects on landscape characteristics relate to the quality of what people see from places they commonly visit. Levels of effect for viewers should take into consideration the number of viewers affected. If many viewers are affected, the overall level of effect would usually be higher than otherwise expected; if few viewers are affected it would be lower. The level of impact can be affected by the topography of the study area (rolling terrain minimizes views), distance (as distance increases the ability to detect detail decreases) and position of the viewer (facing towards the east or west), unique landscape characteristics (i.e., waterfall or bedrock outcrop) and conspicuous (natural landforms) or inconspicuous (extensively disturbed) landscape patterns.

The approach in conducting the assessment involved the mapping of the landscape of the LCSA, then assessing these specific components of the landscape with respect to the Facility, as viewed from selected points of view in and around the Site. This assessment takes into consideration the viewshed of identified receptors within the PSVSA and LCSA of the Project.

Sensitive Receptors

In terms of the receptors considered in the visual assessment, a number of residential as well as recreational features, businesses, and public facilities and institutions located within the vicinity of the PSVSA and LCSA were identified to assist with the consideration of potential visual effects that may result from the Facility. These receptors included, for instance:

- CEBP;
- Courtice WPCP;
- CN Rail;
- Highway 401 users;
- Waterfront Trail users;
- Nearby Residences;
- Darlington (Hydro) Sport Fields (Ontario Power Generation);
- Darlington Nuclear Generating Station (Ontario Power Generation);
- Darlington Provincial Park;
- Municipality of Clarington;
- Town of Bowmanville;

- City of Oshawa;
- Proposed 407 Expansion; and,
- Proposed OPG Administrative Building.

Viewshed Analyses, Photo Montages, and Assumptions

For the viewshed analysis, the Study Team used Environmental Systems Research Institute, Inc. (ESRI) GIS software to compute a “Viewshed Analysis” for the Visual Assessment. This analysis uses the topographic surface model as the base, along with additional available 3-dimensional (3D) spatial features, to model all areas that are visible from a “source”. In this case, the source is the stack of the Facility (one stack in the 140,000 tpy scenario).

The viewshed was performed using a 10 metre (m) resolution surface model platform. The surface model was enhanced by the addition of 3D woodlot coverage provided by the MNR (2008) and building polygons available from 1:10,000 planimetric mapping. All woodlot polygons were assigned a global 10 m height value. All building polygons were assigned a global 5 m height value.

An observer point for the viewshed model was established as being the top of the stack that is part of the proposed infrastructure as this is the highest structure on the Site and is anticipated to be the primary feature of the Facility that would be visible at a distance. The stack location was taken from preliminary Site plans prepared by Covanta Energy Corporation (Covanta) of the Facility, which illustrates the proposed layouts for this Facility (140,000 tpy). Accompanying artistic renderings of the Site, prepared by the preferred vendor, are also considered and included in the assessment to depict what the Facility could look like. The observer point (stack) was then assigned the height value of 87.6 m (to the top of the flue).

Using the assigned observer point, a viewshed analysis was then performed on the enhanced surface model, using the option to account for earth curvature. This viewshed type is referred to as “worst-case” because it is an extremely conservative method that does not account for any view obstructions other than topographic barriers, existing woodlots, and available building polygons. The viewshed analysis also does not account for atmospheric conditions (i.e., smog) that may inhibit human visibility, potentially cleared woodlots, spatial barriers (i.e., buildings, roads).

A series of computer generated photo montages were prepared based on various vantage points of the Facility. A series of photos were taken by field staff, in the general location of the proposed infrastructure. Three dimensional images were superimposed on photos of the existing location to depict what the Facility could look like.

While the 3D representations of the proposed infrastructure takes into account the general dimensions, shapes and location of the Facility, it does not account for the overall architectural design, landscaping, material and colour choices and other elements that have been considered in the preliminary design. Therefore, the visual assessment represents a “worst-case” concept of the Facility for the purposes of the modelling and visual assessment.

It is important to note that the visual assessment is conservative using existing conditions. In addition, the photos used were taken during winter months when there is little foliage and vegetation that would potentially provide additional screening of the Facility from certain vantages.

An analysis of the potential visual effect of the Facility, as viewed from several vantages in relation to receptors within both the PSVSA and the LCSA was undertaken and is outlined below and documented in detail in the *Visual Assessment - Technical Study Report* in **Appendix C-6**.

11.1.5.2 Potential Visual Effects

In terms of the potential visual effects associated with constructing the Facility, potential short term construction related effects could include Site clearing, grubbing, and associated ground disturbance, which may be considered unsightly. Large construction equipment could also be visible from different vantages around the Site, potentially resulting in short term visual disturbances.

The duration of the construction period is currently anticipated to be approximately 30 months. However, construction activities would take place in stages. The early stages of construction could have the greatest potential for visual effects during this period; however, this intensive stage of construction would be of short duration.

Regarding the potential visual effects associated with operating the Facility, consideration was given to the Facility, specific structures associated with the Facility, and the buildings and Facility stack.

During operations the Facility would be visible from around the PSVSA (within 1 km), and no mitigation is possible to reduce the visual effects of the Facility due to the minimal viewing distance from the adjacent roadways and properties to the activities. The presence of the Facility cannot be readily shielded from the adjacent roadways, and would result in a change to the existing local landscape for the duration of the operational period for the Project.

The stack and the upper portion of the process unit of the Facility would be prominent features that would be visible from within the PSVSA. Only the tallest structures, specifically the stack, could be visible within the broader LCSA (within 5 km) and on a Regional basis however, the visibility of the stack is affected by distance and the presence of vertical obstructions.

Within the PSVCA and LCSA other industrial facility structures are as visible, if not more visible, than the proposed Facility. Visually, the Darlington Nuclear Generating Station is a very prominent and relatively widespread industrial feature that has a high level of impact on the landscape. The existing commercial and industrial nature of this area does not impede current recreational or tourism activities from occurring.

As the Facility would be situated between two existing commercial properties in the CEBP and the Courtice WPCP, which can also be seen from within the PSVSA, this could lessen the degree to which the new Facility would stand out for some receptors.

The main source of potential direct effects would be to the Clarington Energy Business Park users. These users would include part and full-time employees, as well as customers and visitors. The number of permanent and casual employees within the eventual full build-out of the Clarington Energy Business Park is expected to be between 3000 and 5000, which would be the main source of receptors with the potential for prolonged viewing opportunities of the Facilities. However, due to the nature of the Business Park, and the generally temporary duration of the use and visitation, these users would be expected to have a passive to moderate interest in their visual surroundings.

Due to the already commercial and industrial nature of the PSVSA, this landscape is not valued for its scenic quality and is tolerant of change. The PSVSA is not considered a pristine environment and has been substantially modified by human activity. The development of the Facility and other planned and disclosed projects in the PSVSA would be compatible with the existing land uses in the PSVSA.

The potential visual effects associated with post-closure/decommissioning, are expected to be similar to those experienced during construction and of similar duration. Demolition and removal of structures at the Facility would likely occur first and could be the most visually apparent phase of the decommissioning, despite its expected short-term timeframe. These activities could potentially include the presence of piles of debris, demolition equipment, and land remediation activities on the Site. Decommissioning of the Facility was considered to have minimal potential visual effects.

Receptors within the broader community (LCSA) would remain largely unaffected by activities during the construction and operational periods of the Facility. During the post-closure period, there could be minimal visual effects during the early phase of decommissioning, as tall structures could be dismantled. The overall effects of decommissioning could be positive as the activities could result in a less obstructed skyline. These activities would be temporary in nature and the overall effect experienced by receptors for the post-closure period is anticipated to be minimal.

Visual effects associated with the Facility relate to the tallest structures including the stack and the process unit. While the visual effects associated with the Facility would be greater in close proximity to the Site, it is anticipated that only the taller structures could affect potential receptors in the LCSA.

11.1.5.3 Impact Management

During the construction and decommissioning periods, the highest potential for visual effects would result during the initial construction and demolition phases within the PSVSA.

As the Site is prepared, the presence of debris, and resultant movement of machinery at the Site during these phases could create a visual effect. Timely removal of the debris could lessen the effect associated with these phases. Visual effects associated with the construction and decommissioning periods are thus anticipated to be minimal and temporary in nature.

No mitigation is possible to eliminate the visual effects of the Facility within the PSVSA during operations due to the minimal viewing distance from the adjacent roadways to the activities. The presence of the Facility could not be readily shielded from the adjacent roadways, and could result in a change to the existing local landscape for the duration of the operational period for the Facility.

In addition, as described in the Host Community Agreement, Durham will incorporate an allowance of up to nine million dollars in the RFP for the provision of architectural treatments and upgrades to the Facility. This will also ensure appropriate and effective visual mitigation measures are used.

Given that the Facility is proposed to be developed within the Clarington Energy Business Park, the Principles established for Design Excellence will be considered in the design of the Facility. The Principles are:

- The physical and business environment of the CEBP should make it a showcase for Clarington, Durham Region, and Ontario;
- Celebrate the presence of the CEBP with an innovative design representing modern day technology; and,
- The design should reflect the community's vision for the future of the area.

In addition, hedgerows and small woodlots occur throughout the LCSA, providing some visual obstruction and relief from various vantages. A berm of approximately 350 m by 800 m with an average elevation of 25 to 30 m is situated to the east of the Site, associated with the Ontario Power Generation's Darlington Nuclear Generating Station. This berm would block much of the visual effects to the east.

Appropriate visual mitigation and landscaping would be used during the construction and operation of the Facility; however, if visual concerns are raised by receptors in the vicinity of the Facility then various strategies towards mitigating these effects could be assessed, such as planting additional trees or other suitable vegetation at the receptor location to provide a screen against the line of the sight of the Facility

11.1.5.4 Conclusions

The potential for visual effects from the development of a new Facility is highly subjective and varies across receptors. However, due to the presence of existing industrial structures and commercial buildings a certain level of visual impact is already present. The Facility is being constructed in an area that is not a pristine landscape but, rather, one that has already been influenced by human activities. As a result, the effect of the Facility in addition to other planned and disclosed future projects, given the presence of the other existing structures in the landscape, would have a minimal effect on the landscape, while having an overall medium level effect on some receptors within the PSVSA and LCSA.

Regionally, no adverse visual effects are anticipated to result from the Facility. While a line of sight to the tallest structure, the stack, could be available from various vantages in the LCSA, the dimensions of the stack and the surrounding topography make it unlikely that the stack would be visible in areas of higher population densities. The visual properties of the Facility are expected to be relatively minimal as the stack is slender and would appear insubstantial as viewed on the horizon from across the LCSA and the broader Region. Across the broader Region, the Facility structures would be difficult to view unaided.

11.1.6 Natural Environment

This section summarizes the results of the technical study report titled *Natural Environment Assessment - Technical Study Report* prepared for use in the EA Study as well as for other regulatory requirements. The assessment was concerned only with the physical placement of the Facility on the Site, (i.e., the "footprint" of the Facility). (**See Appendix C-7**)

11.1.6.1 Assessment Methodology

In July 2007, biologists assessed the Site to:

- identify potentially affected species and environments;
- inventory onsite aquatic habitats;
- evaluate the amount of woodlands and hedgerows potentially affected at the Site and the degree of impact on any adjacent woodlot or hedgerow edges.

Any natural and biological features present on the Site, including wildlife, vegetation, watercourses and avian species, were noted and inventoried. All distances and lengths were subsequently measured using geospatial data and GIS applications, as were calculations of the distances from the Site and haul routes to areas designated as Natural Heritage Features and Areas.

Field surveys included:

- Observations of bird species, bird habitats, and the location of any active or inactive nests;
- Observations of reptilian and amphibian species, habitats, and the location of any hibernacula (rock piles);
- Observations of vegetation communities and species;
- Observations of wildlife and potential wildlife habitat;
- Observations of any watercourses on or adjacent to the Site, and the classification of such watercourses as wet or dry; and,
- Assessment of any watercourses to determine the potential for either seasonal or permanent fish habitat.

In 2008/2009 the results of the field assessment undertaken in 2007 were reviewed and updated. This included undertaking additional assessment and field surveys, documentation reviews, consultation with regulatory authorities including the Central Lake Ontario Conservation Authority.

Based on the results of the surveys, document reviews and consultation with regulatory agencies, the assessment included documentation of the significance of existing natural environment potentially affected, analysis and identification of potential effects, mitigation measures, and net effects on:

- mammalian species;

- avian species;
- amphibians and reptiles;
- vegetation;
- aquatic habitat;
- natural areas; and,
- hazard lands.

Potential effects were considered during construction, operations, and post-closure. However, as previously mentioned, this natural environment assessment was concerned only with the physical placement of the Facility on the Site, (i.e., the "footprint" of the Facility). Therefore, from this perspective, the primary affects on the natural environment occur mostly during the initial construction phase when the Site is physically disturbed. Although discussed at high level in the natural environment assessment, the potential effects on the ecology of the Site and surrounding area during the operation phase are discussed in more detail in the HHERA.

An additional field survey was completed on May 7, 2009 with the specific intent to assess:

- Post-freshet conditions and potential fish habitat in the drainage ditch along the access road;
- Potential nesting cavities for identified birds of conservation concern;
- Hibernacula (rock piles) that might suggest the potential presence of milk snakes; and,
- Additional nesting cavities on adjacent land.

11.1.6.2 Potential Effects on Mammalian Species

The flat, open terrain of the Site and lack of cover offer few habitat opportunities for specialized species. Wildlife surveys confirmed the presence of White-tailed Deer, Raccoon and signs of rabbit browse, likely representing the Eastern Cottontail. It is anticipated that the site also supports common near-urban mammalian species including Striped Skunk, small rodents, Woodchuck, and canid predators including Red Fox and Coyote. Onsite field surveys and desktop reviews of the Natural Heritage Information Centre's (NHIC) website (NHIC 2009) show that no mammalian Species of Conservation Concern occur within a 2 km radius of the centre of the Site. Based on field surveys performed in 2007 and 2009, no forested areas large enough to provide a winter deer yard exist onsite

The Site supports hedgerow habitats that act as minor movement corridors for mammalian species. Additionally the agricultural fields provide good cover for small rodents. Despite the hedgerows, wildlife movement is inhibited by commercial-industrial areas north and east of the Site, by the CN Rail tracks and fencing running south of the Site and by local roadways. While they provide localized habitat, the hedgerows onsite are isolated from larger areas of wildlife refuge such as Darlington Provincial Park and do not constitute significant wildlife habitat. Based on field surveys, no forested areas large enough to provide a winter deer yard exist onsite.

Although the erection of property fencing would likely obstruct most terrestrial wildlife passage, minimal net effects are anticipated. The mammalian species using the Site are mobile and can relocate to undisturbed areas nearby considering there is no significant habitat onsite.

11.1.6.3 Impact Management

Mitigation measures include protective protocols to avoid killing or harming wildlife during Facility construction and utilization activities.

In addition, a wildlife corridor (i.e., 30 m) along the entire east-west length of the Site may be established to enhance wildlife movement. Native tree and shrub species could also be planted and existing species allowed to grow, without disturbance providing additional habitat. The benefits of this corridor can be coordinated with the work of the Region of Durham who have established a corridor south of the railway tracks.

A diversity of native tree and shrub species will be incorporated into a planting plan for the area and existing species allowed to grow without disturbance.

11.1.6.4 Conclusion

Considering the characteristics of existing features and mitigation measures, no significant net effects to mammalian species are anticipated.

11.1.6.5 Potential Effects on Avian Species

Lake Ontario lies approximately 400 m south of the Site and provides significant over-wintering and migration staging habitat for a variety of birds along the length of its shoreline. Based on field surveys, no significant roosting areas for birds or migratory stopovers exist onsite. Due to its agricultural nature, the Site itself hosts a limited community of birds.

The most abundant bird species observed during field surveys were Common Grackle, Ring-billed Gull, Song Sparrow, Savannah Sparrow, and European Starling. Other species observed such as Brown Thrasher, White-crowned Sparrow, Yellow Warbler, Northern Mockingbird, Killdeer, Willow Flycatcher, and Eastern Meadowlark represent species common in shrub/successional and agricultural habitats. No nests were found onsite during the mid-summer field survey in 2007, but five species with fledged young were observed, confirming onsite nesting activity for the following species: Red-winged Blackbird, House Sparrow, Eastern Kingbird, Common Grackle, and Savannah Sparrow.

Within the area surrounding the Site, records from the Ontario Breeding Bird Atlas (OBBA) show the occurrence of several Species of Conservation Concern including Black-crowned Night-Heron, Least Bittern, Chimney Swift and Red-shouldered Hawk. Literature reviews and discussions with CLOCA noted two additional Species of Conservation Concern (Black Tern and Red-headed Woodpecker) as having the potential to occur in the immediate vicinity of the Site. None of the species were identified as breeding onsite.

Except for the Chimney Swift and Red-headed Woodpecker, all of the species noted above require specialized wetland or interior forest habitat that the Site does not provide. While the OBBA shows potential occurrence of the Chimney Swift in the area, there is no documented evidence of Chimney Swifts nesting onsite. The Red-headed Woodpecker has likewise been known to inhabit similar habitat, and has breeding ranges extending into the area, but has not been documented onsite (Warme, 2004).

A survey was conducted in May 2009 to determine if suitable nesting habitat (i.e., cavities in trees) for both the Chimney Swift and the Red-headed Woodpecker existed onsite. Field evidence showed only one tree onsite, a Weeping Willow with a cavity suitable for nesting opportunities for either of these two Species of Conservation Concern. The property immediately west of the Site supports additional potential nesting sites which may provide suitable nesting options for Chimney Swifts or Red-headed Woodpeckers.

11.1.6.6 Impact Management

The timing of tree clearing should occur outside of migratory breeding bird activity, defined from May 1- July 31 via the *Migratory Birds Convention Act* to limit clearing impacts on nesting bird species. In addition, if the tree described above requires removal, it would be inspected to ascertain existing nesting activity.

Other potential mitigation measures could include habitat enhancement for Chimney Swifts if present onsite and once construction has been completed, compensation for the loss of hedgerow by incorporating native shrubs and trees into landscaping for the Facility.

11.1.6.7 Conclusion

Considering the characteristics of existing features and mitigation measures, no significant net effects to avian species are anticipated.

11.1.6.8 Predicted Effects on Amphibians and Reptiles

Due to the lack of permanent or vernal pool habitat onsite, very few amphibians and reptiles (herpetofauna) are expected to be found on the Site itself. Adaptable species, including the Northern Leopard Frog, the American Toad, and the Eastern Garter Snake may be present in the hedgerow areas onsite, but were not seen during field surveys. The above-listed species are all common and widespread in Ontario. They are also highly mobile species, and are able to relocate from disturbed areas providing suitable habitat is found in close proximity.

Desktop reviews of data from the NHIC indicated occurrence from 1989 of the Milksnake within a 2 km radius of the Site. The Milksnake is designated as a Species of Special Concern both provincially and nationally (NHIC, 2009).

Because Milksnakes are found in a wide variety of habitats including prairies, pastures and rocky hillsides, they could potentially find suitable habitat cavities on the Site. As a result, a field survey was carried out focusing on the identification of potential hibernacula (rock piles); however no habitat was found. Minimal potential effects are anticipated since no Milksnakes or habitat was observed during field surveys.

Impact Management

An informational package could be supplied to assist with the identification of snakes and habitat as part of the protective protocols to avoid harm to wildlife during construction, in case any are encountered.

11.1.6.9 Conclusion

Considering characteristics of existing features and mitigation measures, no significant net effects on amphibian and reptile species are anticipated.

11.1.6.10 Potential Effects on Vegetation

Due to the agricultural activities previously practiced onsite, exotic species such as European Buckthorn, as well as weeds associated with agricultural fields such as Common Ragweed and Green Amaranth were commonly found. The native vegetation (trees, shrubs and herbaceous plants) consisted of common species of hedgerow habitats. No vegetation Species of Conservation Concern were observed during the 2007 and 2009 site visits.

Within a radius of approximately 2 km of the Site, however, the NHIC notes the occurrence of the native Bushy Cinquefoil (designated S4). Bushy Cinquefoil was observed in 1980 and is an uncommon, but not rare species preferring lakeshore, beach and wet prairie habitats (Newcomb 1977, NHIC 2009). Given the absence of suitable habitat, it is unlikely this species would be present occur onsite. The NHIC record of this species in the general area is likely a record from the nearby Lake Ontario shoreline.

The partial or total removal of the hedgerow may remove some native vegetation.

11.1.6.11 Impact Management

Once construction has been completed, loss of hedgerow may be compensated for by incorporating a diversity of native shrubs and trees into landscaping for the Facility.

The planting plan for the wildlife corridor (see Section 11.1.6.3) will provide hedgerow habitat for birds as well as mammals, and species selection should focus on bird-friendly tree and shrub species.

11.1.6.12 Conclusion

Considering the characteristics of existing features and mitigation measures, no significant net effects on vegetative species would be anticipated.

11.1.6.13 Potential Effects on Aquatic Habitat

No permanent watercourses were identified onsite. A dry drainage ditch was identified running south from the central access road towards the railway tracks. Its primary function is to allow runoff to flow from the north to south side of the access road. The drainage ditch is not mapped as part of the Tooley Creek Watershed, nor is it within CLOCA's jurisdiction (*Memo dated September 29th, 2008, Jeff McNeice, Natural Heritage Resource Analyst, CLOCA and letter dated October 25, 2007 from Heather Brooks, Director, Watershed Planning and Natural Heritage, CLOCA*). The 2009 post-freshet survey of this ditch confirmed that no connectivity exists between the ditch and natural waterbodies downstream nor does the ditch provide fish habitat. No signs of alluvial flow were present, and terrestrial grasses indicate lack of permanent flow and habitat. Fish communities associated with the mouth of Tooley Creek (located offsite to the west of the Site) include warm water species such as Common White Sucker and Carp.

In addition, as described in the surface water and groundwater assessment, the implementation of a proposed storm water management plan during operations would result in no potential effects to surface water quality or aquatic habitat. In addition, the existing drainage ditch would likely be altered or removed during construction.

11.1.6.14 Impact Management

No mitigation measures are required as the drainage ditch does not provide fish habitat, nor is it connected to any downstream waterbodies.

11.1.6.15 Conclusion

Considering the characteristics of existing features and mitigation measures, no significant net effects on aquatic habitat is anticipated.

11.1.6.16 Potential Effects on Natural Areas

A desktop survey of the NHIC natural areas database and properties identified by CLOCA revealed 13 natural areas within a radius of approximately 5 km of the Site (Table 11-5). A larger radius was used for this search to account for the effects to natural areas along the haul route from Hwy. 401.

In addition to the sites identified below, CLOCA has noted that the south side of the CN Rail right-of-way functions as a wildlife corridor. The hedgerow vegetation along this corridor provides wildlife habitat, but the value of the area as a wildlife corridor is limited due both to the north-south roadways bisecting it, and to the fencing running along the north side of the right-of-way (adjacent to the Site). This corridor has been enhanced along the south side of the tracks, and measures are suggested to enhance vegetation species along the north side of the tracks as mitigation for the Facility.

The Site is designated as a ‘Low Sensitivity’ area through CLOCA’s environmentally sensitive areas mapping. No impact to natural areas is anticipated since there are no natural areas onsite.

Table 11-5 Natural Areas within 5 km of the Site Centroid

Name	Significance	Area Type	Size (ha)	Distance (km) from Natural Area to Site	Distance (km) from Natural Area to Haul Route
Tooley Creek Coastal Wetland	Local	Wetland	0.35	0.87	0.9
Darlington Provincial Park	-	Provincial Park - Recreational	209	2.2	1.3
Darlington Provincial Park	-	Earth Science Site	111	2.4	1.4
Darlington Provincial Park - NE Zone	-	Provincial Park Zone - Natural Environment	96	3.0	2.1
McLaughlin Bay Wetland	Provincial	Wetland	31	3.3	2.3
Raby Head Wetland #1	-	Wetland	4	4.2	3.3
Oshawa Second Marsh	Provincial	Life Science ANSI	135	4.3	3.3
Oshawa Second Marsh	Provincial	Wetland	105	4.6	3.5
Bowmanville Quarry	Provincial	Earth Science ANSI	3	4.6	3.8
Raby Head Wetland #2	-	Wetland	3	4.8	3.9
Maple Grove Wetland Complex	-	Wetland	149	5.1	4.8
West Side Beach Marsh	Provincial	Wetland	36	5.9	5.0
Westside Marsh	-	Life Science Site	--	6.0	5.1

The Site is located 0.87 km from the Tooley Creek Coastal Wetland and 2.2 km from Darlington Provincial Park, the closest natural areas to the Site. The proposed haul route for the Facility is 0.9 km from the Tooley Creek Coastal Wetland and 1.3 km from Darlington Provincial Park, with the majority of natural areas falling farther than 2 km from the proposed haul route. Given the distances between the Site and nearby natural areas, it is not anticipated that development activities (dust, noise, construction impacts) will have immediate impacts on the natural areas identified in the table above.

11.1.6.17 Impact Management

No mitigation measures are required as there are no natural areas onsite and as there are no anticipated effects on natural areas due to the distances between natural areas and the Facility and haul route.

11.1.6.18 Conclusion

Considering the distance of the closest natural area to the Site, no significant net effects to any natural areas are anticipated.

11.1.6.19 Potential Effects on Hazard Lands

Hazard lands are areas that typically follow the historical high water level of a watercourse and therefore may be prone to flooding during periods of significant rainfall or during spring runoff. A designated hazard land area, namely, the creek valley of an unnamed headwater tributary to

Tooley Creek, is located approximately 100 m northwest of the Site boundary. No effects would be anticipated considering the distance of the closest hazard land to the Site.

11.1.6.20 Impact Management

No mitigation measures are required as there are no hazard lands onsite.

11.1.6.21 Conclusion

Considering the distance of the closest hazard land to the Site, no net effect would be anticipated.

11.1.6.22 Natural Environment Conclusions

It is anticipated that effects to the terrestrial and aquatic features of the Site would be minimal during both construction and operation of the Facility. The primary effects to the natural environment would occur during initial construction when the existing environment is disturbed. No Species of Conservation Concern were observed onsite. Although insect species were not surveyed, previous surveys conducted on adjacent land did not reveal any Species of Conservation Concern. No permanent watercourses were identified onsite. The nearest hazard lands are located approximately 100 m from the Site. The nearest natural area is located approximately 1 km from the Site and proposed haul route, and should not be directly impacted by the Facility. It is important to note that this Site lies within an area already designated and zoned for industrial and commercial development.

Overall, following the implementation of appropriate mitigation measures, the Facility is not anticipated to have a significant effect on the natural features and ecological functions of the Site.

11.1.7 Social and Cultural

This section summarizes the results of the technical study report titled *Social/Cultural Assessment - Technical Study Report* completed for use in the EA Study as well as for other regulatory requirements as they relate to the approved design capacity scenario of 140,000 tpy (see **Appendix C-8**).

11.1.7.1 Assessment Methodology

The social/cultural assessment was undertaken to assess the effects of the Facility on the people and community within the area around the Site, as appropriate at this stage in the EA Study. The potential effects on the Social/Cultural environment have been studied extensively throughout the EA Study and an effort was made not to re-examine or replicate the previous net effects evaluation that has taken place, but instead to focus on the specific effects associated with the preferred Undertaking.

For example, the potential for the direct loss of property and the displacement of social features such as residences, public amenities and businesses was addressed during the process of selecting the preferred Site, resulting in selection of a Site which does not result in property loss or displacement of such features.

Information from various previous and new sources made available during the EA process was used to complete the social/cultural assessment including:

- Previous reports and technical studies generated during the EA process and evaluation of “Alternatives to” (i.e., alternative post-diversion residual waste management systems) and “Alternative methods” (i.e., alternative sites). These reports were largely used to assist in establishing the baseline social/cultural environment, and to establish the Facility characteristics and assumptions that were applicable to the social/cultural assessment;
- The results of the extensive consultation process that has been undertaken during the course of this EA Study, and documented as part of previous reports and within the EA Record of Consultation were used to identify the relative importance of social/cultural issues during the EA and to establish a general picture of the attitudes and perception of the Facility in the community;
- Various site-specific assessment Technical Study Reports were used to determine the potential effects of the Facility (the preferred long-term post residual waste management system and the preferred site) on various aspects of the ‘physical’ environment. Effects on the social/cultural environment can occur with nuisances such as emissions of dust, odour, noise or litter which can result in a physical effect on people or the community. For example, the visual effect of construction activities or the presence of a new building could be noticeable to and/or disturb people that live or work in the area.
- Other documents and studies including the *Durham York Energy from Waste Facility Business Case* and the recently approved *Clarington Host Community Agreement* were used to identify potential interaction of the Facility with the CEBP within which the Facility is located and to identify potential impact management measures that have been identified by the Proponents during the EA process.
- The assessment of the compatibility of the Facility with existing and/or proposed land uses considered baseline conditions (land uses in the local area and the surrounding community) and the degree of physical impacts (e.g., traffic, odour, dust, litter, noise) associated with the operation of the Facility as documented in the other Technical Study Reports that have been undertaken to determine the effect of the Facility on the environment.
- For the purpose of this study a Local Social Study Area (LSSA) was considered, consisting of all lands within a one kilometre (km) radius around the Site to address the primary effects of the Facility, encompassing the area in the immediate vicinity of the Site and the haul route from the closest 400 series highway (Highway 401) to the Site. A Community Social Study Area (CSSA) consisting of a 5 km radius was selected to include any potential broader effects on the general community. This larger community area addresses areas that may be able to discern the Facility from a distance and that are considered to be communities that are proximate to the Facility. It is believed that areas beyond that distance have decreased potential to be affected by the presence of the Facility. The CSSA also includes the near shore of the Lake Ontario shoreline within 5 km of the Site, given that recreational use may be made of this area.

In the social/cultural assessment, the following criteria and relevant indicators were considered as set out below (Table 11-6).

Table 11-6 Social/Cultural Criteria and Indicators

Criteria	Indicators
Compatibility with Existing and Proposed Land Uses (Construction and Operation Cases)	Potential for Disruption to use and enjoyment of residential properties
	Potential for Changes in community character
	Potential for Disruption to use and enjoyment of public facilities and institutions
	Potential for Disruption to use and enjoyment of cultural and recreational resources
	Compatibility with existing land use designations and proposed land use changes (Operation Case only)

A number of residential as well as recreational features, businesses, public facilities and institutions located within the vicinity of the LSSA and CSSA were identified as outlined below:

- CEBP – the development area the Facility is located within is the CEBP and includes the two existing commercial operations (Copart Auto Auctions and Manheim Oshawa Auctions) located within 1 km of the Site;
- CN Rail – VIA Rail passenger trains and CN cargo trains– located adjacent to the south boundary of the Site;
- Highway 401 – The nearest major intersection is Highway 401 and Courtice Road, which is approximately 1.5 km to the north of the Site;
- Residences - The nearest residential area designated as future urban residential is 3.2 km northwest of the Site in the vicinity of Bloor Street and Townline Road, in the community of Courtice. Within 1 km of the Site there is one occupied residence located approximately 420 metres west of the property and one located approximately 600 metres to the east. Both occupied residences are on-farm residences. The one abandoned residence to the north of the Site was not considered as a residential receptor. There are no residences along the proposed haul route;
- Public Facilities/Institutions – There are two Public Facilities or Institutions (e.g., schools, hospitals, etc.) within 1 km of the Site; the Durham Regional Police Service unit to the north of Highway 401 and the Courtice WPCP to the southwest of the Site. There are no Public Facilities or Institutions along the proposed haul route.
- Cultural or Heritage Resources - There are no buildings, structures, cemeteries, plantings or other landscape structures or features within 1 km of the Site that would be considered to constitute a built heritage feature or cultural landscape.
- Waterfront Trail – the Waterfront Trail runs west to east along the shore of Lake Ontario, and loops around the Site to the north;
- Darlington (Hydro) Sport Fields (Ontario Power Generation) – sport fields (upper and lower), located 1 km to the east;
- Darlington Provincial Park – is located approximately 2 km to the west;

- The Lake Ontario shore – located approximately 500 m to the south of the Site;
- Darlington Nuclear Generating Station (Ontario Power Generation) - located approximately 2 km to the east;
- Municipality of Clarington –the municipality within which the Facility is located;
- Town of Bowmanville – the outskirts of which are located approximately 5 km to the northeast; and,
- City of Oshawa – the outskirts of which are located approximately 5 km to the west (for the purposes of this assessment, the community of Courtice [approximately 4 km northwest of the Site] is included with Oshawa as one receptor).

11.1.7.2 Potential Social/Cultural Effects

As noted above, effects on the social/cultural environment can occur with nuisances such as emissions of dust, odour, noise or litter which can result in a physical effect on people or the community. The following Table 11-7 summarizes the potential effects of the Facility on various aspects of the ‘physical’ environment.

In regards to the “Potential for Disruption to Use and Enjoyment of Residential Properties” there are two (2) occupied and one abandoned residences within 1 km of the Site. The Facility does not require the displacement of any residents from their properties, however, in the longer term the designated land use within the immediate vicinity of the Site within the CEBP will encourage the development of commercial/light industrial land uses. During construction there could be short-term/temporary impacts associated with noise, dust and visual effects. Minimal to no potential exists for effects of odour, litter and vermin/vectors during construction as no waste materials would be onsite. During operations, some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects as noted above. No potential effects are anticipated related to construction or operational traffic as there are no residences located along the haul route

The “Potential for Changes in Community Character” considered the potential for effects in the broader community, particularly residential neighbourhoods. The proximity of existing and planned residential neighbourhoods within 5 km was considered along with the proximity of the Site to neighbouring communities. The compatibility of the Facility with the proposed developments and other major projects in the area was considered. The nearest residential area designated as future urban residential is 3.2 km from the Site to the northwest on the outskirts of the built-up area of Courtice. No existing or planned residential neighbourhoods are located along the haul-route off of the 400 series highways. Over 1 km to the north of the Facility, on the north side of Highway 401, there is a scattering of residences along Baseline Road interspersed with commercial properties representing the Hamlet of Darlington. The distance between the Site and the local communities results in minimal to no potential effect related to odour, noise, dust, vermin/vectors, litter or traffic during construction, operations or decommissioning of the Facility. During construction there is minimal potential for short-term visual effects in the closest residential community (Hamlet of Darlington). During operations, there is some potential for visual effects in the closest residential community (Hamlet of Darlington) as residents may be able to view a portion of the Stack. Results of consultation processes indicate a level of community concern related to health, safety and well-being that could affect a resident's perception regarding the character of their community.

Table 11-7 Summary Potential Effects on the Physical Environment Considered in the Social/Cultural Assessment

Parameter	Potential Effect
Odour	Minimal to no potential effect from odour on receptors within 1 km or beyond during construction, or decommissioning/post-closure. Potential effect of odour from post-diversion residual waste received during operations, particularly to receptors within 1 km of the Site.
Noise	Some potential exists for short-term noise and vibration impacts to receptors during the construction phase of the Facility under worst-case conditions, in regards to pile driving and peak construction traffic. Predicted noise levels at all receptors within 1km of the Site are less than the applicable criteria for the operational scenario assessed for the Facility.
Dust	Dust emissions from construction and for decommissioning activities could have a temporary effect on local air quality. Dust emissions from operations would be managed via Facility design and operational controls.
Vermin / Vectors	Minimal potential to attract vermin/vectors during construction and decommissioning. Some potential to attract vermin/vectors during operations as the Facility will be accepting residual waste with a small proportion of food residuals.
Litter	Minimal potential for litter during construction and decommissioning. Some potential for litter during operations, but will be minimized based on management of residual waste in enclosed vehicles and buildings. Any offsite litter that leaves the Site could be a nuisance to nearby receptors within 1 km of the Site.
Traffic	No sensitive receptors (residences, institutions, recreational facilities) are located along the haul route. The intersections and existing road network along the haul route can accommodate traffic associated with construction, although some pavement improvements may be required. Pavement testing along the haul route will be completed by the Region of Durham if the Project is approved to confirm if reconstruction/pavement improvements are required. No traffic control measures are required on the adjacent road network to accommodate traffic during operations of the Facility. Traffic during operations will account for 2 to 3% of the total trips generated in the fully built-out CEBP.
Visual	A number of receptors within 1 km of the Site will have a clear line of sight to the Facility. During construction and decommissioning these receptors could experience short-term visual disturbance. During operation, the Facility will be visible from within 1 km of the Site. Most receptors within 1 km will be able to view the majority of the buildings on the Site, and are expected to experience a medium level visual effect. Some potential visual disturbance is already present as the landscape has already been influenced by human activities and the presence of existing industrial structures and commercial buildings.

In regards to the "Potential for Disruption to Use and Enjoyment of Public Facilities and Institutions" there are two (2) public facilities/institutions located within 1 km of the Site, the Durham Regional Police Service Unit and the Courtice WPCP. During construction, potential exists for short-term/temporary impacts associated with noise, dust and visual effects. Minimal to no potential exists for effects of odour, litter and vermin/vectors during construction as no waste materials would be onsite. During operations some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects. No potential effects are anticipated related to construction or operational traffic as these facilities are not located along the haul route

The “Potential for Disruption to Use and Enjoyment of Cultural and Recreational Resources” considered the potential for effects within 1 km and in the broader community. There are no buildings, structures, cemeteries, plantings or other landscape structures or features within 1 km of the Site that would be considered to constitute a built heritage feature or cultural landscape. There are three recreational resources located within relatively close proximity to the Site. Potential effects on these resources would be considered to represent the ‘worst case’ potential effects to cultural and recreational resources given their proximity to the Site and that the primary use of all three recreational resources is out-of-doors. They include the: Waterfront Trail; the Darlington (Hydro) Sport Fields (Ontario Power Generation); and, Darlington Provincial Park. In addition, the near shore of Lake Ontario may be used for recreational boating and/or fishing. During construction, potential exists for short-term/temporary impacts to these recreational resources associated with noise, dust and visual effects. Minimal to no potential exists for effects of odour, litter and vermin/vectors during construction as no waste materials would be onsite. During operations some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects. No potential effects are anticipated related to construction or operational traffic as these recreational facilities are not located along the haul route.

The “Compatibility with Existing Land Use Designations and Proposed Land Use Changes” considered the compatibility with existing and proposed land use within 1 km of the Site. Existing land use designations and proposed land use changes indicate that the area around the Site is currently occupied by a mixture of commercial/industrial land uses and undeveloped land and is designated for a mixture of prestige employment and light industrial land uses. During operations, some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects. No potential effects during operations are anticipated related to traffic as the land use designation along the haul route is employment area and business park.

11.1.7.3 Impact Management Measures

Impact management measures (primarily mitigation) were identified for each of the potential physical effects of the Facility in the other supporting Technical Study Reports, and some additional measures were identified in other documentation relevant to the Project and the EA. A summary of these impact management measures is provided in Table 11-8 below.

Table 11-8 Social/Cultural Impact Management Measures

Issue	Summary of Impact Management Measures	Supporting Technical Study or Document
Noise	Construction/decommissioning: monitoring and protection plan to address potential noise and vibration impacts associated with the Facility Operational: No mitigation measures are predicted to be necessary at the Facility during regular operations as the Facility meets MOE noise criteria.	Acoustic Assessment

Issue	Summary of Impact Management Measures	Supporting Technical Study or Document
	Potential mitigation measures can be included in the Facility design to ensure that noise criteria are met including equipment controls, setback limitations or property-line barriers. The need for controls will be confirmed during detailed design.	
Traffic	Construction: Road reconstruction/pavement improvements may be required for the section of South Service Road between the interchange and Osborne Road, as well as the section of Osborne Road between South Service Road and the future site access. Pavement testing along the haul route will be completed by the Region of Durham if the Project is approved to confirm if reconstruction/pavement improvements are required. Operational: No impact management measures are required to address current traffic conditions, but upon full build out of the CEBP some improvements (signals, turning movements, widening of Courtice Road) may be required.	Traffic Assessment
Dust	Construction: Various measures including the use of construction exits, temporary and permanent grassing, dust control measures, staging of work and emission controls for construction equipment. Operational: Various controls and strategies to control fugitive emissions from the Facility including the use of fully enclosed trucks to haul materials, loading and unloading materials in enclosed areas, stabilization of fly ash, residue loading and unloading systems designed to be dust free, and draw of combustion air from above the storage pit, which will maintain a negative pressure in the tipping building and help prevent the escape of dust and odour.	Air Quality Assessment
Odour	Construction: No mitigation is necessary until residual waste is received upon which time the operational measures to control odour emissions would be used. Operational: Various controls and strategies to control odour emissions including the use of fully enclosed trucks to haul materials, loading and unloading materials in enclosed areas, and draw of combustion air from above the storage pit, which will maintain a negative pressure in the tipping building and help prevent the escape of dust and odour.	Air Quality Assessment
Visual	Construction/Decommissioning: Timely removal of debris would lessen the effect associated with these phases. Operational: No mitigation is possible to reduce the visual effects of the Facility on adjacent roadways and properties to the activities and would result in a change to the existing local (1 km) landscape for the duration of the operational period for the Facility. Wooded areas and hedgerows would also act to obstruct views of the Facility from various vantages. To reduce the potential visual impact of the facility, Durham has agreed to provide a cash allowance of up to $9 million for architectural treatments and upgrades to the Facility.	Visual Assessment
Vermin/Vectors	Pest/vector control subcontracted to a qualified local company.	Covanta Proposal
Litter	Litter control throughout the Site will be routinely conducted on a daily basis.	Covanta Proposal
Communications	An agreement to provide accurate and timely information on emission levels to the public through a variety of means. Formation of a Thermal Treatment Facility Site Liaison Committee (SLC) with a mandate to review and provide input on site-specific studies related to the EA Study of the Facility.	Durham/York Reports to Committee/Council
	Development and implementation of a Community Relations Plan (CRP) through which Durham, York, and Covanta staff would relate to the local community, including advance notification to local authorities and residents	Covanta Proposal

Issue	Summary of Impact Management Measures	Supporting Technical Study or Document
	near the Facility of any planned unusual noises or activities, or other events that may be of concern to the local community. Development and implementation of a community complaints system for construction and operations.	
Environmental Surveillance	Approval by both Durham and York to implement an environmental surveillance program that includes stack testing, along with ambient air and soil testing for a minimum of the first three years of operation, along with public reporting of the environmental surveillance results and formation of an advisory group.	Reports to Durham and York Committee and Council

11.1.7.4 Conclusions

Overall, it was found that the Facility is compatible with existing and/or proposed land uses and would have minimal to no overall Net Effects on the Social/Cultural Environment. The Facility is anticipated to have minimal overall net effects in regards to the potential for disruption to use and enjoyment of residential properties. Exposure of residents to minor nuisance effects will be minimal for most parameters such as odour, dust, litter and vermin based on the proposed design and operation of the Facility. There could be short-term exposure to noise and vibration impacts to residential receptors during the construction phase of the Facility due to pile driving and peak construction traffic. The primary net effect of the Facility will be visual, as the two residential receptors have a clear line of sight to the Facility and are likely to experience a medium level of visual effects during both construction and operations.

The Facility is anticipated to have minimal to no overall net effects in regards to the potential for changes in community character. The Site is within an area designated for development as employment lands is part of the CEBP, and is situated well away from built up communities. There could be short-term exposure to noise and vibration impacts to receptors in the Hamlet of Darlington just over 1 km to the north of the Site during the construction phase of the Facility due to pile driving and peak construction traffic. During operation the closest residential communities may be able to view a portion of the stack, and are expected to experience a medium level visual effect, primarily due to the permanent nature of the change to the viewscape and the high number of viewers with a proprietary interest. Due to the built-up nature of the population centres that are further from the Site, the Facility would only be a moderate change to the landscape. Additionally, the greater distance of these communities and the intervening visual obstructions would interfere with the line of sight to the Facility. These factors would result in unremarkable/minimal changes in the components or character of the landscape. Public participation in consultation activities indicate a level of interest in the community near the Facility and some concerns regarding health, safety and well-being that could affect perception of the community near the Site. Impact management measures regarding communication and environmental surveillance will address these matters.

The Facility is anticipated to have minimal overall net effects in regards to the potential for disruption to use and enjoyment of public facilities or institutions. There may be some short-term exposure to noise and vibration impacts during the construction phase of the Facility due to pile driving and peak construction traffic and some short-term exposure to visual disturbances. During operation these public facilities or institutions are expected to experience a medium level visual effect. Some potential visual disturbance is already present as the landscape has already been influenced by human activities.

The Facility is anticipated to have minimal overall net effects in regards to the potential for disruption to use and enjoyment of cultural and recreational resources. There is limited to no potential for users of these recreational resources to be exposed to minor physical effects such as odour, dust, litter and vermin based on the proposed design and operation of the Facility and no potential for adverse effects related to traffic. No net effects related to construction noise are anticipated given the separation distance of these recreational resources from the Site, and given the transitory nature of the use of these facilities. No net effects related to operational noise are anticipated. During construction and decommissioning these recreational receptors could experience short-term visual disturbance. During operation these recreational receptors are expected to experience a medium level visual effect. Some potential visual disturbance is already present as the landscape has already been influenced by human activities.

The Facility is anticipated to have minimal overall net effects in regards to its compatibility with existing land use designations and proposed land use changes. The Facility will be visible to the majority of existing and proposed land uses within 1 km, and no mitigation is possible to reduce the visual effects of the Facility due to the minimal viewing distance from the adjacent roadways and properties. The visual characteristics of the Facility and the adjacent industrial landscape type are considered to exhibit minimal scenic attributes with respect to landscape distinction. Some potential visual disturbance is already present as the landscape has already been influenced by human activities. The development of the Facility may encourage development of the CEBP given the investment in servicing infrastructure associated with the Facility and the future availability of district heating.

11.1.8 Archaeology

This section summarizes the results of the technical study report titled *Stage 2 Archaeological Assessment and Build Heritage Assessment - Technical Study Report* JWSL's Archaeological and Built Heritage Assessment prepared for use in the EA Study as well as for other regulatory requirements (see **Appendix C-9**). The assessment was concerned only with the physical placement of the Facility on the Site, (i.e., the "footprint" of the Facility).

11.1.8.1 Assessment Methodology

The Archaeological and Built Heritage Assessment for the Site included a Stage 1 and Stage 2 Archaeological Assessment undertaken in accordance with appropriate regulatory requirements.

A Stage 1 Archaeological Assessment consists of a desktop search undertaken to identify archaeological sites near the Site and to assess the Site's archaeological potential. The Stage 1 Archaeological Assessment of the Site determined that the Site had an elevated potential for the presence of archaeological resources and that a Stage 2 Archaeological Assessment would be required prior to any below grade Facility-related activities. The Stage 2 Archaeological Assessment was the below grade survey undertaken in order to determine whether there were unknown archaeological resources located on the Site. If archaeological resources are identified during the Stage 2 assessment then the next step is to accurately delimit each site (Stage 3 Archaeological Assessment).

In the Stage 1 Archaeological Assessment of the property it was identified that portions of the Site would require pedestrian survey and that those parts of the property which had been used for cultivation would be required to be ploughed and weathered in advance of archaeological fieldwork. The ploughed portion of the current study area comprises approximately 6.0 ha of the approximate 12 ha Site in two discrete fields. The remaining 6.0 ha are comprised of approximately 5 ha of land previously surveyed in 2004 for the development of the Courtice WPCP and 1.0 ha of irregularly shaped parts of the property which were not cultivated.

The fields requiring assessment were ploughed in mid-November, 2008 and allowed to weather through light rains, and one episode of heavy snow. The pedestrian survey of the ploughed portions of the field occurred on November 29, 2008. Pedestrian survey occurred at 5 m intervals or less across the entirety of the two fields. Visibility of the ground was very good and the general lack of stones in the soils matrix made for ready observation of any materials in the soil. A shovel test survey of the unploughed portions of the Site was completed on May 6, 2009.

A portion of the current Site was subject to Stage 2 archaeological assessment in 2004, completed in advance of the development of the Courtice WPCP.

11.1.8.2 Potential Effects on Archaeological and Built Heritage

The Stage 1 Archaeological Assessment of the Site determined that there was an elevated potential for the presence of archaeological resources and that a Stage 2 Archaeological Assessment would be required.

The Stage 2 Archaeological Assessment of the cultivated fields and the unploughed portions of the Site that was carried out identified no new archaeological artifacts, anthropogenically altered soils or sites of significance. There are no significant built heritage features on the Site.

Based on the results of the field assessment and previous studies in and around the Site, it is considered likely that the current Site does not contain significant, intact archaeological or built heritage resources.

A report detailing the activities and results of the Stage 2 Archaeological Assessment was submitted to the Ministry of Culture in mid-May 2009. A letter of concurrence with the findings and recommendations of the report was requested. When the Ministry of Culture issues this letter, it will enter the report into the provincial registry of reports and the project can be considered cleared to proceed.

11.1.8.3 Impact Management

It is possible that even after completion of archaeological testing, deeply buried archaeological resources could still exist within the limits of the proposed Facility. The following measures are recommended:

1. Should human remains be identified during operations, all work in the vicinity of the discovery will be suspended immediately. Notification will be made to the Ontario Provincial Police, or local police, who will conduct a site investigation and contact the district coroner.

Notification must also be made to the Ministry of Culture and the Registrar of Cemeteries, Cemeteries Regulation Unit, Ministry of Small Business and Consumer Services.

2. Should other significant cultural heritage values (archaeological or historical materials or features) be identified during operations, all work in the vicinity of the discovery will be suspended and the Ministry of Culture archaeologist contacted. This condition provides for the potential for deeply buried or enigmatic local site areas that are not typically identified in archaeological field assessments.

11.1.8.4 Conclusions

Based on the results of the Stage 2 Archaeological Assessment and previous studies in and around the Site it is considered likely that the current Site does not contain significant, intact archaeological or built heritage resources.

11.1.9 Traffic

This section summarizes the results of the technical study report titled *Traffic Assessment - Technical Study Report,* prepared for use in the EA Study as well as for other regulatory requirements, for the 140,000 tpy operating scenario (see **Appendix C-10**).

11.1.9.1 Assessment Methodology

The traffic assessment was based on a review of the existing and forecasted a.m. and p.m. road peak hours on a weekday, as this is generally the simultaneous peak for both commuter and site traffic. Potential traffic effects were based on the observed and forecast traffic volumes for both the weekday a.m. and p.m. peak hours. A traffic assessment study of this nature is usually based on the forecasted traffic effects associated with the usual or typical traffic conditions that are to be experienced on a day-to-day basis at the Site during the a.m. and p.m. peak hours.

Trip generation for the Site during the construction period was based on the forecasted construction traffic required to develop a 140,000 tpy Facility, during the three primary construction periods being 2010 (principal activities being earthworks and foundations), 2011 (principal activities being structure steel erection and major equipment delivery) and 2012-2013 (principal activities being installation, piping and electrical work). Trip generation was based on truck and car access to the Site. Construction of the Facility is expected to generate the most traffic in the 2012-2013 period, which would involve the highest level of vehicle access to the Site for primarily passenger vehicles for the construction labour force. The most truck traffic would be generated in the first year of construction.

Trip generation for the Site during the operational period was based on 140,000 tpy of waste processing capacity for the Facility. Trip generation for the remaining uses within the Clarington Energy Business Park (CEBP) was based on Institution of Transportation Engineers (ITE) trip generation rates obtained from the ITE Trip Generation Manual, 8th Edition for corresponding land uses and their sizes.

For the purpose of the traffic assessment, a ten-year horizon period was selected to assess future traffic conditions. The Facility is expected to be operational by 2013, thus a 2023 horizon year reflects an appropriate assessment horizon (10 years from beginning of operations).

11.1.9.2 Potential Traffic Effects

Construction

The Facility is expected to be operational by 2013, with construction starting in 2010. Access to and from the Site during construction and operation is expected to be along Courtice Road, South Service Road and Osborne Road. Future CEBP traffic is expected to utilize both the Courtice Road/Highway 401 interchange and the Holt Road/Highway 401 interchange, with the majority of Site traffic utilizing the former.

Both ramp terminal intersections (Courtice Road/Highway 401) were found to operate acceptably under existing traffic conditions, lane configurations and traffic control. Traffic signals are not warranted at either ramp terminal intersection, and are not expected to be warranted at the time of construction.

Construction of the Facility is expected to generate 44 two-way peak hour trips in the first year, 94 two-way peak hour trips in the second year and up to 122 two-way peak hour trips in the third year. The existing Courtice Road/Highway 401 interchange will accommodate additional traffic associated with construction works. The eastbound left turn at the south ramp terminal intersection is expected to operate at LOS "E" in the p.m. peak hour. The lower LOS is due to growth in background traffic.

Study area intersections are expected to operate at good Levels of Service during construction. Construction generated traffic is not expected to have adverse traffic effects at the ramp terminal intersections and other study area intersections.

Road/pavement improvements may be required to South Service Road and Osborne Road to accommodate future trucks associated with the construction of the Facility, as well as Site-generated trucks once the Facility is operational. Pavement testing along the haul route will be completed by the Region of Durham if the Project is approved to confirm if road reconstruction/pavement improvements are required.

Operations

During operations, the Project is expected to generate up to 34 daily truck trips in the Base Case scenario with a waste throughput of 140,000 tpy. The Facility is expected to generate 18 trucks (inbound and outbound) and 22 cars during the peak hour operating at 140,000 tpy. No traffic control measures are required on the adjacent road network to accommodate traffic during operations of the Facility.

Partial and full build-out of the future CEBP was used in the analysis under 2013 and 2023 traffic conditions. The future CEBP (excluding traffic generated by the Facility) is estimated to generate a total of 2,100 two-way trips during both a.m. and p.m. peak hours once fully developed. Traffic associated with a partial development of the subject lands (Courtice Road to Osborne Road by 2013) was calculated to be in the 800 to 900 vehicles per hour range, or slightly less than 50% of total traffic under the full build-out scenario (2023 horizon year). The Facility, operating at 140,000 tpy, is anticipated to account for approximately 1.9% of the total trips generated in the fully developed CEBP.

Both ramp terminal intersections (Courtice Road/Highway 401) could require traffic signals by the ultimate 2023 horizon year with the full development of the CEBP. With the partial development of the subject lands assumed for the 2013 horizon year, only the south ramp terminal intersection is expected to require traffic signals. Traffic on the westbound approach (off-ramp) at the north ramp terminal intersection is expected to experience delays of up to one minute during the p.m. peak hour with a stop control.

The south ramp terminal is expected to have critical movements in the 2023 horizon year due to traffic associated with the CEBP. Specifically, eastbound left turning traffic and northbound through traffic could experience LOS “F” operations in the p.m. peak hour under the traffic signal control. Widening of Courtice Road to four lanes through the interchange could alleviate the problem, resulting in shorter delays and traffic queues on eastbound and northbound approaches at this intersection.

The northbound left turn lane at the north ramp terminal intersection is expected to carry over 900 vehicles per hour during the p.m. peak hour. The 95th percentile queue on the northbound approach at the north ramp terminal intersection is expected to extend to the south ramp terminal intersection in the p.m. peak hour (2023 horizon year). A loop ramp to accommodate traffic originating from the south and destined to the west (S-W) at this location would alleviate the queuing problem.

In addition, CEBP traffic destined to Highway 401 west will have the flexibility in accessing Highway 401 by diverting to the Holt Road interchange at the east end; however, resulting in minor out-of-way travel (back-tracking). This could result in further reduction of left turning traffic volumes on the northbound approach at the north ramp terminal intersection at Courtice Road. Specifically, approximately 270 northbound left turning vehicles at the north ramp terminal intersection at Courtice Road could potentially be reassigned to the Holt Road interchange, as these trips are generated by the CEBP land uses located east of Osborne Road.

No truck traffic associated with the Project will travel to and from the Site via the potential future Holt Road interchange. Therefore, no truck traffic associated with the Project was modeled to travel to and from the Site via the potential future Holt Road interchange.

All other study area intersections were found to operate at good LOS under 2013 and 2023 traffic conditions.

At the time of preparation of this Technical Study Report, the MTO had developed a conceptual design of the Highway 401/Courtice Road interchange as part of their Highway 407 East Preliminary Design project. The proposed interchange eliminates the N/S-E loop ramp, and replaces it with a directional ramp forming a full Diamond interchange. This conceptual reconfiguration of the interchange along with the proposed realignment of South Service Road may preclude certain roadways from being constructed within the CEBP as identified in the Municipality of Clarington Official Plan. The analysis undertaken as part of this study, assumed the future road network that was provided in the Municipality of Clarington Official Plan (Municipality of Clarington, 2007). A supplementary analysis may be required to incorporate potential changes to the road network due to Highway 401 widening and improvements to the Courtice Road/Highway 401 interchange once designs are finalized.

11.1.9.3 Impact Management Measures

As noted above, road/pavement improvements may be required to South Service Road and Osborne Road to accommodate future trucks associated with the construction of the Facility, as well as Site-generated trucks once the Facility is operational. Pavement testing along the haul route will be completed by the Region of Durham if the Project is approved to confirm if road reconstruction/pavement improvements are required.

No other mitigation is required to address Facility related traffic during construction or operations.

Some traffic control measures (traffic signals, loop ramps, etc.) may be required to the adjacent road network to address future traffic conditions in the CEBP. The proposed Host Community Agreement between Durham and the Municipality of Clarington includes the Region assuming the cost of construction of Energy Drive from Courtice Road to Osborne Road to serve the CEBP.

11.1.9.4 Conclusions

Construction and operations traffic is not expected to have adverse traffic effects at the ramp terminal intersections and other study area intersections.

No traffic control measures are required on the adjacent road network to accommodate traffic during construction and operations of the Facility.

The future total traffic analysis without the development of the CEBP (assuming growth in background traffic based on historical traffic data) revealed acceptable operations at all study area intersections. Traffic control measures including signal changes may be required by the year 2023 with the full build-out of the CEBP.

11.1.10 Economic

This section summarizes the results of the technical study report titled *Economic Assessment - Technical Study Report* prepared for use in the EA Study as well as for other regulatory requirements (see **Appendix C-11**).

11.1.10.1 Assessment Methodology

The initial phase of the economic assessment was a baseline study which described the existing economic environment within the Regions (the Regional Economic Study Area or RESA) and highlighted the business and agricultural activities within 1 km of the Site, or the Local Economic Study Area (LESA).

The Economic Assessment assessed the economic effects of the Project for a Facility of 140,000 tpy, during construction, operations, and post-closure using the following economic, financial, and socio-economic measures and indicators (Table 11-9):

Table 11-9 Economic Assessment Measures and Indicators

Economic and Financial Measures	Indicator	Methodology
Employment levels	• Direct employment • Indirect employment • Induced employment	• Estimated labour force directly hired by Covanta • Indirect employment during construction period: Use of Statistics Canada Input-Output Model multiplier based on 2.84 person-years of employment resulting from $1 million in capital expenditures • Indirect employment during operations period: Use of Statistics Canada Input-Output Model multiplier based on 0.7 indirect jobs are created for every one direct job • Use of Ministry of Agricultural, Food and Rural Affairs multiplier (Ministry of Agricultural, Food and Rural Affairs, 2007), of one induced person-year of employment for every five direct or indirect person-years of employment.
Aggregate wages and salaries	• Wages and salaries	• Estimated wages and salaries identified by Covanta, 2009.
Effects on Property Value	• Property Value	• Review of Property Value Studies (North America and Europe).
Municipal revenues and expenditures	• Tax base • Cost of municipal services • Project expenditures	• Estimated payment in lieu of taxes included in Host Community Agreement. • Estimated use of/demand for municipal services by construction and operational labour force. • Total project expenditures and business case (Covanta 2009, Deloitte and Touche LLP, 2008).
Socio-Economic Measures	**Indicator**	**Methodology**
Effects on existing businesses	• Displacement of businesses and agricultural farms • Disruption to use and enjoyment of businesses and agricultural farms	• Determination of the number of businesses and agricultural farms that would be displaced. • Review of potential physical effects (noise, traffic etc.) of the Project in the LESA.
Business opportunities	• Demand for goods and services	• Estimation of the potential demand for local goods and services based on Covanta proposal (Covanta 2009).

In regards to the terms used above related to employment, direct employment represents the employees that would be hired by the Covanta team to build and/or operate the Facility, indirect employment would be created in businesses and industries that would supply goods and services for the Project and induced employment is generated as direct and indirect employees spend their wages in the community.

11.1.10.2 Potential Economic Effects

Construction

Construction of the Facility is expected to begin in 2010 and continue for approximately three years (30 months), ending in 2013. During construction, the actual number of workers employed and the make-up of those employed would vary over time as the Facility goes through the various construction phases. Peak labour demands are anticipated at 50 full-time employees in 2010, 150 in 2011, and 200 in 2012-2013. On average, it is expected that 300 to 400 person-years (equivalent to a full-time position for one year) of direct employment would be generated over the construction period. Local hiring will be maximized during the construction period providing work for existing tradespersons and labourers within the Region. Trades that could be provided locally include pipefitters, electricians, ironworkers, millwrights and carpenters.

It is anticipated that up to half of the total construction cost of the Facility of $236 million, or up to $118 million, would be spent on locally/Regionally sourced labor, goods and services (Covanta, 2009).

Along with the direct employment associated with onsite construction, capital investment in the Project is expected to generate or sustain an estimated 534 indirect person-years of employment.

During the construction period 167 to 187 person-years of induced employment is expected to be generated or sustained through the purchase of goods and services by the direct and indirect labour force involved in the Project. Examples of the categories of induced jobs which may be created in the RESA include financial services, social services, retail, and transportation.

A summary of the potential person-years of local/regional employment (both total and annual) estimated for the construction period of the Project is as follows (Table 11-10):

Table 11-10 Summary of Potential Person Years of Local/ Regional Construction Related Employment

Employment Type	Estimated Total Person-Years Over Construction Period	Estimated Average Annual Person-Years Construction Period
Direct	300 to 400	120 to 160
Indirect	534	214
Induced	167 to 187	67 to 75
Total	1,001 to 1,121	401 to 449

During the construction period, it is estimated that the average worker wage would be $54 (CDN) per hour. These wages are higher than the average hourly wage rates in Ontario for the construction or utilities sectors of $35.58 and $25.47 respectively (Statistics Canada, Survey of Employment Payrolls and Hours, 2008). Using an average number throughout the construction period of 50 to 200 full-time employees (it is expected the number of workers would vary throughout this period), working an average of 40 hours per week, this represents a total of approximately $5.6 to $22.4 million (CDN) in direct wages and salaries over the 30 to 33 month construction period.

In regards to impacts to the tax base related to the demand for local or regional services during construction, the average annual person-years (401 to 449) of local/regional employment is most likely to be filled by existing local/regional residents and potential new residents in Durham Region and is not expected to result in any increased demands on local or regional services.

No businesses are located within the Site boundary and thus no businesses will be displaced during construction. None of the 11 businesses and three farms currently operating in the Local Economic Study Area will be displaced as a result of the Facility.

It is anticipated that there will be minimal disruption to the use and enjoyment of the businesses and agricultural farms within the local area during construction. Potential disruptions would be caused by physical effects from noise and visual aesthetics, however they are expected to be temporary and short-term in duration.

It is expected that qualified local contractors and businesses would experience an increase in demand for their products and services from the Project during construction.

Operations

During the operational period at the approved design capacity, the Project would directly employ an estimated 33 full-time equivalents or 33 person-years annually. The new employment positions could include: management (~4), safety, environmental compliance, operations (~16, i.e., shift supervisors, control room operator, operations crews), maintenance (~8), refurbishment, back up operations, waste transport, and administration (~5) (Covanta, 2009). Along with the direct employment associated with operations, the Project is expected to generate or sustain an estimated 23 indirect full-time equivalent workers annually. These could be either newly created positions or current positions that are sustained by new demand for services. According to the Covanta proposal submission, $10-14 million a year will be spent on locally/Regionally sourced labor, goods and services during operations. Direct and indirect employment during operations of the Project in the local/Regional area would generate or sustain approximately 11 person-years of induced employment annually. It is expected that qualified local contractors and businesses could see an increased demand for their products and services from the Project during operations.

A summary of the potential person-years of employment estimated for the operational period of the Project is as follows (Table 11-11):

Table 11-11 Summary of Potential Person Years of Local/ Regional Operation Related Employment

Employment Type	Estimated Average Annual Person-Years During Operations
Direct	33
Indirect	23
Induced	11
Total	67

Total annual labour costs, including salaries, wages and benefits, from the Project during operations, are expected to be approximately $5 million per year (Covanta, 2009).

In regards to the potential effect of the Project on the Region of Durham and York Region tax base associated with the cost of the Facility that could be passed onto Regional taxpayers, expenditures during operations of the Facility are anticipated to be $14.67 million per year[1], excluding revenues from electricity, sale of Greenhouse Gas credits, and ferrous and non-ferrous metal recovery. Annual electricity revenues are anticipated to be $8.59 million. This is assuming a fixed power purchase price of 8 cents per kilowatt hour, and a waste throughput of 140,000 tpy. Revenue opportunities may also be available through the sale of carbon credits on carbon markets. If revenues from the sale of electricity, Greenhouse Gas credits, and ferrous and non-ferrous metals are included in the operating costs, it is anticipated that operating costs for the Project will be less than sending the waste to a landfill in Ontario.

In regards to potential effects on property values, recent European experiences indicate that Thermal Treatment Facilities appear to have minimal to no measurable impacts on the value or ability to sell property in areas around such facilities. There are indications that in the local area around Thermal Treatment Facilities there may be a potential short-term effect on property value largely as a result of the perceived effect of waste facilities, which return to normal once it is clear that there are no long-term physical effects. The Project has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the Clarington Energy Business Park, given the investment in infrastructure (road access, district heating and cooling) and depending on the public perception of risk associated with the Facility. Provisions for district heating and cooling have been considered in the design of the Facility and estimates generated in the *Energy and Life Cycle Assessment - Technical Study Report* indicate that the Project could provide for a portion of the heating and cooling requirements for the full build-out of the Clarington Energy Business Park (CEBP). Given the level of investment associated with the Project in infrastructure in the CEBP and the potential availability of district heating and cooling, it is likely that new industries may be attracted to the area strengthening both the local tax base in the Municipality of Clarington and in the Region of Durham.

The property taxes (or payment in lieu of taxes) that would be paid as a result of the Project would be an increase in municipal taxes for the Municipality of Clarington compared to the taxes related to the current land use.

In regards to impacts to the tax base related to the demand for local or regional services during operations, the average annual person-years (160 to 208) of local/regional employment is most likely to be filled by a combination of existing local/regional residents and potential new residents in Durham Region and is not expected to result in any significant increase in demands on local or regional services.

It is anticipated that there will be minimal disruption to the use and enjoyment of businesses and agricultural farms within the local area (1 km) during operations, as no net effects are anticipated from odour, noise, dust, or traffic from the Project during operations. During

[1] May 2008 Durham Business Case evaluation (Report 2008-J-13) conducted by Deloitte & Touche LLP determined that it would cost approximately $16,915,000 a year to operate the facility, assuming a waste throughput of 140,000 tpy. The RFP submission from Covanta identified annual operating costs for the same sized facility at $14,665,000. According to Durham Region Report 2009-J-18 the Covanta submission falls within the scope of the Durham Business Case.

operations, businesses and agricultural farms within 1 km of the Facility will be able to see the majority of the buildings on the Site, and are expected to experience a medium level visual effect. Some potential visual disturbance is already present as the landscape has already been influenced by human activities. Mitigation measures including Facility design and landscaping can reduce the potential effects.

It is expected that qualified local contractors and businesses could experience increased demand for their products and services from the Facility during operations.

Decommissioning/Post Closure

In regards to decommissioning/post closure, the potential cost of decommissioning and person-years of employment required to complete decommissioning/post closure have not yet been determined. While there would potentially be increased employment required for decommissioning in the long-term this would result in elimination of long-term employment positions, decreases in local expenditures and a likely decrease in contributions to local taxes.

It is anticipated that there will be minimal disruption to the use and enjoyment of businesses and agricultural farms within the local area during post-closure activities. Potential disruptions could be caused by physical effects from noise and visual aesthetics.

11.1.10.3 Impact Management

No mitigation measures are required for the majority of potential effects, given that they are largely positive.

The potential for a net effect on property values in the local or regional area from the Project is largely related to the potential ‘perception’ of the Project in the local and regional community. The potential effect on property value based on perception of the Facility would be addressed through the development and implementation of a comprehensive Community Relations Plan.

In regards to the potential effects on the municipal tax base, in addition to the provision of a payment in lieu of taxes, additional mitigation in regards to the provision of municipal services is addressed through the Host Community Agreement approved by the Municipality of Clarington and the Region of Durham. This agreement includes investment by the Region in additional infrastructure both within the Clarington Energy Business Park and surrounding area to serve both businesses/industry and local residents.

The potential for disruption to the use and enjoyment of businesses and agricultural farms within the local area during construction or operations, by physical effects from noise and visual aesthetics, can be addressed in part by the mitigation measures identified as part of the Acoustic and Visual Assessments completed as part of this Environmental Assessment.

11.1.10.4 Conclusions

Overall, the Project is expected to generally have positive net effects on the economic environment within the local and/or regional areas, as defined by the *Economic Assessment - Technical Study Report* for the majority of economic criterion and indicators assessed in this Study. The economic effects of the Project will benefit the local and regional areas through increased employment opportunities, addition of wages, potential growth in various service sectors, and providing a more sustainable economic community base. The Project could also provide some economic benefit to assist in alleviating the effects of the economic downturn in the Region.

There would be minimal potential to disrupt use and enjoyment of local businesses or agricultural farms (located within 1 km of the proposed Site). The only net effects regarding the disruption of use and enjoyment of local businesses within 1 km of the Site would be due to temporary/short-term noise and/or visual effects during construction and due to visual effects during operations both of which would be reduced through proposed mitigation measures.

The provisions of the proposed Host Community Agreement approved by the Municipality of Clarington and the Region of Durham provides direct economic benefit to the Municipality of Clarington in the form of direct investment in local infrastructure (e.g., investment in supporting infrastructure for the CEBP).

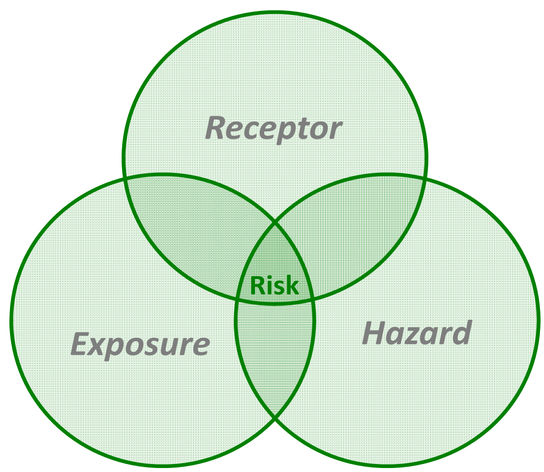
11.1.11 Human Health and Ecological Risk

People are concerned with potential health and ecological effects that could arise from contact with chemicals released to the environment from a Thermal Treatment Facility. Through many years of study and research, government agencies and scientists around the world have developed a process which allows us to understand the movement of chemicals in the environment and whether they may have an effect on people and the ecosystem. This process is called Human Health and Ecological Risk Assessment (HHERA).

All chemicals have the potential to cause effects in people and the ecosystem, but it is the level (or concentration) and the manner (the route) by which people and the ecosystem come into contact with a particular chemical that determines if it may cause harm to health. In order for there to be a potential health risk:

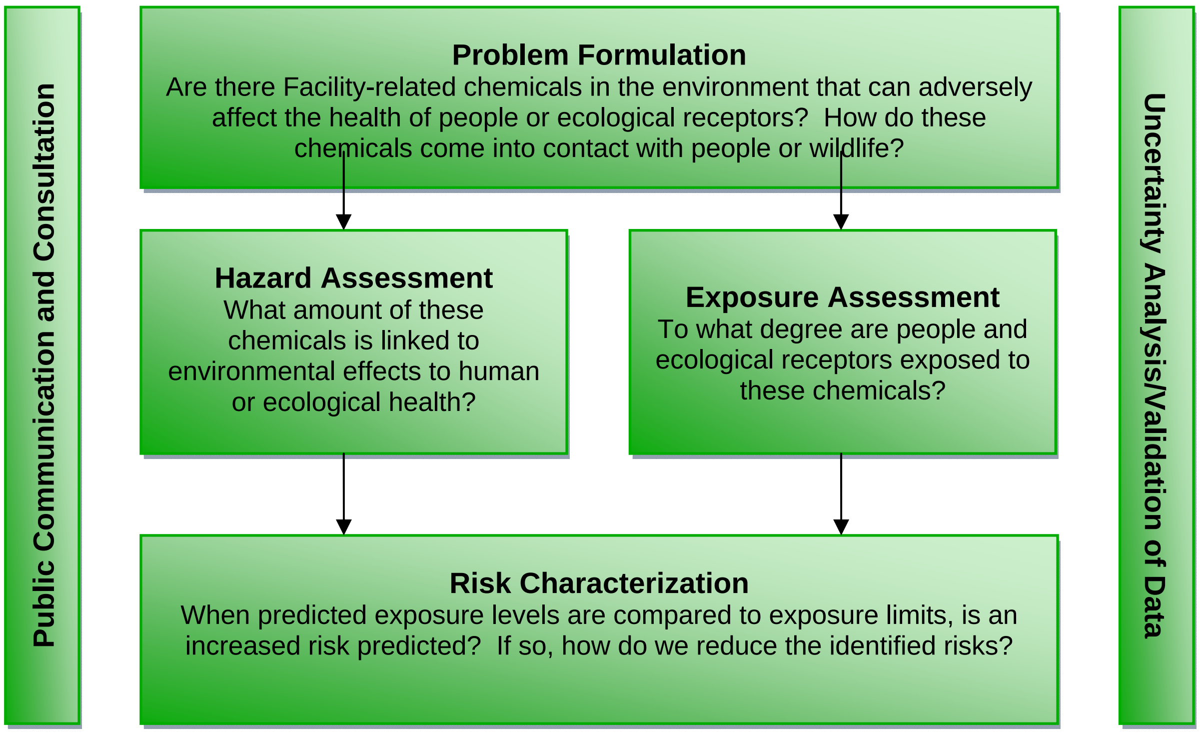
- People or wildlife (Receptor) must be present;
- Receptors must come into contact with chemicals emitted from a Thermal Treatment Facility (Exposure); and,
- Chemicals must be emitted at a high enough level and must be able to cause some adverse health effect (Hazard).

If any one of these three components is missing then there would not be a risk to either human or ecological health.



This section provides a summary of the methodology and key results of the report titled *Human Health and Ecological Risk Assessment (HHERA) - Technical Study Report* that was prepared to evaluate the potential human health and ecological related effects associated with the Facility at the Site located in the Municipality of Clarington. This report will form part of the supporting documentation and materials completed as part of the EA Study. The Technical Study Report is attached as **Appendix C-12**.

The subject risk assessment examined the potential for emissions from the Facility to pose an adverse risk to human and ecological receptors in the short-term and long-term (i.e., after 30 years of operating the Facility). The risk assessment framework used in this Technical Study Report follows the standard methodology, namely, problem formulation, exposure assessment, hazard assessment, and risk characterization as illustrated in the following diagram.



The Site is the property where the Facility is proposed to be located. Currently, it is comprised of undeveloped land which is owned by Durham and located south of Highway 401 within the Municipality of Clarington. The highest level of potential emissions from the Facility would be deposited in an area identified as the Local Risk Assessment Study Area (LRASA). The LRASA extends approximately 10 km in all directions around the Site.

11.1.11.1 Assessment Methodology

In the **Problem Formulation** step in the assessment, information is gathered and interpreted which focuses the work on the primary areas of concern for the Study. At this step the nature and scope of the risk assessment are formulated which ensures that the HHERA is directed at the key areas of concern related to Facility emissions. In the **Exposure Assessment** step, the means by which people and ecological "receptors" would contact a chemical in the environment, or "exposure pathways" are determined together with the means by which a chemical enters the body, or the "exposure route". The exposure assessment predicts the rate of exposure of identified receptors to COPC via the various exposure pathways identified at the problem formulation step. In the **Hazard or Toxicity Assessment** step, "toxicity reference values" or "exposure limits" for COPC were determined. There is a specific dose and duration of exposure necessary to produce a toxic environmental effect in a given receptor. At the **Risk Characterization** step the exposure and toxicity assessments were integrated to provide a conservative estimate of human health and ecological risk for the receptors assessed at the various exposure scenarios. Potential risks were characterized through a comparison of the estimated or predicted exposures from all pathways, from the exposure assessment, with the exposure limits identified in the hazard assessment.

In order to assess potential risks, receptor locations (both human and ecological) within the LRASA were selected. There are a variety of land uses within the LRASA, including light industrial, agricultural, rural, urban residential and natural areas. The final list of receptor locations incorporated land use, air modeling results and input from various sources such as open houses, EA studies, official plans and online and government sources.

The primary route of human exposure to Facility-related air emissions would be through inhalation (breathing). These exposures were evaluated in the human health risk assessment at 309 locations within the LRASA.

Additional potential routes of exposure were considered for chemicals which deposit in the environment and move into other environmental media (e.g., soil, water, and food). This process is called a multi-pathway risk assessment which evaluates the potential for humans and wildlife to be exposed to chemicals from soil, water and food. One hundred and thirty-three of the 309 receptor locations were selected for use in the multi-pathway human health risk assessment. In the ecological risk assessment, 22 of the 309 receptor locations were selected for use in the multi-pathway ecological risk assessment.

There were 10 project scenarios that were assessed in the HHERA as follows (Table 11-12):

Table 11-12 HHERA Scenarios Assessed

Project Scenarios	Case	Description
Existing conditions	Baseline Case	Evaluation of the Baseline Case involved the quantitative (i.e., measurable) assessment of existing conditions in the assessment area. Health risks were assessed using measured concentrations of COPCs in air and in other environmental media (e.g., soil, water, food). No facility-related emissions or exposures were monitored in this assessment case as this case was completed prior to construction and operation of the Facility.
	Baseline Traffic Case	Evaluation of the Baseline Traffic Case involved the quantification of existing offsite vehicle traffic emissions prior to the start-up of the Facility.
Construction	Construction Case	Evaluation of the Construction Case involved the qualitative (i.e., based only on qualities not numerical data) assessment of the potential health risks associated with air emissions during construction and commissioning of the Facility.
Operational Cases	Project Alone Case	Evaluation of the Project Alone Case during operation of the Facility involved the quantitative (i.e., measurable) assessment of COPC emissions from the Facility.
	Project Case (Baseline + Project)	Evaluation of the Project Case during operation of the Facility involved the quantitative (i.e., measurable) assessment of COPC emissions from the Facility in combination with existing/baseline conditions.
	Process Upset Case	Evaluation of the Process Upset Case involved the quantitative (i.e., measurable) assessment of COPC emissions from the Facility operating at upset conditions (i.e., facility start-up and shutdown) for 20% of the year. For the remaining 80% of the year, the Facility was assumed to be operating at normal conditions.
	Process Upset Project Case (Baseline+ Upset Conditions)	Evaluation of the Process Upset Project Case involved the quantitative (i.e., measurable) assessment of COPC emissions from the Facility (at both 140,000 tpy and 400,000 tpy) operating at upset conditions for 20% of the year. For the remaining 80% of the year, the Facility was assumed to be operating at normal conditions. These upset conditions were evaluated in combination with existing/baseline conditions
	Traffic Case	Evaluation of the Traffic Case involved the assessment of emissions from offsite and onsite traffic associated with the Facility and baseline traffic conditions in combination with onsite stationary source emissions for the Facility.
	Future and Existing Conditions Case	Evaluation of the Future and Existing Conditions Case involved the qualitative (i.e., based only on qualities, not numerical data) evaluation of the Facility emissions in combination with future or existing sources of air emissions.
Decommissioning	Decommissioning (Closure Period) Case	Evaluation of the Decommissioning Case involved the qualitative (i.e., based only on qualities not numerical data) assessment of air emissions related to the removal of infrastructure and rehabilitation of the Site.

11.1.11.2 Potential Effects on Human and Ecological Health

A qualitative assessment of the "construction case" was undertaken for both human and ecological receptors. Typical construction activities would entail site preparation (clearing, grubbing and grading), major equipment delivery and structural steel erection and process equipment installation. In this case, it was determined that vehicle and dust emissions would not be different from those occurring at any medium-sized construction site in Ontario. Standard dust suppression and construction scheduling would mitigate potential effects.

Overall, the results of the human health risk assessment indicated that there would be no adverse health effects to humans exposed either by way of inhalation or via other environmental media, to emissions from the Facility. Further, it was determined that there would be no adverse health effects from exposure to emissions from the operation of vehicles directly related to facility operations. Similarly, the ecological risk assessment determined that there would be no adverse ecological effects associated with Facility emissions.

11.1.11.3 Net Effects Monitoring and Environmental Management

There would be no effects monitoring required beyond those identified in Section 11.1 Air Quality, concerning the protocol and programs to manage air emissions from the Facility.

11.1.12 Summary of Potential Environmental Effects

The criteria and indicators used in the assessment, together with the rationale for their use, are presented in the following Table 11-13. The potential effects assessment of the Undertaking at the approved design capacity scenario (140,000 tpy) is provided in Table 11-14, for the construction of the Facility and Table 11-15 for Facility operations.

Table 11-13 Criteria, Indicators and Rationale

Criteria	Indicators	Rationale & Technical Report
Physical Environment		
Effects on Air Quality (*Construction Case*)	Emissions from construction equipment and associated vehicle traffic. Dust emissions associated with land clearing, ground excavation, cut-and-fill operations and equipment traffic.	The potential effects of emissions to air during the construction and operation of the Facility need to be understood and appropriately mitigated. The potential effects of emissions to air will depend on the magnitude of the Facility emissions, physical and chemical properties of the contaminants, physical characteristics of the emissions sources (i.e., stack height, building wake effects, vehicle types) local meteorological conditions and existing (ambient) air quality in proximity to the Facility. Potential nuisance effects associated with the Facility (including odour) may disturb activities and uses of properties/facilities in the vicinity of the Site. **Source: *Air Quality Assessment – Technical Study Report***
Effects on Air Quality (*Operation Case*)	Ambient air quality in proximity to the Site considering ambient air quality criteria. Facility emissions considering applicable air quality criteria. Incremental change in O_3 precursor emissions Incremental contribution of the Facility to total Ontario annual GHG emissions. Odour emissions and offsite detectability.	
Effects on Surface Water (*Construction and Operation Cases*)	Location and characteristics of existing water courses/receiving water bodies. Quantity and characteristics of storm water generated. Quantity and characteristics of process water and sanitary waste generated (operations only).	The construction and operation of the Facility may alter existing soil characteristics of local recharge areas. Facility construction and/or operations may affect local water courses (runoff volumes, erosion, flooding potential). Process water and sanitary waste generated as a result of operations may affect water quality. **Source: *Surface Water and Groundwater – Technical Study Report***
Effects on Ground Water (*Construction Case*)	Local groundwater characteristics and conditions.	Potential requirements to dewater during

Criteria	Indicators	Rationale & Technical Report
		construction could have an effect on local groundwater conditions. **Source: *Surface Water and Groundwater – Technical Study Report***
Effects on Soils (*Construction Case*)	Characteristics of existing soils. Soil quantities (erosion of soil)	Construction of the Facility will require soil excavation and/or removal or stockpiling and may lead to soil loss through wind or water erosion of disturbed soil. **Sources: *Geotechnical Assessment – Technical Study Report* and *Surface Water and Groundwater – Technical Study Report***
Noise and Vibration Effects (*Construction and Operation Cases*)	Existing ambient acoustic environment. Predicted noise and vibration effects during both construction, then operation of the Facility.	Potential nuisance effects associated with the construction and operation of the Facility (including noise and vibration) may disturb activities and uses of properties/facilities in the vicinity of the Site. **Source: *Noise and Vibration Assessment – Technical Study Report***
Visual Effects (*Construction and Operation Cases*)	Predicted visual effects associated with Facility construction. Predicted visual effects of the Facility itself.	Potential nuisance effects associated with the construction and operation of the Facility (including visibility and lighting) may disturb activities and uses of properties/facilities in the vicinity of the Site. **Source: *Visual Assessment – Technical Study Report***
Biological (Natural) Environment		
Loss/Disruption to Terrestrial Ecosystems (*Construction and Operation Cases*)	Presence of populations of species of special concern, threatened and/or endangered species in the area potentially affected by both construction and operation of the Facility. Presence of areas of Natural and Scientific Interest, PSWs or ESAs potentially affected by both construction and operation of the Facility.	Proximity of the Facility to sensitive environmental features, habitats or populations of species of special concern, threatened and/or endangered species could result in potential effects during construction and operation of the Facility. Presence of wildlife within the Site could result in potential effects during construction and operation of the Facility.

Criteria	Indicators	Rationale & Technical Report
	Presence of significant wildlife habitat potentially affected by both construction and operation of the Facility. Presence of wildlife potentially affected by both construction and operation of the Facility through disturbance, habitat loss or death. Extent of woodlands/wetlands to be removed further to construction of the Facility (Construction Case only). Presence of migratory birds and habitat potentially affected by both construction and operation of the Facility through disturbance, habitat loss or death.	**Source: *Natural Environment Assessment – Technical Study Report***
Loss/Disruption to Aquatic Ecosystems (*Construction Case and Operation Case*)	Presence of sensitive fish habitat in the area potentially affected by both construction and operation of the Facility Presence of species at risk potentially affected by both construction and operation of the Facility.	Proximity of the Facility to sensitive environmental features could result in effects during construction and operation of the Facility. **Source: *Natural Environment Assessment – Technical Study Report***
Social and Cultural Environment		
Compatibility with Existing and Planned Land Uses (*Construction and Operation Cases*)	Potential for disruption to use and enjoyment of residential properties. Potential for changes in community character. Potential for disruption to use and enjoyment of public facilities or institutions. Potential for disruption to use and enjoyment of cultural and recreational resources. Compatibility with existing land use designations and proposed land use changes (Operation Case only).	Potential nuisance effects associated with the construction and operation of the Facility may disturb the daily activities and uses of residential properties, public facilities or institutions, cultural and recreational resources. Disturbances could result from noise, dust, litter, odours, light, visibility and traffic congestion. The construction and operation of the Facility could actually or perceptually affect community character and cohesion based on the physical characteristics, social stability and attractiveness of the community and the patterns of social interaction within the community around the Site.

Criteria	Indicators	Rationale & Technical Report
		Existing land use designations and/or proposed changes in existing land use in the vicinity of the Site may be incompatible with Facility operations. **Source: *Social/Cultural Assessment – Technical Study Report***
Loss of significant heritage and/or archaeological resources (*Construction Case)*	Location and characteristics of heritage and archaeological sites and features	The construction of the may result in disturbance or loss of a significant heritage or archaeological features. **Source: *Stage 2 Archaeological Assessment and Built Heritage Assessment Technical Study Report***
Disruption to local traffic networks (*Construction and Operation Cases*)	Existing traffic volumes and projected traffic volumes generated by the Facility. Future traffic volumes considering development of the Clarington Energy Business Park.	Increased traffic volumes resulting from the construction and operation of the Facility could disturb the overall traffic flow along the proposed haul route and reduce road capacity. The construction and operation of the Facility may result in the need for upgrades and/or alteration along the proposed haul route either under current conditions or considering future development in the area. **Source: *Traffic Assessment – Technical Study Report***
Economic Environment		
Effects on Employment (*Construction and Operation Cases*)	Direct, indirect and induced employment numbers and characteristics.	The construction and operation of the Facility has the potential to create increased direct and indirect employment opportunities. New opportunities may be created for local businesses/suppliers. Wages and salaries earned by those employed by the construction and operation of the Facility have the potential to increase induced employment in the local area associated with the expenditures of Facility employees on personal goods and services.
Aggregate wages and salaries (*Construction and Operation Cases*)	Wages and salaries.	
Effects on Property Value (*Construction and Operation Cases*)	Property Values.	
Effects on the Municipal Tax Base (*Construction and Operation Cases*)	Considering the tax base, potential cost for provision of municipal services related to the project and project expenditures.	
Effects on existing businesses (Construction and	Potential for disruption to use and enjoyment of	

Criteria	Indicators	Rationale & Technical Report
Operation Cases)	businesses and agricultural farms.	The construction and operation of the Facility may affect property values in the vicinity of the Site. The construction and operation of the Facility has the potential to affect municipal (local and Regional) revenues from the property it occupies. The tax base can be affected by the net cost of the construction and operation of the Facility and other potential costs outside of construction and operation that is allocated to taxpayers. The construction and operation of the Facility has the potential to affect some types of businesses located in the vicinity of the Facility, which may suffer financial losses due to the potential nuisance effects. A large capital project can create new opportunities for local businesses. **Source: *Economic Assessment – Technical Study Report***
Business opportunities (Construction and Operation Cases)	Demand for goods and services.	
Human Health		
Risk to Human Health due to Construction-related Emissions (*Construction Case*)	Qualitative assessment of dust and vehicle emissions during site preparation, structural steel erection, major equipment delivery and process equipment installation.	Potential emissions to air from Facility construction and, more critically, from the Facility itself during operations through various routes of exposure (air inhalation, soil, water and food) may affect the health of human and ecological receptors. The location of receptors relative to the Facility will be important to the evaluation of the potential effects. **Source: *Site Specific Human Health and Ecological Risk Assessment – Technical Study Report***
Chemical Risk to Human Health due to Emissions during Operation of the Facility (*Operation Case*)	The hazard to human health related to the inhalation of both carcinogenic and non-carcinogenic chemicals of potential concern (COPC) resulting from the Facility emissions during normal as well as "upset" operating conditions in combination with existing/baseline conditions. The hazard to human health related to exposure, via environmental media including food, water and soil, to elevated concentrations of both carcinogenic and	

Criteria	Indicators	Rationale & Technical Report
	non-carcinogenic COPC from Facility emissions during both normal and "upset" operating conditions in combination with existing/baseline conditions. The hazard to human health related to the exposure to criteria air contaminants	
Ecological Risk due to Construction-related Emissions. (*Construction Case*)	Qualitative assessment of dust and vehicle emissions during site preparation, structural steel erection, major equipment delivery and process equipment installation.	Potential emissions to air from Facility construction and, more critically, from the facility itself during operations through various routes of exposure (air inhalation, soil, water and food) may affect the health of ecological receptors. The location of receptors relative to the Facility will be important to the evaluation of the potential effects. **Source: *Site Specific Human Health and Ecological Risk Assessment – Technical Study Report***
Chemical Ecological Risk due to Facility Emissions. (*Operation Case*)	Ecological risk associated with exposure to COPC in emissions from the facility considering operations under both normal and "upset" operating conditions and in combination with existing/baseline conditions.	

Table 11-14 Summary of Potential Effects, Impact Management and Net Effects During Construction

Criteria	Indicators	Potential Effects	Impact Management	Net Effects	Environmental Management
Physical Environment					
Effects on Air Quality	• Emissions from construction equipment and associated vehicle traffic. • Dust emissions associated with land clearing, ground excavation, cut-and-fill operations and equipment traffic.	• Intermittent vehicle exhaust emissions during typical daylight working hours over the estimated 30-month construction period. • Intermittent dust emissions due to normal construction activities over the course of the 30-month construction period.	• Employment of controlled entrances and exits at the construction site to minimize the offsite tracking of mud. • Temporary and permanent grassing in disturbed areas. • Dust control during dry periods. • Possible implementation of an idling protocol as required. • Adherence to an equipment maintenance program.	• Emissions during Facility construction would be the same as any other medium-sized construction site in southern Ontario.	• Ambient air quality monitoring for particulate matter would be undertaken to monitor the effectiveness of the mitigation measures.
Effects on Surface Water	• Location and characteristics of existing water courses/receiving water bodies. • Quantity and characteristics of storm water generated. • Quantity and characteristics of process water and sanitary waste generated.	• No watercourses are located onsite and therefore none would be affected. • Potential for increased surface water overland flow during construction into nearby drainage swales which convey runoff to Tooley Creek approximately 1000 m to the west. • Potential increase in erosion and sedimentation.	• Construction phase drainage would route stormwater from throughout the site to a stormwater sedimentation pond and to the extent feasible, maintain existing drainage routes. Permanent SWM ponds may be constructed early to reduce need for sedimentation ponds. • Use of perimeter ditching and site grading as well as silt fencing around forested areas to isolate runoff. • Use of setback transition use areas and erosion control fencing along watercourses. • Erosion and sediment controls (ESC) would be implemented during the construction phase to reduce potential soil loss and runoff velocities. • During the construction phase, stormwater would be routed via conveyance swales and/or stormsewers draining catchbasins to a SWM pond in the southwest corner of the Site. • The pond would discharge to the CN Rail swale and stormwater would subsequently be conveyed to Tooley Creek. • In addition to the pond, lot level, and conveyance controls such as surface stabilization measures, sediment traps, and swales enhanced with rock check dams would also be employed. • Grading plans would be designed to maintain existing drainage patterns which would ensure all captured stormwater would be routed through SWM features.	• No net effect.	• None required
Effects on Ground Water	• Local groundwater characteristics and conditions.	• Potential to encounter groundwater during excavation for the Facility which would require dewatering activities.	• Dewatering and excavation pumping is expected in order to establish a sufficiently dry environment to	• No net effect.	• A series of groundwater monitoring wells may be installed within the Site to assess the Facility's effects on both groundwater

			construct the Facility foundations.		quantity and quality during construction.
Effects on Soils	• Characteristics of existing soils. • Soil quantities (erosion of soil etc.).	• Potential risk for soil loss through wind and water erosion during construction.	• Topsoil and subsoil salvage and storage. • Apply erosion and sedimentation control measures (also described in surface water).	• Minimal net effects.	• None required.
Noise and Vibration Effects	• Existing ambient acoustic environment. • Predicted noise and vibration effects during construction of the Facility.	• Ambient noise ranging from approximately 48 to 51 dBA is dominated by traffic noise (e.g., Highway 401, Courtice Road); the sounds of nature (e.g., birds, insects, rustling trees and grasses); and, local industry. • Potential of increases in short-term construction related noise levels over ambient during the structural assembly of the Facility associated with pile driving activities (if required); and increased short-term (i.e., 1-hour) offsite vehicle traffic.	• Pile driving effects could be reduced through alternative technologies (e.g., vibratory pile driving), controls, and scheduling. • Construction vehicle traffic is predicted to be acceptable against applicable criteria, but short-term (i.e., 1-hour) effects during peak demand are possible. These peaking issues can be reduced through scheduling and planning of vehicle trips.	• Short-term construction related net effects would include noise levels associated with pile driving (if required) and increased short-term offsite vehicle traffic.	• A monitoring program and contingency plan could be implemented to address any issues that may arise during the construction and post-closure periods of the Facility.
Visual Effects	• Predicted visual effects associated with Facility construction.	• Potential for visual effects associated with construction would be within approximately 1 km of the Site and are anticipated to be minimal and temporary in nature. • Potential short term construction related effects could include site clearing, grubbing, and associated ground disturbance. • Receptors further from the Site (beyond 1 km) would remain largely unaffected by activities during construction.	• Staging of construction activities. • Timely removal of construction debris.	• Short-term construction-related net effects would include visual disturbance within approximately 1 km of the Site.	• A monitoring program and contingency plan could be implemented to address any issues that may arise during the construction of the Facility.
Biological (Natural) Environment					
Loss/Disruption to Terrestrial Ecosystems	• Presence of populations of species of special concern, threatened and/or endangered species in the area potentially affected by Facility construction. • Presence of areas of Natural and Scientific Interest, PSWs or ESAs potentially affected by Facility construction. • Presence of significant wildlife habitat potentially affected by Facility construction. • Presence of wildlife potentially affected by Facility construction through disturbance, habitat loss or death. • Extent of woodlands/wetlands to be removed by Facility construction. • Presence of migratory birds and habitat potentially affected by Facility construction through disturbance, habitat loss or death.	• No populations of species of special concern threatened and/or endangered species potentially affected by construction activities. • No Areas of Natural and Scientific Interest, PSWs or ESAs potentially affected as they are located sufficient distance from the Site. • No significant wildlife habitat potentially affected. • All wildlife are common species and would relocate to undisturbed areas nearby. • No woodlands or wetlands would be affected; however, some existing hedgerows and a weeping willow tree would likely be removed. . • No bird species of significance or concern were observed on the Site. However, literature and regulatory agencies indicate potential habitat in the area for the Chimney Swift and the Red-headed woodpecker. • No other habitat of significance is located on Site.	Although potential effects to local wildlife and habitat are anticipated to be minimal, the following mitigation measures would further minimize any potential effects: • Protective protocols to avoid killing or harming wildlife during Facility construction. • Wildlife corridor along the entire east-west length of the Site may be established to enhance wildlife movement. • Native tree and shrub species could be planted and existing species allowed to grow without disturbance providing additional habitat. • Undertake a pre-construction survey to assess bird nesting activity prior to clearing and grubbing. • Habitat enhancement for Chimney Swifts if present onsite and once construction has been completed, compensation for the loss of hedgerow by incorporating native shrubs and trees into landscaping for the Facility.	• Minimal net effect on terrestrial ecosystems.	• None required
Loss/Disruption to Aquatic Ecosystems	• Presence of sensitive fish habitat in the area potentially affected by Facility construction. • Presence of species at risk potentially affected by Facility construction.	• No permanent watercourses are located on the Site.	• None required.	• No net effect.	• None required.
Social and Cultural Environment					
Compatibility with Existing and Planned Land uses	• Potential for disruption to use and enjoyment of residential properties.	• There are two (2) occupied and one abandoned residence within 1 km of the Site.	• Mitigation of noise/vibration during construction includes:	• Minimal net effects in short-term to closest social/cultural receptors	• Formation of a Thermal Treatment Facility SLC for the construction/operations period.

	• Potential for changes in community character. • Potential for disruption to use and enjoyment of public facilities or institutions. • Potential for disruption to use and enjoyment of cultural and recreational resources.	Some potential exists for short-term/temporary effects associated with noise, dust and visual effects. No potential effects anticipated related to traffic as the residences are not located along the haul routes. Minimal to no potential exists for effects of odour, litter and vermin/vectors during construction as no waste materials would be onsite. • Nearest existing and/or planned built-up community (residential area) is located over 3.2 km from the Site. There is a scattering of residences in the Hamlet of Darlington over 1 km to the north of the Site. No communities are located along the haul route. Distance to local communities results in minimal to no potential effect related to odour, noise, dust, vermin/vectors, litter or traffic. Minimal potential for short-term visual effects in the closest residential community (Hamlet of Darlington). • There are two (2) public facilities/institutions located within 1 km of the Site, the Durham Regional Police Service Unit and the Courtice WPCP. Some potential exists for short-term/temporary effects associated with noise, dust and visibility. No potential effects anticipated related to traffic as the facilities/institutions are not located along the haul routes. Minimal to no potential exists for effects of odour, litter and vermin/vectors during construction as no waste materials would be onsite. • There are three (3) cultural/recreational resources located within 1 to 2 km from the Site, the Waterfront Trail, Darlington (Hydro) Sports Fields and Darlington Provincial Park. Some potential exists for short-term/temporary effects associated with noise, dust and visual effects. No potential effects anticipated related to traffic as the cultural/recreational resources are not located along the haul routes. Minimal to no potential exists for effects of odour, litter and vermin/vectors during construction as no waste materials would be onsite.	o Reduction of Pile driving effects through alternative technologies, controls, and scheduling. o Reducing peak construction traffic effects through scheduling and planning of vehicle trips. • Dust control during construction can be accomplished through a number of physical and operational methods such as construction exits, timely revegetation, watering, and staging of work. • It is not possible to eliminate visual effects within 1 km of the Site during construction however, the visual effects during construction are expected to be of short duration. • No traffic mitigation measures required for Facility construction prior to full build out of the CEBP. The full development of the CEBP would drive the need for road network improvements.	related to noise/vibration, dust and visual effects.	• Development and implementation of a CRP through which Durham, York, and Covanta staff would relate to the local community, including advance notification to local authorities and residents near the Facility of any unusual noises or activities (e.g., pile driving, steam blows) or other events that may be of concern to the local community during the construction phase. The plan would also establish contacts and procedures for providing accurate and timely information to the community in the event of an unforeseen incident that may cause concern or impact upon the community. • Development and implementation of a community complaints system for construction.
Loss of significant heritage and/or archaeological resources	• Location and characteristics of heritage and archaeological sites and features.	• Stage 2 Archaeological Assessment identified no archaeological artifacts or sites of significance on the Site. • There are no significant built heritage features on or near the Site.	• No mitigation required to address identified potential effects. • Deeply buried archaeological resources could still exist and standard conditions regarding discovery of human remains and/or other cultural heritage values would apply.	• No net effect.	• None required.
Disruption to local traffic networks	• Existing traffic volumes and projected traffic volumes generated by Facility construction. • Future traffic volumes considering development of the CEBP.	• Operation of local road network acceptable under existing traffic conditions based on MTO guidelines. • Construction would potentially result in peak hourly traffic volumes of 37 inbound/outbound vehicles at the beginning of the construction period (2010) and 122 inbound/outbound vehicles at the end of the construction period (2012-2013).	• Road/pavement improvements may be required to the South Service Road and Osborne Road to accommodate construction vehicles. No other mitigation is required to address Project related traffic during operations.	• No net effect.	• None required.

		• No traffic control measures are required on adjacent road network to accommodate traffic during construction of the Facility. Road reconstruction/pavement improvements may be required for the South Service Road between the 401 interchange and Osborne Road as well as the section of Osborne Road between the South Service Road and the future site access.			
Economic Environment					
Effects on Employment	• Direct, Indirect and Induced employment numbers and characteristics.	• Peak labour demands during construction are potentially 50 full time positions in 2010, 150 in 2011 and 200 in 2012-2013, and in the order of 300 to 400 person-years of direct employment. • Capital investment in Facility construction could potentially generate an estimated 534 person-years of indirect local/regional employment. • During construction, between 167 and 187 person-years of induced local/regional employment is expected to be generated through the purchase of goods and services by the directly and indirectly employed.	• None required.	• Positive net effect through increased full-time employment (person-years of Direct, Indirect and Induced employment).	• None required.
Aggregate wages and salaries	• Wages and salaries.	• Total annual labour costs (salaries and wages) during construction would potentially be $5.6 to $22.4 million per year.	• None required.	• Positive net effect based on approximately $5.6 to $22.4 million in new wages and salaries for Direct Employment.	• None required.
Effects on Property Value	• Property Values.	• European experiences indicate that Thermal Treatment Facilities appear to have no impact on the value or salability of property in areas around such facilities. • Experience in Ontario indicates that around waste management facilities there may be a potential short-term effect on property value, but there is no evidence of potential long-term effects. Such effects are often the result of the 'perceived effect' of waste facilities. • Construction of the Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating and cooling) associated with the Facility.	• Development and Implementation of a Community Relations Plan (CRP) to address issues of 'perception' regarding the Facility, including provision of information on Facility emissions to the public through a variety of means.	• No net effect.	• Development and implementation of a CRP through which Durham, York, and Covanta staff would relate to the local community, including advance notification to local authorities and residents near the Facility of any unusual noises or activities (e.g., pile driving, steam blows) or other events that may be of concern to the local community during the construction phase. The plan would also establish contacts and procedures for providing accurate and timely information to the community in the event of an unforeseen incident that may cause concern or impact upon the community.
Effects on the Municipal Tax Base	• Considering the tax base, potential cost for provision of municipal services for the Facility.	• According to the Host Community Agreement between the Region of Durham and the Municipality of Clarington the payment in lieu of taxes will be approximately $650,000 per year. The municipal taxes will be a net gain for the Municipality of Clarington. • Durham Region will provide additional infrastructure both within the CEBP and surrounding area. • Development of CEBP will increase tax base for Municipality of Clarington and Durham Region. • Local/regional employment during construction is likely to be filled by existing local/regional residents and is not expected to results in any	• In order to mitigate the effects of the Facility on the Local Tax base in Clarington, the approved Host Community Agreement between Durham and the Municipality of Clarington includes the Region assuming the cost of: o Establishment of a hazardous waste depot to serve Clarington residents; o Construction of Energy Drive from Courtice Road to Osborne Road as a Type "C" arterial road complete with all applicable services;	• Positive net effect in regards to potential investment by Durham in infrastructure near the Facility and in payment in lieu of taxes. •	• None required.

		increased demands on local or regional services. • Some investment is potentially required during the construction period to improve the local road network. • The proposed Capital Costs fall within the scope of the May 2008 Durham Business Case evaluation undertaken by Deloitte and Touche LLP.	o Construction of a SWM Facility to serve the Energy Park; o Construction of a segment of paved asphalt waterfront trail from Courtice Road to the eastern limit of Durham's lands south of the Courtice WPCP; o Transfer of 22 acres of surplus land on the west side of the Courtice WPCP to Clarington; and, o Commencement of the EA for municipal servicing the east Bowmanville Science Park. o		
Effects on existing businesses	• Potential for disruption to use and enjoyment of businesses and agricultural farms.	• Minimal potential to disrupt use and enjoyment of local businesses or agricultural farms (field crops) due to temporary/short-term noise and/or visual effects during construction.	• Mitigation measures outlined to address potential Noise and Visual Effects as noted above.	• Minimal net effect.	• Environmental management measures outlined to address potential Noise and Visual Effects as noted above.
Business opportunities	• Demand for goods and services.	• During construction it is estimated that potentially up to $118 million would be spent on local/regionally sourced labour, goods and services.	• None required.	• Positive net effect through increased demand for local goods and services.	• None required.
Human Health and Ecological Risk					
Risk to Human Health due to Construction-related Emissions.	• Qualitative assessment of dust and vehicle emissions during site preparation, structural steel erection, major equipment delivery and process equipment installation.	• Intermittent vehicle exhaust emissions during typical daylight working hours over the estimated 30-month construction period. • Intermittent dust emissions due to normal construction activities over the course of the 30-month construction period.	• Refer to "Effects on Air Quality" above.	• Refer to "Effects on Air Quality" above.	• Refer to "Effects on Air Quality" above.
Ecological Risk due to Construction-related Emissions.	• As above.	• As above.	• Refer to "Effects on Air Quality" above.	• Refer to "Effects on Air Quality" above.	• Refer to "Effects on Air Quality" above.

Table 11-15 Summary of Potential Effects, Impact Management and Net Effects During Operations

Criteria	Indicators	Potential Effects	Impact Management	Net Effects	Environmental Management
Physical Environment					
Effects on Air Quality	• Ambient air quality in proximity to the Site considering ambient air quality criteria. • Facility emissions considering applicable air quality criteria. • Incremental change in ground level ozone (O_3) precursor emissions • Incremental contribution of the Facility to total Ontario annual GHG emissions. • Odour emissions and off-Site detectability	• Potential for the deterioration of ambient air quality downwind of the Site due to the elevation of concentrations of contaminants above applicable air quality criteria. • Potential for emissions to air from the Facility to exceed applicable contaminant emission limits for municipal waste incinerators. • Potential for an incremental contribution to ground-level ozone concentrations due to increased NOx and VOC emissions from the Facility. • Potential for an incremental contribution to total Ontario and total Canadian GHG emissions. • Potential for offsite detection of odour due to Facility operations.	• The following emissions control equipment would be incorporated into the design of the Facility: o very low NOx (VLN) system in the Facility's stoker; o SNCR for additional NOx control; o activated carbon injection after the economizer for mercury and dioxin/furan control; o acid gas scrubber for the removal of gases such as SO_2 and HCl; and, o a fabric filter baghouse to remove solid particulate matter. • The application of design and operations pre-processing odour control measures such as enclosed loading, negative air pressure inside the facility and fully-enclosed feedstock delivery trucks.	• Downwind ambient concentrations of air contaminants from the Facility are predicted to meet all applicable ambient air quality criteria during normal Facility operation. During "process ups" (including start-up and shut-downs) downwind concentrations of all contaminants from Facility emissions are predicted to meet applicable ambient air quality criteria. • Emissions at the stack would meet or would be below the air contaminant limits placed on municipal waste incinerators in accordance with MOE Guideline A-7 (2004). • The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions determined further to the air quality modeling. • The incremental contribution of the Facility to total Ontario annual GHG emissions would be 0.06% and the incremental contribution to total Canadian annual GHG emissions would be 0.018% based on projected 2010 GHG emissions levels. • There is not expected to be adverse effects at offsite locations from Facility-based odour.	• Provision of a CEM system to monitor and record: o The baghouse outlet for opacity, moisture, CO, O_2, NOx, SO_2, HCL and HF. Opacity measurements would be used to as the filter bag leak detection system. o The economizer outlet for O_2, SO_2 and CO. o Flue gas temperatures at the inlet of the boiler convection section and at the baghouse inlet. o The temperature and pressure of the feedwater and steam for each boiler. o The mass flow rate of steam at each boiler. • A long-term continuous dioxins sampling device would be installed to monitor the adsorption of dioxins onto the exchangeable adsorption-resin-filled cartridge. • Emissions (stack) testing and monitoring protocol as required for the C of A under the EPA. • NPRI emissions reporting that would entail a combination of monitoring or direct measurement, mass balance, process-specific emissions factors and engineering estimates. • Proposed ambient air quality monitoring in the immediate vicinity of the Facility for a 3-year period.
Effects on Surface Water	• Location and characteristics of existing water courses/receiving water bodies • Quantity and characteristics of storm water generated • Quantity and characteristics of process water and sanitary waste generated	• Potential for increase in stormwater runoff to receiving surface water and groundwater resources. • Potential water quality effects include the discharge of degraded quality runoff and the accidental release of contaminants. • Process water and sanitary services requirements would be met through existing municipal connections located adjacent to the Site. • No Facility process wastewater would be discharged.	• Storm water pond design criteria would meet enhanced design guidance criteria found in the MOE SWM Planning and Design Manual.; • Increase in runoff potential would be mitigated with peak flow attenuation, baseflow augmentation and stormwater management design that provides an enhanced level of receiving water protection. • Accidents and malfunctions planning and spill management redundancy and stormwater control from source to discharge would ensure the protection of surface water and groundwater resources.	• No net effect	• Monitoring of stormwater end-of-pipe Facility discharge quality (required as part of C of A);
Effects on Ground Water	• Local groundwater characteristics and conditions	• No effects to local groundwater resources during operation. Site would be serviced via municipal infrastructure.	• None required.	• No net effect.	• None required.

Criteria	Indicators	Potential Effects	Impact Management	Net Effects	Environmental Management
Effects on Soils	• Characteristics of existing soils • Soil quantities (erosion of soil etc.)	• No potential effects on soils.	• None required.	• No net effects.	• None required.
Noise and Vibration Effects	• Existing ambient acoustic environment. • Predicted noise and vibration effects of the Facility.	• Ambient noise is dominated by traffic noise (e.g., Highway 401, Courtice Road); the sounds of nature (e.g., birds, insects, rustling trees and grasses); and, local industry and ranged from approximately 48 to 51 dBA. • Potential noise levels at all nearby receptors during operations are not predicted to increase by perceptible levels above existing ambient noise levels. • The predicted potential noise levels at all nearby PORs are less than the applicable criteria for the operational scenario assessed for the Facility.	• The Facility would be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. • Where necessary, mitigation measures can be included to ensure applicable noise criteria are met at PORs as predicted. • Mitigation measures may include the use of equipment control options such as enclosures, local or property-line barriers, mufflers and silencers, and acoustic baffles or insulation.	• No net effects.	• None required.
Visual Effects	• Predicted visual effects of the Facility.	• The stack and the upper portion of the process units of the Facility would be prominent features that would be potentially visible from within approximately 1 km of the Site. • Potential that the taller structures could be visible from receptors within approximately 5 km of the Site. However, the visibility of the stack is affected by distance and the presence of vertical obstructions. • Receptors within the broader region (i.e., 5 km) would remain largely unaffected by activities during the operational periods of the Facility.	• Investments in architectural upgrades and treatments to the Facility.	• The presence of the Facility would not be readily shielded from the adjacent roadways, and will result in a change to the existing local landscape for the duration of its the operational period. • While the stack would be visible from various vantages in the Region, the stack dimensions and the surrounding topography make it unlikely that the stack would be visible in areas of higher population densities.	• If concerns regarding Facility visibility are raised by members of the community in the vicinity of the Facility, mitigation measures would be considered such as planting trees or other suitable vegetation at the particular location to provide a screen within the line of the sight of the Facility.
• **Biological (Natural) Environment**					
Loss/Disruption to Terrestrial Ecosystems	• Presence of populations of species of special concern, threatened and/or endangered species in the area potentially affected by Facility operation. • Presence of areas of Natural and Scientific Interest, PSWs or ESAs potentially affected by Facility operation. • Presence of significant wildlife habitat potentially affected by Facility operation. • Presence of wildlife potentially affected by Facility operation through disturbance, habitat loss or death. • Extent of woodlands/wetlands to be removed by Facility operation. • Presence of migratory birds and habitat potentially affected by the Facility operation through disturbance, habitat loss or death.	• No populations of species of special concern threatened and/or endangered species potentially affected by Facility operation. • No ANSIs, PSWs or ESAs potentially affected by Facility operation, as they are located sufficient distance from the Site. • No significant wildlife habitats potentially affected by Facility operation as they are located sufficient distance from the Site. • All wildlife are common species and would relocate to undisturbed areas nearby. • No woodlands or wetlands would be affected by Facility operation as they are located sufficient distance from the Site. • No bird species of significance or concern were observed on the Site. Potential effects are considered during construction period.	• None required.	• No net effects on terrestrial ecosystems during Facility operations.	• None required.
Loss/Disruption to Aquatic Ecosystems	• Presence of sensitive fish habitat in the area potentially affected by Facility operation. • Presence of species at risk potentially affected by Facility operation.	• No permanent watercourses are located on the Site.	• None required.	• No net effect.	• None required.
• **Social and Cultural Environment**					

Criteria	Indicators	Potential Effects	Impact Management	Net Effects	Environmental Management
Compatibility with Existing and Planned Land uses	• Potential for disruption to use and enjoyment of residential properties. • Potential for changes in community character. • Potential for disruption to use and enjoyment of public facilities or institutions. • Potential for disruption to use and enjoyment of cultural and recreational resources. • Compatibility with existing land use designations and proposed land use changes.	• There are two (2) occupied and one (1) abandoned residences within 1 km of the Site. Some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects. No potential effects anticipated related to traffic as the residences are not located along the haul routes. • Nearest existing and/or planned built-up community (residential area) is located over 3.2 km from the Site. There is a scattering of residences in the Hamlet of Darlington over 1 km to the north of the Site. No communities are located along the haul route. Distance to local communities results in minimal to no potential effect related to odour, noise, dust, vermin/vectors, litter or traffic. Some potential for visual effects in the closest residential community (Hamlet of Darlington) as residents may be able to view a portion of the Stack. • There are two (2) public facilities/institutions located within 1 km of the Site, the Durham Regional Police Service Unit and the Courtice WPCP. Some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects. No potential effects anticipated related to traffic as these facilities are not located along the haul routes. • There are three (3) cultural/recreational resources located within 1 to 2 km from the Site, the Waterfront Trail, Darlington (Hydro) Sports Fields and Darlington Provincial Park. Some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects. No potential effects anticipated related to traffic as these facilities are not located along the haul routes. • Existing land use designations and proposed land use changes indicate that the area around the Site is currently occupied by a mixture of commercial/industrial land uses and undeveloped land and is designated for a mixture of prestige employment and light industrial land uses. Some potential exists for impacts associated with odour, noise, dust, vermin/vectors, litter and visual effects. No potential effects anticipated related to traffic as the land use designation along the haul route is Employment Area and Business Park.	• Mitigation of odours during operation includes: o Management of residual waste on enclosed vehicles and on enclosed tipping floor; and, o Use of air from the tipping floor as combustion air, destroying odours and maintaining negative pressure within receiving area. • During operations, where necessary, mitigation measures can be included to ensure applicable noise criteria are met at PORs as predicted, including the use of equipment control options such as: o enclosures; o local or property-line barriers; o mufflers and silencers; and, o acoustic baffles or insulation. The need for controls will be confirmed during detailed design. • Mitigation of dust during operation includes: o Management of residual waste on enclosed vehicles and on enclosed tipping floor; and, o Management of ash and residues using various measures to reduce ash emissions. • Mitigation of vectors/vermin through Pest/vector control subcontracted to a qualified local company. • Mitigation of litter through implementation of litter control program throughout the Site, routinely conducted on a daily basis. • To reduce the potential visual impact of the Facility, various measures can be considered including investments in architectural upgrades and treatments to the Facility. • No mitigation measures required for traffic for foreseeable Operations prior to full development of the CEBP. The full development of the CEBP would drive the need for road network improvements.	• The Project is compatible with existing and/or proposed land uses. • No net effects for most Physical Parameters (odour, noise, dust etc.) that could affect existing and planned land uses within 1 km and 5 km from the Site. • It is anticipated the Facility would have a minimal effect on the landscape, while having an overall medium level visual effect on some receptors within proximity to the Facility. • Further from the Site, the visual effects are reduced due to distance and presence of visual obstructions so that the Facility would have unremarkable/minimal change to the viewscape.	• Formation of a Thermal Treatment Facility Site Liaison Committee (SLC) for the construction/operations period. • Development and implementation of a Community Relations Plan (CRP) through which Durham, York, and Covanta staff would relate to the local community, including advance notification to local authorities and residents near the Facility of any unusual noises or activities (e.g., steam blows) or other events that may be of concern to the local community. The plan would also establish contacts and procedures for providing accurate and timely information to the community in the event of an unforeseen incident that may cause concern or impact upon the community. • Development and implementation of a community complaints system for operations.
Loss of significant heritage and/or archaeological resources	• Location and characteristics of heritage and archaeological sites and features	• The Stage 2 Archaeological Assessment of the Site determined there are no archaeological artifacts, sites of significance, or significant built heritage features on the Site.	• None required.	• No net effect.	• None required.
Disruption to local traffic networks	• Existing traffic volumes and projected traffic volumes generated by the Facility	• Operation of local road network acceptable under existing traffic conditions.	• Road/pavement improvements may be required to the South Service Road and Osborne Road to accommodate	• No net effect.	• None required.

Criteria	Indicators	Potential Effects	Impact Management	Net Effects	Environmental Management
	• Future traffic volumes considering development of the CEBP	• The Facility is expected to be accessed by up to 34 trucks, 33 staff vehicles per day and one visiting vehicle per day. • Peak hourly traffic volumes (based on 140,000 tpy) of 31 inbound and 9 outbound vehicles. No traffic control measures are required on adjacent road network to accommodate traffic during operation of the Facility. • The future CEBP is estimated to generate a total of 2,100 two-way trips per day once fully developed. Some traffic control measures (traffic signals, loop ramps etc.) may be required to the adjacent road network to address future traffic conditions with the build-out of the CEBP. Facility traffic would account for 2 to 3% of the total peak hour trips.	operations vehicles. No other mitigation is required to address Project related traffic during operations. • Some traffic control measures (traffic signals, loop ramps etc.) may be required to the adjacent road network to address future traffic conditions with the build-out of the CEBP. • The approved Host Community Agreement between Durham and the Municipality of Clarington includes the Region assuming the cost of construction of Energy Drive from Courtice Road to Osborne Road to serve the CEBP.		
• **Economic Environment**					
Effects on Employment	• Direct, Indirect and Induced employment numbers and characteristics	• Facility would potentially employ 33 full-time equivalents, in both management and operating positions. • Estimated that 34 person-years of local/regional indirect/induced employment will be generated or sustained annually.	• None required.	• Positive net effect: through increased full-time employment (Direct, Indirect and Induced).	• None required.
Aggregate wages and salaries	• Wages and salaries	• Total annual labour costs (salaries, wages, benefits) during operations are expected to be approximately $5 million per year.	• None required.	• Positive net effect: based on approximately $5 million in new wages, salaries, and benefits for direct employees annually.	• None required.
Effects on Property Value	• Property Values	• European experiences indicate that Thermal Treatment Facilities appear to have no measurable impacts on the value or salability of property in areas around such facilities. • Experience in Ontario indicates that although around waste management facilities there may be a potential short-term effect on property value, there is no evidence of potential long-term effects. Such effects are often the result of the 'perceived effect' of waste facilities. • The Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating) associated with the Facility.	• Development and Implementation of a Community Relations Plan (CRP) to address issues of 'perception' regarding the Facility, including provision of information on Facility emissions to the public through a variety of means.	• No net effect.	• Development and implementation of a CRP through which Durham, York, and Covanta staff would relate to the local community, including advance notification to local authorities and residents near the Facility of any unusual noises or activities (e.g., steam blows) or other events that may be of concern to the local community. The plan would also establish contacts and procedures for providing accurate and timely information to the community in the event of an unforeseen incident that may cause concern or impact upon the community.
Effects on the Municipal Tax Base	• Considering the tax base, potential cost for provision of municipal services for the Facility.	• According to the Host Community Agreement between the Region of Durham and the Municipality of Clarington the payment in lieu of taxes will be approximately $650,000 per year. The municipal taxes will be a net gain for the Municipality of Clarington. • Durham Region will provide additional infrastructure both within the CEBP and surrounding area. • Development of CEBP will increase tax base for Municipality of Clarington and Durham Region. • Local/regional employment during operations is likely to be filled by existing local/regional residents and is not expected to results in any increased demands on local or regional services.	• In order to mitigate the effects of the Facility on the Local Tax base in Clarington, the approved Host Community Agreement between the Durham and the Municipality of Clarington includes the Region assuming the cost of: o Establishment of a hazardous waste depot to serve Clarington residents; o Construction of Energy Drive from Courtice Road to Osborne Road as a Type "C" arterial road complete with all applicable services; o Construction of a SWM Facility to serve the Energy Park;	• Positive net effect: in regards to potential investment by Durham in infrastructure near the Facility and in payment in lieu of taxes (PIL). • Durham taxpayers would fund net costs of developing Facility however it is anticipated that operating costs for the Project will be less than sending the waste to a landfill in Ontario	• None Required.

Criteria	Indicators	Potential Effects	Impact Management	Net Effects	Environmental Management
		• Some investment is potentially required during the operating period to improve the local road network. • Annual Operating Fees ($14.67 million per annum as of Feb 2009) and amortized net Capital Costs fall within the scope of the May 2008 Durham Business Case evaluation undertaken by Deloitte and Touche LLP, which found that the cost of thermal treatment was comparable to Ontario Landfill on a net present value basis and therefore would have similar effects on the taxpayers in regards to the long-term cost of waste disposal.	o Construction of a segment of paved asphalt waterfront trail from Courtice Road to the eastern limit of Durham's lands south of the Courtice WPCP; o Transfer of 22 acres of surplus land on the west side of the Courtice WPCP to Clarington; and, o Commencement of the EA for municipal servicing the east Bowmanville Science Park. o		
Effects on existing businesses	• Potential for disruption to use and enjoyment of businesses and agricultural farms.	• Minimal potential to disrupt use and enjoyment of local businesses or agricultural farms (field crops) due to visual effects.	• Mitigation measures outlined to address potential Visual Effects as noted above.	• Minimal net effect.	• Environmental management measures outlined to address potential Noise and Visual Effects as noted above.
Business opportunities	• Demand for goods and services	• During Operations it is estimated that potentially $10 to $14 million per year would be spent on local/regionally sourced labour, goods and services	• None required.	• Positive net effect: through increased demand for local goods and services.	• None required.
Human Health and Ecological Risk					
Chemical risk to Human Health due to Facility Emissions.	• The hazard to human health related to the inhalation of both carcinogenic and non-carcinogenic COPC resulting from the Facility emissions during normal as well as "upset" operating conditions in combination with existing/baseline conditions. • The hazard to human health related to exposure, via environmental media including food, water and soil, to elevated concentrations of both carcinogenic and non-carcinogenic COPC from Facility emissions during both normal and "upset" operating conditions in combination with existing/baseline conditions.	• Potential for adverse effects on human health associated with exposure (via inhalation and/or environmental media including soil, water and food) to elevated concentrations of COPC over the operating life of the Facility.	• Refer to the "mitigation measures" identified in the "Effects on Air Quality" assessment summarized above.	• There would be no adverse health effects to human receptors exposed either by way of inhalation or via other environmental media, to emissions from the Facility.	• None required.
	• The hazard to human health related to the exposure to criteria air contaminants from vehicle emissions	• Potential for adverse effects on human health associated with exposure to elevated concentrations of criteria air contaminants from vehicle emissions.	• Refer to the "mitigation measures" identified in the "Effects on Air Quality" assessment summarized above.	• There would be no adverse health effects to human receptors exposed to emissions from the operation of vehicles directly related to the Facility.	• None required.
Chemical Ecological Risk due to Facility Emissions.	Ecological risk associated exposure to COPC in emissions from the Facility considering operations under both normal and "upset" operating conditions and in combination with existing/baseline conditions.	• Potential for adverse environmental effects to mammalian (other than human) and avian receptors, terrestrial plants, soil & benthic invertebrates and aquatic life associated with elevated concentrations of COPC over the operating life of the Facility.	• As above.	• There would be no adverse ecological effects associated with the emissions from the Facility.	• None required.

11.1.13 Facility Energy and Life Cycle Assessment

In addition to the various technical study reports that assessed the potential effects of the Facility, a Facility Energy and Life Cycle Assessment was undertaken. This section summarizes the results of this assessment as they relate to the approved design capacity scenario of 140,000 tpy (see **Appendix C-3**).

11.1.13.1 Assessment Methodology

This Project involves the construction of a Facility to thermally process solid waste that remains after Regional diversion efforts. The Facility would be located approximately 2 kilometres (km) south of Highway 401, between Courtice Road and Osborne Road in Clarington, Ontario within the CEBP. Presently there is no energy produced in the CEBP.

The Facility would produce electricity and possibly district energy, both heating and cooling, that could be used by businesses developed within the CEBP.

Three energy recovery scenarios for the Facility at the Site were assessed:

- Electrical energy recovery only;
- Electrical energy recovery and heat energy recovery for district heating; and,
- Electrical energy recovery and heat energy recovery for district heating and cooling via absorption chillers.

In all scenarios, electrical energy recovered through the thermal treatment process would be used to operate the plant and to supply the local 44kV power line into the Wilson Transformer Station which feeds power to the Clarington area.

In the second scenario, heat energy would also be recovered from the thermal treatment process and would be used for district heating for businesses developed within the proposed CEBP. Heat from the Facility would be used to offset natural gas that would have otherwise been used to heat buildings in the Business Park.

In the third scenario, the recovered heat energy would be used for district heating, as in the second scenario, as well as district cooling during the summer months. It was assumed that district cooling would be achieved through the use of absorption chillers, which use steam or hot water to drive a phase change in a medium to create a cooling effect. The use of absorption chillers would replace the need for electric chillers and therefore offset some of the electricity requirements for the Business Park.

Direct power outputs in regards to electrical energy and heat available for peak thermal loads were determined based on the Facility specifications set out in the successful proposal made by Covanta. The annual direct energy benefits were determined based on the annual net energy produced by the Facility and saved through the use of district cooling, and on the annual quantity of natural gas saved through district heating or district heating and cooling.

LCA modelling was undertaken to estimate the environmental implications related to air, water, and energy associated with developing the Facility. It includes the assessment of raw material production, manufacture, distribution, use, and disposal, including transportation, involved in operating the Facility.

The LCA model chosen was the Municipal Solid Waste Decision Support Tool (MSW-DST), which utilizes average default data from existing waste management facilities across North America, as well as specific inputs/assumptions for the subject Facility. The MSW-DST was developed by RTI International in cooperation with the U.S. EPA Office of Research and Development. The MSW-DST is a peer-reviewed and widely used North American LCA model.

Previously, LCA modelling was undertaken to assess the energy and environmental implications of landfill and thermal treatment. The results of that analysis were presented in the Supplement to Annex E-5 of the *Durham/York Residual Waste Study Alternatives to* report.

For this current exercise, the MSW-DST model was run by RTI International to determine life cycle implications for the three energy recovery scenarios for the Facility at the Site. In order to use the MSW-DST model to accurately reflect the life cycle impacts of the Facility, vendor and site-specific information was input into the model. Key Project specific assumptions that were input into the model included:

- Use of a custom energy grid that assumed the eventual replacement of coal-fired power plants with natural gas-fired power plants and renewable energy.
- Electricity generation (for all three scenarios) and district cooling via absorption chilling (Scenario 3 only) would displace electricity based on the custom energy grid provided. District heating (Scenarios 2 and 3) would displace natural gas.
- Waste composition estimates were based on post diversion quantities, determined through waste audits and represent the estimated composition of the post-diversion residual waste to be delivered to the Facility based on reasonable material recovery scenarios.
- Following the thermal treatment process there would be some residual material that would be sent to landfill. Three types of residual are produced as a result of the thermal treatment process. These include bypass waste (removed from the waste stream prior to combustion), bottom ash, and fly ash. The estimated quantities were determined through the waste composition and Facility specifications provided by Covanta.
- Metals are recovered from the ash before it is sent to landfill. The ferrous recovery rate from ash is 80% and the non-ferrous recovery rate is 60%, as quoted by Covanta.
- The default heating values for the MSW-DST model are used. Based on the default heating values for the individual materials and waste composition for Durham/York, the energy content of the input waste was estimated at approximately 5,600 BTU/lb.
- The haul distance (300 km) from the Facility to the ash landfill was based on a weighted average (i.e., weight of ash for disposal) of distances to conventional and hazardous waste disposal facilities.
- The Net Plant Heat Rate was estimated based on data from Covanta and is the difference between the Gross Plant Heat Rate and Plant Parasitic Load (i.e., energy used to operate the Facility).
- Air emissions estimates were based on:

- o The Thermal Treatment Facility Stack Emission Limits (Emissions factors) required by Durham and York as set out in the RFP, agreed to with representatives of MOE, and guaranteed by Covanta; and,
- o Default values from the MSW-DST model which were assumed for contaminants not specified by Ontario regulations and not guaranteed by the Vendor

- Default values for ash landfills are used. Landfills were assumed to be lined U.S. EPA Subtitle D sites, given that this represents the most likely scenario for ash disposal.
- To determine the uncaptured emissions that would be generated under a landfill scenario (i.e., if the waste thermally processed by the Facility were instead sent to landfill), a lined landfill with 75% landfill gas recovery efficiency and flaring was assumed based on reasonable assumptions reflecting current practice.

11.1.13.2 Potential Energy and Life Cycle Effects

LCA of Remote Landfill and Thermal Treatment

Durham and York currently dispose of post-diversion residual waste by remote landfill. The environmental life cycle implications of the management of residual waste by remote landfill were modeled in the previous LCA study presented in the Supplement to Annex E-5 of the *Durham/York Residual Waste Study Alternatives to* report. The LCA was completed based on a modern lined landfill with landfill gas and leachate recovery.

Results of the LCA for the remote landfill were compared with results from the initial LCA of thermal treatment. Relative energy and environmental implications were compared and, based on these results, it was determined that residual waste management by thermal treatment is better than remote landfill with respect to reduced energy consumption (net energy produced), emissions to air of GHGs, acid gases, smog precursors and emissions to water.

Thermal Treatment Facility Energy Outputs

The Facility would meet its own internal energy needs and produce both electricity and heat for export off the Site. The energy output would be a function of the energy content of the incoming waste stream. The Facility would be capable of processing waste with an energy content, on a higher heating value (HHV) basis, ranging from 11 MJ/kg to 15 MJ/kg. Waste audit data and energy content calculations indicate that the post diversion waste stream has energy content around the mid-point of this range. This energy content is higher than generally reported for municipal solid waste because of the removal of low energy materials such as food waste by the Regions' aggressive waste diversion program.

The energy output from the Facility, as presented in the Covanta Proposal to the Regions, assuming waste with an energy content of 13 MJ/kg and base Facility size of 140,000 tpy is summarized in the following Table 11-16.

Table 11-16 Covanta Proposed Durham/York Thermal Treatment Energy Output

Scenario	Average Electrical Power Supplied to Grid (MW Electrical)	Heat Available for Peak Thermal Loads (MW Thermal)	Annual Electrical Energy Supplied to Grid (MWh Electrical)
Electricity Production Only	13.6	n/a	107,222
Electricity & District Heat Production	11.9	7.4	93,820
Electricity, District Heat & Cooling Production	11.9	7.4	96,454

The heat energy recovered from the Facility is dictated by the estimated heating and cooling loads for the CEBP. The thermal load profile development for the Business Park was based on the light industrial and prestige employment building footprints, developed based on the proposed land use in the CEBP Study Report (March 2005). The potential heating and cooling loads estimated for the CEBP are summarized as follows:

- Heating load assuming natural gas boilers:
  - Peak heating load 64 MW thermal
  - Annual heating load 225,000 MWh thermal
- Cooling load assuming absorption chillers:
  - Peak cooling load 45 MW thermal
  - Annual cooling load 120,000 MWh thermal

The heat output for the 140,000 tpy Facility (7.4 MW) is considerably less than the ultimate peak heating and cooling loads estimated above for the CEBP. It should therefore be possible for the approved Facility capacity (140,000 tpy) to supply the required energy during the early stages of development of the Business Park, and although not quantified, future Facility expansions would be capable of supplying a larger portion of the needs of the ultimate requirements.

The annual direct energy benefits associated with the Facility are summarized as below (Table 11-17).

Table 11-17 Annual Direct Energy Benefits

Scenario	Annual Net Electrical Energy Produced & Saved (MWh)	Annual Quantity of Natural Gas Saved (Million m^3)
Electricity Production Only	107,222	n/a
Electricity & District Heat Production	93,820	5.6
Electricity, District Heat & Cooling Production	96,454	5.0

In broad terms, the electricity produced by the Facility, when operating at 140,000 tpy, is sufficient to power about 10,000 homes; while the district heating produced could heat the equivalent of 2,200 homes.

The MSW-DST model was used to calculate the emissions to air of:

- GHGs (net carbon dioxide equivalents, or CO_2e);
- Acid gases (nitrogen oxides, sulphur oxides, and hydrochloric acid); and,
- Smog precursors (nitrogen oxides and particulate matter).

It should be noted that emissions to air of other heavy metals, including mercury and cadmium, as well as dioxins/furans are not standard outputs from the MSW-DST model. Therefore the emissions of these and other trace contaminants were not presented in the LCA but are considered in other studies including the *Air Quality Assessment* and *Human Health and Ecological Risk Assessment*.

The net energy consumption and emissions to air and water that were determined based on the LCA, are the sum of the energy consumption and emissions (or reductions from offsets) for the following sources:

- Thermal Treatment Facility – energy consumption and emissions associated with material inputs (i.e., APC system);
- Offsets for Electrical/Heating/Cooling Energy – energy offsets from the grid/natural gas resulting from the energy produced by the Facility (takes into account the plant parasitic load);
- Ash Transport – transportation of residual ash from Facility to landfill;
- Ash Landfill;
- Recycling Transport – transportation of recyclables from Facility to recycling facility;
- Recycling Offset/Remanufacture – energy consumption and emissions offset by recycled materials replacing virgin material; and,
- Landfill Long Haul Burdens – accounts for the haul distance saved by hauling waste to a local facility rather than a remote landfill.
- Avoided Landfill – accounts for the avoided methane (uncaptured GHG emissions) that would have resulted if the post-diversion residual waste had been landfilled instead of thermally treated.

The LCA results indicate that for all three scenarios there is net energy production, therefore providing a local source of electrical and heat energy. Approximately 1,113,000 GJ/yr of energy is produced when only electrical energy is recovered, 1,205,000 GJ/yr when, in addition, heat is also recovered for district heating, and 1,193,000 GJ/yr when heat recovery for district cooling is added.

In addition to potential reductions in net GHG through the WTE process, GHG landfill emissions are also avoided. The Intergovernmental Panel on Climate Change (IPCC) recognizes waste to energy as a technical option for addressing GHG emissions from solid waste disposal, including it as a measure for source reduction (avoidance) of landfill methane. (IPCC Technical Paper I, Technologies, Policies and Measures for Mitigating Climate Change, November 1996).

Approximately 10% of Global methane emissions from human-related sources are emitted from landfills and open dumps annually. Approximately 23,930 tonnes CO_2e of GHG emissions generated from the 140,000 tonnes of waste if it were to be landfilled would be avoided by providing thermal treatment as an alternative to disposal.

Net greenhouse gas (GHG) emissions, expressed in terms of annual metric tonnes of CO_2 equivalents (CO_2e) are reduced for all scenarios. For the electricity production only scenario, the indirect reduction in GHGs associated with electrical energy and materials recovery and avoided landfill methane emissions more than offset the direct GHG emissions from the Facility resulting in net annual GHG emission reductions of 16,238 tonnes CO_2e. For the scenarios assuming district energy, the indirect reduction in GHG emissions associated with the recovery of both electricity and heat offset more than the direct GHG emissions from the Facility. Once avoided landfill methane emissions are accounted for, the scenarios that recover waste heat result in greater GHG emission reductions (27,536 and 28,311 tonnes CO_2e, respectively) than when only electricity is recovered. This illustrates the benefits of using waste heat rather than natural gas for heating and electricity for cooling purposes.

Thermal treatment, regardless of the energy recovery scenario, has a net benefit to the environment of reduced LCA emissions of acid gases (nitrogen oxides, sulphur oxides, and hydrochloric acid) and smog precursors (nitrogen oxides and particulate matter).

Although there are no emissions to water from the Facility itself, on a lifecycle basis there are overall reductions in emissions in both dissolved and suspended solids as well as a number of other contaminants. These reductions arise from the energy sector offsets that occur because of the Facility (e.g., reductions in outputs from other generating facilities that result because of energy generation at the Facility).

There are no impact management measures specific to the effects of the Facility related to energy generation or life cycle assessment of the potential environmental burden of the Facility at a Global/Macro-environmental Scale. Energy generation rates and direct emissions are related to the specifications and performance of the Facility, which are assumed to be in accordance with the Covanta proposal. Estimates for emissions of Acid Gases and Smog Precursors are based on the performance of the APC systems for the Facility as outlined in the Covanta proposal and discussed in detail in the *Air Quality Assessment - Technical Study Report* (**Appendix C-1**).

11.1.13.3 Conclusions

Prior life cycle analysis for remote landfill compared with results from the initial LCA of thermal treatment indicated that residual waste management by thermal treatment is better than remote landfill with respect to reduced energy consumption (net energy produced), emissions to air of GHGs, acid gases, smog precursors and emissions to water.

Results of the assessment of energy generation potential and the LCA for the Facility, based on the current description of the Undertaking indicate that:

- A benefit of thermal treatment is that it provides a local source of energy. Between 1.1 and 1.2 million GJ of energy would be generated or conserved by the Facility depending on the accessibility to heat or heat/cooling users in the CEBP. The scenario in which both electrical and heat energy is recovered, and the heat energy provides district heating, provides the most energy potential;

- Thermal treatment, regardless of the energy recovery scenario, has a net benefit to the environment of reduced LCA emissions of GHGs.
- Thermal treatment, regardless of the energy recovery scenario, has a net benefit to the environment of reduced LCA emissions of acid gases and smog precursors. Although there are air emissions from the Facility itself, there are offsetting reductions in emissions in other areas such as electricity utility power generation. When these various effects are considered together there is a net reduction in emissions to the environment of many common contaminants such as oxides of sulphur that contribute to acid rain.
- Thermal treatment, regardless of the energy recovery scenario, has a net benefit to the environment of reduced LCA emissions to water for a number of parameters; and,
- Thermal treatment with both electrical and heat energy recovery would result in GHG credits due to the offset of natural gas from district heating.

11.1.14 Consultation on the Assessment of the Undertaking

Consultation activities associated with the Assessment of the Undertaking are detailed in Section 16 of this EA Study document and in the Record of Consultation.

11.1.15 Advantages and Disadvantages of the Undertaking

There are both potential advantages and disadvantages associated with the Undertaking under the approved design capacity scenario (140,000 tpy). These advantages and disadvantages reflect the net effects that may exist after the application of impact management measures which would likely last throughout the operational period until closure of the Facility. This Section provides a qualitative discussion of the potential advantages and disadvantages of the Undertaking based on the net (or residual) effects discussed in the previous sections and described in Table 11-14 and Table 11-15.

For many aspects of the environment there are neither advantages nor disadvantages, as no net effect of the Undertaking on the environment has been identified. The following is a summary of the aspects of the environment for which minimal to no effects are anticipated:

- In regards to air quality, intermittent vehicle and dust emissions are addressed through a variety of good construction practices. Emissions during Facility construction would be the same as any other medium-sized construction site in southern Ontario. Given the results of the assessment of air emissions, no risk to Human Health or Ecological Risk has been identified related to construction.
- During operation, air emissions are predicted to meet applicable ambient air quality criteria and would meet or, more commonly, would be below the current air contaminant limits placed on municipal waste incinerators. The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions.

- The results of the air emissions modeling and human health and ecological risk assessment indicate that there would be no adverse health effects to human receptors exposed either by way of inhalation or via other environmental media to emissions from the Facility or from the operation of vehicles directly related to the Facility. In addition, there would be no adverse ecological effects associated with the emissions from the Facility.
- No adverse effects at offsite locations are expected from Facility-based odour given the proposed Facility design.
- Provisions included in the Facility design for SWM on the Site will meet enhanced design guidance criteria found in the MOE *Stormwater Management Planning and Design Manual*, and proposed measures to reduce runoff potential provides an enhanced level of receiving water protection.
- No effects to local groundwater resources are expected during construction or operations. The Site will be serviced via municipal infrastructure (sewer and water).
- The Facility would be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. The predicted potential noise levels at all nearby points of reception are less than the applicable criteria for the operational scenario assessed for the Facility.
- Effects to local wildlife and habitat are anticipated to be minimal given that: no populations of species of special concern, threatened and/or endangered species; no ANSI, PSWs or ESAs; and, no significant wildlife habitat, woodlands or wetlands are potentially affected by the Facility. In addition, no permanent watercourses are located onsite and no fish habitat or species are located onsite.
- The Facility is compatible with existing and planned land uses. During construction, minimal net effects are anticipated in the short-term to the closest social/cultural receptors related to noise/vibration, dust and visual effects. During operations, there will be minimal to no effect from most physical parameters (odour, noise, dust, vermin/vectors, litter and traffic) on residential properties, public facilities or institutions or cultural/recreational resources. It is anticipated the Facility would have a minimal effect on the landscape, while having an overall medium level visual effect on some receptors within 1 km proximity to the Facility. Existing land use designations and proposed land use changes indicate that the area around the Site is currently occupied by a mixture of commercial/industrial land uses and undeveloped land and is designated for a mixture of prestige employment and light industrial land uses which would be compatible with the Facility.
- Stage 2 Archaeological Assessment identified no archaeological artifacts or sites of significance on the Site and there are no significant built heritage features on or near the Site.
- The Facility is anticipated to result in minimal disruption to the local traffic network. The only improvements proposed that would be specific to the Facility would be road/pavement improvements to the South Service Road and Osborne Road to accommodate construction and operational vehicles. Future development of the CEBP

will generate significantly more traffic in the area that would likely necessitate some traffic control measures (traffic signals, loop ramps, etc.).

- The Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating) associated with the Facility. In regards to the effect of the Facility on property value outside the CEBP, current European experience indicates that Thermal Treatment Facilities have no effect on the value or salability of property in areas around such facilities, while North American experience indicates that short-term effects may result from the perception of the impacts of proposed facilities that could be addressed through a CRP.

Potential advantages of the Undertaking include:

- An overall reduction in the environmental burden associated with residual waste disposal given that LCA indicates that the Facility would result in:
  - A net reduction in overall GHG emissions, considering both direct emissions, indirect emissions/offsets associated with recovery of energy and metals and avoided methane emissions from landfill;
  - An overall net reduction in emissions of Acid Gases and Smog Precursors;
  - A net reduction in emissions to Water; and,
  - Annual energy benefits of between 94,000 MWh and 107,000 MWh of electricity generated/saved and 5.0 to 5.6 million m^3 of natural gas saved if the Facility provides heating or heating/cooling to the CEBP.
- Recovery of approximately 14,760 tonnes annually of ferrous and non-ferrous metals from the post-diversion residual waste stream that would have otherwise been landfilled, particularly as the majority of these metals would be recovered from materials (e.g., mattress boxsprings) that are not acceptable in the Ontario Blue Box program.
- The Facility is expected to have a positive effect on the economic environment in the Region during construction and operations as:
  - During construction, the Facility will result in an increase in 300 to 400 person-years of employment for the labour force directly employed to construct the Facility, the local capital investment in the Facility that could result in 1,000 to 1,180 person-years of indirect employment and 260 to 316 of induced employment resulting from the purchase of goods and services by the labour force.
  - During operations, the Facility will result in an increase in full-time employment for the 33 full-time positions required to manage and operate the Facility and the 127 to 175 person-years of indirect/induced employment positions resulting from the $10 to $14 million per year that would potentially be spent on local/regionally sourced labour, goods and services.
  - The Municipality of Clarington could benefit from the potential investment by Durham in infrastructure near the Facility and in payment in lieu (PIL) of taxes that have been set out in the Host Community Agreement.

- o There is minimal potential for the Facility to disrupt the use and enjoyment of local businesses or agriculture, with the only anticipated effect being short-term noise and visual effects during construction. Local businesses stand to benefit from the up to $118 million that is anticipated to be spent during construction and the $10 to $14 million per annum that would be spent during operations on local/regionally sourced labour, goods and services.

Potential disadvantages of the Undertaking include:

- There is some potential for short-term construction related net effects from noise levels associated with pile driving (if required) and increased short-term offsite vehicle traffic. Also, some short-term visual disturbances could affect receptors within approximately 1 km of the Site.
- The presence of the Facility cannot be readily shielded from the adjacent roadways, and could result in a change to the existing local landscape for the duration of the operational period for the Facility. It is anticipated the Facility would have a minimal visual effect on the landscape, while having an overall medium level visual effect on some receptors within proximity to the Facility. While the stack could be visible from various vantages in the in region, the dimensions of the stack and the surrounding topography make it unlikely that the stack would be visible in areas of higher population densities. Investments in architectural enhancement to the Facility are proposed to minimize these effects.

The Facility addresses the “Purpose of the Undertaking” identified in the Approved EA Terms of Reference and described in Section 3.0 and addresses the opportunities/constraints related to the management of the post-diversion residual waste stream generated by both municipalities in that it:

- Has been designed to thermally process the post-diversion residual waste that currently requires disposal for both Regions;
- Will recover both energy (electricity and heat) and material resources (ferrous and non-ferrous metals) from the post-diversion residual waste stream;
- Will provide a safe and effective local solution for the processing of residual waste as determined based on the results of the assessment of the undertaking described in this Section;
- Can be implemented within a reasonably short timeframe, in that the Facility could be operational in 2013/2014 pending receipt of all necessary approvals; and,
- Is fully compatible with Durham and York’s aggressive long-term diversion programs, as it is sized to manage only the post-diversion residual waste stream in both the short and long-terms.

11.2 Maximum Design Capacity Scenario

The assessment of potential effects of the Undertaking at the maximum design capacity of 400,000 tpy was, by necessity, completed on a more general basis. Documentation of these assessments is provided in a more general, summary format as follows.

11.2.1 Air Quality

This section provides a summary of the assessment of air emissions from the Facility assuming a maximum design capacity of 400,000 tonnes per year (tpy). These results are contained in the technical study report titled *Air Quality Assessment - Technical Study Report,* attached as **Appendix C-1.**

For the purposes of the assessment, a 400,000 tpy Facility was conceptually assumed to include the two completely independent waste processing trains installed for the 140,000 tpy Facility (each 70,000 tpy), a single independent 110,000 tpy train and a single independent 150,000 tpy train. The emissions from the 110,000 tpy train would exhaust from a second flue installed in the stack built for the 140,000 tpy Facility, while the emissions from the 150,000 tpy train would be exhausted from a new independent stack, identical in height to that of the 140,000 tpy Facility stack. Each train would utilize identical processing technologies and APC equipment, appropriately sized to the process train throughput. Potential air quality issues associated with a 400,000 tpy Facility were evaluated in the same fashion as for the 140,000 tpy Facility. The following table (Table 11-18) lists potential air-emissions issues related to a 400,000 tpy Facility. Construction was not separately assessed for the 400,000 tpy Facility since it is expected to involve lower levels of activity than that associated with the initial construction of the 140,000 tpy Facility.

Table 11-18 Key Issues for Air Quality (400,000 tpy Facility)

Project Phase	Key Issue	Relevance to Project
Operational	Facility emissions to atmosphere with potential effects on community and residential receptors	The Facility would produce SO_2, nitrogen dioxide (NO_2), CO, PM, metals, polycyclic aromatic hydrocarbon (PAH) and VOC emissions. An emissions inventory was developed for the Facility and compared to AQSA emissions. Dispersion modelling was conducted to assess the ambient concentrations of contaminants.
	Production of ozone	Ambient NO_x emissions interact with anthropogenic and biogenic VOC emissions to produce ground level ozone (O_3) downwind of emission sources. Southern Ontario has typically high ground level O_3 levels due primarily to trans-boundary impacts from the United States.
	Secondary particulate formation	$PM_{2.5}$ and precursor fine particulate matter emissions would occur.
	Odour emissions	Waste processed by the Facility may have odour emissions.
	Contribution to GHG emissions	Combustion sources produce CO_2 and nitrous oxides.

The assessment of the 400,000 tpy Facility's effect on air quality was performed by conducting dispersion modelling to predict the downwind concentrations of air contaminants and comparing these predictions to regulatory standards, objectives and guidelines. The dispersion model, domain, receptors, meteorology and baseline air quality levels were all identical to those for the 140,000 tpy Facility assessment. The timeframe considered for the 400,000 tpy Facility operational period was 30 years, which was the same as that for the 140,000 tpy Facility.

Air quality effects were modelled assuming the application of design-based mitigation measures and the predicted "net effects" of the 400,000 Facility were described. The mitigation measures that would be applied to the 400,000 tpy Facility would be the same as those for the 140,000 tpy Facility. The same list of COPCs were modeled and assessed as for the 140,000 tpy Facility.

The following mitigation measures were assumed in the analysis of potential effects on air quality from on-site stationary and mobile sources during the Facility operational period:

a. Very low $NO_{x,}$ (VLN) system in the Facility's stoker.

b. SNCR for additional NO_x control.

c. Activated carbon injection after the economizer for mercury and dioxin/furan control.

d. Acid gas scrubber for the removal of gases such as SO_2 and HCl.

e. A fabric-filter baghouse to remove solid particulate matter.

f. Design and operations pre-processing odour control measures such as enclosed loading, negative air pressure inside the Facility and fully-enclosed feedstock delivery trucks.

Based on the foregoing, the following net effects of the 400,000 tpy Facility-based emissions on air quality were identified:

- Downwind ambient concentrations of air contaminants from the 400,000 tpy Facility are predicted to meet all applicable ambient air quality criteria during normal Facility operation. During "process upsets" (including start-up and shut-downs) downwind concentrations of all contaminants from Facility emissions are predicted to meet applicable ambient air quality criteria.
- Emissions at the stacks will meet or will be below the air contaminant limits placed on municipal waste incinerators in accordance with MOE Ontario Guideline A-7 (2004).
- The change in ozone formation due to Facility emissions will be larger than that associated with the 140,000 tpy facility, but is still expected to be minimal based on the magnitudes of the NOx and VOC emissions relative to air quality study area emissions.
- The incremental direct contribution of the 400,000 tpy Facility to total Ontario annual GHG emissions would be 0.17% and the incremental contribution to total Canadian annual GHG emissions would be 0.05% based on projected 2010 GHG emissions levels (this determination of GHG emissions considered only the direct emissions of the 400,000 tpy Facility and not the GHG emissions offsets resulting from recovery of energy and materials nor the avoided landfill CH_4 that would otherwise have been emitted if 400,000 tpy of post-diversion residual waste was landfilled).

- Since the 400,000 tpy Facility would utilize the same odour control methodologies as for the 140,000 tpy Facility, there is not expected to be adverse effects at offsite locations from Facility-based odour.

The possible monitoring and environmental management protocol and programs that were assumed for the 140,000 tpy Facility with respect to effects on air quality should also be considered for the 400,000 tpy Facility.

11.2.2 Surface Water, Groundwater and Stormwater

This section summarizes the assessment of the maximum capacity scenario of 400,000 tpy on surface water, groundwater, and stormwater. The 400,000 tpy Facility would potentially affect the water supply requirements, wastewater discharge volumes and stormwater management features located both on- and offsite.

11.2.2.1 Water Supply and Wastewater Discharge

It was determined that the maximum annual water demand for the maximum capacity scenario of 400,000 tpy would be approximately 120,120 m^3/yr. It is anticipated that water supply needs could be met through connection to the existing approved design capacity 140,000 tpy scenario Facility watermain. A hydraulic assessment should be carried out during detailed design to ensure the fire fighting water and Facility demands could be met. If water demands would not be met through connection to the Osborne Road watermain, a secondary connection may be necessary

Online fire fighting water demand would be determined during the detailed design phase for the 400,000 tpy scenario upgrades.

It is anticipated that the 400,000 tpy scenario Facility could operate without requiring significant addition staff beyond the 33 necessary for the 140,000 tpy scenario. As a result, wastewater discharges for the 400,000 tpy scenario could be as low at those for the 140,000 tpy scenario. The wastewater discharges for the 400,000 tpy Facility, therefore, should be able to be handled by the existing 140,000 tpy scenario Facility infrastructure. However, if there were increases in staff during Facility expansion they would be minimal resulting in negligible increases in wastewater discharge.

11.2.2.2 Stormwater Management

For the maximum capacity scenario of 400,000 tpy Facility, access roads, refuse storage areas and the number of waste processing buildings would need to be increased from the current approved design capacity of 140,000 tpy. The 400,000 tpy scenario would increase the imperviousness of the Site from approximately 45% (for the 140,000 tpy) to 55% (for the 400,000 tpy). This would increase runoff volumes onsite which would also cause an increase in peak discharges.

Stormwater mitigation options would be designed to reduce these peak discharges to pre-development levels and attenuate flows.

Similar to the 140,000 tpy scenario, the following is a list of mitigation measures that should be considered for the construction of 400,000 tpy scenario Facility.

- All cleared areas not required for equipment storage, building construction or vehicle access should be seeded to avoid excess soil loss;
- Sediment traps should be installed within flow paths, slope toes and surrounding drains to minimize the amount of sediment deposited in conveyance networks and detention ponds;
- Silt fencing should be installed around the perimeter of all laydown areas, disturbed working areas and the boundary of the construction Site; and,
- All laydown areas, storage areas and access roads should receive a top dressing of gravel as soon as possible after upgrade initiation.

It is anticipated that construction phase stormwater conveyance will be accommodated through swales and catchbasin/stormsewer infrastructure. If additional catchbasins and stormsewers are to be installed, it is assumed that they would be constructed during the initial stages of the 400,000 tpy scenario construction. The number, location and route of sub-surface stormsewers would be determined during the detailed design of the upgrade components.

During construction, the existing SWM pond should provide adequate stormwater retention and drawdown requirements. It is recommended that pond capacity expansion is undertaken in the early stages of the 400,000 tpy scenario construction.

To offset the effects of the approximately 10% increase in imperviousness from the 140,000 tpy scenario Facility to the 400,000 tpy scenario Facility, lot level and conveyance level SWM features should be considered to detain the volume and reduce the flow rate of runoff at the lot level. Detention of runoff at the lot level through depression storage and reduced runoff flow rates would act to encourage ET and infiltration.

The expanded Facility will require a larger capacity stormwater management pond than that required for the 140,000 tpy scenario Facility. The 400,000 tpy scenario SWM pond and outlet structures would be designed to ensure that post-development peak discharges would not exceed pre-development peak discharges for similar sized precipitation events. The final SWM pond and outlet configuration would be provided during detailed design of the 400,000 tpy scenario upgrades.

The conveyance swale located immediately south of the proposed development site alongside the CN Rail tracks will act as the receiver for all discharged stormwater. Presently, no upgrades to this conveyance swale are necessary for the 400,000 tpy scenario Facility.

11.2.3 Acoustic and Vibration

This section summarizes the assessment of acoustic effects arising from the maximum design scenario of 400,000 tpy (400,000 tpy scenario) (see **Appendix C-5**). The methodology used to undertake the assessment was the same as was used for a capacity of 140,000 tpy (see Section 11.1.4 for details).

The construction activities during the 400,000 tpy scenario would be similar in process to the 140,000 tpy scenario but on a smaller scale. Therefore, the construction of the Facility for the 140,000 tpy scenario with all land clearing, grubbing, and administrative and supporting buildings was considered as the worst case, and no modeling was performed for 400,000 tpy scenario. However, it was assessed qualitatively.

Some potential exists for noise and vibration effects during the construction phase of the 400,000 tpy scenario Facility. Generally, vibration effects would be confined to a couple of hundred metres, but noise is not. There are two construction activities that are likely to create elevated sound levels that are difficult to mitigate. These are similar to the initial design capacity scenario and include pile driving activities associated with the construction at the facility (if required) and potentially increased short-term (i.e., 1-hour) offsite vehicle traffic associated with construction. However, this would depend on the future road network.

These activities would only be a concern during worst-case conditions. They are temporary and of short duration relative to the Facility construction, and would cease upon completion of construction activities. Pile driving effects could be reduced through alternative technologies, controls, and scheduling. Construction vehicle traffic is predicted to be acceptable against applicable criteria, but short-term (i.e., 1-hour) effects during peak demand are possible. However, this would depend on the local network at the time of the maximum project design capacity and could be reduced through scheduling and planning of vehicle trips.

There is a minor predicted increase in potential operational noise at some of the PORs for the maximum design capacity of 400,000 tpy compared to the 140,000 tpy Facility. However, based on the results of the acoustical modelling considering ambient noise levels and predicted noise levels from the maximum design capacity (400,000 tpy scenario) Facility and traffic sources, the predicted noise levels at all nearby PORs are less than the applicable criteria (Class 2 noise limits).

Sound levels from the operation of the Facility during the 400,000 tpy scenario are expected to be localized, and not large enough to impact wildlife in adjacent non-operational areas. As such, most wildlife would be expected to continue their patterns outside the main site areas unimpeded. It is expected that wildlife would either naturally avoid these areas due to the human presence and activity, or would adjust to the noise. In all areas, occasional short-term loud sounds, particularly associated with construction activities, may produce retreat or startle responses in some wildlife.

Similar to the impact management described for the 140,000 tpy Facility, during operation of the 400,000 tpy scenario current standards for building Facility equipment and process units would incorporate efficiencies and design enhancements that reduce sound emissions. Where necessary, mitigation measures would be included in the Facility design to ensure applicable noise criteria are met at PORs. Selection and design of specific mitigation measures would be subject to the detailed design of the proposed equipment.

11.2.4 Visual

This section summarizes the assessment of visual effects arising from the maximum design scenario of 400,000 tpy (400,000 tpy scenario). The methodology used to undertake the assessment was the same as was used for the 140,000 tpy Facility (see Section 11.1.5.1 for details). It is important to note that the visual assessment is conservative using existing conditions. In addition, the photos used were taken during winter months when there is little foliage and vegetation that would potentially provide additional screening of the Facility from certain vantages.

For the maximum design scenario of 400,000 tpy, much of the initial ground preparation would already have taken place if the 140,000 tpy scenario Facility is constructed first. While there would be a requirement for additional construction materials, machinery and construction personnel, the duration of the construction for the 400,000 tpy scenario should be of a similar or lesser extent. Potential visual effects would be similar to those experienced during the construction of the 140,000 tpy scenario Facility. However, as the 140,000 tpy scenario would already be present and operational, the existing structures would act to obstruct much of the visual effects associated with the construction of the 400,000 tpy scenario from certain vantages (i.e., the majority of the new features would be constructed to the west of the existing structures, so the views would be obstructed primarily from the east of the Site).

The 400,000 tpy scenario would result in the addition of several Facility structures and buildings and an additional stack. This larger operation would be contained within the same property boundaries with a minor increase in Facility footprint. The additional structures would remain adjacent to the existing structures (140,000 tpy scenario). Approximately 14 new structures (i.e., tanks, buildings and enclosures) are associated with the 400,000 tpy scenario. The two stacks and the upper portions of the process units of the 400,000 tpy scenario capacity Facility would continue to be the most prominent features that would be visible from within approximately 1 km (the Project Site and Vicinity Study Area, PSVSA). Only the tallest structures, specifically the stacks, could be visible within the broader approximate 5 km (Local Community Study Area, LCSA) and on a Regional basis. However, as discussed during the visual assessment of the 140,000 tpy scenario, the visibility of the stacks is affected by distance and the presence of vertical obstructions. Additionally, it is important to note that the visual characteristics of the LCSA may change before the 400,000 tpy scenario is constructed resulting in intervening visual obstructions from certain vantages as the Region continues to develop and expand.

Depending on timing of construction of the 400,000 tpy Facility, the sensitivity of the receptors to the potential future case expansion of the Facility to 400,000 tpy capacity may also be much reduced from those values identified for the 140,000 tpy scenario because the likely development in the area in the future. As the built character of the Clarington Energy Business Park would be greater than what is currently present, because of the presence of the 140,000 tpy scenario Facility and the anticipated build-out of the area, it is likely that the expansion would not add considerably to the visual characteristics of the PSVSA. Development of the 400,000 tpy scenario may be considered to be a relatively minor additional visual component when existing and planned future developments are taken into account. In the future, other existing projects in the PSVSA and LCSA would likely include the expansion of express toll route Highway 407 to connect to Highway 401 in the vicinity of the Facility, the expansion of the existing Darlington Nuclear Generating Station, and Clarington Energy Business Park would contain more business and industry than currently present.

In terms of potential impact management during the construction of the ,400,000 tpy scenario, the majority of the new structures would be constructed on the west side of the existing structures, so much of the visual disturbance associated with this expansion would be obstructed for receptors situated to the east of the Site. If required, similar mitigation measures to those described in the 140,000 tpy scenario would be used. However, the mitigation measures used for the 140,000 tpy scenario would likely suffice for the construction of the 400,000 tpy scenario (see Section 11.1.5.3 for the Impact Management measures for the 140,000 tpy scenario).

As a result, the overall visual effect of the 400,000 tpy scenario, in addition to other planned and disclosed future projects would likely result in minor visual effects. It is expected that the landscape sensitivity and magnitude rankings would decrease over time because of the increased development in the area. Overall, the visual difference of the 400,000 tpy scenario Facility compared to the 140,000 tpy facility would not be considerable.

11.2.5 Social and Cultural

This section summarizes the assessment of social/cultural effects arising from the maximum design scenario of 400,000 tpy (400,000 tpy scenario). The methodology used to undertake the assessment was the same as was used for the 140,000 tpy Facility (see Section 11.1.7.1 for details).

This social/cultural assessment considered the compatibility of the Facility under the 400,000 tpy scenario, with existing and proposed land uses with consideration of the following indicators:

- Potential for Disruption to use and enjoyment of residential properties;
- Potential for Changes in community character;
- Potential for Disruption to use and enjoyment of public facilities and institutions;
- Potential for Disruption to use and enjoyment of cultural and recreational resources; and,
- Compatibility with existing land use designations and proposed land use changes.

The assessment of the compatibility of the Facility with existing and/or proposed land uses considered baseline conditions (land uses in the local area and the surrounding community) and the degree of potential impacts (e.g., traffic, odour, dust, litter, noise) associated with the Facility as documented in the other technical study reports that have been undertaken to determine the effect of the Facility on the environment. Generally, there was little to no differences between the potential effects to the environment of the Facility at 140,000 tpy versus 400,000 tpy in regards to noise, odour, litter, traffic, and the other physical effects that the Facility could have on social/cultural receptors. Therefore the evaluation of the net effects of the Facility on the social/cultural environment presented in Section 11.1.7, applied to both the 140,000 tpy and the 400,000 tpy scenarios.

The only physical effect of the Facility for which some difference between the 140,000 tpy and 400,000 tpy scenarios was determined, was in regards to potential visual effects. It was noted that the sensitivity of the receptors to a 400,000 tpy scenario may be much reduced from those values identified for the 140,000 tpy scenario, depending on the built character of the Clarington Energy Business Park at that time.

Development of the 400,000 tpy scenario would be considered to be a relatively minor additional visual component when existing and planned future developments are taken into account. In the future case, other existing projects in the PSVSA and LCSA would include the expansion of express toll route Highway 407 to connect to Highway 401 in the vicinity of the Facility, the expansion of the existing Darlington Nuclear Generating Station, and Clarington Energy Business Park would contain more business and industry than currently present.

Overall, it was found that the Facility is compatible with existing and/or proposed land uses at the maximum design scenario of 400,000 tpy.

The Facility is anticipated to have minimal overall net effects in regards to the potential for disruption to use and enjoyment of residential properties. Exposure of residents to minor nuisance effects will be minimal for most parameters such as odour, dust, litter and vermin based on the proposed design and operation of the Facility. The primary net effect of the Facility will be visual, as the two residential receptors have a clear line of sight to the Facility and are likely to experience a medium level of visual effects during operations of the expanded Facility.

The Facility is anticipated to have minimal to no overall net effects in regards to the potential for changes in community character. The Site is within an area designated for development as employment lands, is part of the CEBP, and is situated well away from built up communities. During operation the closest residential communities may be able to view a portion of the stacks, and are expected to experience a medium level visual effect, primarily due to the permanent nature of the change to the viewscape and the high number of viewers with a proprietary interest. Due to the built-up nature of the population centres that are further from the Site, the expanded Facility would only be a moderate change to the landscape. Additionally, the greater distance of these communities and the intervening visual obstructions would interfere with the line of sight to the Facility. These factors would result in unremarkable/minimal changes in the components or character of the landscape. Public participation in consultation activities indicate a level of interest in the community near the Facility and some concerns regarding health, safety and well-being that could affect perception of the community near the Site. Impact management measures regarding communication and environmental surveillance will address these matters.

The Facility is anticipated to have minimal overall net effects in regards to the potential for disruption to use and enjoyment of public facilities or institutions. During operation of the expanded Facility these public facilities or institutions are expected to experience a medium level visual effect. Some potential visual disturbance is already present as the landscape will continue to be influenced by human activities.

The Facility is anticipated to have minimal overall net effects in regards to the potential for disruption to use and enjoyment of cultural and recreational resources. There is limited to no potential for users of these recreational resources to be exposed to minor physical effects such as odour, dust, litter and vermin based on the proposed design and operation of the Facility and no potential for adverse effects related to traffic. No net effects related to operational noise are anticipated. During operation of the expanded Facility these recreational receptors are expected to experience a medium level visual effect. Some potential visual disturbance is already present as the landscape will continue to be influenced by human activities.

The 400,000 tpy Facility is anticipated to have minimal overall net effects in regards to its compatibility with existing land use designations and proposed land use changes. The Facility will be visible to the majority of existing and proposed land uses within 1 km, and no mitigation is possible to eliminate the visual effects of the Facility due to the minimal viewing distance from the adjacent roadways and properties. The visual characteristics of the Facility and the adjacent industrial landscape type are considered to exhibit minimal scenic attributes with respect to landscape distinction. There will be other visual disturbances as the landscape will continue to be influenced by human activities. The development of the Facility may encourage development of the CEBP given the investment in servicing infrastructure associated with the Facility and the future availability of district heating.

11.2.6 Traffic

This section summarizes the results of the technical study report titled *Traffic Assessment Technical Study Report,* prepared for use in the EA Study as well as for other regulatory requirements, for the 400,000 tpy operating scenario (see **Appendix C-10**).

The traffic assessment was based on a review of the existing and forecasted a.m. and p.m. road peak hours on a weekday, as this is generally the simultaneous peak for both commuter and Site traffic. Potential traffic effects were based on the observed and forecast traffic volumes for both the weekday a.m. and p.m. peak hours. A traffic assessment study of this nature is usually based on the forecasted traffic effects associated with the usual or typical traffic conditions that are to be experienced on a day-to-day basis at the Site during the a.m. and p.m. peak hours.

Trip generation for the Site during the operational period was based on 400,000 tpy of waste processing capacity for the Facility. Trip generation for the remaining uses within the Clarington Energy Business Park (CEBP) was based on Institution of Transportation Engineers (ITE) trip generation rates obtained from the ITE Trip Generation Manual, 8th Edition for corresponding land uses and their sizes.

For the purpose of the traffic assessment, a ten-year horizon period was selected to assess future traffic conditions. The Facility is expected to be operational by 2013, thus a 2023 horizon year reflects an appropriate assessment horizon (10 years from beginning of operations).

In the event that the 400,000 tpy scenario is reached before 2023, the traffic assessment will be updated to assess the traffic effects of the Project on the adjacent road network, and to identify any road and/or traffic control improvements required.

During operations, the Project is expected to generate up to 77 daily truck trips under the 400,000 tpy operating scenario. The Facility is expected to generate 40 trucks (inbound and outbound) and 22 cars during the peak hour operating at 400,000 tpy. No traffic control measures are required on the adjacent road network to accommodate traffic during operations of the Facility.

As described in Section 11.1.9, partial and full build-out of the future CEBP was used in the analysis under 2013 and 2023 traffic conditions. The future CEBP (excluding traffic generated by the Facility) is estimated to generate a total of 2,100 two-way trips once fully developed. Traffic associated with a partial development of the subject lands (Courtice Road to Osborne Road by 2013) was calculated to be in the 800 to 900 vehicles per hour range, or slightly less than 50% of total traffic under the full build-out scenario (2023 horizon year). The Facility, operating at 400,000 tpy, is anticipated to account for approximately 3.0% of the total trips generated in the fully developed CEBP.

Traffic control measures for the adjacent road network to address future traffic conditions in the CEBP are the same under the 140,000 tpy operating scenario.

As noted in Section 11.1.9, road/pavement improvements may be required to the South Service Road and Osborne Road to accommodate future trucks associated with the construction of the Facility, as well as site-generated trucks once the Facility is operational.

No other mitigation is required to address Facility related traffic under the 400,000 tpy operating scenario.

Some traffic control measures (traffic signals, loop ramps etc.) may be required to the adjacent road network to address future traffic conditions in the CEBP. The Host Community Agreement between Durham and the Municipality of Clarington includes the Region assuming the cost of construction of Energy Drive from Courtice Road to Osborne Road to serve the CEBP.

Operations traffic is not expected to have adverse traffic effects at the ramp terminal intersections and other study area intersections under the 400,000 tpy operating scenario. No traffic control measures are required on the adjacent road network to accommodate traffic during operations of the Facility at 400,000 tpy.

The future total traffic analysis without the development of the CEBP (assuming growth in background traffic based on historical traffic data) revealed acceptable operations at all study area intersections. Traffic control measures including signal changes may be required by the year 2023 with the full build-out of the CEBP.

11.2.7 Economic

This section summarizes the assessment of economic effects arising from the maximum design scenario of 400,000 tpy (400,000 tpy scenario). Generally, the methodology used to undertake the assessment was the same as was used for the 140,000 tpy Facility, although in many cases the potential effects cannot be quantified at this time.

Should the Facility be expanded to receive a waste throughput of 400,000 tpy, it is expected that overall there would be positive net effects on the economic environment within the LESA and RESA for the majority of economic criterion and indicators assessed in this Study.

It is anticipated that additional direct employment opportunities would be provided, beyond those identified for the approved design capacity of 140,000 tpy, as a result of expansion of the Facility. The increase in direct employment would have a positive impact on indirect and induced employment numbers. Additional employment opportunities would provide a positive effect on wages and salaries within the LESA and RESA. At this time it is not possible to quantify the potential direct, indirect and induced employment as the level of capital investment and labour required for the expansion has not yet been determined.

The potential effects on property values associated with the expansion of an existing Facility are expected to be minimal as the community would have first-hand experience that the Facility is operating effectively. Given that the potential expansion to 400,000 tpy could occur at some point during the 35-year planning period, it is anticipated that the potential for property value effects associated with 'perception' of the Facility would be minimized. It is anticipated that there should be minimal to no effect on property values associated with the potential Facility expansion.

The value of property taxes (or payment in lieu of taxes) paid to the Municipality of Clarington as a result of the Project under a 400,000 tpy operating scenario has yet to be determined, but would likely be the same as or greater than that paid under the 140,000 tpy scenario. In regards to impacts to the tax base related to the demand for local or regional services, the employment positions created during construction of the Facility expansion and any additional operating staff, are most likely to be filled by a combination of existing local/regional residents and potential new residents in Durham Region and is not expected to result in any significant increase in demands on local or regional services.

It is anticipated that there will be minimal disruption to the use and enjoyment of businesses and agricultural farms within the LESA during construction and operations of the expanded Facility. Potential disruptions during construction would be caused by physical effects from noise and visual aesthetics, however they are expected to be temporary and short-term in duration. During operations, the primary effect would be in regards to visual aesthetics as the buildings and stacks of the expanded Facility will be visible to businesses in the LESA. These receptors will be able to view the majority of the buildings on the Site, and are expected to experience a medium level visual effect. Some potential visual disturbance is already present as the landscape has already been influenced by human activities. Visual effects can be reduced through Facility design and landscaping.

The location of the Facility will be within the same Site as under the 140,000 tpy scenario, therefore, none of the 11 businesses and three farms currently operating in the LESA would be displaced as a result of the expanded Facility.

It is expected that qualified local contractors and businesses would see an increase demand for their products and services during construction of the expanded Facility.

11.2.8 Human Health and Ecological Risk

This section summarizes the human health and ecological risk assessment from the maximum design scenario of 400,000 tpy (400,000 tpy scenario). The methodology used to undertake the assessment was the same as was used for a 140,000 tpy Facility.

The results of the 400,000 tpy Facility assessment determined that for the majority of chemicals and operating scenarios there would be no undue risk from chemical emissions for either human or ecological health.

However, a limited number of chemicals under the Process Upset Case resulted in slightly elevated potential risks above the government benchmarks for human health. These include:

- maximum exposure to the 1 hour hydrogen chloride concentration at the commercial/industrial receptor location resulting in a CR of 1.0 which is at the benchmark; and,
- exposure of farmer infant to breast milk of a mother living in close proximity to the EFW facility under the Process Upset Case resulted in an infant dioxin and furan HQ of 0.22, slightly in excess of the government benchmark of 0.2.

There would be no undue risk to ecological receptors as a result of exposure to chemical emissions in the 400,000 tpy scenario.

The two slight exceedances of benchmark risk levels were seen when the Facility was operating under upset conditions, where two of the three air pollution control units were not operational, for the entire one hour period, and at the time of the worst meteorological conditions. The probability of this hypothetical situation actually occurring is expected to be very low.

Regardless, in the event that a 400,000 tpy expansion of the Facility is eventually contemplated, special consideration should be given at that time to ensure that Process Upset Conditions do not result in an undue risk to people living and working in the area surrounding the Facility.

11.2.9 Facility Energy and Life Cycle Assessment

This section summarizes the energy generation and life cycle assessment arising from the maximum design scenario of 400,000 tpy (400,000 tpy scenario).

The methodology used to undertake the assessment was largely the same as was used for a 140,000 tpy Facility (see Section 11.1.13.1 for details), however, some adjustments were required as follows:

- A higher efficiency of heat recovery can be achieved by extracting a lower grade heat than what was proposed by Covanta. In the interest of being conservative for the 140,000 tpy scenario Facility, only the approach proposed by Covanta was considered. However, for the 400,000 tpy scenario Facility, both heat recovery efficiencies are analyzed.
- The majority of the inputs to the LCA model for the 400,000 tpy scenario Facility are the same as with the 140,000 tpy scenario Facility. Input information that changed in the modeling were values proportional to the amount of waste being processed (i.e., quantities of waste, residual material, and recovered metals) and amounts of electrical energy and natural gas saved/displaced. Facility specifications, such as net plant heat rates and emissions factors, were assumed to remain the same.
- Processing 400,000 tpy of waste, would result in annual quantities of thermal treatment residuals as follows:
  - Bypass waste = 6,000 tonnes
  - Bottom ash = 84,000 tonnes
  - Fly ash/APC residue = 24,000 tonnes
  - Total material to disposal = 114,000 tonnes (28.5%)
- Metals recovery rates remain the same; however, with the increased capacity the annual tonnage of recovered metals would be 40,960 tonnes of ferrous and 1,200 tonnes of non-ferrous.
- The natural gas and electricity offsets from district heating and cooling would increase with the increase in Facility capacity. Two scenarios of heat recovery were considered for the 400,000 tpy scenario Facility: extraction of high grade heat as per the Covanta Proposal (low efficiency) and extraction of lower grade heat based on European experience (high efficiency).

European experience shows that approximately two units of heat can be produced for each unit of electricity produced by extracting the lower grade heat. However, with the extraction of this heat, electrical output is reduced to about 80% of what it would have been without any heat recovery. Alternately, based on the Covanta approach of extracting a higher grade heat, the heat output is approximately 60% of the electrical output.

The annual heating and cooling requirements for the Business Park that are displaced for the low efficiency scenario are as follows:

- Displaced Natural Gas Consumption (Heating only) = 13.28 million m^3/yr
- Displaced Natural Gas Consumption (Heating and Cooling) = 12.70 million m^3/yr
- Displaced Electricity Consumption (Cooling) = 7,498 MWh/yr

And for the high efficiency scenario:

- Displaced Natural Gas Consumption (Heating only) = 23.70 million m^3/yr
- Displaced Natural Gas Consumption (Heating and Cooling) = 23.70 million m^3/yr
- Displaced Electricity Consumption (Cooling) = 17,180 MWh/yr

Results show that there would be net energy production for all scenarios, therefore providing a local source of electrical and heat energy. At maximum capacity the Facility could potentially produce approximately 3,180,000 GJ/yr of energy when only electrical energy is recovered, 3,513,000 GJ/yr when, in addition, heat is also recovered for district heating at a high efficiency, and 3,593,000 GJ/yr when heat recovery for district cooling is added (also at a high efficiency).

Greenhouse gas (GHG) emissions, expressed in terms of metric tonnes of CO_2 equivalents (CO_2e) are reduced for all scenarios. For the electricity production only scenario, the indirect reduction in GHGs associated with electrical energy and materials recovery and avoided landfill methane emissions more than offset the direct GHG emissions from the Facility resulting in a net reduction of GHG emissions of 46,395 tonnes CO_2e.

Heat energy recovered for district heating offsets natural gas therefore offsetting a large amount of greenhouse gas emissions. The annual GHG emission reductions for the scenario with district heating only is up to 93,607 tonnes CO_2e and is up to 107,219 tonnes CO_2e when district cooling is also incorporated (maximum reductions reported for high efficiency scenario).

An increase in capacity of the Facility would provide the benefit of satisfying a greater portion of the Business Park heating and cooling requirements. Emissions to air increase, however the increases are proportional to the increase in waste, and there is the potential for greater GHG reductions.

11.2.10 Advantages and Disadvantages of the Undertaking (400,000 tpy)

The potential advantages and disadvantages associated with the Undertaking under the 400,000 tpy scenario are largely unchanged from those identified for the 140,000 tpy scenario, as there was little difference in the overall net effects that may exist after the application of impact management measures. This Section provides a qualitative discussion of the potential advantages and disadvantages of the Undertaking at 400,000 tpy based on the net (or residual) effects discussed in the previous sections.

As with the 140,000 tpy scenario, for many aspects of the environment there are neither advantages nor disadvantages, as no net effect of the Undertaking on the environment has been identified. The following is a summary of the aspects of the environment for which minimal to no effects are anticipated:

- In regards to air quality, similar to the 140,000 tpy scenario, intermittent vehicle and dust emissions are addressed through a variety of good construction practices. Emissions during Facility construction would be the same as any other medium-sized construction site in southern Ontario. Given the results of the assessment of air emissions, no risk to Human Health or Ecological Risk has been identified related to construction.
- During operation and “process upsets”, air emissions are predicted to meet applicable ambient air quality criteria and would meet or, more commonly, would be below the current air contaminant limits placed on municipal waste incinerators. The change in ozone formation due to Facility emissions is expected to be minimal based on the magnitudes of the maximum NOx and VOC emissions.
- The results of the air emissions modeling and HHERA indicate that during normal operations there would be no adverse health effects to human receptors exposed either by way of inhalation or via other environmental media to emissions from the Facility or from the operation of vehicles directly related to the Facility. In addition, there would be no adverse ecological effects associated with the emissions from the Facility during normal operations or “process upset” conditions.
- No adverse effects at offsite locations are expected from Facility-based odour given the proposed Facility design.
- Provisions are included in the Facility design for SWM on the Site to meet enhanced design guidance criteria found in the MOE *SWM Planning and Design Manual*, and proposed measures to reduce runoff potential provides an enhanced level of receiving water protection. During construction of the expanded Facility, the existing SWM pond should provide adequate stormwater retention and drawdown requirements. It is recommended that pond capacity expansion is undertaken in the early stages of the 400,000 tpy scenario construction.
- No effects to local groundwater resources are expected during construction or operations. The Site will be serviced via municipal infrastructure (sewer and water).
- The Facility would be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. There is a minor predicted increase in potential operational noise at some of the PORs for the maximum design capacity of 400,000 tpy compared to the approved design capacity of 140,000 tpy.

However, based on the results of the acoustical modelling considering ambient noise levels and predicted noise levels from the maximum design capacity (400,000 tpy scenario) Facility and traffic sources, the predicted noise levels at all nearby PORs are less than the applicable criteria (Class 2 noise limits).

- Effects to local wildlife and habitat are anticipated to be minimal given that: no populations of species of special concern, threatened and/or endangered species; no ANSI, PSWs or ESAs; and, no significant wildlife habitat, woodlands or wetlands are potentially affected by the Facility. In addition, no permanent watercourses are located onsite and no fish habitat or species are located onsite.
- The Facility is compatible with existing and planned land uses. During construction, minimal net effects are anticipated in the short-term to the closest social/cultural receptors related to noise/vibration, dust and visual effects. During operations, there will be minimal to no effect from most physical parameters (odour, noise, dust, vermin/vectors, litter and traffic) on residential properties, public facilities or institutions or cultural/recreational resources. It is anticipated the Facility would have a minimal effect on the landscape, while having an overall medium level visual effect on some receptors within 1km proximity to the Facility. Existing land use designations and proposed land use changes indicate that the area around the Site will continue to be occupied by a mixture of commercial/industrial land uses which would be compatible with the Facility.
- Stage 2 Archaeological Assessment identified no archaeological artifacts or sites of significance on the Site and there are no significant built heritage features on or near the Site.
- The Facility is anticipated to result in minimal disruption to the local traffic network. The only improvements proposed that would be specific to the Facility would be road/pavement improvements to the South Service Road and Osborne Road to accommodate construction and operational vehicles. No traffic control measures are required on the adjacent road network to accommodate traffic during operations of the Facility at 400,000 tpy. The future total traffic analysis without the development of the CEBP (assuming growth in background traffic based on historical traffic data) revealed acceptable operations at all study area intersections. Traffic control measures including signal changes may be required by the year 2023 with the full build-out of the CEBP.
- The Facility has the potential to have either a neutral or positive effect on property value in the immediate vicinity of the Site within the CEBP, given the investment in infrastructure (road access, district heating) associated with the Facility. In regards to the effect of the Facility on property value outside the CEBP, current European experience indicates that Thermal Treatment Facilities have no effect on the value or salability of property in areas around such facilities, while North American experience indicates that short-term effects may result from the perception of the impacts of proposed facilities that could be addressed through a CRP.

Potential advantages of the Undertaking include:

- An overall reduction in the environmental burden associated with residual waste disposal given that LCA indicates that the Facility would result in:

- A net reduction in overall GHG emissions, considering both direct emissions, indirect emissions/offsets associated with recovery of energy and metals and avoided methane emissions from landfill;
- An overall net reduction in emissions of Acid Gases and Smog Precursors;
- A net reduction in emissions to Water; and,
- Net energy production, with the Facility providing a local source of electrical and heat energy. At maximum capacity the Facility could potentially produce approximately 3,180,000 GJ/yr of energy when only electrical energy is recovered, 3,513,000 GJ/yr when, in addition, heat is also recovered for district heating at a high efficiency, and 3,593,000 GJ/yr when heat recovery for district cooling is added (also at a high efficiency).

- Recovery of approximately 42,160 tonnes annually of ferrous and non-ferrous metals from the post-diversion residual waste stream that would have otherwise been landfilled, particularly as the majority of these metals would be recovered from materials (e.g., mattress boxsprings) that are not acceptable in the Ontario Blue Box program.
- The Facility is expected to have a positive effect on the economic environment in the Region during construction and operations as:
  - During construction, the Facility will result in an increase in person-years of employment for the labour force directly employed to construct the Facility, increases in indirect employment and induced employment resulting from the purchase of goods and services by the labour force.
  - The Municipality of Clarington could benefit from the potential investment by Durham in infrastructure near the Facility The value of property taxes (or payment in lieu of taxes) paid to the Municipality of Clarington as a result of the Project under a 400,000 tpy operating scenario has yet to be determined, but would likely be the same as or greater than that paid under the 140,000 tpy scenario.
  - There is minimal potential for the Facility to disrupt the use and enjoyment of local businesses or agriculture, with the only anticipated effect being short-term noise and visual effects during construction. Local businesses stand to benefit from the investment in construction and during operations on local/regionally sourced labour, goods and services.

Potential disadvantages of the Undertaking include:

- Some potential exists for noise and vibration effects during the construction phase of the 400,000 tpy scenario Facility. Generally, vibration effects would be confined to a couple of hundred metres, but noise is not. There are two construction activities that are likely to create elevated sound levels that are difficult to mitigate. These are similar to the approved design capacity scenario and include pile driving activities associated with the construction at the Facility (if required) and potentially increased short-term (i.e., 1-hour) offsite vehicle traffic associated with construction. However, this would depend on the future road network. These activities would only be a concern during worst-case conditions. They are temporary and of short duration relative to the Facility construction, and would cease upon completion construction activities.

- The overall visual effect of the 400,000 tpy scenario, in addition to other planned and disclosed future projects, including the initial 140,000 tpy scenario, would likely result in minor visual effects. This is because it is expected that the landscape sensitivity and magnitude rankings would decrease over time because of the increased development in the area. Overall, the visual difference of the 400,000 tpy scenario Facility compared to the 140,000 tpy Facility would not be considerable.
- During potential "process upset" conditions, a limited number of chemicals resulted in slightly elevated potential risks above two government benchmarks for human health. The two slight exceedances of benchmark risk levels were seen when the Facility was operating under "process upset" conditions, where two out of three exhaust streams affected by a process upset such as start-up or equipment malfunction, for the entire one hour period, and at the time of the worst meteorological conditions. The probability of this hypothetical situation actually occurring is expected to be very low. Regardless, in the event that a 400,000 tpy expansion of the Facility is eventually contemplated, special consideration would be given at that time to ensure that "process upset" conditions do not result in an undue risk to people living and working in the area surrounding the Facility.

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Section 12 Summary

Although the EA Study document includes consideration of the appropriate level of details about the Undertaking at an EA level of detail as part of the planning process, the details of the Project will be refined and other changes may arise during the detailed design phase and/or during the construction and operational periods. This section describes the proposed procedure to accommodate changes to the Project. These changes could occur because the environmental setting has changed since the Undertaking was approved or there is a new technology of which the Regions would like to take advantage.

12. Changes to the EA

Although the EA Study document includes consideration of the Undertaking at an EA level of detail as part of the planning process, the details of the Project will be refined and other changes may arise during the detailed design phase and/or during the construction and operational periods. The following section describes the procedure to accommodate changes to the Project. In accordance with the EAA, a change to an undertaking, after it is approved may be considered a new undertaking. However, including change procedure in the environmental assessment will allow the Regions to make certain modifications to the approved Undertaking without having the change regarded as a new undertaking under the EAA.

In recognition of the fact that there could be changes to the Undertaking following its approval by the Minister under the EAA during detailed design and/or construction, Durham and York are proposing an amendment procedure to this EA Study. This amendment procedure would benefit all parties potentially involved by providing an agreed to and well understood approvals process for ensuring that proposed changes to the Undertaking are effectively and appropriately dealt with.

With this in mind, Durham and York are proposing that any refinements or changes to the Undertaking be first reviewed by them and then grouped into one of two categories:

- Category 1 - a minor amendment required; or,
- Category 2 - a major amendment required.

As a result of this approach, two amendment procedures are being proposed: one associated with Category 2 and one associated with Category 3.

12.1 Change Review Process

During the detailed design, construction or operation of the Undertaking, changes to some aspects of the Project may occur due to many factors, including:

a) unforeseen site-specific problems encountered only during detailed design, construction or operation;

b) normal course refinements in the design at the detailed design stage;

c) improvements in the design to provide greater environmental benefits and/or less adverse effects;

d) elements of the Project that were not previously envisioned;

e) circumstances that develop at the time of construction;

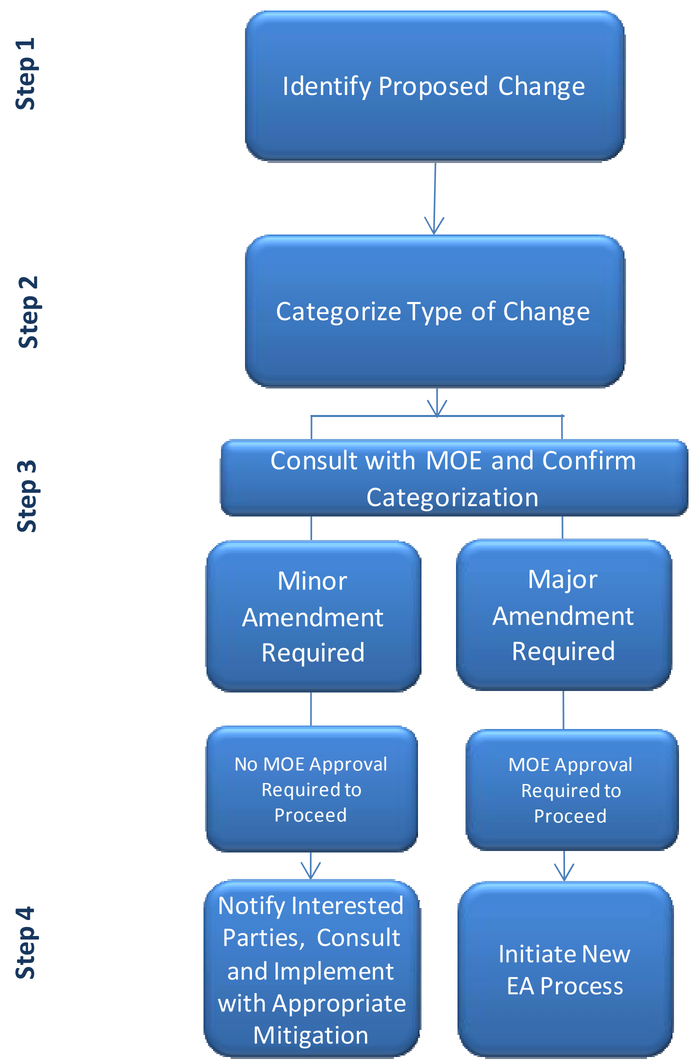
f) issues identified in other approvals processes;

g) changes to the regulatory framework (i.e., new legislation or regulations); and,

h) new opportunities or needs in relation to the Facility.

Where such changes may occur, a process must be followed to consider them within the context of the Minister approved EA in order to determine if an amendment to the EA is required based on the significance of the change. Therefore, any potentially material changes to the approved Undertaking will be considered by Durham and York for EA significance prior to them being carried out. Figure 12-1 presents the proposed process for identifying, assessing and implementing potential changes to the EA.

Figure 12-1 Proposed Change Review Process



With this in mind, the following questions will be applied to the proposed change as part of the review to determine how it should be dealt with within the context of the amendment procedures:

a) Is there a change to what was proposed to be built?

b) Is there a change to how something was to be built?

c) Is there a change to when something was to be built?

Durham and York will utilize the responses to these questions to determine how the proposed change will be dealt with. For example, in the case where a "Yes" is provided, then Durham and York in consultation with the MOE, will determine the significance of that change in terms of its potential effect on the environment, potential effects on stakeholders (including the public), and/or a commitment made in the Minister approved EA.

12.2 Minor Amendments

As the design of the Facility progresses, if a change is considered to be normal course refinement to the initial conceptual design of the Undertaking, then it is likely that no amendment would be required and Durham and York could go ahead and implement the change (although it may require other approvals issued by the Ministry to be amended (such as C of As). Potential examples of this would include the alteration or change in location or configuration of equipment within the previously defined development area, where the alteration or change results in similar or reduced potential effects that have been previously identified or included in the approved EA. In these circumstances the proponent would notify the MOE of the change but would not seek formal approval to proceed.

Proposed changes to the Undertaking of a minor nature that go beyond normal course refinements as the Facility design progresses would also be categorized as minor amendments. Minor changes would not alter the Undertaking significantly. Minor changes would not include changes identified in Ontario Regulation 101/07, as amended, that would trigger an EA.

In the case of a minor amendment, regardless of the changes proposed, the conclusion that the Undertaking is required, and its status as the Undertaking in relation to the other alternatives considered during the EA, would not be affected or opened to re-evaluation.

Some examples of proposed changes that would be considered as requiring a minor amendment include the following:

a) A change in the storage capacity or maximum rate of receipt of waste at the Site on any one day.

b) Implementation of onsite pre-processing of waste materials to recover additional materials and to improve fuel quality.

In these types of circumstances, the following process will be followed:

a) The Proponents will attempt to accommodate any concerns raised by any potentially directly affected stakeholders identified by the Regions.

b) The Proponents will implement the proposed change ensuring that any appropriate mitigation/compensation/enhancement measures are documented and provided for and carried out.

Consultation to be undertaken in support of minor amendments will be deteremined in consultation with the MOE, EAAB.

Should the minor amendment include matters requiring amendments to the C of As, then approval will be required by the Director of the MOE under Section 9 or Section 27 of the EPA.

12.3 Major Amendments

Proposed changes to the Undertaking of a more significant nature would be categorized as major amendments. In general, these proposed changes would alter the Undertaking significantly.

Some examples of these proposed changes would include the following:

a) A change that increases the amount of waste that is authorized to be thermally treated at the Facility on any one day;

b) A change that would result in a change in the Service Area for the Facility.

Where the proposed change is determined to be a major amendment, Durham and York will be subject to a new environmental assessment process for the major amendment in accordance with Ontario Regulation 101/07, as amended, under the EAA.

In the case of a major amendment, regardless of the changes proposed, the conclusion that the Undertaking is required, and its status as the Undertaking in relation to the other alternatives considered during the EA Study, would not be affected or opened to re-evaluation. Therefore, the scope of the new environmental assessment process would focus on the proposed change that is determined to be a major amendment.

12.4 Applicability of Ontario Regulation 101/07 – Waste Management Projects

The Undertaking would be classified as a thermal treatment site under Section 11 (1) 2 of O. Reg. 101/07 as the proposed Facility would be a: "Thermal treatment site that does not use coal, oil or petroleum coke as a fuel for thermal treatment and that produces EFW". Such projects are not subject to Part II of the EAA.

As set out in O. Reg. 101/07 environmental screening is required for the following changes:

- a Thermal Treatment Site as described in section:11(1)2, 11(1)3 or 11(2) for a change that increases the amount of waste that is authorized to be thermally treated at the site on any day, in accordance with Section 17 of O. Reg. 101/07; and,
- A Waste Disposal Site as described in section 2(1), 11(1) or 11(2) for a change that would include new area to the geographic area from which the site is authorized to receive waste, in accordance with Section 18 of O. Reg. 101/07.

The Undertaking for which approval is being sought is a Thermal Treatment Facility that does not use coal, oil or petroleum coke as a fuel for thermal treatment and that produces Energy-from-Waste, capable of processing 140,000 tpy. The Certificate of Approval for the Facility will be sought for the initial design capacity of the Facility and therefore, should the Regions proceed with an expansion in the future, additional studies would be required to support the increase in capacity. This work would be required to be completed, to meet the environmental screening requirements under Ontario Regulation 101/07, as amended, (or the applicable piece of legislation at the time of expansion) subject to interpretation by the Ministry of the Environment.

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To ensure the Facility is designed, constructed and operated in accordance with the recommendations set out in this EA Study document, the Regions have developed a plan that sets out how and when all commitments, including impact management measures, made in the EA Study document will be fulfilled. This plan also documents how the Regions will report to the Ministry on compliance.

All assumed environmental mitigation and commitments to future work during construction, operation, and post-closure with respect to the Undertaking for the EA in general as well as those found in the site-specific technical study reports have been documented in this section.

13. Commitments

To ensure the Facility is designed, constructed and operated in accordance with the recommendations set out in this EA, the Regions have developed a plan that sets out how and when all commitments, including impact management measures, made in the document will be fulfilled. This plan also documents how the Regions will report to the Ministry on compliance with these commitments. As per the Ministry's Codes of Practice, this information has been summarized in a single table. The table has columns that include a brief description of all commitments, where in the document the commitment is mentioned and when each commitment will be fulfilled. Since the EA has not yet been approved at the time of submission of this EA Study document, information regarding conditions of approval cannot be included as a decision has not yet been made. If approval is granted and conditions are imposed, the approach to documenting those conditions will be similar to the approach taken to documenting the commitments.

Table 13-1 documents all environmental mitigation and commitments to future work during construction, operation, and post-closure with respect to the Proposed Undertaking.

- "Construction" is considered to be prior to and/or during construction activities (as required) based on the estimated 3 year construction period commencing in 2011-2014.
- "Operation" is considered to be prior to and/or during operations (as required).
- "Post-closure" is considered to be the time after the Undertaking will be closed, which typically includes decommissioning, post-closure monitoring and property maintenance.

It should be noted that the details of the impact mitigation management and future work measures will be refined, clarified and updated through the subsequent EPA and other approvals processes required to construct and operate the Facility. It is intended and anticipated that those refined impact mitigation management and future work measures will be addressed through the terms and conditions of those subsequent approvals as is normally the case. Once subsequent approvals are issued, compliance reporting under this EA can terminate for matters that are addressed in those subsequent approvals.

Table 13-1 Summary of Environmental Mitigation and Commitments to Future Work

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
General	2	Construction / Operation / Post Closure	• The Proponents commit that if approval to proceed with the Undertaking is given, it will be the Proponents who are legally responsible for carrying out the Undertaking as approved.
General	11	Operation	• The Regions will undertake an evaluation of post-closure uses for the property associated with the Project, at the appropriate time when the Project is nearing the end of its life expectancy.
General	11	Post Closure	• Decommissioning of the Facility will be conducted in compliance with applicable regulatory requirements at the time of decommissioning.
General	11.2	Construction / Operation	• Environmental protection awareness, spill prevention planning and contingency training will be implemented for all employees as necessary and appropriate.
General	15	Construction / Operation / Post Closure	• The Regions will prepare and submit to the Director of the EAAB of the Ontario MOE an EA Compliance Monitoring Program.
Air Quality	11.1	Construction	***Air quality related mitigation/management during construction*** Mitigation and environmental management / monitoring measures will include: • Employment of controlled entrances and exits at the construction site to minimize the offsite tracking of mud. • Temporary and permanent grassing in disturbed areas. • Dust control during dry periods. • Possible implementation of an idling protocol as required. • Adherence to an equipment maintenance program. • Ambient air quality monitoring for particulate matter will be undertaken to monitor the effectiveness of the mitigation measures.
		Operation	***Air quality related mitigation/management during operation*** Mitigation and environmental management / monitoring measures will include: • The following emissions control equipment will be incorporated into the design of the Facility: o very low NOx (VLN) system in the Facility's stoker;

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
			o SNCR for additional NOx control; o activated carbon injection after the economizer for mercury and dioxin/furan control; o acid gas scrubber for the removal of gases such as SO_2 and HCl; and, o a fabric filter baghouse to remove solid particulate matter. • The application of design and operations pre-processing odour control measures such as enclosed loading, negative air pressure inside the Facility and fully-enclosed feedstock delivery trucks. • Provision of a CEM system to monitor and record: o The baghouse outlet for opacity, moisture, CO, O_2 , NOx, SO_2, HCL and HF. Opacity measurements will be used to as the filter bag leak detection system. o The economizer outlet for O_2, SO_2 and CO. o Flue gas temperatures at the inlet of the boiler convection section and at the baghouse inlet. o The temperature and pressure of the feedwater and steam for each boiler. o The mass flow rate of steam at each boiler. • A long-term continuous dioxins sampling device will be installed to monitor the adsorption of dioxins onto the exchangeable adsorption-resin-filled cartridge. • Emissions (stack) testing and monitoring protocol as required for the C of A under the EPA. • NPRI emissions reporting that will entail a combination of monitoring or direct measurement, mass balance, process-specific emissions factors and engineering estimates. • Proposed ambient air quality monitoring in the immediate vicinity of the Facility for a 3-year period.
Surface Water and Groundwater	11.2	Construction	***Surface water, storm water, and groundwater related mitigation / management during construction*** Mitigation and environmental management / monitoring measures will include: • Construction phase drainage will route stormwater from throughout the Site to a stormwater sedimentation pond and to the extent feasible, maintain existing drainage routes. Permanent SWM ponds may be constructed early to reduce need for sedimentation ponds.

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
			• Use of perimeter ditching and site grading as well as silt fencing around forested areas to isolate runoff. • Use of setback transition use areas and erosion control fencing along watercourses. • ESC will be implemented during the construction phase to reduce potential soil loss and runoff velocities. • During the construction phase, stormwater will be routed via conveyance swales and/or storm sewers draining catchbasins to a SWM pond in the southwest corner of the Site. • The pond will discharge to the CN Rail swale and stormwater will subsequently be conveyed to Tooley Creek. • In addition to the pond, lot level, and conveyance controls such as surface stabilization measures, sediment traps, and swales enhanced with rock check dams will also be employed. • Grading plans will be designed to maintain existing drainage patterns which will ensure all captured stormwater will be routed through SWM features. • Dewatering and excavation pumping is expected in order to establish a sufficiently dry environment to construct the Facility foundations. • A series of groundwater monitoring wells may be installed within the Site to assess the Facility's effects on both groundwater quantity and quality during construction to be determined at subsequent approvals stage.
		Operation	***Surface water, storm water, and groundwater related mitigation / management during operation*** Mitigation and environmental management / monitoring measures will include: • Storm water pond design criteria will meet enhanced design guidance criteria found in the MOE SWM Planning and Design Manual; • Increase in runoff potential will be mitigated with peak flow attenuation, baseflow augmentation and SWM design that provides an enhanced level of receiving water protection; • Accidents and malfunctions planning and spill management redundancy and stormwater control from source to discharge will ensure the protection of surface water and groundwater resources. • Monitoring of stormwater end-of-pipe Facility discharge quality (as required as

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
			part of C of A);
Soils	11.2 and 11.3	Construction	***Soils related (geotechnical and erosion and sedimentation) mitigation / management during construction*** Mitigation and environmental management / monitoring measures will include: • Topsoil and subsoil salvage and storage. • Apply erosion and sedimentation control measures (also described in surface water).
Acoustic	11.4	Construction	***Noise related mitigation / management during construction*** Mitigation and environmental management / monitoring measures will include: • Pile driving effects will be reduced through alternative technologies (e.g., vibratory pile driving), controls, and scheduling. • Construction vehicle traffic is predicted to be acceptable against applicable criteria, but short-term (i.e., 1-hour) effects during peak demand are possible. These peaking issues will be reduced through scheduling and planning of vehicle trips. • A monitoring program and contingency plan will be implemented to address any issues that may arise during the construction and post-closure periods of the Facility.
		Operation	***Noise related mitigation / management during operation*** Mitigation and environmental management / monitoring measures will include: • The Facility will be designed to current standards incorporating efficiencies and design enhancements that reduce sound emissions. • Where necessary, mitigation measures will be included to ensure applicable noise criteria are met at PORs as predicted. • Mitigation measures may include the use of equipment control options such as enclosures, local or property-line barriers, mufflers and silencers, and acoustic baffles or insulation.
Visual	11.5	Construction	***Visual related mitigation / management during construction*** Mitigation and environmental management / monitoring measures will include: • Staging of construction activities. • Timely removal of construction debris.

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
			• A monitoring program and contingency plan will be implemented to address any issues that may arise during the construction of the Facility. • Investment in architectural enhancements to the Facility.
		Operation	***Visual related mitigation / management during operation*** Mitigation and environmental management / monitoring measures will include: • The use of neutral external colours and effective landscaping. • If concerns regarding Facility visibility are raised by members of the community in the vicinity of the Facility, mitigation measures will be considered such as planting trees or other suitable vegetation at the particular location to provide a screen within the line of the sight of the Facility.
Natural Environment	11.6	Construction	***Natural environment related mitigation / management during construction*** Mitigation and environmental management / monitoring measures will include: • Protective protocols to avoid killing or harming wildlife during Project activities. • Wildlife corridor along the entire east-west length of the Facility's southern property line may be established to enhance wildlife movement. • Native tree and shrub species will be planted and existing species allowed to grow without disturbance providing additional habitat. • Undertake a pre-construction survey to assess bird nesting activity prior to clearing and grubbing. • Habitat enhancement for Chimney Swifts, if present onsite, and once construction has been completed, compensation for the loss of hedgerow by incorporating native shrubs and trees into landscaping for the Facility.
Social / Cultural *(also includes consideration archaeological and traffic related commitments)*	11.7, 11.8, and 11.9	Construction	***Social / Cultural related mitigation / management during construction*** Mitigation and environmental management / monitoring measures will include: • See Noise above for related mitigation / management measures. • See Visual above for related mitigation / management measures • Dust control during construction will be accomplished through a number of physical and operational methods such as construction exits, timely revegetation, watering, and staging of work. • Deeply buried archaeological resources could still exist and standard conditions regarding discovery of human remains and/or other cultural heritage

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
			values will apply. • Road/pavement improvements to the South Service Road and Osborne Road to accommodate construction vehicles. • Formation of a Thermal Treatment Facility Site Liaison Committee (SLC) for the construction period. • Development and implementation of a Community Relations Plan (CRP) through which Durham, York, and Covanta staff will relate to the local community, including advance notification to local authorities and residents near the Facility of any planned unusual noises or activities (e.g., pile driving, steam blows) or other events that may be of concern to the local community during the construction phase. The plan will also establish contacts and procedures for providing accurate and timely information to the community in the event of an unforeseen incident that may cause concern or impact upon the community. • Development and implementation of a community complaints system for construction.
		Operation	***Social / Cultural related mitigation / management during operation*** Mitigation and environmental management / monitoring measures will include: • Mitigation of odours during operation includes: o Management of residual waste on enclosed vehicles and on enclosed tipping floor; and, o Air from tipping floor is used as combustion air, destroying odours and maintaining negative pressure within receiving area. • See Noise above for related mitigation / management measures. • See Visual above for related mitigation / management measures • Mitigation of dust during operation includes: o Management of residual waste on enclosed vehicles and on enclosed tipping floor; and, o Management of ash and residues using various measures to reduce ash emissions. • Mitigation of vectors/vermin through pest/vector control. • Mitigation of litter through implementation of litter control program throughout

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
			the Site. • Some traffic control measures (traffic signals, loop ramps, etc.) may be required to the adjacent road network to address future traffic conditions in the CEBP. • The Host Community Agreement between Durham and the Municipality of Clarington includes the Region assuming the cost of construction of Energy Drive from Courtice Road to Osborne Road to serve the CEBP. • Soil testing for contaminants for a minimum of three years at which time its effectiveness will be evaluated (recommendation by Durham Region Medical Officer of Health, endorsed by both Regional Councils) • Formation of a Thermal Treatment Facility Site Liaison Committee SLC for the operations period. • See construction above regarding development and implementation of a CRP. • See construction above regarding development and implementation of a community complaints system for operations.
Economic	11.10	Construction / Operation	***Economic related mitigation / management during construction and operation*** Mitigation and environmental management / monitoring measures will include: • See Social / Cultural above regarding the development and Implementation of a Community Relations Plan. • In order to mitigate the effects of the Facility on the Local Tax base in Clarington, the proposed Host Community Agreement between Durham and the Municipality of Clarington includes the Region assuming the cost of: o Establishment of a hazardous waste depot to serve Clarington residents; o Construction of Energy Drive from Courtice Road to Osborne Road to serve the Energy Park; o Construction of a SWM Facility to serve the Energy Park; o Construction of a waterfront trail from Courtice Road to the eastern limit of the Durham property; o Transfer of 22 acres of surplus land adjacent to the Courtice WPCP to Clarington; and, o Commencement of the EA for servicing the Clarington Science Park. • See Noise above for related mitigation / management measures.

Environmental Element/Concern and Potential Effect	Relevant Section of EA	Implementation Period	Summary of Environmental Mitigation and Commitments to Future Work
			• See Visual above for related mitigation / management measures • See Social / Cultural above regarding the finalization and execution of the Host Community Agreement between Durham and the Municipality of Clarington.
Human Health and Ecological Risk	11.1 and 11.11	Construction / Operation	• Refer to "Air Quality" above.

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Section 14 has no tables

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Section 14 Summary

To ensure compliance with the EA Study during construction, operation and closure, the Regions will prepare and submit an Environmental Assessment Compliance Monitoring Program to the MOE. The program will include monitoring of the fulfillment of the EA Study document's mitigation measures, consultation, further studies and work to be carried out, as well as commitments made and described in the EA Study.

14. Monitoring Program

To ensure commitments made in the EA with respect to the fulfillment of the EA Study's proposed mitigation measures, consultation, further studies and work to be carried out, as well as commitments made and described in the EA Study (Section 11; summarized in Section 13), including any conditions of EA approval are appropriately implemented, the Regions will prepare a comprehensive monitoring program to address all phases of the Proposed Undertaking, as required, including planning, detailed design, construction, operation, closure, and decommissioning. The program will contain an implementation schedule to be followed for fulfillment of the commitments. The program will be submitted to the MOE on the later of one year following the end of the month after approval of the EA Study or 60 days before the commencement of construction.

It is anticipated that commitments with respect to implementation of mitigation and monitoring made in the EA and any subsequent conditions of EA approval for Facility operation would be reiterated in the conditions of approval for the Facility's Certificates of Approval under the EPA and OWRA. As a result, compliance related activities with respect to Facility operations including monitoring and mitigation would be addressed as part of the annual reporting requirements for the Facility under the EPA and OWRA. As part of the EPA and OWRA permitting processes, additional work, based on a greater level of detailed design will be undertaken as appropriate. Through this additional design and study, the need to refine some EA level mitigation and monitoring requirements may be required. As a result, the EPA and OWRA conditions of approval will potentially refine or supersede, as applicable, some of the EA level commitments and recommendations.

The Regions will maintain copies of all compliance reports onsite and will make the reports available in a timely manner to the MOE upon request.

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There are no figures in this section.

Section 15 Summary

The proponent is committed to ensuring that all applicable regulatory requirements related to the Undertaking will be met. In addition to the EA requirements, there are other approvals and agreements that are potentially applicable to the Proposed Undertaking. These approvals include such things as a municipal building permit, site plan approval, Certificates of Approval under the *Environmental Protection Act*, etc.

15. Additional Approval Requirements

As described in the EA Terms of Reference, all applicable regulatory requirements related to the Proposed Undertaking will be met. In addition to the EA requirements, the following table (Table 15-1) describes approvals, agreements and other potentially applicable requirements for the Proposed Undertaking.

Table 15-1 Additional Approval Requirements

Additional Approval / Permit Required	Rationale / Requirements	Work Completed to Date	Comments
Municipality of Clarington			
Building Permit (Municipality of Clarington Building By-Law and *Building Code Act*, 1992). Site Plan Approval (Municipality of Clarington By-Law 2007-132 and *Planning Act*, Section 41).	Site plan approval resulting in a building permit. A municipal building permit would be needed for any new structure. This would require: • Set of working drawings; • Site plan showing setback dimensions; • Ontario Land Surveyors drawing; and, • Entrance Approval on Municipal, County or Provincial Roads.	As part of the DBO RFP, Covanta prepared conceptual designs of the proposed Thermal Treatment Facility. Upon signing the Project Agreement contract, Covanta will prepare detailed designs which will be utilized to secure Building Permit approvals.	Based on the work completed to date, no issues have been identified that would prevent receipt of this permit.
Stormwater Infrastructure Permit and Discharge to Sewer Permit (Region of Durham Sewer Use By-Law 43-2004).	A permit may be required for infrastructure associated with the SWM system, such as piping (typically addressed during Site Planning process). A permit would be required for the disposal of water to the Municipality's Storm Sewers.	Refer to the *Surface Water and Groundwater – Technical Study Report* for a detailed assessment of stormwater infrastructure requirements and potential discharge to the local sanitary sewer.	Based on the work completed to date, no issues have been identified that would prevent receipt of these permits.
Tree Cutting By-Law (Municipality of Clarington By-Law 97-35; Durham By-Law 27-2008).	Permits may be required where trees are to be removed or trimmed to permit construction.	The majority of onsite vegetation will be cleared to facilitate construction of the Facility. Where possible, mature trees will be maintained.	Based on the work completed to date, no issues have been identified that would prevent receipt of this approval.
Noise By-Laws (Municipality of Clarington Noise By-Law 2007-071).	If necessary, Durham and York will require exemptions to the municipal by-law for construction noise from the Municipality of Clarington. Exceptions include requirements for operation beyond standard work hours of 7:00 a.m. and 7:00 p.m. Monday to Saturday, or to operate construction equipment that exceeds MOE noise	Refer to the *Acoustic Assessment – Technical Study Report* for a detailed assessment of potential noise impacts and proposed mitigation/impact management measures	Based on the work completed to date, no issues have been identified that would prevent receipt of this approval. Consultation with the Municipality of Clarington will be completed during construction and operation.

Additional Approval / Permit Required	Rationale / Requirements	Work Completed to Date	Comments
	guideline NPC-115 levels applicable to maximum construction equipment levels.		
Drinking Water Supply (Durham By-Law 89-2003).	The local Municipality would govern the use of, and connection to, the pre-existing watermains.	Refer to the *Surface Water and Groundwater Assessment - Technical Study Report* for a detailed assessment of water supply requirements	Based on the work completed to date, no issues have been identified that would prevent receipt of this approval.
Wastewater Discharge (Durham Sewer Use By-Law 43-2004).	The effluent would be required to meet Durham's guidelines in Part 2 of the Sewer Use By-law 43-2004.	Refer to the *Surface Water and Groundwater Assessment - Technical Study Report* for a detailed assessment of wastewater discharge from the facility.	Based on the work completed to date, no issues have been identified that would prevent receipt of this approval.
Utilities			
General Utilities	Appropriate agreements be in place with the appropriate utilities to provide the required services (electricity, telephone, etc.) during the construction and operation of the Facility.		
Power Purchase Agreement (PPA)	The power purchase agreement (PPA) is the legal contract that will be required between Durham and York and the OPA for the sale of electricity from the Facility. The PPA defines the price at which the OPA procures the electricity and the Terms and Conditions under which it does so.	A formal letter was received from the Ministry of Energy and Infrastructure confirming that the OPA has been directed to enter into negotiations with the proponents of the Durham York facility for the procurement of electricity at a price of eight cents per kilowatt hour. Three qualifying requirements were stated in the letter as follows: 1) The Durham-York Facility must obtain all required licenses and approvals for commercial operation as an EFW electricity generation facility in Ontario. 2) The Durham-York Facility	Further to requirement 3) the Hydro One Networks Inc. (HONI) Connection Impact Assessment (CIA) Application - Form B, the HONI CIA Study Agreement and the Independent Electrical System Operator (IESO)/HONI joint System Impact Assessment/Customer Impact Assessment package (Form 1536) have all been submitted resulting in Hydro One completing a CIA for the project as well as a Class "C" Connection Cost Estimate (+/- 50%).

Additional Approval / Permit Required	Rationale / Requirements	Work Completed to Date	Comments
		must meet or exceed emissions, waste diversion and any other requirements established by the Ontario MOE for the purposes of the initiative. 3) The Durham-York Facility must be capable of connecting to, and conveying electricity into, out of and through, either a local electricity distributor's distribution system or the IESO-controlled grid, without additional cost to that system or the grid.	
Capital Cost Recovery Agreement (CCRA)	With respect to the next step, it has been recommended that the Project proceed directly to the Capital Cost Recovery Agreement (CCRA) based on the CIA and the Class "C" Connection Cost Estimate of $411,200 which includes capital upgrades to the existing Hydro One system for final connection but not any line expansion work which may be required. At this stage the Hydro One relationship lead interface should be transferred from the Region to Covanta who will design, build and operate the Facility. This would be the logical point to transfer the Hydro One interface to Covanta as equipment specific details will be required to fully proceed with the CCRA.		All of these electrical applications will have to be revised and the studies refined to incorporate updated vendor specific information including the actual estimated output from the facility. There may be additional fees payable to HONI and IESO for these revisions.
Provincial – Ontario Ministry of the Environment			

Additional Approval / Permit Required	Rationale / Requirements	Work Completed to Date	Comments
Environmental Assessment Act (EAA)	The EA must satisfy the requirements of the Approved Terms of Reference and the requirements of the EAA.	Completed Environmental Assessment and all associated technical study reports supporting the environmental assessment.	The Environmental Assessment has been prepared in accordance with the requirements of the Approved Terms of Reference and the *Environmental Assessment Act*.
Environmental Protection Act (EPA)	**Section 9 – Air and Noise** C of A for air emissions would be required under Section 9 of the EPA in regards to point-of-impingement (POI) standards, end-of-stack standards and ambient air quality standards. Noise emissions would also be addressed under this approval. Requires the preparation of a C of A application.	Refer to *the Air Quality Assessment – Technical Study Report* and the *Acoustic Assessment – Technical Study Report*.	Based on the work completed to date, no issues have been identified that would prevent issuance of this C of A.
Environmental Protection Act (EPA)	**Section 27 - Waste** C of A under Part V, Section 27 of the EPA requires that a C of A (Waste) be issued for the use, operation, establishment, alteration, or enlargement or extension of a waste management system or waste disposal site**.**	Details with respect to the design and operations of the facility have been included in Section 10.0 – Identification and Description of the Undertaking. Each of the Site Specific Studies has been completed based on the conceptual design and proposed operating parameters supplied by the Preferred Vendor.	Based on the work completed to date, no issues have been identified that would prevent issuance of this C of A.
Ontario Water Resources Act (OWRA)	Under Ontario Regulation 387/04, the Water Taking and Transfer Regulation, the extraction of groundwater resources are regulated and guidance criteria explained. A Permit To Take Water (PTTW) (**Section 34**) may be required for construction dewatering. A C of A (Industrial Sewage Works) is required to establish, alter, extend or replace new or existing sewage works	Refer to the *Surface Water and Groundwater Assessment - Technical Study Report* for a detailed assessment of potential water impacts.	Based on the work completed to date, no issues have been identified that would prevent issuance of this C of A.

Additional Approval / Permit Required	Rationale / Requirements	Work Completed to Date	Comments
	used for the collection, transmission, treatment or disposal of wastewater to the environment. As required under **Section 53**, an application for a C of A (Industrial Sewage Works) must be submitted to the MOE for the Facility in the event that it would be discharging industrial wastewater and stormwater to a receiving waterbody. It is anticipated that a C of A for stormwater would be required for the Facility.		
Ministry of Culture			
Letter of Concurrence	A Letter of Concurrence is required from the Ministry of Culture agreeing with Archaeological Assessment prior to any construction activities on the site.	Refer to the *Stage 2 Archaeological Assessment and Built Heritage, Clarington 01 Site, Township of Clarington, Durham, Ontario.*	Based on the work completed to date, no issues have been identified that would prevent issuance of this clearance.
International			
Canada – U.S. Air Quality Agreement	As the Project would be located within 100 km of the U.S. border (approximately 27 km), notification under Article V of the Ozone Annex to the Canada – U.S. Air Quality Agreement would be required.	Refer to the *Air Quality Assessment – Technical Study Report*. Notification has been submitted as per requirement.	Based on the work completed to date, no issues have been identified with respect to this agreement.

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Section 16 Summary

Throughout the EA process, a considerable level of effort has been expended on consultation. The consultation summary provides an overview of all consultation activities undertaken during the EA Study. It documents the consultation activities conducted during the EA process, in accordance with the requirements of the EAA, the Approved Terms of Reference, and the Consultation Code of Practice. Consultation completed as part of the EA process includes input received from interested parties including the general public, government agencies, non-governmental organizations (NGOs) and First Nations, all of which have provided feedback that has been, and will continue to be, considered as the Project continues forward.

As part of the Communications Strategy developed by the Regions, consultation was undertaken through the development of public liaison committees such as the Joint Waste Management Group and the Site Liaison Committee, consultation with Government Agencies, First Nations, the public and other interested parties (e.g., non-governmental organizations).

Notification and dissemination of information was undertaken through newspaper, radio and TV advertising, a mailing list, and an EA Study website (www.durhamyorkwaste.ca) maintained throughout the course of the EA Study. Consultation included public polling, consultation events such as public information centres, and opportunities for delegations at Regional Committee and Council meetings.

Although opportunities for public input were available throughout the EA Study, consultation events typically took place during major milestones such as upon the identification of the preferred technology, Short-list of sites, and the preferred site; and for the results of the draft EA Study document and draft site-specific studies.

These consultation events have been summarized in the EA Study document, and are described in more detail in the Record of Consultation (RoC). The RoC has been submitted as a separate document to the EA Study.

16. Consultation Summary

This summary of consultation provides an overview of the consultation process undertaken during the EA Study as described in detail in the Record of Consultation (RoC). The consultation process followed during the EA satisfies the consultation requirements set out in the Approved Terms of Reference and meets the consultation guidelines set out in the *Code of Practice: Consultation in Ontario's Environmental Assessment Process, June 2007* (Consultation Code of Practice).

The RoC documents the consultation activities conducted during the EA process, in accordance with the requirements of the EAA, the Approved EA Terms of Reference, and the Consultation Code of Practice. This RoC was completed as part of the EA process and includes input received from interested parties including the general public, government agencies (including the federal government), non-governmental organizations (NGOs) and First Nations, all of which have provided feedback that has been, and will continue to be, considered as the Project continues forward.

The RoC has been submitted as a separate document to the EA Study.

16.1 Consultation in Accordance with the Approved Terms of Reference

The consultation process documented in the RoC has addressed the objectives for consultation set out in the Approved Terms of Reference, which were to:

- engage interested and potentially affected parties in a timely, transparent consultation process designed to meet the needs of Durham/York and its stakeholders;
- determine the appropriate consultation methods;
- promote effective, proactive and responsive communications that allow for:
  - o the provision of information about the EA Study;
  - o issues, areas of concern or support to be considered and addressed; and,
  - o accurate and consistent responses.
- track and document communications between Durham and York Regions (the Regions) and interested parties including how comments may be considered in the EA process; and,
- meet consultation requirements under the EAA.

Regional representatives, First Nations, Government Agencies, interested parties and elected representatives and spokespersons for the local residents were consulted throughout the EA.

Key consultation milestones were set out in the Approved Terms of Reference for the purpose of consultation during the EA. These milestones were adjusted as necessary during the EA to include additional points of consultation, such as consultation on the generic human health and ecological risk assessment and on the draft results of the EA.

Table 16-1 illustrates the public consultation activities undertaken at key milestones in the EA Study. The number in parentheses indicates the number of sessions held for that particular milestone. In comparison with the consultation plan set out in the Approved EA Terms of Reference, the final consultation plan as completed in support of this EA included both additional consultation milestones and a broader scope of consultation activities at each milestone.

Table 16-1 Public Consultation at Key Milestones in EA Study

Timeframe	Key Milestones as set out in EA Terms of Reference	Public Information Sessions		Polling	GRT Workshops	Drop-in Centre	First Nation Sessions	Delegations
		Open House	Formal Presentation Q&A session					
March ‘06	Review of “Alternatives to” Evaluation Methodology & Criteria		✓ (6)	✓(1)				
May '06	Identification of Preferred System		✓ (6)	✓(1)				✓ (2)
Sept. '06	Review of “Alternative Methods” (Facility Siting) Methodology & Criteria		✓ (6)	✓(1)	✓ (2)			
Apr. '07	Identification of the Short-Listed Sites		✓ (4)					
June - July '07	Results of Generic HHERA Study		✓ (5)			✓ (1)		
Oct. - Dec. '07	Identification of Consultant's Recommended Site		✓ (3)	✓(1)				
April – May ‘09	Draft Results of EA				✓ (2)			
May ‘09	Results of Site-specific Studies	✓ (2)	✓ (2)				✓ (2)	

In addition, the principle of continuous consultation based on multiple points of contact (web, email, 1-866 number, and mailing address) and numerous consultation opportunities was ascribed to throughout the EA.

16.2 Consultation in Accordance with the Code of Practice

The consultation process was structured to meet the guidelines for consultation as set out in the Code of Practice for consultation under the EAA. The Code of Practice outlines the obligations for consultation under the EAA, the consultation requirements for an individual EA, strategies for the development of consultation plans and the roles and responsibilities of various parties in the process.

The consultation process used for this EA generally followed the process suggested for a project of medium to high complexity (only a few alternatives) and high environmental sensitivity. Consultation opportunities were provided early in the process to identify concerns and develop the study work plans and to provide input to the comparative evaluation criteria that were used in the EA. All notification requirements for key milestones and public events were met in the consultation process as described in detail in the RoC and summarized in this section of the EA.

The Code of Practice notes the documentation requirements for the consultative process. These documentation requirements, as addressed in the RoC and summarized in the EA Study document as appropriate, include the following:

- A description of the consultation process completed (schedule of events, methods used to consult);
- A description of the consultation that has taken place, with whom (list of persons and Aboriginal communities consulted) and the purpose;
- Identification of how consultation results were considered in the Regions' planning and decision-making process. This is addressed generally in the EA Study document and in the detailed comment/response tables included in the appendices of the RoC;
- Identification of concerns that were raised and how the Regions responded. This is addressed in the summaries of key issues and the detailed comment/response tables included in the annexes of the RoC;
- Agreements or commitments arrived at to address concerns which have been addressed in Section 13 of the EA Study document;
- Identification of outstanding concerns and conflicts and why they are still outstanding, and identification of those concerns that would be addressed at a future date pending completion of the EA and the consultation process;
- A copy of all notification information provided, including how, when and where;
- A description of materials that were handed out or discussed at consultation events;
- Minutes from any meetings held with interested persons; and,
- Copies of written comments received from interested persons.

16.3 Consultation Plan for the EA Study

This section describes the general consultation plan, which was intended to guide the consultation process over the course of the EA Study. It includes reference to the types of parties that were consulted over the course of the Study and the scope of consultation undertaken at various milestones. In general, there are four types or categories of parties that were consulted over the course of the EA Study. These categories, together, are considered to cover the full range of stakeholders, which may have an interest in the EA Study and include:

- Public Liaison or Advisory Committees which are committees designated by the Regions to represent a broad range of interests across the study area community and to focus public input to the EA Study. Two such committees were formed to act in an advisory capacity; the Joint Waste Management Group and the Site Liaison Committee.
- First Nations Groups as identified by Durham and York in consultation with the Ontario Native Affairs Secretariat that may be potentially affected by the outcome of the EA Study.
- Government and Agencies which represent the interests and mandate of various governmental departments, ministries and agencies potentially affected by the outcome of the EA Study. This included departments and agencies associated with the federal government, provincial government and regional/local municipal governments.
- General Public which includes all residents and businesses within the study area as well as other interested parties (e.g., non-governmental organizations), which may have a broad or general interest in the Study or may be directly affected by the Study outcome. Over the course of the EA, a contact list of those individuals and groups expressing interest in the Study was compiled and was updated as the Study proceeded. The current contact list is included as part of the Consultation Record and forms part of the RoC.

By way of a Communications Strategy developed for the Study and Study consultation events, the lists of parties to be consulted were continually updated over the course of the EA Study.

In accordance with the Study's Communications Strategy, a range of notices, updates, etc. were prepared and issued. The scope of consultation events moved from initiatives and events addressing and seeking input from the larger community to a program that was more focused on the individuals and community with the greatest potential to be impacted by the proposed undertaking. Table 16-2 outlines the minimum scope of consultation associated with the various Study milestones according to the Approved Terms of Reference as well as the actual consultation events that were completed during the EA.Additional consultation activities were developed and implemented as required as part of the EA Study in accordance with the principles outlined in the Residual Waste Study Communications Strategy.

Table 16-2 Minimum Scope of Consultation Activities Proposed in EA Terms of Reference

Study Milestones	Minimum Scope of Consultation Activities (EA Terms of Reference)	EA Consultation Events Completed
Initiate EA Study and review Evaluation Methodology and Criteria for "Alternatives to" (Alternative technologies)	General Public Notices possibly followed by events such as open houses intended to obtain input on finalizing the evaluation methodology and criteria.	• General Notices issued regarding initiation of the EA Study • Meetings of the Joint Waste Management Group formed in 2005 • Six Public Information Sessions on Review of Evaluation Methodology and Criteria
Evaluate "Alternatives to" the Undertaking Select Preferred Approach to Manage Residual Wastes	Open House/Public Meeting type events open to the general public and intended to notify and receive input on selection of the preferred "Alternative to".	• Meetings of the Joint Waste Management Group • Six Public Information Sessions on Identification of Preferred Residuals Processing System • Two Public Delegation Sessions
Review of Evaluation Methodology and Criteria for "Alternative methods" (alternative sites)	Events such as open houses intended to obtain input on finalizing the evaluation methodology and criteria.	• Meetings of the Joint Waste Management Group • Six Public Information Sessions on Review of Evaluation Methodology and Criteria • Two Agency Workshops
Evaluate "Alternative methods" of Implementing the Undertaking, RFP to Identify a Preferred Technology Vendor and Identification of a Preferred Site.	At Identification of Short-list: Sites Open House / Public Meeting type events open to the general public and intended to notify and receive input on the process leading to selection of the short list sites (i.e., study area to suitable areas to Long-list to Short-list). At Identification of Preferred Site: One-on-one meetings, such as kitchen table meetings, and focused information sessions with community / residents potentially impacted by the Site to inform and exchange information regarding site-specific issues, next steps in process, and opportunities to discuss / resolve concerns. General public notice of selected preferred Site.	• Meetings of the Joint Waste Management Group • Four Public Information Sessions on the Short-list of Sites • Five Public Information Sessions and one drop-in centre on the Generic Human Health & Ecological Risk Assessment • Three Public Information Sessions on the Consultant's Recommended Site

Study Milestones	Minimum Scope of Consultation Activities (EA Terms of Reference)	EA Consultation Events Completed
Complete Site-specific Studies to Confirm Suitability and Documentation to Support Approvals	Provision of opportunity to form a Site Liaison Committee consisting of resident, agency and other interested representatives to review and provide input on site-specific studies. One-on-one meetings, such as kitchen table meetings, and focused information sessions with community / residents potentially impacted by site to obtain input on Study methodologies and to inform and exchange information regarding Study results, design and operational implications, and supporting documentation.	• Meetings of the Joint Waste Management Group Meetings of the Site Liaison Committee formed in 2008 • Two Open Houses for First Nations to view results of Site-specific Studies held in May 2009 • Two Public Information Centres held in May 2009 to present results of site-specific studies. Each PIC consisted of one drop-in session and one formal presentation session. • Two GRT EA Update Meetings held in April and May 2009.

Given that the Proposed Thermal Treatment Facility Site (the Site) identified is owned by the Region of Durham and that there are very few residential or other receptors located within 1 km of it, the latter stages of the consultation process did not include one-on-one meetings with individual residents potentially impacted by the Facility but rather general information sessions designed to accommodate the broader community in the Municipality of Clarington.

16.4 Communications Strategy

To effectively disseminate information on the EA Study and to provide opportunities for the public and agencies to provide specific or general input to it, Durham and York developed a communications strategy. Elements of the communications strategy included maintenance of a Study website (www.durhamyorkwaste.ca); the development and issuance of public advisories, notices and news releases; and the provision of a range of avenues for communication between the public and Study representatives. This strategy was maintained and updated, as required, for the entirety of the Study.

The following sections describe the components of the Communications Strategy used throughout the EA Study.

16.4.1 Public Liaison or Advisory Committees

A few committees participated in the consultation process consisting of public and elected members, with two key committees being specifically formed during the EA process. A Joint Waste Management Group was formed very early in the EA process to provide advice and recommendations to Regional committees. Once a site had been chosen, a Site Liaison Committee was created to provide feedback to residents. Meetings of both committees are open to all residents and are advertised in newspapers well in advance of the meeting. Agendas, minutes and relevant presentations are posted on the Study website. Further details about these two committees can be found below.

16.4.1.1 Joint Waste Management Group

The Joint Waste Management Group (JWMG) was created in 2005 as a sub-committee of Durham's Works Committee and York's Waste Management Committee to provide advice and make recommendations to these Committees on all matters relating to the Residual Waste Management EA Study.

The scope of activities of the JWMG included:

- Examining the composition and quantity of the post-diversion residual wastes to be managed;
- Establishing the limits of the area to be serviced by a facility, or facilities, established as a result of the Committee's work;
- Researching available energy and recyclable resource markets and their operating requirements;
- Reviewing and making recommendations regarding the Study's preferred post-diversion residual waste processing technologies and systems;
- Reviewing and making recommendations regarding the Study's preferred site location(s) for the required facility or facilities;
- Securing meaningful public input through public information protocols such as workshops and open houses;
- Reporting and making recommendations to the Durham's Works Committee and to York's Waste Management Committee.
- The JWMG is comprised of the following:
- 8 Voting members - Four (4) current members of Durham's Works Committee and four (4) current members of York's Waste Management Committee. The Chairs and Vice Chairs of each Committee, or their designate, shall sit as members of the JWMG. These members shall select the remaining two (2) members from their respective Committee to sit on the JWMG.
- 6 Non-voting members - Three (3) interested residents from the Region of Durham and three (3) interested residents from the Region of York; and,
- The Chair of the City & County of Peterborough's Waste Management Steering Committee, or a designate, shall sit as an observer.
- Membership in the JWMG consists of a 3-year term corresponding with the terms of Regional Councils.

Since the formation of the JWMG in 2005, meetings have been held regularly throughout the EA process in order to provide updates and information on the Study. The dates and meeting content of the JWMG meetings from 2005 – 2009 is outlined in Table 16-3 below.

Table 16-3 Summary of JWMG Meetings

Meeting Date	Subject	Location of Meeting
August 30, 2005	Overview of EA process Consultation Summary EA Terms of Reference Update	MacViro Consultants Inc. 600 Cochrane Drive, Suite 500 Markham
September 27, 2005	Presentation on EA Terms of Reference	The Regional Municipality of Durham Meeting Room #1F 605 Rossland Road East Whitby
November 22, 2005	EA Terms of Reference Update	The Regional Municipality of York Committee Room B, Main Floor 17250 Yonge Street Newmarket
January 24, 2006	EA Terms of Reference Update Project Schedule Communications Strategy Implications of York/Dongara Agreement	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road East Whitby
April 18, 2006	Presentation on Recommended Preferred "Alternative to"	The Regional Municipality of York Seminar Room, Main Floor 17250 Yonge Street Newmarket,
May 30, 2006	Resolution approved by the JWMG Summary of key issues identified during consultation on Draft Report Presentation on Recommended Preferred "Alternative to"	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
September 19, 2006	Overview of revised timelines Overview of siting methodology – report on consultation Approval of recommended siting evaluation methodology and criteria Consideration and approval to proceed with RFQ for vendor selection	The Regional Municipality of York Seminar Room, Main Floor 17250 Yonge Street Newmarket
January 30, 2007	Overall facility development process and schedule Durham York Memorandum of Understanding 2007 Work Plan RFQ for vendor selection	The Regional Municipality of York Seminar Room, Main Floor 17250 Yonge Street Newmarket
February 20, 2007	Presentation on status of REOI for sites Review of facility procurement process Update on generic human health and ecological risk assessment	The Regional Municipality of Durham Meeting Room CLK1-A 605 Rossland Road Whitby
March 6, 2007	Host community agreement considerations	The Regional Municipality of York

Meeting Date	Subject	Location of Meeting
	Update on generic human health and ecological risk assessment Outline of communication plan for announcement of Short-list of sites	Seminar Room, Main Floor 17250 Yonge Street Newmarket
March 27, 2007	Presentation on the identification of the Short-list of sites Project schedule and proposed EA reform	The Regional Municipality of York Seminar Room, Main Floor 17250 Yonge Street Newmarket
April 24, 2007	Presentation on new EA screening process Report on Public Information Sessions on Short-list of sites Update on resolutions from Durham and York councils Project schedule – Short-list evaluation process	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
June 19, 2007	Presentation on generic human health and ecological risk assessment Delegations (8) Update on the Short-list Site evaluation process and workplan Review of recent public consultation events	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
September 25, 2007	Presentation on Consultants Recommended Preferred Site Review of correspondence received Delegations (3)	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
January 8, 2008	Presentation on Results of RFQ process Presentation on Recommendation of Preferred Site Location Overview of the RFQ Submissions – Design, build, operate an EFW facility Review of correspondence received Presentation on December 2007 Polling Results Delegations (9) Presentation by Peel EFW Facility Public Liaison Committee Co-Chairs	The Regional Municipality of York Seminar Room, Main Floor 17250 Yonge Street Newmarket
March 4, 2008	Presentation on Results of Ambient Air Quality Study Review of correspondence received Delegations (6)	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
April 15, 2008	SLC – Terms of Reference Response to Durham Region Council Direction on EFW facility air emissions and control system Presentation on Accommodating Durham Region Council Direction in the Design of EFW Facility Air Emission Criteria Presentation on Formation of a SLC Delegations (3)	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby

Meeting Date	Subject	Location of Meeting
	Review of Correspondence Received	
May 13, 2008	Presentation on Accommodating Durham Region Council Direction in the Design of EFW Facility Air Emission Criteria – Proposed Operational Limits Response to Durham Region Council Direction on EFW facility air emission control system – updated Request for Alternate for Citizen Members of the JWMG Review of Correspondence Received	The Regional Municipality of York Seminar Room, Main Floor 17250 Yonge Street Newmarket
June 24, 2008	Presentation on the Framework for an Environmental Biomonitoring Program and Human Biomonitoring Program Presentation on the Interim Report on Ambient Air Monitoring at the Courtice Road Site Presentation on the Status of the EA Presentation on the Meeting with OPG and Highway 407 EA Representatives Delegations (4) Review of Correspondence Received	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
October 7, 2008	Presentation on Review of International Best Practices of Environmental Surveillance for EFW facilities Presentation on the Environmental Biomonitoring Program Interim Report on Ambient Air Monitoring at the Courtice Road Site Status of the EA Delegations (3) Review of Correspondence Received	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
November 4, 2008	Presentation on the Review of International Best Practices of Environmental Surveillance for EFW facilities Presentation on the Environmental Biomonitoring Program Presentation on the Status of the Site-specific studies Status of the EA and the Oct. 24 2008 Meeting with the MOE Review of Correspondence Received	The Regional Municipality of York Seminar Room, Main Floor 17250 Yonge Street Newmarket
March 10, 2009	Presentation on the Natural Environment Impact Assessment Presentation on the Geotechnical Investigation Presentation on the Stage 2 Archaeological Assessment and Built Heritage Presentation on the Environmental Biomonitoring Program Presentation on the Review of International Best Practices of Environmental Surveillance for EFW facilities	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
April 14, 2009	Updates on SLC meetings Presentation on the Status of the EA process Delegations (3)	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road

Meeting Date	Subject	Location of Meeting
	Memorandum on Request for Proposal 604-2008 for the Proposed Energy-From-Waste (EFW) Facility The Regional Municipality of Durham's Joint Works and Finance and Administration Report 2009-J-18 of April 14, 2009 - Recommendation of a Preferred EFW Proponent: Request for Proposals 604-2008	Whitby
May 5, 2009	Presentation Update on EA Study Site-Specific Study Results	The Regional Municipality of Durham Meeting Room LL-C 605 Rossland Road Whitby
May 26, 2009	Presentation on the Air Quality Assessment and the Site Specific Human Health and Ecological Risk Assessment	The Regional Municipality of Durham Council Chambers 605 Rossland Road Whitby

16.4.1.2 Site Liaison Committee

In late 2008, the Municipality of Clarington formed a public Site Liaison Committee (SLC) in partnership with the Region of Durham. The committee was formed to provide feedback to and exchange information with Regional residents on the site-specific studies that were conducted on the recommended Site for a Thermal Treatment Facility.

The Municipality of Clarington selected four Clarington residents to participate on the committee. The Region of Durham selected five residents from the Region of Durham at-large to participate on the committee as well. Committee member selection was based on the qualifications and level of interest provided with a completed application.

The scope of the SLC activities includes:

- Scheduling, advertising and maintaining agendas and minutes for quarterly or more frequent meetings open to the public.
- Review of site-specific EA Study reports in coordination with the ongoing EA Project schedule.
- Distribution of information from the site-specific EA studies as requested by JWMG.
- Facilitating communication between local residents and stakeholders, and the JWMG.
- Receiving and hearing deputations from local residents and stakeholders pertaining to the Thermal Treatment Facility site-specific EA studies. The SLC should develop protocols governing acceptable and relevant content.
- Preparing, maintaining and archiving supporting material as the committee deems necessary including committee agendas and minutes, deputation records, mailing lists, information files, resource materials, newsletters, fact sheets and presentations.

As per the Terms of Reference developed for the SLC, Durham will provide space on its website to post information such as meeting minutes and pertinent information as it pertains to the site-specific EA studies as it deems appropriate. York and the JWMG may provide independent posting of information or provide linkage to Durham's website as required.

All meeting minutes are posted on the Study website and links to the information are posted on the Regional websites.

A summary of the SLC meetings that have been held to-date, is provided in Section 16.7, Table 16-5.

16.4.1.3 Consultation with Other Committees

Over the course of the EA, discussion has taken place with a number of other committees in Durham and York as necessary, as part of the process of reporting on the EA Study within the respective Regions. Presentations and updates were provided as needed and are documented on the respective areas of the Region's websites.

A number of delegations were received at Regional council and committee meetings such as Works Committees, Finance & Administration Committees, where members of the public had an opportunity to make delegations regarding residual waste management outside of key decision making points in the EA process. Essentially, stakeholders had the ability to make delegations outside of the EA consultation process at any time over the period during which the EA was undertaken. Copies of their delegations/presentations were made public with copies circulated to Council and committee members and posted on the respective Regional website with minutes and agendas.

16.4.2 Consultation with Government Agencies

Various levels of government were consulted during the course of the EA Study. A Government Review Team (GRT) was established consisting of different levels of government (i.e., federal, provincial, and municipal), First Nations, and other municipal agencies early in the consultation process for the EA. The list of all current GRT members, their affiliation, and departments was continually updated over the course of the EA Study and can be found in the consultation summary reports in the appendices to the RoC. Many government agencies along with the First Nations located within a 100 km radius of the Study were included on the GRT list and were invited to participate in the consultation process. The level of participation of each agency and First Nations varied depending on their area of interest in the Study.

The purpose of the GRT was to provide expertise regarding the EA process, as well as to provide expert review of the reports conducted for the EA and the draft EA Study document. The Study Team communicated with the GRT throughout the EA process regarding key Study milestones and updates.

Beyond ongoing consultation with updates about the Study, two major sets of agency consultation occurred during the EA study with the GRT. The first set, a series of two workshops in September 2006, was held to review the evaluation methodology and criteria for "Alternative methods". The second set, two workshops held on April 7 and May 21, 2009, were held during the completion of the Assessment of the Undertaking to discuss the EA Study document. The purpose of the first workshop was to present the "front-end" of the EA Study document up to and including the identification of the Preferred Technology and Recommended Preferred Site. The second workshop presented the entire draft EA Study to attendees.

16.4.3 Consultation with First Nations

During the development of the Approved EA Terms of Reference and throughout the duration of the EA Study, a detailed First Nations distribution list was developed in consultation with the Ministry of the Environment, Indian and Northern Affairs Canada, Ontario Secretariat for Aboriginal Affairs and other First Nations organizations and groups.

At each point of consultation in the EA, the First Nations and related organizations on the list were notified of the pending consultation and invited to participate. As well, whenever new documents became available and were distributed to the agency contact list, documents were distributed to all First Nations groups on the list. First Nation consultation has been considered to be part of the agency consultation and is not described as a separate process in this record of consultation.

All First Nations listed below in Table 16-4 were invited to participate on the GRT and were forwarded all EA materials including draft reports, invitations to workshops, and invitations to participate in the review of the various draft reports. In addition, First Nations were invited to participate in a session reserved specifically for them preceding both public information centres held to discuss the draft EA Study document and site-specific studies on May 12 and 19, 2009.

Table 16-4 First Nations Contact List

Chippewas of Mnjikaning	Mississauga of the New Credit First Nation	Six Nations of the Grand River
Chippewas of Georgina Island	Delaware First Nation (Moravian of the Thames)	Oneida Nation of the Thames
Mississaugas of Scugog Island	Mississauga of the New Credit First Nation	Wahta Mohawks
Anishinabek Nation/Union of Ontario Indians	Mississaugas of Alderville First Nation	Ontario Secretariat for Aboriginal Affairs
Association of Iroquois and Allied Indians (AIAI)	Mohawks of the Bay of Quinte	Aboriginal Affairs - Policy and Relationship
Batchewana First Nation	Ojibways of Hiawatha First Nation	Indian and Northern Affairs Canada
Beausoleil First Nation	Huronne-wendat Nation	Department of Indian and Northern Affairs-Litigation Management and Resolution, Specific Claims, Environment Unit - Lands and Trusts Services
Caldwell First Nation	Curve Lake First Nation	

16.4.4 Public Notification and Consultation Activities

The following sections describe the notification and communication outreach activities undertaken by the Regions to inform the public of EA Study updates and milestones.

16.4.4.1 Newspaper and Radio Advertising

Advertisements were placed in major and local newspapers in each municipality, which provided information on the public information sessions, workshops and drop-in centres. Efforts were made to place information in non-English newspapers (e.g., Ming Pao, Pakistani Star, Lo

Specchio) in order to reach a greater audience. Radio advertisements were aired on local radio stations in Durham and York, prior to each community event.

In addition to the placement of notices in local weekly newspapers, Public Service Announcements were issued to notify interested parties and organizations throughout Durham and York. The 'brand image' notifications, developed for the Study advising of the Public Information Sessions, were also placed across both Durham and York via bus ads and local movie theatres as well as via the Toronto Star newspaper.

16.4.4.2 Website, Email and Toll-free Number

A website (www.durhamyorkwaste.ca) was established in late 2005 to provide information about the Study and the EA to interested parties. This website, hosted and regularly updated by an independent web design company includes news and updates about the EA Study, the EA, updated documents for review and comment, and contact information. The address for this website has been made available to the public in newsletters, notices, open house information boards, presentations, Study handouts available at the open houses and public information sessions, and correspondence with the public.

An e-mail address, local and toll-free phone numbers and a mailing address were posted on the website. Messages and letters received included questions concerning information that was distributed, requests for copies of the Technical Study Reports, dates for planned public information sessions and general comments about the Project. Comments received from the toll-free number, e-mails or letters are summarized in the public comment and response tables found in the Record of Consultation. These comments were considered in the development of the EA Study document.

16.4.4.3 Mailing List

A preliminary mailing list was developed before the EA's consultation process began to identify key contacts within the community, government agencies, NGOs and First Nations. These were updated through workshops and information supplied by the agencies themselves. The Study mailing list was continuously updated, primarily as a result of attendance at the public information sessions where a mailing list sign-up sheet was always made available. At an individual's request, their name was placed on the mailing list to which updates and Project information would be sent by either mail or e-mail.

Note: upon identification of the Short-list of sites, in addition to the use of the overall Study mailing-list, site-specific mailing lists were developed to issue notices to property owners within 1 km of the sites and notices were also hand delivered in order to reach current tenants of any properties.

16.4.4.4 Public Information Sessions

The majority of public consultation events took place through public information sessions held in both Durham and York. The Public Information Sessions included an informal presentation of display boards and a formal presentation by the Study Team. These consultation events focused on aspects of background, scope and work plan activities associated with each milestone of the Study. Representatives from Durham and York Region's Waste Management Services Department together with members of the Study Team - Genivar and Jacques

Whitford Ltd. - attended each of the sessions and were available to discuss content of the display boards and answer questions. At each session, participants were provided with comment sheets which could be handed in or mailed in at a later date. These comments were compiled and published in comment/response tables documented in the RoC.

An important part of the public information sessions was the formal presentation which was followed by a Q&A session. This allowed attendees an opportunity to obtain additional information from the Study Team.

All the public information sessions held on the identification of the Short-list of sites, the Generic Human Health and Ecological Risk Assessment, the Recommended Site, and the results of the Site-specific studies were facilitated by an independent facilitator not involved in the Study. The facilitator also provided attendees with a form entitled "I didn't get a chance to say" which they could fill out later and return with questions/issues that they didn't have a chance to raise or didn't want to raise, at the session. Transcripts of these sessions and forms were posted on the website and are included in the RoC.

16.4.4.5 Public Polling

The Joint Waste Management Group retained the services of the public polling firm Ipsos Reid to undertake a series of four sets of public polls over the course of the EA Study; two during the identification of the preferred residuals processing system, one during the identification of the Short-list of sites and one following the preferred site identification to confirm the results of an earlier poll regarding the selection of thermal treatment as the preferred technology for managing the post-diversion residual solid waste stream.

16.4.4.6 Public Delegations

A series of two (2) concurrent Public Delegation Sessions on 'Alternatives to' – Identification of Preferred Residuals Processing System were held on May 17, 2006, one in the morning and one in the evening, in both Durham and York. The purpose of these sessions was for the interested parties to present their comments/opinion to members of the Joint Waste Management Group on the draft report on the *Evaluation of "Alternatives to" and Identification of the Preferred Residuals Processing System* and its results. Notification of these Public Delegation Sessions was issued through placement of notices in local weekly newspapers that serve both Durham and York. Following the identification of the preferred Site, the public had opportunities to make delegations to the JWMG, SLC and various committees and Council.

Following the release of the draft EA, Durham and York Councils provided opportunities for the public to make delegations to both Council meetings and Committee of the Whole meetings. Durham Region extended the June Regional Council meeting and Committee of the Whole meeting to receive over 80 delegations at each meeting.

16.4.4.7 Drop-in Centre

One Drop-in Centre was held on June 18, 2007 in Courtice to present the results of the Generic Human Health and Ecological Risk Assessment Study. There was no formal presentation at the Drop-in Centre, rather there were a series of display boards which included information on: the EA Study Process, the Durham/York Residual Waste Study, thermal treatment technologies and emissions, the siting process and results, the Short-list of alternative sites, an overview of the

Generic Human Health and Ecological Risk Assessment Study and the results of the Study. Members from the Study Team were available to discuss the content of the display boards and answer questions throughout the entire Drop-in Centre.

16.5 Public and Agency Consultation on the Preferred System

This section provides a brief summary of the results of the phase of the consultation process undertaken related to the selection of the preferred post-diversion residual waste management system. With the receipt of the draft report *Report on Evaluation of "Alternatives to" and Identification of Preferred Long-term Residual Processing System Recommendations* by the Joint Waste Management Group on April 18, 2006 the following activities were undertaken prior to completion of the evaluation of "Alternatives to" and the identification of the preferred long-term residuals processing system:

- The draft report was released to the public and government review agencies for a review period of 30 days starting on April 19th, 2006 and ending on May 19th, 2006.
- Notification was issued of the availability of the draft report by way of direct contact with the established public and government review agency list and by way of the website and local media for the general public.
- Copies of the draft report were forwarded to the public and government agencies in the established contact lists and copies were placed in the local libraries, municipal offices and on the Study website for public review.
- Concurrent Public Information Sessions were held in both Durham and York during the evenings of May 9, 10 and 11, 2006. These sessions were attended by a total of 303 individuals, and 110 attendees completed and returned a questionnaire providing input on the draft report. The majority of attendees indicated that they strongly or somewhat agreed with the recommended residuals processing system. The following table indicates the date, time and location of each event:

Date	Time	Location
May 9, 2006	7:00 p.m. to 9:00 p.m.	Cannington Community Centre 91 Elliot Street Township of Brock
May 9, 2006	7:00 p.m. to 9:00 p.m.	Ray Twinney Recreation Complex Lounge #1, 100 Eagle Street West Town of Newmarket
May 10, 2006	7:00 p.m. to 9:00 p.m.	Garnet B. Rickard Recreation Complex 2440 King Street West Municipality of Clarington
May 10, 2006	7:00 p.m. to 9:00 p.m.	York Region South Service Centre, 1st Floor, Corporate Learning Rooms, A, B &C 50 High Tech Road Town of Richmond Hill
May 11, 2006	7:00 p.m. to 9:00 p.m.	Ajax Community Centre, HMS Banquet Hall South 75 Centennial Road Town of Ajax

Date	Time	Location
May 11, 2006	7:00 p.m. to 9:00 p.m.	St. Joan of Arc Catholic High School, Cafeteria 1 St. Joan of Arc Avenue City of Vaughan

- A telephone poll was conducted by Ipsos Reid during the week of May 15, 2006, reaching 200 individuals in Durham and 200 individuals in York to determine their support for the recommended residuals processing approach. The results of the survey indicated that approximately 80% of the residents of Durham and York agreed with building a Thermal Treatment Facility.
- The Joint Waste Management Group scheduled, advertised and held concurrent special meetings in both Durham and York during the day and evening of May 17, 2006 to receive delegations from interested parties on the draft report and its results. A total of 18 delegations were received in Durham and 16 in York. The majority of delegations supported the recommended residuals processing system, and those that did not were highly supportive of increased diversion efforts in both municipalities. The following table indicates the date, time and location of each event:

Date	Time	Location
May 17, 2006	1:00 p.m. to 3:00 p.m.	Durham Region Headquarters Meeting Room 1B, Main Floor 605 Rossland Road East Whitby
	7:00 p.m. to 9:00 p.m.	Durham Region Headquarters Meeting Room LL-C, Lower Level 605 Rossland Road East Whitby
	9:00 a.m. to 9:30 a.m. (during Solid Waste Management Committee)	York Region – Administrative Centre Committee Room 'A', Main Floor 17250 Yonge Street Newmarket
	7:00 p.m. to 9:00 p.m.	York Region – Administrative Centre Committee Room 'A', Main Floor 17250 Yonge Street Newmarket

- Comments received during the draft report review period were documented and included in the final report on the evaluation of "Alternatives to" dated May 30, 2006. Comments received were considered and addressed, as appropriate, during finalization of this report.

Additional details regarding the public and agency consultation on the preferred system are provided in the Record of Consultation.

The results of the consultative process indicated that:

- A significant majority of the public (approximately 80%) that participated in the consultative process agreed with the consultants' recommendation the preferred system is *System 2a – Thermal Treatment of MSW and Recovery of Energy followed by Recovery of Materials from the Ash/Char.* It was recognized that new technologies categorized in System 2b – Thermal Treatment of Solid Recovered Fuel may ultimately offer important benefits and as a result the competitive process used during the evaluation of "Alternative Methods" should allow for the submission of proposals to implement both System 2a and System 2b, with the final decision on the technologies used to implement the preferred residuals processing system being based on the results of this competitive process.
- The majority of those that did not agree with the recommended preferred system generally supported increased diversion activities, including extended producer responsibility and expansion of the municipal diversion system. It was recommended that Durham and York continue to support a hierarchy of waste management practices whereby diversion is the priority and continues to manage an increasing percentage of the municipal waste stream over time with diversion targets of 60% at the beginning of the planning period escalating to 75% towards the latter end of the planning period.
- A minority of those that did not agree with the recommended system, preferred to continue to export waste to landfill sites outside of the Regions.

16.6 Public and Agency Consultation on the Recommended Preferred Site

This section provides a brief summary of the results of the phase of the consultation process undertaken related to the selection of the preferred Site.

The following activities were undertaken prior to completion of the evaluation of "Alternative methods" and the identification of the Recommended Preferred Site.

- Public and agency consultation took place to review and obtain input on the siting methodology and criteria in September 2006. Six public information sessions were held in Durham and York and were attended by 167 people. Questionnaires on awareness of and siting of an EFW facility were completed by 89 attendees. The following table indicates the date, time and location of each event:

Date	Time	Location
September 12, 2006	7:00 p.m. to 9:00 p.m.	Garnet B. Rickard Recreation Complex 2440 King Street West Municipality of Clarington
September 12, 2006	7:00 p.m. to 9:00 p.m.	Woodbridge Pool and Memorial Arena Community Hall 5020 Highway 7 City of Vaughan
September 13, 2006	7:00 p.m. to 9:00 p.m.	Ajax Community Centre, HMS Banquet Hall South 75 Centennial Road Town of Ajax

Date	Time	Location
September 13, 2006	7:00 p.m. to 9:00 p.m.	York Region Administrative Centre, Seminar Room Main Floor, 17250 Yonge Street Town of New Market
September 14, 2006	7:00 p.m. to 9:00 p.m.	Scugog Community Centre 1655 Reach Street Port Perry
September 14, 2006	7:00 p.m. to 9:00 p.m.	York Region South Services Centre, Corporate Learning Rooms A, B, C, 50 High Tech Road, 1st Floor Town of Richmond Hill

- Two agency workshops were held in September 2006. The following table indicates the date, time and location of each event:

Date	Time	Location
September 11, 2006	10:00 a.m. to 1:00 p.m.	Centennial Building, Regal Room 416 Centre Street South Town of Whitby
September 12, 2006	10:00 a.m. to 1:00 p.m.	York Region's Waste Management Centre, Education Centre 100 Garfield Wright Boulevard Town of East Gwillimbury

- An online poll was conducted in September 2006 to test support for the undertaking, determine issues of concern to the broader community with respect to facility siting and provide additional input on priorities regarding facility siting.

  Results of this consultation step resulted in some refinements to the site selection methodology, and were used to establish environmental priorities for the considerations used to evaluate and identify the preferred site.

- Potential sites were identified by reviewing publicly owned sites as well as issuing a call for willing sellers which included a Request for Expressions of Interest (REOI) and two public information sessions on the REOI.

- Public and agency consultation was conducted on the identification of the Short-list of alternative sites. Four (4) Public Information Sessions were held between April 10, 2007 and April 21, 2007; the first of which was held in York Region and the remaining three in Durham Region. These events were attended by 380 people. The following table indicates the date, time and location of each event:

Date	Time	Location
April 10, 2007	7:00 p.m. to 9:00 p.m.	Roman Palace Banquet Hall 1096 Ringwell Road Newmarket
April 12, 2007	7:00 p.m. to 9:00 p.m.	Clarington Beech Centre 26 Beech Street Bowmanville

Date	Time	Location
April 14, 2007	9:30 a.m. to 11:30 a.m.	Municipality of Clarington Municipal Office 40 Temperance Street Bowmanville
April 21, 2007	9:30 a.m. to 11:30 a.m.	Faith United Church 1778 Nash Road Courtice

- The results of this consultation step were used to confirm/ensure that the criteria and indicators that were used to evaluate the Short-list, addressed the community issues to the extent that was reasonable. Certain matters were identified as being more appropriately addressed during the more detailed assessment of the preferred Undertaking (preferred Site and Technology) as part of the site-specific technical studies or pertained to items that would be addressed/clarified in the EA Study document (e.g. consideration of zero waste).
- Throughout the public consultation process, concerns were raised about the potential for emissions from a Thermal Treatment Facility to adversely impact human and environmental health. Although previous human health and ecological risk assessments of thermal treatment conducted in Ontario have concluded that there would be no significant impact on the environment, recent regulatory changes have prompted a re-examination of these findings. In response to these concerns, the Regions opted to include Health Risk Assessment as part of the EA Study. Given that a specific site had not been selected, nor had a vendor or technology been chosen, a regional generic risk assessment was conducted based on emissions data from an existing facility and Ontario emissions guidelines. The generic risk assessment study was meant as a feasibility study only and to identify potential issues of concern that should be closely examined during the conduct of the site-specific risk assessment. One Drop-in Centre and five Public Information Sessions were held between June 18, 2007 and July 24, 2007. Three of the Public Information Sessions were held in Durham and the other two Public Information Sessions were held in York and were attended by a total of 386 people. The following table indicates the date, time and location of each event:

Date	Time	Location
June 18, 2007 (Drop-in Centre)	2:00 p.m. to 7:00 p.m.	Faith United Church 1778 Nash Road Courtice
June 19, 2007	6:30 p.m. to 9:30 p.m.	Roman Palace Banquet Hall 1096 Ringwell Road Newmarket
June 20, 2007	6:30 pm. to 9:30 p.m.	Clarington Beech Centre 26 Beech Street Bowmanville
June 27, 2007	6:30 pm. to 9:30 p.m.	Faith United Church 1778 Nash Road Courtice

Date	Time	Location
June 28, 2007	6:30 pm. to 9:30 p.m.	Newcastle Hall 20 King Avenue West Newcastle
July 24, 2007	6:30 pm. to 9:30 p.m.	York Region Administrative Centre 17250 Yonge Street Newmarket

- The draft report *Thermal Facility Site Selection Process, Results of Step 7: Evaluation of Short- List of Sites and Identification of Consultants Recommended Preferred Site* and supporting documentation was released to the public and government review agencies for a period of 76 days starting on September 26, 2007 and ending on December 10, 2007. The timeframe was extended from 30 days at the request of the JWMG to allow an extended period of review.
- Notification was issued of the availability of the draft report by way of direct contact with the established public and government review agency list and by way of the website and local media for the general public.
- Copies of the draft documents were forwarded to the public and government agencies in the established contact lists and copies placed in the local libraries, municipal offices and on the Study website for public review.
- Three Public Information Sessions were held in Durham and York on October 3, 9 and 23, 2007. The sessions were attended by 379 people. The following table indicates the date, time and location of each event:

Date	Time	Location
October 3, 2007	2:00 p.m. to 10:00 p.m.	Garnet B. Rickard Complex 2440 King Street West Bowmanville
October 9, 2007	2:00 p.m. to 10:00 p.m.	Faith United Church 1778 Nash Road Courtice
October 23, 2007	4:00 p.m. to 10:00 p.m.	Roman Palace Banquet Hall 1096 Ringwell Road Newmarket

- A telephone poll was conducted during December 2007, reaching 400 residents of Durham and York to gauge awareness and opinions regarding building a Thermal Treatment Facility. Overall three-quarters agreed (strongly or somewhat) with building a thermal facility.
- Peer Review Consultants, working on behalf of Clarington, provided extensive comments on the Consultant Team's report.

Comments received during the draft report review period were documented and included in the final report on the Preferred Recommended Site to be submitted to both Regional Councils for approval. Comments were considered and addressed, as appropriate, during finalization of the report.

Generally, a variety of concerns were expressed that related to matters including the HHERA and the site evaluation process, consistent with those raised throughout the siting process. The issues raised largely related to matters that had either been addressed during site evaluation or which were to be addressed during the more detailed assessment of the preferred Undertaking (preferred Site and Technology) as part of the site-specific technical studies, or pertained to items that would be addressed/clarified in the EA document (e.g., consideration of zero waste).

An overview of key issues along with discussion as to how these issues were taken into consideration during the EA process is provided in Table 16-6. Detailed responses to each of the comments raised at the public information sessions are provided in the summaries/transcripts for each session which can be found in the Record of Consultation.

The net effect of considering and addressing many of the public and peer review comments received was to enhance the level of detail, readability and traceability of the final EA Study document. Based on the consideration of the comments received, the overall result of the evaluation process continued to be, the identification of Clarington 01 as the Consultant Team's Preferred Recommended Site.

16.7 Public and Agency Consultation on the Assessment of the Undertaking

Following the identification of the Preferred Recommended Site, the primary point for public consultation through most of 2008 and into early 2009 was through the JWMG and the Site Liaison Committee (SLC) meetings whose mandate is to provide information on site-specific issues to the public and to provide a vehicle for public input (e.g., delegations, correspondence, questions, etc). In addition, ongoing consultation through the Study website and email address continued throughout this period.

The JWMG met ten times during this phase of the EA; seven meetings were held in 2008 and three meetings were held in 2009. Table 16-3 provides an overview of the meeting dates and subjects of the meetings. Twenty-seven delegations were made to the JWMG during this period.

Following the formation of the SLC in 2008, six meetings of the SLC have been held. Table 16-5 outlines the dates and content of the meetings.

Table 16-5 SLC Meeting Dates and Content

Meeting Date	Subject	Location of Meeting
November 25, 2008	Background and Terms of Reference Presentation on the EA Process Presentation on the Review of International Best Practices of Environmental Surveillance for EFW facilities Presentation on the EFW Technology Procurement Process	Durham Region Headquarters Meeting Room LL-C 605 Rossland Road
January 14, 2009	Presentation on the Site-specific studies Public Questions/Comments	Durham Region Headquarters Meeting Room 1A 605 Rossland Road

Meeting Date	Subject	Location of Meeting
March 4, 2009	Presentation on the Natural Environment Impact Assessment Presentation on the Geotechnical Investigation Presentation on the Stage 2 Archaeological Assessment and Built Heritage Presentation on the Environmental Baseline Study Presentation on the Review of International Best Practices of Environmental Surveillance for EFW facilities Delegations (3)	Durham Region Headquarters Meeting Room LL-C 605 Rossland Road
April 8, 2009	Further discussion on the Draft Technical Reports (Natural Environment, Geotechnical, Archaeological, Environmental Baseline and International Best Practices) Discussion of Upcoming Public Information Centres Delegations (1)	Durham Region Headquarters Meeting Room LL-C 605 Rossland Road East Whitby
May 6, 2009	Presentation on Update on EA Study and Site-specific Study Results Delegations (2)	Durham Region Headquarters Meeting Room LL-C 605 Rossland Road East Whitby
May 20, 2009	Presentation on the draft results of the Air Quality Assessment and Human Health and Ecological Risk Assessment	Durham Region Headquarters Meeting Room LL-C 605 Rossland Road East Whitby

As of May 2009, draft Interim EA Study documentation and draft site-specific studies had been released to the public and agencies. The May versions of these documents addressed the initial design capacity scenario (140,000 tpy). As of June 12, 2009, the draft EA Study document and draft site-specific studies addressing both the initial design capacity scenario (140,000 tpy) and the maximum design capacity scenario (400,000 tpy) design had been released. The following activities were completed following the release of these documents.

- Copies were placed in Durham and Clarington's Clerks Department and were available on the Study website for public review.
- On April 7 and May 21, 2009, two Agency workshops were held for members of the GRT to review the draft Interim EA. These were attended by 33 people. Both sessions were held at the Ajax Convention Centre, 550 Beck Crescent, Ajax. As of June 5, 2009, seven representatives from various agencies provided comment on the draft Interim EA documents.
- On May 12 and 19, 2009, two Public Information Centres (PICs) were held with a drop-in style afternoon session and a formal presentation in the evening. The PICs were held at the Garnet B. Rickard Complex, 2440 King Street West, Bowmanville. These were attended by 176 and 105 registered attendees respectively. Including those who did not register, approximately 200 people attended each PIC.
- On May 12 and 19, 2009, one session at each of the Public Information Centres was reserved exclusively for First Nations consultation. The location for the First Nations consultation was the Garnet B. Rickard Complex.

- Peer Review Consultants, working on behalf of Clarington, provided extensive comments on the Study Team's report.
- Opportunities were provided at the Durham Region Committee of the Whole meeting held on June 16, 2009, the Durham Region Council meeting held on June 24, 2009 and the York Region Solid Waste Committee meeting of June 19th, 2009 to hear delegations. In the order of 32 hours of delegations were heard, 16 hours at each of the Durham committee and council meetings.

In regards to the public consultation on the draft EA Study document and site-specific studies, a variety of concerns were expressed that were consistent with many of the issues that were raised throughout consultation regarding the selection of the preferred alternative system (as discussed in Section 7) and regarding the selection of the preferred site (as discussed in Section 8). Many of the issues raised related to matters that were addressed during the detailed assessment of the preferred Undertaking (preferred Site and Technology) through the site-specific technical studies and/or were items that would be addressed/clarified in the EA document (e.g., consideration of zero waste).

16.8 Consideration of Key Issues

Input was solicited from stakeholders and agencies in different forms throughout the Study. At workshops, public information sessions and facilitated meetings, attendees had a chance to provide input with questionnaires, comment sheets, and opportunities to speak with members of the Study Team. Delegations were received during the process at JWMG and SLC meetings. At all times during the Study, letters, emails and phone messages were received and responded to by the Study Co-ordinator.

Responses to comments made during the Study were compiled and made public as part of the summary of public consultation reports posted on the Study website. Letters, emails and phone messages were also compiled with the appropriate responses and these tables were also posted on the website. All comment/response tables can be found in the appendices of the RoC.

Generally, the key issues identified in Table 16-6 below, are those issues that have been consistently raised and addressed throughout the EA process. There are a number of summary tables within the Record of Consultation that summarize key issues that were identified at each major phase of the consultation process and that discuss how they were considered at each stage of the EA. A full and detailed overview of all of the issues raised during the course of the consultation process is included in the various comment/response tables in the Record of Consultation.

In regards to the consideration of the results of agency consultation and peer review processes undertaken throughout the Study, and documented in the Record of Consultation the net effect of considering and addressing the agency and peer review comments was to enhance the detail, readability and traceability of the final EA Study document.

Table 16-6 Summary of Key Issues

Summary of Key Issues	Consideration in the EA
Concerns regarding air emissions from a Thermal Treatment Facility and the potential impact on Public Health	During the initial public consultation events, it was evident that human health was a major concern for residents and as a result it has received significant consideration throughout the EA process. During consultation regarding the evaluation criteria used to select the preferred "Alternative to", the highest priority category of criteria identified by the public was consideration of the natural environment. In part, this included examination of emissions to Air and Water from waste management practices and was linked in public comments to the issue of public health. As a result, natural environment considerations were applied as the highest ranking set of criteria in the evaluation of "Alternatives to" and potential emissions from all alternative systems were derived from Life Cycle Assessment models. During the evaluation of "Alternative methods", public consultation on the methodology and criteria identified "Public Health &Safety and Natural Environment" as the most important priority of evaluation categories. Air quality was used as one of the criteria for evaluating the Short-list of sites, including the consideration of the local meteorological conditions at each of the Short-listed site locations. Overall, the preferred Site Clarington 01 was found to be comparatively neutral in regards to Air Quality impacts. Once a Short-list of sites had been identified, a generic air quality assessment was conducted on the sites. Following the identification of Clarington 01 as the Proposed Thermal Treatment Facility Site, a generic analysis of the impact of air emissions from a Municipal Solid Waste (MSW) thermal treatment facility on the air quality of the surrounding area was conducted which indicated that during normal operations, emissions from the Facility in combination with existing air quality levels are predicted to meet all applicable provincial/federal air quality criteria for all contaminants (continuous operation at maximum capacity). A generic human health and ecological risk assessment based on the results of this air quality assessment was also completed. Five consultation events were held in June/July 2007 to present and discuss the results of the Generic Human Health and Ecological Risk Assessment (HHERA). Additionally, a review of international best practices of environmental surveillance for Thermal Treatment Facilities was conducted to guide the site-specific studies that were used to assess the Undertaking. The focus of this study was to review environmental surveillance programs at similar facilities around the world and to recommend an appropriate level of environmental surveillance for the Proposed Thermal Treatment Facility. Once the preferred Site and technology vendor were identified, a site (and Vendor) specific air quality assessment was undertaken which was used, in part, by the site-specific human health and ecological risk assessment. Results of the Air Quality Assessment and the HHERA were presented and discussed at the Public Information Centre held on May 19, 2009. The results of the air quality assessment indicated that during normal operations, emissions from the Facility in combination with existing air quality levels are predicted to meet all applicable provincial/federal air quality criteria for all contaminants (continuous operation at maximum capacity). The human health risk assessment found that exposure to Facility-related air emissions will result in no adverse health effects to humans living or visiting the area around the Facility. Given the continued concerns expressed regarding air quality and potential health effects, in addition to implementing Continuous Emissions Monitoring (CEM) for a number of key operational parameters, and emissions (stack) testing and monitoring protocol as required for the C of A under the EPA, it is proposed that ambient air

Summary of Key Issues	Consideration in the EA
	quality monitoring be undertaken in the immediate vicinity of the Facility for a 3-year period.
Potential Impacts to Ecological Health	Public and Agency consultation identified the Natural Environment as the most important priority for the identification of the preferred "Alternative to" and "Alternative method". During the evaluation of "Alternatives to", the environment potentially affected by the Undertaking was examined at a Regional level by compiling background information on the terrestrial and aquatic environment to provide a baseline for further studies. During the evaluation of "Alternative methods", a generic assessment of the effects of a Thermal Treatment Facility on Environmentally Sensitive Areas and Species and Aquatic and Terrestrial Species was conducted on the Short-list of sites which found that Clarington 01 was likely to be the least sensitive site for a Thermal Treatment Facility. A generic ecological risk assessment was also undertaken to help classify potential ecological impacts of Thermal Treatment Facility activities, the results of which were used to guide the site-specific ecological risk assessment. Following the identification of Clarington 01 as the preferred recommended site, a site-specific natural environment assessment and an ecological risk assessment was conducted to confirm these results. The results of the natural environment assessment indicated that impacts to the terrestrial and aquatic features of Clarington 01 Site would be minimal to non-existent, confirming the results of the assessment undertaken during the evaluation of the Short-list sites. The results of the ecological risk assessment confirmed that the combination of chemical and non-chemical stressors (noise, habitat alteration, water resources), were not expected to have an effect on ecological receptors in the area.
Potential Effects from Traffic	The potential effects of traffic related to waste management facilities were also identified as a key issue early in the EA process, and was considered as a key issue in the evaluation of "Alternative methods". Evaluation of the Long-list of potential sites considered the accessibility of all of the sites in regards to the maximum distance of the sites to the nearest major highway, as generally shorter haul routes on secondary or tertiary roads lower the potential effect of traffic on receptors. During the evaluation of the Short-list of potential sites, traffic impacts including the type of roadway, site access, proximity to major highways and existing and projected traffic volumes were considered. A report on the potential traffic impacts at the Short-list sites, prepared as part of this evaluation, did not identify any concerns for the preferred site, Clarington 01. A more detailed traffic assessment was prepared to support these findings and analyzed the impact of increased traffic associated with the Facility and the build-out of the Clarington Energy Business Park. The effects of traffic (including noise and emissions) related to the Undertaking was addressed in the traffic assessment and considered in the air quality assessment, the acoustic assessment, the human health and ecological risk assessment, and the social/cultural assessment.
Energy Output and Efficiency	As noted in Section 3.0, the Purpose of the Undertaking is " to process – physically, biologically and/or thermally – the waste that remains after the application of both Regions' at-source waste diversion programs in order to recover resources – both material and energy – and to minimize the amount of material requiring landfill disposal." The potential for energy recovery, and the desire to maximize energy

Summary of Key Issues	Consideration in the EA
	recovery was expressed consistently in public consultation during the development of the Approved Terms of Reference and throughout the EA. During consultation regarding the evaluation criteria used to select the preferred “Alternative to”, the highest priority category of criteria identified by the public was consideration of the natural environment, including the consumption/preservation of non-renewable environmental resources. A Life Cycle Analysis (LCA) was undertaken to consider the energy balance for all of the alternative systems and an estimate of the net electrical energy generation (both renewable and total) was also determined and considered in the selection of the preferred “Alternative to’, thermal treatment. The preferred system (thermal treatment of MSW) was comparatively advantaged in regards to its overall energy balance and capacity to generate electricity. During the evaluation of “Alternative methods” the proximity of the Short-list sites to the potential markets for energy were considered, in regards to the proximity to required infrastructure to market electricity and also in regards to potential markets for recovered heat. Clarington 01 was relatively advantaged given that it was in close proximity to the required infrastructure for sale of electricity to the grid as well as potential users of heat energy including the Courtice Water Pollution Control Plant (WPCP) and the Clarington Energy Business Park (CEBP). As part of the Vendor identification process, the potential for vendors to address the energy recovery objectives of Durham and York was assessed as part of the evaluation and selection of the preferred Vendor. Vendors were required to demonstrate the capability of their technology to maximize energy production as superheated steam used to generate electricity and potentially district heating for use in the Courtice WPCP and the CEBP. The preferred Vendor, Covanta, demonstrated its capability to generate sufficient energy for both electricity generation and district heating. Covanta provided the highest net electricity production and performance guarantees of any Vendor, with and without a future district heating system. Once Site and Vendor-specific information was available, an updated LCA was completed to estimate the environmental implications related to air, water, and energy associated with developing a Thermal Treatment Facility. It included the assessment of raw material production, manufacture, distribution, use, and disposal, including transportation, involved in operating the Facility. Three scenarios were analyzed for the Facility: • *Recovery of the electrical energy.* • *Recovery of both electrical and heat energy* for district heating within the CEBP, where the Site is located. • *Recovery of both electrical and heat energy* for district heating and cooling within the CEBP. In broad terms, the electricity produced by the Facility, when operating at the initial design capacity of 140,000 tpy, is sufficient to power about 10,000 homes; while the district heating produced could heat the equivalent of 2.200 homes.
Potential Effects on Property Values	Concerns regarding the potential effects of a Thermal Treatment Facility on property values were raised during consultation regarding selection of the Site, Clarington 01. As a result, during the assessment of the potential effects of the Undertaking, the potential effect of the Facility on Property Values was considered in the Economic Assessment. The most recent studies available to the Study Team that examine the potential

Summary of Key Issues	Consideration in the EA
	effect of Thermal Treatment Facilities on property value indicate that there may be some short-term effects during the first few months following announcement of a new project on residential property values based on ‘perceived risk’ associated with a facility. There is no evidence that there is any real effect on residential property values in the longer term. Also, the effect is primarily within the area closest to the Facility and drops-off the further away residential neighbourhoods are from the site. There are only two occupied residential properties near the Facility, and the area around the Facility is planned to be developed as part of the CEBP. The nearest existing and/or proposed built-up community is located over 3.2 km northwest of the Site. The Facility has the potential to have either a neutral or positive effect on property values in the immediate vicinity of the Site within the Energy Park, given the investment in infrastructure (road access, district heating) associated with the Facility.
Costs and Economic Viability	Concerns regarding the potential cost of managing post-diversion residual waste were raised early in the EA process, and as a result, the public identified economic/financial considerations as being an important priority in the evaluation and selection of the preferred “Alternative to”. During the evaluation of “Alternatives to” the net system costs for the alternative systems, as well as the sensitivity of these systems to external influences was examined. The preferred system, System 2a, Thermal Treatment of MSW & Recovery of Materials from Ash/Char was advantaged, having one of the lowest net system costs per tonne and in that it was found to be less sensitive to external financial influences. During the evaluation of “Alternative methods”, economic/financial criteria were also considered important in the evaluation of alternative sites and in the selection of the preferred Vendor. The evaluation of the Short-list of sites considered the potential capital and operational costs that could be influenced by site-specific factors, such as site development costs and the cost to haul residual waste to the Facility. Clarington 01 was found to be comparatively advantaged given potential haul cost savings and in regards to the proximity of the site to a potential market for heat energy (the Courtice WPCP and the CEBP). Prior to issuing the RFP to identify the preferred Vendor, the Region of Durham retained Deloitte & Touche to complete a Business Case for the development of a Thermal Treatment Facility. The Business Case indicated that although the proposed Thermal Treatment Facility has a higher up-front cost compared to a landfill option, it was deemed beneficial given that it would provide a long-term secure and local waste disposal option and as it avoids the risks associated with the shortage of Ontario landfill options. The Business Case evaluation found that the cost of thermal treatment was comparable to Ontario Landfill on a net present value basis and therefore would have similar effects on the taxpayers in regards to the long-term cost of waste disposal. The Business Case determined that it would cost approximately $197 million to build the Facility and $16,915,000 a year to operate the Facility, assuming a waste throughput of 140,000 tpy. The RFP submission from Covanta identified construction costs as $236 million, and annual operating costs for the same sized Facility at $14,665,000. According to Durham Region Report 2009-J-18 the Covanta submission falls within the scope of the Durham Business Case. The assessment of the Undertaking, considered the potential effects of the Facility on the Economic Environment, including effects on employment, aggregate wages and salaries, and effects on the municipal tax base. Overall, it was found that the

Summary of Key Issues	Consideration in the EA
	economic effects of the Facility will benefit the local and regional areas through increased employment opportunities, potential growth in various service sectors and in providing a more sustainable economic base in the community.
Facility Ownership and Operational Responsibility	Concerns were expressed throughout the EA in regards to the potential implementation model for the Facility and that public-private partnerships (P3s) could cost more, are less effective and less accountable to the public. According to the Business Case prepared for Durham Region, the long-term operating contract with the private entity, if structured properly, can ensure: • Cost certainty; • The asset is properly maintained through appropriate investments; and, • The service levels are constant over the Facility's life cycle. The Facility will operate under a public-private partnership as it will be publicly owned by the Regions but privately operated by Covanta Energy. The Regions will be responsible for supplying waste to the Facility and Covanta will be responsible for operation and maintenance in accordance with a performance-based contract. Covanta will be responsible for any non-compliance issues. Durham and York have publicly identified a number of measures relating to operational responsibility including: • A requirement that the successful Vendor ensure incorporation into the design and installation of the Facility of the most modern and state-of-the-art emissions control technologies in order to meet or exceed the European Union monitoring and measurement standards and commit to maximum achievable control technology for emissions standards and monitoring; • An agreement to provide accurate and timely information on emission levels to the public through a variety of means (e.g., an electronic display board mounted on the Facility exterior that will display the real time emissions and most recent stack test results); • The establishment of a Thermal Treatment Facility Site Liaison Committee; and, • The development of a Community Relations Plan (CRP) to establish a plan through which Durham, York, and Covanta staff would relate to the local community.
Facility Compliance With and Monitoring of Air Emissions	During the EA process, particularly following the identification of thermal treatment as the preferred "Alternative to" and throughout the evaluation of sites, residents expressed concerns regarding monitoring of the proposed Facility and the potential for non-compliance. As noted, the Regions specified in the RFP that the Facility must use the most modern and state-of-the-art emissions control technologies to meet exceed the European Union monitoring and measurement standards and commit to maximum achievable control technology for emissions standards and monitoring. Covanta has guaranteed that it will meet the emissions and monitoring requirements set out in the RFP. The air emissions limits that will govern this facility are the lower of Ontario A-7 limits and European Union (EU) standards. As a result, during operations, the Facility emissions will meet or will be below the air contaminant emission limits placed on municipal waste incinerators by the current version of Ministry of the Environment (MOE) Guideline A-7 (dated 2004). This will be verified through

Summary of Key Issues	Consideration in the EA
	continuous monitoring of stack emissions and annual stack tests. Monitoring data will be submitted to the MOE as required in Guideline A-7 and the conditions of the C of A issued for the facility by the MOE. The following emission source monitoring would be undertaken to meet these requirements. **Continuous Emissions Monitoring** A continuous emission monitoring (CEM) system will be provided to continuously monitor and record parameters such as sulfur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, hydrogen chloride, and oxygen. CEM systems will also measure flue gas temperature, air flow and flue gas opacity. A long-term continuous sampling device for dioxins and furans will be installed which will sample the flue gas with the adsorption of dioxins onto an exchangeable adsorption-resin-filled cartridge. The CEM system will allow for continuous monitoring of the efficacy of the operations of the Facility, by monitoring the key performance parameters that would indicate if there is any potential for process upsets. It is proposed that the results of the CEM for key performance parameters be posted publicly, so that they are available to residents in Durham Region. **Stack Testing** In Guideline A-7 (dated 2004), it is noted that emission testing requirements will be included in the C of A for a Thermal Treatment Facility in order to verify compliance with the limits set out in the C of A issued for the Facility. Completion of testing in accordance with the Ontario Source Testing Code under maximum operating feed rates for the equipment is normally required within six months of start up and annually thereafter. Annual testing is expected to be included in the C of A for the Facility. The air contaminants to be sampled will be determined in consultation with the MOE but would be expected to include dioxins, combustion gases and selected Contaminants of Concern.
Concern that a Thermal Treatment Facility will hinder future diversion efforts	Some concern has been expressed that a Thermal Treatment Facility will compete for materials in the waste stream and hinder efforts to achieve higher diversion rates. It is essential to reinforce that both Durham and York are committed to an immediate goal of 60% waste diversion by 2013 and a goal of 75% in the future. Diversion was studied in detail as part of the consideration of "Alternatives to" including consideration of the level of diversion being achieved worldwide and the potential to divert additional materials from the Durham/York waste stream. No comparable municipality – including both single and multi-family housing - in North America has achieved a diversion rate much beyond 50%. Some jurisdictions in Europe have achieved higher diversion rates and the majority of these also use thermal treatment to dispose of the residues that remain after diversion. In such jurisdictions it has been found that the recovery of metals from ash, and the potential utilization of thermal treatment ash or char as an aggregate material can add significantly to diversion rates. The EA has assumed material recovery rates that are reasonably aggressive, based on Durham and York's planned waste diversion systems and noted that further initiatives such as extended producer responsibility will be required to further increase diversion to 75% over the planning period. It has been determined that if the140,000 tpy Facility continues to operate at this capacity through to the end of the study planning period, then increased municipal diversion will be required to offset population growth, or otherwise residual waste in excess of the 140,000 tpy initial design capacity will be generated. An overall diversion rate in excess of 75% would be required to continue to address Durham and York's residual waste management needs.

Summary of Key Issues	Consideration in the EA
	The composition of the residual waste that would be thermally treated is largely made of materials that cannot be easily recovered by source separated diversion programs or mechanical treatment and that in the most part are difficult to recycle into new materials/products. The Facility has the potential to increase diversion rates beyond that achieved by residential recycling by recovering metals from components of the residual waste stream such as bulky wastes that would not otherwise be diverted. The Facility also offers the potential to manage and make beneficial use of materials in the post diversion waste stream including those materials for which diversion may decline or disappear in the future.
Greenhouse Gas Emissions	Concern was expressed by many of those that participated in the consultation regarding “Alternatives to” on potential greenhouse gas emissions (GHG) from thermal treatment and the need to address climate change. In the evaluation of alternative residuals processing systems for Durham and York, the initial LCA found that System 2a Thermal Treatment of Mixed Solid Waste and Recovery of Energy followed by Recovery of Materials from Ash/Char would have the highest net life-cycle emissions of GHG. However, for the purpose of evaluating systems it was assumed that only electrical energy would be recovered. If the recovery of available heat as well as electricity had been factored into the analysis, the thermal treatment systems would have had the lowest life-cycle emissions of GHG. Additional analysis regarding the potential for GHG emissions was undertaken and provided as an addendum to the original LCA, to compare the potential GHG emissions from the preferred thermal treatment system to the emissions that would result if Durham and York continue to use landfill capacity located outside of the Regions. That analysis indicated that the potential GHG emissions from thermal treatment would be significantly less than a long-haul landfill alternative. Following identification of the preferred Site and Vendor, a site-specific LCA analysis was undertaken. Greenhouse gas (GHG) emissions resulting from the thermal treatment of waste, expressed in terms of metric tonnes of CO_2 equivalents (CO_2e) were found to be reduced based on the recovery of energy (electricity and potentially district heating) and in regards to avoided landfill methane emissions.
Consideration of other Technologies (e.g., Gasification)	Throughout the EA, various members of the public and interested parties indicated that ‘new technologies’ such as gasification should be considered as alternatives for processing the post-diversion waste stream. The evaluation of “Alternatives to” incorporated the consideration of ‘new technologies’ in the formulation of the alternative systems. System 2a, Thermal Treatment of MSW with Recovery of Materials from the Ash/Char, did not specify the thermal treatment approach, but generally more conventional processes are used to thermally treat MSW. System 2b, Thermal Treatment of Solid Recovered Fuel, included consideration of gasification approaches that could be used to gasify fuels generated from processing of residual waste. System 2c, Thermal Treatment of Solid Recovered Fuel with Biogas Recovery, included consideration of anaerobic digestion to recover biogas from the organic fraction of the waste stream prior to thermal treatment of solid recovered fuel. While System 2a was identified as the Preferred Long-Term Residual Processing System, System 2b Thermal Treatment of Solid Recovered Fuel was considered to exhibit an acceptable range of advantages and disadvantages. It was therefore

<table>
<tr><th>Summary of Key Issues</th><th>Consideration in the EA</th></tr>
<tr><td></td><td>recommended that the final selection of System 2a as the preferred residual processing system would be based upon the results of the competitive process used during the evaluation of “Alternative Methods”. It was recommended that the RFQ and RFP process allow for the submission of proposals to implement both System 2a and System 2b, and that the final decision on the technologies used to implement the preferred residual processing system would be based on the results of this competitive process.

The results of the RFQ and RFP process undertaken as part of the evaluation of “Alternative Methods” resulted in the final decision to proceed with System 2a – Thermal Treatment of MSW and Recovery of Energy followed by the Recovery of Materials from the Ash/Char as the preferred technology.</td></tr>
<tr><td>Consideration of multiple smaller Facilities</td><td>Various participants in the consultation process indicated support for consideration of multiple smaller facilities located across Durham and York Regions, with the idea that such a system could reduce overall potential effects associated with hauling residual waste materials, and facility costs.
A single versus multiple site scenario was considered in the evaluation of “Alternatives to” and “Alternative methods”. Generally it was found that in the consideration of systems and sites, that there were significant advantages of a ‘single site’ scenario as:
A ‘single facility, single site’ system configuration represented the most efficient system configuration and would provide the economies of scale sought in the Durham/York EA Study;
In general, a ‘single facility, single site’ configuration also represented the configuration which would be expected to have a lower potential for environmental and social impacts, as the total land area required and number of potential receptors that could be impacted by the systems increases as the number of sites required for each system increases.</td></tr>
<tr><td>Zero-waste and Extended Producer Responsibility</td><td>Concern was expressed throughout the EA process that consideration of zero-waste and programs such as extended producer responsibility could avoid the need for Durham and York to develop a residual waste disposal facility. As a result, the potential for zero-waste and extended producer responsibility was included in the assessment of the potential success of diversion in order to determine the quantity of potential post-diversion residual waste that would require management over the planning period.

During the EA, investigations found that typically, the better-performing cities and urban areas in Europe and North America are achieving waste diversion rates of approximately 45 to 50% through recycling and composting programs. Through extensive research, only a few jurisdictions were found to be achieving higher diversion rates which suggest that the 60% to 75% diversion targets set by Durham and York are aggressive. Research clearly shows that to go beyond 60% diversion requires the implementation of full organics diversion programs (such as those implemented by both Durham and York), supportive policies at the local level, and strong education and outreach programs. Jurisdictions with high diversion rates also typically have a supportive legislative and regulatory framework from senior levels of government, particularly in regards to extended producer responsibility.

The concept of zero-waste has been building momentum over the past number of years; however, progress towards zero-waste targets has been slow. No jurisdiction has been able to come close to their zero-waste goal. The goal of zero-waste will not be achieved, even with well thought out policy and program development, without a fundamental shift from a consumer society to a conserver society. One of</td></tr>
</table>

Summary of Key Issues	Consideration in the EA
	the key elements stressed by all zero-waste programs is the required support of all levels of government: federal, provincial and municipal, if the program is truly going to have a chance of success. Durham and York may choose to adopt a zero-waste vision, but have determined that it is prudent to plan on achieving a more realistic overall diversion rate (i.e., 60%, for both municipalities potentially escalating to 75% over the 35-year planning timeframe). Reaching zero-waste in the timeframe of this EA Study cannot be reasonably expected, however the achievement of higher diversion rates will be a milestone on this path that could be achieved. The EA has assumed material recovery rates that are reasonably aggressive, based on Durham and York's planned waste diversion systems and noted that further initiatives such as extended producer responsibility will be required to further increase diversion to 75% over the planning period.

16.9 On-going Public and Agency Consultation

On July 8, 2009, a letter was sent to the Director of the EAAB advising of the submission of the completed EA on July 31, 2009.

Following completion of the final EA Study document, the document was formally submitted to the Minister of the Environment as of July 31, 2009. The formal seven week government and public review of the EA will begin within two weeks of the July 31, 2009 submission date. A Notice of Submission was issued when the EA document was submitted to the Ministry. This notice was posted in newspapers and was also sent to everyone on the Study contact list.

At a minimum, the final EA document was distributed to and was available for public review at:

- The Ministry of the Environment Environmental Assessment and Approvals Branch;
- The Ministry of the Environment regional and/or district office closest to the study area;
- Durham Regional Headquarters;
- York Regional Headquarters;
- Other public viewing locations (municipal offices and libraries used throughout the study); and,
- As a downloadable document, accessed by the project Website address.

At the point in time that the EA Study document is submitted to the Minister, it is mandatory that a Notice of EA submission be issued. For this mandatory notification process the following must be undertaken:

- Publish a notice in the same local newspaper(s) as used throughout the EA.
- Give notice by mail to local and adjacent municipalities (including municipal councillors).

- Give notice by mail or personal delivery to potentially affected First Nations.
- Give notice by mail or personal delivery to all those who have expressed an interest in writing in regards to the proposed Undertaking.

The following is the minimum information that must be included on the notice:

- Durham/York's contact person, address, phone number, fax number, e-mail address.
- Ministry and Branch name, Branch contact person, phone number.
- Listing of public record locations and available times for the public to review the application (terms of reference or environmental assessment).
- A brief description of the purpose of the environmental assessment study (identify the opportunity or problem being examined). Where appropriate, also include a brief description of the proposed undertaking and how it relates to or is part of the existing development in the area.
- A map that identifies or locates the study area.
- Statements indicating that:
    - An application for approval under the *Environmental Assessment Act* has been made to the ministry.
    - A government and public review has been initiated and the length of the review period.
    - The date that comments are to be submitted to the Branch contact.
    - A statement that notes that all records held by the ministry are subject to the public right of access (complying with *Freedom of Information and Protection of Privacy Act* requirements).
    - A brief statement that indicates that any submission from interested persons, including Aboriginal communities and government agencies, including any personal information contained therein, will be maintained as part of a record available to the public.

A copy of the Notice of Submission is included in Appendix 11 of the RoC.

Following EA approval, a new communications strategy would be developed and implemented to keep interested parties apprised of the status of the Facility. During this time, a new Site Liaison Committee may be formed to address community relations and public information needs.

16.10 Issues Resolution and Outstanding Concerns

Over the course of the Study it was expected that issues would arise requiring resolution either before moving from one step to the next or prior to the issuance of approvals. It was Durham and York's preference to resolve issues as they arose and without the assistance of an outside party. However, should this approach not have worked as the EA process was completed, the use of a facilitator to negotiate a resolution or use of the EAA's mediation provisions would have been considered. It is recognized that unresolved issues could be referred to the Province's

Environmental Review Tribunal which would make a decision on approval of the undertaking and that unresolved issues could have a bearing on that decision and that conditions of approval could be imposed to deal with certain issues.

As of the date of preparation of this EA Study document, there were no unresolved matters or outstanding concerns that had not been addressed during the process of completing this EA.

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Section 17 Summary

Implementation of the Undertaking will provide Durham and York with a long-term, local, and sustainable waste management alternative that will ensure the protection of human health and the environment, while taking advantage of waste as a resource and generating energy for the local community.

This EA Study has assessed the potential effects of the Undertaking during the construction, operation, and post-closure period considering appropriate and feasible mitigation, monitoring, and management plans to minimize any associated potential effects. However, over the course of the construction and operation periods there may be possible improvements that could be considered as a result of new technology or processes. The Regions understand the importance of minimizing any potential adverse effects and enhancing potential opportunities that would also benefit the environment and potentially affected stakeholders. The Regions will appropriately investigate the opportunities afforded by new technologies as they become available.

17. Closure

This EA Study document represents the culmination of approximately three years of work since the approval of the EA Terms of Reference in March 2006. The document outlines the process followed to arrive at a preferred alternative for managing the post-diversion residual waste generated by the two Regions that constitutes the Undertaking. Implementation of the Undertaking will provide Durham and York with a long-term, local, and sustainable waste management alternative that will ensure the protection of human health and the environment, while taking advantage of waste as a resource and generating energy for the local community.

This EA Study document has been prepared in accordance with the Ontario EAA, the Approved EA Terms of Reference (March 2006) for the Durham/York Residual Waste Study and the MOE Code of Practice for Preparing and Reviewing Environmental Assessments in Ontario.

Overall, this EA Study concluded that the Facility can be constructed, operated and closed in an environmentally safe and acceptable manner.

Commitment to Continuous Improvement

This EA Study has assessed the potential effects of the Undertaking during the construction, operation, and post-closure period considering appropriate and feasible mitigation, monitoring, and management plans to minimize any associated potential effects. However, over the course of the construction and operation periods there may be possible improvements that could be considered as a result of new technology or processes. The Regions understand the importance of minimizing any potential adverse effects and enhancing potential opportunities that would also benefit the environment and potentially affected stakeholders. The Regions will appropriately investigate the opportunities afforded by new technologies as they become available.

The EA Study Team can be contacted as follows:

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All documentation related to the Durham/York Residual Waste Study can be viewed on our website at www.durhamyorkwaste.ca

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