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FINAL DRAFT
BIOSOLIDS MASTER PLAN FOR THE REGIONAL MUNICIPALITY OF HALTON
EXECUTIVE SUMMARY

Prepared for:

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ES 1. EXECUTIVE SUMMARY

ES 1.1 Background

In 2009, the Regional Municipality of Halton (Halton Region) initiated the development of a comprehensive Master Plan for the management of biosolids generated at the Region's seven wastewater treatment plants (WWTPs). Biosolids are a nutrient-rich, organic by-product of the wastewater treatment process, which is currently provided to the agricultural community for beneficial reuse in crop production.

The purpose of the study was to develop a long-term, environmentally sustainable, reliable, and cost effective biosolids management program that responds to current and future program challenges. Specifically, the purpose was to evaluate biosolids Management Methods, and to recommend a Strategy that ensures the program's long-term sustainability to the year 2031. It was recognized that there were a number of challenges to be considered in the development of the strategy, including:

- Population increases (projected to double by 2031);
- Less available agricultural land;
- Finite off-season storage capacity;
- Regulatory constraints; and
- Public sensitivity.

Halton Region retained a consulting team consisting of XCG Consultants Ltd. (XCG), Hydromantis Inc. (now Tetratech), and D.C. Damman and Associates, along with selected biosolids management experts, to undertake the preparation of the Halton Region Biosolids Master Plan .

ES 1.1.1 Objectives of the Biosolids Master Plan Study and Problem Definition

The following were the objectives of the Biosolids Master Plan study:

- To complete Phases 1 and 2 of the Municipal Class Environmental Assessment (Class EA) (Municipal Engineers Association, October 2000 as amended in 2007 and 2011) process;
- To allow for public, stakeholder, and agency consultation to satisfy the requirements of the Class EA process;
- To determine and recommend preferred Biosolids Management Methods for detailed investigation and potential implementation; and
- To identify follow-up projects required to confirm the viability of the preferred Biosolids Management Methods.

Halton Region faces significant growth in a number of communities. The increase in population will have a direct impact on the amount of biosolids produced and the biosolids handling method. A long-term strategy for biosolids management must be developed to ensure proper management of biosolids and to protect human health and the environment.

ES 1.1.2 Class Environmental Assessment and Master Planning Process

The Municipal Class EA (Municipal Engineers Association, 2000, as amended in 2007 and 2011) outlines an approved planning process for municipal infrastructure projects, including wastewater projects. Municipal proponents can use the Class EA process to meet the requirements of the Ontario *Environmental Assessment Act* (EAA). Individual projects subject to the Municipal Class EA process are categorized as Schedule A, A^+, B, or C, depending on the type of project and its potential environmental effects. The Master Plan provisions of the Municipal Class EA allow municipalities to develop long range plans for integrated infrastructure requirements.

The Biosolids Master Plan was completed as a Master Plan, fulfilling the requirements of Phases 1 and 2 of the Municipal Class EA. Projects that result from the Master Planning process will be subject to the requirements of the Municipal Class EA process which may include further assessment for Schedule B activities. In addition, Phase 3 and Phase 4 requirements may need to be carried out for any Schedule C activities related to the Master Plan.

ES 1.1.3 Public, Agency, Stakeholder, and Aboriginal Consultation

Public and agency consultation is an important element of the Class EA process. A vital component of the Halton Region Biosolids Master Plan involved consultation with interested stakeholders, including regulatory and review agencies, the public, and Aboriginals. As such, a Consultation and Engagement Strategy that outlined key opportunities for participation in the Biosolids Master Plan Class EA Study was developed and followed during the Master Plan process.

A Regional Project Committee (RPC), consisting of Halton Region staff from various departments, was formed to participate and provide input to the Master Plan process. A Biosolids Master Plan Stakeholders Advisory Committee (BMPSAC) was formed to participate in the Master Plan process. Membership was by invitation, with the BMPSAC consisting of representatives from a diverse selection of agencies and stakeholders with experience in the biosolids industry.

A project mailing list was maintained throughout the Master Plan process. The mailing list was developed at the Notice of Commencement stage and names were added to the project mailing list in response to requests. In addition, key project information such as notifications, Public Information Centre (PIC) materials (i.e. display boards, comment sheet, handout) and the Master Plan Report were posted on Halton Region's web site at http://www.halton.ca/biosolids.

ES 1.2 Current and Future Quantities of Biosolids in Halton Region

Halton Region currently operates seven WWTPs that produce biosolids. There is also a Biosolids Management Centre (BMC) that provides for storage of liquid biosolids prior to land application. In 2011, 79,724 cubic metres of liquid biosolids and 13,851 tonnes of dewatered biosolids (cake) were land-applied by Halton Region's biosolids land application contractor. Liquid biosolids are primarily stored at the BMC while the dewatered biosolids are transported to the Terratec Environmental Ltd. Power-Grow facility in Niagara Region prior to land application.

The volume of anaerobically digested liquid biosolids produced in Halton Region is projected to reach 366,754 cubic metres by 2031. The amount of dewatered biosolids produced at the two WWTPs, which dewater biosolids on-site (Skyway and Mid-Halton), is expected to reach 44,298 Wet Tonnes by 2031.

ES 1.3 Development of Halton Region's Biosolids Management Strategy

ES 1.3.1 Evaluation Process

The evaluation of biosolids management methods and the development of Halton Region's Biosolids Management Strategy was a step-wise process. The process is illustrated in Figure ES1.

Key considerations in the development of the Biosolids Master Plan were Halton Region's current and future infrastructure requirements, the current biosolids management program, the commitment to organics recycling, and program diversification requirements to ensure flexibility and sustainability over the long-term. The selected methods must be proven, cost effective, protective of human health, and respectful of the environment.

The evaluation process involved a three-step process that included:

- Pre-Screening and Short Listing of Management Methods for Evaluation;
- Detailed Evaluation of Short Listed Management Methods; and
- Identification of the Preferred Strategy.

ES 1.3.2 Long List of Biosolids Management Alternatives and Methods

A large number of Biosolids Management Methods are available but there are only three end use alternatives; namely:

- Utilization on Land;
- Thermal Processes; and
- Disposal to Land.

Figure ES2 shows the three Biosolids Management Alternatives and the Management Methods that were considered for each Alternative.

Figure ES.1 Evaluation Process for Biosolids Management Methods

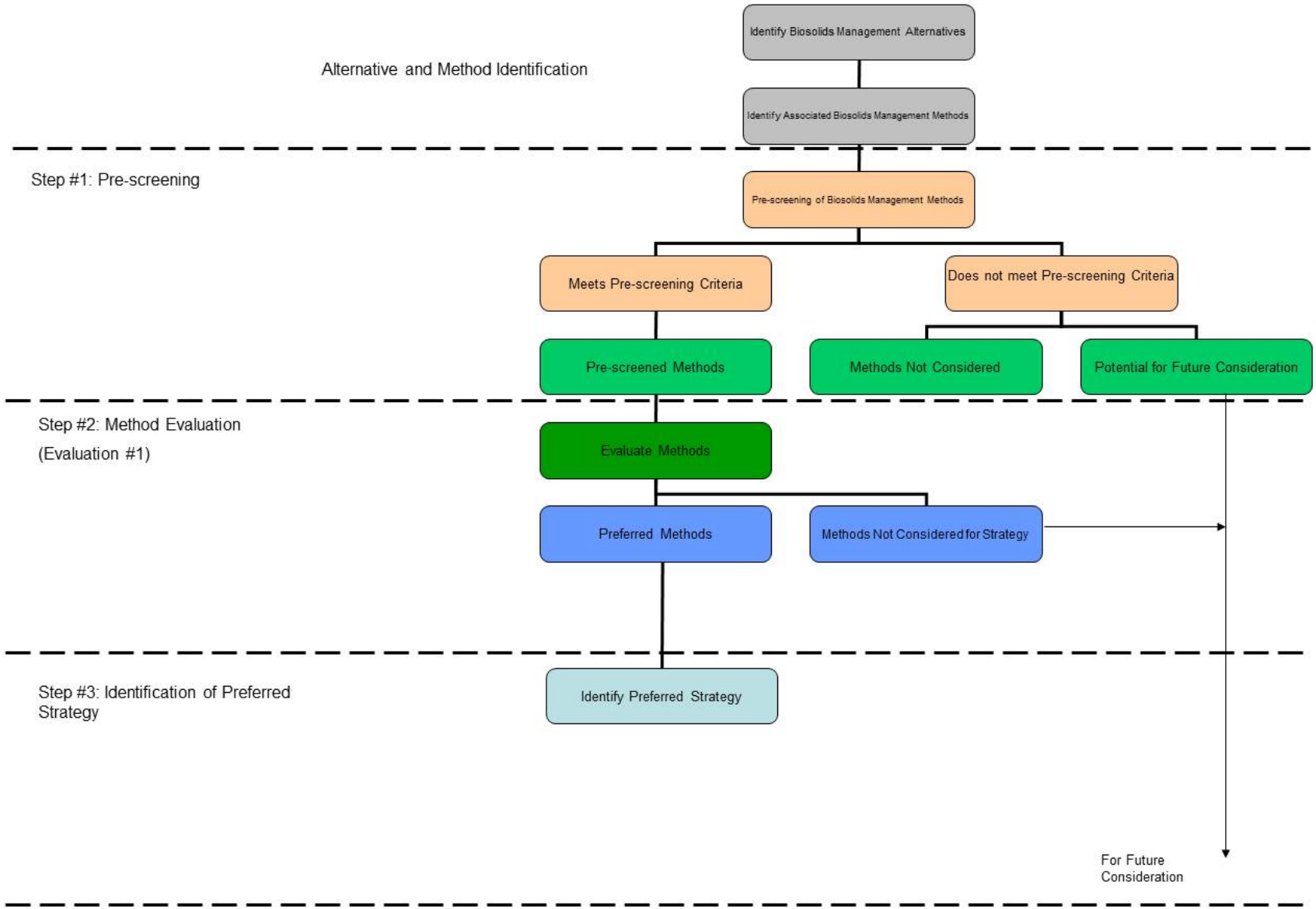
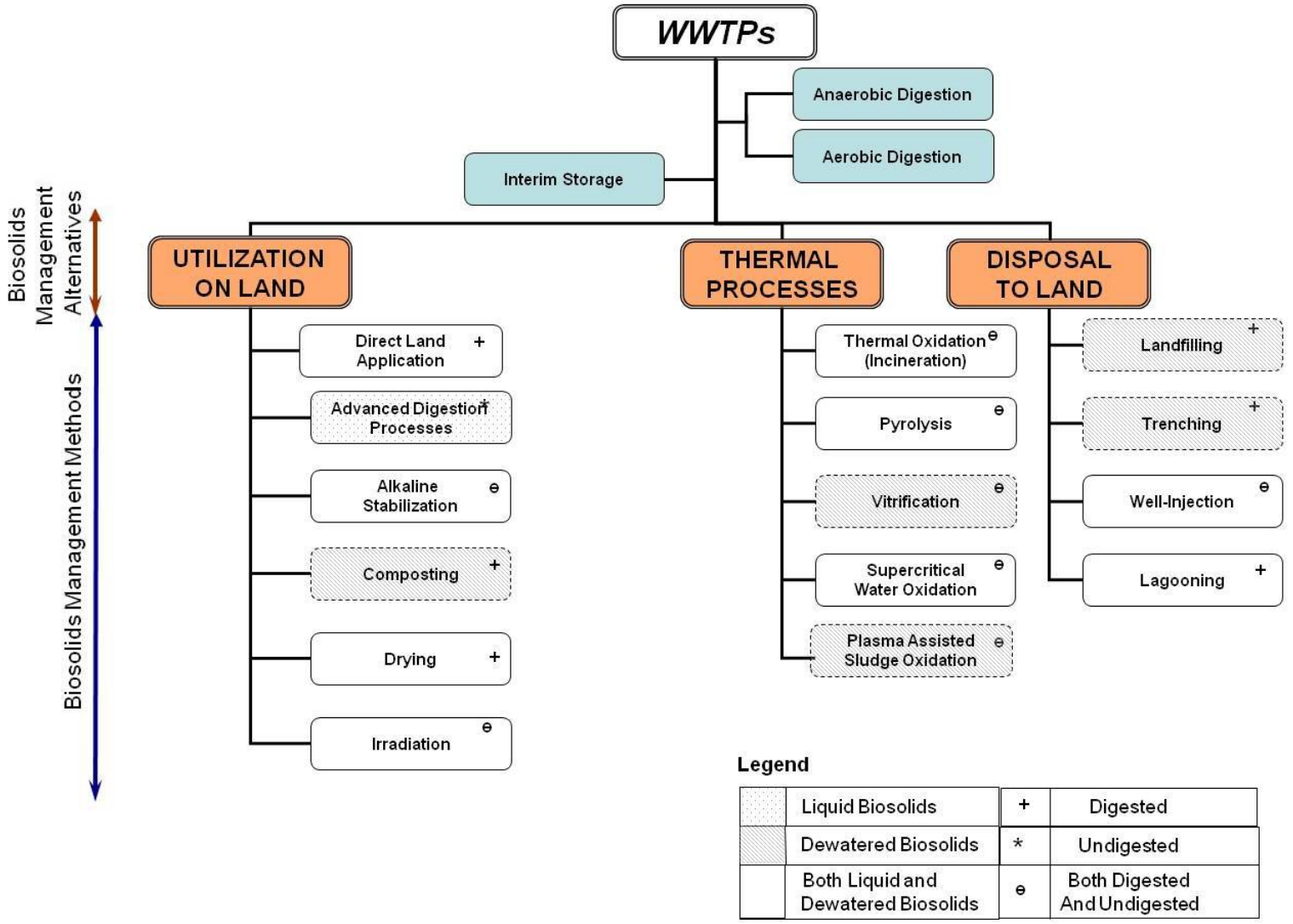


Figure ES.2 Schematic of Biosolids Alternatives and Management Methods



ES 1.3.3 Short Listed Management Methods

From the long list of Management Methods, a short list of viable Methods was developed based on the following evaluation criteria:

- Ability to meet current and potential future regulatory requirements;
- At least three known systems in full-scale operation;
- System is operating at a similar scale as potentially required for Halton Region; and
- A minimum of three years of successful operating experience at full-scale.

Each Method had to meet all of the pre-screening criteria to proceed to the detailed evaluation stage. The pre-screening process resulted in a pass or fail rating for each Method. As this is a long-term strategy, some Methods that do not qualify for detailed evaluation at this time may be of particular interest to Halton Region and may be considered in the future as more experience becomes available.

Table ES1 presents the short-list of Management Methods that met the pre-screening requirements.

Table ES1 Short-Listed Management Methods

Alternative	Method
Utilization on Land	Mesophilic Anaerobic Digestion
	Thermophilic Digestion
	Staged Anaerobic Digestion
	Alkaline Stabilization (N-Viro)
	Open Composting
	Composting Under Gore™
	In-Vessel Composting
	Heat Drying
Thermal Processes	Thermal Oxidation (Incineration)

The short list of Methods was expanded and/or refined to include additional options available to Halton Region for implementation of a particular Method. This refined list of Methods for evaluation is presented in Table ES2.

Table ES2 Refined Short-Listed Management Methods

Alternative	Method
Utilization on Land	Land Application of Liquid and Cake (Conventional Digestion)
	Land Application of Cake Only (Conventional Digestion)
	Land Application of Liquid and Cake (Advanced Digestion)
	Land Application of Cake Only (Advanced Digestion)
	Alkaline Stabilization (Regional Facility)
	Alkaline Stabilization (Shared Facility)
	Open Composting
	Composting Under Gore™
	In-Vessel Composting
	Heat Drying (Regional Facility)
	Heat Drying (Shared Facility)
Thermal Processes	Thermal Oxidation (Incineration, Regional Facility)
	Thermal Oxidation (Incineration, Shared Facility)

ES 1.3.4 Detailed Evaluation of Biosolids Management Methods

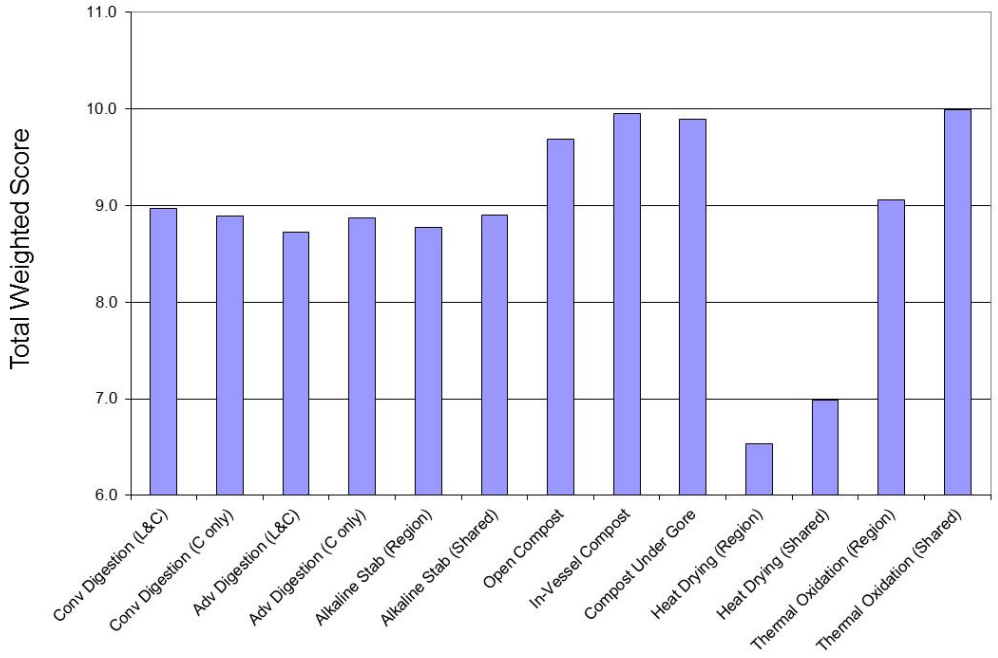
The refined short list of Biosolids Management Alternatives and Methods was evaluated based on a set of evaluation categories, criteria and weightings. The results of the detailed evaluation of the Biosolids Management Methods is shown graphically in Figure ES3.

Based on the detailed evaluation of the Methods, Thermal Oxidation (Incineration) as a partnership in a shared facility outside of Halton Region scored higher than the other Methods and is therefore ranked first.

The In-Vessel Composting, Composting Under Gore™ and Open Composting Methods ranked 2, 3 and 4, respectively. As a group, these Methods ranked second and will be collectively referred to as Composting.

The next highest ranked Method was Thermal Oxidation (Incineration) as a Regional facility. However, since Thermal Oxidation (Incineration) as a partnership at a shared facility is the preferred Method, this Method in a Regional facility will not be considered further for the strategy as there is no benefit to Halton Region to include both a Regional Thermal Oxidation (Incineration) and a Shared Thermal Oxidation (Incineration) facility within the Biosolids Management Strategy. Therefore, Land Application of Liquid and Cake (Conventional Digestion) was considered to be ranked third.

Figure ES.3 Results of Detailed Evaluation of Biosolids Management Methods



In summary, Thermal Oxidation (Incineration) as a partnership in a shared facility outside Halton Region, Composting, and Land Application of Liquid and Cake (Conventional Digestion) are considered to be the preferred Methods.

ES 1.3.5 Development of a Biosolids Strategy

Inclusion of Land Application of Liquid and Cake (Conventional Digestion) as a preferred Method and an element of Halton Region's Biosolids Management Strategy continues a long and successful program in Halton Region that has resulted in a long standing relationship with the agricultural community. However, recent changes in regulations along with the development of agricultural land in Halton Region has shown that this Method as the only element of a Strategy is not sustainable in the long-term as land availability will decline and costs will increase as biosolids must be land applied at greater distances from the source. In addition, a significant increase in biosolids storage would be needed to accommodate a Land Application only strategy.

Composting was the second ranked Method and its use in Halton Region as part of the Strategy would augment and diversify the existing land application program by diversifying the market and providing a higher quality product to other potential

users outside of the agricultural community. Inclusion of composting in Halton Region's Biosolids Management Strategy satisfies two of the key strategy considerations by continuing the Region's relationship with the agricultural community while diversifying with an enhanced product that may attract new agricultural users and new end users such as landscapers. However, the new Composting Guidelines are still in draft form and the market in Ontario for a biosolids compost product is uncertain at this time; therefore, considerable additional effort will be needed to determine the optimum biosolids composting process, the preferred product, and the marketability of a compost product containing biosolids.

Thermal Oxidation (Incineration) as a partnership in a shared facility outside Halton Region was the first ranked Method based on the evaluation process. Thermal Oxidation (Incineration) effectively diversifies Halton Region's Biosolids Management Strategy as it is the only Method that does not depend on land application in some form as the final end use. Further, Thermal Oxidation (Incineration) reduces the risk associated with the other two elements of the Strategy as it is not sensitive to weather conditions, product acceptability, or market issues that challenge the other two Methods of the strategy. Current Thermal Oxidation (Incineration) technologies comply with all recent stringent emission regulations and can produce recoverable energy.

ES 1.3.6 Preferred Biosolids Management Strategy

Halton Region's Preferred Biosolids Management Strategy involves:

- Continued Land Application to the extent that costs are controlled and reasonable, and vulnerabilities are minimized;
- Investigation of Composting opportunities to enhance Halton Region's land application program; and
- Investigation of Thermal Oxidation (Incineration) partnership opportunities at a facility outside of Halton Region to diversify the Strategy.

ES 1.3.7 Proposed Implementation Plan

Each of the three Methods (Land Application of Liquid and Cake; Composting; and Thermal Oxidation) could be an integral part of the Region's Biosolids Management Strategy, depending on the outcome of further investigations. Further investigations will be needed to define the specific details of each element of the Strategy [e.g. composting method, allocation of biosolids to each method, partnership options for Thermal Oxidation (Incineration), etc.].

Key decisions that will need to be made by Halton Region regarding the Preferred Biosolids Management Strategy include:

- The quantities and sources of liquid and dewatered biosolids that can be accommodated in a sustainable land application program (including storage requirements);
- The feasibility of composting biosolids;

- The details of a partnership agreement for Thermal Oxidation (Incineration) of biosolids;
- The approximate quantity of biosolids that should be allocated to each element of the Strategy to minimize risk and optimize the cost of the program; and
- The need for and location of additional dewatering.

These decisions will allow the final costs and details of the Biosolids Management Strategy to be defined.