

# County of Simcoe

## Organics Management Preliminary Business Case

August 2017

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## Glossary of Terms

AD	Anaerobic Digestion
CCF	Central Composting Facility
DBB	Design-Bid-Build
DBO	Design-Build-Operate
DC	Development Charges
DCF	Discounted Cash Flow
Dry AD	Dry Anaerobic Digestion
ECA	Environmental Compliance Approval
EPA	Environmental Protection Act
ERRC	Environmental Resource Recovery Centre
GHG	Greenhouse Gas
IC&I	Industrial, Commercial and Institutional
MMF	Materials Management Facility
MOECC	Ministry of the Environment and Climate Change of Ontario
MRF	Materials Recovery Facility
MWP	Mixed Waste Processing
NPV	Net Present Value
OPF	Organics Processing Facility
OWMA	Ontario Waste Management Association
REA	Renewable Energy Approval
RFI	Request for Information
RFP	Request for Proposals
RFPQ	Request for Prequalification
SSO	Source-Separated Organics
TBL	Triple Bottom Line
TS	Total Solids
Wet AD	Wet Anaerobic Digestion

## Notice

Ernst & Young Orenda Corporate Finance Inc. (“**EY**”) was engaged by the County of Simcoe (the “**County**”) to assist the County’s Solid Waste Management Division in completing a two-part business case for the development of an Organics Processing Facility - prepared in conjunction with the procurement of the facility (the “**Project**”). This Preliminary Business Case (the “**Preliminary Business Case**”) highlights the methods, tools and findings of the Project options analysis, qualitative analysis, quantitative analysis (including risk and value for money) and recommendations for the Project.

This Preliminary Business Case was prepared on County instructions solely for the purposes of the County. It should not be relied upon for any other purpose. The Report is based on objective analysis and information provided to us by the County and third parties.

The Preliminary Business Case may not have considered issues relevant to any third parties. Any use such third parties may choose to make of the Preliminary Business Case is entirely at their own risk and we shall have no responsibility whatsoever in relation to any such use and to the fullest extent permitted by law we do not accept or assume responsibility to anyone other than the County for our work, for this Preliminary Business Case or for the opinions formed.

This Preliminary Business Case has been limited in time and a more detailed/lengthy exercise may reveal material issues that this review has not. Our report to the County is based on inquiries of, and discussions with, the County and their consultants. We have not undertaken any form of investigation, audit, substantiation or verification procedures for the information, data and projections provided to us. We have not sought to verify the accuracy of the data or the information and explanations provided.

## 1. Executive Summary

The County of Simcoe's (the "**County's**") Solid Waste Management Strategy (the "**Strategy**") provides the framework for both short-term and long-term waste disposal options and diversion programs over the next 20 years. The Strategy recommended that the County assess development of an Organics Processing Facility ("**OPF**") to meet long-term processing requirements with regards to source-separated organics ("**SSO**") (the "**Project**"). In addition, it recommended the development of infrastructure for transfer of garbage, organics, and recycling, referred to as a Materials Management Facility ("**MMF**"). A number of studies have subsequently been undertaken to further development of both projects. Siting work undertaken by the County's consultant, GHD Limited, identified a property in the Township of Springwater as the preferred site for both the MMF and OPF, in a co-located configuration that would optimize logistics. Following a recommendation by the County's project consultant, GHD Limited ("**GHD**"), and public consultation, County Council approved a recommendation to further procure the OPF utilizing a Design-Build-Operate ("**DBO**") procurement model. Procurement of technology is proposed to follow the Planning approvals process. With the siting process complete and site-specific conditions understood, Ernst & Young Orenda Corporate Finance Inc. ("**EY**") has been retained at this time to complete a two-part business case (the "**Business Case**") for the OPF. To complete this Business Case, EY has teamed with WSP Global Inc. ("**WSP**"), an engineering firm specializing in waste management projects, and 2cg Inc. ("**2cg**"), an organic waste and diversion target specialty firm (collectively referred to as the "**Consultant Team**").

The Preliminary Business Case is intended to provide a recommendation based on a comprehensive, three-part analysis of business and operational impacts, high-level qualitative risks, and costs and benefits based on information provided through a Request for Information ("**RFI**") process. The Preliminary Business Case examined the Project and its alignment with the County's Strategy and changes to waste sector-related legislation noting that in 2016, the provincial government passed the Waste-Free Ontario Act. The goal of the Act is for Ontario to achieve zero waste and zero GHG emissions from the waste sector. The Act states among its goals a reduction in the volume of food and organic waste going to landfill and considers a long-term ban of the disposal of organics in landfills. The impacts of the Act have been considered alongside the County's Solid Waste Management Strategy, as key drivers for the OPF Business Case.

RFI 2016-127 for Organics Management Options was issued by the County of Simcoe on November 30, 2016. The purpose of the RFI was to gather information on alternatives for processing the County's source-separated organics - including the development of an OPF. The RFI process yielded the following alternatives or "Project Options" for further analysis, noting that Project Options 2 to 4 were various technology options for a County-owned processing facility:

- Project Option 1 - Status Quo
- Project Option 2 - Wet Anaerobic Digestion (AD)
- Project Option 3 - Dry Anaerobic Digestion (AD) with In-vessel Composting
- Project Option 4 - In-Vessel Composting
- Project Option 5 - Merchant Capacity (continued export)

A comparative evaluation was conducted on the Project Options based on both quantitative and qualitative factors to determine which options provide the greatest overall benefit. The analyses

undertaken included a business and operational impacts assessment, a high-level risk assessment and a cost-benefit analysis. Based on the outcomes of the three-part analysis Project Options for developing a County-owned facility (Project Options 2 to 4), delivered under a DBO model were determined to be the most advantageous to the County. Although there may be some indication that pursuing Dry AD with in-vessel composting could be a viable and advantageous technology option for the County OPF, this will be confirmed through the RFPQ/RFP process. Based on this initial analyses, there is no distinct advantage to eliminating any technology option at this time.

Development of a County-owned facility delivered through a DBO procurement model could provide a solution that is advantageous, comparably low risk, financially viable, and aligned to the County's objectives. It considers the long-term diversion targets outlined in the County's Solid Waste Management Strategy and the impending impact of the Waste-Free Ontario Act and aims to minimize risk to the County while achieving this alignment. Notably, the Act was considered to create additional risk with respect to the Merchant Capacity Project Option; over time, and as a result of the legislated ban of organics landfilling, the need for organics treatment capacity may increase. If there are no new organics processing facilities developed, a lack of treatment capacity would occur and could create challenges for the selected merchant.

As the analyses in this Preliminary Business Case were conducted using high-level cost estimates (based on RFI responses), the County would benefit from a "technology neutral" procurement process that would allow proponents greater flexibility in the development of a solution to meet the County's organics processing needs.

EY recommends that the County move forward with development of the OPF and advance a procurement process that allows for further input from the market, by soliciting bids for viable technology solutions and designs to be delivered under a DBO model. Allowing proponents to submit solutions and bids for any viable technology allows for greater innovation and potential value for the County. Evaluation of various technologies should consider the potential to recover biogas to heat and power the facility and, in addition, potential for additional revenue from excess biogas.

Following procurement, the Final Business Case will be developed based on the detailed information provided by the short-listed proponents during the RFP phase. The Final Business Case will include refreshed qualitative and quantitative analyses featuring updated information from the market.



## 2. Background

### 2.1 Introduction

The County of Simcoe's (the "**County**") Solid Waste Management Strategy (the "**Strategy**") was originally approved by County Council in 2010 and updated in 2016. The Strategy provides the framework for both short-term and long-term waste disposal options and diversion programs for the next 20 years.

The County offers a wide range of waste management services, serving approximately 296,000 residents in 139,000 curbside serviced residential and commercial units. There are currently eight (8) waste receiving facilities, including four (4) active landfill sites, four (4) permanent HHW depots, and five (5) composting facilities for leaf and yard waste. Diverted materials and garbage are processed or disposed of at various facilities both within and outside of the County. These processes are facilitated by the County through contracted transfer and haulage operations. The County is amongst the top municipalities in the province when it comes to diverting blue box materials (the 2015 residential waste audits indicated an 87% capture of recyclable materials). The green bin collection program has been identified by the County as an area for potential capture improvements (the 2015 audit revealed that 40% of the average residential garbage bag is food waste and other divertible green bin material).

The Strategy recommended the County assess the development of an Organics Processing Facility ("**OPF**") to meet long-term processing requirements with regards to source-separated organics ("**SSO**") (the "**Project**"). The Strategy also recommended that the County concurrently assess the viability of developing infrastructure for transfer of garbage, organics, and recycling, referred to as a Materials Management Facility ("**MMF**").

GHD Limited ("**GHD**" or the "**Owner's Technical Consultant**") has been retained to undertake a number of studies related to the development of this infrastructure, including a comprehensive siting process for both the OPF and MMF. In spring 2016, County Council approved development of both facilities co-located on one site located at 2976 Horseshoe Valley Road West, Springwater. The co-located facilities are now referred to as the County's Environmental Resource Recovery Centre ("**ERRC**").

On November 8, 2016, County Council approved a recommendation to further procure the OPF utilizing a Design-Build-Operate ("**DBO**") procurement model. Ernst & Young Orenda Corporate Finance Inc. ("**EY**") has been engaged to complete a two-part business case (the "**Business Case**") for the OPF. To complete this Business Case EY has teamed with WSP Global Inc. ("**WSP**"), an engineering firm specializing in waste management projects, and 2cg Inc. ("**2cg**"), an organic waste and diversion target specialty firm (collectively referred to as the "**Consultant Team**"). The Consultant team has worked with the County and their Technical Consultant to ensure the Business Case methodology is aligned to the goals of the County and, at the same time, has maintained independence throughout the process to enable the delivery of objective advice and services.

Part one of the Business Case (the "**Preliminary Business Case**") includes an analysis of options for organics management, including options related to development of a County-owned facility and, in addition, continuing to export this material for processing. This analysis includes a high-level financial model of potential project solutions and a qualitative review of Project Options.

## 2.2 Current System

The County provides a wide range of waste management services. The three (3) main streams: (i) garbage (residual), (ii) recyclables, and (iii) organics are collected at curbside or County waste receiving facilities and either disposed of or recovered. Residual waste is landfilled at one (1) of four (4) active landfills in the County or is transferred at a privately owned transfer centre and exported for incineration. Recyclables and organic material are transferred at a privately owned transfer centre where they are consolidated and shipped outside the County for processing.<sup>1,2,3</sup>

Currently, organic material is hauled by the County's waste management fleet to Hamilton. The export of this material will carry on until 2018 based on current contractual engagements. The following section will focus on organic material and will describe the current SSO and green residues management system. The information presented will be valuable as it will serve as a baseline and assist the project delivery team in assessing the upcoming organics management system.

### 2.2.1 Current Management

#### 2.2.1.1 SSO Collection, Transfer and Processing

The green bin program (SSO), which was introduced to the County in 2008, offers door-to-door curbside collection services for residents of the County. In 2016, 11,085 tonnes of SSO was collected, transferred and hauled for processing in Hamilton. The collected volume of organic material amounts to approximately 38% (capture rate) of the County's generated SSO. The current capture rate is a work in progress, as there are opportunities for improvement. A recent audit indicated that 40% of the residual waste destined for disposal is comprised of organic material.<sup>1,2,3</sup>

An extensive list of materials are accepted in the County's green bin program, however, the program does not accept plastic bags, pet waste, diapers or sanitary products. A detailed list of accepted green bin material is provided in Section 2.2.1.2 of this report.<sup>3</sup>

##### 2.2.1.1.1 Collection

A large portion (98%) of the County's SSO is collected from residential and industrial, commercial, and institutional ("IC&I") curbside collection points and transferred at a privately owned transfer centre. The curbside collection contractor, Waste Connections of Canada ("Waste Connections") (formerly Progressive Waste Solutions), serves approximately 139,000 residential and commercial units with a split garbage truck that collects both garbage and organics. Split garbage/organics trucks go to the Waste Connections transfer station on some collection days, where garbage and organics are exported for processing from their contracted transfer station. These split trucks also go to County landfills on some collection days where the garbage is landfilled and the organics are transferred and sent out for processing. Other collected SSO comes from residential and IC&I drop-off from eight (8) waste receiving facilities (including landfill sites and transfer centres).

In addition, the County manages SSO collection of some targeted institutions and facilities like long-term care facilities, the County Administration Centre, and the Simcoe County District School Board Education Centre with a front-end truck. Organics from this run are added to residential drop-off material.<sup>2</sup>

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<sup>1</sup> SIMCOE County, 2015a. Annual Report - Solid Waste Management Strategy. 22 pages

<sup>2</sup> SIMCOE County, 2015b. 5-Year Update - Current Status Report. 96 pages

<sup>3</sup> SIMCOE County, 2016. Request for information RFI 2016-127. Organics management options. 17 pages

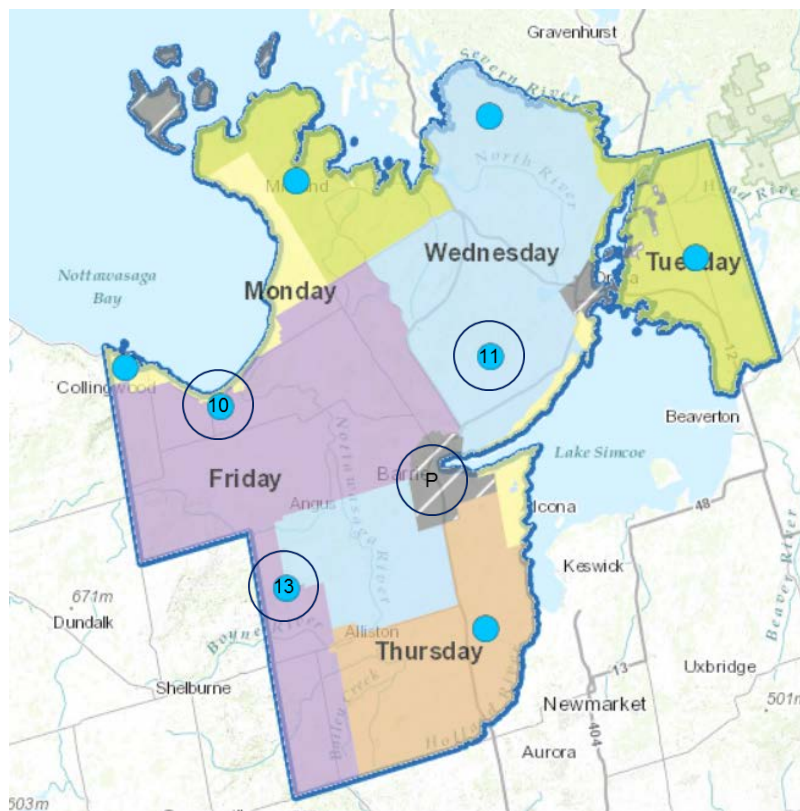
### 2.2.1.1.2 Transfer

The transfer point for SSO is dependent on the curbside collection day, with material being transferred from either the Waste Connections transfer station or from one (1) of three (3) County landfill sites (Sites 10, 11 or 13) to facilitate the County's collection fleet and timing constraints.

In addition, the County currently has a pilot program underway to manage the transfer and haulage of commercial organics collected at Casino Rama. In 2016, the County facilitated the transfer and haulage of 490 tonnes of this material from Site 11 - Oro.

Transfer site locations are mapped with a large circle in Figure 1.

Figure 1: County of Simcoe Waste Receiving Facilities<sup>4</sup>



#### Legend

- 10. Site 10 - Nottawasaga landfill (5715 County Road 64, Clearview)
- 11. Site 11 - Oro landfill (610 Old Barrie Road West, Oro-Medonte)
- 13. Site 13 - Tosorontio landfill (6815 Concession Road 4, Adjala-Tosorontio)
- P. Waste Connections Transfer Station (320 Saunders Road, Barrie)

Blue points represent other localized County waste receiving facilities.

<sup>4</sup> Simcoe County, 2017b. Interactive map - solid waste management available at: <https://maps.simcoe.ca/public/?THEME=Solid%20Waste%20Management>, consulted 17/02/2017

**2.2.1.1.3 Processing**

Organic material is hauled by the County’s fleet to the Hamilton Centralized Composting Facility (“HCCF”) and is processed by AIM Environmental Group (“AIM”) to produce a high quality end product.

At the HCCF, organics are prepared and placed into “in-tunnel” composting systems. Aerobic degradation takes approximately 45 to 60 days and then the compost material is matured in windrows for a period between 20 to 40 days. The end product is a pathogen-free, Class A compost that is shipped and sold out of the facility.<sup>5</sup> It is noted that under this arrangement, AIM assumes responsibility for the end product and in turn receives any revenue from associated carbon credits.

**2.2.1.2 Source-Separated Organics**

**2.2.1.2.1 Composition**

Table 1 includes materials that are currently accepted in the County’s green bin or SSO program.

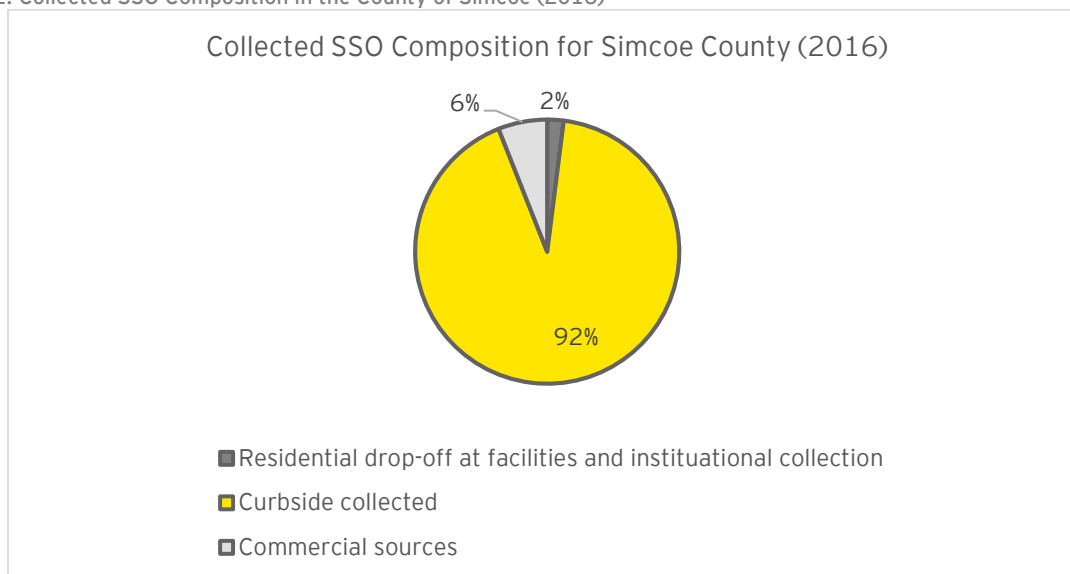
Table 1 : Currently Accepted SSO Materials in Green Bin Program<sup>3</sup>

Acceptable SSO Materials		
<ul style="list-style-type: none"> <li>• Bread, grains, and cereals</li> <li>• Fruits and vegetables</li> <li>• Dairy products</li> <li>• Eggs and egg shells</li> <li>• Corn cobs and husks</li> <li>• Halloween pumpkins</li> <li>• Paper egg cartons</li> <li>• Fast food drink containers</li> </ul>	<ul style="list-style-type: none"> <li>• Meat, fish, and bones</li> <li>• Shellfish</li> <li>• Gravies and sauces</li> <li>• Grease and fat</li> <li>• Nuts and shells</li> <li>• Pet food</li> <li>• Coffee filters and grounds</li> <li>• Tea bags</li> </ul>	<ul style="list-style-type: none"> <li>• Waxed paper (parchment paper)</li> <li>• Microwave Popcorn bags</li> <li>• Paper bags</li> <li>• Paper cups (loose - not stacked)</li> <li>• Paper-only takeout containers</li> <li>• Paper plates</li> <li>• Paper towels and tissues</li> </ul>

Diapers, sanitary products, plastic bags and pet waste are not accepted in the current green bin program.

Table 1 illustrates the source of SSO materials collected by the County of Simcoe.

<sup>5</sup> HCCF, 2006, Hamilton Centralized Composting Facility <http://www.compost.org/conf2006/8BestManagementPractices/CCFPresentation.pdf>. Consulted 07/02/2017

Figure 2: Collected SSO Composition in the County of Simcoe (2016)<sup>6</sup>

In 2016, the residual rate equaled 7.5%. Contaminants are removed in treatment facilities in order to obtain "A" quality compost.

#### 2.2.1.2.2 Tonnages

Table 2 indicates the tonnages hauled by the County of Simcoe to AIM for processing in 2016.

Table 2 : 2016 SSO Effective Tonnages<sup>6</sup>

Collected source-separated organics	2016 tonnage (tonnes)
Curbside collected	10,850
County other collected (Residential drop off at facilities + institutional collection)	236
Commercial sources	708
<b>TOTAL</b>	<b>11,794</b>

#### 2.2.1.3 Leaf & Yard Waste and Brush Collection, Transfer and Processing

Curbside leaf and yard waste and brush is collected by Miller Waste Systems and hauled to one (1) of five (5) County compost sites for processing. In addition, residents of the County can also drop-off this material at one (1) of eight (8) waste receiving (drop-off) facilities throughout the County. Brush material dropped-off at County facilities is ground and used as mulch.

Leaf & yard waste plus curbside-collected brush is composted in windrows, regularly turned, and monitored as per Ministry of the Environment and Climate Change of Ontario ("MOECC") guidelines. In 2013, the County standardized leaf, yard waste and brush curbside collection services around the County's municipalities and expanded its compost operations to be able to process all collected leaf and yard waste and curbside-collected brush.

<sup>6</sup> SIMCOE County, 2017a. Colligated tonnages data (excel sheet format)

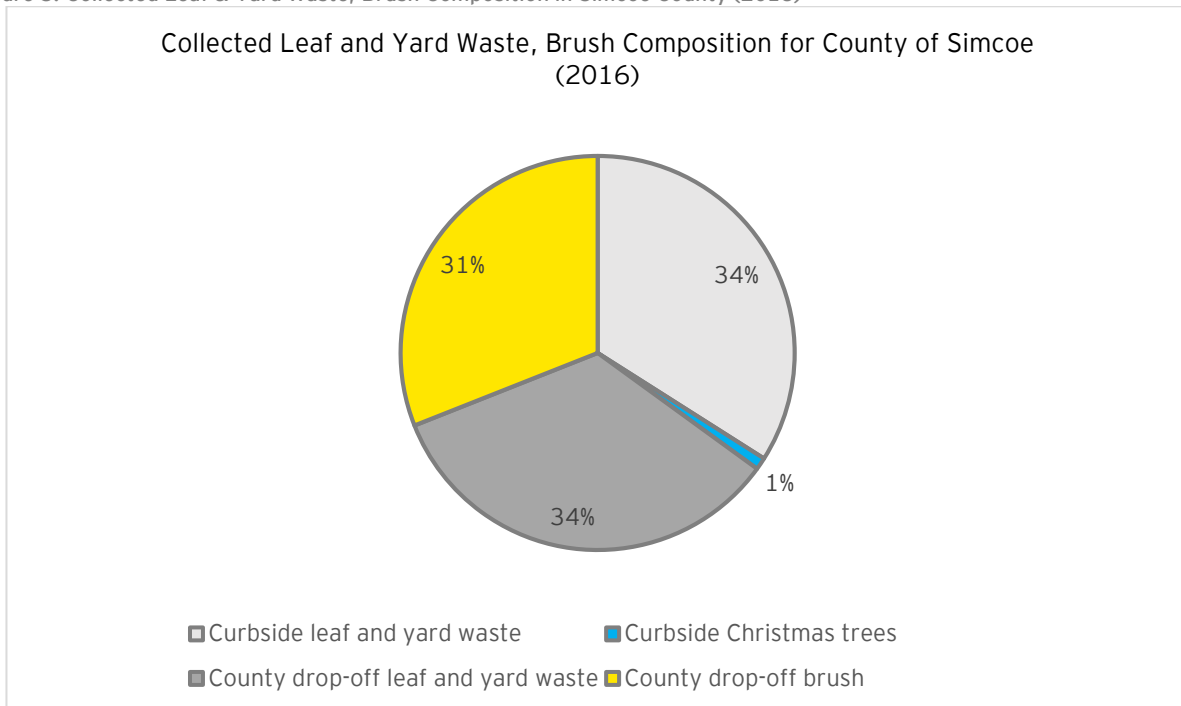
Compost is purchased and hauled by commercial vendors and residents. In 2016, 4,500 and 11,700 tonnes of compost was hauled by residents and commercial vendors, respectively.<sup>2</sup>

**2.2.1.4 Leaf & yard waste and Curbside-Collected Brush**

**2.2.1.4.1 Composition**

Figure 3 illustrates the composition of the collected leaf and yard waste as determined by the 2016 waste audit conducted by the County.

Figure 3: Collected Leaf & Yard Waste, Brush Composition in Simcoe County (2016)



**2.2.1.4.2 Tonnages**

Table 3 outlines the collected residues composition tonnages collected by the County in 2016.

Table 3 : 2016 Leaf & Yard Waste, Brush Effective Tonnages

Collected leaf, yard waste, brush	2016 tonnage (tonnes)
Curbside leaf and yard waste and brush	8,107
Curbside Christmas trees	178
County drop-off leaf and yard waste	8,072
County drop-off brush	8,568
<b>TOTAL</b>	<b>24,925</b>

\*Figures may not sum due to rounding.

## 2.2.2 Current Services

The following section describes contractual terms each of the key services in SSO and green residue processing. These materials are managed by different contractors, under separate contractual agreements.

### 2.2.2.1 SSO

Table 4 provides details of the system for collection, transfer, haulage, and processing of the County's SSO.

Table 4 : SSO Related Services Details<sup>7, 2</sup>

	Collection	Transfer	Haulage	Processing
Site/Location	N/A	Refer to Figure 1 for the four transfer locations	N/A	Hamilton Centralized Composting Facility
Responsibilities	Waste Connections of Canada and County of Simcoe (8 drop-off locations)	Waste Connections of Canada and County of Simcoe	County of Simcoe	AIM Environmental Group
Contract duration	7-year collection contract	7-year collection contract	N/A	5-year (extension of 2008 contract in 2013)
Contract ending year	March 31, 2020	March 31, 2020	N/A	September 2018

Note that under the County's current arrangement with Waste Connections, their collection contractor, transfer costs for SSO are not assessed against the County to facilitate efficient collection operations.

### 2.2.2.2 Leaf and Yard Waste, Brush

Table 5 provides details of the system for collection, transfer, haulage, and processing of the County's leaf and yard waste, and brush.

Table 5 : Leaf & Yard Waste, Brush Related Services Details <sup>7, 2</sup>

	Collection	Transfer	Haulage	Processing
Site/Location	N/A	Refer to Figure 1 for the location of eight transfer locations (drop-off waste receiving facilities)	N/A	Five (5) composting sites
Responsibilities	Miller Waste Systems Inc. and County of Simcoe (8 drop-off locations)	County of Simcoe	County of Simcoe	County of Simcoe
Contract duration	5-year collection contract	N/A	N/A	N/A

<sup>7</sup> SIMCOE County, 2012. Organics Processing Contract Extension CS 12-141. 2 pages

	Collection	Transfer	Haulage	Processing
Contract ending year	March 31, 2022	N/A	N/A	N/A

### 2.2.2.3 Regulatory framework

#### 2.2.2.3.1 Waste management provincial applicable regulations

Waste management is impacted by federal, provincial and municipal regulations. In Ontario, residential waste management regulations are mandated by the Government of Ontario but waste management services are provided by local municipalities. All regulatory frameworks in Ontario that are applicable to the implementation of organic waste processing facilities (composting and/or anaerobic digesters) are presented in the tables below.

Table 6 : Ontario Legislation Affecting Organics Processing Facility Implementation

Act	Pertinent Content
Environmental Protection Act, 1990	The Environmental Protection Act (“EPA”) provides an overarching framework for waste management facilities. Under the EPA, an Environmental Compliance Approval (formerly referred to as a Certificate of Approval) is needed to implement or extend a waste management system. Associated regulations are described in Table 7.
Environmental Assessment Act, 1990	The environmental assessment process ensures that governments and public bodies consider potential environmental effects before an infrastructure project begins. This Act defines the approach and procedure.
Waste Diversion Act, 2002	This Act was introduced to encourage the reduction, reuse and recycling of wastes, and to facilitate the development, implementation and operation of waste diversion programs.
Nutrient Management Act, 2002	Provides a framework that defines a strict set of standards for the agricultural use for finished compost or digestate.
The Planning Act	Defines the ground rules for land use planning in Ontario and defines land management controls.
The Waste-Free Ontario Act, 2016	This Act, and the associated strategy, foster innovation in product and packaging design, boost recycling across all sectors, incent companies to optimize their waste management systems, shift the Blue Box costs from municipal tax payers to producers and develops an action plan to reduce the amount of organic materials going to landfills.

Table 7 : Environmental Protection Act Regulations Affecting Organics Processing Facility Implementation

Regulation	Pertinent Content
Ontario Regulation 1/17: Registrations Under Part II.2 Of The Act - Activities Requiring Assessment Of Air Emissions	Under this regulation, requirements that can affect the implementation of organic treatment facilities include registration details, noise and odour management requirements.
Ontario Regulation 351/12: Registrations Under Part II.2 Of The Act - Waste Management Systems	Under this regulation, requirements that can affect the implementation of organic treatment facilities include waste transportation requirements.
Ontario Regulation 255/11: Applications For Environmental Compliance Approvals	Under this regulation, requirements that can affect the implementation of organic treatment facilities include environmental compliance approvals application requirements.
Ontario Regulation 359/09: Renewable Energy Approvals Under Part V.O.1 Of The Act	Under this regulation, requirements that can affect the implementation of organic treatment facilities include renewable energy projects application process and requirements.
Ontario Regulation 101/94: Recycling And Composting Of Municipal Waste	Under this regulation, requirements that can affect the implementation of organic treatment facilities include leaf and yard waste system service obligations, and, leaf and yard waste composting site regulations.



Regulation	Pertinent Content
Ontario Regulation 347: General - Waste Management	Under this regulation, specifics on the handling requirements for waste categories are described.

#### 2.2.2.4 Useful documentation

Table 8 includes documentation that is to be considered in the development of organics processing facilities and contributes to the understanding of the project approval process.

Table 8 : Useful Documentation in Regards to Organics Processing Facility Implementation

Documentation	Description
Guideline for the Production of Compost in Ontario	Outlines planning, design and operational practices for composting facilities.
Municipal Guide to Biogas	Showcases AD sites in Ontario and explains the applicable renewable energy approval (“ <b>REA</b> ”) process.
Technical Guide to Renewable Energy Approvals	Provide detailed information on the requirements for submitting a complete application for REA.

#### 2.2.2.5 Stakeholders

As listed in the table below, there are several key organizations which serve as subject matter experts in the field of waste management in Ontario. Workshop sessions and meetings with them may add value to municipal stakeholders during the development of organic processing facilities.

Table 9 : Waste Management Stakeholders in Ontario

Organization	Description
Ontario Waste Management Association (“ <b>OWMA</b> ”)	<ul style="list-style-type: none"> <li>Represents the waste and resource management sector in Ontario. Members have diverse interests and capital investments in areas such as waste and recycling collection, landfills, transfer stations, material recycling facilities, organics processing and composting.</li> </ul>
Canadian Biogas Association	<ul style="list-style-type: none"> <li>Represents the biogas sector, developing the biogas industry.</li> <li>Guides policy and regulatory development, builds industry knowledge through exchange of information, and creates knowledge networks.</li> </ul>
Compost Council of Canada	<ul style="list-style-type: none"> <li>National non-profit organization dedicated to advocacy and the advancement of organics residuals recycling and compost use.</li> </ul>

## 2.3 Future Requirements

Future needs related to processing of the County’s SSO is directly tied to recommendations and initiatives outlined in the County’s Solid Waste Management Strategy. The Strategy provides a framework for both short and long-term diversion and waste disposal programs for the next twenty years, with a mandate to encourage and increase diversion to meet the County’s diversion targets (71% by 2020, 77% by 2030).

In September 2016, County Council approved the first 5-year update for the Strategy (the “**Strategy Update**”), prepared by HDR, Inc. (“**HDR**”). The Strategy Update outlined a series of recommendations and initiatives related to increasing diversion. This report also presented the anticipated impact of these initiatives on the County’s waste management system, managed tonnages, and resulting diversion rate. Various proposed options—many set to target increasing the capture of curbside SSO—were presented for future consideration during the next 5-year planning period.

Subsequent to the above, at a Special Meeting of Council on February 9, 2017, County Council approved furthering six (6) specific initiatives, with two (2) specific initiatives set to impact the County’s SSO program directly:

- Strict enforcement of standard-sized garbage container (i.e. removing the variability of container sizes set-out curbside); and
- Addition of pet waste and diapers.

In forecasting future tonnages for the purpose of this financial assessment the implementation of both of the initiatives above were considered. Tonnages and diversion impacts outlined by the HDR report relating to SSO were incorporated into projections outlined below. In addition, 2% population growth was applied to 2016 tonnages.

### **2.3.1 Tonnage Projections**

Given County Council's current direction in regard to restrictions on curbside garbage and the proposed additions to the green bin program, the following assumptions were applied to SSO tonnage projections for consideration in seeking available merchant capacity or development of a County facility for processing.

#### *2.3.1.1 Increased capture rate of curbside SSO from 38% to 52%*

Based on 2015 audit results (outlined in County staff report - Item CCW 16-080), the County currently captures only 38% of its curbside SSO. Based on projections by HDR as part of the Strategy Update, and Council direction to further implement restricting curbside garbage via a standard-sized garbage container, it is estimated that the capture of existing SSO could be increased to 50 to 55%<sup>8</sup>; for the purposes of this assessment, 52% capture was assumed.

#### *2.3.1.2 Capture rate of pet waste and diapers of 52%*

Based on 2015 audit results, the County currently collects an estimated 9,700 tonnes of pet waste and diapers in its curbside garbage (6,100 tonnes of pet waste, 3,600 tonnes of diapers). With input from the County's consultants (GHD, HDR), it is assumed that the County could reasonably anticipate 52% capture of pet waste if included in their SSO program. Given information supplied by other Ontario municipalities accepting pet waste, this is a conservative value as their capture rates range from 66% to 79%.

Capture rates related to diapers are more uncertain given the intention of the County to exclude plastic bags from their green bin program - even with the acceptance of diapers. This may have implications on households utilizing disposal systems which wrap waste diapers in plastic. Given information supplied by other Ontario municipalities accepting diapers, a conservative capture rate of 40% was assumed for diapers for this undertaking, noting that supplied capture rates ranged from 54% to 66%.

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<sup>8</sup> *Final Recommendations and Initiatives - Solid Waste Management Strategy Update*, prepared by HDR, Inc., July 27, 2016.

Considering both the increased capture of SSO (food waste), and the addition of both pet waste and diapers, future tonnages are projected as follows:

Table 10: Projected SSO Tonnages

SSO Source	2016 Base (tonnes)	2021 (tonnes)	2026 (tonnes)	2031 (tonnes)	2036 (tonnes)	2041 (tonnes)
Curbside collected tonnage of SSO (assumed 52% capture rate based on program changes)	13,974	16,164	17,846	19,704	21,755	24,019
Collected from residential drop-off at facilities, institutional collection	236	260	287	317	350	387
Pet waste (assumed 52% capture)	3,177	3,545	3,914	4,322	4,772	5,268
Diapers (assumed 40% capture)	1,421	1,586	1,751	1,933	2,134	2,356
Projected tonnage - SSO, pet waste, diapers (52% capture SSO and pet waste, 40% capture diapers)	18,808	21,555	23,799	26,276	29,010	32,030

### 2.3.2 Impact of Waste-Free Ontario Act

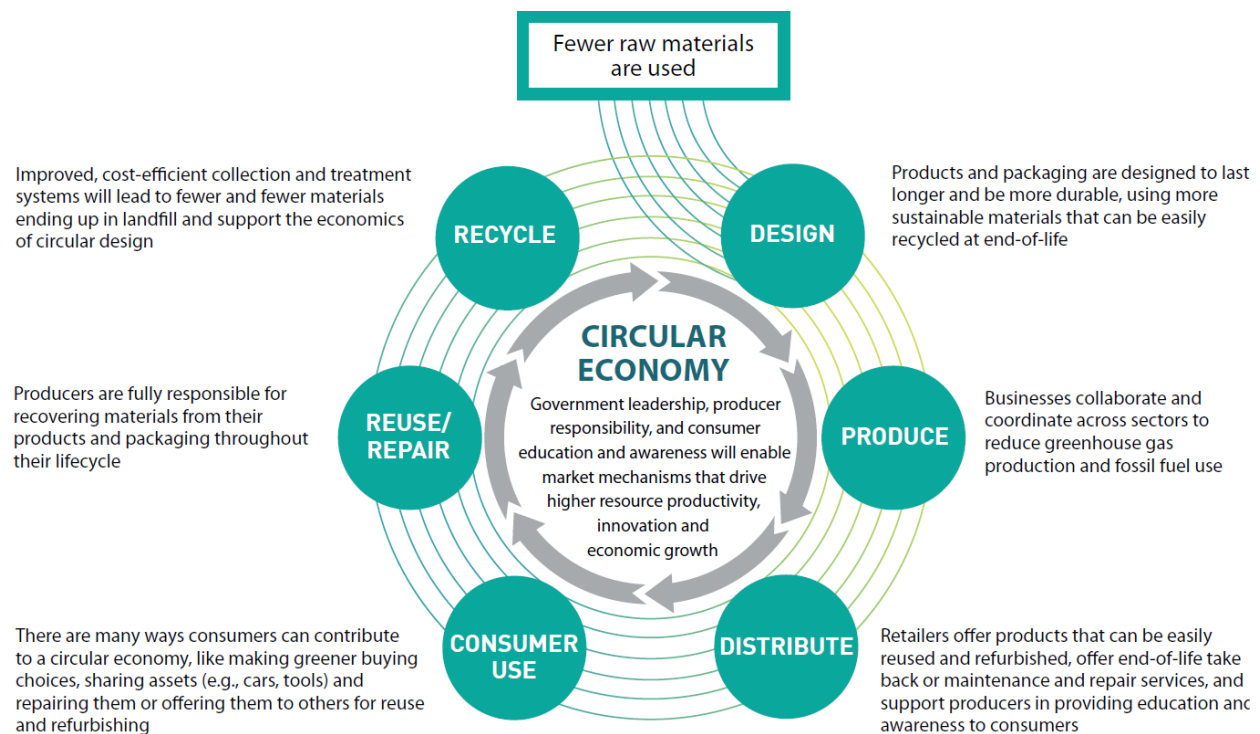
In 2016, the Province of Ontario passed legislation that will divert more waste from landfills, create jobs and help fight climate change.

The Waste-Free Ontario Act is intended to:

- Encourage innovation in recycling processes and require producers to take full responsibility for their products and packaging;
- Lower recycling costs and give consumers access to more convenient recycling options;
- Help fight climate change by reducing greenhouse gas pollution that results from the landfilling of products that could otherwise be recycled or composted; and
- Overhaul Waste Diversion Ontario into the Resource Productivity and Recovery Authority, a strong oversight body with new compliance and enforcement powers that will oversee the new approach and existing waste diversion programs until transition is complete.

In December 2016, the province finalized its Strategy for a Waste-Free Ontario: *“Building the Circular Economy”*. This new strategy aims to reduce waste production and recover resources by implementing a circular economy, in which valuable materials destined for landfill could be fed back into the economy.

Figure 4: Description of a circular economy



Source: *Resource Recovery and Circular Economy Act, 2016*

The main goals of the Strategy for a waste-free Ontario are to achieve a zero waste Ontario and zero greenhouse gas emissions from the waste sector preventing waste in the first place rather than relying on traditional end of life waste management solutions.

The Strategy suggests goals with the following timeline:

- 30% diversion by 2020
- 50% diversion by 2030
- 80% diversion by 2050

Fifteen actions have been developed to move forward a zero-waste Ontario. Two (2) of the above-noted goals are dedicated to residual organics management and will have impacts on the County's organics management planning:

- (i) **Action 10: Implement an action plan to reduce the volume of food and organic waste going to landfill**

The provincial government plans to establish a stakeholder working group to develop an action plan that will aim to reduce food and organic waste going to landfill. This group will be composed of multiple players, including generators, municipalities and service providers. Working sessions will enable the group to develop a coherent plan for the future and find implementation tools, such as disposal bans or source separation requirements. Regulation and guidelines should be updated to reflect new technologies and to promote new processes that support viable end markets. The action is expected to be undertaken in 2017/2018. The working group has been established and is meeting regularly with the intent of releasing a Strategy by the end of 2017.

The action plan will be inspired by best practices already in place in the province and comparable jurisdictions from across the world. The County's planned OPF could serve as a benchmark or best practice example for other jurisdictions.

*(ii) Action 15: Implement disposal bans to direct materials to end-markets*

Organics have been identified as materials that could be considered for disposal bans over the long-term. The provincial government has noted that any potential ban would be announced with sufficient time for the industry to prepare required infrastructure(s). The potential ban is planned to be applicable in medium to long term of the Strategy (2022 and beyond).

Other actions identified in the Waste-Free Ontario Act are intended to enhance access to data, implementing policies, environmental standards, producer responsibility, and promoting innovative best practices. The Strategy also insists in public participation by establishing promotion and education requirements in resource recovery.

## 2.4 Current Opportunity

In 2009, the County retained Stantec Consulting Ltd. to undertake development of a strategy to provide the framework for both short-term and long-term diversion and waste disposal programs for the next 20 years.

The development process included examination of the existing system and policies, current programs and data, population and growth. Further, the Strategy explored combinations of programs, technologies and techniques for integration into the future waste management system while consideration was given to local needs and circumstances, potential impacts to economic, environmental, and social factors. The Strategy was intended to identify potential solutions and make recommendations, establishing a planning framework and strategic direction for the future. The Strategy was approved by Council in 2010.

The Strategy recommended that the County assess development of a Central Composting Facility ("CCF") for the long-term processing of organics. Specifically, it recommended the County explore various technology options, including those that could handle the addition of other organic materials to the program (i.e. pet waste and diapers) and that the facility be owned by the County with a design, build, operate arrangement with a qualified vendor.

Since the completion of the Strategy in 2010, a number of studies have subsequently been undertaken to further the above recommendations. Siting work undertaken by GHD identified a property located at 2976 Horseshoe Valley Road West in the Township of Springwater as the preferred site for both a transfer facility (MMF) and OPF, in a co-located configuration that would optimize logistics. Siting approval was received from County Council on March 22, 2016, allowing work to continue on the development of co-located facilities on the preferred site.

While both facilities will be situated on the same site, they differ in terms of technology, procurement method, approvals, and development timelines. Currently, updated site-specific costing of the MMF is being undertaken by the County (this facility will be procured utilizing a traditional Design-Bid-Build ("DBB") delivery model). Concurrently, EY was retained by the County to undertake a Business Case for the OPF, noting that the County has determined that a DBO project delivery model would be utilized for this facility.

## 2.5 Purpose of Preliminary Business Case

The Business Case related to assessing options for organics processing will be completed in two parts—a preliminary and final—in conjunction with various stages of procurement related to development of a County-owned facility. The purpose of the Preliminary Business Case, set to be presented to County Council in September 2017, will be to outline the business impacts, risk assessment, and cost/benefit analysis of various Project Options for organics management, including facility development and continuation of export. With County Council direction to further the procurement of the OPF, the Final Business Case, set to be presented to County Council following the procurement process, will present a cost/benefit analysis related to a selection of specific processing DBO alternatives to be developed at 2976 Horseshoe Valley Road West, Springwater.

## 2.6 Process for Determining Preferred Project Option

The Business Case process has been designed to function within the procurement process for an in-County OPF as part of the Simcoe's long-term waste management plan. The Preliminary Business Case was developed by the Consultant Team with direct input from the County and their technical advisor, GHD. Background information for the Preliminary Business Case was drawn from the County's official strategy documents, reports by County Staff to Council, and technical reports prepared for the County by technical consultants, including GHD.

These reports, along with information from a County-issued Request for Information ("RFI") for Organics Management Options (County of Simcoe RFI 2016-127) and technical expertise from the Consultant Team, GHD, and the County form the basis of qualitative portions of the Preliminary Business Case. As part of the qualitative portion of the Preliminary Business Case, the Consultant Team also analysed the business and operational impacts of the Project Options reviewed. The financial model represents the quantitative portion of the Preliminary Business Case. Technical and financial data from the RFI, available market information, and based on the past-experience of the Consultant Team, were used as inputs to the financial model developed by EY. The qualitative analysis in combination with the results of the financial model allow for an independent assessment of the potential options for the management of SSO, including the proposed development of a County-owned OPF.

Based on the analysis in this Preliminary Business Case, a recommendation has been presented. Should Simcoe County Council move forward based on this recommendation, a Request for Pre-qualification ("RFPQ") and a Request for Proposals ("RFP") will be issued following the Planning approvals process for the preferred site. Submissions to the RFP will be evaluated by the County and a successful proponent will be selected. Based on the successful proponent's submission the Final Business Case will be prepared to highlight cost and benefits of the proposal before Council's final approval of the plan for the OPF.

## 3. Organics Processing Facility Project

### 3.1 Project Description

An OPF is a location where SSO (i.e. green bin material) and potentially materials such as leaf and yard waste, pet waste, and diapers are processed under controlled conditions and converted into other valuable products, such as compost, fertilizer and/or biogas for energy production.

It is anticipated that the County's procurement process for the OPF will be open to all types of aerobic composting and anaerobic digestion technologies, as these are common in the industry and there are many examples of both technologies in-place across Canada. Both are engineered biochemical conversion processes which involve the decay of organic materials and utilize biological processes, but each method involves different conditions and produces different outputs, with different cost factors. Composting is the controlled decomposition of organic material by introducing oxygen, to produce a value-added compost product; anaerobic digestion is an oxygen-free process that also decomposes organic material using natural biological processes but that further produces biogas and fertilizer products.

Both aerobic composting and anaerobic digestion processes generally include the following components:

- Receiving area for incoming materials;
- Handling area;
- Pre-Processing area;
- Storage area;
- Post-Processing area;
- Loading area for outgoing materials; and
- Environmental control facilities (e.g., odour abatement and water control features).

Biogas management processes, such as refining, valorization and storage would be applicable for AD processes only.

### 3.2 Chronology of Project Development

Following the 2010 Solid Waste Management Strategy's recommendation to pursue a County-owned Central Composting Facility ("CCF"), GENIVAR Inc. ("Genivar") was retained in 2012 to complete an initial viability study. This report outlined facility sizing and identified a number of potential processing technologies which could realistically incorporate additional materials which County Council had indicated a desire to process (diapers, pet waste, and sanitary products). This report also outlined the next steps required in the development of a facility, including the procurement process required to obtain a DBO vendor and the required siting and approvals processes. Genivar presented the findings of their central composting viability assessment to County Council in 2012. It is noted that following Genivar's work and identification of differing processing technologies, notably the potential for AD, the CCF project was renamed as the OPF to be inclusive of all potential technologies.

On June 27, 2013, a full-day Waste Management Strategy session was held to provide County Council with an opportunity to discuss improving diversion and in particular, the addition of pet waste and diapers to the organics program.

Council approved, in principle, the addition of pet waste and diapers to the organics program and directed Staff to provide additional information on costing. Costing information, a proposed project plan for development of a County facility, and timeline were endorsed by Council in early 2014.

Following direction from Council in early 2014, the project began with public notification, including a public information session in June of 2014. In addition, GHD were retained as the County's consultant for this project and the siting process was initiated.

In 2014, County Council also endorsed further work to determine the viability of a County MMF and extending the scope of work assigned to GHD to provide engineering services for siting this facility concurrently with the OPF. The MMF, a transfer facility, will be an integral part of the County's waste management system - the link between collection operations and moving material to final waste disposal/processing locations. It will provide a location for consolidation of garbage and recycling from multiple collection vehicles into larger, higher-volume transfer vehicles for more economical shipment to disposal/ processing sites. In addition, this site could provide a location for a truck servicing facility. Note that there will be no long-term storage of materials or public drop-off at this facility.

### **3.2.1 Siting Process - OPF and MMF**

A comprehensive siting process for both the MMF and OPF was undertaken in 2015/early 2016 which included the evaluation of 502 potential sites. A short list of sites was presented for public, Aboriginal, and stakeholder consultation in fall 2015, followed by a detailed comparative evaluation completed by the County's consultant. This evaluation was also extended to consider the option of co-locating both facilities on a single site. On March 22, 2016, County Council approved furthering development of a co-located MMF and OPF at 2976 Horseshoe Valley Road West, Springwater.

### **3.2.2 Development Strategy - Environmental Resource Recovery Centre**

The co-located facility will house both the OPF and MMF, a Solid Waste Management truck servicing area, and potentially a future Materials Recovery Centre ("MRF") and public education centre. For ease of reference, the complex is referred to as the County of Simcoe's Environmental Resource Recovery Centre ("ERRC").

With direction to advance work to co-locate the two (2) facilities at 2976 Horseshoe Valley Road West, Springwater, GHD was retained to provide an updated work plan that considered the more complex project delivery of two facilities at one location.

The resulting Development Strategy and conceptual timeline was based on GHD's experience in developing similar facilities. The project plan considers that developing infrastructure at this location will require amendments to the County Official Plan as well as the Township of Springwater Official Plan and Zoning By-law.

In addition, the MMF and OPF will be advanced with different delivery methods. Co-location must consider the timing of both procurement processes, timing of the Business Case for the OPF, obtaining an Environmental Compliance Approval ("ECA"), and construction of two facilities on the same footprint.

Development of the co-located facilities will incorporate four key paths which, although interconnected, will have distinct milestones and timing:

- Planning approvals process
- Environmental Compliance Approval process



- MMF - procurement of design (with updated costing), design, and construction
- OPF - procurement of technology (with Business Case), design, and construction

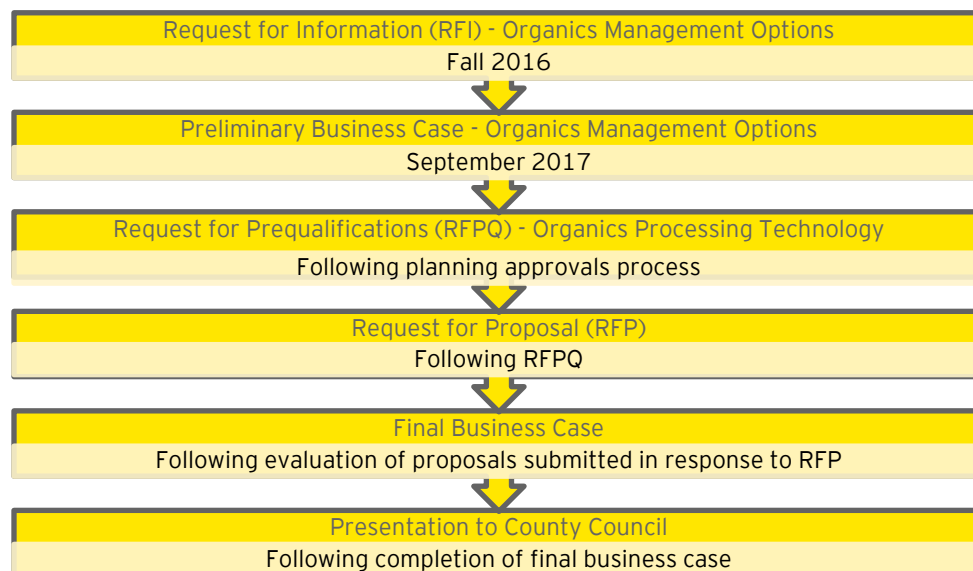
In consideration of varying methods of processing organics and proprietary technology, the OPF procurement process is expected to be longer and more complex than procuring the MMF, a simple building. The MMF be advanced following a traditional DBB procurement process.

### 3.2.3 Procurement Process for OPF

On November 8, 2016, County Council approved a recommendation to further procurement of the OPF utilizing a DBO procurement model. This followed a GHD report on various ownership and financing models for the OPF which outlined a recommended model and public consultation (outlined in staff reports CCW 16-266 and CCW 16-357).

With direction on the project delivery method for the OPF, the procurement process for this facility was initiated. It is anticipated to occur in three (3) stages, with a segmented Business Case (Preliminary and Final) presented to County Council as follows:

Figure 5: OPF Procurement Process



The RFI followed a similar methodology to work completed for the 2010 Solid Waste Management Strategy and furthered in the initial viability study for the OPF undertaken in 2012. As some time has passed—and as a measure of prudence—all organics management options were re-examined via the RFI and this Preliminary Business Case.

## 3.3 Environmental Resource Recovery Centre

The ERRC is proposed for development at 2976 Horseshoe Valley Road West in the Township of Springwater. The property is located on the north side of Horseshoe Valley Road, approximately 3 kilometres west of Highway 400. The property is approximately 84 hectares in total area and is owned by the County. The facility footprint for the ERRC is anticipated to be approximately 4.5 hectares, or 5%, of the property.

As outlined in Section 3.2.1, during the siting process, the County's consultant, GHD, determined there was potential that both the OPF and MMF could be located at one location and benefit from shared infrastructure. There are numerous benefits of co-locating the facilities. The selected site is large enough to house multiple operations with few constraints in regard to layout and topography, provides excellent buffer distances, and in addition, surplus developable area allowing for operational and expansion flexibility. Other benefits include:

- Reduced capital - a single facility would act as both a location for transfer of garbage and recycling and receiving of SSO for on-site processing;
- Reduced operating and maintenance expenses (shared staffing, equipment, and environmental monitoring, for example);
- Increased transportation and operational efficiencies as SSO would not be hauled to an additional processing facility;
- Minimizing the number of nearby neighbours; and
- Reduced footprint requirements would lessen the environmental impact of developing two facilities noting that co-location would allow for sharing of buildings and supporting infrastructure such as internal roads, weigh scales, and buffers.

Although the OPF and MMF are proposed for development at one (1) site, each facility has its own project delivery method and timeline. Based on assumptions related to timing of the approvals process, MMF will be commissioned first in 2019, and the OPF will follow in 2021. Co-location will consider the timing of both procurement processes, timing of the business case development for the OPF, obtaining ECA, and construction of two (2) facilities on the same footprint. The majority of the site works (i.e., access road, grading, scale area, stormwater management facility, and administrative facility) will be designed and constructed at the same time as the MMF.

## 4. Strategic Alignment

### 4.1 Strategic Waste Management Strategy

Through the 2010 Solid Waste Management Strategy, the County spoke strongly about no new landfills, the importance of enhancing diversion programs, and taking ownership of waste. The Strategy recommended that the County continue exporting organic waste in the short-term through to approximately 2018 - the timeframe for which it had recommended the County develop its own processing facility. It acknowledged a shortage of available organics processing capacity in the province and that development of a County owned facility would provide security in addition to other benefits such as cost savings. The Strategy recommended evaluation and consideration of multiple available technologies, as well as consideration to expand the green bin program to include pet waste and diapers and sanitary products, which was supported through public feedback.

The Strategy update (the "**Update**") was approved by County Council in September 2016. The Update outlined progress made in regards to the siting process of the ERRC and provided a summary of the OPF project development completed. The Update also highlighted the forthcoming procurement process for the OPF and that it would be structured to allow consideration of both aerobic and anaerobic processing technologies and other options such as continuation of export.

The Update indicated that changes in Provincial legislation in relation to the Waste-Free Ontario Act (specifically the Organics Action Plan) could include disposal bans for materials such as residential organics, and that mixed waste processing ("**MWP**") may provide an alternative for the recovery of additional organic materials from the County's garbage in the future. County Council directed, through resolution #2015-317, further investigation of MWP and future reporting to Council as the technology advances.

### 4.2 County of Simcoe - Strategic Plan

In 2015, the County of Simcoe developed its Strategic Plan (the "**Strategic Plan**") in order to communicate, educate and promote an understanding of the County's Vision, Mission, Core Values and Strategic Directions. The Strategic Plan provides a clear outline of the preferred methods for achieving its goals and the cost to implement. It also serves as a framework for the 10-year planning period, 2018-2027, such that County departments may align their goals and strategies, in order to make budgetary decisions more consistent, sustainable and transparent.

The County's vision statement, "Working Together to Build Vibrant, Healthy, Sustainable Communities", aims to help to guide decisions and align priorities to shape the future of the County. Strategic directions, which represent the priorities and desired results that are to be achieved in support of the vision, include:

- Growth Related Service Delivery
- Strengthened Social, Health and Educational Opportunities
- Economic & Destination Development
- Environmental Sustainability
- A Culture of Workplace and Operational Excellence
- Responsive and Effective Governance

As part of the Strategic Plan, the Long Term Financial Plan forecasts previously approved strategic directions and new initiatives approved by Council. The Long Term Financial Plan was developed for both

the operating and capital programs and was based on the forecasted needs for each program and/or service delivery areas. The following Solid Waste Management Department initiatives were provided as key inputs and assumptions in the projected Long Term Financial Plan (Item CCW 17-159, June 2017):

- Construction of an Organics Processing Facility for \$25 million is planned for 2021-2022 and operational in 2022.
- Materials Management Facility was previously reserved and is forecasted to be completed in 2019-2020 and operational in 2020.

### 4.3 Waste-Free Ontario Act - Organics Action Plan

In February 2017, the MOECC released the final strategy for a Waste Free Ontario - *"Building a Circular Economy"* (see Section 2.3.2 of this Preliminary Business Case for further details).

Organic waste represents approximately one-third of Ontario's 12 million tonne waste stream. As such, the need to address the generation, processing and management of these materials is a key element in achieving a circular economy. The management of organic waste is not simply a waste diversion effort; the goal is to reduce carbon emissions and environmental impacts by reducing waste generation and where waste is created, ensure it is cycled back into the community.

The expanded processing of organic waste, offers considerable environmental and economic opportunities. A key action of the strategy was the development of a *"Food and Organic Waste Action Plan"* which focuses on regulatory and non-regulatory actions to address food waste prevention and recovery of food and organic wastes from the waste stream.

Considering the Strategy for a Waste-Free Ontario, the Organics Action Framework could include:

- Prioritized goals and interim targets, including alignment with Ontario's climate change strategy and economy-wide greenhouse gas emission reduction targets;
- Consideration of the entire supply chain, including pre-consumer and post-consumer organic wastes;
- Consideration of recovery in high-rise and multi-residential dwellings;
- Identification of regional infrastructure capacity and gaps;
- Cost and benefit analysis, including cost efficiency and program effectiveness;
- Harmonization across existing voluntary programs;
- Data gathering, public reporting and performance measures;
- Third-party monitoring, audits and transparency through public reporting;
- Regulatory actions (e.g. source separation, disposal bans);
- Non-regulatory measures (e.g. streamlined approvals, consumer, processor and industry best practices); and
- Collaboration between government and industry to update regulations and guidelines to reflect new technologies and promote new processes that support viable end markets.

In 2017, the MOECC also launched a Discussion Paper addressing food and organics waste In Ontario to gather general public and stakeholders' opinions on following topics:

- Policy Tools to Prevent Food Waste
- Policy Tools to Support Diversion of Food and Organic Waste
- Policy Tools to Support Processing Capacity

- Policy Tools to Support End Markets

The “*Food and Organics Waste Framework*” includes two (2) components:

- i. Actions to be taken by the province; and
- ii. Policy statements (under the Resource recovery and Circular Economy Act 2016) to provide direction to public, municipal and private sectors on food and organics waste management

Based on the discussion paper, the Organics Action Framework may be updated to include:

- Enhancing existing partnerships with stakeholders and building new relationships;
- Building on progress made in Ontario and learn from other leading jurisdictions;
- Collaborating across all levels of government to avoid duplication;
- Supporting an outcome-based approach;
- Using evidence to guide decision making;
- Using regulatory and non-regulatory tools;
- Creating conditions that support sustainable end-markets;
- Increasing the use of innovative technologies;
- Enabling efficient and effective recovery systems;
- Recognizing the administrative impacts and costs to divert organic materials; and
- Increasing accountability.

The development of the County's new organic waste processing facility fits with the requirements stated in Bill 151, Ontario's Circular Economy Strategy and the Organics Action Plan. The County's efforts can be framed within the circular economy context and include considerable focus on its climate change benefits and the production of high quality biogas, digestate and/or compost products that will be cycled back into the local economy.

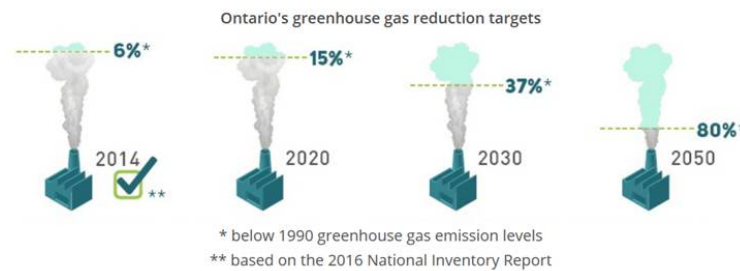
#### 4.4 Climate Change Action Plan

The province of Ontario has put in place a five (5) year plan to fight climate change, reduce greenhouse gas pollution and transition to a low-carbon economy. The action plan covers a wide range of climate change targets and strategies including those concerning organics recovery projects. The action plan items related to organics recovery include:

- Supporting a carbon market that drives the lowest cost greenhouse gas emission reductions. Actions in this plan, supported by cap and trade proceeds, will help business and industry make investments that reduce greenhouse gas pollution.
- Ensuring natural, agricultural, and forested lands are used in ways that are efficient, sustainable and enhance the removal and storage of carbon from the atmosphere, while working with Ontario's waste sector to leverage different practices and technologies to capture greenhouse gas pollution that would otherwise be released into the air.

Ontario's Climate Change Action Plan also includes long-term reduction targets, as illustrated by the figure below.

Figure 6: Ontario's greenhouse gas reduction targets



Source Government of Ontario - Five Year Climate Change Action Plan (2016 - 2020)

The County's proposed organics recovery facility and related efforts would reduce GHG emissions from processing, in comparison with current organics management processes that do not yield fossil fuel alternatives (biogas). Emissions reductions would be eligible for compliance offset credits (carbon credits). Under Ontario's compliance offsets regulatory proposal, to be eligible for a compliance offset credits, an initiative must:

- Reduce or remove at least one (1) tonne of greenhouse gas emissions;
- Meet the rules to be set out in the regulation, including the relevant protocols; and
- Not claim reductions of emissions that are covered by the cap and trade program, or, that have already been credited under some other offset program (e.g., Alberta Specified Gas Emitters Regulation, etc.)

Examples of initiatives noted in Ontario's "cap-and-trade-offset-credits-and-protocols" which may create carbon offsets include:

- Tree planting projects - trees absorb carbon and store the carbon, which reduces the amount of carbon dioxide present in the atmosphere;
- Manure management projects that capture and destroy methane gas which is a potent greenhouse gas; and
- Upgrading commercial and industrial cooling systems to replace refrigerants with a large impact on global warming with refrigerants that have less of an impact on global warming.

The County's Project could be compared to the second example noted above, as an organics treatment project would capture methane emissions (which could be generated by landfilling) and valorize it via an AD process. Considering that organics are already collected and composted, greenhouse gas ("GHG") emissions reduction eligible for carbon credits would be limited to the substitution of fossil natural gas by renewable biomethane. Therefore, in this particular context, only AD options could be eligible for carbon credits.

The following assumptions were used to calculate the County's potential carbon credit benefit:

- CH<sub>4</sub> production at future AD facility (considering a total capacity of 30,000 tpy) : 1,700,000 Nm<sup>3</sup> of CH<sub>4</sub>
- Fossil natural gas GHG emissions :
  - CO<sub>2</sub> = 1,88 kg/m<sup>3</sup> of gas
  - CH<sub>4</sub> = 0,0019 kg/m<sup>3</sup> of gas
  - N<sub>2</sub>O = 0,00005 kg/m<sup>3</sup> of gas

- Total carbon dioxide equivalent emissions calculations:  $1 \times \text{CO}_2 + 25 \times \text{CH}_4 + 298 \times \text{N}_2\text{O} = 3,299$  tonnes of  $\text{CO}_2\text{eq}$

In April 2017, permits for Ontario's cap and trade system trade were set at approximately \$18/tonne of  $\text{CO}_2$ . Based on this information, potential annual revenues were estimated at approximately \$59,375. Despite the AD option's potential eligibility to receive carbon credits, the estimated annual revenues have not been included in the financial model to keep the outcomes conservative. For the purposes of discussion related to this business case we have calculated revenues based on the excess capacity, discussed further in Section 10.1.2, without the inclusion of ancillary revenues.

## 5. Situational Analysis

### 5.1 Current Context Regarding Organics in Ontario

The Waste-Free Ontario Act has enacted municipal resource recovery and waste diversion projects across Ontario. In the event the County's SSO is not managed to the recovery and diversion levels indicated in the Waste-Free Ontario Act, there are two (2) potential options available to ensure alignment with regulations and legislation:

- Build a new infrastructure for processing (anaerobic digestion or composting facilities)
- Transfer SSO materials to existing and neighbouring processing facilities

As discussed in Section 4, Simcoe County has undertaken the initiative to pursue development of County-owned organics processing infrastructure in order to manage its own waste, control costs, and have the ability to add materials and increase diversion.

The situational analysis provided in this section was conducted to identify leading practices, options, technologies and processes applied in comparable jurisdictions across Ontario.

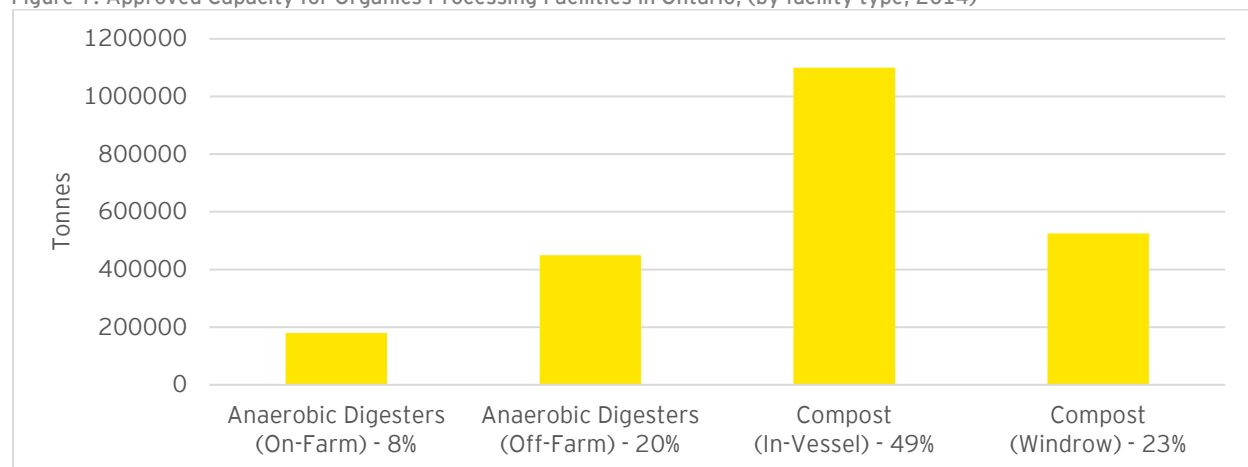
### 5.2 Current Methods for Municipal Organics Management in Ontario

#### 5.2.1 Background

Many municipalities in Ontario have implemented curbside collection programs for the management of SSO. As more and more organics are generated and collected, the pressures to processing capacity levels have considerably increased. Many of the municipalities have developed processing facilities as an option to manage their SSO including leaf & yard waste/brush from curbside collection and drop-offs.

The figure below, extracted from the "Organics Report" of OWMA 2016<sup>9</sup>, represents organics tonnages by facility type in Ontario.

Figure 7: Approved Capacity for Organics Processing Facilities in Ontario, (by facility type, 2014)



As is highlighted in the figure approximately three-quarters of the authorized tonnage in Ontario is represented by composting facilities (e.g. in-vessel and windrow methods). In Ontario, forty-one (41)

<sup>9</sup> OWMA - 2016 Organics Report, <http://www.owma.org/Publications/OWMAReportsandPolicies.aspx>



composting sites exist in comparison to only eight (8) anaerobic digestion facilities (all employing Wet AD technology). The majority of anaerobic digestion facilities in Ontario are privately-owned with only two (2) facilities managed by a municipality (the City of Toronto's Disco Road and Dufferin sites).

### 5.2.2 Jurisdictional Scan of Comparable Ontario Municipalities

In order to better understand the Ontario organics management landscape, the Consultant Team undertook a jurisdictional scan of comparable Ontario municipalities with programs designed to divert organics from the general waste stream.

Table 11 : Organics Management Infrastructures Examples in Ontario

Organics processing infrastructure	Capacity (tonnes per year)	Publicly owned facility	Technology	Commissioning date	Accepted waste	Odour emissions	Overall Diversion rate	Contamination rate of SSO	Organic collection participation rate	Additional Comments
<b>City of Toronto</b>										
Toronto Disco Road facility	75,000 tpy (initial announced capacity)	Yes	Wet AD	2014	SSO Diapers Plastic Bags Pet Waste	Acceptable (no major issues reported)	52% (2016)	12% - 14%	89% (2015)	City of Toronto is currently planning to use a combined heat and power system to convert biogas into heat and power at the Toronto Disco Road facility.  Currently produced biogas is flared in both plants.
Dufferin facility	25,000 tpy expected to increase to 55,000 tpy in the future	Yes	Wet AD	2002	SSO Diapers Plastic Bags Pet Waste	Acceptable (no major issues reported)	52% (2016)	12% - 14%	89% (2015)	
<b>City of Guelph</b>										
Guelph Composting Facility (OWPF)	30,000 tpy	Yes	In-vessel Composting	2011	SSO Pet Waste	Acceptable - but significant odour issues were identified at commissioning	63% (2015)	No data available	No data available	Facility accepts organic waste from other regions, including the region of Waterloo.

Organics processing infrastructure	Capacity (tonnes per year)	Publicly owned facility	Technology	Commissioning date	Accepted waste	Odour emissions	Overall Diversion rate	Contamination rate of SSO	Organic collection participation rate	Additional Comments
<b>Regional Municipality of Peel</b>										
Peel Integrated Waste Management Facility (IWMF)	60,000 tpy	Yes	In-vessel Composting	2006	SSO	Acceptable (no major issues reported)	45% (2015)	5% - 10%	50% (2016)	Peel region is currently assessing the option to implement an anaerobic digestion facility.
<b>York Region</b>										
London Composting Facility operated by Orgaworld (export SSO)	150,000 tpy	No	In-vessel Composting	2006	SSO Diapers Plastic Bags Pet Waste	Numerous odour issues reported	64% (2014)	15%	85%	London facility also receives organics from City of Toronto (in plastic bags). This transported waste tends to degrade in anaerobic condition during transit, creating a specific challenge for aerobic degradation process.  York region is currently assessing the option to implement a new organics treatment facility.
London Stormfisher Environmental AD facility	100,000 tpy	No	Wet AD	2012	SSO Organics in packaging	Odour issues reported				
<b>Durham Region</b>										
Pickering Composting Facility operated by Miller	25,000 tpy	No	In-vessel Composting	2006	SSO	Acceptable (no major issues reported)	55% (2015)	4%	70%	Durham region is currently assessing the option to implement an anaerobic digestion facility.

Organics processing infrastructure	Capacity (tonnes per year)	Publicly owned facility	Technology	Commissioning date	Accepted waste	Odour emissions	Overall Diversion rate	Contamination rate of SSO	Organic collection participation rate	Additional Comments
<b>Niagara Region</b>										
Thorold Composting Facility operated by Walkers	90,000 tpy	No	In-windrow with GORE® technology covers	2009	SSO Pet Waste	Highly localized odour issues when covers are removed from the piles	52% (2014)	No data available	42% (2016)	
<b>City of Hamilton</b>										
City of Hamilton Composting Facility operated by AIM	60,000 tpy	No	In-vessel Composting	2006	SSO	Acceptable (no major issues reported)	55%	No data available	No data available	
<b>Ottawa</b>										
Orgaworld composting facility	100, 000 tpy	NO	In-vessel composting	2010	SSO Plastic bags Pet waste	Acceptable (no major issues reported)	Ottawa: 51.9% (curbside collection diversion rate)	No data available	No data available	
Lafèche Environmental	120, 000 tpy	No	In-vessel composting	2009	SSO Plastic bags	Acceptable (no major issues reported)	Not city specific	Not city specific	Not city specific	Odour emissions are a potential issue for this facility, however, the facility is situated directly on the landfill site, reducing the impact on potential neighbours.

Organics processing infrastructure	Capacity (tonnes per year)	Publicly owned facility	Technology	Commissioning date	Accepted waste	Odour emissions	Overall Diversion rate	Contamination rate of SSO	Organic collection participation rate	Additional Comments
<b>Waterloo</b>										
Woolwich facility (Bio-en-Power), in Elmira	70,000 tpy	No	Wet AD	2014	SSO Biosolids Pet waste	Acceptable (no major issues reported)	Not city specific	Not city specific	Not city specific	

The table above illustrates that the preferred technology selection in comparable jurisdictions is in-vessel composting.

The facilities noted in the table above are either owned and/or operated by the municipality or by a private sector partner. The majority of organics processing facilities in Ontario are privately owned and operated. The Toronto, Peel region and Guelph facilities are owned and operated by the respective municipalities.

At the time of this Preliminary Business Case, jurisdictions such as the Region of Durham, Region of Peel, City of Hamilton, and York Region are in the process of assessing various options for the design, build, operation and maintenance of new organics treatment facilities.

### **5.2.3 Ontario Carbon Market**

Ontario's cap and trade program is designed to help fight climate change, and reward businesses that reduce their greenhouse gas emissions. The Climate Change Action Plan and the cap and trade program form the backbone of Ontario's strategy to cut greenhouse gas pollution to 15% below 1990 levels by 2020.

In June 2017, the Ontario government held its second cap-and-trade auction. The auction sold out of its allowances, bringing the program's total revenue so far to nearly \$1 billion. The June auction in the system aimed at lowering greenhouse gas emissions follows the inaugural one in March, which also sold out. The system puts caps on the amount of pollution companies in certain industries can emit, and if they exceed those limits they must buy allowances at auction or from other companies that come in under their limits. The first auction in March brought in \$472 million and the June results brought in about \$504 million.

Demand appears to have increased from the first auction to the second, with about 22% more bids than available allowances, up from the first auction that was 16% oversubscribed. At the second auction, the settlement price was \$18.72 per allowance, compared to \$18.08 in the first auction.

## **5.3 Leading Practices and Lessons Learned**

Upon further examination of the jurisdictions and facilities highlighted in Table 11, the following leading practices and lessons learned were identified for further consideration by the County:

### **5.3.1 Odours and External Environmental Impacts**

The site selected for the County's OPF (2976 Horseshoe Valley Road West, Springwater) is isolated from urban areas, however residential areas are in close proximity (less than a one kilometer distance). In order to ensure stakeholder and public acceptance of the site and facility, the County must conduct thorough due diligence in the selection of a technology/process for implementation of the facility, as well as developing a comprehensive mitigation strategy to address odours and other external environmental impacts.

Accepted materials such as diapers, pet waste, and plastic bags in organics processing feedstock are a subject of discussion in Ontario. Several municipalities have included these materials to increase participation and diversion rates (as noted in Table 11). While increasing diversion rates and participation are positive factors, there is also the potential to generate more residues as a result of processing. The contamination rate for facilities accepting the above noted materials is often higher than 10%. The municipalities which do not include these materials have maintained relatively lower contamination rates

at the beginning/input of the process and often ensure better quality and marketability of the final compost/output.

The County is considering the inclusion of diapers and pet waste into its processing feedstock for the purposes of meeting its long-term diversion targets. The inclusion of these materials could increase potential contamination of the input stream. The inclusion of these materials as feedstock for the process would require a thorough review of the processing capabilities of the selected technologies/processes, along with implementation of efficient pre- and potentially post-treatment processes and equipment.

### **5.3.2 Operations and Ownership**

Some regions, like Waterloo, rely on nearby facilities (City of Guelph Organic Waste Processing Facility) for the treatment of its SSO, while others rely on existing privately-owned and operated organic treatment facilities. While the option to transport waste is convenient in the short-term, it is expected that increasing pressure on municipalities in the form of waste related regulations and legislation could lead to market capacity and availability issues. Potential impacts related to market capacity may include increasing gate fees at privately-owned or partner facilities/sites, lower diversion rates and increased transport costs to facilities/operators in distant jurisdictions.

Based on the County's long-term waste strategy, pending legislation and trends of increasing diversion from landfill, the County should consider options that allow for long-term control over waste processing and diversion, including the development of a County-owned facility, or ensure that contracts with partner facilities are structured to "freeze" gate fees for long term arrangements.

## 6. Project Options

This section provides details on the RFI for Organics Management Options issued by the County. This includes a description of the RFI process, its relationship to the Business Case, and a summary of the information contained in the submissions received in response to the RFI. This section also provides details on the review of the submissions and the development of groupings of various Project Options for a more comprehensive analysis in the Preliminary Business Case.

### 6.1 Request for Information - Organics Management Options

#### 6.1.1 RFI Process

Request for Information (RFI 2016-127) - Organics Management Options was issued by the County on November 30, 2016. The purpose of the RFI was to gather information on alternatives for processing the County's source-separated organics - including the development of an OPF as part of the proposed ERRC at 2976 Horseshoe Valley Road West in the Township of Springwater. A copy of the RFI is provided in Appendix A.

#### 6.1.2 Roles and Responsibilities

GHD was retained by the County to assess the submissions received in response to the RFI. In addition to reviewing the various submissions in terms of technology and agreement structure, one of the key outcomes of the assessment was to summarize the relevant financial data that could be incorporated into the Preliminary Business Case for the OPF. GHD was tasked with categorizing the financial information based on technology type, and reviewing the data to determine if it was representative of the various submissions. The results of GHD's assessment of the RFI submissions are provided in Sections 6.2 to 6.4.

GHD worked with the County and the Consultant Team to ensure that the financial inputs were developed such that they could easily be incorporated into the Consultant Team's financial model for further analysis.

### 6.2 Information Gathered from RFI

Respondents to the RFI were asked to outline a variety of information in their submissions, including details such as:

- Corporate background
- Proposed technology
- Mass balance
- Environmental controls
- Materials management
- Infrastructure requirements

The RFI noted that the information gathered would be used to support the development of the Preliminary Business Case, particularly as it relates to the following key areas:

- **Business & Operational Impacts** - including labour requirements, materials management, and environmental controls



- **Assessment of Risk** - including legislation changes, process and technical risks, and long-term viability
- **Full Cost Analysis** - including direct and indirect costs, capital and operating costs, and equipment maintenance and replacement costs

A total of eight (8) separate submissions were received in response to the RFI. The respondents included a variety of constructors, operators, and technology providers. The submissions varied in terms of the proposed technology and agreement structure, with some respondents providing multiple options under the same submission.

Of the eight (8) responses received, three (3) proposed the utilization of in-vessel composting, one (1) proposed Dry AD with in-vessel composting, and six (6) proposed Wet AD. Seven (7) options proposed establishing an OPF at the County's ERRC site, while three (3) respondents proposed using their existing private organics processing facilities (merchant capacity). The various arrangements proposed are summarized in the table below.

Table 12: Summary of RFI submissions

Submission No.	Technology Type			Agreement Structure	
	Wet AD	Dry AD with In-Vessel Composting	In-Vessel Composting	County ERRC Site	Merchant Capacity
1	•			•	
2	•			•	
3			•	•	
4	•			•	
5			•	•	•
6	•	•	•	•	•
7	•				•
8	•			•	

### 6.3 Assessment of Responses to RFI

Submissions received in response to the RFI were generally assessed using the following approach:

1. Individual review of each RFI submission
2. Consolidation of similar submissions based on technology type and agreement structure
3. Summary of technical and financial information for each alternative

A complete review of each of the submissions was undertaken in consideration of the following factors:

- Corporate background
- Proposed technology and agreement structure
- Compatibility of process with existing and future feedstocks
- Material management
- Mass balance
- Labour requirements
- Environmental constraints

- Process water and storm water requirements
- Ability to mitigate odour and noise
- Ability to comply with future regulations
- Market for end products and/or by-products
- Long-term viability and flexibility
- Capital and operational costs
- Planning and approvals risk
- Process and technical risk

The main objective of GHD's work was to review the information provided against the requirements outlined in the RFI. Data gaps were identified and addressed using other information contained in the submissions where possible, or supplemented based on previous experience and industry standards. This ensured that a fair and balanced comparison could be made between the various submissions for the purpose of the Preliminary Business Case. It is noted that additional information may come forward during the RFP process. The RFI process does not exclude vendors from participating in any forthcoming RFPQ/RFP process.

## 6.4 Summary of Project Options

Following the review of individual RFI submissions, the information was summarized and grouped according to technology type and agreement approach (i.e. development of a County-owned facility or export to an alternate processor). The following groupings will form the Project Options to be assessed in the forthcoming sections:

- Project Option 1 - Status Quo
- Project Option 2 - Wet AD
- Project Option 3 - Dry AD with In-Vessel Composting
- Project Option 4 - In-Vessel Composting
- Project Option 5 - Merchant Capacity

Project Option 1, the "Status Quo" option, serves as the benchmark against which the other alternatives are assessed. The Status Quo option considers continued export of the County's SSO to the processor in Hamilton, noting that this does not consider the addition of pet waste and diapers to the waste stream. For this option, pet waste and diapers would continue to be managed as garbage (landfill). With the exception of Project Option 1, each alternative was established based on the information contained in the RFI submissions. Each Project Option reflects a compilation of the information received on the various technologies and vendors as detailed in the table below:

Table 13: Definition of Project Options

Project Option	Description
Project Option 1 Status Quo	Under this scenario, the County would continue to export SSO to AIM Environmental in Hamilton. This facility utilizes in-vessel composting and does not accept pet waste and diapers. Under this arrangement, no benefits from end products or carbon credits are obtained by the County. Costs are reflective of current contractual pricing for processing. Transfer and haulage would be undertaken by the County.
Project Option 2 Wet Anaerobic Digestion ("Wet AD")	Anaerobic digestion is a collection of processes by which microorganisms break down biodegradable material in absence of oxygen to produce biogas (mainly composed of methane and carbon dioxide) and digestate.

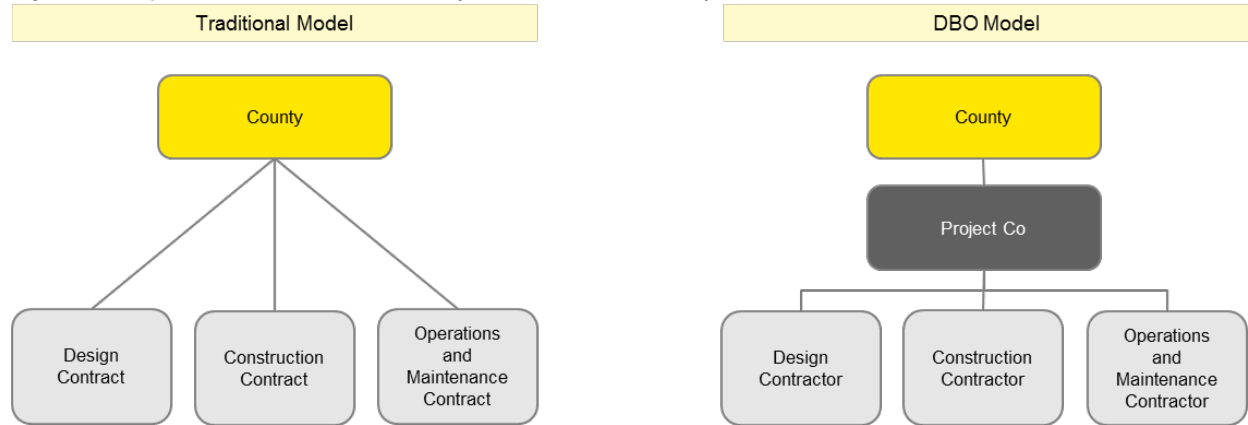
Project Option	Description
	<p>The digestate may undergo dewatering, additional aerobic stabilization and refining to be able to be converted to compost. If the quality of the digestate is within the applicable legislated criteria, it could also be applied directly as a fertilizer. The direct application of digestate is not common, and could not occur during winter months. Under this scenario, the County may require significant storage capacity should be available at the site to be able to store the generated digestate during winter months.</p> <p>Wet AD systems operate at low total solids (“TS”) (less than 10% to 20% TS). Biogas produced by the Wet AD process could be refined to feed an engine, a boiler or to be send to the natural gas grid or converted and used as fuel for vehicles.</p>
<p>Project Option 3 Dry Anaerobic Digestion with In-Vessel Composting (“Dry AD”)</p>	<p>Dry AD systems are typically based on the same microbiological process as Wet AD, but operate at higher total solids (less than 20% to 40% TS). The outputs include digestate that can be converted to compost.</p> <p>AD technologies are able to accept higher rates of contamination in the feedstock with the application of a pre-treatment process and applicable technologies.</p> <p>As per the RFI responses, the Dry AD Project option will combine Dry AD systems with in-vessel composting systems. Biogas produced by the Dry AD process could be refined to feed an engine or, a boiler to supply both heat and electricity to the facility. Remaining feedstocks will be processed with in-vessel composting technology to yield compost.</p> <p>As a consequence of pre-treatment, digestate generated by Dry AD systems presents a rate of contaminants which are usually not consistent with required criteria for direct application of digestate as fertilizer. Digestate contaminants will need to be extracted at the compost refining stage only.</p>
<p>Project Option 4 In-Vessel Composting</p>	<p>In-vessel composting is a process by which microorganisms break down biodegradable material in presence of oxygen. The process occurs at a solids content of 40%-60%. The primary off-gas, carbon dioxide, is evolved to the atmosphere. The process produces compost.</p>
<p>Project Option 5 Merchant Capacity</p>	<p>Merchant capacity considers the use of a composting or AD facility owned and operated by a merchant partner for a specified contract period. In this case, the total costs for the County would include transfer, haulage and gate fees (processing costs) charged by the site operator.. It is assumed that under the merchant capacity option, pet waste and diapers, as a part of the County’s green bin program, would be accepted for processing, subject to contractual terms for processing and related costs.</p>

The Project Options noted for development at the County’s site (i.e. Wet AD, Dry AD, and In-vessel composting) would be undertaken via a DBO procurement model.

Under a DBO delivery model (as defined by the County), the County of Simcoe would award a contract to a private sector partner (“**Project Co**”) for the design, construction, operation and maintenance of a facility or system for a specified contract period, for what would otherwise be a public sector project. Risks related to design, construction, operation and maintenance are typically transferred to Project Co

for the contract period, with full ownership of the asset remaining with the public sector. At the end of the contract term, the operations and maintenance are transferred back to the owner or subsequent operator.

Figure 8: Comparison of a Traditional Delivery Model to a DBO Delivery Model



The DBO model was recommended by GHD to County Council in fall of 2016 based on project-specific conclusions they reached in their analysis and public consultation (outlined in staff reports Item CCW 16-266 and Item CCW 16-357).

Key inputs for the Preliminary Business Case, presenting a range of construction and operating costs for each option, and including notes and assumptions where relevant are outlined further in Section 10 - Cost/Benefit Analysis.

## 7. Assessment Methodology

A comparative assessment was conducted on the Project Options noted in Section 6. This analysis considered both quantitative and qualitative factors to determine which options provide the most benefit to the County.

### 7.1 Guiding Principles

The assessment focused on a set of guiding principles as determined by the Consultant Team and the County. The qualitative and quantitative factors focused on potential advantages, disadvantages, benefits and costs of each Project Option over the Project lifecycle. The assessment includes the following considerations for each of the organics management options:

- Policy, legislation and regulation;
- Public ownership and control;
- Permitting and approvals;
- Design and construction;
- Operations and maintenance;
- Process feedstocks;
- Process outputs; and
- Environmental impacts.

### 7.2 Methodology

The Project Options were assessed using various criteria considered in three (3) sections as follows:

- (i) Business and operational impacts;
- (ii) Risk assessment; and
- (iii) Cost/benefit analysis.

A final comparative analysis of the Project Options (Section 11) was provided using results from all three (3) above noted assessments to determine a recommended Project Option for the County.

#### 7.2.1 Business and Operational Impacts

The business and operational impacts assessment was applied to each of the Project Options that could be employed by the County. The Consultant Team, in collaboration with the County and GHD, developed a listing of qualitative criteria based on Project and County objectives. Each Project Option was assessed under each qualitative criterion as a major advantage, advantage, neutral or disadvantage in terms of achieving the County's objectives.

Further details on the methodology and outcomes of the business and operational impacts assessment are provided in Section 8 of this preliminary business case.

#### 7.2.2 Risk Assessment

In assessing the full impact of the identified Project Options for organics waste management on the County, it is necessary to estimate the likelihood and potential impact of risks related to each Project Option.

The purpose of the qualitative risk assessment exercise was to qualify the risk inherent in the identified Project Options so that they may be taken into consideration in selecting the option that best addresses the needs of the County.

The following approach was applied to conduct the qualitative risk assessment:

- Review of a pre-populated risk matrix, based on recent relevant projects, as a starting point and add project-specific risks; and
- Comparison of the impact of risks associated with each Project option to determine the option with the lowest risk to the County. This information will be combined with other qualitative factors and the results of the cost/benefit analysis to inform a decision on Project options.

Further details on the risk assessment methodology and outcomes are provided in Section 9 of this preliminary business case.

### **7.2.3 Cost/Benefit Analysis**

A full analysis was conducted on the costs and expected benefits presumed to be provided for each viable Project Option determined through the RFI process. The inputs and calculations applied in the quantitative analysis were based on the responses provided by RFI respondents. Any gaps in the information were supplemented by assumptions which were further confirmed by the County and GHD.

These assumptions and inputs were compiled and assessed in a financial model which outlined the relevant costs incurred by the County over the chosen Project timeframe (20 years).

Elements incorporated into the financial model included:

- Timing assumptions;
- Escalation assumptions;
- Planning and development costs;
- Construction period costs;
- Operating and maintenance costs;
- Ancillary costs (County);
- Lifecycle costs;
- Revenues; and
- Financing costs and assumptions.

Consideration was given to the timing, ownership and certainty of costs, financing and revenues. The analysis yielded a Net Present Value (“NPV”) (time value of money) for each Project option.

Further details on the cost/benefit analysis methodology and outcomes are provided in Section 10 of this preliminary business case.

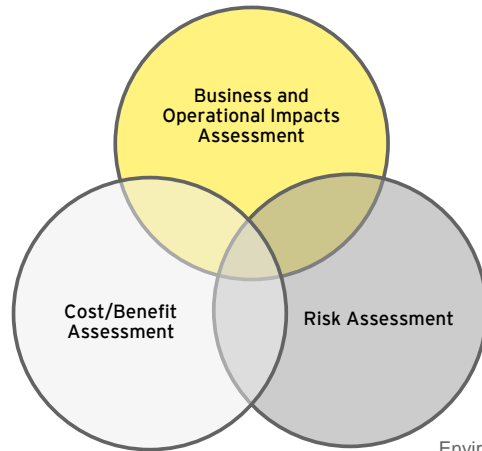
### **7.2.4 Comparative Analysis of Project Options**

The comparative analysis of the Project Options are based on an adjusted triple bottom line (“TBL”) framework, which assesses each Project Option on social, environmental and economic criteria.

The three assessments noted above (business and operational assessment, risk assessment and cost/benefit assessment) include factors associated with TBL (as indicated in the diagram below):

Figure 9: Triple Bottom Line Framework

Environmental, Economic and Social impacts under each proposed Project Option, related to the business and operations of the County.



Cost/benefit assessment of each Project Option based on inputs related to performance targets and forecasts.

Environmental, Economic and Social risks related to each Project Option under consideration by the County.

	Business and Operational Impacts Assessment	Risk Assessment	Cost/Benefit Assessment
Social Criteria	<ul style="list-style-type: none"> <li>• Alignment with Policies</li> <li>• Public Ownership and Control</li> <li>• Permitting</li> <li>• Long-term Operation</li> </ul>	<ul style="list-style-type: none"> <li>• County Strategic Direction</li> <li>• Legislative/Regulatory Changes related to the Waste-Free Ontario Act and Climate Change</li> <li>• Owner Management/Control Over Operations</li> <li>• Site Approvals and Permitting</li> <li>• Stakeholder Acceptance</li> </ul>	<ul style="list-style-type: none"> <li>• County/Municipal Funding Requirements</li> </ul>
Economic Criteria	<ul style="list-style-type: none"> <li>• Timeliness of Implementation</li> <li>• Potential for Revenue Generation</li> <li>• Potential for Downtime</li> </ul>	<ul style="list-style-type: none"> <li>• Failure to Design in Accordance with County Requirements</li> <li>• Scope Changes Initiated by the County During Design and Construction</li> <li>• Construction Costs are not as estimated</li> <li>• Net operating costs are not as estimated</li> <li>• Failure to meet process output/recovery requirements</li> <li>• Short- and Long-Term Availability of Facility/Services</li> <li>• Transfer Station Operation/Availability</li> <li>• Haulage and Transportation</li> <li>• Asset Obsolescence</li> </ul>	<ul style="list-style-type: none"> <li>• OPF Development Costs</li> <li>• Revenues</li> <li>• Operating and Maintenance Costs</li> <li>• Lifecycle Costs</li> <li>• Capital Costs</li> <li>• Ancillary Costs</li> <li>• Terminal Value</li> <li>• Net Present Value of Project Costs and Revenues</li> </ul>

	Business and Operational Impacts Assessment	Risk Assessment	Cost/Benefit Assessment
Environmental Criteria	<ul style="list-style-type: none"> <li>• Availability and Applicability of Technology Solution</li> <li>• Long-term viability of technological solution</li> <li>• Input Volume Capacity and Composition</li> <li>• Process Flexibility</li> <li>• Potential environmental impacts</li> <li>• Diversion</li> <li>• End Products</li> <li>• Residuals</li> <li>• Input composition</li> </ul>	<ul style="list-style-type: none"> <li>• County Strategic Direction</li> <li>• Failure to Meet Operating Performance Standards/Targets</li> <li>• Haulage and Transportation</li> <li>• Diversion Targets</li> <li>• Changes in General Waste Composition and Input Volume</li> <li>• External Environmental Impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Carbon credits</li> <li>• Tonnage forecasts</li> <li>• Management of end products</li> </ul>

The TBL framework was applied to evaluate their performance in a broader perspective to create greater business value and to provide a more comprehensive assessment of Project Options.



## 8. Business and Operational Impacts

The objective of the business and operational impacts assessment is to consider the identified Project Options against qualitative assessment criteria in order to assess the potential advantages and disadvantages related to each identified Project Option.

The methodology to carry out this objective includes:

- The identification of a list of the Project Options that could be employed by the County;
- Development of qualitative evaluation methodology with which the Project Options will be assessed; and
- Application of the qualitative evaluation methodology to the list of Project Options and assess the advantages and disadvantages to recommend the most applicable and advantageous Project Options to the County.

The criteria were developed in consultation with the County, GHD and comparable project information. The business and operational impact assessment was undertaken with input and review by the County.

### 8.1 Project Options

As outlined in Section 6.4, the RFI process identified the following Project Options:

- Project Option 1 - Status Quo
- Project Option 2 - Wet AD facility delivered under a DBO model;
- Project Option 3 - Dry AD with in-vessel composting facility delivered under a DBO model;
- Project Option 4 - In-vessel composting facility delivered under a DBO model; and
- Project Option 5 - Merchant capacity.

### 8.2 Description of Criteria

The table below lists the Evaluation Criteria as developed in collaboration with the County, GHD and the Consultant Team. The criteria were based on Project and County objectives and considerations.

Table 14: Business and Operational Impacts Evaluation Criteria

Evaluation Criteria	Description
Alignment with policies	Alignment with policies related to the County's long-term strategic direction and/or current and future legislative/regulatory requirements (i.e. Waste-Free Ontario Act and climate change).
Public ownership/control	Assesses the level of ownership afforded by the Project Option.
Availability and applicability of technology solution	Considers if the Project Option is well accepted by the market and readily available for application, with comparable facilities/technologies in current operation in the North American market.
Long-term viability of technological solution	Assesses the long-term viability and applicability of the technological solution.
Timeliness of implementation	Assessment of the timeliness of Project delivery/implementation for each Project Option.
Permitting	Ability to obtain and comply with site approvals and permitting requirements.

Evaluation Criteria	Description
Input volume capacity	Considers the volume of materials that can be accepted by the Project Option and potential constraints related to changes in input volumes. This could include County program changes (restrictions on curbside garbage), constraints on facility capacity (size of facility), loss or increase of feedstock from customers, etc.
Input composition	The quality and type of materials that can be accepted by the Project Option, including limitations to the size and type of feedstock and additions required such as bulking agents. Specifically considers the addition of pet waste and diapers to the green bin program.
Process flexibility	Potential to amend or change the process for seasonal and unplanned input additions, including, pumpkins, and other seasonal organic items.
Potential for downtime	Assessment of the potential for significant downtime or facility unavailability related to the Project Option technology. Any technological innovations or improvements that require significant downtime during operations would be disadvantageous to County operations.
End products	The viability and marketability of end products resulting from the Project Option.
Residuals	Following processing of the SSO, the amount of waste or residual produced (compost refining by-product, non-organic wastes). These materials must be disposed of and, in addition, would not be considered diverted tonnage. Residuals lessen the final compost quality. Costly pre-treatment or post treatment technology are added to the treatment process to remove them. After removal, residuals have to be transported and eliminated which add costs to operations.
Potential for revenue generation	A Project Option's value to the County, including the ability maximize potential revenues and potential usage of the end products for the purposes of off-setting operating and maintenance costs and provide cost effective services.
Potential environmental impacts	Minimized external environmental impacts such as odour and noise, which may result from operations under the specified Project Option.
Long-term operation	Assesses the long-term impact that transfer of operations (at handback or end of contract) would have on the County.
Diversion	Assesses the alignment with the County's long-term diversion goals.

The options were assessed based on the following scale, with rationale and assumptions to determine a ranking of Project Options based on alignment with the County's business and operational objectives.

Table 15: Business and Operational Impacts Assessment Scale

Assessment	Description
Major Advantage	Option fully meets the objective of the criterion
Advantage	Option substantially meets the objective of the criterion
Neutral	Option has no advantage or disadvantage over other options
Disadvantage	Option substantially does not meet the objective of the criterion

### 8.3 Summary of Business and Operational Impacts

The following section summarizes the assessment of each evaluated Project Option, relative to each criterion based on this scoring methodology. This analysis includes summary level rationale for the application of the scoring.

#### 8.3.1 Alignment with Policies

Alignment with policies related to the County's long-term strategic direction and/or current and future legislative/regulatory requirements (i.e. Waste-Free Ontario Act and climate change legislation).

Project Option	Description	Assessment
Status Quo	<p>No change in organics management i.e. treating organics at the AIM facility would not match with the County's long term strategic plan to manage its own waste. Moreover pet waste and diapers are not currently included as feedstock under the current agreement.</p> <p>The AIM facility employs in-vessel composting, which does not produce biogas in addition to compost and, as a result, does not align to the Climate Change Act.</p>	Disadvantage
Wet AD	<p>Under the Wet AD DBO option, the facility is expected to be built to align with the strategic direction of the County. In alignment with the County's long-term strategic plan, the facility would allow for the County to manage its own waste and allow for the inclusion of pet waste and diapers. In addition, the County would be prepared to adjust to changes in organics management outlined in the Waste-Free Ontario Act. Recovery of biogas would align with new cap and trade initiatives.</p>	Major Advantage
Dry AD with In-vessel Composting	<p>Similar to the Wet AD option, under the Dry AD DBO option, the facility is expected to be built to align with the strategic direction of the County. In alignment with the County's long-term strategic plan, the facility would allow for the County to manage its own waste and allow for the inclusion of pet waste and diapers. In addition, the County would be prepared to adjust to changes in organics management outlined in the Waste-Free Ontario Act. Recovery of biogas would align with new cap and trade initiatives.</p>	Major Advantage
In-Vessel Composting	<p>Similar to the AD options, for the in-vessel composting DBO option, the facility is expected to be built to align with the strategic direction of the County. In alignment with the County's long-term strategic plan, the facility would allow for the County to manage its own waste and potentially allow for the inclusion of pet waste and diapers. In addition, the County would be prepared to adjust to changes in organics management outlined in the Waste-Free Ontario Act.</p> <p>In-vessel composting does not produce biogas in addition of compost and, as a result, does not align to Climate Change Act as much as other options. Furthermore, the inclusion of pet waste and diapers would require additional equipment to remove plastics. As seen with other in-vessel composting facilities, diapers (plastic) are often not included in feedstocks/inputs.</p>	Advantage
Merchant Capacity	<p>This Project Option does not align with the County's strategic direction to manage their own waste and develop in-County processing capacity. In addition, finding merchant capacity options to process pet waste and diapers may be challenging - especially considering legislation changes under the Waste-Free Ontario Act. Changes to legislation on climate change could result in concerns related to higher costs or penalties for transportation across longer distances. As the County would be responsible for the haulage and</p>	Disadvantage

Project Option	Description	Assessment
	transportation from the transfer facility to the merchant facility, these costs would be incurred by the County.	

### 8.3.2 Public Ownership/Control

Assesses the level of ownership afforded by the Project Option.

Project Option	Description	Assessment
Status Quo	Currently, organics are treated at the AIM site in Hamilton, owned and operated by the private sector partner. The private sector partner will retain ownership and control of the facility.	Disadvantage
Wet AD	The Wet AD option would be delivered under the DBO delivery model on a County-owned site, as recommended by GHD (based on development of similar facilities and public consultation) and direction from County Council.  Under the DBO model, a single proponent (consortia or Project Co) is responsible for the design, construction and operation of a new or refurbished facility. The County (public sector entity) would retain ownership of the facility under a DBO contract.	Major Advantage
Dry AD with In-vessel Composting	Similar to the Wet AD Project solution option, the Dry AD Project Option would be developed at the County's site via a DBO delivery model.  Under the DBO model, a single proponent (consortia or Project Co) is responsible for the design, construction and operation of a new or refurbished facility. The County (public sector entity) would retain ownership of the facility under a DBO contract.	Major Advantage
In-Vessel Composting	Similar to the Dry AD and Wet AD Project Options, the in-vessel composting option would be developed at the County's site via a DBO delivery model.  Under the DBO model, a single proponent (consortia or Project Co) is responsible for the design, construction and operation of a new or refurbished facility. The County (public sector entity) would retain ownership of the facility under a DBO contract. This Project Option may have the additional benefit of offering the County with future direct control over facility operations.	Major Advantage
Merchant Capacity	The merchant capacity option suggests that the processing of SSO would occur at the merchant site. The merchant partner would retain ownership and control of the facility.	Disadvantage

### 8.3.3 Availability and Applicability of Technology Solution

Availability and applicability of technology solution considers that the Project Option is well accepted by the market and readily available for application, with comparable facilities/technologies in current operation in the North American market.

Project Option	Description	Assessment
Status Quo	Organics are currently shipped to the AIM facility in Hamilton. The private sector partner facility employs in-vessel composting technology, which is widely deployed and available in Ontario.	Major Advantage
Wet AD	There are currently approximately four (4) large scale and 30 on-farm Wet AD facilities in Ontario. There are a number of available technologies that could be deployed for the Wet AD process.  Available Wet AD technologies used to treat the feedstocks under consideration for the OPF Project are widely accepted by the market.	Advantage
Dry AD with In-vessel Composting	There are currently no Dry AD facilities in operation in Ontario. In other markets (including international markets), Dry AD technologies are well-known and accepted for the feedstocks/inputs considered for the OPF Project.  Dry AD technology would be combined with in-vessel composting, technology that is widely deployed in Ontario. This factor could help the integration of this technology in the market.	Neutral
In-Vessel Composting	There are approximately ten (10) in-vessel composting facilities currently in operation in Ontario (managing SSO inputs). There are also a number of available technologies that could be deployed for an in-vessel composting facility.  In-vessel composting technology is well accepted and readily available in the Ontario market. In-vessel composting technology is highly applicable for the feedstocks considered for the OPF Project, and is also relatively easy to operate.	Major Advantage
Merchant Capacity	The merchant capacity option considers facilities currently or expected to be in operation, and as such, considers processing capacity that would be available in the Ontario market.	Neutral

### 8.3.4 Long-Term Viability of Technological Solution

The long-term viability and applicability of the technological solution.

Project Option	Description	Assessment
Status Quo	The current processing facility is using in-vessel composting technology. In-vessel composting technology is widely available in Ontario, however, the technology is mature compared to AD technologies. Generally, the Ontario market is moving away from in-vessel composting technology and implementing AD technologies in new facility or facility redevelopment projects.	Neutral
Wet AD	Wet AD technology is less widespread than in-vessel composting technology. However, with the implementation of organics waste collection programs across the province, it is expected that the waste market will adopt Wet AD technologies for implementation in future facilities or facility redevelopment projects. Innovations and updates to AD technology are expected to continue as the technology matures. The City of Toronto, Region of Peel, Region of	Advantage

Project Option	Description	Assessment
	Durham and York Region are all comparable jurisdictions planning to implement Wet Ad technologies for new waste facility development projects.	
Dry AD with In-vessel Composting	Dry AD technology is not present yet in Ontario. With the development of organics selective collection in Ontario, it is expected that the waste market will adopt Dry AD technologies for implementation in future facilities or facility redevelopment projects. Innovations and updates to Dry AD technology are expected to continue as the technology matures.  Dry AD technology is not currently deployed in the Ontario market but is currently under development at a new AD facility in Surrey, British Columbia.	Advantage
In-Vessel Composting	It is expected that the waste sector will continue its current movement towards AD systems in the planning and development of future facilities or existing facility upgrades and refurbishments.	Disadvantage
Merchant Capacity	The long-term viability and applicability of the merchant capacity facility will be dependent on the type of technology implemented by the merchant partner. RFI responses have indicated that AD or in-vessel composting technologies are potential options for the merchant facility. As noted above, there has been a general movement in the waste sector toward the implementation of AD technologies for new organics processing facilities and/or replacement/refurbishment of existing facilities.	Neutral

### 8.3.5 Timeliness of Implementation

Assessment of the timeliness of Project delivery/implementation for each Project option.

Project Option	Description	Assessment
Status Quo	Continuing the agreement between the County and AIM (Hamilton site) composting facility would meet all of the County's timing constraints and milestones related to implementation.	Major Advantage
Wet AD	Based on the approved Development Strategy, the County is seeking to have the OPF constructed and operational in the year 2021. The County has planned for a one-year procurement period constraint for the DBO Project. It is noted that there may be some delay as both Planning and Environmental approvals are sought.  The County has limited experience in the delivery of DBO projects of this nature along with limited experience in the operation of AD technology, and may face some difficulties in the development of procurement documentation, including, but not limited to the RFP and Project Agreement. This may be complicated by pursuing newer AD technology. The County intends to include sector/DBO procurement specialists on the County team to ensure that the process and documentation are within the planned Project timelines.  Wet AD technology is also available and currently deployed in the Ontario market, ensuring that the Wet AD facility could be implemented within planned timelines.	Neutral
Dry AD with In-vessel Composting	Similar to the Wet AD facility, the County is seeking to have the Dry AD facility constructed and operational in the year 2021. The Dry AD facility is to be procured and developed under the DBO methodology.	Disadvantage

Project Option	Description	Assessment
	<p>The County has planned for a one-year procurement period constraint for the DBO Project. It is noted that there may be some delay as both Planning and Environmental approvals are sought.</p> <p>The County has limited experience in the delivery of DBO projects of this nature along with limited experience in the operation of AD technology, and may face some difficulties in the development of procurement documentation, including, but not limited to the RFP and Project Agreement. This may be complicated by pursuing new AD technology. The County intends to include sector/DBO procurement specialists on the County team to ensure that the process and documentation are within the planned Project timelines.</p> <p>Dry AD technology is not currently deployed in the Ontario market but is currently under development at a new AD facility in Surrey, British Columbia.</p>	
In-Vessel Composting	<p>Similar to the AD facilities, the County is seeking to have the in-vessel composting facility constructed and operational in the year 2021. The in-vessel composting facility is to be procured and developed under the DBO methodology.</p> <p>The County has planned for a one-year procurement period constraint for the DBO Project.</p> <p>The County has limited experience in the delivery of DBO projects of this nature, and may face some difficulties in the development of procurement documentation, including, but not limited to the RFP and Project Agreement. The County intends to include sector/DBO procurement specialists on the County team to ensure that the process and documentation are within the planned Project timelines.</p> <p>In-vessel composting technology is available and currently deployed in the Ontario market, ensuring that the in-vessel composting facility could be implemented within planned timelines.</p>	Neutral
Merchant Capacity	<p>The contract with the merchant partner would include specific timelines related to the implementation and availability of the merchant facility. It is expected that the merchant capacity option would meet all of the County's timing constraints and milestones.</p>	Major Advantage

### 8.3.6 Permitting

Ability to obtain and comply with site approvals and permitting requirements.

Project Option	Description	Assessment
Status Quo	<p>The current private sector partner (AIM - Hamilton facility) has obtained and complied with site approvals and permitting requirements. It is expected that that the current private sector partner will continue to be compliant.</p>	Major Advantage
Wet AD	<p>The County is pursuing Planning approvals for the Project site. Environmental Compliance Approvals ("ECA") should be obtainable, as Wet AD facilities have been developed and operated in the Ontario market.</p> <p>A properly designed and operated facility should be able to meet the requirements of the ECA and provincial regulations, specifically those related to odour abatement.</p>	Advantage

Project Option	Description	Assessment
Dry AD with In-vessel Composting	The County is pursuing Planning approvals for the Project site. There may be some delays or issues in obtaining ECAs, as there is no track record related to Dry AD facilities in Ontario. Applicable criteria for odour management are similar to the one presented for Wet AD option noted above.	Neutral
In-Vessel Composting	The County is pursuing Planning approvals for the Project site. ECA should be obtainable, as in-vessel composting facilities have been developed and operated in the Ontario market.  A properly designed and operated facility should be able to meet the requirements of its ECA and provincial regulations, specifically as those related to odour abatement, however, if pet waste and diapers were to be introduced into the process, there may be issues in operating within ECA. Many, in-vessel compost facilities have had challenges in meeting the odour-related aspects of their ECAs.	Disadvantage
Merchant Capacity	The merchant partner would be responsible for obtaining and adhering to permit requirements. It is noted that during the procurement process for processing options, a valid ECA would be required.	Major Advantage

### 8.3.7 Input Volume Capacity

The volume of materials that can be accepted by the Project Option and potential constraints related to changes in input volumes. This could include County program changes (restrictions on curbside garbage), constraints on facility capacity (size of facility), loss or increase of feedstock from customers, etc.

Project Option	Description	Assessment
Status Quo	The AIM-operated facility in Hamilton currently holds a valid ECA and is permitted to take County SSO for processing. Any program changes, including changes to feedstock, would be subject to further negotiation and potentially costly changes to the existing contract.	Disadvantage
Wet AD	Wet AD is not very flexible in response to variations in feedstock quantity. The processing capacity of the facility is established at the design stage to accommodate potential fluctuations in input volumes, including loss or increase in feedstock. The technology is not particularly modular and must be developed with minimum capacity in the order of 20,000 tonnes/year.	Disadvantage
Dry AD with In-vessel Composting	Dry AD technology is less sensitive to variations of feedstock quantity (within a reasonable range).  Retention time in the digesters could be modified slightly to accept potential input variations. These adaptations would ultimately impact the output (biogas) generation rate, but would not impact the stability of the digestion process itself. The treatment capacity of the facility should be established at the design stage. Modular Dry AD facilities (batch processes) can also be developed to accommodate potential changes to input volumes and allow for additional capacity over the life of the facility in the event that County programs, legislation or regulations change.	Advantage
In-Vessel Composting	In-vessel composting systems and technologies are able to address reasonable variations in feedstock quantity. In peak periods, in-vessel composting systems are able to reduce composting time and increase the maturation duration.  The treatment capacity of the facility should be established at the design stage.	Major Advantage



Project Option	Description	Assessment
	In-vessel composting systems are generally modular and could accommodate potential changes to input volumes and allow for additional capacity over the life of the facility in the event that County programs, legislation or regulations change.	
Merchant Capacity	The quantity accepted by the merchant facility would be defined by the available processing capacity at their composting or AD facility. Any changes to input volumes in excess of the contract agreement would result in the County needing to source an alternative method for transfer, haulage and processing of additional capacity.	Disadvantage

### 8.3.8 Input Composition

The quality and type of materials that can be accepted by the Project Option, including limitations to the size and type of feedstock and additions required such as bulking agents. Pet waste and diapers may be included in the County's long-term waste diversion strategies which may change input compositions over the course of the Project.

Project Option	Description	Assessment
Status Quo	The current contract with the private sector partner does not include pet waste and diapers. Any changes to input composition are subject to negotiation and potential increase in cost to the County.	Disadvantage
Wet AD	<p>Wet AD technology and systems are sensitive to changes in the feedstock composition (including quality). Feedstocks under consideration for the OPF can be accepted by Wet AD systems. The Wet AD process would not require bulking agents, however, feedstock will need to be pre-treated to meet digester specifications.</p> <p>The Wet AD system would need to include a bag opener/shredder. The process also ensures that organic materials would not have to be extracted from the feedstock prior to adding into the digesters.</p> <p>The size of feedstock would need to be reduced to ensure that the maximum feedstock input size of 50 mm is not exceeded. As part of the Wet AD process, water would need to be added with respect to the maximum dry matter content (20%). The Wet AD option requires inclusion of at least 0.5 m<sup>3</sup> of water/tonne of incoming waste into the process.</p>	Neutral
Dry AD with In-vessel Composting	<p>If feedstocks are clearly defined ahead of implementation, adequate equipment and processes can be added to treat plastic contaminants from diapers.</p> <p>Feedstocks under consideration for the OPF could be accepted by Dry AD systems. No bulking agents are required for the Dry AD portion of this process.</p> <p>Feedstock preparation under the Dry AD process is simpler than that of the Wet AD process. A shredder would be required for inputs/feedstocks to achieve the size specifications (from 50 mm to 600 mm) for the technology to function as desired. The amount of water needed to optimise the process will vary with the Dry AD process and would require a maximum of 0.1 m<sup>3</sup> of water/tonne of incoming waste.</p> <p>The Dry AD process (as defined by RFI respondents) would include some in-vessel processing capability. Some in-vessel technologies however, may not be equipped to manage changes to input composition, including the potential</p>	Neutral

Project Option	Description	Assessment
	addition of pet waste and diapers, which would require distinct changes to the process.	
In-Vessel Composting	<p>Feedstocks under consideration for the OPF could be accepted by the in-vessel composting system although many do not accept diapers (plastics). If, however, feedstocks are clearly defined ahead of implementation, adequate equipment and processes can be added to treat plastic contaminants from diapers. Bulking agents will be required. Some in-vessel technologies may not be equipped to manage changes to input composition, including the potential addition of pet waste and diapers, which would require distinct changes to the process.</p> <p>Required feedstock preparation will be simple compared to Wet AD and Dry AD processes. The process would require a bag opener or shredder to mix the different types of feedstocks together and to reduce the size of large input elements (i.e. yard waste such as branches). Water may need to be added during the active composting phase. Water content into the process would need to be maintained between 55% and 65%.</p>	Neutral
Merchant Capacity	The limitations on input composition would be tied to the type of technology used at the proposed merchant facility. The Project Option would be dependent on the processing contract, noting that the processor may be able to refuse some materials due to bad quality (level of contamination). Based on responses to the RFI, there is the potential that some merchant capacity facilities may be able to accept pet waste and diapers although this capacity may be limited as the Waste-Free Ontario Act is further advanced.	Disadvantage

### 8.3.9 Process Flexibility

Potential to change the process for seasonal and unplanned input additions, such as pumpkins and other seasonal organic items.

Project Option	Description	Assessment
Status Quo	The current private sector partner has been able to accept and process County waste materials during seasonal periods (including variations in feedstock) without issue. This variability, however, does not include pet waste or diapers as feedstock.	Advantage
Wet AD	<p>Household organics generation varies seasonally in composition and in quantity with time. In fall months, there is typically an increase pumpkins, apples etc. being delivered to processing sites.</p> <p>Wet AD processes are sensitive to feedstock variations.</p>	Disadvantage
Dry AD with In-vessel Composting	Dry AD technology is less sensitive to variations of feedstock quantity (within a reasonable range) as explained in section 8.3.7. Moreover, generated digestate will need to be composted. As such, peak in feedstock quantity will be easier to manage with this option. Combining this option with in-vessel composting would also ensure that the facility is able to address reasonable variations in feedstock.	Major Advantage
In-Vessel Composting	In-vessel composting systems and technologies are able to address reasonable variations in feedstock. In peak periods, in-vessel composting systems are able to reduce composting time and increase the maturation duration.	Major Advantage

Project Option	Description	Assessment
Merchant Capacity	The contract signed with the operators will have to include the characteristics of the feedstock to be treated including its seasonal variations (quantity and quality). If an in-vessel composting technology is implemented, as suggested in the RFI responses, the facility will be able to accept and implement process amendments to accommodate seasonal fluctuations in feedstocks.	Major Advantage

### 8.3.10 Potential for Downtime

Assessment of the potential for significant downtime or facility unavailability related to each of the Project Options. This would include planned maintenance or improvements. Extended periods of downtime would significantly impact County waste management operations as alternate processing arrangements would be required.

Project Option	Description	Assessment
Status Quo	The current private sector partner is responsible for the operation of its facility, however, any potential downtime could result in the County needing to re-route or process organic materials through alternative means, i.e. sending waste to another privately owned and operated facility. The County would need to consider contingencies for significant downtime. Potential impacts related to downtime could be negotiated and mitigated within the private partner contract.	Neutral
Wet AD	Wet AD technologies are sensitive to changes in feedstock composition or characteristics. In the event that any unplanned (biological) inputs are introduced into the digester, the process would need to stop in order to empty and recommission the digester, which could lead to significant downtime.	Disadvantage
Dry AD with In-vessel Composting	Similar to the Wet AD process, unplanned (biological) inputs introduced into the Dry AD process could lead to downtime.  Batch processes will be able to mitigate this risk. A batch with biodegradation issues could be easily isolated without impacting the whole process availability.  In the case of "plug flow" processes, the digestate is not really stirred as it could be in Wet AD processes. The digestate is pushed by incoming waste and mixing, if any, is very low. If inhibitors introduced in the digesters stopped the digestion process, this will occur in a specific location into the digester and will not need to empty the whole volume of the digesters. When the digestate will come out from the digesters, the digestate blocked by inhibitors will be easy to identify (lack of degradation) and to set aside to be disposed of. So the risk of major downtime (issues with the stirring equipment in the digester, inhibition of the AD reaction in the digester) is also low.  Feedstock would also be processed using in-vessel composting technology to further mitigate the risk of significant downtime related to feedstock variation and technology outages or replacements.	Advantage
In-Vessel Composting	In-vessel composting is a batch process, which would mitigate the risk of significant downtime in case of any feedstock variation.	Advantage
Merchant Capacity	The merchant partner would be responsible for the operation of the merchant facility, however, any potential downtime could result in the County needing to re-route or process organic materials through alternative means, i.e. sending waste to another facility. The County would need to consider contingencies for significant downtime. Potential impacts related to downtime could be negotiated and mitigated within the merchant partner contract.	Neutral

### 8.3.11 End Products

The viability and marketability of end products resulting from the Project Options. In relation to evaluated technologies, end products could include compost, digestate and biogas.

Project Option	Description	Assessment
Status Quo	Under the current contractual arrangement, the end product (compost) is not returned to the County, i.e., the end product is not marketable for the County.	Disadvantage
Wet AD	<p>Wet AD processes will generate process water, digestate and/or compost. All three (3) of these end products could be classified as fertilizers, however the concentration in nutrients for each of these end products is typically low and are often applied as organic amendments rather than as fertilizer. The market value of Wet AD process end products is usually low and the treatment of process water could represent a significant cost for the County. These costs could be equivalent to transportation costs from the OPF to the end user. However, these end products would remain in the County to benefit local agricultural uses.</p> <p>AD facilities also generate biogas. The biogas outputs from the Wet AD facility could be used to offset operating costs. Storage of excess biogas outputs could imply additional costs to the County.</p> <p>Correlating the biogas market to the energy market indicates a very volatile and unpredictable marketplace for biogas. Moreover, climate change initiatives regarding renewable energy portfolio standards could help to obtain premiums for biomethane gas or "green electricity" as an energy source and would mitigate the volatility of the energy market in a medium term perspective.</p>	Advantage
Dry AD with In-vessel Composting	<p>Dry AD processes will generate process water, digestate and/or compost. All these three end product could be considered as fertilizers. However, their concentration in nutrients is low and they are usually considered by end users (farmers) much more as organic amendment than as fertilizer. Their value on the market is usually low and their disposal could represent a cost and not a revenue. These costs could be equivalent to transportation costs from the OPF to the end user. End products would remain in the County to benefit local agricultural uses.</p> <p>The Dry AD technology will be applied for the purposes of generating biogas for off-setting operating costs. No excess biogas production is expected as remaining feedstock will be processed with in-vessel composting technology to yield fertilizer as per the RFI response.</p>	Major Advantage
In-Vessel Composting	Composting facilities will generate compost/fertilizer. The nutrient concentration in of in-vessel composting outputs is typically low and it is often considered by end users as an organic amendment without further treatment or enrichment. The market value of the output is usually low and disposal or storage of any remaining/unsold outputs could represent additional costs to the County. These costs could be equivalent to transportation costs from the OPF to the end user. End products would remain in the County to benefit local agricultural uses.	Neutral
Merchant Capacity	The merchant partner would ultimately be responsible for the sale, storage and disposal of end products. The market volatility of potential end products is not expected to have an impact for the County. These terms are dependent on the nature of the contract with the merchant partner.	Disadvantage

### 8.3.12 Residuals

Management potential of residual product yields as a result of processing/operations. Residuals must be disposed of and, in addition, would not be considered diverted tonnage. Residuals are not organic and lessen the compost quality. Costly pre-treatment or post treatment technology are added to the treatment process to remove them. After removal, residuals have to be transported and eliminated which could add costs to operations.

Project Option	Description	Assessment
Status Quo	Residual management is the responsibility of the current private sector partner. If the feedstock contamination rate increases abnormally, the private sector partner would ask the County to pay for disposal or treatment of the contaminants.	Neutral
Wet AD	In Wet AD processes, contaminants extraction is conducted under wet conditions and as a result, extracted residuals will have a high organics and water content. The amount of contaminants which need to be disposed of will then be higher than for Dry AD or in-vessel composting processes.  AD processes may also generate a high quantity of effluents during the digestate dewatering phase, which will need to be treated if low quality or the local market do not allow for direct land application.	Disadvantage
Dry AD with In-vessel Composting	Contaminants extraction is undertaken under dry conditions and mainly at the compost refining stage. Contaminants extraction is then efficient and reduces the amount of organic matter (less sticky) extracted with the contaminants themselves.	Advantage
In-Vessel Composting	Contaminants extraction is undertaken under dry conditions and mainly at the compost refining stage. Contaminants extraction is then efficient and reduces the amount of organic matter (less sticky) extracted with the contaminants themselves. The addition of plastics (from diapers and pet waste) will increase the contamination level of feedstock, and could prevent the compost outputs from reaching the Ontario Compost Standards.	Advantage
Merchant Capacity	Residual management will be under the responsibility of the site operators. If the feedstock contamination rate increase abnormally, the subcontractor could however ask the County to pay for contaminants disposal or treatment.	Neutral

### 8.3.13 Potential for Revenue Generation

A Project Option's value to the County, including the ability maximize potential revenues and potential usage of the end products for the purposes of off-setting operating and maintenance costs and provide cost effective services.

Project Option	Description	Assessment
Status Quo	Under the current contractual arrangement, the end product (compost) is not returned to the County. The status quo option does not allow for potential revenue generation opportunities for the County.	Disadvantage
Wet AD	The Wet AD process leads to the production/output of three (3) by-products : <ul style="list-style-type: none"> <li>Renewable energy: biogas refined to produce biomethane;</li> <li>Soil amendment: digestate or compost; and</li> <li>Residual waste to be sent to landfill (compost refining by-product, non-organic wastes).</li> </ul>	Advantage

Project Option	Description	Assessment
	<p>The biomethane outputs could be used to produce heat and/or electricity, could be injected into the grid for energy savings, or could replace fuel in some County operations (i.e. fuel for transportation trucks). The compost outputs could be used as a soil amendment.</p> <p>The Wet AD option allows for several opportunities for the generation and optimization of potential revenues (credit carbon, gas market, etc.) and to bring added value and potential benefits for the business and its stakeholders. However, the gas valorization will need additional investment (biogas refining).</p>	
Dry AD with In-vessel Composting	<p>With similar incoming waste, Dry AD would produce less biogas than Wet AD. However Wet AD will require more stringent contaminants removal as presented in Section 8.3.12 above.</p> <p>The pre-treatment phase under the Wet AD process will divert organics from the AD process itself. This will not be the case for Dry AD processes. The amount of organics processed through the AD process will be higher for Dry AD than for Wet AD. Considering these factors, the overall biogas production will be comparable for both technologies.</p> <p>Based on the submission to the RFI, the Dry AD processes portion of the facility is only intended to be used to generate sufficient biogas to offset the costs of operation. The remaining feedstocks are to be processed using in-vessel composting technology. However, typically, Dry AD facilities use 15% to 20% of the produced biogas for auto-consumption needs, with the remaining produced biogas can be sold in the market with high value.</p> <p>In-vessel composting process yields compost, however the contamination level of inputs and the amount of refinement can impact the final quality and value of the product generated. The value of compost is typically relatively low.</p>	Advantage
In-Vessel Composting	In-vessel composting yields compost, however the contamination level of inputs and the amount of refinement can impact the final quality and value of the product generated. The value of compost is moreover typically relatively low.	Neutral
Merchant Capacity	Sharing of any revenue sources under the merchant capacity Project Option would be subject to negotiation and dependent on the nature of the agreement with potential partner merchants. It is expected that the County would not be able to maximize potential revenues under the merchant capacity option.	Disadvantage

### 8.3.14 Potential Environmental Impacts

Ability to minimize external environmental impacts such as odour and noise, which may result from operations under the specified Project option.

Project Option	Description	Assessment
Status Quo	The current agreement with AIM is linked to environmental impacts related to the haulage and transportation of materials from the transfer facility to the processing site, including emissions from transportation.	Disadvantage
Wet AD	Wet AD processes and operations, could generate odours (during reception, digestate dewatering and composting, biogas management phases). A considerable portion of the process is fully contained in digesters. Most of the operations which could generate odours would be undertaken in ventilated buildings and under negative pressure.	Advantage

Project Option	Description	Assessment
	There is potential to collect and treat air to manage the potential odour impact, however, digestate handling and processing (drying and composting) can be odorous. Other impacts, such as noise would be mainly associated with trucks delivering waste to the site. Site loaders would mainly operate into the buildings/facilities with a low noise impact.	
Dry AD with In-vessel Composting	Odours, noise management and related risks are similar to the in-vessel composting option noted below.	Advantage
In-Vessel Composting	In-vessel composting, in its various forms, has potential to generate odour off-gases and greatest potential to create an odour nuisance.  Equipment can be added to the facility to mitigate odours. Most of the operations which could generate odours (during reception and active composting phases) would be undertaken in ventilated buildings and under negative pressure. Collected air could be treated to manage the potential odour impact.	Advantage
Merchant Capacity	Adherence to constraints will depend on the technology used by the facility receiving the SSO as well as the terms and conditions of the contract with the merchant. Based on RFI responses, in-vessel composting systems could potentially be implemented at the proposed merchant facilities. As noted above, in-vessel composting, in its various forms, has potential to generate odour off-gases and greatest potential to create an odour nuisance.  The merchant capacity option would also introduce environmental impacts related to the haulage and transportation of materials from the transfer facility to the merchant site. Transportation of materials would result in greenhouse gas emissions resulting from vehicle use across long distances.	Neutral

### 8.3.15 Long-term operation

Assesses the long-term impact that transfer of operations (at handback or end of contract) would have on the County.

Project Option	Description	Assessment
Status Quo	At the end of the contract term, the County would need to secure another processor or seek to extend the contract for processing of organic waste.  Sourcing a new processor could be impacted by market conditions, market capacity and availability and accessibility of site/facilities.	Neutral
Wet AD	The County does not have familiarity or available resources equipped for the operation and maintenance of a Wet AD facility. At handback, i.e. the end of Project Co. operating term, the County would be responsible for contracting operations to a private partner.  At the end of Project Co, the County may choose to enter into a new contract or negotiate an extension with Project Co.	Neutral
Dry AD with In-vessel Composting	Similar to the Wet AD facility, the County does not have familiarity or available resources equipped for the operation and maintenance of a Dry AD facility. At handback, i.e. the end of Project Co. operating term, the County would be responsible for contracting operations to a private partner.	Neutral



Project Option	Description	Assessment
	<p>It is also important to note that, currently there are no Dry AD facilities in operation in the Ontario marketplace, as such, operators for a Dry AD facility may need to be sourced from outside of province or outside of Canada.</p> <p>At the end of Project Co, the County may choose to enter into a new contract or negotiate an extension with Project Co.</p>	
In-Vessel Composting	Similar to AD facilities, the County won't have resources available to operate an in-vessel composting facility after a long term DBO contract. However the County has experience and familiarity with composting and there is the potential for the County to operate the facility upon handback from DBO contract ending.	Advantage
Merchant Capacity	<p>At the end of the contract term, the County would need to source another merchant partner or seek to extend the contract for processing of organic waste.</p> <p>Sourcing a new merchant capacity contract could be impacted by market conditions and availability and accessibility of merchant site/facilities.</p>	Neutral

### 8.3.16 Diversion

Assesses the alignment with the County's long-term diversion goals.

Project Option	Description	Assessment
Status Quo	The current agreement with AIM does not include feedstocks such as pet waste and diapers. These materials are considered as residues under the current contract.	Disadvantage
Wet AD	Final diversion rates will be associated with the capacity of the technology to deal with input variations in quantity and quality (section 8.3.8). Wet AD would be able to accept all organics which could be included in the accepted organics list (bones, yard waste, diapers, pet waste, for example). Wet AD will, however, require stringent pre-treatment to reach the required feedstock quality (contamination rate). This constraint will generate a larger amount of residuals to be disposed of in comparison with Dry AD or composting processes and will lead to a lower organics diversion rate.	Neutral
Dry AD with In-vessel Composting	Dry AD would be able to accept all organics that could be included in the accepted organics list (bones, diapers, pet waste for example). Processes could include a bag opener to pre-shred the diapers, for example. Due to a limited pre-treatment phase and considering that contaminants extraction will be done on dry material at the compost refining stage, organics diversion rate should be higher than for Wet AD.	Advantage
In-Vessel Composting	Similar to Dry AD.	Advantage
Merchant Capacity	Any change in the list of accepted organics by the County could lead to a revision of the terms of the contract, or for the County to source additional means for processing organics, i.e. another partner or facility for processing. However, a limited number of facilities do accept pet waste and diapers.	Disadvantage



### 8.3.17 Summary of Results

The table below provides a summary of the assessment to highlight the advantages and disadvantages related to each of the identified Project Options based on alignment with the County's business and operational objectives.

Table 16: Summary of Business and Operational Impacts Assessment

	Project Option 1: Status Quo	Project Option 2: Wet AD under a DBO delivery model	Project Option 3: Dry AD under a DBO delivery model	Project Option 4: In-vessel composting under a DBO delivery model	Project Option 5: Merchant Capacity
Alignment with policies	Disadvantage	Major Advantage	Major Advantage	Advantage	Disadvantage
Public ownership/control	Disadvantage	Major Advantage	Major Advantage	Major Advantage	Disadvantage
Availability and applicability of technology solution	Major Advantage	Advantage	Neutral	Major Advantage	Neutral
Long-term viability of technological solution	Neutral	Advantage	Advantage	Disadvantage	Neutral
Timeliness of implementation	Major Advantage	Neutral	Disadvantage	Neutral	Major Advantage
Permitting	Major Advantage	Advantage	Neutral	Disadvantage	Major Advantage
Input volume capacity	Disadvantage	Disadvantage	Advantage	Major Advantage	Disadvantage
Input composition	Disadvantage	Neutral	Neutral	Neutral	Disadvantage
Process Flexibility	Advantage	Disadvantage	Major Advantage	Major Advantage	Major Advantage
Potential for downtime	Neutral	Disadvantage	Advantage	Advantage	Neutral
End products	Disadvantage	Advantage	Major Advantage	Neutral	Disadvantage
Residuals	Neutral	Disadvantage	Advantage	Advantage	Neutral
Potential for revenue generation	Disadvantage	Advantage	Advantage	Neutral	Disadvantage
Potential environmental impacts	Disadvantage	Advantage	Advantage	Advantage	Neutral
Long-term operation	Neutral	Neutral	Neutral	Advantage	Neutral
Diversion	Disadvantage	Neutral	Advantage	Advantage	Disadvantage

As noted above, the DBO options (Wet AD, Dry AD and in-vessel composting) were found to be most advantageous when aligned with the County's business and operational objectives. The status quo and merchant capacity option were determined to be the least aligned with the County's long-term objectives. Amongst the DBO Project Options, the Wet AD model was found to be the least advantageous, whereas the Dry AD Project Option (with mitigation through the addition of in-vessel composting) proved to be the most advantageous to the County in terms of alignment with policies, provision of ownership and control of the facility, process flexibility and County management of end products.

## 9. Risk Assessment

In assessing the full impact of the identified Project options on the County, it is necessary to estimate the likelihood and potential impact of risks related to each Project Option. A qualitative risk assessment was conducted to qualify the risk inherent in the identified Project Options.

The Consultant Team led a risk workshop with key personnel from the County and GHD (collectively, the “**Working Group**”). The risk workshop served as a platform to identify, define, quantify and allocate risks related to the Project. The risk workshop was held on March 30, 2017. The sections below highlight the consensus results on identified risks, likelihood of occurrence, potential impacts on the County and potential mitigation strategies to minimize probability or impact of the risks (where applicable).

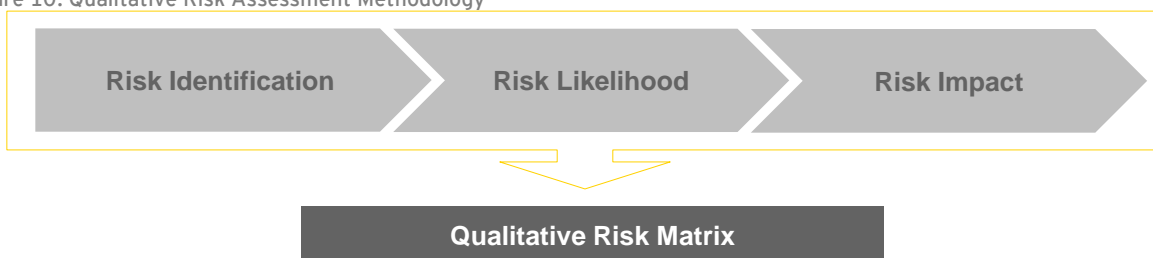
### 9.1 Qualitative Risk Assessment Methodology

Potential risks associated with the five (5) Project Options as identified as per the RFI responses. Each of the Project Options were assessed for likelihood of occurrence (probability) and potential impact should the risk occur.

The approach to the qualitative risk assessment exercise included undertaking the following steps:

- **Risk briefing** - A briefing session with the Working Group to provide an overview of the qualitative risk assessment methodology.
- **Risk identification and categorization** - Identification and definition of all the risks relevant to the Project. The template or base risk matrix along with risk definitions template risk matrix, based on recent relevant projects and Working Group experience on Projects of similar size and scope. The template risk matrix served as a starting point for workshop discussion. Risks were categorized as: (i) policy and strategic risks; (ii) permitting and approvals risks; (iii) design and construction risks; (iv) operational risks; and (v) technology related risks. This exercise ensured a complete list of applicable risks to the Project/County.
- **Risk assessment** - Each identified risk was assessed by the Working Group to determine the likelihood of the identified risks occurring and the potential impact of these events, should they occur. The probabilities were ranked as high, medium or low likelihood of occurrence and the impacts were ranked as high, medium or low impact on the County (financial or political impact).

Figure 10: Qualitative Risk Assessment Methodology



The probability and potential impact of risks associated with each Project Option were assessed to determine the option with the lowest risk to the County. This information will be combined with other qualitative factors and the results of the financial model to inform a decision on Project Options.

## 9.2 Defining Probability and Potential Impact

The risks were assessed based on factors of probability and impact. Probability was defined as the likelihood of occurrence. The probability was ranked on a scale of low (the risk is unlikely to occur), medium (the risk could occur), and high (the risk is likely to occur).

The potential impact was gauged as the potential financial and political impact on the County should the risk occur. The impact was also ranked on a low (minimal impact on the County), medium (manageable impact on the County) and high (severe impact on the County) scale.

## 9.3 Assumptions

The qualitative risk assessment assumed that the Project Options delivered under a DBO contract would transfer or share (with the County) all design, construction and operational risks related to the development of the facility for a minimum of 20 years. It was also assumed that the status quo and merchant capacity options would involve risks related to exporting waste (via a transfer facility) to an out-of-County facility.

## 9.4 Summary of Risk Assessment

Risks included in the template risk matrix have been identified in the following categories:

- Policy and strategic risks;
- Permitting and approvals risks;
- Design and construction risks;
- Operational risks;
- Demographic and economic risks; and
- Technology related risks.

Risks within each category, and the categories themselves, were developed based on precedent projects. The identified risks were refined, added, or deleted based on the discussion during the qualitative risk workshop.

The risks were assessed using the following methodology:

- Risk Identification: Ensuring a complete list of all risk categories;
- Risk Likelihood: Estimating the likelihood (high, medium, low) of each risk occurring; and
- Risk Impact: Estimating the potential impact on the County (high, medium, low) of each risk, should it occur.

The final qualitative risk matrix (table below) resulting from the risk workshop presents a “heat map” which provides a visual representation of the risks of greatest concern to the County for each Project option. High risk items are coded in red, medium risk items are coded in yellow, and low risk items are coded in green. Risks identified as “not applicable” were not included in the assessment as they do not apply under a particular Project Option, i.e. transfer station operation does not apply under the County-owned and operated options.

Table 17: Qualitative Risk Matrix - Post-Risk Workshop

Qualitative Risk Matrix		Description	Project Option 1 Status Quo		Project Option 2 Wet AD procured under a DBO model		Project Option 3 Dry AD with in-vessel composting procured under a DBO model		Project Option 4 In-Vessel composting procured under a DBO model		Project Option 5 Merchant Capacity	
No.	Risk		Prob	Impact	Prob	Impact	Prob	Impact	Prob	Impact	Prob	Impact
<b>Policy and Strategic Risks</b>												
1	County Strategic Direction	Risk that the Project Option does not align with the County's policies and/or strategic direction.	High	High	Low	High	Low	High	Med	High	High	High
2	Legislative/Regulatory Changes related to Waste-Free Ontario Act	Risk that the Project Option does not align with current and/or future legislative requirements related to the Waste-Free Ontario Act and the Organics Action Plan.	Med	High	Low	High	Low	High	Low	High	Med	High
3	Legislative/Regulatory Changes related to Climate Change	Risk that the Project option does not align with current and/or future legislative requirements related to climate change.	High	High	Low	High	Low	High	Med	High	High	High
4	Owner management/control over operations	Risk that the Project option does not allow the County to make long-term adjustments to facility operations or does not allow the County control over long-term processing.	High	High	Med	Med	Med	Med	Low	Low	High	High
<b>Permitting and Approvals</b>												
5	Site Approvals and Permitting	Risk of delays or additional costs related to site approvals and permitting (including planning, environmental approvals and building permits).	Low	Low	Med	Med	Med	Med	Med	Med	Low	Low
<b>Design and Construction Risks</b>												
6	Failure to design in accordance to the County's requirements	Risk of a failure to translate the needs of the County into the design, resulting in additional costs, arising from any modifications required to bring the design back in line with County requirements (e.g. design falls outside the capacity requirements in terms of physical specifications). Note this risk does not include risks around the ultimate operational performance of the facility.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Scope changes initiated by the County during design and construction	There is a risk that the County may require changes to the output specifications during design and construction phases with additional Project delays and costs incurred. An example of scope change could include increases to tonnages/throughput capacity while under construction.	Low	Low	Low	High	Low	High	Low	Med	Low	Low
8	Construction Costs not as estimated	Risk that construction costs are higher than anticipated/estimated.	Low	Low	Med	Med	Med	Med	Med	Med	Low	Low
9	Stakeholder Acceptance	Risk of protest action against the development of the Project, which may incur additional costs (such as security costs), delays or Project termination.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Operational Risks</b>												
10	Net operating costs are not as estimated	Risk that net operating costs are higher than anticipated (i.e. fluctuating market or fluctuating revenues).	Low	Low	Med	Med	Med	Low	Med	Low	Med	Low
11	Failure to meet operating performance standards/targets	There is a risk that the facility does not perform as required. This risk is not related to the design of the facility but the impacts on productivity arising from poor management, operations or maintenance.	Low	Low	Low	Med	Low	Low	Low	Low	Low	Low

Qualitative Risk Matrix		Description	Project Option 1 Status Quo		Project Option 2 Wet AD procured under a DBO model		Project Option 3 Dry AD with in-vessel composting procured under a DBO model		Project Option 4 In-Vessel composting procured under a DBO model		Project Option 5 Merchant Capacity		
No.	Risk		Prob	Impact	Prob	Impact	Prob	Impact	Prob	Impact	Prob	Impact	
12	Failure to meet process output/recovery requirements	Risk that quality of process/facility outputs and recoverable materials do not meet specifications resulting in loss of revenue or additional processing fees over the length of the contract term.	Low	Low	Low	Med	Med	Med	Med	Med	Med	Low	Low
13	Short-term availability of facility/services	There is a risk that the facility will not be available to receive waste in the short-term (1-2 weeks) (e.g. related to operational issues or short-term maintenance) resulting in facility downtime or unavailability.	Low	Med	Med	Med	Low	Med	Low	Med	Low	Med	Med
14	Long-term availability of facility/services	There is a risk that the facility will not be available to receive waste in the long-term (longer than 2 weeks) (e.g. related to operational issues or long-term un-planned maintenance) resulting in facility downtime or unavailability.	Med	High	Med	High	Low	Med	Low	Med	Med	High	High
15	Transfer Station Operation/Availability	There is a risk that the transfer station will not be available to receive waste (i.e. related to operational issues or maintenance) resulting in downtime or unavailability.	Low	Med	N/A	N/A	N/A	N/A	N/A	N/A	Low	Med	Med
16	Haulage and Transportation	There is a risk that issues with haulage or transportation of materials from the transfer facility results in delays or additional costs for the County (e.g. catastrophic issues in which County cannot get waste out of the facility, weather-related incidents, road blockages, etc.)	Low	Med	N/A	N/A	N/A	N/A	N/A	N/A	Low	Med	Med
17	Diversion Targets	Risk that the project option does not meet the County's long-term diversion targets. It is noted that diversion targets cannot be met without the inclusion of pet waste and potentially diapers as diverted materials.	High	Med	Low	Med	Low	Med	Med	Med	Med	Med	Med
<b>Technology related risks</b>													
18	Asset obsolescence	There is a risk that buildings, facility and equipment may become obsolete during the contract, leading to costs of replacement.	Low	Low	Low	High	Low	Med	Med	Med	Low	Low	Low
19	Changes in general waste composition	Risk of unplanned changes in composition of feedstock, resulting in inoperability or technical issues.	Low	Low	Low	High	Low	Med	Low	Med	Low	Low	Low
20	Changes in input volume	Risk of unplanned/off-schedule changes in volume of feedstock, resulting in inoperability or technical issues.	Low	Med	Low	Med	Low	Low	Low	Low	Low	Med	Med
21	External environmental impacts	Risk of environmental impacts including odour or noise which may result from operations and lead to issues and concerns from stakeholders	Med	Low	Med	Med	Med	Med	Med	Med	Med	Med	Low

\*N/A - Not applicable

The table above summarizes the results of the risk assessment as determined based on the outcomes of the risk workshop and further review by the County. The Status Quo, Wet AD and Merchant Capacity Project Options have a higher risk profile (as per the heat map) as compared to the Dry AD with in-vessel composting and in-vessel composting Project Options.

The policy and strategic risks were identified as high risk for the Status Quo and Merchant Capacity Project Options. The Status Quo and Merchant Capacity Project Options do not provide the County with ownership or control over facility operations. These Project Options also do not align with changes to the County's strategic direction related to organic waste progressing. Risks related to long-term availability of facility/services were also ranked as high under the Status Quo and Merchant Capacity options. The implementation of the Waste-Free Ontario Act and related diversion targets, legislation and regulations could result in the increase in volume and changes to composition of the potential feedstock to the facility. Under the Status Quo and Merchant Capacity options, an increase in waste treatment demand could result in a shortfall of treatment capacity or unavailability of the existing private sector facility. If the private sectors facility were to become unavailable for a long period of time, the County may incur additional charges in transporting waste to other facilities for processing, or, may need to find alternative options or partners for waste processing.

The County plans to incorporate pet waste and diapers into the feedstock stream for organics processing. The current arrangement with AIM does not include pet waste or diapers. Any regulatory or legislative changes could result in a re-negotiation of existing contracts under the Status Quo or Merchant Capacity Project Options. Long-term changes to capacity and operational costs would also be subject to additional costs or re-negotiation of the contract(s). Risk associated with facility operational performance and end products are low under these models, as the risk remains with the private sector partner.

Risks related to the Dry AD option were mitigated by the incorporation of in-vessel composting to the process. Risks related to the Project Options can be further mitigated by ensuring that design requirements (specifically capacity requirements) are considered in detail with consensus from all relevant parties during planning stage (i.e. ahead of issuing procurement documentation and/or contract), such that the need for scope changes is minimized during design and construction phase. Specifications and submission requirements as part of the procurement documentation. The length of the contract and County-developed performance specifications could mitigate risks related to long-term operating targets and operating costs.

## 10. Quantitative Analysis – Financial Costs and Benefits

The following section details the quantitative and qualitative evaluation of the costs and benefits associated with each Project Option.

The Consultant Team developed a financial model to conduct a quantitative analysis on the financial costs and benefits related to each Project Option with the objective of establishing which option provides most benefit or least cost to the County.

### 10.1 Quantitative Analysis Approach

A full financial analysis was undertaken to determine the costs and expected benefits for each Project Option (as determined through the RFI process). The viable alternatives defined from the RFIs included:

- Project Option 1 - Status Quo
- Project Option 2 - Wet AD, delivered under a DBO procurement model
- Project Option 3 - Dry AD with In-vessel Composting, delivered under a DBO procurement model
- Project Option 4 - In-vessel Composting, delivered under a DBO procurement model
- Project Option 5 - Merchant capacity

The methodology for establishing the analysis has been based on discounted cash flow (“**DCF**”) analysis. This involves establishing a period by period cash-flow profile for each of the Project Options based on delivering the Project on a “like for like” basis (i.e. assuming consistent timelines, specifications, tonnages, etc.).

These cash-flow profiles are then adjusted for the time value of money by discounting them (using an appropriate discount rate which will be discussed later in this section) to provide a NPV for each Project Option.

The NPV was calculated as the total net present benefits of the Project Option less the total net present value of all the costs of the Project during the design, construction and operation phases.

### 10.2 Financial Model Inputs

The inputs were developed based on the information submitted by the RFI respondents. The data from the RFIs (where available) were summarized by GHD and the County and confirmed for use in the development of the financial model and the subsequent cost/benefit analysis. The inputs, including development costs, construction costs, operating costs and potential revenue streams are detailed in the sections below.

Based on the RFI summary, the Consultant Team derived high and low values (ranked by capital costs) for Project Options 2 to 5.

#### 10.2.1 Project Cost Assumptions

Costs for the Project, including operating costs, maintenance costs, lifecycle costs and capital costs related to Dry AD (with in-vessel composting), Wet AD, and in-vessel composting were provided by the RFI responses. The RFI responses did not, however, provide sufficient information related to the merchant capacity options. Therefore, Project cost data related to the merchant capacity scenarios were established by leveraging the expertise and experience of the Consultant Team, consultation with GHD and review of available standards for industrial facility management.

The following tables provide details related to the cost categories and inputs applied in the financial model for the purposes of conducting the quantitative cost/benefit analysis.

The County provided a summary of processing fees, transfer costs, haulage costs and tonnages for input waste streams based on available information. The financial model assumed an operations period (or contract term) of 20 years as the basis for time value calculations and analysis. All inputs, including assumptions were confirmed by the County ahead of inclusion into the financial model.

#### *10.2.1.1 Estimated County OPF Development Costs*

These upfront estimated costs are related to the planning and development of the OPF at 2976 Horseshoe Valley Road West, Springwater. The development costs would be incurred and paid by the County and are reflective of a co-located OPF and MMF on the preferred site. Site development costs (which are the same for Options 2 to 4) include:

- Consulting related to furthering the Planning and Environmental approvals;
- Development of the OPF business case;
- Consulting services related to the procurement process;
- Upgrades to County Road 22 as recommended in the Traffic Impact Study;
- Site services such as three-phase power, natural gas, on-site well, and septic;
- Paving of the access road and areas around the buildings;
- Stumping, grubbing, and site grading;
- Landscaping and signage; and
- Weigh scales and scale house.

Table 18: County OPF Development Costs estimations

County OPF Development Costs	
OPF development	\$616,599
Engineering studies	\$81,048
Procurement process	\$110,131
Business case	\$142,348
Contingency	\$33,389
Shared additional planning-related costs	\$87,500
Shared site development costs	\$2,613,244
<b>Total OPF development costs</b>	<b>\$3,684,259</b>

#### *10.2.1.2 Revenues*

Benefits were accounted for as revenues earned from the sale of excess capacity at a County facility - noting that there would be excess capacity until County tonnages grow to meet the 30-year design capacity. For Project Options 2, 3 and 4, an estimate of \$100/tonne and \$130/tonne was applied as a low and high rate for the sale of 50% of the excess capacity, respectively. 50% of the excess capacity, which is the variance between the design capacity and the forecasted tonnages, was assumed sold to make up the revenues. Given the Waste-Free Ontario Act and potential provincial processing capacity issues, sale of 50% of the excess capacity is considered a conservative assumption for the purpose of this analysis.

These facilities have the potential to generate additional revenues through biogas and carbon credits, however, these ancillary revenues have not been included in this preliminary financial model:



- **Biogas:** This is a by-product of the fermentation of waste and it can be used to produce electric and thermal energy. The consideration to biogas is that it can be used to offset facility operating costs or, alternatively, can be sold to third parties. Biogas has not been included as a revenue in the preliminary financial model because more information is required to understand what the rates of electric and thermal energy are in the market when selling off this by-product to third parties. Further analysis would also detail whether more capital would be needed to recognize additional revenues in the Wet AD options.
- **Carbon Credits:** As stated in Section 4.4 of this Business Case, AD options could be eligible to receive carbon credits through the substitution of fossil natural gas by renewable bio methane. In April 2017, permits in Ontario's cap and trade system trade at about CAD\$18/t of carbon dioxide, we can therefore estimate revenues of around CAD\$59,375 per year. Despite the AD options potential eligibility to receive carbon credits, the estimated annual revenues have not been included in the financial model to keep the outcomes conservative.

The revenues associated with the AD options will need to be examined as part of the RFP process and final business case to understand the extent to which biogas and carbon credits can be incorporated as ancillary revenues.

### 10.2.1.3 Operating and Maintenance Period Costs

These costs are related to the operation and maintenance of the Project Option and would be incurred over the operating period or contract term, comprised of transfer costs, fees for pet waste and diapers, haulage costs and processing cost. The costs attributed to each Project Option may vary slightly based on the considerations for what is required to run the corresponding facility; categorized in the table below:

Table 19: Operating and Maintenance Categorization of Costs

Project Option	Operating and Maintenance Costs			
	Transfer Costs	Fees for Pet Waste/Diapers (Garbage)	Haulage Costs	Processing/Operating and Maintenance Costs (for DBO options)
Project Option 1 - Status quo	▲	▲	▲	▲
Project Option 2 - Wet AD				▲
Project Option 3 - Dry AD with in-vessel composting				▲
Project Option 4 - In-vessel composting				▲
Project Option 5 - Merchant capacity	▲		▲	▲

Note 1 The processing fee for the merchant capacity option does not take into account the impact of the Waste-Free Ontario Act.

Note 2 The Wet AD options benefit from an offset of 10% to 20% of the operating costs required to run the facility created by the energy by-product of biogas.

Note 3 The Dry AD options consider that only the required biogas to heat and power the facility would be generated so there is no excess biogas to consider in these project options.

Table 20: Operating and Maintenance Period Costs

Project Option	Transfer (\$/tonne)	Fees for Pet Waste/Diapers (Garbage)	Haulage (\$/tonne)		Processing/ Operating and Maintenance (for DBO options) (\$/tonne)	
			Low	High	Low	High
Project Option 1 - Status quo	\$7	\$99	\$19	n/a	\$123	n/a
Project Option 2 - Wet AD	n/a	n/a	n/a	n/a	\$119	\$133
Project Option 3 - Dry AD with in-vessel composting	n/a	n/a	n/a	n/a	\$75	\$85
Project Option 4 - In-vessel composting	n/a	n/a	n/a	n/a	\$85	\$95
Project Option 5 - Merchant capacity	\$7	n/a	\$30	\$34	\$100	\$130

Note 1 Project Option 1's operating and maintenance costs represent the status quo and reflect the County's current operations. This includes the current transfer costs, fees for pet waste/diapers, haulage costs and 2017 rates for processing.

Note 2 Project Options 2, 3 and 4's operating and maintenance costs were supplied as part of the RFI Process where the County would pay annual operating and maintenance costs as part of the DBO arrangement.

Note 3 Project Option 5's transfer costs are attributed to the MMF. The haulage costs are calculated by the distance (km), total time (hours), tolls, cost/load and trucking cost per tonne required to haul from the County's transfer point to the destination. The process cost is calculated on a \$/tonne basis and is provided by 2cg.

#### 10.2.1.4 Lifecycle Costs

These costs represent the lifecycle or refurbishment costs incurred at a specific point during the operating period. The calculation of these costs is based on a percentage, which is allocated to the capital cost of the respective facility. The lifecycle costs apply to Project Options with facilities: Wet AD, Dry AD with in-vessel composting and in-vessel composting. While each of these options incur life cycle costs in years 7, 10, 13 and 14, the lifecycle costs and the type of repair incurred vary slightly by facility. Wet AD's lifecycle costs include the refurbishment of the pre-processing, mixing, dewatering and biogas handling equipment. The costs also include a digester clean-out in year 13. Dry AD with in-vessel composting costs include refurbishment of the blower system for composting and mechanical system for biogas. The refurbishment of the blower system is a consistent cost in the in-vessel composting option. Lifecycle costs are common between the DBO Project Options (Wet AD, Dry AD with in-vessel composting and in-vessel composting). This would include the refurbishment of the tip floor, air handling system, minor processing vessel work in years 7, 10 and 13, and the major building maintenance that comes in year 14. For the purposes of this analysis, the merchant capacity option is assumed to not incur lifecycle costs because the treatment of the waste occurs offsite and these costs will be assumed by the merchant partner.

Table 21: Lifecycle Costs and Timing

Years Applied	Lifecycle Costs & Spending Profile		
	Scenario		
	Project Option 2: Wet AD	Project Option 3: Dry AD with In-Vessel Composting	Project Option 4: In-vessel Composting
Year 7	\$1,400,000	\$980,000	\$560,000
	5.00%	3.50%	2.00%
Year 10	\$1,540,000	\$2,324,000	\$2,324,000
	5.50%	8.30%	8.30%
Year 13	\$1,400,000	\$560,000	\$168,000
	5.00%	2.00%	0.60%
Year 14	\$1,120,000	\$1,792,000	\$1,792,000
	4.00%	6.40%	6.40%

### 10.2.1.5 Capital Costs

These costs are related to the design and construction of the OPF and would be incurred over the design and construction period. Capital costs are based on RFI responses for a 30,000 tpy capacity organics processing facility and exclude site development costs detailed above. These costs estimations are preliminary and will be confirmed through an RFP process. For the purposes of this analysis, these costs would not apply to the merchant capacity option, as the merchant partner would be responsible for the design and construction of the facility.

Table 22: Project Options Capital Costs

Project Option	Low	High
Project Option 2 - Wet AD	\$16,000,000	\$35,000,000
Project Option 3 - Dry AD with in-vessel composting	\$28,000,000	\$32,000,000
Project Option 4 - In-Vessel composting	\$24,000,000	\$28,800,000

### 10.2.1.6 Ancillary Costs

These costs are ancillary costs related to the Project that would be incurred by the County over the entire Project cycle. For each of the DBO options, an estimate of \$40,000 annually was applied for environmental monitoring which would be required as part of an ECA.

### 10.2.1.7 Terminal Value

The Terminal Value is the value attributed to the building constructed for a corresponding Project Option, at a single point in time during the life of a building. The calculation of the Terminal Value starts by allocating 75% of the construction cost as the building portion, noting that 25% of this cost is attributed to the processing technology. The building portion of the capital cost is used as a base for calculating the depreciation per year on a straight-line basis over the total life of the building. The estimated total life of each of the buildings is 50 years and the terminal value calculated in each Project Option occurs with 30 years of remaining life on the building. The Terminal Value is included in the project cash flow as a sale of the building at the end of the 20<sup>th</sup> year of the building's life.

### 10.2.1.8 Development Charges

As outlined in Hemson Consulting Limited's ("Hemson") 2016 report on Development Charges ("DCs") (Item CCW 16-222 - County of Simcoe Development Charge By-law, May 24, 2016), on December 3, 2015, the province passed Bill 73, Smart Growth for Our Communities Act, 2015, which amended the Development Charges Act and Planning Act. Among the changes introduced to the legislation was the

introduction of certain waste management functions as eligible services. Under the previous iteration of the legislation, all waste management functions were an ineligible service. Now, only landfill and waste incineration activities are listed as ineligible.

Based on the Hemson report and discussions with the County, this analysis considered that Project Options 2 to 4 would be eligible for DCs. Based on the Hemson study, it is estimated that DCs would fund 22.5% of the capital costs given that the facility would be constructed to process diverted organics from the waste stream.

#### *10.2.1.9 Management of End Products*

The management of end products considers the potential costs and revenues associated with end products from organics processing such as compost, fertilizer, digestate and biogas, as appropriate based on the technology option selected. It is assumed for Project Options 1 and 5 that any revenues or costs associated with the end product management is included in the cost per tonne to process SSO. As stated in some of the RFI responses, the costs to manage digestate were included for Project Option 2 on an operating and maintenance cost per tonne basis; the inclusion of the management of digestate component contributes greatly to the costs for this option and not including it would skew the outcomes. Project Options 3 and 4 assumed that the management of compost would consider minimal revenue and net out in the payment for haulage leaving this option revenue neutral.

For the purposes of the preliminary financial model and this Business Case we have kept conservative assumptions regarding biogas. As noted above, only 10% to 20% of the biogas by-product has been assumed to offset the heat and power costs as part of the utilities required to run the facility; excess biogas has not been considered on the basis of the possible additional capital required against the potential revenues. This analysis will be important to consider as the RFP process moves forward and a final business case is drafted.

### 10.3 Financial Assumptions

The financial model has been prepared as a monthly cash flow model during the construction phase, and as an annual cash flow model during the operating phase. Cash flows were assumed to occur at the end of the period in which they are incurred. Each financial year was assumed to end on December 31, in line with the County's fiscal year. The table below provides a summary of the timing assumptions that apply to the Project under the options under consideration. Financial modelling assumptions including the discount rate and inflation rates were estimated by the Consultant Team using past experience and previous transactions which were then confirmed with the County. The construction spending curve was assumed to be linear, with equal payments over the construction period.

Table 23: Time Value Assumptions

Time Value Assumptions	Value
Construction Inflation Factor*	3.94%
Operating Inflation Factor*	2.00%
Revenue Escalation Factor*	2.00%
Discount Rate (as confirmed by County)	4.00%
NPV Base Date	01-June-17
Design and Construction Start Date	01-May-18
Design and Construction Period	38 months
Design and Construction End Date	24-June-2021
Operations and Maintenance Period Start Date	25-June-2021
Operations and Maintenance Period	20 years
Operations and Maintenance Period End Date	25-June-2041

\*Derived from Stats Canada

### 10.4 Project Financing Assumptions

In the case of the DBO model all project costs are assumed to be fully funded by the County. Municipal financing cost cash flows have not been included within the financial model, as they are assumed to be reflected within the discount rate for the purposes of the cost/benefit analysis. As noted in 10.1.2.1.8, development charges have been assumed separately in the financial model.

## 10.5 Quantitative Analysis Outputs

A 20-year NPV calculation was used to take into account the time value of money. For each scenario, tables outlining the financial costs and benefits have been included in Appendix B. The table below provides a summary of the quantitative analysis undertaken. The values in the table account for an average, between the revenue estimates and the low and high cost estimates noted in the sections above. Appendix B includes a detailed breakdown of each Project Option's low and high project cash flows and NPV.

Table 24: Summary of Quantitative Cost/Benefit Analysis over 20 Years

	Project Option 1	Project Option 2	Project Option 3	Project Option 4	Project Option 5
	Status Quo	Wet AD	Dry AD with In-Vessel Composting	In-Vessel Composting	Merchant Capacity
Revenues	-	5,340,525	5,340,525	5,340,525	-
Total O&M Costs including HST	(105,879,895)	(99,560,815)	(63,129,711)	(71,020,925)	(114,247,165)
Total Lifecycle Costs including HST	-	(7,188,917)	(7,478,949)	(6,428,839)	-
Total Annual Capital Costs including HST	-	(30,062,988)	(35,430,734)	(31,107,695)	-
<b>Project Net Costs</b>	<b>(105,879,895)</b>	<b>(131,472,194)</b>	<b>(100,698,869)</b>	<b>(103,216,934)</b>	<b>(114,247,165)</b>
Terminal Value	-	11,475,000	13,500,000	11,880,000	-
Development charges offset	-	6,647,182	7,834,036	6,878,175	-
<b>20-year Project Cash flows including TV + DCs</b>	<b>(105,879,895)</b>	<b>(113,350,013)</b>	<b>(79,364,833)</b>	<b>(84,458,759)</b>	<b>(114,247,165)</b>
<b>20-year NPV Of Project Costs Including TV + DCs</b>	<b>(58,234,802)</b>	<b>(71,943,265)</b>	<b>(54,634,691)</b>	<b>(56,105,620)</b>	<b>(62,836,868)</b>

# 11. Conclusion and Recommendations

## 11.1 Comparative Analysis of Alternatives

The table below provides a summary of the comparative analysis for the outcomes of the business and operational impacts, risk assessment and cost/benefit analysis conducted in the sections above.

Table 25: Comparative Analysis Summary

Project Option	Description	Business and Operational Impacts	Risk Assessment	Cost/Benefit Analysis
Project Option 1 Status Quo	Under this scenario, the County would continue to export SSO to AIM Environmental in Hamilton. This facility utilizes in-vessel composting and does not accept pet waste and diapers. Under this arrangement, no benefits from end products or carbon credits are obtained by the County. Costs are reflective of current contractual pricing for processing. Transfer and haulage would be undertaken by the County.	<p>Under the status quo option, the private sector partner will retain ownership and control of the facility. The current contract does not include pet waste or diapers as feedstock. Any program changes, including changes to feedstock, would be subject to further negotiation and potentially costly changes to the existing contract.</p> <p>The current private sector partner is responsible for the operation of its facility, however, any potential downtime could result in the County needing to re-route or process organic materials through alternative means, i.e. sending waste to another privately owned and operated facility. The County would need to consider contingencies for significant downtime. Potential impacts related to downtime could be negotiated and mitigated within the private partner contract.</p>	<p>The status quo option does not align with the County's priorities and objectives related to diversion targets and current/future legislative or regulatory changes.</p> <p>While risks related to site, construction and operation are typically transferred to the private sector partner (under the contractual arrangement), this option does not allow the County ownership, control or flexibility of operations related to any future changes. Risks related to changes in regulations/legislation and feedstock may be mitigated with negotiation of the contract with the private sector partner.</p>	<p>The status quo option was determined to have higher costs than the Dry AD with in-vessel composting option and the In-vessel composting option.</p> <p>The Project's 20-year nominal cash flow for the status quo option is -\$105.9 million.</p> <p>The Project's 20-year NPV cash flow for the status quo option is -\$58.2 million.</p>
Project Option 2 Wet AD	<p>The Wet AD option involves the development and delivery of a County-owned Organics Processing Facility under a DBO model, with application of Wet AD technology.</p> <p>Wet AD is a collection of processes by which microorganisms break down biodegradable material in absence of oxygen to produce biogas (mainly composed of methane and carbon dioxide) and digestate.</p>	<p>The DBO delivery model affords the County ownership and significant control of the asset. The Wet AD technology was determined to be available and applicable, based on current market conditions, with approximately four (4) large scale and 30 on-farm Wet AD facilities in operation in Ontario, including two facilities owned by the City of Toronto (Dufferin and Disco Road). The technology was also determined to provide an advantage related to long-term viability, with the market trending towards increased acceptance and implementation of Wet AD technologies for waste processing solutions due to the opportunity for this technology to recover biogas for facility heat/power and potential excess for revenue generation. Carbon credits for diversion of organics from landfill would benefit the County as additional revenue.</p> <p>However, Wet AD technologies are somewhat sensitive to changes in feedstock composition or characteristics. In the event that any unplanned (biological) inputs are introduced into the digester, the process would need to stop in order to empty and recommission the digester, which could lead to significant downtime.</p> <p>The County also does not have familiarity or available resources equipped for the operation and maintenance of a Wet AD facility. At handback, i.e. the end of Project Co. operating term, the County would be responsible for contracting operations to a private partner.</p>	<p>The Wet AD option (delivered under a DBO model) allows for risks related to the construction and some risks related to the operation of the facility to the private sector, however, risks related to waste composition and volume could have some impact on the County.</p> <p>Wet AD technology and systems are somewhat sensitive to significant changes in the feedstock composition (including quality). Changes in feedstock composition could result in significant downtime for process recalibration.</p> <p>The inputs/feedstock to the process are typically subject to guarantees as per the DBO contract. Dependent on the design of the facility (i.e. single vs. multi vessel), the process changes recalibration and pre-processing could be extensive.</p> <p>Risks related to performance standards (operations) including long-term availability of the facility are minimized under this model.</p>	<p>The Wet AD option was determined to have the highest average costs as compared to the other Project Options. The Wet AD option would provide the least financial benefit to the County as compared to the other Project Options.</p> <p>The Project's 20-year nominal cash flow for the Wet AD option is -\$113.4 million.</p> <p>The Project's 20-year NPV cash flow for the Wet AD option is -\$71.9 million.</p>



Project Option	Description	Business and Operational Impacts	Risk Assessment	Cost/Benefit Analysis
<p>Project Option 3 Dry AD with in-vessel composting</p>	<p>The Dry AD option involves the development and delivery of a County-owned Organics Processing Facility under a DBO model, with application of Dry AD technology in combination with in-vessel composting.</p> <p>Dry AD technologies are more robust in comparison to Wet AD systems as they are able to accept a higher rates of contamination in the feedstock, although a pre-treatment of the feedstock may be required.</p> <p>As per the RFI response (it is noted that only one submission utilized this technology), the Dry AD Project option will combine Dry AD systems with in-vessel composting systems. The Dry AD technology will be applied for the purpose of generating biogas for the operation of the facility. Remaining feedstocks will be processed with in-vessel composting technology to yield compost.</p> <p>As a consequence of pre-treatment, digestate generated by Dry AD systems presents a rate of contaminants which are usually not consistent with required criteria for direct application of digestate as fertilizer. Digestate contaminants will need to be extracted at the compost refining stage only.</p>	<p>As noted under the Wet AD option, for Dry AD, the DBO delivery model affords the County ownership and significant control of the asset.</p> <p>There are currently no Dry AD facilities in operation in Ontario. In other markets (including international markets), Dry AD technologies are well-known and accepted for the feedstocks/inputs considered for the OPF Project. It is noted that the Orgaworld facility in Surrey will be the first to utilize this technology in Canada. However, there are no Ontario-based examples to serve as jurisdictional benchmarks. This has been mitigated, however, by proposing a facility that would employ both Dry AD and in-vessel composting. This would allow for the recovery of biogas for the facility's heat/power needs but processing capacity utilizing known, proven technology. Carbon credits for diversion of organics from landfill would benefit the County as additional revenue.</p> <p>Similar to the Wet AD facility, the County does not have familiarity or available resources equipped for the operation and maintenance of a Dry AD facility. At handback, i.e. the end of Project Co. operating term, the County would be responsible for contracting operations to a private partner.</p>	<p>In general, the Dry AD with in-vessel composting option (delivered under a DBO model) allows for risks related to the construction and some risks related to the operation of the facility to the private sector.</p> <p>Similar to Wet AD, Dry AD technology and systems are sensitive to changes in the feedstock composition (including quality), This option, however, intends to use Dry AD technology to process to generate enough biogas to offset operating costs. The remaining feedstocks are to be processed using in-vessel composting technology. As such, impacts related to downtime are expected to be slightly mitigated.</p> <p>The potential modular design of the Dry AD system could limit the impact of design/capacity related scope changes during construction.</p> <p>Risks related to performance standards (operations) including long-term availability of the facility are minimized under this model.</p>	<p>The Dry AD option with in-vessel composting was determined to have the lowest average costs as compared to the other Project Options. The Dry AD option would provide the most benefit to the County as compared to Status Quo, Wet AD, in-vessel composting, or merchant capacity options.</p> <p>The Project's 20-year nominal cash flow for the Dry AD with in-vessel composting option is -\$79.4 million.</p> <p>The Project's 20-year NPV cash flow for the Dry AD with in-vessel composting option is -\$54.6 million.</p>
<p>Project Option 4 In-Vessel Composting</p>	<p>The in-vessel composting option involves the development and delivery of a County-owned organics processing facility under a DBO model, including the application of in-vessel technology.</p> <p>In-vessel composting is a process by which microorganisms break down biodegradable material in presence of oxygen. The process occurs at a solids content of 40%-60%. The primary off-gas, carbon dioxide, is evolved to the atmosphere. The process produces compost.</p>	<p>As noted under the AD options, for in-vessel composting, the DBO delivery model affords the County ownership and significant control of the asset.</p> <p>In-vessel composting technology is well accepted and readily available in the Ontario market, with ten (10) in-vessel composting facilities currently in operation, including publicly-owned facilities in Guelph and Peel. In-vessel composting technology is highly applicable for the feedstocks considered for the OPF Project, and is also relatively easy to operate, however, it was noted that the waste sector is expected to continue its movement towards AD systems in the planning and development of future facilities or existing facility upgrades and refurbishments as there is the desire to recover biogas and potentially generate revenue. Carbon credits for diversion of organics from landfill would benefit the County as additional revenue.</p> <p>In-vessel composting systems and technologies are able to address reasonable variations in feedstock quantity. In peak periods, in-vessel composting systems are able to reduce composting time and increase the maturation duration.</p> <p>In-vessel composting systems are generally modular and could accommodate potential changes to input volumes and allow for additional capacity over the life of the facility in the event that County programs, legislation or regulations change.</p> <p>The County had experience and familiarity with composting and this technology may provide opportunity for the County to operate the facility upon handback from Project Co.</p>	<p>The DBO model allows for risks related to the construction and some risks related to the operation of the facility to the private sector.</p> <p>The County could eventually operate in-vessel composting facility with its own resources after handback.</p> <p>In-vessel composting technologies and systems are less sensitive to changes in the feedstock composition (including quality) as compared to Wet-AD and Dry-AD processes. In-vessel composting technology is relatively common and requires less pre-processing than AD methods. As a result, impacts related to downtime are expected to be medium, as compared to AD options.</p> <p>For the in-vessel composting option specifically, compost specifications criteria are well-defined, very stringent in Ontario and consistent with the regulations in place in other provinces. Scope changes are unlikely. The impact related to replacement costs for in-vessel composting technologies are generally lower than those for AD technologies. As such, the impact on the County would be less than that of AD technology replacement.</p>	<p>The in-vessel composting option was determined to have comparably lower costs than the Wet AD option. The cost-benefit analysis provided results that were aligned with the Dry AD option. The in-vessel composting option would provide greater benefit to the County compared to the Wet AD and merchant capacity options and would be comparable to the Status Quo option.</p> <p>The Project's 20-year nominal cash flow for the in-vessel composting option is -\$84.5 million.</p> <p>The Project's 20-year NPV cash flow for the in-vessel composting option is -\$56.1 million.</p>



Project Option	Description	Business and Operational Impacts	Risk Assessment	Cost/Benefit Analysis
<p>Project Option 5 Merchant Capacity</p>	<p>Merchant capacity considers the use of a composting or AD facility owned and operated by a merchant partner (on a site not owned by the County) for a specified contract period.</p> <p>In this case, the costs for the County would include the transfer, haulage, and processing fees charged by the site operator.</p>	<p>Under the merchant capacity option, the merchant partner would retain ownership and control of the facility. Any changes to the County's strategic direction would result in the need to re-negotiate the existing contract, which could be costly for the County.</p> <p>Sourcing a new merchant capacity contract at the end of the contract term could be impacted by market conditions and availability and accessibility of merchant site/facilities. There is currently limited capacity for organics processing in the Ontario market. The implementation of the Waste-Free Ontario Act would also impact the processing capacity throughout the province, as increased diversion and recovery targets would further limit the capacity of existing and available processing facilities. Driven by diversion targets, the County's decision to include pet waste and diapers in feedstock would further impact the long-term availability of processing facilities and could potentially increase waste processing and haulage costs related to negotiated contracts.</p> <p>Changes to legislation related to climate change could result in concerns related to higher costs or penalties for transportation across longer distances. As the County would be responsible for the haulage and transportation from the transfer facility to the merchant facility, these penalties would be held by the County. In addition, carbon credits would most likely benefit the site operator.</p> <p>Any changes to input volumes in excess of the contract agreement would result in the County needing to source additional processing capacity.</p>	<p>While the merchant capacity option would transfer all risks related to construction and most risks related to operations to the private sector, the County would retain risks related to the availability of merchant capacity, movement of materials (i.e. haulage) and relinquish control over operations and ownership of the facility.</p> <p>The merchant partner would have full control over management/operation of the facility. Any changes to the contract would be subject to negotiation, and potential increases in costs for the County (dependent on the nature of the contract).</p> <p>With time and in the actual legislative context for waste management (ban of organics landfilling under the Waste-Free Ontario Act), the need for organics treatment capacity will increase. If there are no new organics recycling facilities developed, a lack of treatment capacity would occur.</p> <p>If the merchant facility were to become unavailable for a long period of time, the County may incur additional charges in transporting waste to other facilities for processing, or, may need to find alternative options or partners for waste processing.</p> <p>Risks related to changes in regulations/legislation and increased costs may be mitigated with negotiation of longer contracts with the private sector partner - although, as capacity becomes limited, there is risk that this may not be possible.</p>	<p>The merchant capacity option was assessed for both AD and in-vessel composting technologies. The merchant capacity option provided costs that were relatively higher than those for the DBO Dry AD and in-vessel composting options. The merchant capacity options provides some benefit to the County in terms of overall Project costs and were comparable to the Status Quo option. It is noted that the impact of the Waste-Free Ontario Act is unknown at this time and pricing is not reflective of increased demand for processing.</p> <p>The Project's 20-year nominal cash flow for the merchant capacity option is -\$114.2 million.</p> <p>The Project's 20-year NPV cash flow for the merchant capacity option is -\$62.8 million.</p>

## 11.2 Conclusions

The Preliminary Business Case considers Project Options for the development of an OPF for the County of Simcoe. The Preliminary Business Case involved the review of County strategy documents, provincial legislation and regulations, and information from formally solicited feedback from participants in the waste management market. This information was applied to the qualitative and quantitative analyses undertaken by the Consultant Team in cooperation with the County. This section highlights the key outputs from these analyses that led to the final recommendation.

- Through the 2010 Solid Waste Management Strategy, the County spoke strongly about no new landfills, the importance of enhancing diversion programs, and taking ownership of waste. The Strategy recommended that the County continue exporting organic waste in the short-term through to approximately 2018 - the timeframe for which it had recommended the County develop its own processing facility. It acknowledged a shortage of available organics processing capacity in the province and that development of a County owned facility would provide security in addition to other benefits such as cost savings.
- Development of the County's new organic waste processing capacity fits in very well with Bill 151 - Waste-Free Ontario Act, the province's Circular Economy Strategy, and the Organics Action Plan. The County's efforts can be framed within the circular economy context and include considerable focus on its climate change benefits and the production of high quality biogas, digestate and/or compost products that will be cycled back into the local economy.
- The Organics Action Plan will be inspired by best practices already in place in the province and comparable jurisdictions from across the world. The County's planned OPF could serve as a benchmark for best practice example for other jurisdictions.
- The Climate Change Action Plan covers a wide range of climate change targets and strategies, including those concerning organics recovery projects. The County's proposed organics recovery facility and related efforts would reduce GHG emissions from processing, in comparison with current organics management processes that do not yield fossil fuel alternatives (biogas). Emissions reductions would be eligible for compliance offset credits (carbon credits). Giving consideration to the fact that organics are already collected and composted by the County, any GHG emissions reduction measures eligible for carbon credits would be limited to the substitution of fossil natural gas by renewable biomethane. Therefore, in this particular context, only AD options could be eligible for carbon credits under the Climate Change Action Plan.
- While the option to transport waste is convenient in the short-term, it is expected that increasing pressure on municipalities in the form of waste-related regulations and legislation (such as the above-mentioned Waste-Free Ontario Act) could lead to market capacity and availability issues. Potential impacts related to market capacity may include increasing gate fees at privately-owned or partner facilities/sites, inability to accept new materials such as pet waste and diapers, and expensive transport to facilities/operators in distant jurisdictions.
- Based on the County's long-term waste strategy, pending legislation, and trends of increasing diversion from landfill, the County should consider options that allow for long-term control over

waste processing and diversion, including the development of a County-owned facility, or ensure that contracts with partner facilities are structured to “freeze” gate fees for long term arrangements.

- A business and operational impact assessment was undertaken to consider the identified Project Options against qualitative assessment criteria in order to assess the potential advantages and disadvantages to the County from a business and operational perspective. The Dry AD with in-vessel composting option and in-vessel composting option (both delivered under a DBO model) were found to be the most advantageous when aligned with the County’s business and operational objectives, including providing the County with ownership and control over facility operations, process flexibility (including input volume capacity) and alignment with policies including changes to regulations/legislation. The status quo and merchant capacity options were determined to be the least aligned with the County’s long-term objectives.
- A qualitative risk workshop was conducted in consultation with the County to identify potential risks associated with the Project Options and to assess for likelihood of occurrence (probability) and potential impact on the County should the risk occur. The Status Quo, Wet AD and Merchant Capacity Project Options were determined to have a higher risk profile (as per the outcomes of the risk workshop) as compared to the Dry AD with in-vessel composting and in-vessel composting Project Options.

The policy and strategic risks were identified as high risk for the Status Quo and Merchant Capacity Project Options. The Status Quo and Merchant Capacity Project Options do not provide the County with ownership or control over facility operations. These Project Options also do not align with changes to the County’s strategic direction related to organic waste progressing. The County plans to incorporate pet waste and diapers into the feedstock stream for organics processing. The current arrangement with AIM does not include pet waste or diapers. Any regulatory or legislative changes could result in a re-negotiation of existing contracts under the Status Quo or Merchant Capacity Project Options. The in-vessel composting option was found to have the lowest risk amongst the Project Options. Risks related to the Dry AD option were mitigated by the incorporation of in-vessel composting to the process.

- A financial model was developed and reviewed with the County to assess the 20-year nominal and NPV cash flows for each of the Project Options. The following table ranks the Project Option’s NPV averages from the County’s highest cost option to the lowest cost option:

Table 26: Ranking of Project Options by NPV of Costs

Project Options	NPV
Project Option 2 - Wet AD	-\$71.9 million
Project Option 5 - Merchant capacity	-\$62.8 million
Project Option 1 - Status quo	-\$58.2 million
Project Option 4 - In-vessel composting	-\$56.1 million
Project Option 3 - Dry AD with in-vessel composting	-\$54.6 million

- The analyses were conducted based on input from the RFI and assumptions based on industry benchmarks and comparable projects. The results of the analyses were consistently in favour of the DBO Project Options. Although there may be some indication that pursuing Dry AD with in-vessel composting could be a viable and advantageous technology option for the County OPF, this will be

confirmed through the RFPQ/RFP process. Based on this initial analyses, there is no distinct advantage to eliminating any technology option at this time. In order to select a suitable technology, it was concluded that further analyses should be conducted based on updated and detailed information from market participants. A “technology-neutral” procurement process may result in more innovative and previously unconsidered solutions from bidders, providing the County with relevant and recent information to select the optimal technology for the facility to be delivered under a DBO model.

### 11.3 Recommendation

Based on the above noted considerations and results of the analyses, development of a County-owned facility delivered under the DBO model could provide a solution that is advantageous, comparably low risk, financially viable, and in alignment with the County’s objectives.

As the analyses in this Preliminary Business Case were conducted using high-level estimates (based on RFI responses), the County would benefit from a “technology neutral” DBO procurement process that would allow proponents greater flexibility in the development of a solution to meet the County’s needs. In keeping the procurement process technology neutral, the bidders would be required to provide detailed and competitive information to allow for more accurate testing of technology types.

The Consultant Team recommends that the County develop a procurement process which allows for further input from the market by soliciting bids for viable technology solutions and designs to be delivered under a DBO model. The DBO procurement process should allow proponents to submit solutions and bids for any viable technology (Wet AD, Dry AD, in-vessel composting, etc.) which allows for innovation and the greatest potential value for the County and its residents. Details should be sought during this procurement process on critical information regarding potential revenues (end products, biogas, carbon credits, etc.) and impact of recovery of biogas on O&M costs.

#### 11.3.1 Considerations for Procurement Documents

It is noted that this Preliminary Business Case and the outcomes of the analyses are based on inputs from the RFI responses, and assumptions developed by the Consultant Team in consultation with the County, GHD. It is expected proponents will provide detailed and committed information during the procurement process in the form of their RFP submissions. This detailed and updated information will serve as the basis to update the Preliminary Business Case for completion of the Final Business Case.

The Final Business Case will be used to assess specific technology options given site-specific conditions, delivered under a DBO model and, with that information, outline a recommendation for the selection of the Preferred Proponent.

Amongst other items, it is anticipated that the RFP will include detailed financial requirements such as:

- Revenues consisting of excess capacity based on the proposed facility design and a dollar per tonne rate set forward by the Proponent. The potential to recognize revenues from the utilization of biogas or carbon credits should also be outlined by the proponents;
- Operating and maintenance costs on an annual basis (including costs to manage end products such as digestate, compost, or fertilizer);
- Lifecycle cost estimates and expected schedule of work to be completed as they relate to the refurbishment and repairs to the OPF;

- Capital costs relating to the design and the construction of the OPF (including any additional capital to utilize biogas); and
- Ancillary costs such as costs applied to environmental monitoring (as required as part of an ECA).

It is recommended that the County develop a detailed “cost of work form” or “price form” for proponents to complete in order to obtain detailed costing and schedule related information. The price form could be aligned with the input sheet for the updated financial model to ensure that all factors and considerations included in the development of the Final Business Case are based on proponent provided information.

As the RFPQ and RFP documents are developed, it is recommended that precedent documentation for the DBO procurement of other organics processing projects be consulted for reference to reflect industry best practice.

## 12. Next Steps

### 12.1 Procurement Process for Recommended Project Option

As noted in the previous section, the Consultant Team recommends the procurement of a County-owned facility under a DBO delivery model. The DBO delivery model allows the County to transfer significant risks related to construction and operations/maintenance to the private sector while maintaining ownership and long-term control over the facility.

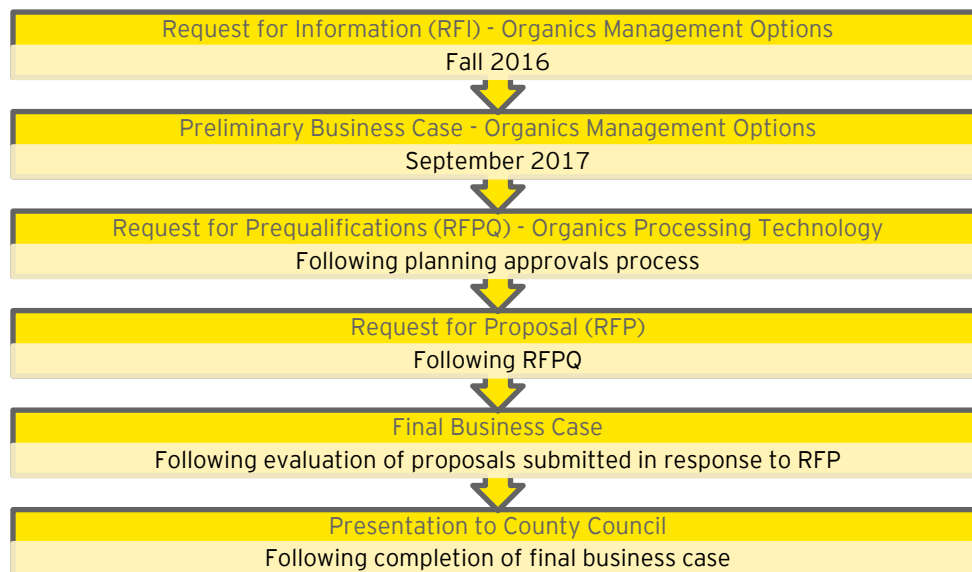
#### 12.1.1 DBO Procurement Process

The phased procurement process as outlined previously in the Development Strategy for the OPF project will include a request for RFPQ phase, to allow for bidders to submit solutions under any technology type, subject to the constraints and specifications of the County. The RFPQ phase is intended to short-list proponents and options based on predetermined evaluation criteria.

The RFP will be developed and issued to the short-listed proponents. Evaluation of the RFP submissions will be conducted based on evaluation criteria developed in consultation with the County to select a Preferred Proponent.

The information presented in the RFP responses (specifically the information from the Preferred Proponent) will be used to update and finalize the Preliminary Business Case (the “**Final Business Case**”) to assess the Project option which provides the most value to the County.

Figure 11: Procurement Process



## **Appendix A: Request for Information - Organics Management Options**



**County of Simcoe  
Procurement, Fleet  
and Property**  
1110 Highway 26,  
Midhurst, Ontario L9X 1N6

Main Line (705) 726-9300  
Toll Free (866) 893-9300  
Fax (705) 720-1078  
**simcoe.ca**



## REQUEST FOR INFORMATION RFI 2016-127 ORGANICS MANAGEMENT OPTIONS

### 1 INTRODUCTION

The purpose of RFI 2016-127 – *Organics Management Options* is to gather information on alternatives for processing of the County's source-separated organics (also referred to in this Request for Information (RFI) as green bin organics). These alternatives will be assessed in a preliminary business case which will examine the various options for organics processing available to the County at this time – including development of an Organics Processing Facility (OPF) at the County's Environmental Resource Recovery Centre, located 2976 Horseshoe Valley Road West, Springwater. The preliminary business case, to be submitted to County Council in spring 2017, is anticipated to assess alternatives such as Design-Build-Operate (DBO) arrangements for aerobic composting or anaerobic digestion facilities at 2976 Horseshoe Valley Road West, available merchant capacity, or other Design-Build-Own-Operate (DBOO) options.

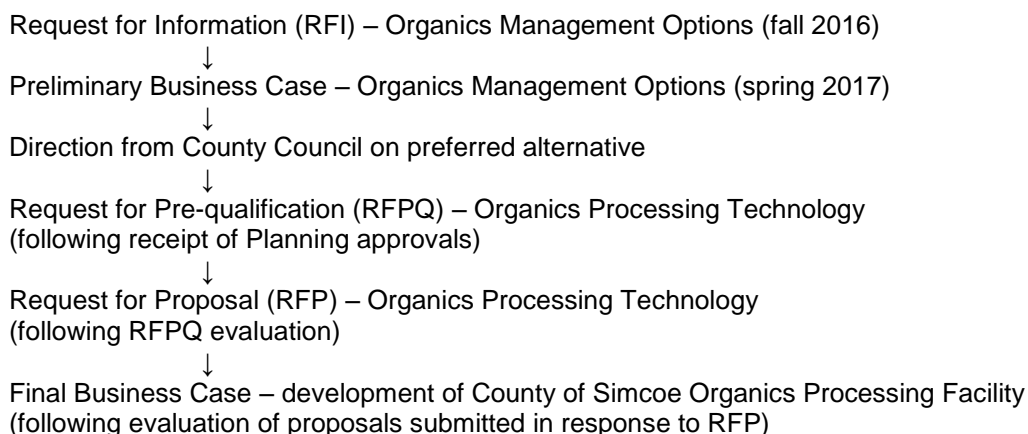
This RFI will follow similar methodology to work completed for the 2010 Solid Waste Management Strategy (Phase 2 Task F: Diversion and Disposal Options) and furthered in the initial viability study for the OPF undertaken in 2012. As some time has passed – and as a measure of prudence – all organics management options will be re-examined via this RFI.

For reference, detailed background information and a chronology of OPF project development can be found in **Appendix A**. In addition, previous consultant and staff reports can be found on the project webpage at [www.simcoe.ca/errc](http://www.simcoe.ca/errc).

**Interested parties are advised that any information provided in response to this RFI may be included in a public report to County Council or in a publicly-posted business case.**

### 2 PROCUREMENT PROCESS

As outlined in **Appendix A**, development of the OPF project to date has included siting, numerous site-specific studies, and furthering Planning-related amendments related to development of the facility at this location. Further to this work, the preliminary business case for the OPF is the next key milestone in project development (as indicated on the [Development Strategy](#) timeline) and part of a process to be undertaken as follows:







### 3 PRELIMINARY BUSINESS CASE – ORGANICS MANAGEMENT OPTIONS

The purpose of the preliminary business case will be to outline the business and operational impacts, risk, and cost/benefit (qualitative and quantitative) for each alternative determined through this RFI process. Respondents to this RFI should be aware that it is intended that their submission will allow the County's consulting team to prepare a detailed analysis for presentation to County Council. Information to be outlined in the preliminary business case may include the following:

#### *Business & Operational Impacts*

- labour requirements – including staff time required to operate and maintain the system
- capacity – including the quantity and quality of materials that can be accepted by the system
- input requirements, including limitations to the size and type of feedstock and additions required such as bulking agent
- flexibility to adapt to change in the green bin program (tonnages, feedstock, etc.)
- constraints such as odour, vectors, or noise that may result from operations
- corporate sustainability benefits – including value to the business, employees, and customers
- management and potential for usage of the end product locally

#### *Assessment of Risk*

- ability to align with changes in legislation
- management/control
- economic considerations
- minimization of environmental impacts
- process and technical risk (proven technology, etc.)
- long-term viability

#### *Full Cost Analysis*

- direct and indirect costs
- initial costs
- capital costs
- on-going operating costs
- equipment maintenance/replacement cost through project lifecycle and building

### 4 CURRENT SYSTEM

#### 4.1 Green Bin Organics

In 2012, the County secured an extension to their existing organics processing contract with AIM Environmental. Export of the County's green bin organics [source-separated organics (SSO)] began on October 1, 2013 under a new 5-year contract. Currently, this material is hauled by the County's waste management fleet to Hamilton. In 2015, the County transferred and hauled 337 loads (equating to 9,500 tonnes) of SSO for processing.

Materials currently accepted in the County's green bin program include:

bread, grains, and cereals	meat, fish, and bones	waxed paper (parchment paper)
fruits and vegetables	shellfish	microwave popcorn bags
dairy products	gravies and sauces	paper bags
eggs and egg shells	grease and fat	paper cups (loose - not stacked)
corn cobs and husks	nuts and shells	paper-only takeout containers
Halloween pumpkins	pet food	paper plates
	coffee filters and grounds	paper towels and tissues
	tea bags	paper egg cartons
		fast food drink containers



Note that the County does not currently accept plastic bags, pet waste, diapers, or sanitary products in their green bin program. Respondents should, however, consider that the County would prefer to add pet waste to their green bin program by 2021. Submissions to this RFI should address their ability to process this material. Additionally, it is noted that County Council has indicated an interest in opportunities that may allow acceptance of diapers and sanitary products (and plastic bags) to the County's program.

The County undertook a comprehensive four season curbside audit in 2015. For information, data outlining the composition of the County's curbside SSO has been provided in **Appendix B**. Also note that SSO residuals (based on audits conducted by the current processor) were reported as a calculated average of 8.65% for 2015.

#### 4.2 Leaf & Yard Waste

Leaf & yard waste (with some curbside-collected brush) is collected curbside and through drop-off at our waste management facilities. It is processed at 5 compost sites located at various open and closed landfills throughout the County. In 2015, over 17,000 tonnes of this material was diverted through open windrow composting.

Over 12,000 tonnes of finished compost was provided to residents and commercial landscapers in 2015.

### 5 FORECASTED TONNAGES – AVAILABLE ORGANIC MATERIAL

**Table 5.1** below is provided as a summary of the County's forecasted organics tonnages. This data is based on 2015 data, assumed rates of growth and increased waste generation, and the most recent curbside audit data. Note that a range is provided of available SSO, reflective of a lower and upper capture rate (40% and 60%, respectively). Currently, the County is approaching 40% capture of available curbside organics but note that with some pending restrictions to curbside garbage, 60% capture may be attained in the future. The tonnage of diapers has been provided separately from pet waste, noting again that it is the County's preference to have pet waste added to their green bin program by 2021. This should be considered by all parties responding to this RFI. Leaf & yard waste and brush tonnages are provided as consideration of amendment which would be available for respondents should it be required by their technology for processing SSO.

**Table 5.1: Forecasted Tonnages – Available Organic Material (tonnes)**

Description	2021 (commissioning)	2026	2031	2036	2041
Available SSO <sup>1</sup> & pet waste – 40% capture	16,346	18,843	21,736	25,087	28,969
Available SSO <sup>1</sup> & pet waste – 60% capture	24,052	27,777	32,092	37,092	42,887
Available diapers – 50% capture	2,102	2,436	2,824	3,274	3,796
Available leaf & yard waste	18,350	18,717	19,092	19,473	19,863
Available brush (collected at facilities)	7,430	7,578	7,730	7,884	8,042

Note:

1. Tonnage includes SSO collected curbside and projected tonnages, residential drop-off at County waste management facilities, organics collected at County institutions, and commercial sources.



## 6 CONSIDERATIONS FOR SUBMISSIONS RELATED TO COUNTY OPF

As outlined in **Appendix A**, the County has recently undertaken a siting process for both an Organics Processing Facility (OPF) and Materials Management Facility (MMF). Planning amendments are currently being furthered to co-locate this infrastructure at one location – the County’s Environmental Resource Recovery Centre (ERRC) located at [2976 Horseshoe Valley Road West, Springwater](#).

In regard to a County OPF, it is anticipated that development of this facility will be undertaken as follows:

- facility will be designed to accommodate 30,000 tonnes/year (TPY) SSO (noting that this will be determined as the County proceeds through the procurement process).
- development at the County’s site will be undertaken via a Design-Build-Operate (DBO) procurement model (note that proposed alternatives to this will be addressed in Section 7).
- technology neutral – both aerobic composting and anaerobic digestion technologies will be considered.
- it is preferred that pet waste be included with SSO feedstock and processed at this facility.
- should the technology allow, the County will consider the inclusion of diapers & sanitary products (and, in addition, plastic bags) to their collection program.
- should the technology allow, the County will consider additional benefits such as the potential to recover biogas.
- end products will be the responsibility of the selected contractor, although the County may take ownership of some end products as a function of the procurement process and submissions made during the downstream procurement steps.
- irrespective of the responsibility of final product management, final organic products must provide a beneficial use product, such as registration through the Non-Agricultural Source Material (NASM) regulations, Canadian Food Inspection Agency (CFIA) fertilizer standards, or the Ontario Compost Quality Standards for A or AA compost.
- for information with respect to this RFI, respondents should express costs based on an overall lifecycle project duration of 20 years. Respondents are to assume a contract length of 10 years with County options for 2 – five-year renewals. This information will be the basis of financial calculations in the preliminary business case but note this may be subject to change in subsequent competitive bid documents.

Responses related to development of a County OPF at 2976 Horseshoe Valley Road West, Springwater, should consider the above. Should information be provided on an alternative solution at the County’s site or differ from the direction currently being pursued, explanation must be provided in the respondent’s submitted package. For example, should the respondent’s technology allow for staged development (i.e. construction to accommodate current tonnages with anticipated expansion to 30,000 TPY with growth), details must be included with the response.

### 6.1 Site-Specific Information

For the purposes of this RFI, the following assumptions regarding the County’s site should be considered in responses:

- 1 ha has been allocated for organics processing on the ERRC footprint (4.5 ha total) – note that a conceptual site plan for the ERRC will be posted once Planning studies are made public.
- respondents are to assume the cost of any mitigative facilities that are required to prevent adverse effect to potential receptors.
- construction of the MMF and all ancillary works at 2976 Horseshoe Valley Road West, Springwater, will be completed prior to construction of the OPF.
- respondents should assume a cleared, flat site of adequate space for development of the OPF.
- conventional slab-on-grade construction is supported at this site.



- preparation of the site should not be included in estimated capital costs for the OPF – this includes stumping and grubbing, preparation of site access and roadways, installation of site services and scale facility, stormwater management, etc.

## **7 CONSIDERATIONS FOR ALTERNATIVE OPTIONS (MERCHANT CAPACITY)**

Alternative options to development of a County OPF at 2976 Horseshoe Valley Road West (such as available merchant capacity, potential DBOO options at another location, etc.) must consider tonnages and composition outlined in Section 5. To reiterate, the County is seeking information on available merchant capacity for their SSO with the inclusion of pet waste and potentially diapers, sanitary products, and plastic bags. Anticipated tonnages are provided in **Table 5.1**.

If the alternative submitted is related to available merchant capacity, the following should be considered in responses:

- proposed costing should be based on a per tonne basis for processing and exclude costs of transfer and haulage.
- transfer and haulage costs will be considered in the preliminary business case and assume that the County will transfer from the MMF located at 2976 Horseshoe Valley Road West, Springwater, and haul material utilizing the County Solid Waste Management fleet (as per the current system).
- description of processing technology and how it is adapted specifically to suit SSO of the character of the County's current and expected stream. Provide processing technology details.
- description of site odour control and water management functions. Further, provide Environmental Compliance Approval (ECA) permits received/anticipated, length of time in operation, and compliance with Ministry of Environment and Climate Change (MOECC) regulations and guidelines, etc. should be included with the submission (noting that this will be incorporated in the risk assessment portion of the preliminary business case).
- summary of mass balance of the facility, indicating operational achievements with respect to preparation of final products for beneficial use, including how much product is produced per incoming tonne and what the quality of this material is.
- current total capacity of the facility and current throughput with clear definition of additional capacity that would be available to the County. Note existing customers for the facility.
- the County notes that in this scenario, the respondent will ultimately be responsible for marketing all final products but must demonstrate that final products achieve beneficial use that addresses the County's desire for increased diversion.

## **8 SUBMISSION REQUIREMENTS**

The following information is requested – noting that respondents may elect to provide any portion or all of the information requested below, at their discretion.

### **8.1 General Corporate Information**

Provide an overview of your corporation or entity including information about your structure, year, and jurisdiction of incorporation or establishment and primary lines of business. Information should include:

- legal name
- address
- business e-mail address
- business phone number
- contact name
- contact e-mail address
- contact phone number



## **8.2 Submissions Related to County OPF**

If the alternative submitted is related to a DBO arrangement at 2976 Horseshoe Valley Road West, Springwater, the following information should be described:

- mass balance – providing information on biogas (if applicable), compost/digestate (as applicable), and residuals
- technology (including pre-processing waste, post-processing, water utilization, etc.)
- odour control and ability to meet environmental standards
- tonnage (or volume) of materials and amendments required for processing (i.e. leaf & yard waste, water, etc.)
- ability of technology to be expanded (i.e. is it modular?) and minimum/maximum design capacity
- typical footprint requirements for a facility processing 30,000 TPY

## **8.3 Submissions for Alternative Options (Merchant Capacity)**

If the alternative submitted is related to available merchant capacity, the following information should be described:

- location of facility
- description of technology (including pre-processing waste, water, etc.)
- odour control and ability to meet environmental standards
- Environmental Compliance Approval (ECA) permits received/anticipated
- length of time in operation, compliance with Ministry of Environment and Climate Change (MOECC) regulations and guidelines, etc.
- available capacity
- description of end products

## **8.4 Format of Submission (all alternatives)**

To assist with the assessment of submissions, information should be provided in three sections – Mass Balance, Reference Facility, and Costs as outlined below in **Table 8.1**. Note that this information will be provided to the County's consultant for preparation of the preliminary business case which will assess all alternatives for organics processing.



**Table 8.1: Summary of Requested Information**

<b>Mass Balance</b>	
<ul style="list-style-type: none"> <li>the intent of the County is to derive information regarding the respondent's technology and approach and its expected outputs</li> <li>respondents should base the information on common units (tonne or m<sup>3</sup> per incoming wet tonne of County SSO)</li> <li>responses should consider 30,000 tonnes/year of SSO (even if technology is modular) and provide details on the ability to accept pet waste, diapers &amp; sanitary products, and plastic bags</li> </ul>	
For each incoming tonne of County SSO, respondent to provide information on the <u>expected consumption</u> of:	
amendment material (include type of material); should the County's leaf and yard waste be an input into the system, indicate how much would be required	
clean or recycled water (breakdown for each)	
airflow either for processing or for general building ventilation, or both as required	
other key materials as required for processing	
total electrical consumption expected	
For each incoming tonne of County SSO, respondent to provide information on the <u>expected output</u> of:	
final beneficial use organic product (include quality and expected beneficial use standard for this product)	
biogas output, as applicable, including expected quality of biogas. Express as biogas evolved per wet incoming tonne.	
biogas quantity expected for re-use in the facility for heating needs, as appropriate; where biogas is not utilized, indicate total heating requirements	
wastewater generation volumes and quality of wastewater expected	
total airflow required for discharge after treatment and expected odour levels of this air after treatment	



**Table 8.1: Summary of Requested Information *continued***

<b>Reference Facility</b>	
<ul style="list-style-type: none"> <li>the intent of the County is to obtain information regarding the successful deployment of the technology or the facility offering merchant capacity</li> </ul>	
<ul style="list-style-type: none"> <li>provide contact details and reference of one facility operating for at least 3 years where the technology noted has been successfully utilized at a minimum scale of 10,000 tonnes per year</li> <li>alternatively, provide contact details of facility offering merchant capacity – include information requested in Section 7 (including the ability to accept SSO with pet waste, diapers &amp; sanitary products, and plastic bags)</li> </ul>	<p><i>please attach information on the reference facility</i></p>
<b>Costs</b>	
<ul style="list-style-type: none"> <li>the intent of the County is to understand the approximate all-in costs of the technology for deployment or alternatively, approximate costs associated with available merchant capacity in order to undertake a preliminary business case</li> <li>detailed costing will be sought via subsequent competitive bid documents</li> <li>these are to be <u>gross</u> costs, and are not to take into account the value or cost of final products that may be generated by the technology</li> <li>proposed alternatives related to merchant capacity should provide cost per tonne, detailing any assumptions (for example, if it is based on an expected annual tonnage)</li> </ul>	
<p><i>Capital</i></p> <ul style="list-style-type: none"> <li>for full deployment utilizing site assumptions as noted in this document</li> <li>this will include:                             <ul style="list-style-type: none"> <li>receiving areas</li> <li>pre- and post-processing functions</li> <li>storage areas</li> <li>environmental control systems</li> <li>other ancillary or key areas required for successful processing of the County's SSO</li> </ul> </li> <li>this is intended to be an all-in capital cost for deployment and should be discretized according</li> </ul>	
<p><i>Operation and Maintenance</i></p> <ul style="list-style-type: none"> <li>this should include labour, materials, and chemical or other material usage based on the assumptions noted in this document, per tonne of incoming SSO</li> <li>this should <u>not</u> include any additional costs or revenues for final products, such as compost, digestate, residual, or biogas; however, the quantities for such outputs should be clearly expressed in the mass balance section</li> <li>the operate/maintain costs should also include a sense of lifecycle equipment replacement costs and timelines</li> </ul>	



*RFI 2016-127  
Organics Management Options*

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The purpose of the RFI process is to gather as much information as possible ensuring the County of Simcoe is an informed customer and that our eventual RFPQ and/or RFP documents and evaluation criteria consider all key aspects in a procurement of this nature – including various technology options and merchant capacity available at this time.

There will be no contract awarded as a result of this RFI process. This is an information gathering exercise only and does not preclude any interested party from participation in any subsequent procurement opportunity.

Your response to this RFI should include detailed information about your company, previous experience, your technology and your place in the market. Interviews/presentations may be scheduled as part of this process.

**Please submit your information by 2:00:00 pm January 13, 2017 addressed to:**

**RFI 2016-127 – Organics Management Options**

**Attention: Procurement Professional**

Procurement, Fleet and Property Department  
1110 Highway 26, Lower Level, North East  
Midhurst, ON L9X 1N6

This Request for Information does not constitute any obligation on the part of the County of Simcoe to enter into any contract with any party or to proceed with a competitive process.





## **APPENDIX A**

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# **CHRONOLOGY OF PROJECT DEVELOPMENT**



## **APPENDIX A – CHRONOLOGY OF PROJECT DEVELOPMENT**

### **BACKGROUND**

The County of Simcoe, located in South-Central Ontario, is composed of 16 member municipalities encompassing an area of 4,840 square kilometers. In 2015, the population was approximately 293,000 with approximately 131,000 total curbside collection stops (made up of residential and industrial, commercial, and institutional properties). The County is experiencing significant growth pressures, therefore demands on waste management facilities and services will continue to increase.

In 1990, the Government of Ontario passed Bill 201 under the Municipal Act. Bill 201 empowered the County to assume waste management responsibilities from all 16 member municipalities, except the separated Cities of Barrie and Orillia. The County also inherited responsibility for approximately 50 landfill and waste disposal facilities.

The following information is provided to parties as background for this project – outlining the County's current Organics Processing Facility (OPF) project.

### **SOLID WASTE MANAGEMENT STRATEGY**

In 2009, the County of Simcoe retained Stantec Consulting Ltd. to undertake development of a strategy to provide the framework for both short-term and long-term diversion and waste disposal programs for the next 20 years. The development process included examination of the existing system and policies, current programs and data, population and growth. Further, the Strategy explored combinations of programs, technologies and techniques for integration into the future waste management system while consideration was given to local needs and circumstances, potential impacts to economic, environmental and social factors. The Strategy was intended to identify potential solutions and make recommendations, establish a planning framework and strategic direction for the future.

The Strategy, related appendices, and annual reports can be found at:

<http://www.simcoe.ca/dpt/swm/swm-strategy>

### **Organics Processing**

The Strategy's Section 7.0 – Organics and the accompanying document Appendix 2: Draft Task F Technical Report, outline various approaches in regards to the County's short and long-term plan for processing organics.

In 2012, GENIVAR Inc. (Genivar) completed an initial viability study in regards to in-County organics processing. This report outlined facility sizing and identified a number of potential processing technologies which could realistically incorporate additional materials which County Council had indicated a desire to process (diapers, pet waste, and sanitary products). This report also outlined the next steps required in the development of a facility, including the procurement process required to obtain a design, build and operate (DBO) vendor and the required siting and approvals processes. The Genivar study can be found in Schedule 1 of the following item:

[\*Item CS 12-095 – Central Composting Facility Viability Assessment Report and Next Steps\*](#)  
(June 13, 2012)



In conjunction with these reports, Genivar presented the findings of their central composting viability assessment to County Council in 2012:

[Genivar Presentation](#) – Central Composting Facility Viability Assessment Simcoe County

On June 27, 2013, a full-day Waste Management Strategy session was held to provide County Council with an opportunity to discuss improving diversion and in particular, the addition of pet waste and diapers to the organics program. The presentation, outlining the history of the Strategy, current system performance, and how the County plans to move forward can be found at:

[http://docs.simcoe.ca/ws\\_cos/groups/public/@pub-cos-sta-com/documents/web\\_content/rsc381019.pdf](http://docs.simcoe.ca/ws_cos/groups/public/@pub-cos-sta-com/documents/web_content/rsc381019.pdf)

Council approved, in principle, the addition of pet waste and diapers to the organics program and directed Staff to provide additional information on costing. Costing information, a proposed project plan for development of a County facility, and timeline were endorsed by Council in early 2014 as outlined in the following staff report:

[Item CCW 14-025](#) – Central Composting Facility Update (January 28, 2014)

### **ORGANICS PROCESSING FACILITY (OPF) PROJECT**

Following direction from Council in early 2014, the Organics Processing Facility (OPF) project began with public notification, including a public information session in June of 2014. In addition, Conestoga-Rovers & Associates (since becoming GHD Limited (GHD)), were retained as the County's consultant for this project and the siting process was initiated.

**Table A.1** below outlines the development process to date for the OPF project and related staff reports.

**TABLE A.1: CHRONOLOGY OF PROJECT DEVELOPMENT – OPF**

Item No. Reference	Description of Milestone
2014	
<u><a href="#">Item CCW 14-025</a></u> – Central Composting Facility Update (January 28, 2014)	A proposed project plan for the Organics Processing Facility (OPF) and timeline were endorsed by County Council.
<u><a href="#">Item CCW 14-246</a></u> – RFP 2014-021 – Consulting Services – Central Composting Facility (May 27, 2014)	Conestoga-Rovers & Associates (CRA) (since becoming GHD Limited) were retained as the County's consultant for siting and furthering procurement of organics processing technology.
<u><a href="#">Item CCW 14-299</a></u> – Organics Processing Facility Update (August 12, 2014)	The first public information sessions were held on June 17, 2014 to provide the public and interested stakeholders an opportunity to receive information on the project and discuss the County's diversion program for source-separated organics.



**TABLE A.1: CHRONOLOGY OF PROJECT DEVELOPMENT – OPF *continued***

Item No. Reference	Description of Milestone
<a href="#">Item CCW 14-407</a> – Community Engagement Committee (October 30, 2014)	Community Engagement Committee formed to provide input on public engagement.
2015	
<a href="#">Item CCW 15-020</a> – Infrastructure Projects – Update (January 13, 2015)	Update on public information sessions held on December 14, 2014 which outlined the proposed siting process and methodology for the facility and to obtain public feedback on site evaluation criteria.
<a href="#">Item CCW 15-055</a> – Organics Processing Facility – Siting Methodology and Evaluation Criteria (February 26, 2015)	The siting methodology and evaluation criteria for the OPF were endorsed by County Council.
<a href="#">Item CCW 15-229</a> – Solid Waste Management Infrastructure Projects – Siting Process Update (June 23, 2015)	An overview of the projects was provided in preparation for presentation of the short list of sites.
<a href="#">Item CCW 15-240</a> – Organics Processing Facility and Materials Management Facility – Short List of Sites (August 11, 2015)	The short list of sites were endorsed by County Council.
<a href="#">Item CCW 15-397</a> – Infrastructure Projects – Consultation Update (November 24, 2015)	Overview of consultation undertaken in regard to the short list of sites.
2016	
<a href="#">Item CCW 16-054</a> – Solid Waste Management Infrastructure Projects – Final Siting Report (March 8, 2016)	The preferred site and recommendation to co-locate both the OPF and MMF was endorsed by County Council.
<a href="#">Item CCW 16-191</a> – Solid Waste Management Infrastructure Projects – Public/Stakeholder Engagement Update (May 24, 2016)	Summary of the engagement process undertaken in regard to co-locating the OPF and MMF at 2976 Horseshoe Valley Road West, Springwater.
<a href="#">Item CCW 16-165</a> – Solid Waste Management Infrastructure Projects – Development Strategy (May 24, 2016)	The project development strategy was endorsed by County Council.
<a href="#">Item CCW 16-266</a> – Organics Processing Facility – Project Delivery Method (August 6, 2016)	A detailed summary of options and key considerations for procurement of the OPF was provided to County Council. GHD Limited recommended a Design-Build-Operate (DBO) procurement method for the facility.
<a href="#">Item CCW 16-301</a> – Solid Waste Management Infrastructure Projects – Project Update (September 13, 2016)	Provided an update on the projects – including details on preparations for Planning applications, the Community Engagement Committee, and correspondence recently received.



**TABLE A.1: CHRONOLOGY OF PROJECT DEVELOPMENT – OPF *continued***

Item No. Reference	Description of Milestone
<a href="#">Item CCW 16-357</a> – Organics Processing Facility – Recommendation for Project Delivery Method (October 25, 2016)	Presented details of public consultation completed in regard to the project delivery method for the OPF, sought County Council's direction on the recommended approach, and provided information on moving forward with the procurement process and preliminary business case.
<a href="#">Item CCW 16-376</a> – Environmental Resource Recovery Centre – Project Update (November 8, 2016)	Update on development of the Environmental Resource Recovery Centre (ERRC) – including information on further archaeological work that was undertaken on the property, details on the conceptual site plan currently being prepared for submission with Planning applications, and presentation of an updated Development Strategy timeline.

### **MATERIALS MANAGEMENT FACILITY (MMF) PROJECT**

In 2014, County Council also endorsed further work to determine the viability of a County Materials Management Facility (MMF) and extending the scope of work assigned to GHD to provide engineering services for siting this facility concurrently with the OPF. The MMF, a transfer facility, will be an integral part of the County's waste management system – the link between collection operations and moving material to final waste disposal/processing locations. It will provide a location for consolidation of garbage and recycling from multiple collection vehicles into larger, higher-volume transfer vehicles for more economical shipment to disposal/ processing sites. In addition, this site would provide a location for a truck servicing facility.

### **SITING PROCESS (OPF and MMF)**

A comprehensive siting process for both the OPF and MMF was undertaken in 2015/early 2016 which included the evaluation of 502 potential sites. A short list of sites was presented for public, Aboriginal, and stakeholder consultation in fall 2015, followed by a detailed comparative evaluation completed by the County's consultant. This evaluation was also extended to consider the option of co-locating both facilities on a single site.

On March 22, 2016, County Council approved furthering development of a co-located OPF and MMF at 2976 Horseshoe Valley Road West, Springwater.

### **DEVELOPMENT STRATEGY – ENVIRONMENTAL RESOURCE RECOVERY CENTRE**

The co-located facility will house both the OPF and MMF, the Solid Waste Management truck servicing area, potentially a public education centre, and area for potential expansion for recycling processing. For ease of reference, the complex is referred to as the County of Simcoe's *Environmental Resource Recovery Centre* (ERRC).



With direction to co-locate the two facilities at 2976 Horseshoe Valley Road West, Springwater, GHD was retained to provide an updated work plan that considered the more complex project delivery of two facilities at one location. This was presented and subsequently updated (reflecting an 80 day delay due to additional study work on the site) in the following staff reports:

[Item CCW 16-165](#) – *Solid Waste Management Infrastructure Projects – Development Strategy* (May 24, 2016)

[Item CCW 16-376](#) – *Environmental Resource Recovery Centre – Project Update* (November 8, 2016)

The resulting Development Strategy and conceptual timeline was based on GHD's experience in developing similar facilities. It was noted that this timeline is expected to be a living document and will likely evolve over time as various milestones are completed.

As outlined, the project plan considers that developing infrastructure at this location will require amendments to the County Official Plan as well as the Township of Springwater Official Plan and Zoning By-law. In addition, the MMF and OPF will be advanced with different delivery methods. Co-location must consider the timing of both procurement processes, timing of the business case for the OPF, obtaining an Environmental Compliance Approval (ECA), and construction of two facilities on the same footprint.

Development of the co-located facilities will incorporate four key paths which, although interconnected, will have distinct milestones and timing:

- Planning approvals process
- Environmental Compliance Approval process
- MMF – procurement of design (with updated costing), design, and construction
- OPF – procurement of technology (with business case), design, and construction

As outlined in Item CCW 16-165, in consideration of varying methods of processing organics and proprietary technology, the OPF procurement process will be longer and more complex than procuring the MMF, a simple building. The MMF be advanced following a traditional Design-Bid-Build (DBB) procurement process.

## **PROCUREMENT OF THE OPF**

On November 8, 2016, County Council approved a recommendation to further procurement of the OPF utilizing a Design-Build-Operate (DBO) procurement model. This followed presentation of a recommendation by GHD and public consultation outlined in the following staff reports:

[Item CCW 16-266](#) – *Organics Processing Facility – Project Delivery Method* (August 9, 2016)

[Item CCW 16-357](#) – *Organics Processing Facility – Recommendation for Project Delivery Method* (October 25, 2016)



## **APPENDIX B**

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### **2015 CURBSIDE AUDIT DATA**

## 2015 Curbside Audit Data

Material Categories	Annual Tonnage (by stream) (average tonnes/year)				
	Garbage stream	Recycling stream	Organics stream	Total (all streams)	Capture (%)
Organics - green bin material (existing program)					
Food Waste	13,297	493	9,872	23,662	42%
Other Items	42	-	2	44	5%
Yard Waste (includes houseplants)	549	10	83	643	13%
Paper Cups & Paper Ice-Cream Containers	187	191	24	402	6%
Tissue/Toweling	2,382	66	623	3,071	20%
TOTAL - green bin material (existing program)	16,457	760	10,604	27,822	38%
Potential expansion materials to green bin program					
Diapers and Sanitary Products	3,582	5	2	3,588	-
Pet waste	6,096	17	-	6,112	-



## Appendix B: Project Option Cash Flows

The following tables outline the low and high Project cash flow scenarios for each Project Option. The values used should be interpreted as millions of dollars. Consideration should be given to a portion of operating & maintenance which occurs in Year 3 in the table below (denoted as part of the Planning and Construction phase). This occurs because construction ends half way through Year 3 and operating & maintenance costs are assumed to begin soon after.

	Planning and Construction			Operations																					
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20		
<b>Project Option 1 - Status quo</b>																									
	<b>NPV</b>	<b>Nominal</b>																							
<b>Expenses</b>																									
Operating & maintenance costs (including HST)	(58,235)	(105,880)	(1,794)	(3,613)	(3,759)	(3,911)	(4,069)	(4,234)	(4,405)	(4,583)	(4,768)	(4,960)	(5,161)	(5,369)	(5,586)	(5,812)	(6,047)	(6,291)	(6,545)	(6,810)	(7,085)	(7,371)	(3,707)		
<b>Project net costs</b>	<b>(58,235)</b>	<b>(105,880)</b>	<b>(1,794)</b>	<b>(3,613)</b>	<b>(3,759)</b>	<b>(3,911)</b>	<b>(4,069)</b>	<b>(4,234)</b>	<b>(4,405)</b>	<b>(4,583)</b>	<b>(4,768)</b>	<b>(4,960)</b>	<b>(5,161)</b>	<b>(5,369)</b>	<b>(5,586)</b>	<b>(5,812)</b>	<b>(6,047)</b>	<b>(6,291)</b>	<b>(6,545)</b>	<b>(6,810)</b>	<b>(7,085)</b>	<b>(7,371)</b>	<b>(3,707)</b>		
<b>Project cash flow</b>	<b>(58,235)</b>	<b>(105,880)</b>	<b>(1,794)</b>	<b>(3,613)</b>	<b>(3,759)</b>	<b>(3,911)</b>	<b>(4,069)</b>	<b>(4,234)</b>	<b>(4,405)</b>	<b>(4,583)</b>	<b>(4,768)</b>	<b>(4,960)</b>	<b>(5,161)</b>	<b>(5,369)</b>	<b>(5,586)</b>	<b>(5,812)</b>	<b>(6,047)</b>	<b>(6,291)</b>	<b>(6,545)</b>	<b>(6,810)</b>	<b>(7,085)</b>	<b>(7,371)</b>	<b>(3,707)</b>		
<b>Project Option 2 - Wet AD (Low)</b>																									
	<b>NPV</b>	<b>Nominal</b>																							
<b>Capital</b>																									
Annual capital costs (including HST)	(16,227)	(18,682)	(4,523)	(9,327)	(4,832)																				
<b>Expenses</b>																									
Operating & maintenance costs (including HST)	(52,312)	(93,905)	(1,789)			(3,562)	(3,664)	(3,769)	(3,878)	(3,990)	(4,106)	(4,225)	(4,349)	(4,476)	(4,608)	(4,744)	(4,885)	(5,030)	(5,180)	(5,335)	(5,495)	(5,678)	(5,907)	(6,146)	(3,090)
Lifecycle costs (including HST)	(4,085)	(7,189)									(1,707)	(1,922)	(1,992)			(1,922)	(1,568)								
<b>Total Expenses</b>	<b>(56,397)</b>	<b>(101,094)</b>	<b>(1,789)</b>			<b>(3,562)</b>	<b>(3,664)</b>	<b>(3,769)</b>	<b>(3,878)</b>	<b>(3,990)</b>	<b>(5,812)</b>	<b>(4,225)</b>	<b>(4,349)</b>	<b>(6,468)</b>	<b>(4,608)</b>	<b>(4,744)</b>	<b>(6,807)</b>	<b>(6,598)</b>	<b>(5,180)</b>	<b>(5,335)</b>	<b>(5,495)</b>	<b>(5,678)</b>	<b>(5,907)</b>	<b>(6,146)</b>	<b>(3,090)</b>
<b>Revenues</b>																									
Excess capacity	3,102	4,644	242	453	437	419	400	380	358	334	308	281	252	221	187	152	114	74	31						
<b>Project net costs</b>	<b>(69,522)</b>	<b>(115,133)</b>	<b>(4,523)</b>	<b>(9,327)</b>	<b>(6,379)</b>	<b>(3,108)</b>	<b>(3,227)</b>	<b>(3,350)</b>	<b>(3,477)</b>	<b>(3,610)</b>	<b>(5,455)</b>	<b>(3,891)</b>	<b>(4,040)</b>	<b>(6,187)</b>	<b>(4,356)</b>	<b>(4,523)</b>	<b>(6,619)</b>	<b>(6,446)</b>	<b>(5,066)</b>	<b>(5,261)</b>	<b>(5,464)</b>	<b>(5,678)</b>	<b>(5,907)</b>	<b>(6,146)</b>	<b>(3,090)</b>
Terminal value	2,744	7,200																						7,200	
<b>Project cash flow (including terminal value)</b>	<b>(66,778)</b>	<b>(107,933)</b>	<b>(4,523)</b>	<b>(9,327)</b>	<b>(6,379)</b>	<b>(3,108)</b>	<b>(3,227)</b>	<b>(3,350)</b>	<b>(3,477)</b>	<b>(3,610)</b>	<b>(5,455)</b>	<b>(3,891)</b>	<b>(4,040)</b>	<b>(6,187)</b>	<b>(4,356)</b>	<b>(4,523)</b>	<b>(6,619)</b>	<b>(6,446)</b>	<b>(5,066)</b>	<b>(5,261)</b>	<b>(5,464)</b>	<b>(5,678)</b>	<b>(5,907)</b>	<b>(6,146)</b>	<b>4,110</b>
Development charges offset	3,588	4,131	1,000	2,062	1,068																				
<b>Project cash flow (including terminal value &amp; development charges offset)</b>	<b>(63,190)</b>	<b>(103,802)</b>	<b>(3,523)</b>	<b>(7,265)</b>	<b>(5,311)</b>	<b>(3,108)</b>	<b>(3,227)</b>	<b>(3,350)</b>	<b>(3,477)</b>	<b>(3,610)</b>	<b>(5,455)</b>	<b>(3,891)</b>	<b>(4,040)</b>	<b>(6,187)</b>	<b>(4,356)</b>	<b>(4,523)</b>	<b>(6,619)</b>	<b>(6,446)</b>	<b>(5,066)</b>	<b>(5,261)</b>	<b>(5,464)</b>	<b>(5,678)</b>	<b>(5,907)</b>	<b>(6,146)</b>	<b>4,110</b>
<b>Project Option 2 - Wet AD (High)</b>																									
	<b>NPV</b>	<b>Nominal</b>																							
<b>Capital</b>																									
Annual capital costs (including HST)	(35,991)	(41,444)	(9,894)	(20,776)	(10,774)																				
<b>Expenses</b>																									
Operating & maintenance costs (including HST)	(58,613)	(105,216)	(2,005)			(3,991)	(4,105)	(4,223)	(4,345)	(4,470)	(4,600)	(4,734)	(4,873)	(5,015)	(5,163)	(5,315)	(5,473)	(5,636)	(5,804)	(5,977)	(6,157)	(6,362)	(6,619)	(6,886)	(3,463)
Lifecycle costs (including HST)	(4,085)	(7,189)									(1,707)	(1,922)	(1,992)			(1,922)	(1,568)								
<b>Total Expenses</b>	<b>(62,698)</b>	<b>(112,405)</b>	<b>(2,005)</b>			<b>(3,991)</b>	<b>(4,105)</b>	<b>(4,223)</b>	<b>(4,345)</b>	<b>(4,470)</b>	<b>(6,307)</b>	<b>(4,734)</b>	<b>(4,873)</b>	<b>(7,008)</b>	<b>(5,163)</b>	<b>(5,315)</b>	<b>(7,395)</b>	<b>(7,204)</b>	<b>(5,804)</b>	<b>(5,977)</b>	<b>(6,157)</b>	<b>(6,362)</b>	<b>(6,619)</b>	<b>(6,886)</b>	<b>(3,463)</b>
<b>Revenues</b>																									
Excess capacity	4,033	6,037	315	589	568	545	520	494	465	434	401	365	327	287	244	197	148	96	41						
<b>Project net costs</b>	<b>(94,656)</b>	<b>(147,812)</b>	<b>(9,894)</b>	<b>(20,776)</b>	<b>(12,464)</b>	<b>(3,401)</b>	<b>(3,537)</b>	<b>(3,678)</b>	<b>(3,824)</b>	<b>(3,977)</b>	<b>(5,842)</b>	<b>(4,300)</b>	<b>(4,472)</b>	<b>(6,642)</b>	<b>(4,836)</b>	<b>(5,029)</b>	<b>(7,151)</b>	<b>(7,007)</b>	<b>(5,655)</b>	<b>(5,881)</b>	<b>(6,116)</b>	<b>(6,362)</b>	<b>(6,619)</b>	<b>(6,886)</b>	<b>(3,463)</b>
Terminal value	6,002	15,750																						15,750	
<b>Project cash flow (including terminal value)</b>	<b>(88,654)</b>	<b>(132,062)</b>	<b>(9,894)</b>	<b>(20,776)</b>	<b>(12,464)</b>	<b>(3,401)</b>	<b>(3,537)</b>	<b>(3,678)</b>	<b>(3,824)</b>	<b>(3,977)</b>	<b>(5,842)</b>	<b>(4,300)</b>	<b>(4,472)</b>	<b>(6,642)</b>	<b>(4,836)</b>	<b>(5,029)</b>	<b>(7,151)</b>	<b>(7,007)</b>	<b>(5,655)</b>	<b>(5,881)</b>	<b>(6,116)</b>	<b>(6,362)</b>	<b>(6,619)</b>	<b>(6,886)</b>	<b>12,287</b>
Development charges offset	7,958	9,164	2,188	4,594	2,382																				
<b>Project cash flow (including terminal value &amp; development charges offset)</b>	<b>(80,696)</b>	<b>(122,898)</b>	<b>(7,707)</b>	<b>(16,182)</b>	<b>(10,082)</b>	<b>(3,401)</b>	<b>(3,537)</b>	<b>(3,678)</b>	<b>(3,824)</b>	<b>(3,977)</b>	<b>(5,842)</b>	<b>(4,300)</b>	<b>(4,472)</b>	<b>(6,642)</b>	<b>(4,836)</b>	<b>(5,029)</b>	<b>(7,151)</b>	<b>(7,007)</b>	<b>(5,655)</b>	<b>(5,881)</b>	<b>(6,116)</b>	<b>(6,362)</b>	<b>(6,619)</b>	<b>(6,886)</b>	<b>12,287</b>

	Planning and Construction			Operations																					
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20		
<b>Project Option 3 - Dry AD with in-vessel composting (Low)</b>																									
	<b>NPV</b>	<b>Nominal</b>																							
<b>Capital</b>																									
Annual capital costs (including HST)	(28,682)	(33,027)	(7,916)	(16,527)	(8,584)																				
<b>Expenses</b>																									
Operating & maintenance costs (including HST)	(32,970)	(59,184)		(1,128)		(2,245)	(2,309)	(2,375)	(2,444)	(2,515)	(2,588)	(2,663)	(2,741)	(2,821)	(2,904)	(2,990)	(3,079)	(3,170)	(3,265)	(3,362)	(3,463)	(3,578)	(3,723)	(3,873)	(1,948)
Lifecycle costs (including HST)	(4,212)	(7,479)								(1,195)	(3,006)					(769)	(2,509)								
<b>Total Expenses</b>	<b>(37,182)</b>	<b>(66,663)</b>		<b>(1,128)</b>		<b>(2,245)</b>	<b>(2,309)</b>	<b>(2,375)</b>	<b>(2,444)</b>	<b>(2,515)</b>	<b>(3,782)</b>	<b>(2,663)</b>	<b>(2,741)</b>	<b>(5,828)</b>	<b>(2,904)</b>	<b>(2,990)</b>	<b>(3,847)</b>	<b>(5,679)</b>	<b>(3,265)</b>	<b>(3,362)</b>	<b>(3,463)</b>	<b>(3,578)</b>	<b>(3,723)</b>	<b>(3,873)</b>	<b>(1,948)</b>
<b>Revenues</b>																									
Excess capacity	3,102	4,644		242		453	437	419	400	380	358	334	308	281	252	221	187	152	114	74	31				
<b>Project net costs</b>	<b>(62,762)</b>	<b>(95,046)</b>	<b>(7,916)</b>	<b>(16,527)</b>	<b>(9,470)</b>	<b>(1,791)</b>	<b>(1,872)</b>	<b>(1,956)</b>	<b>(2,044)</b>	<b>(2,135)</b>	<b>(3,425)</b>	<b>(2,329)</b>	<b>(2,432)</b>	<b>(5,546)</b>	<b>(2,652)</b>	<b>(2,769)</b>	<b>(3,660)</b>	<b>(5,527)</b>	<b>(3,151)</b>	<b>(3,288)</b>	<b>(3,432)</b>	<b>(3,578)</b>	<b>(3,723)</b>	<b>(3,873)</b>	<b>(1,948)</b>
Terminal value	4,801	12,600																							12,600
<b>Project cash flow (including terminal value)</b>	<b>(57,961)</b>	<b>(82,446)</b>	<b>(7,916)</b>	<b>(16,527)</b>	<b>(9,470)</b>	<b>(1,791)</b>	<b>(1,872)</b>	<b>(1,956)</b>	<b>(2,044)</b>	<b>(2,135)</b>	<b>(3,425)</b>	<b>(2,329)</b>	<b>(2,432)</b>	<b>(5,546)</b>	<b>(2,652)</b>	<b>(2,769)</b>	<b>(3,660)</b>	<b>(5,527)</b>	<b>(3,151)</b>	<b>(3,288)</b>	<b>(3,432)</b>	<b>(3,578)</b>	<b>(3,723)</b>	<b>(3,873)</b>	<b>(1,948)</b>
Development charges offset	6,342	7,303	1,750	3,654	1,898																				
<b>Project cash flow (including terminal value &amp; development charges offset)</b>	<b>(51,619)</b>	<b>(75,143)</b>	<b>(6,165)</b>	<b>(12,873)</b>	<b>(7,572)</b>	<b>(1,791)</b>	<b>(1,872)</b>	<b>(1,956)</b>	<b>(2,044)</b>	<b>(2,135)</b>	<b>(3,425)</b>	<b>(2,329)</b>	<b>(2,432)</b>	<b>(5,546)</b>	<b>(2,652)</b>	<b>(2,769)</b>	<b>(3,660)</b>	<b>(5,527)</b>	<b>(3,151)</b>	<b>(3,288)</b>	<b>(3,432)</b>	<b>(3,578)</b>	<b>(3,723)</b>	<b>(3,873)</b>	<b>10,652</b>
<b>Project Option 3 - Dry AD with in-vessel composting (High)</b>																									
	<b>NPV</b>	<b>Nominal</b>																							
<b>Capital</b>																									
Annual capital costs (including HST)	(32,857)	(37,835)	(9,046)	(18,953)	(9,835)																				
<b>Expenses</b>																									
Operating & maintenance costs (including HST)	(37,366)	(67,075)		(1,278)		(2,544)	(2,617)	(2,692)	(2,770)	(2,850)	(2,933)	(3,018)	(3,106)	(3,197)	(3,291)	(3,389)	(3,489)	(3,593)	(3,700)	(3,811)	(3,925)	(4,056)	(4,219)	(4,390)	(2,207)
Lifecycle costs (including HST)	(4,212)	(7,479)									(1,195)	(3,006)				(769)	(2,509)								
<b>Total Expenses</b>	<b>(41,578)</b>	<b>(74,554)</b>		<b>(1,278)</b>		<b>(2,544)</b>	<b>(2,617)</b>	<b>(2,692)</b>	<b>(2,770)</b>	<b>(2,850)</b>	<b>(4,127)</b>	<b>(3,018)</b>	<b>(3,106)</b>	<b>(6,204)</b>	<b>(3,291)</b>	<b>(3,389)</b>	<b>(4,258)</b>	<b>(6,102)</b>	<b>(3,700)</b>	<b>(3,811)</b>	<b>(3,925)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>(2,207)</b>
<b>Revenues</b>																									
Excess capacity	4,033	6,037		315		589	568	545	520	494	465	434	401	365	327	287	244	197	148	96	41				
<b>Project net costs</b>	<b>(70,402)</b>	<b>(106,352)</b>	<b>(9,046)</b>	<b>(18,953)</b>	<b>(10,799)</b>	<b>(1,955)</b>	<b>(2,049)</b>	<b>(2,147)</b>	<b>(2,249)</b>	<b>(2,356)</b>	<b>(3,662)</b>	<b>(2,584)</b>	<b>(2,705)</b>	<b>(5,838)</b>	<b>(2,964)</b>	<b>(3,102)</b>	<b>(4,014)</b>	<b>(5,905)</b>	<b>(3,552)</b>	<b>(3,715)</b>	<b>(3,885)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>(2,207)</b>
Terminal value	5,487	14,400																							14,400
<b>Project cash flow (including terminal value)</b>	<b>(64,915)</b>	<b>(91,952)</b>	<b>(9,046)</b>	<b>(18,953)</b>	<b>(10,799)</b>	<b>(1,955)</b>	<b>(2,049)</b>	<b>(2,147)</b>	<b>(2,249)</b>	<b>(2,356)</b>	<b>(3,662)</b>	<b>(2,584)</b>	<b>(2,705)</b>	<b>(5,838)</b>	<b>(2,964)</b>	<b>(3,102)</b>	<b>(4,014)</b>	<b>(5,905)</b>	<b>(3,552)</b>	<b>(3,715)</b>	<b>(3,885)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>12,193</b>
Development charges offset	7,265	8,366	2,000	4,191	2,175																				
<b>Project cash flow (including terminal value &amp; development charges offset)</b>	<b>(57,650)</b>	<b>(83,586)</b>	<b>(7,046)</b>	<b>(14,762)</b>	<b>(8,624)</b>	<b>(1,955)</b>	<b>(2,049)</b>	<b>(2,147)</b>	<b>(2,249)</b>	<b>(2,356)</b>	<b>(3,662)</b>	<b>(2,584)</b>	<b>(2,705)</b>	<b>(5,838)</b>	<b>(2,964)</b>	<b>(3,102)</b>	<b>(4,014)</b>	<b>(5,905)</b>	<b>(3,552)</b>	<b>(3,715)</b>	<b>(3,885)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>12,193</b>
<b>Project Option 4 - In-vessel composting (Low)</b>																									
	<b>NPV</b>	<b>Nominal</b>																							
<b>Capital</b>																									
Annual capital costs (including HST)	(24,515)	(28,228)	(6,785)	(14,110)	(7,333)																				
<b>Expenses</b>																									
Operating & maintenance costs (including HST)	(37,366)	(67,075)		(1,278)		(2,544)	(2,617)	(2,692)	(2,770)	(2,850)	(2,933)	(3,018)	(3,106)	(3,197)	(3,291)	(3,389)	(3,489)	(3,593)	(3,700)	(3,811)	(3,925)	(4,056)	(4,219)	(4,390)	(2,207)
Lifecycle costs (including HST)	(3,594)	(6,429)									(683)	(3,006)				(231)	(2,509)								
<b>Total Expenses</b>	<b>(40,959)</b>	<b>(73,504)</b>		<b>(1,278)</b>		<b>(2,544)</b>	<b>(2,617)</b>	<b>(2,692)</b>	<b>(2,770)</b>	<b>(2,850)</b>	<b>(3,615)</b>	<b>(3,018)</b>	<b>(3,106)</b>	<b>(6,204)</b>	<b>(3,291)</b>	<b>(3,389)</b>	<b>(3,720)</b>	<b>(6,102)</b>	<b>(3,700)</b>	<b>(3,811)</b>	<b>(3,925)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>(2,207)</b>
<b>Revenues</b>																									
Excess capacity	3,102	4,644		242		453	437	419	400	380	358	334	308	281	252	221	187	152	114	74	31				
<b>Project net costs</b>	<b>(62,372)</b>	<b>(97,088)</b>	<b>(6,785)</b>	<b>(14,110)</b>	<b>(8,369)</b>	<b>(2,091)</b>	<b>(2,180)</b>	<b>(2,273)</b>	<b>(2,369)</b>	<b>(2,470)</b>	<b>(3,258)</b>	<b>(2,684)</b>	<b>(2,798)</b>	<b>(5,923)</b>	<b>(3,040)</b>	<b>(3,168)</b>	<b>(3,532)</b>	<b>(5,950)</b>	<b>(3,586)</b>	<b>(3,737)</b>	<b>(3,894)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>(2,207)</b>
Terminal value	4,115	10,800																							10,800
<b>Project cash flow (including terminal value)</b>	<b>(58,257)</b>	<b>(86,288)</b>	<b>(6,785)</b>	<b>(14,110)</b>	<b>(8,369)</b>	<b>(2,091)</b>	<b>(2,180)</b>	<b>(2,273)</b>	<b>(2,369)</b>	<b>(2,470)</b>	<b>(3,258)</b>	<b>(2,684)</b>	<b>(2,798)</b>	<b>(5,923)</b>	<b>(3,040)</b>	<b>(3,168)</b>	<b>(3,532)</b>	<b>(5,950)</b>	<b>(3,586)</b>	<b>(3,737)</b>	<b>(3,894)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>8,593</b>
Development charges offset	5,421	6,241	1,500	3,120	1,621																				
<b>Project cash flow (including terminal value &amp; development charges offset)</b>	<b>(52,837)</b>	<b>(80,046)</b>	<b>(5,285)</b>	<b>(10,990)</b>	<b>(6,748)</b>	<b>(2,091)</b>	<b>(2,180)</b>	<b>(2,273)</b>	<b>(2,369)</b>	<b>(2,470)</b>	<b>(3,258)</b>	<b>(2,684)</b>	<b>(2,798)</b>	<b>(5,923)</b>	<b>(3,040)</b>	<b>(3,168)</b>	<b>(3,532)</b>	<b>(5,950)</b>	<b>(3,586)</b>	<b>(3,737)</b>	<b>(3,894)</b>	<b>(4,056)</b>	<b>(4,219)</b>	<b>(4,390)</b>	<b>8,593</b>
<b>Project Option 4 - In-vessel composting (High)</b>																									
	<b>NPV</b>	<b>Nominal</b>																							
<b>Capital</b>																									
Annual capital costs (including HST)	(29,517)	(33,988)	(8,142)	(17,012)	(8,834)																				
<b>Expenses</b>																									
Operating & maintenance costs (including HST)	(41,762)	(74,967)		(1,428)		(2,844)	(2,925)	(3,009)	(3,096)	(3,185)	(3,278)	(3,373)	(3,472)	(3,574)	(3,679)	(3,787)	(3,899)	(4,015)	(4,135)	(4,259)	(4,387)	(4,533)	(4,716)	(4,906)	(2,467)
Lifecycle costs (including HST)	(3,594)	(6,429)									(683)	(3,006)				(231)	(2,509)								
<b>Total Expenses</b>	<b>(45,355)</b>	<b>(81,395)</b>		<b>(1,428)</b>		<b>(2,844)</b>	<b>(2,925)</b>	<b>(3,009)</b>	<b>(3,096)</b>	<b>(3,185)</b>	<b>(3,960)</b>	<b>(3,373)</b>	<b>(3,472)</b>	<b>(6,580)</b>	<b>(3,679)</b>	<b>(3,787)</b>	<b>(4,130)</b>	<b>(6,525)</b>	<b>(4,135)</b>	<b>(4,259)</b>	<b>(4,387)</b>	<b>(4,533)</b>	<b>(4,716)</b>	<b>(4,906)</b>	<b>(2,467)</b>
<b>Revenues</b>																									
Excess capacity	4,033	6,037		315		589	568	545	520	494	465	434	401	365</											

The table below summarizes the average NPV and Nominal values based on the low and high project cash flow scenarios for each Project Option.

Project Options	Project Option 1 - Status quo		Project Option 2 - Wet AD		Project Option 3 - Dry AD with in-vessel composting		Project Option 4 - In-vessel composting		Project Option 5 - Merchant capacity	
	NPV	Nominal	NPV	Nominal	NPV	Nominal	NPV	Nominal	NPV	Nominal
<b>Capital</b>										
Annual capital costs (including HST)			(26,109)	(30,063)	(30,770)	(35,431)	(27,016)	(31,108)		
<b>Expenses</b>										
Operating & maintenance costs (including HST)	(58,235)	(105,880)	(55,463)	(99,561)	(35,168)	(63,130)	(39,564)	(71,021)	(62,837)	(114,247)
Lifecycle costs (including HST)			(4,085)	(7,189)	(4,212)	(7,479)	(3,594)	(6,429)		
<b>Total Expenses</b>	<b>(58,235)</b>	<b>(105,880)</b>	<b>(59,547)</b>	<b>(106,750)</b>	<b>(39,380)</b>	<b>(70,609)</b>	<b>(43,157)</b>	<b>(77,450)</b>	<b>(62,837)</b>	<b>(114,247)</b>
<b>Revenues</b>										
Excess capacity			3,567	5,341	3,567	5,341	3,567	5,341		
<b>Project net costs</b>	<b>(58,235)</b>	<b>(105,880)</b>	<b>(82,089)</b>	<b>(131,472)</b>	<b>(66,582)</b>	<b>(100,699)</b>	<b>(66,606)</b>	<b>(103,217)</b>	<b>(62,837)</b>	<b>(114,247)</b>
Terminal value			4,373	11,475	5,144	13,500	4,527	11,880		
<b>Project cash flow (including terminal value)</b>	<b>(58,235)</b>	<b>(105,880)</b>	<b>(77,716)</b>	<b>(119,997)</b>	<b>(61,438)</b>	<b>(87,199)</b>	<b>(62,079)</b>	<b>(91,337)</b>	<b>(62,837)</b>	<b>(114,247)</b>
Development charges offset			5,773	6,647	6,803	7,834	5,973	6,878		
<b>Project cash flow (including terminal value &amp; development charges offset)</b>	<b>(58,235)</b>	<b>(105,880)</b>	<b>(71,943)</b>	<b>(113,350)</b>	<b>(54,635)</b>	<b>(79,365)</b>	<b>(56,106)</b>	<b>(84,459)</b>	<b>(62,837)</b>	<b>(114,247)</b>

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