Request for Information #RFI-1158-2017

for

Mixed Waste Transfer and Pre-sorting, Organics Processing, and Beneficial use of By-Products/End Products

for the Regional Municipality of Durham

Appendix C, Background

RFI Document 4 of 4

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Appendix C, Background

1. Study Background

The Regional Municipality of Durham (Region) is continually evaluating options to improve the performance of its integrated waste management system for efficiency, changes to provincial policies and regulations and the continuing drive to increase diversion.

In 2009, Regional Council approved a Works Committee Report (#2009-WR-5) titled "Moving Towards a 70% Diversion Target for Municipal Solid Waste." Having achieved the Region's previous 50 per cent diversion target, largely through implementation of the curbside Green Bin organics collection and processing programs, the 2009 report outlined recommendations to increase the Region's solid waste diversion rate to the new 70 per cent target. Options identified in the study included expansion of diversion programs in both the single family and multi-residential sector, and greater extraction of divertible materials, including organics, which remained within the garbage disposal stream, despite successful Blue Box and Green Bin programs.

Since 2009, several diversion initiatives investigated and/or implemented resulted in or had potential to result in only small incremental increases to the Region's diversion rate (e.g. clear bags, bag limits, by-law enforcement, additional education and promotion, user fees and re-use pilots). Greater diversion potential was anticipated with the expansion of organics diversion, however factors related to technology, scale of implementation and cost were also deemed significant and requiring additional due diligence.

In 2012, Regional Council directed staff to complete a preliminary investigation of anaerobic digestion (AD). Kelleher Environmental Inc. was retained to complete the technical review and analysis of AD technologies. The resulting Kelleher

Report confirmed that AD technology could provide a solution to expand the Region's organics program to include more problematic materials and introduce source separated organics collection to the Region's multi-residential sector.

In 2013, a comprehensive waste composition analysis of multi-residential households in Durham Region determined that the multi-residential waste stream is comprised of up to 50 per cent organic materials, which could potentially be diverted.

In 2016, staff built on the findings of the Kelleher Report, retaining HDR Corporation to conduct technical feasibility and due diligence analysis of available technologies that could potentially deliver more comprehensive organics processing. HDR's assessment concluded:

- Mixed waste processing or pre-sorting offers the best solution for capturing and diverting organics from the multi-residential sector and has the highest potential to significantly increase organics recovery from the single-family sector.
- Technology options for both sorting of mixed waste to separate organics from the waste stream and AD processing of organics have reached a maturity level in the industry that would provide the Region with reliable options for the potential development of such a processing system.
- There is a range of AD processing technologies which could be adopted for the Region's organic waste stream.
- The Region generates sufficient organic waste to support a mixed waste pre-sorting and AD facility.

The Region's 2016 Solid Waste Management Servicing and Financing Study identified other major drivers of the feasibility study, including: organic processing capacity limits which were constraining opportunities for diversion program expansions; and, existing organics processing contracts that were nearing the

end of their contract terms. Regional Council approved the recommendations of this Study (Regional Report #2016-J-7) to issue a Request for Proposal (RFP) to obtain financial and technical advisors with adequate knowledge of anaerobic digestion technology, business case analysis, risk and service delivery analysis and conduct the feasibility study.

Based on Regional Council direction of February 17, 2016 Regional staff retained (through RFP #602 2016) the consultant GHD Limited to complete a study of long term organics management options including anaerobic digestion. The objectives of the feasibility study were to explore suitable AD technologies and associated regulatory, market and other requirements, as well as conduct a preliminary business case and service delivery analysis as part of the broader exploration of viable long term organics management options to determine if AD would be the best long term organics waste management option for the Region.

On June 14, 2017, Regional Council received the results of the work completed by GHD and directed that the Region issue a RFI process with the continued assistance of GHD. It is hoped that this process will provide benefits by confirming or identifying additional viable organics management options that may be available and will allow the Region to confirm and/or update the business case for presentation to Regional Council in support of a 2018 decision to initiate implementation of a long term organics management plan.

1.1 Region of Durham Waste Management System

The Region manages municipal solid waste within its jurisdiction serving single family (SF) residences and multi-family residential properties (multi residential) (MR) from Pickering, Ajax, Clarington, Brock, Scugog, Uxbridge, Whitby, and Oshawa.

1.1.1 Waste generation and Housing Projections

The Region managed approximately 218,989 tonnes of municipal solid waste in 2016, of which approximately 111,100 tonnes were diverted from disposal. This total excludes composter and grasscycling program credits (9,566 diversion tonnes) which also contribute to the current diversion rate.

The majority (87 per cent) of the Region's waste is collected curbside with the remainder being collected at the Region's three waste management facilities (WMFs) that are open to the public. The actual waste tonnages generated between 2012 and 2016 from the Region's curbside collection program, WMFs, residual material from its Material Recover Facility (MRF), source separated organics (SSO), and leaf and yard waste between are presented in Table 1. Figure 1 provides a general flow diagram of waste movement in the Region.

Table 1: Mixed Waste, SSO, and Leaf and Yard Waste Tonnages

Year	Mixed Waste Single Family	Mixed Waste Multi-Residential	Mixed Waste WMFs	SSO SF/MR	Leaf and Yard Waste SF	Leaf and Yard Waste WMFs
2012	74,617	13,867	17,448	26,899	23,778	1,695
2013	76,125	13,739	17,926	27,486	23,593	1,675
2014	77,350	13,626	17,734	27,007	30,033	2,090
2015	77,602	13,495	17,605	26,796	25,588	1,966
2016	77,356	13,397	15,208	27,612	22,865	1,865

Waste volumes are anticipated to grow over time due to household growth, however impacts are also anticipated due to waste volumes per household that can shift based on the province’s extended producer responsibility programs and housing density and occupancy. While low density housing (e.g. singles and

semis) currently represents approximately 48 per cent of existing households, the new Seaton community in Pickering will have a reduced mix of low density housing (to approximately 35 per cent), with medium density housing (e.g. townhouses) at approximately 38 per cent of the total. This is compared to Townhouses representing approximately 26 per cent of existing households across the Region currently.

The overall number of households in Durham is expected to increase from approximately 230,530 in May 2017 to approximately 260,870 by May 2022. This assumes the increased growth in Pickering, resulting from the new Seaton development (an added 5,700 Pickering households between 2018 and 2022).

Table 2: Durham Region Household Growth Estimates

	Ajax	Brock	Clarington	Oshawa	Pickering	Scugog	Uxbridge	Whitby	Durham
2017	37,815	4,555	33,570	63,340	31,220	8,230	7,795	44,005	230,530
2018	38,630	4,710	34,220	64,750	32,220	8,330	7,770	44,430	235,060
2019	39,550	4,780	35,200	65,540	33,700	8,540	7,820	45,160	240,290
2020	40,660	4,850	36,100	66,630	35,850	8,730	7,880	46,060	246,760
2021	41,920	4,900	37,040	67,890	38,050	8,870	7,930	47,070	253,670
2022	43,160	4,950	38,000	69,130	40,420	9,010	7,980	48,220	260,870

1.1.2 Waste Collection and Processing

Durham's curbside residual mixed waste is currently collected and transferred through transfer stations provided through private sector contracts.

The collected SSO material is processed by a private contractor to generate compost that meets the current Ontario Composting Guidelines for 'AA' grade compost.

Leaf and yard waste is also processed by private contractors. The leaf and yard waste collected in Ajax and Pickering is co collected with the SSO and processed at the composting facility in Pickering. The remaining leaf and yard waste organics is processed at a private sector outdoor compost facility in the Municipality of Clarington.

Recyclable material is processed at the Region owned material recovery facility (MRF), which is operated by a private contractor.

The Region's mixed waste is disposed of at the Durham York Energy Centre (DYEC), an energy from waste facility which is operated by a private contractor under a design, build, operate and maintain contract. The facility is co-owned by Durham Region (78.6 per cent) and York Region (21.4 per cent).

The following is a summary of the waste management facilities currently utilized by the Region, excluding closed landfills:

- Oshawa Waste Management Facility (WMF), 1640 Ritson Road North, City of Oshawa.
- Brock WMF, C22480 Brock Sideroad #17, Township of Brock.
- Scugog WMF, 1623 Reach Street, Port Perry, Township of Scugog.
- Clarington MHSW facility (under design/construction), Regional Road #57, Municipality of Clarington.
- Private Pickering MHSW facility, 1220 Squires Beach Road, City of Pickering.
- Private transfer station and organics in-vessel composting processing facility, 1220 Squires Beach Road, City of Pickering.

- Private windrow/outdoor compost processing facility, 1100 Hancock Road, Municipality of Clarington.
- Private transfer station, 2000 Wenthworth Street, Town of Whitby.
- Durham Region Waste Management Centre, 4600 Garrard Road, Town of Whitby.
- Durham Material Recovery Facility, 4590 Garrard Road, Town of Whitby.
- Durham York Energy Centre (DYEC), 1835 Energy Drive, Municipality of Clarington.

The facility locations are shown on Figure 2.

In April, 2010, a GIS-based waste transfer logistics modelling study was completed by consultant Golder Associates and based on haul time, distance and cost metrics a centralized transfer location for receipt of Durham's residential waste collection was recommended by Golder.

In December, 2012, AECOM completed a "Waste Optimization Study for 4600 Garrard Road." The Region owns land at 4600 Garrard Road which may be available for future waste management requirements (approximately 3.2 hectares). The site is one option that remains under consideration as a potential future transfer location, as recommended by AECOM. Other potential transfer options continue to be explored through this RFI.

1.2 Waste Collection, Processing, and Disposal

1.2.1 Program Overview

The Region manages the collection of Blue Box in all eight lower tier municipalities as well as mixed waste, recyclables, SSO, and leaf and yard waste from six lower tier municipalities within the Region (The Cities of Oshawa and Pickering, Townships of Brock, Scugog and Uxbridge and the Municipality of Clarington). The Town of Whitby and City of Oshawa are the exception, and manage their own collection of mixed waste, SSO, and leaf and yard waste. The

Region's collection services are contracted to private firms, who concurrently collect mixed waste with SSO. Mixed waste is collected every two weeks; recyclables and SSO are collected weekly. Leaf and yard waste is collected every two weeks from May to December.

The Region also collects mixed waste, leaf and yard waste, recyclables, and other materials at its WMFs in Oshawa, Scugog, and Brock. Other materials collected at the WMFs include municipal household special waste (MHSW), bulky goods, waste electrical and electronic equipment (WEEE), metal goods, bulky white polystyrene, used tires, agricultural bale wrap plastic signs, porcelain, drywall, and wood.

The transfer of the material from the WMFs is completed by private contractors or managed by material stewards.

The Region also has a program for the curbside collection of batteries, which are then processed by a private contractor.

1.2.2 Services for the Single Family (SF) Residential Sector

The Region provides mixed waste collection services, SSO and leaf and yard waste and recyclables pick up to single family homes and Business Improvement Areas (BIAs) in the City of Pickering, Town of Ajax, Municipality of Clarington, and Townships of Brock, Scugog, and Uxbridge.

The City of Oshawa and Town of Whitby provide the same collection services to single family homes and BIAs in their municipalities.

1.2.3 Services for the Multi-Residential (MR) Sector

The Region provides waste collection services and recyclables pick up to approximately 24,000 low to medium density multi-residential (MR) units (e.g. apartments, townhomes and condominiums) in The City of Pickering, Town of Ajax, Municipality of Clarington and Townships of Brock, Scugog, and Uxbridge.

The Region also provides collection of SSO from low to medium density MR sites along with collection of WEEE from 51 low to medium density MR units and batteries from 54 low to medium density MR units.

There is no SSO collection by the Region at high density MR sites (high rise apartments) and the Region is not considering the expansion of the SSO program to include high density MR sites. These locations present unique challenges for collection of SSO, based in part on the lack of local site infrastructure for separation of the waste stream.

Therefore, the MR sector being considered for a future long-term organics management strategy is limited to low and medium density MR sites.

1.2.4 Source Separated Organic (SSO) Materials

The Region's SSO program includes the collection of the following items:

- Food Waste: all vegetables (cooked/raw/whole/peelings), corn cobs and husks, all fish and fish products (cooked/raw), all fruits and fruit products (cooked/raw/whole/peelings/cores/seeds/pits) , tea bags, bones, all meat and meat products (cooked/raw), all shellfish and shellfish products (cooked/raw), all poultry and poultry products (cooked/raw), seasonings and spices, frozen foods, breads, cakes, cookies, muffins, pasta, toast, coffee grounds, paper coffee filters, plate scrapings, baking wastes, and dairy products.
- Paper Fibre: Molded pulp paper egg cartons, molded pulp paper beverage trays, paper towels, tissues, napkins/serviettes, paper plates and paper cups (no lids), soiled paper food containers and wraps (i.e. frozen food boxes, pizza boxes, fast food boxes and wraps, special event paper food containers), muffin paper, butcher paper, paper table cloths.
- Other Compostable Items: Hair, sawdust, wood shavings, wooden stir sticks, wooden cutlery, dryer lint, bedding from pet cages, house plants

with or without soil, flowers, cold fireplace ash, wooden toothpicks, garden fruit (e.g., crabapples), hair, pet food, pet fur, Halloween pumpkins, gourds, dried decorative fruits and vegetables, natural wreaths, natural garland, cotton balls, sawdust.

- Liner Bags: The Region permits residents to use ether paper or compostable bags to line their SSO bins (green bins)
- The following materials are not currently collected within the Region's SSO program:
- Animal Waste: Animal waste and cat litter;
- Personal Products: Diapers, sanitary products, and incontinence products;
- Paper Fibre: Coffee cups; or,
- Liner Bags: Plastic bags.

The complete list of acceptable and non-acceptable household organic waste collection in the SSO program is provided in Schedule "F" to By Law 46 2011.

1.2.5 Leaf and Yard Waste Materials

The Region permits the following materials in its leaf and yard waste collection program: brush and thatch, Christmas trees, fallen fruit from trees, gourds, garden trimmings, hedge and tree trimmings/branches, house and garden plants, leaves, pumpkins, and decorative corn stalks.

1.2.6 Organics Collected from the Region’s Waste Management Facilities (WMF)

Based on available audit data, WMF waste has an organic content that is low, given that most Regional residents make use of curbside waste collection and likely use the WMFs only for excess or bulky mixed waste.

The mixed waste collected at the WMFS has been shown to have little organic content. The types and tonnes of materials collected at the WMFs are shown in Table 3.

Table 3: Waste Management Facility Tonnes (2016)

Bulky Items	Blue Box Material	Leaf and Yard	Other Diversion	Total Waste
15,208	560	1,865	10,395	28,028

1.2.7 Waste Disposal

The Region disposes of mixed waste collected from the SF sector, the MR sector, and its three WMFs through its DYEC design build operate and maintain (DBOM) contract.

The Regional Municipality of Durham and the Regional Municipality of York jointly own the DYEC. The service area for the DYEC is the jurisdictional boundaries of The Regional Municipality of Durham and the Regional Municipality of York.

The DYEC is permitted under Environmental Compliance Approval (ECA) No. 7306 8FDKNX, which sets out the requirements for the development and operation of the entire DYEC site.

The accepted waste is limited to solid non-hazardous residual waste from domestic waste and limited Industrial, Commercial, and Institutional (IC&I) waste from the Regions' curbside collection and/or from the Regions' WMFs.

The throughput capacity of the DYEC is 140,000 tonnes of waste per year. Of this, the Regional Municipality of Durham provides 110,000 tonnes.

1.3 Mixed Waste Generated and Potential for Additional Diversion

1.3.1 Mixed Waste Generation

Table 3 provides a high level projection of the mixed waste generated from SF and MF households, while assuming constant capture rates and waste composition shares through time. These projections are based on 2015 waste

generation rates for SF and MF households multiplied by the pre-Census estimates of household growth to 2041.

Table 4: Residual Mixed Waste Projections (tonnes per year)

Year	2016	2021	2026	2031	2036	2041
Single Family (SF)	78,000	87,000	100,000	114,000	126,000	140,000
Multi Residential (MR)	14,000	15,000	19,000	22,000	24,000	27,000
Total	**92,000**	**102,000**	**119,000**	**136,000**	**150,000**	**167,000**

1.3.2 Waste Composition

The Region commissioned waste audits in 2010 (WMF), 2011 (SF) and 2013 (MR) to determine the amounts of divertible organic materials in the SSO stream and disposed within mixed waste volumes.

The studies found that:

- Recovery of organics from the Region's WMFs presents limited opportunities (estimated at less than 250 tonnes per year);
- The estimated percentage of organic material captured by the existing SSO Program is 54 per cent (this represents the percentage of the available household/kitchen organics in the total waste stream from the SF sector that is collected as SSO by the Green Bin program);
- The organics content of SF mixed waste is estimated at approximately 47 per cent;
- The organics content of MR mixed waste stream is estimated at 49 per cent.

1.3.3 Potential Recyclables Recovery from Mixed Waste

While not all recyclable material available from the mixed waste stream will be suitable for diversion, Table 5 below provides an estimate of the amount of recyclables within Durham's mixed waste stream.

Table 5: Estimated Recyclables in Durham's Mixed Waste

Recyclable Material	Percent by weight in SF Mixed Waste[1]	Percent by weight in MR Mixed Waste[2]	Recovery Efficiency
Ferrous Metals	0.3%	0.7%	90%
Non-Ferrous Metals	0.5%	0.7%	90%
PET	1.2%	1.3%	85%
HDPE	0.4%	0.4%	85%
Rigid Mixed Plastic Containers	0.4%	0.5%	75%
Other Plastics	16.2%	6.5%	0%
Paper	6.2%	12.1%	0%
Glass	0.5%	1.0%	0%

1. Region of Durham Large Blue Box Container Study, AET Group, December 2011, Average June and November Audits
2. Multi-Residential Waste Composition Study, AET Group, December 2013

Table 6 summarizes estimated recyclable material in Durham's mixed waste including the SF and MR mixed waste, consistent with Table 5.

Table 6: Potential Recoverable Recyclables from Mixed Waste (tonnes per year)

Year	2016	2021	2026	2031	2036	2041
Ferrous Metals	300	300	400	500	500	600
Non-Ferrous Metals	500	500	600	700	800	800
PET	900	1,100	1,200	1,400	1,500	1,700
HDPE	300	300	400	400	500	500
Rigid Mixed Plastic Containers	300	300	400	400	500	500
Total	2,300	2,500	3,000	3,400	3,800	4,100

1.3.4 Organics Recovery from Mixed Waste (SF and MR)

Based on the following assumptions, Table x estimates the material that may be recoverable from the Region's mixed waste stream:

- An organics capture rate of 54 per cent for the SSO single family program.
- Approximately 80 per cent of the incoming organics are recoverable from mixed waste.
- The contamination rate of Organic Fraction of Mixed Waste (OFMW) is estimated at 20 per cent.
- Approximately 65 percent of the incoming organics are recoverable.

Table 7: Potential Recoverable Organic Material from Mixed Waste (tonnes per year)

Year	2016	2021	2026	2031	2036	2041
Single Family (SF)	78,000	87,000	100,000	114,000	126,000	140,000
Multi Residential (MR)	14,000	15,000	19,000	22,000	24,000	27,000
Total	**92,000**	**102,000**	**119,000**	**136,000**	**150,000**	**167,000**

Note:
This projection is based on an estimated organics capture rate of 54 per cent and pre-Census household growth projections. The organic fraction of SF waste is estimated at 47 per cent and the organic fraction of MR waste is estimated at 49 per cent. Recovery of organic materials is estimated at 80 per cent of incoming tonnage.

1.3.5 Potential Organics Recovery

The potential organic material available is the sum of the SSO material collected from SF units, the recoverable organics from the mixed waste collected from the SF sector, and the recoverable organics from the mixed waste collected from the MR sector.

The potential available organic material is presented in Table 8 based on 2010 audit data of the Region's WMFs, recovery of organics would be limited (estimated at less than 250 tonnes/year).

Table 8: Total Potential Recoverable Organic Material (tonnes per year)

Year	2016	2021	2026	2031	2036	2041
Mixed Waste	34,000	39,000	45,000	51,000	57,000	63,000
SSO	27,000	30,000	34,000	39,000	43,000	48,000

Year	2016	2021	2026	2031	2036	2041
Total	**61,000**	**69,000**	**79,000**	**90,000**	**100,000**	**111,000**

1.3.6 Estimated Tonnages

This section provides high level estimations of the potential mixed waste, recyclables, OFMW and SSO. These projections are based on the assumptions as outlined in the section. Respondents are encouraged to develop their own projections based on the information provided when considering facility sizing.