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Ridge Landfill Expansion Environmental Assessment

SUPPORTING DOCUMENT 1:

Needs/Opportunity Assessment

Progressive Waste Solutions

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Environmental Assessment Preparation for the Ridge Landfill

Needs/Opportunity Assessment

June 2016 – 15-2456

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1.0 Introduction

The Ridge Landfill is located near Blenheim, Ontario and operated by Progressive Waste Solutions (PWS). The landfill is expected to reach its current approved capacity by 2022. The site is currently licensed to receive waste from the Industrial, Commercial and Institutional (IC&I) sector from across Ontario, and residential waste from the Municipality of Chatham-Kent and the Counties of Essex, Lambton, Middlesex and Elgin.

The purpose of this assessment is to determine if there is a need and/or opportunity for PWS to provide additional disposal capacity in southern Ontario beyond 2022. Four tasks were completed to provide a high level assessment of the current and expected quantities of IC&I and residential waste generated in southern Ontario:

- ***Task 1*** – Future potential quantities of waste generated, diverted and disposed over a 20-year planning period were projected for both residential and IC&I waste in southern Ontario. The projections included three scenarios, each based on a different assumption as to how much waste could be diverted from landfill.
- ***Task 2*** – Major disposal facilities in southern and eastern Ontario that receive both residential and non-residential residual waste were researched. The remaining capacity was estimated for each landfill over its expected life.
- ***Task 3*** – Research was conducted to determine the total quantity of Ontario waste being transported and disposed of at landfills in the United States (US).
- ***Task 4*** – Based on the information and estimates from tasks 1 to 3, the waste disposal capacity needs for southern Ontario were identified.

This Needs/Opportunity Assessment was developed under the following key assumptions:

- that a 20-year planning period from 2022 to 2041 will be used; and,
- that the Ridge Landfill residential service area will expand to all of Ontario.

Secondary sources were consulted for information on existing waste facilities in southern Ontario. Southern Ontario was defined as central Ontario, southwestern Ontario and the Greater Toronto Area (GTA) (see **Figure 1**).

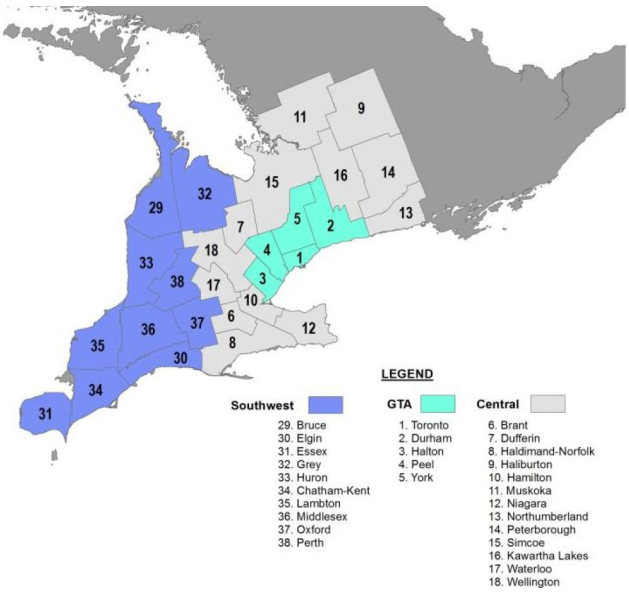


Figure 1: Map of Southern Ontario

This report focuses on residual waste; however, it is important to mention the opportunities associated with the management of diverted waste. In the residential sector, "Blue Box" collection programs are well established and refinements are continually made to accommodate changes in product packaging and availability of end markets for recyclable materials. Organic (i.e., compost) collection programs continue to be implemented and existing programs have shown an increase in the rate at which waste is captured from residences1. Overall, residential waste diversion rates have been increasing, but not at a fast pace. For the IC&I sector, the data from Statistics Canada reported a decrease in non-residential waste diverted between 2008 and 2010. Overall, IC&I diversion rates have been steady at around 12% between 2006 and 2010. Despite the Provincial target that 60% of all waste products be diverted from landfill, generally no more than 25% of all waste products have been diverted from landfill over the last decade.

In November 2015, the Province of Ontario introduced the proposed Waste-Free Ontario Act (Bill 151) and Draft Strategy. The Draft Strategy outlines a resource recovery and waste reduction road map for Ontario which targets greater diversion of waste from landfills through policies such as Extended Producer Responsibility (EPR), disposal bans, reduce, reuse and recycle regulations under the Environmental Protection Act, and the development and implementation of an Organics Action Plan. Through this initiative the Province is targeting to achieve zero waste and zero greenhouse gas emissions from the waste sector. Bill 151 was passed on June 1, 2016. Implementation will begin in 2017 and be carried out over a number of years.

2.0 Waste Forecast

The first step in the needs assessment involved estimating the amount of waste that would be generated in southern Ontario over the 20-year planning period. A determination of how much waste would be generated and how much would be diverted from landfill led to an overall estimate of how much waste disposal capacity would be needed in southern Ontario from 2022-2041.

Population projections to 2041 were obtained from the Ministry of Finance.[2] These projections show that by the end of the 20-year planning period (2041), it is anticipated that almost 83% of Ontario's population will live in southern Ontario[3]. This represents a change from 2006 population information which identified that approximately 80% of Ontario's population resided in southern Ontario.

[1] Waste Diversion Ontario (WDO) 2014 Data Report #3 – Organics Trends (Residential)
[2] Population data was obtained from the Ministry of Finance's report *Ontario Population Projections (2013-2041),* Fall 2014 - Based on the 2011 Census.
[3] Population data was obtained from the Ministry of Finance's report *Ontario Population Projections (2013-2041),* Fall 2014 - Based on the 2011 Census.

Historical employment data (2010 to 2014) for all of Ontario was obtained from Statistics Canada. Projections for employment were based on data obtained from the Ministry of Finance's report *Ontario's Long-Term Report on the Economy*, 2014 which provides projected annual growth rates in employment from 2014 to 2035. To generate employment data specific to southern Ontario, the same allocation used for the population data was applied to the employment data (i.e. the assumption that over the planning period employment will change from 80% in southern Ontario to 83% in southern Ontario).

Current estimates of the quantity of waste diverted and sent to disposal by the residential and IC&I sectors in Ontario were based on Statistics Canada's *Waste Management Industry Survey* (2010) data. ***Table 1*** provides data regarding the total and per-capita amount of waste generated, disposed, and diverted from landfills in Ontario for 2006, 2008 and 2010. Between 2006 and 2008, although the quantity of total waste generated increased, the quantity of waste disposed decreased due to more waste being diverted from landfills. Between 2008 and 2010, the total quantity of waste generated and sent to disposal in Ontario decreased, and there was also a slight decrease in the total quantify of waste diverted from landfills.

Estimates of residential waste diversion rates vary. Statistics Canada estimates that 38% of residential waste was diverted from landfills in 2010. Statistics Canada defines diversion on the basis of materials that enter the waste stream. In comparison, Waste Diversion Ontario (WDO) estimates that up to 44% of residential waste was diverted in 2010, however WDO uses a definition of diversion that includes materials that are diverted after entering the waste stream, plus allowances for containers collected at the LCBO, on-property management (e.g., grasscycling, backyard composting) and municipally-operated reuse activities.

Table 1: Waste Quantity Estimates in Ontario, 2006-2010 (Statistics Canada)

Ontario	2006	2008	2010
Total Waste Generated (tonnes)	**12,107,315**	**12,413,389**	**11,996,462**
Total Waste Generation Per Capita (kg)	956	960	907
Total Waste Disposed (tonnes)	**9,710,459**	**9,631,559**	**9,247,415**
Waste disposal per capita (kg)	767	745	699
Residential waste disposed (tonnes)	3,411,642	3,231,399	3,204,263
Non-residential waste disposed (tonnes)	6,298,818	6,400,160	6,043,151
Total Waste Diverted (tonnes)	**2,396,856**	**2,781,830**	**2,749,047**
Waste diverted per capita (kg)	189	215	208
Residential waste diverted (tonnes)	1,511,467	1,849,828	1,996,057
Residential diversion rate (%)	31%	36%	38%
Non-residential waste diverted (tonnes)	885,389	932,001	752,990
Non-residential diversion rate (%)	12%	13%	11%

Per-capita and per-employee waste generation rates for 2010 were applied to population and employment projections to estimate the future requirements for waste management in southern Ontario over the planning period. ***Table 2*** provides the projected population and employment levels and total quantities of waste estimated to be generated by the residential and IC&I sectors for 2010, 2022, 2031 and 2041 in southern Ontario.

Table 2: Projected Population, Employment and Total Waste Generated (2010–2041)

Year	Projected Population	Projected Employment	Total Waste Generated (tonnes)	
			IC&I	Residential
2010 (actual)	10,600,000	5,282,000	5,437,000	4,160,000
2022	12,136,000	6,126,000	6,306,000	4,763,000
2031	13,408,000	6,581,000	6,774,000	5,262,000
2041	14,747,000	7,255,000	7,468,000	5,788,000

These estimations were done based on three scenarios of waste diversion (low, medium, and high). Each scenario was based on a different assumption regarding how much waste could be diverted from landfill. These assumptions are shown in **Table 3** and described below.

Table 3: Projected Diversion Rates (2010 – 2041)

	2010 (actual)	2022	2031	2041
Scenario 1 - Low Diversion				
IC&I Diversion Rate	11%	12%	12%	12%
Residential Diversion Rate	44%	45%	45%	45%
Scenario 2 - Medium Diversion				
IC&I Diversion Rate	11%	16%	25%	35%
Residential Diversion Rate	44%	48%	51%	55%
Scenario 3 - High Diversion				
IC&I Diversion Rate	11%	17%	38%	60%
Residential Diversion Rate	44%	53%	60%	65%

In Scenario 1 (Low Diversion), it is assumed that the IC&I diversion rate will not exceed the 2006 to 2010 historical rate and thus will remain around 12%. Residential waste diversion rates increased from 44% in 2010 to 48% in 2014 (WDO, 2014). The difference between the 2010 Statistics Canada residential diversion rate and the 2010 WDO diversion rate is 6%. Noting that 2013 WDO reports on the Blue Box and Green Bin programs indicate increases in capture rates, it is assumed that the diversion rate in 2014 is 45% which is applied during the planning period for this scenario.

In Scenario 2 (Medium Diversion), it is assumed that the waste diversion rates in the residential sector will increase from 45% in 2014 to 55% by 2041. It is assumed that waste diversion rates in the IC&I sector will increase to 16% by 2022 and then 35% by 2041.

In Scenario 3 (High Diversion), it is assumed that the residential sector will achieve the Provincial waste diversion target of 60% by 2030, increasing to 65% by 2041. It is assumed that waste diversion rates in the IC&I sector will increase to 17% by 2022 and will meet the Provincial diversion target by 2041.

This approach does not take into account the fact that waste generation has slowly been decreasing due to lightweight packaging and reduction efforts by producers. A sensitivity analysis was conducted on Scenario 2 (Medium Diversion) to see how a reduction in the per capita waste generation rate would impact the projected quantities of residual waste (the amount of waste left to send to landfill after diversion has been accounted for). It was assumed that the per capita waste generation rate for both sectors in 2041 would be 10% less than the rate of waste generation in 2010.

The following graphs illustrate the results of the projections using each of the projection scenarios and sensitivity analysis (noted as "SA – Med" in the legend). **Figure 2** illustrates the projected amount of residential waste that would need to be sent to landfill after accounting for diversion.

Figure 3 illustrates the same for the IC&I sector. **Figure 4** illustrates the projected total amount of waste from both sectors (residential and IC&I) that would need to be sent to landfill after accounting for diversion throughout the planning period.

Figure 2: Residual Waste Remaining, 2022-2041 (Residential Sector)

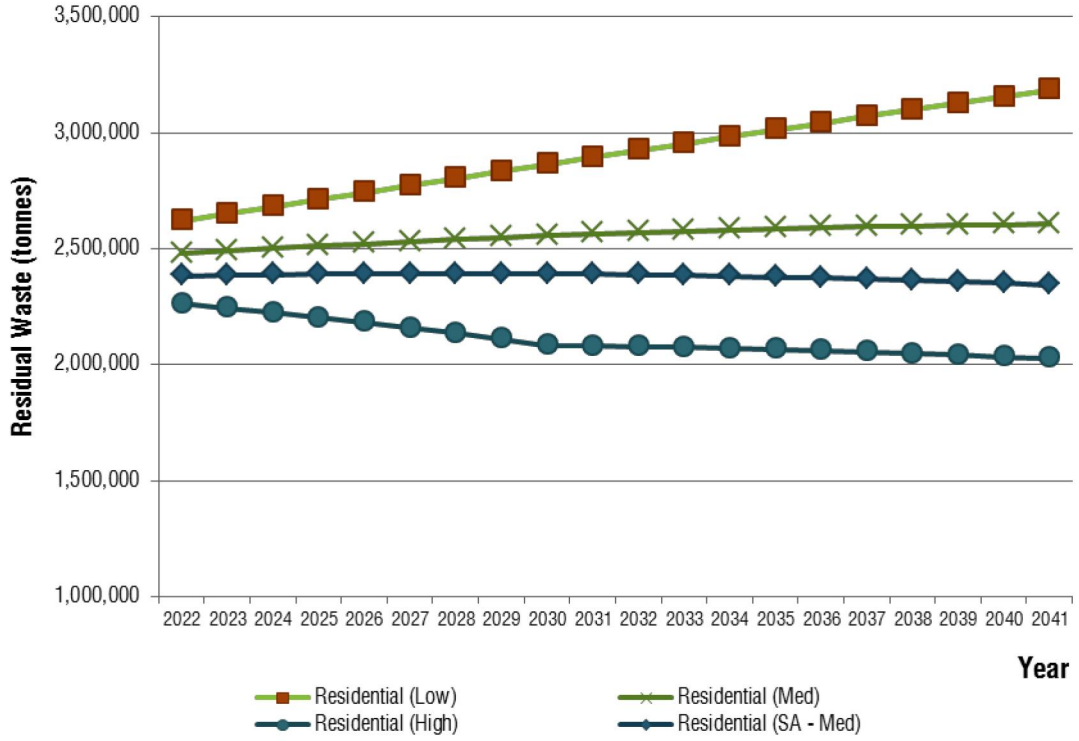


Figure 3: Residual Waste Remaining, 2022-2041 (IC&I Sector)

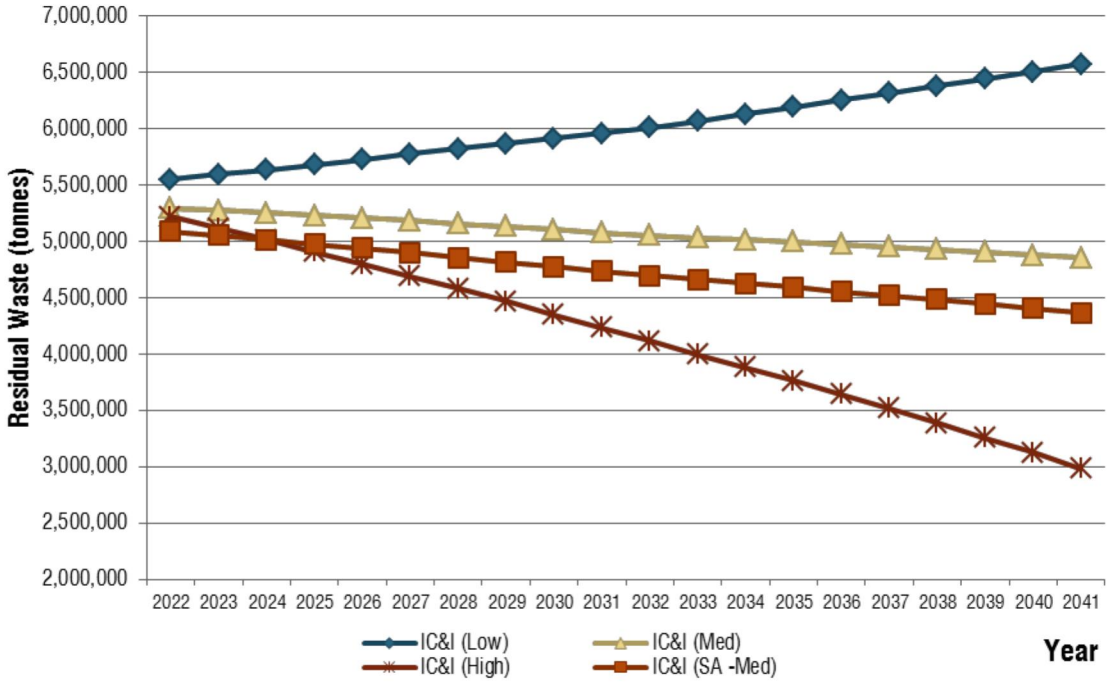
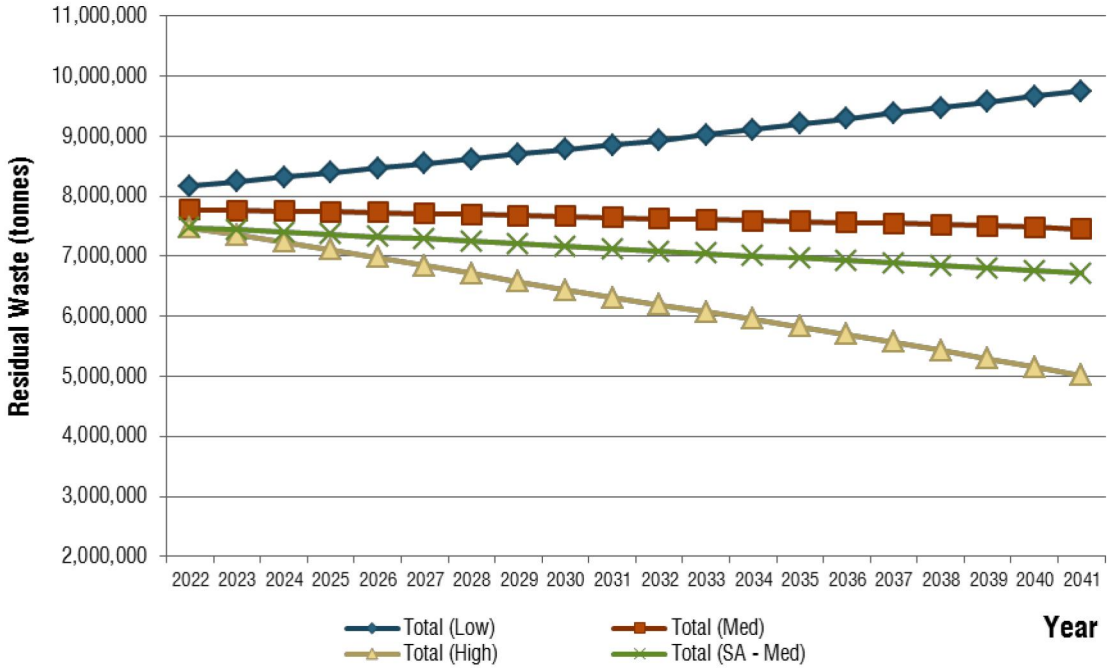


Figure 4: Residual Waste Remaining, 2022-2041 (Combined)



In Scenario 1, the amount of residual waste that must be sent to landfill increases with population and employment growth. In Scenario 2, residual waste quantities remain relatively flat over the planning period. In Scenario 3 the projected amount of residual waste decreases as diversion rates increase. Detailed descriptions of the projection results are provided in ***Appendix A***.

3.0 Major Disposal Facilities

Research was conducted to identify landfills in Ontario with an annual fill rate of 100,000 tonnes or more (considered as major disposal facilities) and estimate their remaining site capacity. Major landfills located in southern Ontario were identified as well as major landfills located in Eastern Ontario that are permitted to accept waste from the Province of Ontario. The information was gathered primarily from the large landfill sites directory[4] of the Ministry of Environment and Climate Change (MOECC) and from landfill websites. The MOECC directory provides the following information as part of site profiles for large landfills:

- ECA number
- ECA issue date
- Service area
- Approved waste types
- Total site area
- Footprint
- Total approved capacity
- Fill rate
- Estimated remaining capacity
- Total waste received
- Last reporting year

There are fifteen landfills in southern Ontario that have annual fill rates of 100,000 tonnes or more. ***Table 4*** provides summaries of their available capacities and approximate year at which they will reach capacity. Detailed information about each of the identified landfills is provided in ***Appendix B***. Data on existing and planned large landfills in eastern Ontario that have (or are anticipated to have) approved service areas covering the entire province is also provided in ***Appendix B***.

Two estimates of remaining site life were prepared for each landfill: the first uses the approved fill rate, and the second uses the actual amount of waste sent to landfill from the previous reporting year. Among the fifteen landfills studied, almost five million tonnes of waste were received in total during the previous reporting year; however, these fifteen landfills have approval to receive 7.3 million tonnes of waste each year. ***Table 4*** provides a summary of the reported remaining capacity and estimated year at which capacity will be reached at each landfill.

[4] Map of Large Landfills in Ontario http://www.ontario.ca/environment-and-energy/map-large-landfill-sites

Table 4: Estimated Capacity and Site Life in Southern Ontario Large Landfills

Landfill	Reporting Year	Capacity Remaining in Reporting Year (m^3)	Estimated Year of Closure based on Approved Fill Rates[1]	Estimated Year of Closure based on Waste Received in Reporting Year[1]
Halton Regional Landfill	2010	5,060,000	2039	2058
Waterloo Landfill	2011	5,736,000	2021	2030
Niagara Waste Systems Limited Walker South Landfill	2011	16,322,000	2024	2025
Newalta Stoney Creek Landfill	2011	1,891,000	2013	2013
Glanbrook - Hamilton	2011	6,004,000	2019	2047
Humberstone - Niagara Region[2]	2011	442,000	2012	2016
Mohawk Street - Brantford	2011	7,789,000	2042	2080
Tom Howe- Haldimand	2011	205,000	2012	2015
Salford - Oxford County	2011	3,042,000	2029	2053
W12A - London	2011	4,305,000	2017	2025
Green Lane Landfill	2013	11,658,000	2029	2029
Twin Creeks - Lambton	2011	22,669,000	2032	2048
Petrolia - Lambton	2011	521,000	2012	2012
Ridge Landfill - Chatham-Kent	2013	11,105,000	2021	2023
EWSWA Regional Landfill	2011	8,282,000	2032	2037

1. Years of capacity remaining starts the year after the last reporting year.
2. An Environmental Assessment (EA) is being undertaken to expand the Humberstone Land fill and Alternative Methods are being established. The expansion would provide an additional 2.6 million m3 in capacity and extend the life of the landfill for another 25 years.

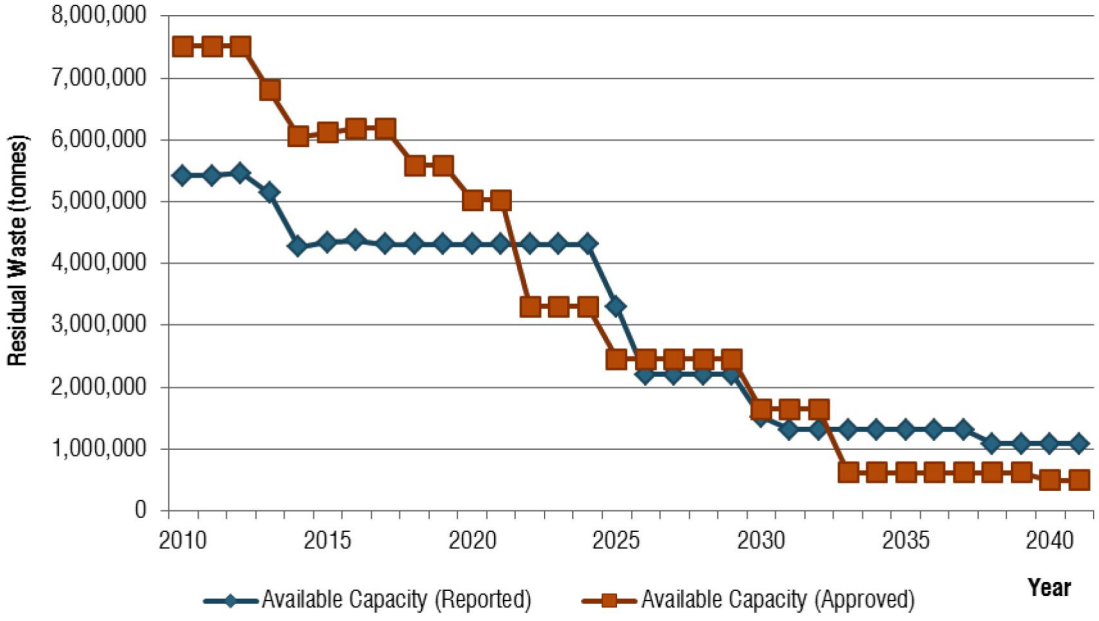
Three landfills are estimated to be near or at capacity (Newalta, Haldimand and Petrolia).

There are two one Waste to Energy (WtE) facilities currently operating in Southern Ontario (Emerald EFW Inc. and the Durham York Energy Centre). These WtE facilities are able to process approximately 176,500 tonnes of residual waste per year (Emerald EFW, 2016 and OPA, 2016).

Appendix B provides a summary of available details on the landfill expansion and WtE facilities.

Figure 5 illustrates the overall capacity available to handle residual waste in Southern Ontario from 2010 to 2041. This includes the remaining capacity of landfills and WtE facilities in Southern Ontario, but does not include operating or planned facilities in Eastern Ontario that have province-wide service areas.

Figure 5: Available Capacity To Manage Residual Waste (2010 – 2041)



Using approved annual fill rates to project future capacity, it is estimated that available annual capacity will decrease from 7.5 million tonnes per year in 2010 to 3.3 million tonnes per year by 2022 and further shrinking to 500,000 tonnes per year by 2041. Using projections based on the quantity of waste received, it is estimated that available annual capacity will decrease from 5.4 million tonnes in 2010 to 4.3 million tonnes per year by 2022 and further decrease to 1.1 million tonnes per year by 2041.

4.0 Quantities of Ontario Waste Transported to the US

The United States closed its border to the import of waste from large Canadian municipalities in 2010; however some residential and IC&I waste generated in Ontario are still being transported to and disposed of in the United States. This waste is sent for disposal in Michigan, New York and Ohio.

Table 5 outlines the quantity of waste exported from Ontario to Michigan between 2005 and 2013[5].

It is estimated that Canadian waste products accounted for 16.5% of all waste sent to landfill in Michigan in 2014. The majority of this waste was generated from the IC&I sector with small amounts coming from the residential sector. While landfills in Michigan are not required to report where their waste originates from, reporting by the Michigan Department of Environmental Quality assumes that the majority of waste from Canada comes from Ontario. In 2014, Ontario exported approximately 2.4 million tonnes of waste to eleven landfills in Michigan; this accounted for 22% of all waste sent to landfill in the province. In comparison, Ontario exported approximately one million tonnes of waste to landfills in New York in the same year (9% of all waste sent to landfill in Ontario).

[5] The information was gathered from the Ontario Waste Management Association (OWMA) and the *Report of Solid Waste Landfilled in Michigan (2014).* Note there are discrepancies with the data due to the different terminologies that are used in the US versus Canada. In the US, Municipal and Commercial waste are reported under the same category whereas in Canada, Municipal waste is reported separate from IC&I waste.

Table 5: Waste Exported from Ontario to Michigan (tonnes), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Municipal & Commercial Waste	3,430,222	3,406,941	3,129,575	3,159,032	2,665,332	2,549,195	2,032,940	1,827,202	2,011,139
Industrial Waste	161,653	247,474	191,624	83,297	72,664	45,918	38,604	108,107	154,217
Construction & Demolition Waste						52,963	40,118	110,366	157,472
TOTAL	**3,591,875**	**3,654,415**	**3,321,199**	**3,242,329**	**2,737,996**	**2,648,077**	**2,111,663**	**2,045,675**	**2,322,828**

Waste from Ontario accounted for approximately 13% of the total waste disposed in NY State Landfills in 2013. ***Table 6*** outlines the quantity of waste exported from Ontario to New York between 2005 and 2013[6]. In 2013, Ontario exported approximately 800,000 tonnes of waste to 7 facilities in New York; of this, approximately 273,000 tonnes was sent to Covanta Niagara, a WtE facility in Niagara County operated by Covanta Energy Corporation, with the remainder sent to six landfills across the state.

Table 6: Waste Exported from Ontario to New York State (tonnes), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Construction & Demolition Debris	58,894	23,841	20,808	54,369	23,219	52,054	133,528	246,894	160,247
Industrial Waste	16,738	16,440	16,498	40,470	43,502	45,337	54,554	48,719	74,740
Municipal Solid Waste	177,108	364,378	454,657	664,856	639,836	598,359	766,463	641,656	540,099
Petroleum Contaminated Soil	92								22
Sewage Plant Sludge	19,727	45,179	84,205	45,522	72,670	47,745	45,643	18,713	8,860
TOTAL	**272,558**	**449,838**	**576,168**	**805,216**	**779,227**	**743,496**	**1,000,189**	**955,982**	**809,477**

[6] The information was gathered from the OWMA and the Bureau of Permitting and Planning, Division of Materials Management (Albany, NY).

A small amount of waste is exported from Ontario to landfills in Ohio (15,531 tonnes in 2011, 11,441 tonnes in 2012, and 88,552 tonnes in 2013). Waste from Ontario accounted for approximately 2.5% of the total waste disposed of at landfills in Ohio in 2013.

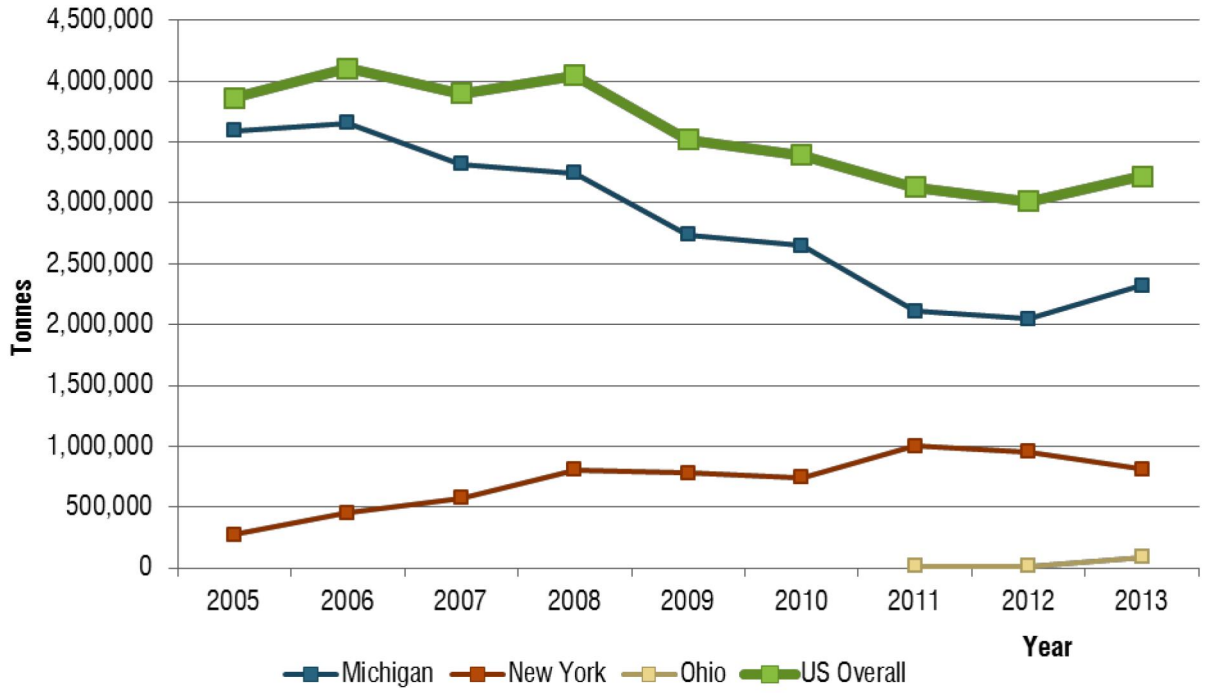
The values presented for waste exported from Ontario to Michigan and Ohio do not take into consideration waste sent to WtE facilities. However, due to the high processing cost compared to landfill disposal it is unlikely there are high volumes of waste from Ontario that are managed in this manner.

Table 7 and **Figure 6** show the consolidated quantities of waste exported to landfills and WtE facilities in the US. In 2013, approximately 3.2 million tonnes of waste from Ontario was exported for disposal at US landfills. It is assumed that the majority of this waste is generated in Southern Ontario.

Table 7: Total Waste Exported from Ontario to United States (tonnes), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Michigan	3,591,875	3,654,415	3,321,199	3,242,329	2,737,996	2,648,077	2,111,663	2,045,675	2,322,828
New York	272,558	449838	576,168	805,216	779,227	743,496	1,000,189	955,982	809,477
Ohio	-	-	-	-	-	-	15,531	11,441	88,552
US Overall	**3,864,433**	**4,104,253**	**3,897,367**	**4,047,545**	**3,517,223**	**3,391,573**	**3,127,383**	**3,013,098**	**3,220,857**

Figure 6: Waste Exported from Ontario to United States (2005 – 2013)



5.0 Waste Disposal Capacity Needs for Southern Ontario

The findings from the Needs/Opportunity Assessment provided the following information:

- Assuming diversion rates do not change from that currently achieved, the residential and IC&I sectors are projected to generate between 8 and 10 million tonnes of residual waste annually over the 20-year planning period.
- Assuming the IC&I sector achieves the Provincial target of 60% diversion by 2041 and the residential sector exceeds the target to achieve a waste diversion rate of 65% by 2041, it is projected that approximately 7 million tonnes of waste per year will need management by 2022, decreasing to 5 million tonnes per year by 2041.
- Based on approved annual fill limits, existing residual waste management facilities (landfills and WtE) are projected to have capacity to manage 3.3 million tonnes of waste per year in 2022 and 500,000 tonnes of waste per year in 2041.
- Based on the reported quantity of waste disposed in Southern Ontario landfills, the estimated capacity of residual waste management facilities is 4.3 million tonnes per year in 2022 and 1.1 million tonnes per year in 2041.
- US landfills disposed of approximately 3.2 million tonnes of Ontario waste in 2013.
- In 2010, 9.3 million tonnes of residential and IC&I waste was sent for disposal in Ontario. This includes approximately 5.9 million tonnes sent to landfills in southern Ontario, eastern Ontario (those with province-wide service areas), and WtE facilities; and approximately 3.4 million tonnes sent to US landfills7.

Figure 7 illustrates the projected quantity of residential and IC&I waste that will need to be managed on an annual basis through disposal in Southern Ontario compared to the estimated available annual disposal capacity according to the "Low" scenario over the 20-year planning period**. Figure 8** shows the same for the "Medium" scenario, and **Figure 9** the "High" scenario. In all three scenarios it is assumed that 3 million tonnes of waste will be exported on an annual basis to facilities in the US. Available capacity in Ontario does not include facilities in Eastern Ontario that have province-wide service areas, nor landfill expansions currently in the approvals process.

[7] It is noted that the 2010 disposal amount differs from the value reported by Statistics Canada, which reported 9.2 million tonnes of disposal reported in 2010. A potential reason for this difference is the assumption that the quantity of waste disposed in 2010 was the same as the quantity of waste disposed in the MOECC reporting year which was, in most cases, from 2011.

Between 2010 and 2014, the figures show that there is more disposal capacity available than residual waste generated in southern Ontario. It may be that the amount of waste exported to the US includes some waste generated from eastern Ontario (data was only available for Ontario and not for southern Ontario). An alternate explanation may be that the assumption used to develop southern Ontario employment data differ from reality. It is also possible that some landfills in southern Ontario received waste from outside the region.

Figure 7: Projected Quantities and Available Capacity, 2010-2041 (Low)

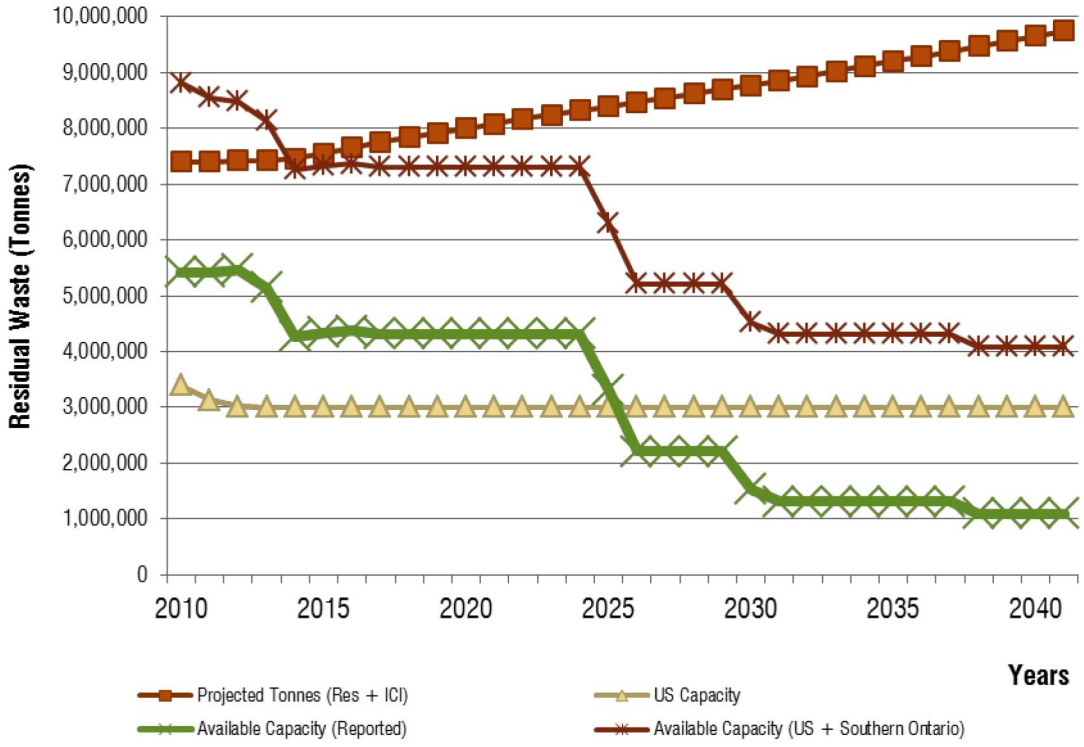


Figure 8: Projected Quantities and Available Capacity, 2010-2041 (Medium)

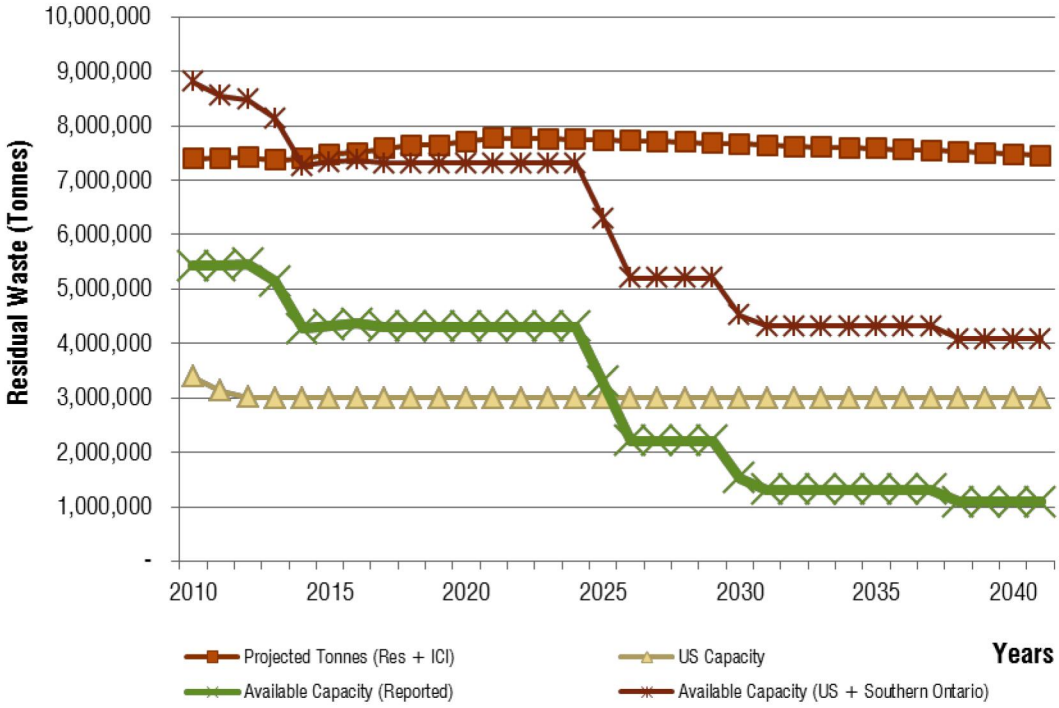


Figure 9: Projected Quantities and Available Capacity, 2010-2041 (High)

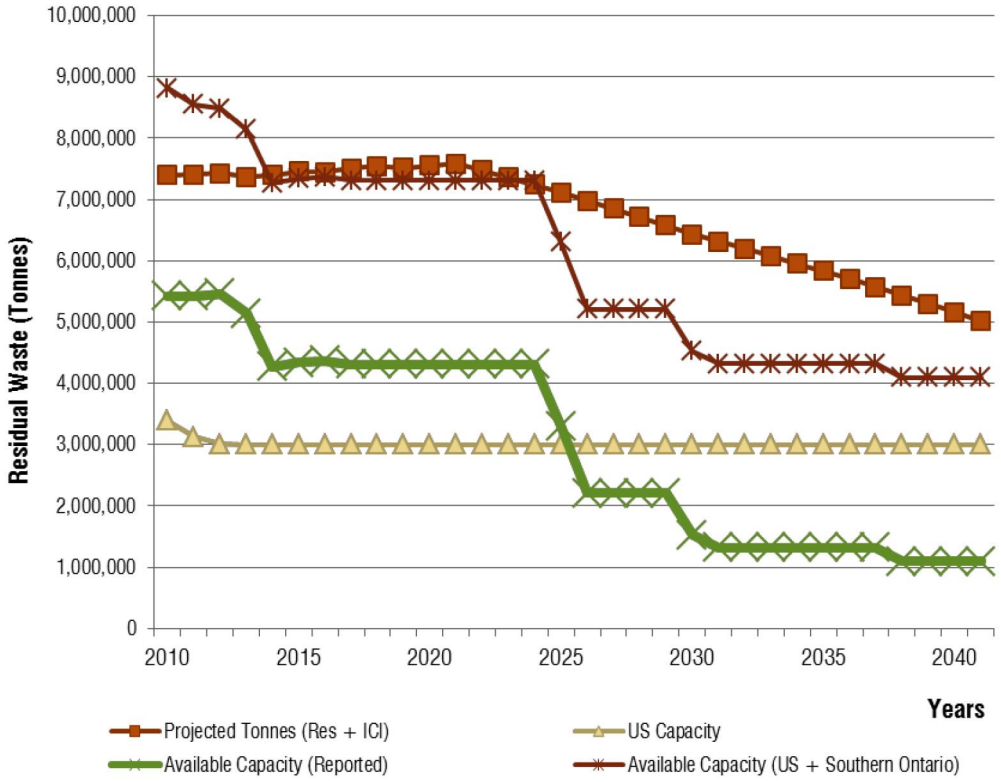


Table 8 outlines the projected difference between the amount of residential and IC&I waste generated on an annual basis compared to the available annual capacity to dispose of that waste in southern Ontario. It is estimated that the amount of waste generated will exceed available capacity in Southern Ontario before 2022. Under Scenario 1, this gap exceeds 5.67 million tonnes of waste per year by 2041. Under Scenario 2, this gap exceeds 3.37 million tonnes of waste per year by 2041. Under Scenario 3, this gap is projected to exceed approximately 923,000 tonnes of waste per year by the end of the planning period.

Table 8: Difference in Projected Residual Waste and Available Capacity (tonnes), 2022-2041

	2022	2031	2041
Scenario 1 - Low Diversion	859,000	4,540,000	5,665,000
Scenario 2 - Medium Diversion	466,000	3,328,000	3,369,000
Scenario 3 - High Diversion	170,000	2,000,000	923,000

In the event the Ridge landfill is expanded, it is estimated that the landfill will continue to be filled at its current rate (1.3 million tonnes per year).

6.0 Peer Review

A peer review of this report was completed by Querencia Partners Canada Ltd. in November 2015. The peer review verified that the waste projections in this report are credible. Some comments received highlight potential scenarios which may impact the waste generation and disposal capacity in southern Ontario. These scenarios include:

- *Circular Economy:* Efforts to move toward a 'circular economy' are growing: A key aspect of this includes more extensive extended producer responsibility (EPR). The goal of a circular economy is to recycle more material and more fully integrate the concept of 'cradle to cradle' for the flow of materials. Ontario, similar to many other jurisdictions, has typically focused on packaging materials and general consumables. These efforts are expanding to include a broader waste stream, e.g.,, 'e-waste'. These efforts might reduce overall waste quantities more than previous diversion and reduction initiatives.
- *Waste and Climate Change:* As countries introduce a price on carbon and there is a greater focus on short lived climate pollutants (e.g., methane), a stronger link between climate change mitigation and waste management should emerge. This may bring about several changes to waste management practices, such as: (i) enhanced efforts to divert (and process) food waste and other organic materials; (ii) encouragement toward less transportation, greater preference for electric, hydrogen and natural gas fuel over diesel/gasoline and possibly more rail transport; and, relatively more emphasis on waste combustion (with energy recovery such as refuse derived fuel).
- Climate events of greater intensity, e.g., major storms, could increase events with emergency peak waste volumes, such as demolition wastes or horticultural waste. Provincial waste planning may suggest a greater emergency capacity of buffer volume in local landfills.
- *Changing Waste Composition:* Much has been written on the 'Evolving Tonne' and changing waste composition. Waste is generally becoming lighter and bulkier as multi-laminates and plastics increase relative to paper and metals. This Report estimates waste quantities by tonnes and notes that "waste generation has slowly been decreasing dues to lightweight packaging". However waste generation, by volume is decreasing much less than by mass. In-situ landfill compaction rates of lightweight packaging tend to be lower than historical estimates. This could bring about several changes to waste management practices, including: (i) relative under-estimation of landfill capacity (greater volumes); (ii) greater emphasis on waste as a potential combustible (fuel), especially if organics are more effectively sorted; and (iii) more industry stewardship plans for specific components of the waste stream (with funding allocations adjusted for volumes rather than mass).
- *Changing Flow Control on Waste: Cost of Waste Disposal:* Much of Ontario's waste management practice is determined by pricing of alternatives, which is often impacted by political considerations (e.g., opening or closing the Canada-US border to waste shipments). Typically municipal solid waste has flowed from Ontario to US states, however flows could be reversed if economics warranted. If this were to happen, disposal facilities in Ontario would require service

area expansions. High disposal costs in one region could also precipitate longer transport distances, e.g., train-transport. Regulatory changes (e.g., mandating combustion of certain waste components), or banning landfilling of organics (e.g., as in much of Europe), can impact waste disposal quantities and flow of material.

The Ontario Waste Free Strategy includes a stronger link between climate impacts of waste and diversion practices, and perhaps sharing (or allocation) of potential carbon credits. Municipalities may emerge as stronger proponents of waste flow practices (diversion and disposal).

Tipping fees provide a very powerful driver of final waste disposal (quantities and location). Residential and IC&I housekeeping practices can be dramatically impacted by waste disposal costs (perhaps differentiated by material or degree of separation).

Since the peer review was completed prior to the proposed *Waste-Free Ontario Act*, it is to be noted that the Act addresses the potential scenarios which may impact the waste generation and disposal capacity in southern Ontario. The Act was passed on June 1, 2016 and the strategy will start to be created in late 2016 and go into the year 2019 and beyond. Full implementation of the Strategy will take longer. PWS is fully supportive of the Act and will conduct on-going studies at the Ridge landfill to evaluate the change in residual waste as the Act gets implemented.

Appendix A

Waste Projections

Table A1: Projection Scenario 1 - Low Diversion

Year No.	Year	Population and Employment		TOTAL WASTE GENERATED		DIVERSION RATE		TOTAL WASTE DIVERTED		TOTAL RESIDUAL WASTE REQUIRING DISPOSAL		
		IC&I	Residential	IC&I	Residential	IC&I	Residential	IC&I	Residential	IC&I (Low)	Residential (Low)	Total (Low)
	2010	**5,282,000**	**10,600,000**	**5,437,000**	**4,160,000**	**11%**	**38%**	**602,000**	**1,597,000**	**4,835,000**	**2,563,000**	**7,398,000**
	2010 Average per Capita (kg)			**1,029**	**392**			**114**	**151**	**915**	**242**	
	2011	5,394,000	10,706,000	5,552,000	4,202,000	12%	40%	666,000	1,681,000	4,886,000	2,521,000	7,407,000
	2012	5,472,000	10,833,000	5,633,000	4,251,000	12%	42%	676,000	1,785,000	4,957,000	2,466,000	7,423,000
	2013	5,543,000	10,959,000	5,706,000	4,301,000	12%	44%	685,000	1,892,000	5,021,000	2,409,000	7,430,000
	2014	5,592,000	11,082,000	5,756,000	4,349,000	12%	45%	691,000	1,957,000	5,065,000	2,392,000	7,457,000
	2015	5,670,000	11,205,000	5,836,000	4,397,000	12%	45%	700,000	1,979,000	5,136,000	2,418,000	7,554,000
	2016	5,749,000	11,329,000	5,918,000	4,446,000	12%	45%	710,000	2,001,000	5,208,000	2,445,000	7,653,000
	2017	5,829,000	11,462,000	6,000,000	4,498,000	12%	45%	720,000	2,024,000	5,280,000	2,474,000	7,754,000
	2018	5,887,000	11,595,000	6,060,000	4,550,000	12%	45%	727,000	2,048,000	5,333,000	2,502,000	7,835,000
	2019	5,946,000	11,728,000	6,120,000	4,603,000	12%	45%	734,000	2,071,000	5,386,000	2,532,000	7,918,000
	2020	6,005,000	11,861,000	6,181,000	4,655,000	12%	45%	742,000	2,095,000	5,439,000	2,560,000	7,999,000
	2021	6,065,000	11,994,000	6,243,000	4,707,000	12%	45%	749,000	2,118,000	5,494,000	2,589,000	8,083,000
1	2022	6,126,000	12,136,000	6,306,000	4,763,000	12%	45%	757,000	2,143,000	5,549,000	2,620,000	8,169,000
2	2023	6,175,000	12,278,000	6,356,000	4,819,000	12%	45%	763,000	2,169,000	5,593,000	2,650,000	8,243,000
3	2024	6,224,000	12,420,000	6,407,000	4,874,000	12%	45%	769,000	2,193,000	5,638,000	2,681,000	8,319,000
4	2025	6,274,000	12,562,000	6,458,000	4,930,000	12%	45%	775,000	2,219,000	5,683,000	2,711,000	8,394,000
5	2026	6,324,000	12,702,000	6,510,000	4,985,000	12%	45%	781,000	2,243,000	5,729,000	2,742,000	8,471,000
6	2027	6,375,000	12,843,000	6,562,000	5,040,000	12%	45%	787,000	2,268,000	5,775,000	2,772,000	8,547,000
7	2028	6,426,000	12,984,000	6,615,000	5,096,000	12%	45%	794,000	2,293,000	5,821,000	2,803,000	8,624,000
8	2029	6,477,000	13,125,000	6,667,000	5,151,000	12%	45%	800,000	2,318,000	5,867,000	2,833,000	8,700,000
9	2030	6,529,000	13,266,000	6,721,000	5,206,000	12%	45%	807,000	2,343,000	5,914,000	2,863,000	8,777,000
10	2031	6,581,000	13,408,000	6,774,000	5,262,000	12%	45%	813,000	2,368,000	5,961,000	2,894,000	8,855,000
11	2032	6,634,000	13,544,000	6,829,000	5,315,000	12%	45%	819,000	2,392,000	6,010,000	2,923,000	8,933,000
12	2033	6,700,000	13,680,000	6,897,000	5,369,000	12%	45%	828,000	2,416,000	6,069,000	2,953,000	9,022,000
13	2034	6,767,000	13,816,000	6,966,000	5,422,000	12%	45%	836,000	2,440,000	6,130,000	2,982,000	9,112,000
14	2035	6,835,000	13,952,000	7,036,000	5,476,000	12%	45%	844,000	2,464,000	6,192,000	3,012,000	9,204,000
15	2036	6,903,000	14,090,000	7,106,000	5,530,000	12%	45%	853,000	2,489,000	6,253,000	3,041,000	9,294,000
16	2037	6,972,000	14,221,000	7,177,000	5,581,000	12%	45%	861,000	2,511,000	6,316,000	3,070,000	9,386,000
17	2038	7,042,000	14,352,000	7,249,000	5,632,000	12%	45%	870,000	2,534,000	6,379,000	3,098,000	9,477,000
18	2039	7,112,000	14,483,000	7,321,000	5,684,000	12%	45%	879,000	2,558,000	6,442,000	3,126,000	9,568,000
19	2040	7,183,000	14,614,000	7,394,000	5,735,000	12%	45%	887,000	2,581,000	6,507,000	3,154,000	9,661,000
20	2041	7,255,000	14,747,000	7,468,000	5,788,000	12%	45%	896,000	2,605,000	6,572,000	3,183,000	9,755,000
TOTALS				**136,819,000**	**105,658,000**	**12%**	**45%**	**16,419,000**	**47,547,000**	**120,400,000**	**58,111,000**	**178,511,000**

NOTES:

Generated #'s *: Based on 2010 Statistics Canada Waste Management Survey data.*

Diverted #'s *: Assumes ICI diversion will not progress past historical achievements (around 12% since 2006).*

2014 residential diversion rate is estimated to be 45%. Assumes diversion rate will not surpass 45%.

Disposal #'s *: Generated minus Diverted*

Table A2: Projection Scenario 2 - Medium Diversion

Year No.	Year	Population and Employment		TOTAL WASTE GENERATED		DIVERSION RATE		TOTAL WASTE DIVERTED		TOTAL RESIDUAL WASTE REQUIRING DISPOSAL		
		IC&I	Residential	IC&I	Residential	IC&I	Residential	IC&I	Residential	IC&I (Med)	Residential (Med)	Total (Med)
	2010	**5,282,000**	**10,600,000**	**5,437,000**	**4,160,000**	**11%**	**38%**	**602,000**	**1,597,000**	**4,835,000**	**2,563,000**	**7,398,000**
	2010 Average per Capita (kg)			**1,029**	**392**			**114**	**151**	**915**	**242**	
	2011	5,394,000	10,706,000	5,552,000	4,202,000	12%	40%	666,000	1,681,000	4,886,000	2,521,000	7,407,000
	2012	5,472,000	10,833,000	5,633,000	4,251,000	12%	42%	676,000	1,785,000	4,957,000	2,466,000	7,423,000
	2013	5,543,000	10,959,000	5,706,000	4,301,000	13%	44%	742,000	1,892,000	4,964,000	2,409,000	7,373,000
	2014	5,592,000	11,082,000	5,756,000	4,349,000	13%	45%	748,000	1,957,000	5,008,000	2,392,000	7,400,000
	2015	5,670,000	11,205,000	5,836,000	4,397,000	13%	45%	759,000	1,995,000	5,077,000	2,402,000	7,479,000
	2016	5,749,000	11,329,000	5,918,000	4,446,000	14%	46%	829,000	2,034,000	5,089,000	2,412,000	7,501,000
	2017	5,829,000	11,462,000	6,000,000	4,498,000	14%	46%	840,000	2,074,000	5,160,000	2,424,000	7,584,000
	2018	5,887,000	11,595,000	6,060,000	4,550,000	14%	46%	848,000	2,115,000	5,212,000	2,435,000	7,647,000
	2019	5,946,000	11,728,000	6,120,000	4,603,000	15%	47%	918,000	2,157,000	5,202,000	2,446,000	7,648,000
	2020	6,005,000	11,861,000	6,181,000	4,655,000	15%	47%	927,000	2,198,000	5,254,000	2,457,000	7,711,000
	2021	6,065,000	11,994,000	6,243,000	4,707,000	15%	48%	936,000	2,240,000	5,307,000	2,467,000	7,774,000
1	2022	6,126,000	12,136,000	6,306,000	4,763,000	16%	48%	1,009,000	2,284,000	5,297,000	2,479,000	7,776,000
2	2023	6,175,000	12,278,000	6,356,000	4,819,000	17%	48%	1,081,000	2,329,000	5,275,000	2,490,000	7,765,000
3	2024	6,224,000	12,420,000	6,407,000	4,874,000	18%	49%	1,153,000	2,374,000	5,254,000	2,500,000	7,754,000
4	2025	6,274,000	12,562,000	6,458,000	4,930,000	19%	49%	1,227,000	2,419,000	5,231,000	2,511,000	7,742,000
5	2026	6,324,000	12,702,000	6,510,000	4,985,000	20%	49%	1,302,000	2,465,000	5,208,000	2,520,000	7,728,000
6	2027	6,375,000	12,843,000	6,562,000	5,040,000	21%	50%	1,378,000	2,511,000	5,184,000	2,529,000	7,713,000
7	2028	6,426,000	12,984,000	6,615,000	5,096,000	22%	50%	1,455,000	2,557,000	5,160,000	2,539,000	7,699,000
8	2029	6,477,000	13,125,000	6,667,000	5,151,000	23%	51%	1,533,000	2,604,000	5,134,000	2,547,000	7,681,000
9	2030	6,529,000	13,266,000	6,721,000	5,206,000	24%	51%	1,613,000	2,651,000	5,108,000	2,555,000	7,663,000
10	2031	6,581,000	13,408,000	6,774,000	5,262,000	25%	51%	1,694,000	2,699,000	5,080,000	2,563,000	7,643,000
11	2032	6,634,000	13,544,000	6,829,000	5,315,000	26%	52%	1,776,000	2,746,000	5,053,000	2,569,000	7,622,000
12	2033	6,700,000	13,680,000	6,897,000	5,369,000	27%	52%	1,862,000	2,794,000	5,035,000	2,575,000	7,610,000
13	2034	6,767,000	13,816,000	6,966,000	5,422,000	28%	52%	1,950,000	2,842,000	5,016,000	2,580,000	7,596,000
14	2035	6,835,000	13,952,000	7,036,000	5,476,000	29%	53%	2,040,000	2,890,000	4,996,000	2,586,000	7,582,000
15	2036	6,903,000	14,090,000	7,106,000	5,530,000	30%	53%	2,132,000	2,939,000	4,974,000	2,591,000	7,565,000
16	2037	6,972,000	14,221,000	7,177,000	5,581,000	31%	54%	2,225,000	2,987,000	4,952,000	2,594,000	7,546,000
17	2038	7,042,000	14,352,000	7,249,000	5,632,000	32%	54%	2,320,000	3,035,000	4,929,000	2,597,000	7,526,000
18	2039	7,112,000	14,483,000	7,321,000	5,684,000	33%	54%	2,416,000	3,084,000	4,905,000	2,600,000	7,505,000
19	2040	7,183,000	14,614,000	7,394,000	5,735,000	34%	55%	2,514,000	3,133,000	4,880,000	2,602,000	7,482,000
20	2041	7,255,000	14,747,000	7,468,000	5,788,000	35%	55%	2,614,000	3,183,000	4,854,000	2,605,000	7,459,000
TOTALS				**136,819,000**	**105,658,000**	**26%**	**51%**	**35,294,000**	**54,526,000**	**101,525,000**	**51,132,000**	**152,657,000**

NOTES:

Generated #'s *: Based on 2010 Statistics Canada Waste Management Survey data.*

Diverted #'s *: Assumes ICI sector will reach 35% diversion by 2040 and Residential sector will achieve 55% by 2040.*

Disposal #'s *: Generated minus Diverted*

Table A2: Sensitivity Analysis - Medium Diversion Projection Scenario

Year No.	Year	Population and Employment		TOTAL WASTE GENERATED (ICI)			TOTAL WASTE GENERATED (Residential)			DIVERSION RATE		TOTAL WASTE DIVERTED		TOTAL RESIDUAL WASTE REQUIRING DISPOSAL		
		IC&I	Residential	IC&I	Generation Rate	Revised ICI Generated	Residential	Generation Rate	Revised Res Generated	IC&I	Residential	IC&I	Residential	IC&I (SA - Med)	Residential (SA - Med)	Total (SA - Med)
	2010	**5,282,000**	**10,600,000**	**5,437,000**	**1,029**		**4,160,000**	**392**		**11%**	**38%**	**602,000**	**1,597,000**	**4,835,000**	**2,563,000**	**7,398,000**
	2010 Average per Capita (kg)											**114**	**151**	**915**	**242**	
	2011	5,394,000	10,706,000	5,552,000	1,026	5,534,000	4,202,000	391	4,188,000	12%	40%	664,000	1,675,000	4,870,000	2,513,000	7,383,000
	2012	5,472,000	10,833,000	5,633,000	1,023	5,596,000	4,251,000	390	4,224,000	12%	42%	672,000	1,774,000	4,924,000	2,450,000	7,374,000
	2013	5,543,000	10,959,000	5,706,000	1,019	5,650,000	4,301,000	389	4,259,000	13%	44%	735,000	1,874,000	4,915,000	2,385,000	7,300,000
	2014	5,592,000	11,082,000	5,756,000	1,016	5,682,000	4,349,000	387	4,293,000	13%	45%	739,000	1,932,000	4,943,000	2,361,000	7,304,000
	2015	5,670,000	11,205,000	5,836,000	1,013	5,742,000	4,397,000	386	4,327,000	13%	45%	746,000	1,963,000	4,996,000	2,364,000	7,360,000
	2016	5,749,000	11,329,000	5,918,000	1,009	5,803,000	4,446,000	385	4,360,000	14%	46%	812,000	1,994,000	4,991,000	2,366,000	7,357,000
	2017	5,829,000	11,462,000	6,000,000	1,006	5,865,000	4,498,000	384	4,397,000	14%	46%	821,000	2,028,000	5,044,000	2,369,000	7,413,000
	2018	5,887,000	11,595,000	6,060,000	1,003	5,903,000	4,550,000	382	4,433,000	14%	46%	826,000	2,061,000	5,077,000	2,372,000	7,449,000
	2019	5,946,000	11,728,000	6,120,000	999	5,943,000	4,603,000	381	4,469,000	15%	47%	891,000	2,094,000	5,052,000	2,375,000	7,427,000
	2020	6,005,000	11,861,000	6,181,000	996	5,982,000	4,655,000	380	4,505,000	15%	47%	897,000	2,127,000	5,085,000	2,378,000	7,463,000
	2021	6,065,000	11,994,000	6,243,000	993	6,021,000	4,707,000	379	4,540,000	15%	48%	903,000	2,161,000	5,118,000	2,379,000	7,497,000
1	2022	6,126,000	12,136,000	6,306,000	989	6,062,000	4,763,000	377	4,578,000	16%	48%	970,000	2,196,000	5,092,000	2,382,000	7,474,000
2	2023	6,175,000	12,278,000	6,356,000	986	6,090,000	4,819,000	376	4,616,000	17%	48%	1,035,000	2,231,000	5,055,000	2,385,000	7,440,000
3	2024	6,224,000	12,420,000	6,407,000	983	6,117,000	4,874,000	375	4,654,000	18%	49%	1,101,000	2,267,000	5,016,000	2,387,000	7,403,000
4	2025	6,274,000	12,562,000	6,458,000	980	6,146,000	4,930,000	373	4,691,000	19%	49%	1,168,000	2,302,000	4,978,000	2,389,000	7,367,000
5	2026	6,324,000	12,702,000	6,510,000	976	6,174,000	4,985,000	372	4,728,000	20%	49%	1,235,000	2,338,000	4,939,000	2,390,000	7,329,000
6	2027	6,375,000	12,843,000	6,562,000	973	6,202,000	5,040,000	371	4,764,000	21%	50%	1,302,000	2,373,000	4,900,000	2,391,000	7,291,000
7	2028	6,426,000	12,984,000	6,615,000	970	6,230,000	5,096,000	370	4,800,000	22%	50%	1,371,000	2,409,000	4,859,000	2,391,000	7,250,000
8	2029	6,477,000	13,125,000	6,667,000	966	6,258,000	5,151,000	368	4,835,000	23%	51%	1,439,000	2,444,000	4,819,000	2,391,000	7,210,000
9	2030	6,529,000	13,266,000	6,721,000	963	6,287,000	5,206,000	367	4,870,000	24%	51%	1,509,000	2,480,000	4,778,000	2,390,000	7,168,000
10	2031	6,581,000	13,408,000	6,774,000	960	6,315,000	5,262,000	366	4,906,000	25%	51%	1,579,000	2,517,000	4,736,000	2,389,000	7,125,000
11	2032	6,634,000	13,544,000	6,829,000	956	6,344,000	5,315,000	365	4,938,000	26%	52%	1,649,000	2,551,000	4,695,000	2,387,000	7,082,000
12	2033	6,700,000	13,680,000	6,897,000	953	6,385,000	5,369,000	363	4,970,000	27%	52%	1,724,000	2,586,000	4,661,000	2,384,000	7,045,000
13	2034	6,767,000	13,816,000	6,966,000	950	6,426,000	5,422,000	362	5,002,000	28%	52%	1,799,000	2,621,000	4,627,000	2,381,000	7,008,000
14	2035	6,835,000	13,952,000	7,036,000	946	6,468,000	5,476,000	361	5,034,000	29%	53%	1,876,000	2,657,000	4,592,000	2,377,000	6,969,000
15	2036	6,903,000	14,090,000	7,106,000	943	6,510,000	5,530,000	360	5,066,000	30%	53%	1,953,000	2,692,000	4,557,000	2,374,000	6,931,000
16	2037	6,972,000	14,221,000	7,177,000	940	6,552,000	5,581,000	358	5,095,000	31%	54%	2,031,000	2,727,000	4,521,000	2,368,000	6,889,000
17	2038	7,042,000	14,352,000	7,249,000	936	6,594,000	5,632,000	357	5,124,000	32%	54%	2,110,000	2,761,000	4,484,000	2,363,000	6,847,000
18	2039	7,112,000	14,483,000	7,321,000	933	6,636,000	5,684,000	356	5,152,000	33%	54%	2,190,000	2,795,000	4,446,000	2,357,000	6,803,000
19	2040	7,183,000	14,614,000	7,394,000	930	6,678,000	5,735,000	354	5,180,000	34%	55%	2,271,000	2,830,000	4,407,000	2,350,000	6,757,000

Table A3: Projection Scenario 3 - High Diversion

Year No.	Year	Population and Employment		TOTAL WASTE GENERATED		DIVERSION RATE		TOTAL WASTE DIVERTED		TOTAL RESIDUAL WASTE REQUIRING DISPOSAL		
		IC&I	Residential	IC&I	Residential	IC&I	Residential	IC&I	Residential	IC&I (High)	Residential (High)	Total (High)
	2010	**5,282,000**	**10,600,000**	**5,437,000**	**4,160,000**	**11%**	**38%**	**602,000**	**1,597,000**	**4,835,000**	**2,563,000**	**7,398,000**
	2010 Average per Capita (kg)			**1,029**	**392**			**114**	**151**	**915**	**242**	
	2011	5,394,000	10,706,000	5,552,000	4,202,000	12%	40%	666,000	1,681,000	4,886,000	2,521,000	7,407,000
	2012	5,472,000	10,833,000	5,633,000	4,251,000	12%	42%	676,000	1,785,000	4,957,000	2,466,000	7,423,000
	2013	5,543,000	10,959,000	5,706,000	4,301,000	13%	44%	742,000	1,892,000	4,964,000	2,409,000	7,373,000
	2014	5,592,000	11,082,000	5,756,000	4,349,000	13%	45%	748,000	1,957,000	5,008,000	2,392,000	7,400,000
	2015	5,670,000	11,205,000	5,836,000	4,397,000	13%	46%	759,000	2,020,000	5,077,000	2,377,000	7,454,000
	2016	5,749,000	11,329,000	5,918,000	4,446,000	14%	47%	829,000	2,084,000	5,089,000	2,362,000	7,451,000
	2017	5,829,000	11,462,000	6,000,000	4,498,000	14%	48%	840,000	2,151,000	5,160,000	2,347,000	7,507,000
	2018	5,887,000	11,595,000	6,060,000	4,550,000	14%	49%	848,000	2,218,000	5,212,000	2,332,000	7,544,000
	2019	5,946,000	11,728,000	6,120,000	4,603,000	15%	50%	918,000	2,287,000	5,202,000	2,316,000	7,518,000
	2020	6,005,000	11,861,000	6,181,000	4,655,000	15%	51%	927,000	2,357,000	5,254,000	2,298,000	7,552,000
	2021	6,065,000	11,994,000	6,243,000	4,707,000	15%	52%	936,000	2,427,000	5,307,000	2,280,000	7,587,000
1	2022	6,126,000	12,136,000	6,306,000	4,763,000	17%	53%	1,088,000	2,501,000	5,218,000	2,262,000	7,480,000
2	2023	6,175,000	12,278,000	6,356,000	4,819,000	20%	53%	1,239,000	2,575,000	5,117,000	2,244,000	7,361,000
3	2024	6,224,000	12,420,000	6,407,000	4,874,000	22%	54%	1,394,000	2,650,000	5,013,000	2,224,000	7,237,000
4	2025	6,274,000	12,562,000	6,458,000	4,930,000	24%	55%	1,550,000	2,727,000	4,908,000	2,203,000	7,111,000
5	2026	6,324,000	12,702,000	6,510,000	4,985,000	26%	56%	1,709,000	2,804,000	4,801,000	2,181,000	6,982,000
6	2027	6,375,000	12,843,000	6,562,000	5,040,000	29%	57%	1,870,000	2,882,000	4,692,000	2,158,000	6,850,000
7	2028	6,426,000	12,984,000	6,615,000	5,096,000	31%	58%	2,034,000	2,962,000	4,581,000	2,134,000	6,715,000
8	2029	6,477,000	13,125,000	6,667,000	5,151,000	33%	59%	2,200,000	3,042,000	4,467,000	2,109,000	6,576,000
9	2030	6,529,000	13,266,000	6,721,000	5,206,000	35%	60%	2,369,000	3,124,000	4,352,000	2,082,000	6,434,000
10	2031	6,581,000	13,408,000	6,774,000	5,262,000	38%	60%	2,540,000	3,181,000	4,234,000	2,081,000	6,315,000
11	2032	6,634,000	13,544,000	6,829,000	5,315,000	40%	61%	2,715,000	3,237,000	4,114,000	2,078,000	6,192,000
12	2033	6,700,000	13,680,000	6,897,000	5,369,000	42%	61%	2,897,000	3,295,000	4,000,000	2,074,000	6,074,000
13	2034	6,767,000	13,816,000	6,966,000	5,422,000	44%	62%	3,082,000	3,352,000	3,884,000	2,070,000	5,954,000
14	2035	6,835,000	13,952,000	7,036,000	5,476,000	47%	62%	3,272,000	3,410,000	3,764,000	2,066,000	5,830,000
15	2036	6,903,000	14,090,000	7,106,000	5,530,000	49%	63%	3,464,000	3,469,000	3,642,000	2,061,000	5,703,000
16	2037	6,972,000	14,221,000	7,177,000	5,581,000	51%	63%	3,660,000	3,526,000	3,517,000	2,055,000	5,572,000
17	2038	7,042,000	14,352,000	7,249,000	5,632,000	53%	64%	3,860,000	3,584,000	3,389,000	2,048,000	5,437,000
18	2039	7,112,000	14,483,000	7,321,000	5,684,000	56%	64%	4,063,000	3,643,000	3,258,000	2,041,000	5,299,000
19	2040	7,183,000	14,614,000	7,394,000	5,735,000	58%	65%	4,270,000	3,702,000	3,124,000	2,033,000	5,157,000
20	2041	7,255,000	14,747,000	7,468,000	5,788,000	60%	65%	4,481,000	3,762,000	2,987,000	2,026,000	5,013,000
TOTALS				**136,819,000**	**105,658,000**	**39%**	**60%**	**53,757,000**	**63,428,000**	**83,062,000**	**42,230,000**	**125,292,000**

NOTES:

***Generated #'s**: Based on 2010 Statistics Canada Waste Management Survey data.*

***Diverted #'s**: Assumes ICI sector will achieve Provincial target by 2040.*

Assumes residential sector will achieve Provincial target by 2030 and increase to 65% by 2040.

***Disposal #'s**: Generated minus Diverted*

Appendix B

Data on Southern and Eastern Ontario Major Residual Waste Management Facilities

				Project History									
Site Name	Proponent	Location	Project Summary	TOR Submitted	Expiry of Public Comment	Decision Date	EA Submitted	Expiry of Public Comment Period	Expiry of Public Comment Period For Ministry Review	Decision Date	Current Status	Anticipated Capacity	Approx. Life Span
Biggars Lane Landfill Site	County of Brant	County of Brant	The proposed undertaking is to establish landfill capacity at the Biggars Lane Landfill Site. The proposed undertaking would provide waste disposal capacity to meet the County's needs until the year 2050 after the existing approved disposal area at the Biggars Lane Landfill reaches capacity in approximately 2021. The proposed undertaking would provide waste disposal capacity for approximately 1.1 million cubic metres (m3) of post-diversion solid, non hazardous waste generated within the County's boundaries.	May 22, 2014	June 21, 2014						Terms of reference		
Brooks Road Landfill Site	Brooks Road Environmental	Haldimand County	Brooks Road Environmental has initiated this study to review alternative design options for vertically expanding the Brooks Road Landfill Site. The existing Brooks Road landfill (site) has an approved fill rate of 500 tonnes per day and a capacity of 624,065 cubic metres. It is expected to reach capacity as early as the end of 2015. Brooks Road Environmental has initiated this study to review alternative design options for vertically expanding the site to allow for an additional capacity of approximately 421,000 cubic metres over a 5 to 7 year planning period.	4/25/2014	26-May-14						Terms of reference		
West Carleton Environmental Centre (WCEC)	Waste Management of Canada Corporation	The lands generally bounded by Highway 417, Carp Road and Richardson Sideroad, City of Ottawa	The purpose of the undertaking is to develop a new landfill footprint as part of the development known as the West Carleton Environmental Centre (WCEC).	June 18, 2010	19-Jul-10	25-Nov-10	14-Sep-12	2-Nov-12	22-Feb-13	28-Aug-13	Environmental assessment approved, August 28, 2013	Expand capacity by 6.5 million cubic metres	The estimated site life of the proposed new landfill footprint will be approximately 10 years.
Beachwood Road Environmental Centre (BREC)	Waste Management of Canada Corporation	Town of Greater Napanee	The proposed undertaking includes a new secure engineered landfill on a new footprint located north or northeast of the current Richmond Landfill.	11-Jun-10	11-Jul-10	16-Feb-12					Terms of reference: approved	Capacity 13 million cubic meters	Approx. 20 years from open date
Capital Region Resource Recovery Centre (CRRRC)	Taggart Miller Environmental Services	Ottawa area	The purpose of the integrated waste management facility, the Capital Region Resource Recovery Centre (CRRRC), is to provide facilities and capacity for recovery of resources and diversion of materials from disposal for solid non-hazardous wastes and soils that are generated by the industrial, commercial and institutional (IC&I) and construction and demolition (C&D) sectors and provide landfill disposal capacity on the same site for post-diversion residuals and materials that are not diverted.	14-Sep-12	15-Oct-12	17-Dec-12	2-Jan-15	20-Feb-15			Environmental assessment: expiry of public comment period	10.17 million cubic meters	Approx. 30 years from open date
Madawaska Valley Waste Management Strategic Plan	The Corporation of the Township of Madawaska Valley	Township of Madawaska Valley, Renfrew County	The purpose of the EA was to identify a Preferred Alternative of managing an estimated 175,000 cubic metres of solid waste anticipated to be generated by the municipality over a 25-year planning period. In consideration of the environment, the EA process has taken into account the economic viability, technical feasibility, and public opinion in the assessment of each identified alternative and its potential impact on the environment.	4-Jun-04	9-Jul-04	15-Nov-04	4-May-07	22-Jun-07	23-Nov-07	19-Mar-08	Environmental assessment: approved		
Walker Waste Disposal	Niagara Waste Systems Limited	City of Niagara Falls, Region of Niagara	The purpose of the undertaking is for the provision of future waste disposal capacity in the City of Niagara Falls for solid, non-hazardous waste generated in the Province of Ontario.										

References

Emerald EFW. 2016. Online Resource: http://www.emeraldefw.com/overview.php. Last accessed June 9, 2016.

Ministry of the Environment and Climate Change. 2011. Large Landfill Sites. Online Resource: https://www.ontario.ca/data/large-landfill-sites Last accessed: April 25, 2016.

Ontario Ministry of Finance. 2013. Ontario's Long-Term Report on the Economy. Online Resource: http://www.fin.gov.on.ca/en/economy/ltr/2014/ Last accessed: April 25, 2016.

Ontario Ministry of Finance. 2014. Ontario Population Projections – Fall 2014 Based on the 2011 Census 2013-2041 Ontario and its 49 Census Divisions. Online Resource: http://www.fin.gov.on.ca/en/economy/demographics/projections/ Last accessed: April 25, 2016.

Ontario Power Authority (OPA). 2016. Online Resource: http://powerauthority.on.ca/efw/durham-york-energy-centre Last accessed: June 9, 2016.

State of Michigan. Department of Environmental Quality. 2016. Report of Solid Waste Landfilled in Michigan for Fiscal Year (FY) 2015. Online Resource: http://www.michigan.gov/documents/deq/DEQ-OWMRP-SW_Landfill_Annual_Rpt_FY2015_512594_7.pdf Last accessed: April 25, 2016.

Waste Diversion Ontario. 2014. Data Report #5 2014 Ontario Residential Waste Diversion Rates. Online Resource: http://wdo.ca/Partners/municipalities/municipal-datacall Last accessed: April 25, 2016.

Waste Diversion Ontario. 2016. Data Report #3 2014 Organics Trends (Residential). Online Resource: http://www.wdo.ca/Portals/0/Document_Folder/2014_Organics_Trends_Residential.pdf Last accessed: April 25, 2016.