DILLON CONSULTING

Ridge Landfill Expansion Environmental Assessment

SUPPORTING DOCUMENT 1:

Needs/Opportunity Assessment

Progressive Waste Solutions

Table of Contents

Figures

Tables

Appendices

References

1.0 Introduction

The Ridge Landfill is located near Blenheim, Ontario and is operated by Progressive Waste Solutions Canada Inc. (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.

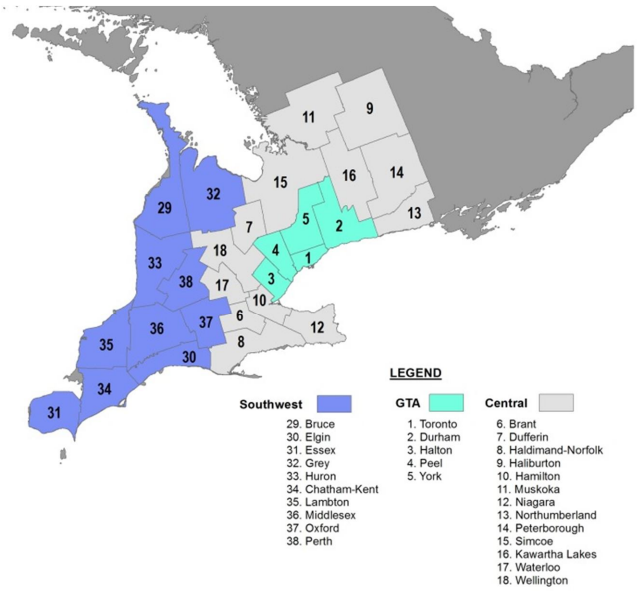


FIGURE 1: MAP OF SOUTHERN ONTARIO

Southern Ontario was defined as central Ontario, southwestern Ontario and the Greater Toronto Area (GTA) (see Figure 1).

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 residences[1]. 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 will be carried out over a number of years.

[1] Waste Diversion Ontario (WDO) 2014 Data Report #3 – Organics Trends (Residential)

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.

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 (2014) report titled *Ontario's Long-Term Report on the Economy*, 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.

[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.

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%

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 Liquor Control Board of Ontario properties, on-property management (e.g., grasscycling, backyard composting) and municipally-operated reuse activities.

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 made 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 (Waste Diversion Ontario, 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)

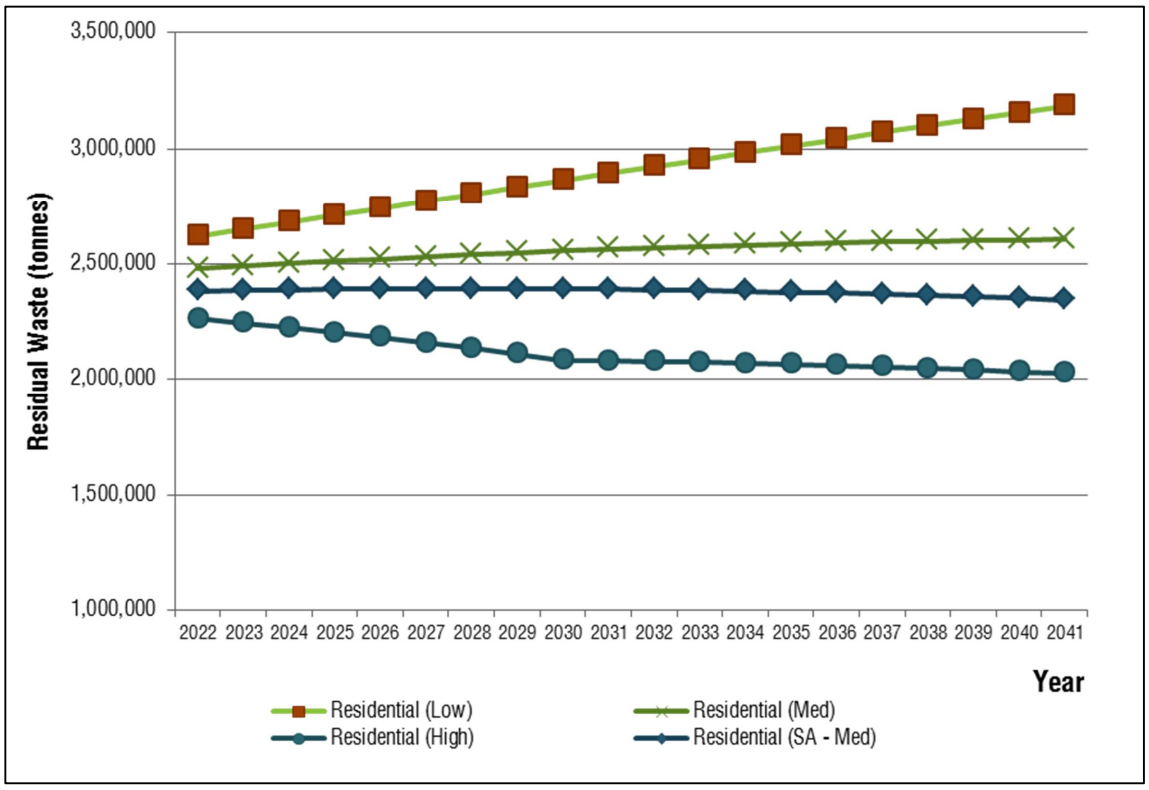


FIGURE 3: RESIDUAL WASTE REMAINING, 2022-2041 (IC&I SECTOR)

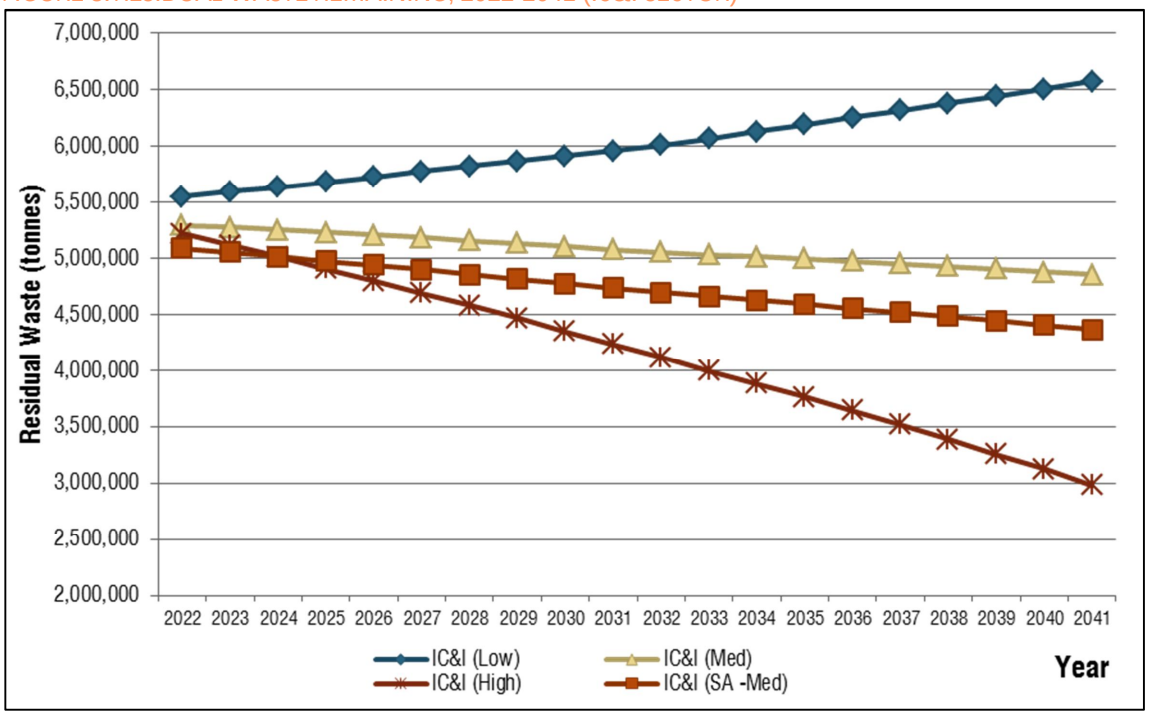
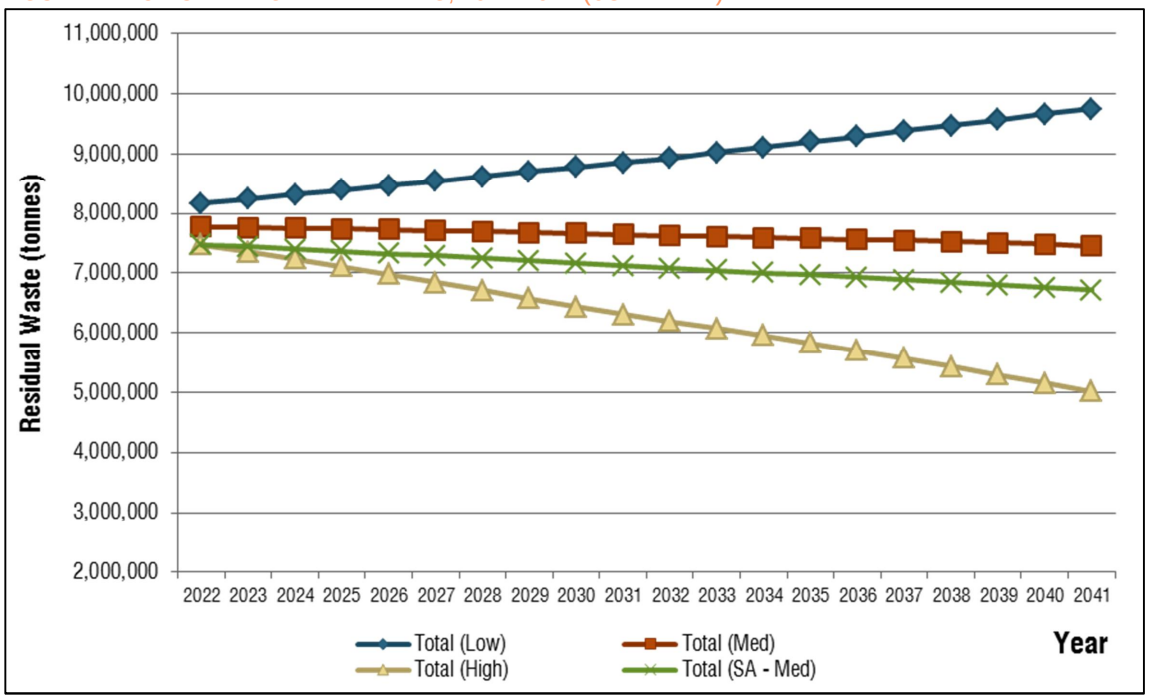


FIGURE 4: RESIDUAL WASTE REMAINING, 2022-2041 (COMBINED)



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 across Ontario. The information was gathered primarily from the large landfill sites directory[4] of the Ministry of Environment and Climate Change (MOECC) and from commercial 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 (m3)	Estimated Year of Closure based on Approved Fill Rates1	Estimated Year of Closure based on Waste Received in Reporting Year1
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 Landfill 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.

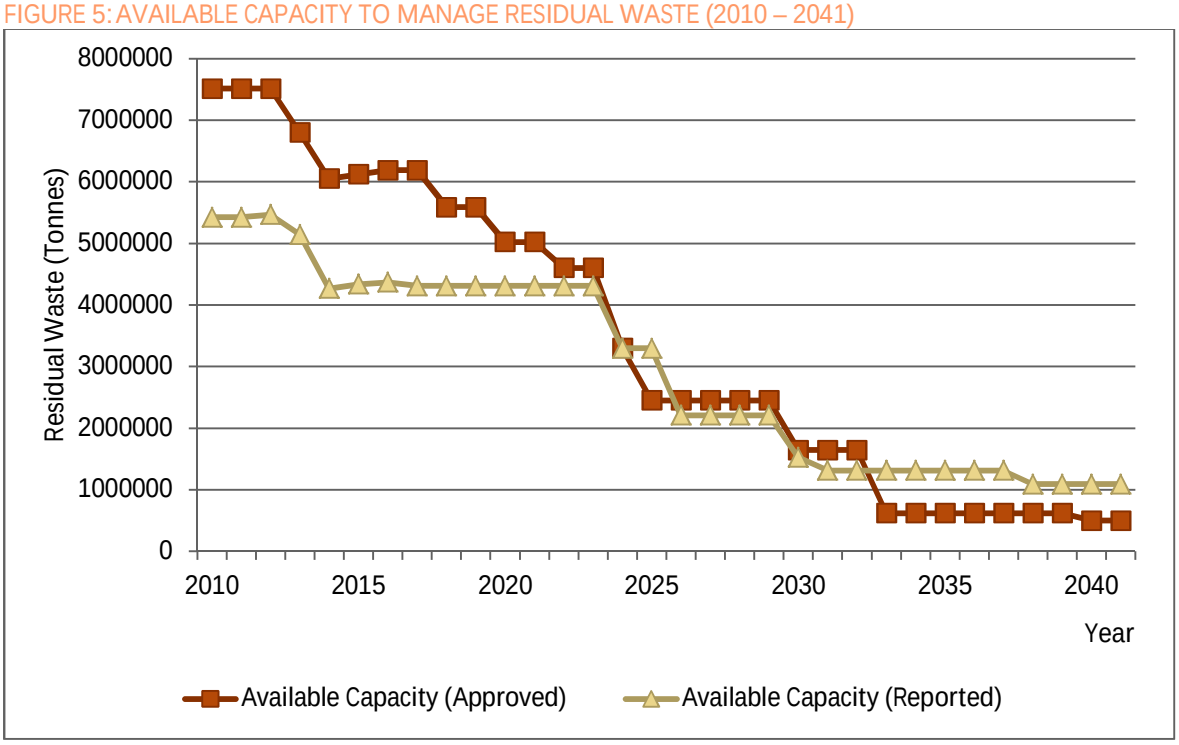
Three landfills are estimated to be near or at capacity (Newalta, Haldimand and Petrolia).

There are two 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 Inc., 2016; Ontario Power Authority, 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 4.3 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 state 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 New York state landfills in 2013. Table 6 outlines the quantity of waste exported from Ontario to New York State 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

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

	2005	2006	2007	2008	2009	2010	2011	2012	2013
TOTAL	272,558	449,838	576,168	805,216	779,227	743,496	1,000,189	955,982	809,477

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.

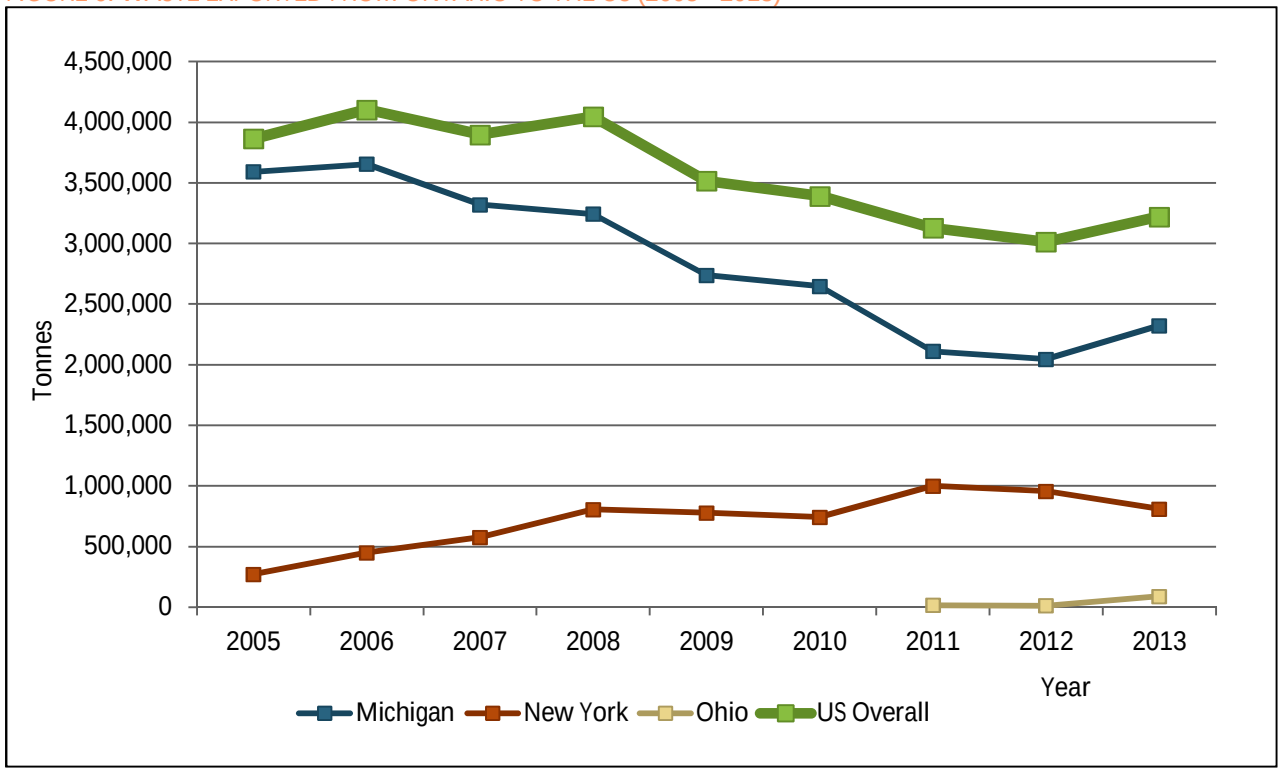
The values presented for waste exported from Ontario to Michigan and Ohio do not take into consideration waste sent to WtE facilities. However, due to the high processing cost compared to landfill disposal it is unlikely there are high volumes of waste from Ontario that are managed in this manner.

Table 7 and Error! Reference source not found. 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 THE US (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 4.3 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

[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.

facilities in eastern Ontario that have province-wide service areas, nor landfill expansions currently in the approvals process.

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 as a whole). 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)

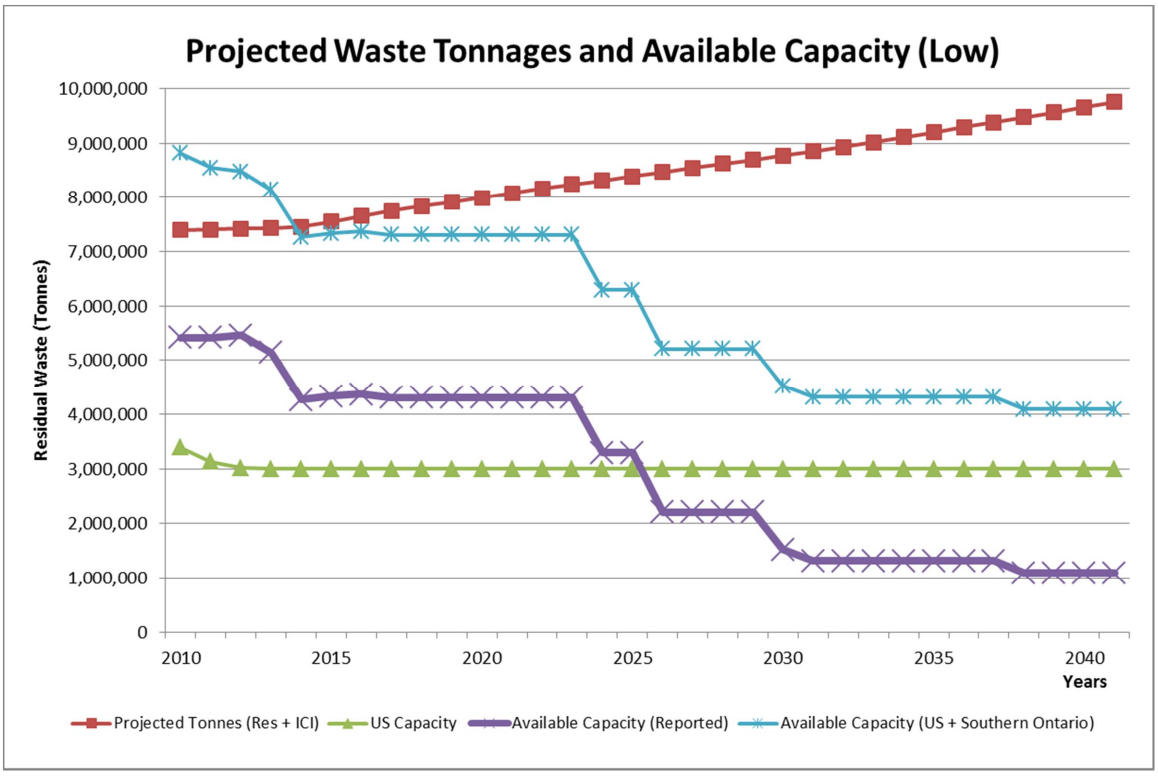


FIGURE 8: PROJECTED QUANTITIES AND AVAILABLE CAPACITY, 2010-2041 (MEDIUM)

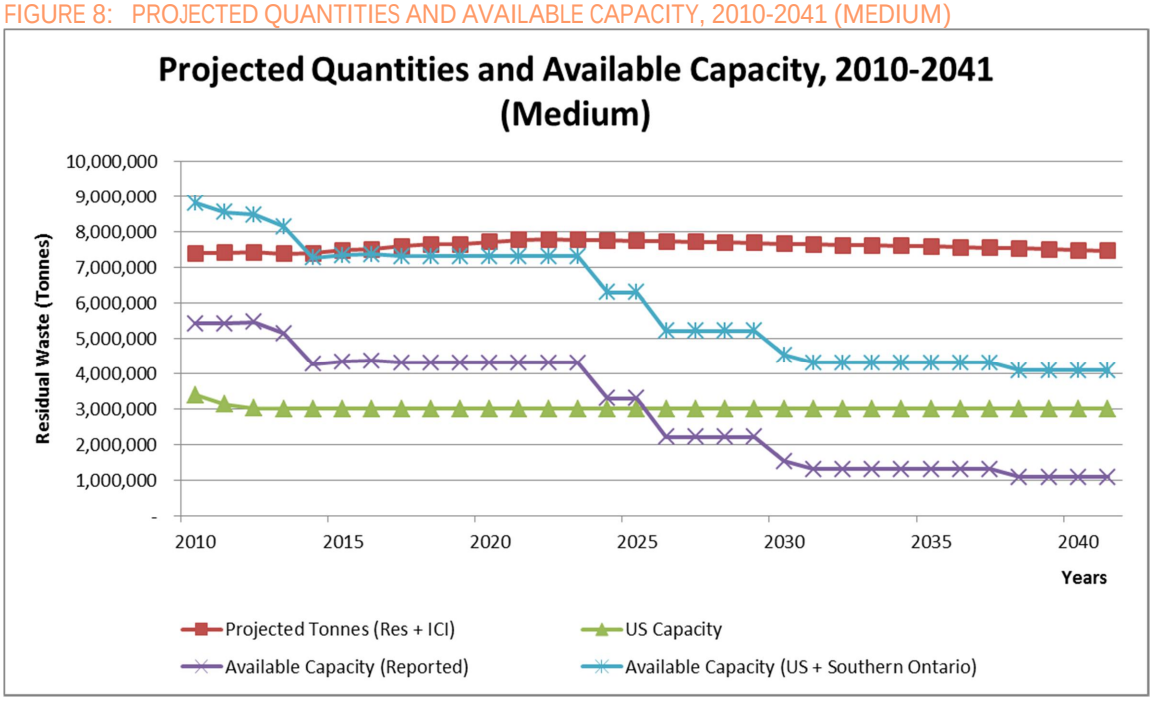


FIGURE 9: PROJECTED QUANTITIES AND AVAILABLE CAPACITY, 2010-2041 (HIGH)

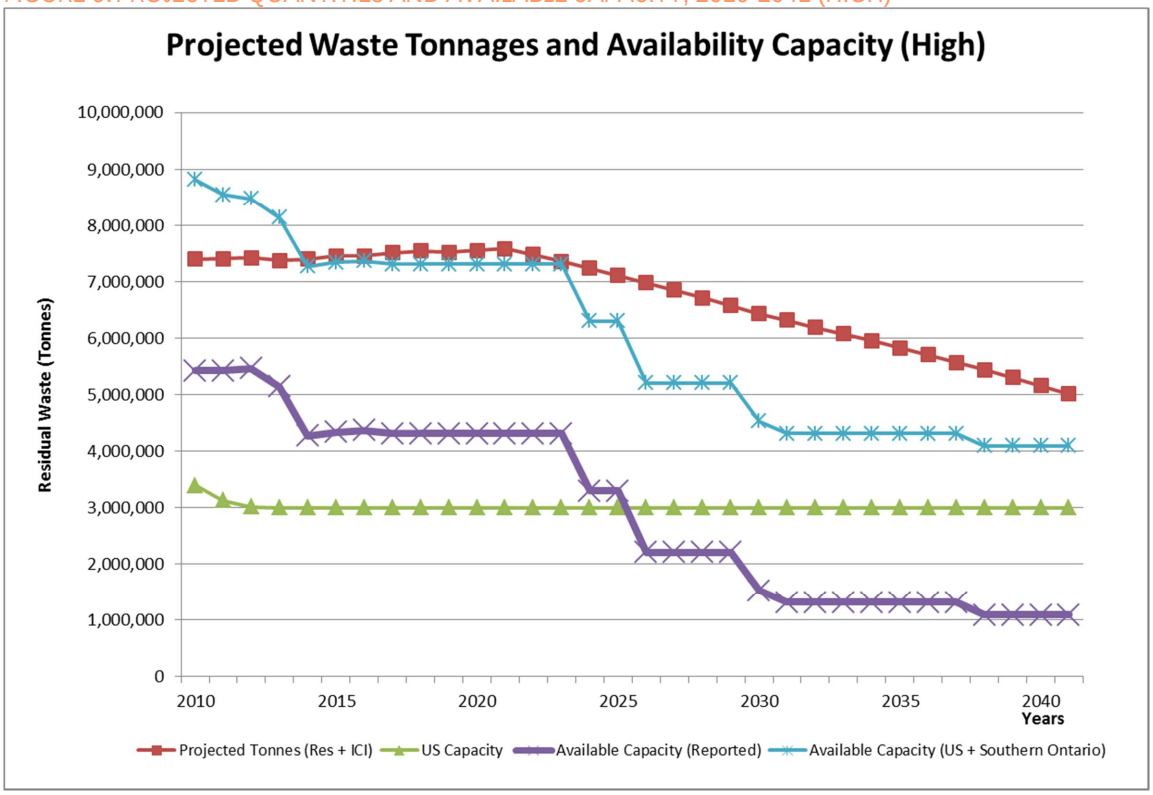


Table 8 outlines the projected difference between the amount of residential and IC&I waste generated on an annual basis compared to the available annual capacity to dispose of that waste in southern Ontario. It is estimated that the amount of waste generated will exceed available capacity in southern 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* (the *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

Table B1 - Major Residual Waste Management Facilities in Southern and Eastern Ontario

Facility Name	Operated By	ECA Issue Year	Landfill Type	Site Location	Hours of Operation	Waste Accepted	Service Area	Total Site Area (Ha)	Area for Landfill Footprint (Ha)	Total Approved Capacity (m^3)	Approved Annual Fill Rate (tonnes)	Total Waste Received in Reporting Year (tonnes)	Estimated Remaining Capacity (m^3)	Last Reporting Year (Waste Received & Remaining Capacity)	Estimatd Capacity Used (m^3)	Additional Site Comments
Lafleche (Eastern Ontario Waste Handling Facility)	Lafleche Environmental (Transforce Inc.)	1999	Private	17125 Lafleche Road, Moosecreek, ON	Mon-Fri 7am-5pm, Sat 8am-2pm	Solid non-hazardous municipal, ICI wastes, including dewatered and digested sewage and pulp mill sludges, construction and demolition waste, asbestos, auto-fluff, shredder fluff, dredged materials, grill ash, tire shreds	Province of Ontario	189	66	7,400,000	755,000	281,461	5,102,563	2011	2,297,437	
Ottawa - Navan Road	Progressive Waste Solutions Ltd.	2009	Private	3354 Navan Road, Ottawa, ON	Monday to Saturday: 7:00 am - 6:00 pm.	Domestic/Residential, Hazardous and Asbestos	Province of Ontario (no waste from the City of Toronto)	90	31.9	7,600,000	234,750	229,590	3,195,120	2013	4,404,880	The proposed expansion alternatives under consideration would provide approximately 2.4 to 3.6 million tonnes of additional waste disposal capacity. Data from 2013 Annual Report.
West Carleton Environmental Centre (WCEC) (planned)	Waste Management of Canada Corporation	2011	Private	2301 Carp Rd, Carp Ontario	7:00 am – 7:00 pm, Monday to Friday and 7:00 am to 6:00 pm, Saturdays.	Non-hazardous waste including residential, insitutional, commerical and industrial waste from acorss the province.	Province of Ontario	232.9	37.8		400,000					Existing site (Carp Landfill) closed in 2011. EA approved in September 2014. ECA application states estimated closure year is 2028.
Beachwood Road Environmental Centre (BREC) (planned)	Waste Management of Canada Corporation		Private	1271 Beechwood Road, Town of Greater Napanee			Province of Ontario		55		400,000					Formerly the Richmond Landfill (closed in 2011). New landfill footprint that will take 400,000 tpy for 20 years. Terms of Reference was approved and EA is underway.
Durham York Energy Centre (to be opened in 2015)	Regions of Durham and York, Covanta Durham York Renewable Energy Limited Partnership	2015	EFW - Municipal	72 Osbourne Road, Lot 27, Clarington	24 hours, 365 days	Solid non-hazardous post-diversion domestic and ICI waste from curbside and Regions' waste management facilities.	Regions of Durham and York				140,000					EA approved in 2010. Facility to be operational in mid-2015.
Peel Energy Recovery Centre (planned)			EFW	7795 Torbram Road, Brampton							400,000					Undergoing Environmental Screening. Facility expected to be operational by mid to late 2020 and last for 30+ years.
Emerald Energy from Waste inc.	Emerald EFW Inc.	1992	EFW - Municipal and ICI	7656 Bramalea Road		Solid non-hazardous post-diversion waste from domestic and ICI sources and limited International Waste	Province of Ontario, Pearson and Hamilton International Airports, Ports of Toronto and Ontario.				182,500					Formerly called Algonquin Power facility.
Halton Regional Landfill	Regional Municipality of Halton	1989	Municipal	5400 Regional Road 25, Milton, ON	Mon-Sat 8am-4:30pm	Non-Hazardous Solid Domestic, ICI; Other/Biosolids	Regional Municipality of Peel	126	53	7,960,000	123,000	74,327	5,060,000	2010	2,900,000	
Waterloo Landfill	Region of Waterloo	1991	Municipal	925 Erb Street West, Lot 40	Mon - Sat 7am - 6 pm	Solid, non-hazardous domestic and IC&I	Cambridge, Kitchener, North Dumfries, Waterloo, Wellesley, Wilmot, Woolwich	127	71	14,772,120	421,200	209,907	5,736,000	2011	9,036,120	
Niagara Waste Systems Limited Walker South Landfill	Walker Environmental Group	2008	Private	3081 Taylor Road, Niagara Falls, ON	Mon-Fri 7am-5pm, Sat 7am-1pm	Solid non-hazardous waste including municipal and ICI wastes	Province of Ontario	86	54	17,700,000	850,000	839,394	16,321,898	2011	1,378,102	Disposal capacity of 10,000 tonnes/day
Newalta Stoney Creek Landfill	Newalta Corporation	1996	Private	65 Green Mountain Road	Mon - Fri 7am to 4:30pm	Solid, non-hazardous IC&I	Province of Ontario	75	59	6,320,000	750,000	874,054	1,891,400	2011	4,428,600	
Glanbrook - Hamilton	Waste Management of Canada Corporation	1979	Municipal	1500 Haldibrook Road	Mon - Sat 8am - 6 pm	Non-hazardous solid domestic, IC&I and yard waste	City of Hamilton	219	100	13,258,000	565,968	134,534	6,004,000	2011	7,254,000	20 years for Stage 3.
Humberstone - Niagara Region (expansion planned)	Regional Municipality of Niagara	1996	Municipal	700 Humberstone Road	Mon-Fri 8am-5pm, Sat 8am-4pm	Non-hazardous solid domestic, commercial or industrial	Regional Municipality of Niagara	49	38	2,200,000	218,400	59,528	441,952	2011	1,758,048	EA to expand landfill is underway. Expansion to provide 2.6M m3 of capacity over 25+ years (2016-2041). ToR provides tonnage projections to 2041.
Mohawk Street - Brantford	City of Brantford	1974	Municipal	20 Morrison Road	Mon - Sat 8am - 5 pm	Solid, non-hazardous domestic and IC&I	Brantford and Brant	175	73	19,000,000	176,059	79,055	7,788,637	2011	11,211,363	
Tom Howe- Haldiman	Haldiman County	1971	Municipal	611 Concession 15 Walpole, Hagersville, ON	Monday to Friday – 8 a.m. – 4:15 p.m, Sat 9am-1 pm	Municipal waste	Regional Municipality of Haldiman-Norfolk and the Mississaugas of the New Credit First Nation	38	26.4`	1,861,890	130,000	38,123	204,921	2011	1,656,969	
Salford - Oxford County	The County of Oxford	1983	Municipal	777 Romeo Street South	Mon-Fri 8am-5pm, Sat 9am-12pm	Domestic, commercial, non-Hazardous solid industrial and other waste limited to sewage sludge (processed organic waste) and non-Hazardous industrial sludges	County of Oxford	89	43.7	5,905,200	116,000	51,036	3,042,380	2011	2,862,820	
W12A - London	City of London	1973	Municipal	3502 Manning Drive, London, ON	Mon-Fri 8am-4pm, Sat 8am-3pm	Solid non-Hazardous municipal waste	City of London and the County of Middlesex	142	107	13,800,000	600,000	250,949	4,305,000	2011	9,495,000	

Table B1 - Major Residual Waste Management Facilities in Southern and Eastern Ontario

Facility Name	Operated By	ECA Issue Year	Landfill Type	Site Location	Hours of Operation	Waste Accepted	Service Area	Total Site Area (Ha)	Area for Landfill Footprint (Ha)	Total Approved Capacity (m^3)	Approved Annual Fill Rate (tonnes)	Total Waste Received in Reporting Year (tonnes)	Estimated Remaining Capacity (m^3)	Last Reporting Year (Waste Received & Remaining Capacity)	Estimatd Capacity Used (m^3)	Additional Site Comments
Green Lane Landfill	City of Toronto	1978	Municipal	38593 Third Line, St. Thomas, ON	Green Lane accepts waste Mon.-Fri. and half-day on Sat.	May only accept for disposal municipal waste, including domestic, non-hazardous ICI waste, sewage sludge from municipal sewage treatment plants, and non-Hazardous contaminated soils generated within the Province	Counties of Elgin and Middlesex, including the City of St. Thomas (excluding the City of London), City of Toronto	130	71	16,750,000	690,000	683,453	11,657,539	2013	5,092,461	Data from 2013 Annual Report. Airspace utilization factor (annual waste density) is 0.926 tonnes/m3.
Twin Creeks - Lambton	Waste Management of Canada Corporation	1972	Private	8039 Zion Line Watford Ontario,Part of Lots 19-20, Concession 3, Lots 20-21, Concession 4	Mon-Fri 7am-4pm, Sat 7am-11am	Municipal, ICI and solid non-Hazardous waste generated within the Province of Ontario, including non-Hazardous contaminated soil.	Province of Ontario	301	110	26,508,000	750,000	429,041	22,669,491	2011	3,838,509	
Petrolia - Lambton	Waste Management of Canada Corporation	1982	Private	4052 Oil Heritage Road; South half of Lot 16, Concession 10	Mon-Fri 7:30am-4:30pm, Sat 8am-11:30am	ICI waste	County of Lambton and Province of Ontario	41	26	4,749,000	365,000	281,274	520,760	2011	4,228,240	New ECA issued in April 2014. Capacity is still 4.7M m3, 365,000 tpy. Article says landfill to close any day now.
Ridge Landfill-Kent	Progressive Waste Solutions Ltd.	1999	Private	20262 Erieau Road, Part of Lot 5, Front Concession	Monday to Saturday, 7.00 AM – 5.00 PM	Commercial, Domestic	Province of Ontario (IC&I Waste) and Essex County, Lambton County, Middlesex County, Elgin County and the Municipality of Chatham-Kent	262	131	36,800,000	1,300,000	1,011,445.00	11,104,596.00	2013	25,695,404	Data from 2013 Annual Report
EWSWA Regional Landfill	Essex - Windsor Solid Waste Authority	1982	Municipal	7700 Essex County Road 18, R.R.#3; Part of Lots 14-16, Concession 7	Mon-Fri 8am-4:45pm, Sat 8am-1:45pm	Non-Hazardous Solid Domestic and ICI.	Counties of Essex, Lambton, Elgin, City of Windsor and Municipality of Chatham-Kent	123	65	12,800,000	275,000	224,572	8,281,900	2011	4,518,100	Industrial waste from the Province of Ontario.
										TOTAL	9,042,877					

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