SNC·LAVALIN

FINAL REPORT

HAMILTON MRF INFRASTRUCTURE PLANNING FOR 2020

PREPARED FOR:

THE CITY OF HAMILTON

SNC-LAVALIN INC.

February 2015

FINAL REPORT

Project n°621354

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1 INTRODUCTION

The following two sections provide the background to and a description of the services provided to the City of Hamilton with respect to the subject investigations and reporting.

1.1 Background

The City of Hamilton is interested in establishing the basis upon which it can make critical decisions concerning future investments in its Blue Box recyclables management infrastructure. In the fall of 2011, at the direction of Waste Diversion Ontario's (WDO) Municipal Industry Program Committee (MIPC), a RFP was issued by the Continuous Improvement Fund (CIF) for a *Study of Optimization of the Blue Box Materials Processing System in Ontario* (the MIPC Study). The work was completed over the course of 2012 with a series of reports published in June of that year.

The MIPC Study created a model of an optimized (greenfield) province-wide system of Material Recycling Facilities (MRFs) and transfer stations for the management of a "standard suite" of Blue Box recyclable materials. The Study's consulting team undertook to compare this greenfield system to existing public and private Blue Box infrastructure in a number of defined regions. Gaps were identified together with the presentation of options for transitioning to the optimized greenfield system for each region.

The City of Hamilton is located within the "Southwestern Ontario" region as defined in the Study. The existing Blue Box recyclables management infrastructure is identified together with the greenfield infrastructure and a series of "options" comprised of alternative scenarios for components of the infrastructure. The City of Hamilton is defined within the subject greenfield system as the location of one of two large MRFs that would serve as "hubs" for the management of Blue Box recyclables from various jurisdictions via transfer stations located in the Niagara, Brantford, Waterloo, Huron-Perth and Grey-Bruce areas.

The City's existing MRF is a two-stream processing facility. It presently has an approved through-put capacity of 109,000 tonnes per year (TPY) which is sufficient to meet the City's projected recyclables management requirements for the current planning period. The building that houses the MRF was built in the 1950's and retrofitted for its current use in 1989. The facility's equipment was updated in 2008 but according to the City's 2012 SWMMP report, it is anticipated that the MRF equipment will reach the end of its useful life by 2020. Among the recommendations coming out of the Plan-update process, adopted by City Council in June 2012, directed that a review of single-stream processing and expansion of the capacity of the City's MRF be undertaken to provide for the planning of Hamilton's Blue Box recyclables management infrastructure for 2020 when the facility's current equipment will have to be replaced. Council subsequently agreed to move this review to 2014 so as to accommodate for the analysis of the feasibility of establishing a single-stream MRF as a regional "hub" facility further to the MIPC Study.

1.2 Project Description

The subject assignment entailed the following key components:

- The preparation of projections of the quantity and characteristics of Blue Box recyclables in both the City of Hamilton and selected municipalities in the catchment area defined in the MIPC Study.
- The development of an up-to-date model that mapped the City's existing Blue Box recyclables infrastructure including collection and transfer to the MRF together with a process-design-based outline of the MRF's design capacity.
- Discussion of the key components of the model with City representatives and the incorporation of modification further to these discussions.
- The modeling of alternative options for the catchment area defined in the MIPC Study to examine the tonnage of Blue Box recyclables that may realistically be secured at a MRF located in the City of Hamilton.
- Completion of an analysis of single stream and two-stream MRF process designs with a focus on capital and operating costs.
- Examination of the option of the City acquiring processing capacity from either a municipal or private-sector third party (parties) for its Blue Box recyclables.

The project entailed the following key components:

- The collection and organization of existing, applicable background information.
- The completion of volume and composition projections for the City's as well as selected municipalities' Blue Box recyclables within a defined catchment area.
- Development of a methodology that would model alternative Blue Box recyclables management scenarios or options.
- Confirmation of the modeling methodology with City of Hamilton representatives.
- Population and application of the model to alternative, defined management options.
- Completion of an engineering review of the existing services and floorspace of the facility against typical requirements for a facility that would be required to service the "hub" processing level throughput. This will not involve detailed design but will be a general review of the services and spacing that are anticipated to be required, in comparison to the capability of the current facility.
- Preparation and distribution of a questionnaire to identify "linked" municipalities to determine their interest in accessing the services of a regional MRF located in the City of Hamilton. This project component included the tabulation of the responses received from the subject municipal contacts.

- Documentation of the key findings as a “draft” report for review by City representatives and then preparation of a “final” report based upon the input received from the representatives.

2 METHODOLOGY

The Hamilton MRF Infrastructure Planning 2020 Study employed two methods for its analysis: 1) modeling; and 2) surveying linked municipalities. The following sections below outline the different methodologies undertaken for this Study.

2.1 Hamilton MRF Infrastructure Planning Study Area

2.1.1 Catchment Area

The catchment area for this Study was derived from the MIPC Study. The Southwestern Study Area defined in the report was utilized to determine the identities of linked municipalities for the purposes of the subject Study. The catchment area was then developed by identifying the municipalities linked to Hamilton based on the MIPC Study's "Existing System" figure as well as in consultation with City of Hamilton representatives. The linked municipalities used to identify the catchment area for the subject Study are as follows:

- County of Brant
- City of Brantford
- City of Guelph
- County of Haldimand
- Regional Municipality of Halton
- Regional Municipality of Niagara
- County of Norfolk
- Regional Municipality of Waterloo
- County of Wellington

2.1.2 Scenarios

The municipalities in the defined catchment area were divided into different scenarios to determine feasible options for the Hamilton MRF. The scenarios were analyzed based upon collection, processing and transportation costs both to and from the Hamilton MRF. The following scenarios will be further examined and discussed below:

- **Scenario 1: City of Hamilton** – the Hamilton MRF serving the City of Hamilton only.

- **Scenario 2a**: **City of Hamilton, County of Brant, City of Brantford, City of Guelph, Regional Municipality of Halton, Regional Municipality of Waterloo, and County of Wellington** – This scenario includes municipalities north and west of City of Hamilton. This scenario was used to analyze the feasibility of the Hamilton MRF servicing these western municipalities.
- **Scenario 2b**: **City of Hamilton, Haldimand County, Regional Municipality of Niagara, and Norfolk County –** This scenario includes municipalities east of the City of Hamilton and was defined to provide of the analysis of the feasibility of the Hamilton MRF serving these identified eastern municipalities.

2.2 Analysis of Alternative Blue Box Recyclables Management Options

This analysis entailed the investigation of the aforementioned scenarios presented by the selected catchment area. The planning period for the Study was defined as extending from 2020 to 2035. This timeline was selected based on the following: previous studies have determined that it is anticipated that the MRF equipment will reach the end of its useful life by 2020. Replacement equipment is expected to have a useful service life in the order of 15 years.

An individual profile was created for each municipality. Each of these profiles includes:

- Blue Box Quantities and Composition
- Financial Analysis
- Environmental Impact

The following sections describe the methodology used to undertake the modeling of the identified alternative management scenarios or options.

2.2.1 The Modeling Methodology

Blue Box Quantities and Composition

Blue Box quantities and composition changes over time were tied to the municipality's respective population changes. The major assumption in this section was that the per capita composition and quantity of Blue Box values would be constant, and therefore would increase as the population increases.

Base information to determine the composition and quantity of Blue Box materials in each municipality was sourced from *2012 Blue Box Tonnage, WDO Municipal Datacall*. Information for each of the ten municipalities investigated was available through this source.

Population projections were determined using the census data for 2011 and 2006 from Statistics Canada. The rate of population change from the period 2006 to 2011 was extrapolated forward to provide population projections for the 2020 to 2035 period. The projected population for each year was applied to the Blue Box material per person calculation to generate the value for the total Blue Box materials generated per year.

To account for the upward trend in plastics use and corresponding downward trend in printed paper and paper packaging, a 1% annual decrease in fibres generation rates and a 1% annual increase in plastic generation rates was incorporated into the model. Each of these assumptions for generation on a per capita basis was coupled with the projected population increase on an annual basis, to represent an annual rate of change. For example, when the model combines the overall fibre decrease of 1% per year with a population increase of 1% per year, the result is an overall 0.1% decrease per year in anticipated fibre tonnages for Hamilton. This compares well with the June 2012 StewardEdge projections, which indicates a 4% net tonnage decrease for fibres over 15 years or about a loss of 0.25% per year (one quarter of one percent) in tonnage for all of Ontario. Similar projected changes were applied within the model to obtain estimates of what the anticipated future recyclables generation would be.

Financial Analysis

Base information to determine system cost for each municipality was sourced from *2012 Blue Box Financial Details, WDO Municipal Datacall*. Information for each of the ten municipalities investigated was available through this source. The information used from the municipal data call included:

- Residential Collection Cost
- Residential Depot/ Transfer
- Residential Promotion and Education Cost
- Administration and Interest on Municipal Capital

Each of these costs are presented as a cost per tonne, therefore to produce cost projections using the current system for Blue Box recycling, these proportions were applied to the projected Blue Box quantities produced in the respective time period. A two percent annual inflation rate was also assumed.

Several of the investigated municipalities included in this study currently run as a dual stream system. To account for conversion to a single stream system that will be supported by the Hamilton MRF, it was assumed that the overall cost of a dual stream system is 3% higher than a single stream system. This is based on various inputs, in particular related to potential savings in single stream collection due to efficiencies that can be achieved with longer routes, fewer staff, etc. These anticipated savings are generally offset at the processing stage, with an increase in sorting equipment, residual volumes or reduction of quality of salable material due to contamination, additional staffing and maintenance associated with single stream processing, etc.

Analysis of costs related to a Hamilton Regional MRF based system assumed that the major variable would be Residential depot/Transfer costs. Residential Collection Cost, Residential Promotion and

Education Cost, and Administration and Interest on Municipal Capital were assumed to follow the same cost per tonne proportions.

Transfer Station costs as a result of a Hamilton Regional MRF system were calculated using the methodology outlined in *Guidelines for Establishing Transfer Stations for Municipal Solid Waste, UMA Engineering Inc*. The base assumptions that feed into this method are indicated in each individual municipality datasheet.

Costs outlined in the *Guidelines for Establishing Transfer Stations for Municipal Solid Waste, UMA Engineering Inc* were used for estimating the costs associated with each municipality's transfer station. Additionally, the percentage of Blue Box material that would be directed to the transfer station as opposed to going directly to the Hamilton MRF was also estimated. Generally, the further the individual Municipality was from the Hamilton MRF, the higher the percentage of total Blue Box material that is directed to the respective Transfer Station. Both the cost for the current system and the selected scenarios of a Hamilton Regional MRF system are presented for comparison purposes.

Environmental Impact

The Environmental Impact of each municipality, and by extension each scenario, was determined using the *Municipal Solid Waste Decision Support Tool (MSWDST)* developed by RTI International Ltd. The MSWDST can be used to identify and evaluate cost and environmental aspects associated with specific waste management strategies or existing systems. It can also be used to identify costs and environmental aspects of proposed strategies such as those designed to meet recycling and waste diversion goals, quantify potential environmental benefits associated with recycling, identify strategies for optimizing energy recovery from MSW, and evaluate options for reducing greenhouse gases, air pollutants, and environmental releases to water-bodies or ecosystems.

For the purposes of this assessment, the life cycle environmental impact of the system was not the focus, since this study revolves around Blue Box recyclables. Thus, the gross emissions as a result of collection and processing were calculated using the MSWDST. Additionally, the base figures were not deemed to be as important as the comparison in environmental impact between the existing system and the scenarios presented for the Hamilton MRF system.

Scenarios

The scenarios are presented in a summary page of the model, which essentially provides a summation of the individual municipalities included in each scenario. The model has been constructed to allow alternative scenarios to be analyzed as well.

2.2.2 Surveys to Linked Municipalities

A survey was conducted to engage with surrounding municipalities within the catchment area for interest and information regarding their current management systems.

Contacts at each of the municipalities were identified and asked to complete a small questionnaire. These questions entailed:

- The Project will be building on the results reported in A Study of the Optimization of the Blue Box Material Processing System in Ontario – Final Report, June 2012 (MIPC Blue Box MRF Optimization Study). The study identified Hamilton as one of the 2 regional state-of-the-art MRFs that would anchor the processing and transfer system in Southwest Ontario. As such, would your municipality be interested in participating in a recyclables management system where your Blue Box recyclables are processed at a regional MRF in Hamilton? Please provide reason(s) for your response.
- Would your municipality consider other MRF options, such as partnerships, retro-fitting your existing facility, building a new facility, etc?
- What is the nature of your current Blue Box recyclables Contract (i.e., % out-sourced/% in-house)?
- What is the duration of current Contract(s)?
- Is your municipality carrying out any work/studies to assess Single Stream vs. Dual Stream processing?

The answers to these questions will aid the City of Hamilton in establishing various scenarios to act as a regional hub for different cities.

Each of the nine (9) linked municipalities were contacted via email and followed up by phone calls to complete the questionnaire. Linked municipalities provided responses to the questions as well as indicated whether or not they are interested in participating in a regional MRF hub with the City of Hamilton. Results of the survey can be found in Section 3 below.

3 KEY FINDINGS

3.1 Projection Modeling

This section will contain relevant excerpts from the model created for this study. The full model is provided in Appendix A.

Blue Box Quantities and Composition

The total blue box recyclable marketed tonnages for each scenario are summarized below in Table 1.

Table 1 – Total Blue Box Recyclable Tonnages

	2020	2035
Scenario 1	40,104	44,000
Scenario 2A	152,687	194,409
Scenario 2B	87,485	92,529

Determining the required processing capacity of the Hamilton MRF facility is directly related to the number of adjacent municipalities that will participate. Based on our model, the tonnages generated from each scenario lead to what may be entirely different processing options as outlined in Section 4. Note that despite the difference between marketable tonnages and inbound tonnages actually received at the MRF (different due to year-end inventories and contamination resulting in some material being considered unsalable), for the cases described in Section 4, the differences in quantities would make little change to the design capacity of the processing lines. Changes in requirements would be specifically addressed during future studies, in particular during or prior to engineering feasibility assessment and/or detailed design.

The composition of Blue Box recyclables per *2012 Blue Box Tonnage, WDO Municipal Datacall* across all ten (10) investigated municipalities is summarized in Figure 1.

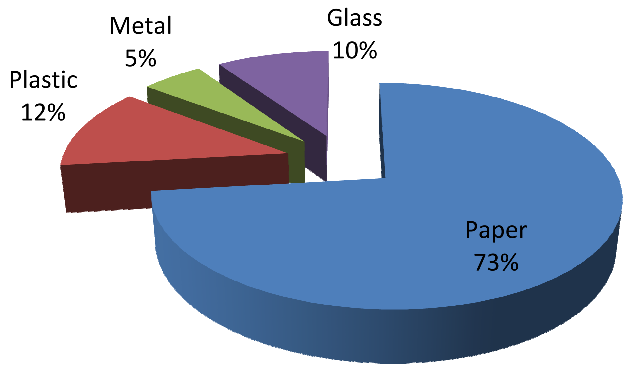

Figure 1 – Blue Box Recyclables Composition

Figure 1 demonstrates that the large majority of recyclable material consists of paper products. This indicates that the majority of processing costs and potential revenue that will be generated from the Hamilton MRF is tied to the processing efficiency of paper products.

Financial Analysis

The summary of system costs generated by the model is outlined in Table 2.

Table 2 – System Costing Summary

		2020	2035
Scenario 1	**Current System**	**2020**	**2035**
	Collection Cost (delivered directly to MRF)	$9,688,974	$14,306,884
	Transportation Cost (from local Transfer Stations to MRF)	$151,823	$224,183
	Residential Promotion and Education	$177,942	$262,751
	Admin and Interest on Municipal Capital	$694,114	$1,024,940
	Total Collection Cost of Dual Stream System	$10,712,852	$15,818,758
	Hamilton MRF System	**2020**	**2035**
	Collection Cost (delivered to MRF)	$9,398,304	$13,877,677
	Transportation Cost (from local Transfer Stations to MRF)	$55,057	$79,402
	Residential Promotion and Education	$177,942	$262,751
	Admin and Interest on Municipal Capital	$694,114	$1,024,940
	Total Collection Cost of Single Stream System	$10,325,417	$15,244,770
Scenario 2A	**Current System**	**2020**	**2035**
	Collection Cost (to Transfer Station)	$32,023,190	$53,098,635
	Transportation Cost (from Transfer Station to MRF)	$770,071	$1,210,138
	Residential Promotion and Education	$920,309	$1,570,808
	Admin and Interest on Municipal Capital	$2,504,793	$4,129,816
	Total Collection Cost of Dual Stream System	$36,218,363	$60,009,396
	Hamilton MRF System	**2020**	**2035**
	Collection Cost (to Transfer Station)	$31,357,507	$52,075,415
	Transportation Cost (from Transfer Station to MRF)	$2,249,247	$3,634,594
	Residential Promotion and Education	$920,309	$1,570,808
	Admin and Interest on Municipal Capital	$2,504,793	$4,129,816
	Total Collection Cost of Single Stream System	$37,031,856	$61,410,632
Scenario 2B	**Current System**	**2020**	**2035**
	Collection Cost (to Transfer Station)	$20,867,744	$29,650,008
	Transportation Cost (from Transfer Station to MRF)	$755,891	$1,027,820
	Residential Promotion and Education	$774,989	$1,087,295
	Admin and Interest on Municipal Capital	$1,835,133	$2,593,642
	Total Collection Cost of Dual Stream System	$24,233,757	$34,358,764
	Hamilton MRF System	**2020**	**2035**
	Collection Cost (to Transfer Station)	$20,241,712	$28,760,508
	Transportation Cost (from Transfer Station to MRF)	$1,142,823	$1,570,161
	Residential Promotion and Education	$774,989	$1,087,295
	Admin and Interest on Municipal Capital	$1,835,133	$2,593,642
	Total Collection Cost of Single Stream System	$23,994,656	$34,011,605

Generally, cost differences between the current system and a Hamilton Regional MRF system are based almost entirely on the additional transportation costs. As a result, any investigated scenario that includes municipalities other than the City of Hamilton would generate a higher cost in collection and transportation than their respective existing systems.

However, this needs to be weighed against the potential savings that will result from not operating additional MRF facilities that were previously necessary.

Environmental Impact

After running scenarios for each municipality through the MSWDST tool, it was evident that converting from the current system towards a Hamilton Regional MRF system would result in significant increases in emissions as a result of collection and transportation.

On average, the percentage increase in emissions for the ten municipalities is as follows:

Table 3 – Percentage Increase in Emissions for Hamilton MRF System

Emission Impact	Emission Type	Percentage Increase
Global Warming Air	Carbon Dioxide Fossil	34%
Acidification Air	Nitrogen Oxides	45%
	Sulfur Oxides	0%
Human Health Criteria Air-Point Source	Total Particulate Matter	8%
	Nitrogen Oxides	45%
	Sulfur Oxides	0%
Eutrophication Air	Nitrogen Oxides	45%
Smog Air	Nitrogen Oxides	45%
	Carbon Monoxide	92%

These increases are due to the increased need for haulage of recyclable materials from transfer stations to the Hamilton MRF. However, there would be a significant reduction in emissions due to there being one operating MRF facility versus having several in operation. This would likely partially or fully offset the additional emissions caused by the increased transportation requirements of the Hamilton MRF system.

Revenues

Due to the high level of volatility that exists in the commodities market coupled with the fact that the period being investigated extends well into the future, projected revenues were not modeled in our analysis. As indicated in Figure 2, cumulative tonnages and gross costs per tonne increased at a relatively stable rate during the 2002 to 2011 period, however revenues during this time are seen to fluctuate wildly. These trends allow for relatively accurate projections for tonnages and gross costs, though any speculation about the resulting revenues would be largely unreliable.

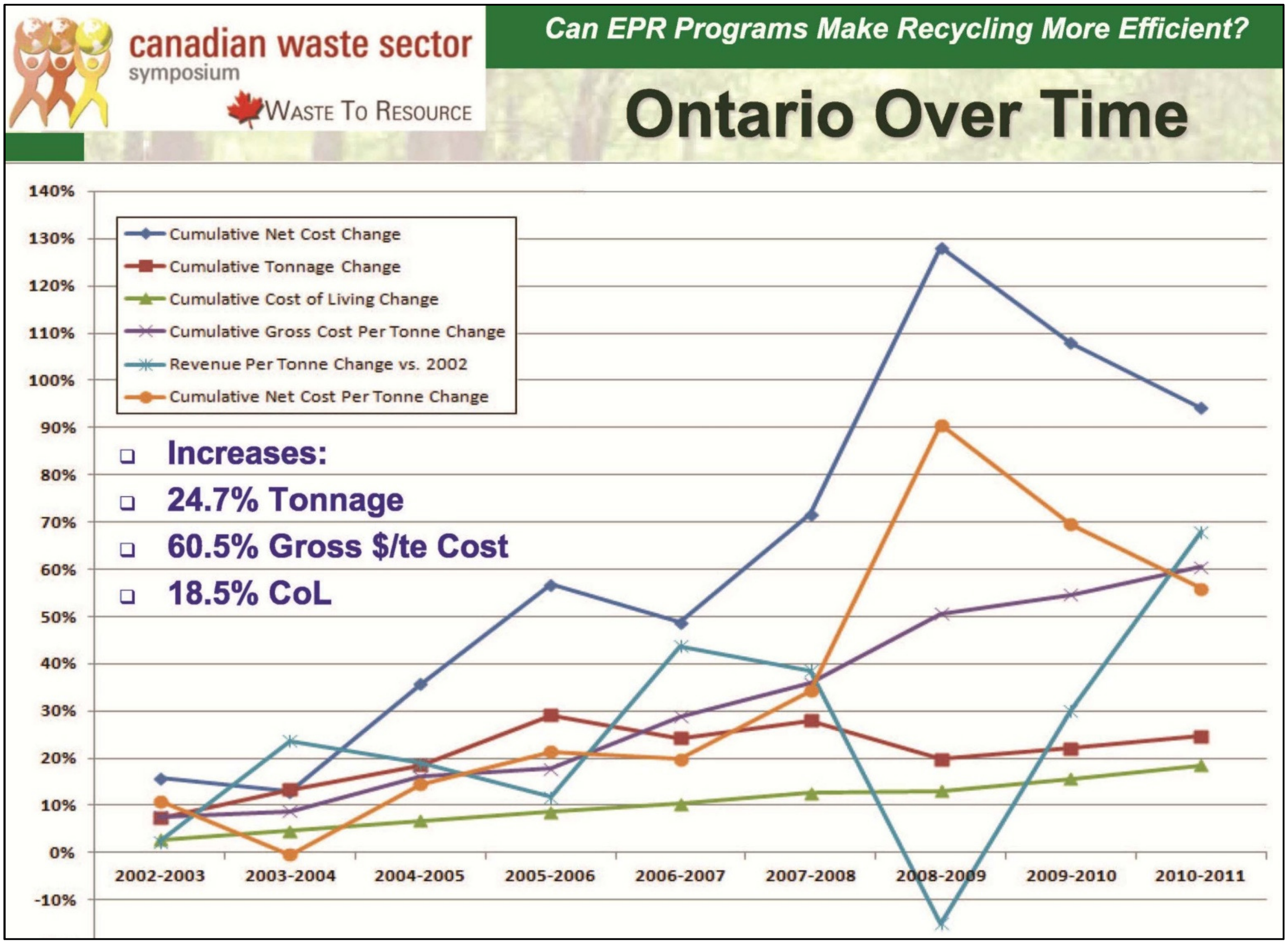

Figure 2 – Ontario Waste Management Trends

Potential revenues have been identified, using data presented in the Reclay StewardEdge Ontario Price Sheet. The RSE Ontario Price Sheet is a monthly publication that contains a blend of municipal spot market prices for Ontario-based municipalities. It details current and historical price trends for post-consumer metals, glass, plastic and fibres. Table 4 provides the mean revenues generated for each Blue Box recyclable material during the 2011 to 2014 time period.

Table 4 – Mean Revenues (2011-2014)

Commodity	CDN$/Metric Tonne
Aluminum Cans	1648
Steel Cans	294
PET (mixed)	458
HDPE (mixed)	565
Plastic Tubs & Lids	128
Mixed Plastics	41
Film Plastic	22
Polystyrene	(22)
Newspaper (ONP8)	86
Corrugated (OCC)	143
Hardpack (OBB/OCC)	65
Boxboard (OBB)	60
Polycoat Containers	91
Composite Index	103

From Table 1 and from the Blue Box Quantities and Composition projections, it is evident that the major drivers of revenues will be Aluminum, PET, HDPE and Fibres. PET, HDPE and particularly aluminum will contribute to high revenues due to their high commodity prices. Fibres (paper, OCC/OBB) will contribute significantly to revenues due to the large quantity of these materials that will be recycled in all investigated scenarios. The distribution of Blue Box recyclable materials across all ten investigated municipalities is illustrated in Figure 3.

From Figure 3, the highest drivers of revenue in terms of value per tonne collectively make up approximately 11 percent of all collected Blue Box recyclable material with Aluminum making up approximately 1 percent of all collected Blue Box recyclable material. Additionally, fibres, which comprise approximately 73 percent of all Blue Box recycling material, will, therefore, contribute to the majority of revenues realized despite its relatively low value per tonne as a product. The ability to find appropriate markets for the recycled materials presents an additional factor in its effectiveness in generating revenue.

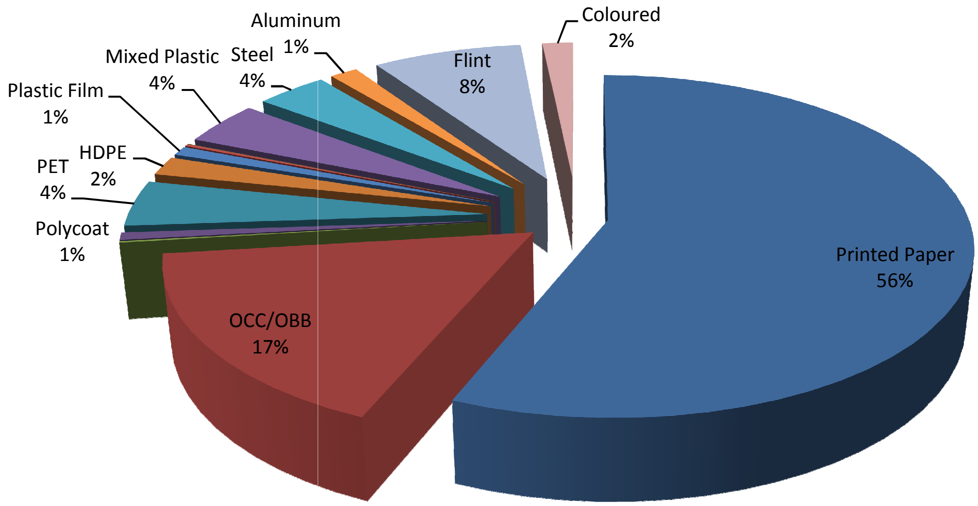

Figure 3 – Breakdown of Blue Box Recyclables Composition

Outsourcing

As noted in Table 2, the total cost for the current Blue Box recycling system for the City of Hamilton is expected to be approximately $11 million per year. By pursuing an outsourcing option, it would be anticipated that the costs associated with the service provider would be within a similar range, with an additional service charge. It is difficult to define what any associated service charge would be, as it will likely be a result of extensive negotiations conducted between the supplier and the City. As a result, this may represent a more expensive option for the City of Hamilton.

3.2 Participation of Linked Municipalities

The survey to the nine (9) linked municipalities will allow for the City of Hamilton to determine various MRF scenarios with different municipalities. All of the nine (9) linked municipalities within the catchment area provided responses to the questionnaire.

It is acknowledged that any information provided by the municipalities may include confidential information regarding their interest, management systems and current contracts, not previously disclosed to the general public. As such, the information provided by the respondents will strictly be kept confidential and for the purposes of the City of Hamilton's MRF Infrastructure Planning for 2020 Study.

Table 5 provides a description of the responses to each question by each municipality. To ensure that municipalities are kept anonymous, respondent codes are used so as to not reveal which municipality is making the comment.

Table 5 – Municipality Responses to Questionnaire

	Municipality 1	**Municipality 2**
Is your municipality carrying out any work/studies to assess Single Stream vs. Dual Stream processing?	No.	No. The municipality uses regional facilities to process Blue Box materials and the municipality collects based on processing capabilities.
What is the duration of current Contract(s)?	10 Year period, ends Nov 1, 2017.	Curbside collection expires October 2016 and the processing contract expires October 2017.
What is the nature of your current Blue Box recyclables Contract (i.e., % out-sourced/% in-house)?	100% Outsourced.	100% Outsourced.
Would your municipality consider other MRF options, such as partnerships, retro-fitting your existing facility, building a new facility, etc?	The municipality has not considered other MRF options.	The municipality currently does not have a MRF. Currently in the redevelopment of its transfer station.
Would your municipality be interested in participating in a recyclables management system where your Blue Box recyclables are processed at a regional MRF in Hamilton? Please provide reason(s) for your response.	The municipality does not currently own our own MRF. Blue Box collection is contracted out. The municipality has not made a decision on how it will tender its next garbage/recycling contract.	Yes, the municipality would be interested in sending its Blue Box material to a regional MRF in Hamilton.

	Municipality 3	Municipality 4	Municipality 5
Is your municipality carrying out any work/studies to assess Single Stream vs. Dual Stream processing?	No, the municipality moved to a single stream program with the implementation of weekly Blue Box and GreenCart collection in 2008.	Yes, the study will be initiated in 2015.	No.
What is the duration of current Contract(s)?	Current contract is for 10 years and expires April, 2018.	Processing contract expires April 6, 2018; collection contract expires March 2, 2018,	1 year collection; 6 years processing.
What is the nature of your current Blue Box recyclables Contract (i.e., % out-sourced/% in-house)?	The municipality has an agreement with a waste management company for the receipt, processing and marketing of Blue Box material.	100% outsourced, but municipality owns the MRF and equipment.	100% out-sourced.
Would your municipality consider other MRF options, such as partnerships, retro-fitting your existing facility, building a new facility, etc?	The municipality will consider other partnership opportunities with a Single Stream MRF when our current contract expires in April, 2018. The municipality has no plans at this time to build our own MRF.	Other MRF options may be considered to results of cost benefit analysis and business cases.	Always open to efficiencies.
Would your municipality be interested in participating in a recyclables management system where your Blue Box recyclables are processed at a regional MRF in Hamilton? Please provide reason(s) for your response.	The municipality would with minimal adjustments be able to transfer Blue Box material to a single stream MRF in Hamilton. The municipality would need to determine the impact of transfer costs due to distance Blue Box material is to be shipped, including any costs to the municipality for processing and the amount of any potential revenue for sales.	The municipality is interested in evaluating the option of processing recyclables at a regional MRF in Hamilton for either single or dual stream. The municipality is evaluating a range of options to identify an optimized collection/processing system that is most cost-effective.	The municipality is open to efficiencies. However, preference is to support local jobs. Distance of bulk material to Hamilton may be cost prohibited.

	Municipality 6	Municipality 7	Municipality 8
Is your municipality carrying out any work/studies to assess Single Stream vs. Dual Stream processing?	No.	The municipality will be initiating a Master Plan.	The municipality's next tender will likely include both options.
What is the duration of current Contract(s)?	N/A	N/A	3 years remaining.
What is the nature of your current Blue Box recyclables Contract (i.e., % out-sourced/% in-house)?	100% In-House.	N/A	100% Outsourced.
Would your municipality consider other MRF options, such as partnerships, retro-fitting your existing facility, building a new facility, etc?	No.	The region is not looking at anything different at this time.	The municipality contracts the service, there is little for the municipality to offer into a partnership. The municipality tenders for this service.
Would your municipality be interested in participating in a recyclables management system where your Blue Box recyclables are processed at a regional MRF in Hamilton? Please provide reason(s) for your response.	No.	No. The municipality went through an expansion 6 years ago to increase its current program.	There may be some interest if all of the municipality is considered to be part of the catchment area.

	Municipality 9
Is your municipality carrying out any work/studies to assess Single Stream vs. Dual Stream processing?	No studies are currently underway for this type of assessment.
What is the duration of current Contract(s)?	N/A
What is the nature of your current Blue Box recyclables Contract (i.e., % out-sourced/% in-house)?	100% outsourced.
Would your municipality consider other MRF options, such as partnerships, retro-fitting your existing facility, building a new facility, etc?	Options can be reviewed/ investigated at the staff level.
Would your municipality be interested in participating in a recyclables management system where your Blue Box recyclables are processed at a regional MRF in Hamilton? Please provide reason(s) for your response.	Options can be reviewed/investigated at the staff level. Collection and processing operations are currently contracted out to the private sector through competitive tender process every 5-7 years.

Based upon the results of the questionnaire, two (2) municipalities have expressed interest in participating in a recyclables management system where their Blue Box materials would be processed at a regional MRF located in Hamilton. However, they have indicated that their interest is dependent on the costs to transfer the materials to the city as well as access to their portion of the potential revenues generated by the sale of the processed materials. One (1) municipality indicated that options can be reviewed and/or investigated at the staff level to determine their interest in participating in a regional MRF located in Hamilton. The remaining four (4) municipalities indicated that they were not interested in accessing a regional MRF located in Hamilton for reasons such as transfer costs and the fact that they have a MRF facility located in their municipality.

In terms of the municipalities considering other MRF options such as partnerships, retro-fitting their existing facility, or building a new facility, three (3) municipalities indicated that they are considering other options and partnerships, and one (1) indicated that options can be investigated further to consider other MRF options for their municipality. The remaining five (5) municipalities indicated that they are not considering other options as they do not have their own MRF, they tender the service, or they have already expanded their facility.

According to the responses, seven (7) of the municipalities outsource their Blue Box recyclables and one (1) municipality processes their recyclables in-house.

In terms of their current contracts, municipalities have two to three years left in their current contracts.

Based on the results, three (3) municipalities will be carrying out any work/studies to assess single stream versus multi-stream processing and six (6) municipalities will not be doing so.

4 ENGINEERING REVIEW OF EXISTING MRF FACILITY

4.1 Scope of Work

The engineering review of the current MRF included a review of the existing and anticipated services to be provided, and a comparison of available floor space of the facility against typical storage, staging and equipment requirements for a facility that would be required to service future recycling needs for the City (and potentially additional surrounding areas) for the period of 2020 to 2035. The engineering review considers the following scenarios:

- Two (2) stream processing of blue box recyclables for the City of Hamilton only, with an anticipated maximum capacity of 45,000 tonnes per year.
- Two (2) stream processing for the City of Hamilton and some of the surrounding area, up to a maximum capacity of 93,000 tonnes per year.
- Single (1) stream processing for the City of Hamilton and some of the surrounding area up to a maximum capacity of 185,000 tonnes per year.

The above tonnages represent the cumulative total of material to be processed, individual components can be estimated based on the breakdown of material received as identified previously in Figure 3. The scenarios were selected in order to meet potential future throughput requirements for a MRF, as predicted by modelling projections. In the event that the Regional Hub model does not progress, the first scenario will be appropriate for future City of Hamilton volumes/tonnages during that period (barring any significant changes in receivable material). The second scenario highlights the possibility of some contribution from (a) local municipality(ies); however, for a relatively modest increase in throughput, it is likely that the most feasible option would be to partner with municipalities also operating a similar, or mostly similar, collection system (2-streamed source separated). In the event a significant increase in volumes or tonnages is ultimately deemed feasible due to partnerships with surrounding municipalities, the third scenario reviews the potential for implementing a single-stream collection system due to the likelihood that other contributing municipalities would have contracts for collection under a single-stream program, necessitating Hamilton adopt this system.

The engineering review provided herein does not involve detailed design but is considered a general review of the services and spacing that are anticipated to be required, in comparison to the capability of the current facility. Preliminary and detailed design are anticipated to follow in later projects once additional clarification has been developed on interest from potential partners and follow-up planning review and implementation studies have been completed.

4.2 Existing Facility

The MRF is owned by the City and is operated by Canada Fibers Ltd. (CFL). The MRF receives two stream recyclables (mixed fibers and mixed containers) from a blue box based program from the residents of the City.

The following items are currently accepted for paper (mixed fibers) recycling:

- Cardboard, Molded Pulp (egg cartons, coffee cup trays, etc.), Boxboard, Fine Paper, Newspapers and Magazines, Paper Towel or Toilet Paper Cores, Soft-cover Books, Telephone Books.

The following items are currently accepted for mixed container recycling:

- Glass – Bottles and jars
- Metal – Metal cans, Soft drink cans, Aluminum containers, Clean foil, Empty paint cans with lids removed, Aerosol cans (empty hairspray, paint, whipping cream), Spiral-wound canisters with metal ends (frozen concentrate cans, potato chip tube)
- Plastic – HDPE & PETE plastic bottles, jars and jugs, tubs and tub lids (yogurt, sour cream, hand cleaner, margarine containers), Plastic grocery or shopping bags, Styrofoam (coffee cup lids, plastic bakery trays, Styrofoam containers)
- Cartons – Milk and juice cartons
- TC Tetra Pak – Drink boxes, Soup boxes, Milk boxes

All recyclable materials are hauled by a collection contractor in split collection trucks. Materials are tipped at the MRF (mixed fibers in one area, mixed containers in another area) and processed on the mixed fiber line and mixed container line. Separated material is then sent to markets and residue sent to landfill.

4.2.1 Existing Facility Equipment

The fibre line equipment is owned by CFL. The processing equipment appears to include an old corrugated cardboard (OCC) screen for removal of cardboard from the paper stream since the outgoing products to market from the fibre line are OCC and mixed paper. The fiber line also includes one conveyor/baler system. As there is only a single baler present, under current processes, the system typically focuses on mixed paper during day-to-day operations and cardboard is stockpiled separately until sufficient volumes have been accumulated. The line is then switched over to be dedicated to bail cardboard only until the stockpile is exhausted and the system returns to mixed paper bailing. As this equipment is owned by CFL, it would need to be replaced once the existing contract with CFL is completed, or included as a provision by the site operator in future contracts. Should the two (2) stream process continue, the City should consider whether they would invest in their own fibre processing line and whether they want to have the line designed with additional screens in order to produce additional outgoing products or paper recyclables of varying grades.

The container line produces several outgoing products to market including two (2) grade aluminum, mixed glass, film, gable top/aseptic (tetra packs and cartons), mixed plastics, HDPE #2, PET #1, polystyrene, metal, and tin cans.

The container processing line includes several screens and sorters to separate out the various recycling products. The container line has 1 conveyor/baler system. According to the City, the baler is owned by CFL with the remaining equipment making up the container processing line owned by the City. In 2013, the container line was upgraded with new equipment worth $1.9 million. . According to the City, this newer equipment includes a drum feeder, fines screen, ORSE (organic separator) screen, glass eddy current and transfer system, and bag opener.

4.2.2 Existing Facility Layout

The building that houses the MRF was built in the 1950's and retrofitted for its current use in 1989. The property includes the sub-basement portions of the former Firestone plant, which is a vacant lot to the north of the existing building. The facility's equipment was updated in 2008 but according to the City's 2012 SWMMP report, it is anticipated that some of the MRF equipment will reach the end of useful life in the early 2020's, depending on individual usage and installation dates since 2008 and 2013.

MRF operations utilize approximately half of the space in the existing MRF building. The facility layout is shown on Drawing 1.

Existing ceiling elevations are considered an important factor in potential future changes to the processing equipment in the existing building. Drawings 2 and 3 illustrate the building dimensions and ceiling elevations across the building layout. The building fibre and container sorting/processing lines are strategically located in areas with higher ceilings in order to accommodate height requirements for equipment.

4.2.3 Existing Facility Capacity

The existing MRF has an approved through-put capacity of 109,000 tonnes per year, which is significantly higher than actual processing tonnages in recent years. In 2011, 2012, and 2013, actual inbound processing tonnages were approximately 46,300 tonnes, 44,400 tonnes, and 45,000 tonnes, respectively. Further, it is noted that based on current staffing and processing rates utilized by CFL, the mixed fibre line is shut down during the low season on a daily basis 1 to 2 hours before shift completion due to a lack of material.

4.3 Future Design Scenarios

4.3.1 Option 1 – Two Stream Processing with a Maximum Capacity of 45,000 tonnes per Year

No changes to the current facility operations would be required to maintain a through-put capacity of 45,000 tonnes per year.

Given that the existing fibre line equipment and two (2) balers are owned by the contractor currently operating the facility, the City would need to consider potential investment in a new fibre processing line should the two (2) stream process continue in 2020. Alternatively, the contractor could continue to be responsible for provision of this equipment with no capital outlay required by the City, but with the costs balanced by the contract period and amount.

It is understood that under former studies it was noted that the fibre processing line could be upgraded to include additional screens in order to better segregate the outgoing products/paper recyclables into varying grades in order to maximize potential profitability.

In 2011, $5 million worth of capital costs were estimated for potential improvements to the current dual stream processing facility (HDR, 2013). More details about costs are reportedly available in the City report PW11030a dated June 2011; however, this report was not made available to SNC-Lavalin. The only investment made following the recommendations by the City was $1.9 million towards the container line. They continued the contract with CFL for the fibres line with no change to operations. It was noted by the City that an additional study is nearing completion that will provide specific recommendations to implement improvements to the container line to improve overall capture rate of container recyclables.

It is assumed that upgrades would include at a minimum a new fibre processing line and two (2) balers, to replace equipment currently owned by CFL. Estimated capital costs for equipment and installation would be on the order of $6 to 7 million.

4.3.2 Option 2 – Two Stream Processing with a Maximum Capacity of 93,000 tonnes per Year

Given that the current facility is already approved for a maximum capacity of 109,000 tonnes per year, to increase the capacity of the existing two (2) stream process up to a through-put of 93,000 tonnes per year would not involve significant changes.

The facility currently operates with staff working one (1) day shift. Staff have noted that they can accommodate greater volumes of material within their existing work hours. As such, it is anticipated that an increase to a little over twice the current capacity could be accommodated by increasing the working hours to two (2) shifts. Several large municipal recycling facilities (Region of Peel, City of Toronto) currently operate with two (2) or more work shifts. The existing building also has sufficient storage space for a greater through-put capacity and potential storage of additional ready for market products awaiting shipment.

Operating costs would increase under this scenario; however, capital costs are estimated to be the same as with Option 1 described above. Noise by-laws and other considerations may also need to be addressed for this scenario.

In particular under this scenario, it is more likely that an improved line for fibres would generate sufficient quantities of various grades of material to justify the expense of implementing such an operation.

4.3.3 Option 3 – One Stream Processing with a Maximum Capacity of 185,000 tonnes per Year

It is anticipated that a full new single-stream MRF would need to be installed to operate a one (1) stream processing facility with capacity of up to 185,000 tonnes per year (50 tonnes per hour). Processing equipment for a single-stream facility will typically occupy more space that the 2-stream equipment each organized separately, and the facility would involve additional manual labour support for QA/QC at various stations along the processing line, as well as an additional shift to handle the increased tonnage.

As much of the existing building is currently unused, the City may be able to work with a supplier to design a processing line that will fit within the existing building; however, a significant limiting factor would be areas with lower ceilings, which would need to be worked around. Further, given what are anticipated to be significant inefficiencies in designing the layout, due to the limitations imposed by the low roofline in the majority of areas of the facility, the existing building may not have sufficient space for both the processing equipment and the storage of ready-for-market materials. Finally, the construction of a new 1-stream processing line within the existing building would require the temporary relocation of the existing 2-stream process during the construction phase (costs for this relocation were previously estimated on the order of $2 million by others; Stantec, 2011).

Given the above, the existing facility may not be best suited for retrofit of a 1-stream processing line; however, it has been confirmed by potential suppliers that 1-stream systems can be aligned to fit within existing buildings, however, based on input from technology providers, additional work, including removal of walls and associated restructuring (if required) as well as re-working of ceiling heights in some areas would also be required, these costs would be in addition to those noted for provision and installation of the equipment.

Conceptual level requirements for a new 1-stream processing facility would generally include a building with dimensions of approximately 150 m in length, 75 m in width, and 12 m in height. This would include space for the processing equipment as well as storage (tipping floor and baled materials). For processing equipment only (no storage), approximately 60% of this space would be required.

The property immediately adjacent to the MRF facility, the former Firestone site, could be a potential location for such a building. It should be noted that the existing MRF building could potentially house the equipments and/or be used for storage of both received and ready-for-delivery (bailed) materials, thus reducing the need, or overall size requirements for, a new building significantly.

Stantec's 2011 report estimated the capital costs for a new single-stream MRF (with capacity of 70,000 tonnes per year) at approximately $16 million, which took into account both design and construction phase costs. For a capacity of 185,000 tonnes per year, estimated capital costs for equipment and installation of a new single-stream system (not including building) is on the order of $12 to 18 million. Operating costs to run a system of this capacity would include the requirement for the contracted operator to incorporate 2 shifts.

5 CONCLUSIONS

Following are summary outlines of the key findings coming out of the study's three components.

5.1 Alternative Management Options

The results of the modelling exercise for each investigated scenario illustrates the respective impacts on capacity, costing and emissions by establishing a Hamilton Regional MRF for the time period 2020 to 2035.

Scenario 1, which is representative of the City of Hamilton only, will involve the processing of between 40,000 and 44,000 tonnes of Blue Box recyclable material per year. The total collection cost of a Single Stream system under this scenario is expected to be roughly 3.6% less than the current Dual Stream System.

Scenario 2a, which encompasses City of Hamilton, City of Brant, City of Brantford, City of Guelph, Regional Municipality of Halton, Regional Municipality of Waterloo and County of Wellington, will require the processing of between 152,000 and 195,000 tonnes of Blue Box recyclable material per year. The total collection cost of a Single Stream Hamilton MRF system under this scenario is expected to be roughly 2.2% higher than the sum of the relevant current collection systems. Additionally, emissions would also increase. The increases in emissions and collection costs are due to greater need for transportation to the Hamilton MRF Facility. Much of this increase is expected to be offset by the subsequent closure of other previously required recycling facilities.

Scenario 2b, which represents City of Hamilton, Haldimand County, Regional Municipality of Niagara and Norfolk County, will process between 87,000 and 93,000 tonnes per year. The total collection cost of a Single Stream Hamilton MRF system under this scenario is expected to be roughly 1% lower than the sum of the relevant current collection systems. Emissions however will also increase under this scenario due to higher transportation requirements. As for Scenario 2a, much of this increase is expected to be offset by the subsequent closure of other previously required recycling facilities.

Offsetting the potential savings in collection costs, it has been estimated (as documented in the HDR report to WDO entitled, *An Assessment of Single and Dual Stream Recycling Including Current Program Performance in Large Ontario Municipalities)*, that the gross processing cost per tonne marketed for large Ontario blue box programs reported from 2008 to 2010 is in the order of 14 to 15% lower than the cost of single stream processing.

Revenues are expected to be driven primarily by Fibres, which comprise approximately 73% of all Blue Box material across all municipalities, with high value recyclable materials like PET, HDPE, Steel and particularly aluminum collectively comprising 7% of all recyclable materials. Access to an appropriate market may also present a barrier to the recycled materials being an effective revenue stream, in particular for some individual components where little to no end users/purchasers may be present and materials from a combined system may be generated in excess of their capacity or desire to accept.

Pursuing an outsourcing option for the City of Hamilton is expected to be a derivative of the calculated collection costs, which was approximately $11 million per year, in addition to a service charge. It is impractical to define what that service charge might be, since it will be decided as a result of extensive negotiations between the City of Hamilton and the prospective service provider.

5.2 Engineering Review of Existing MRF

A review of the existing and anticipated services for a facility that would be required to meet future recycling needs for the City and some of the surrounding area, as predicted by modelling projections, considered three (3) potential scenarios related to capacity and process, including: 1) no change; 2) increased capacity, no change to process; and 3) increased capacity, change to process.

The existing MRF has an approved through-put capacity of 109,000 tonnes per year, significantly higher than actual processing tonnages of recent years (approx. 45,000 tonnes). With no change to this capacity or the current two-stream process, future needs would likely include upgrades and/or replacement of equipment, specifically a new fibre processing line and two (2) balers currently owned by CFL. Estimated capital costs for this equipment would be on the order of $6 to 7 million. Alternatively, this equipment could be included as a provision by the site operator in future contracts.

A modest increase in capacity of up to a through-put of 93,000 tonnes per year would not involve significant changes in capital costs (estimated to be the same as Option 1), but operating costs would increase by doubling the number of shifts.

A significant increase in capacity of up to 185,000 tonnes per year due to partnerships with other municipalities may be possible. In the event that a number of the identified partners utilize single stream collection, this would likely necessitate the need for a new single-stream processing facility. The existing facility may not be best suited for retrofit of a single-stream processing line; however, technology providers have confirmed that these systems can be aligned to fit within existing buildings, assuming capital investment such as removal or partial removal of walls and reworking of the ceiling and roof is conducted in some areas. Specific and final requirements would be determined during preliminary design studies. It is also noted that a linear based layout will result in some operational inefficiencies for transfer of some segregated materials to the next stage of processing Estimated capital costs for equipment and installation of a new single-stream system (not including building) is on the order of $12 to 18 million, as well as doubling of operations (2 shifts).

5.3 Participation of Linked Municipalities

Based on the results of the questionnaire distributed to linked municipalities, the majority of the respondents have indicated that they are not interested in participating in a management system that would include transport of their Blue Box recyclable materials to a regional MRF located in Hamilton. However, a few municipalities exhibited interest in participating in a system that would entail transfer of their Blue Box recyclables to a regional MRF located in Hamilton should the option present a cost effective solution.

The linked municipalities generally have a ten (10) year period for their current management contracts which will be ending between 2016 and 2018. As such, the municipalities may not be in the position to examine other MRF options or partnerships in the short term.

6 NEXT STEPS

Next steps for evaluation of this work would involve further discussions with both potential municipal partners to better assess the interest and volume of materials, as well as confirming the necessity to consider single-stream processing. This would presumably be combined with an overall study on the potential impacts of implementing single-stream collection within Hamilton, and should assess items including, but not limited to, the following:

- Single stream is easier and more efficient for pickup but requires more staffing and equipment at the backend for sorting.
- Single stream impacts to diversion rate from single family homes, changes in contamination rates and resultant impacts to the marketable value for the materials.
- Single stream impacts on integration of multi-family residences (i.e. difficulties in incorporating multi-stream with their existing infrastructure for both moderately aged buildings with only one recycling chute, and older buildings that have no recycling chute, only garbage).

Also pre-feasibility studies on the engineering requirements to incorporate either capital upgrades to the existing building or remediation and work requirements to build on the former Firestone plant should be conducted as soon as greater clarity on the volumes and methodology to be implemented is achieved.

Furthermore, it is recommended to use the model to assess different scenarios with the linked municipalities. The model will aid the City in determining the feasibility of various scenarios to serve as a regional MRF for the other municipalities.

7 REFERENCES

1) StewardEdge, 2012. A Study of the Optimization of the Blue Box Material Processing System in Ontario. June 2012.

2) 2012 Blue Box Tonnage, WDO Municipal Datacall.

3) 2012 Blue Box Finanacial Details, WDO Municipal Datacall.

4) Guidelines for Establishing Transfer Stations for Municipal Solid Waste, UMA Engineering Inc.

5) HDR Corporation (HDR), 2013. An Assessment of Single and Dual Stream Recycling, Including Current Program Performance in Large Ontario Municipalities. November 1, 2012 (updated March 4, 2013). Case Study #3 City of Hamilton (p.12-14).

6) Municipal Solid Waste Decision Support Tool (MSWDST) developed by RTI International Ltd.

7) Stantec Consulting Ltd. (Stantec), 2011. City of Hamilton – Waste Collection Service Level Review. January 24, 2011.

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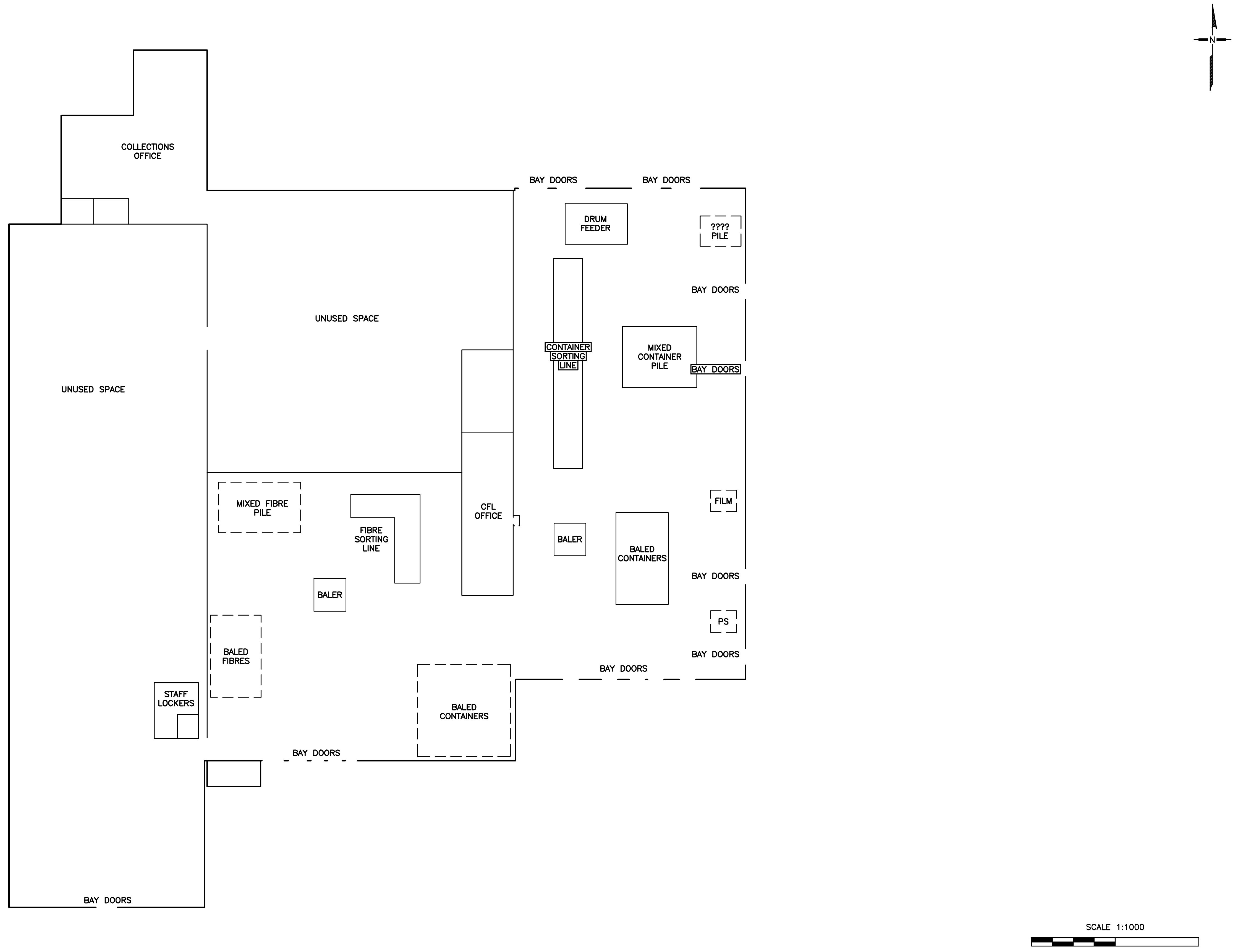
DRAWINGS



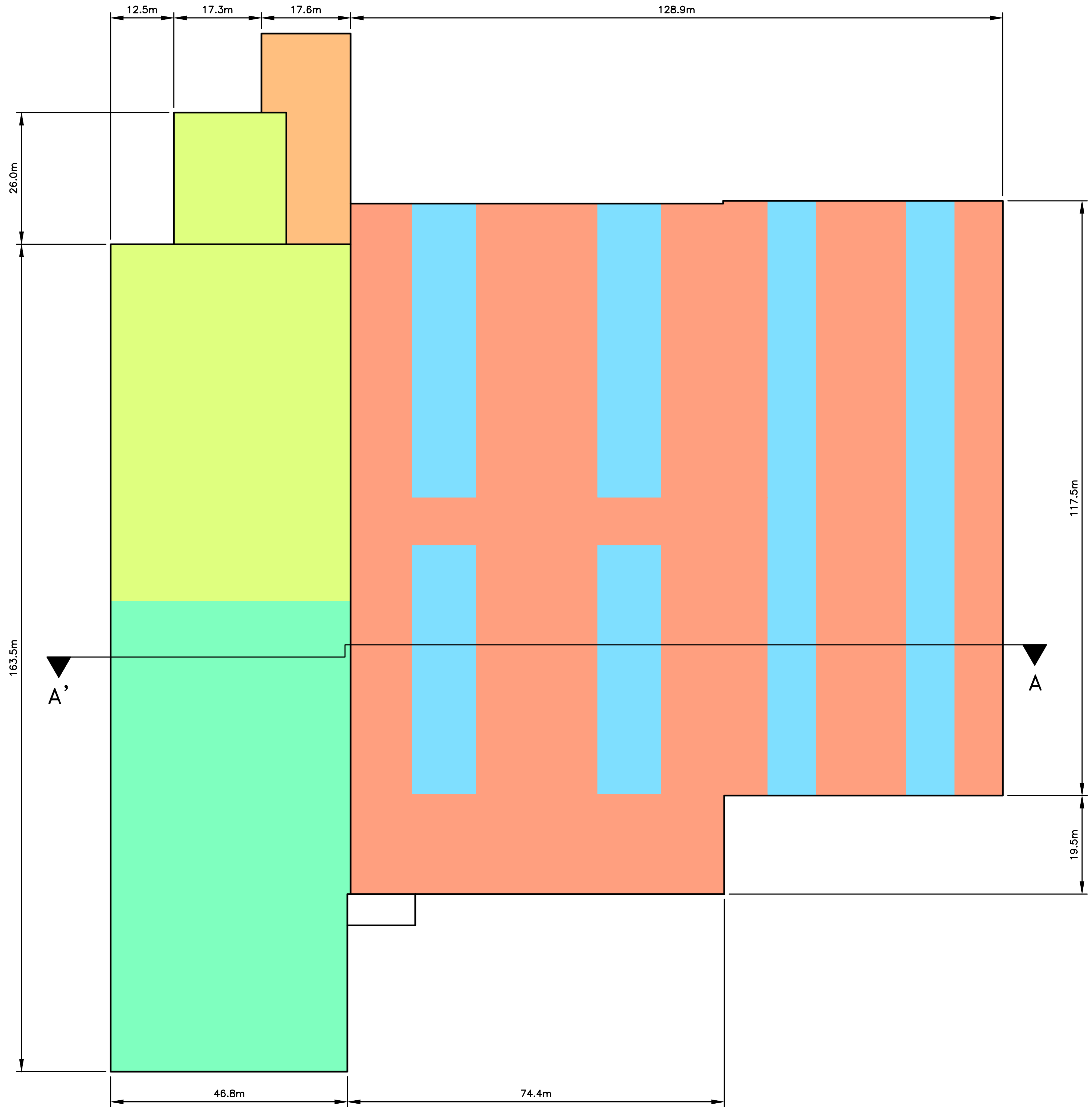
NOTE(S):
1. SCALE AND SITE INFRASTRUCTURE LOCATIONS ARE APPROXIMATE
2. INFORMATION ON THIS FIGURE MAY BE LOST IF IT IS PRINTED, PHOTOCOPIED OR FAXED IN OTHER THAN ITS ORIGINAL SIZE AND COLOURS
3. 'm' : METRES

SOURCE(S):
1. HAMILTON MRF, ARCHITECTURAL, MRF FACILITY OVERALL GROUND FLOOR PLAN, BYRNE ENGINEERING, MARCH 2006

SNC·LAVALIN

Client/Location: CITY OF HAMILTON ENGINEERING REVIEW OF EXISTING MRF FACILITY 1575 BURLINGTON STREET, HAMILTON, ON		Title: MRF FACILITY LAYOUT	
Project No: 621354	Filename: 001F01_621354	Date: FEBRUARY 2015	Dwg No: 1
Drawn: DM	Verified: AM	Project Manager: DD	

PAGE FORMAT: 11x17



WALL HT.*	COLOUR	ROOF ELEV.
5.8		84.97
6.7		85.83
7.9		87.05
9.4		88.58
13.4		92.53

* WALL HEIGHT = TOP OF ROOF ELEVATION – 0.5m (ASSUMED THICKNESS OF ROOF STRUCTURE) – FLOOR ELEVATION (78.67m)

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3. 'm' : METRES

SOURCE(S):
1. HAMILTON MRF, ARCHITECTURAL, MRF FACILITY OVERALL ROOF PLAN, BYRNE ENGINEERING, MARCH 2006

SCALE 1:1000

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SNC·LAVALIN

Client/Location: CITY OF HAMILTON ENGINEERING REVIEW OF EXISTING MRF FACILITY 1575 BURLINGTON STREET, HAMILTON, ON		Title: BUILDING LAYOUT	
Project No: 621354	Filename: 001F01_621354	Date: FEBRUARY 2015	Dwg No: 2
Drawn: DM	Verified: AM	Project Manager: DD	

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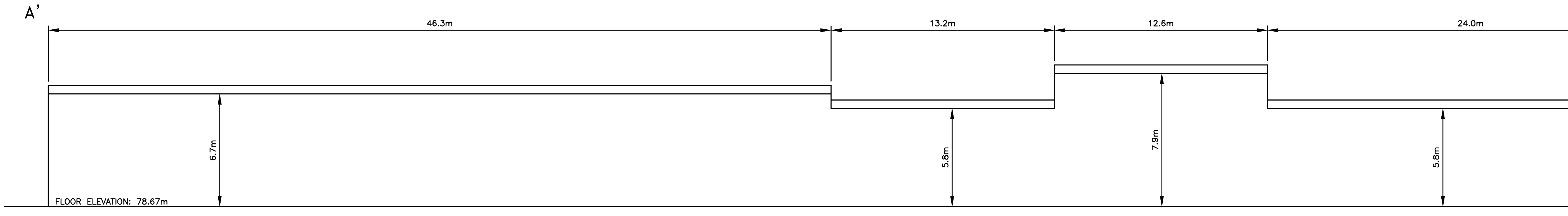
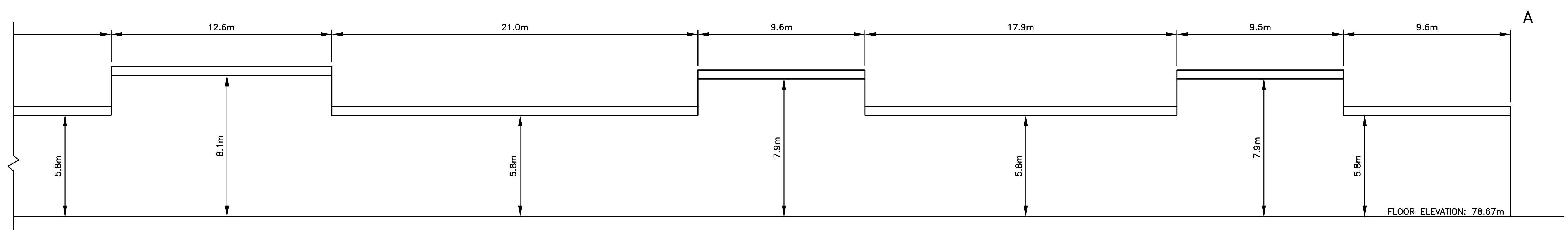


CROSS SECTION A'–A



CROSS SECTION A'–A (CON'T)

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SOURCE(S):
1. HAMILTON MRF, ARCHITECTURAL, MRF FACILITY OVERALL ROOF PLAN, BYRNE ENGINEERING, MARCH 2006

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SNC·LAVALIN

Client/Location: CITY OF HAMILTON ENGINEERING REVIEW OF EXISTING MRF FACILITY 1575 BURLINGTON STREET, HAMILTON, ON		Title: BUILDING CROSS–SECTIONS
Project No: 621354	Filename: 001F03_621354	Date: DECEMBER 2014	Dwg No: 3
Drawn: DD	Verified: AM	Project Manager: DD	

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APPENDIX A

Projection Model

Directions to Use Model

This model has incorporated the latest WDO data and a series of informed assumptions in order to make reasonable projections for the Planning time period (2020-2035). The model has been designed to accommodate assessment of new scenarios, and for the user to change assumptions in order to improve accuracy as new data becomes available. This section outlines the layout and summarizes the functions that can be performed with the model.

The model comprises of twelve (12) linked datasheets. These include:

- A Summary Sheet providing the figures resulting from projected scenarios;
- Ten (10) Individual Municipality Profiles; and
- A Background Data Sheet containing all the pertinent Statistics Canada population figures and WDO Municipality Datacall statistics. These feed into the Individual Municipality Profiles.

The spreadsheet is protected to reduce the chance of any tampering with the necessary formulas. However the cells necessary to perform functions remain unlocked.

Two main functions are amendable by the user. These are:

1- Setting Scenarios

At the base of the "Summary Sheet-Scenarios" page, there is a table (shown below) that allows the user to choose the municipalities to be included into a scenario. This spreadsheet currently includes Scenarios 1, 2A and 2B which have been preselected to reflect the basis of our reporting. A blank has been included to allow the user to analyze any desired combination of municipalities. Note this table is unlocked to allow for editing without removing the worksheet's protection.

	SCENARIO			
Locations	**1**	**2A**	**2B**	**X**
BRANT, COUNTY	N	Y	N	
BRANTFORD, CITY	N	Y	N	
GUELPH, CITY	N	Y	N	
HAMILTON, CITY	Y	Y	Y	
HALDIMAND, COUNTY	N	N	Y	
HALTON, RM	N	Y	N	
NIAGARA, RM	N	N	Y	
NORFOLK, COUNTY	N	N	Y	
WATERLOO, RM	N	Y	N	
WELLINGTON, COUNTY	N	Y	N	

2- Transfer Cost Analytics

Regarding the individual municipalities, the major driver to change in cost between their current collection system, and the collection system under a Hamilton Regional MRF scenario is the increased costs associated with transportation and transfer stations. Each of the individual municipality data sheets contains the following table of assumptions (below is the County of Brant). This table is unlocked and can be revised if new data becomes available.

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	100%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	127.8
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$16,600.00
Incidental Costs	
Transfer Station Maintenance	$2,000
Site maintenance	$2,400
Administrative allowance	10.0%

3- Recyclables Tonnage Trends

There has been a general downward trend in paper products over the last several years that is expected to continue into the future. There has also been an upward trend in plastics. As a result, a factor has been included to account for these trends. The default set for this draft report was set as a 1% annual decrease in paper products and a 1% annual increase in plastics. These can be edited as desired through the listing at the end of each Individual Municipality Profile shown below

Rate of Increase in Plastics	**1.01**
Rate of Increase of Paper Products	**0.99**

In the event that unlocking the spreadsheet becomes necessary, use the following steps:

- Click on “Review” tab on the upper Excel ribbon
- Click on Unprotect Sheet
- Enter Password - mrf

Please take care not to mistakenly delete or alter any formulas after unlocking the sheet. It should generally not be required to unlock any worksheet at all. Each worksheet is locked separately, though the all can be unlocked with the same procedure and password.

HAMILTON MRF SCENARIO PROJECTIONS (2020-2035)

SCENARIO 1 - City of Hamilton

Blue Box Quantities and Composition

Projected Recyclabes Tonnages

Material		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	18,855	18,782	18,709	18,637	18,565	18,493	18,422	18,351	18,280	18,209	18,139	18,069	17,999	17,930	17,860	17,792
	OCC/OBB	9,190	9,154	9,119	9,084	9,049	9,014	8,979	8,944	8,910	8,875	8,841	8,807	8,773	8,739	8,705	8,672
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	202	205	208	212	215	219	222	226	229	233	237	241	245	249	253	257
	PET	1,571	1,596	1,622	1,649	1,675	1,703	1,730	1,758	1,787	1,816	1,846	1,876	1,906	1,937	1,969	2,001
	HDPE	713	725	737	749	761	773	786	799	811	825	838	852	866	880	894	908
	Plastic Film	555	564	574	583	592	602	612	622	632	642	653	663	674	685	696	707
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	20	20	20	21	21	21	22	22	22	23	23	23	24	24	25	25
	Mixed Plastic	1,092	1,110	1,128	1,146	1,165	1,184	1,203	1,222	1,242	1,263	1,283	1,304	1,325	1,347	1,369	1,391
Metal	Steel	1,553	1,563	1,573	1,582	1,592	1,602	1,612	1,622	1,632	1,642	1,652	1,663	1,673	1,683	1,694	1,704
	Aluminum	553	557	560	564	567	571	574	578	582	585	589	592	596	600	604	607
Glass	Flint	3,390	3,411	3,432	3,453	3,475	3,496	3,518	3,540	3,562	3,584	3,606	3,628	3,651	3,674	3,696	3,719
	Coloured	646	650	654	658	662	666	670	674	678	683	687	691	695	700	704	708
Total		**40,104**	**40,353**	**40,603**	**40,855**	**41,108**	**41,363**	**41,619**	**41,877**	**42,137**	**42,398**	**42,661**	**42,926**	**43,192**	**43,460**	**43,729**	**44,000**

Financial Analysis

Current System	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$9,688,974	$9,944,026	$10,205,793	$10,474,450	$10,750,179	$11,033,167	$11,323,604	$11,621,687	$11,927,616	$12,241,599	$12,563,846	$12,894,577	$13,234,014	$13,582,386	$13,939,929	$14,306,884
Transportation Cost (from Transfer Station to MRF)	$151,823	$155,819	$159,921	$164,131	$168,451	$172,886	$177,437	$182,107	$186,901	$191,821	$196,871	$202,053	$207,372	$212,831	$218,433	$224,183
Residential Promotion and Education	$177,942	$182,626	$187,433	$192,367	$197,431	$202,628	$207,962	$213,437	$219,055	$224,822	$230,740	$236,814	$243,048	$249,446	$256,012	$262,751
Admin and Interest on Municipal Capital	$694,114	$712,386	$731,139	$750,386	$770,139	$790,412	$811,219	$832,573	$854,490	$876,983	$900,069	$923,763	$948,080	$973,037	$998,651	$1,024,940
Total Collection Cost of Dual Stream System	$10,712,852	$10,994,857	$11,284,286	$11,581,334	$11,886,201	$12,199,093	$12,520,222	$12,849,804	$13,188,062	$13,535,225	$13,891,526	$14,257,207	$14,632,513	$15,017,700	$15,413,026	$15,818,758

Hamilton MRF System	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$9,398,304	$9,645,705	$9,899,619	$10,160,216	$10,427,674	$10,702,172	$10,983,896	$11,273,036	$11,569,788	$11,874,351	$12,186,931	$12,507,740	$12,836,994	$13,174,915	$13,521,731	$13,877,677
Transportation Cost (from Transfer Station to MRF)	$55,057	$56,414	$57,806	$59,232	$60,694	$62,193	$63,729	$65,303	$66,917	$68,571	$70,266	$72,004	$73,785	$75,611	$77,483	$79,402
Residential Promotion and Education	$177,942	$182,626	$187,433	$192,367	$197,431	$202,628	$207,962	$213,437	$219,055	$224,822	$230,740	$236,814	$243,048	$249,446	$256,012	$262,751
Admin and Interest on Municipal Capital	$694,114	$712,386	$731,139	$750,386	$770,139	$790,412	$811,219	$832,573	$854,490	$876,983	$900,069	$923,763	$948,080	$973,037	$998,651	$1,024,940
Total Collection Cost of Single Stream System	$10,325,417	$10,597,132	$10,875,997	$11,162,202	$11,455,938	$11,757,405	$12,066,806	$12,384,349	$12,710,249	$13,044,726	$13,388,006	$13,740,320	$14,101,906	$14,473,009	$14,853,877	$15,244,770

HAMILTON MRF SCENARIO PROJECTIONS (2020-2035)

SCENARIO 2A - City of Hamilton & Brant County & & City of Brantford & City of Guelph & RM of Halton & RM of Waterloo & Wellington County

Blue Box Quantities and Composition

Projected Recyclabes Tonnages

Material		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	84,257	84,790	85,334	85,889	86,455	87,032	87,620	88,220	88,832	89,456	90,091	90,740	91,400	92,074	92,761	93,461
	OCC/OBB	24,351	24,438	24,527	24,619	24,713	24,810	24,909	25,011	25,116	25,223	25,333	25,446	25,562	25,681	25,802	25,927
	Mixed Paper	278	283	288	294	299	304	310	315	321	327	333	339	345	351	358	364
Plastic	Polycoat	1,105	1,132	1,160	1,189	1,218	1,248	1,279	1,311	1,343	1,377	1,411	1,447	1,483	1,520	1,559	1,598
	PET	6,698	6,862	7,031	7,205	7,384	7,568	7,756	7,950	8,150	8,355	8,566	8,783	9,007	9,236	9,472	9,716
	HDPE	3,039	3,114	3,191	3,270	3,351	3,435	3,521	3,610	3,701	3,794	3,891	3,990	4,092	4,196	4,304	4,415
	Plastic Film	570	580	589	599	609	619	629	639	649	660	671	682	693	704	716	728
	Tubs and Lids	374	386	398	411	424	437	451	466	481	497	513	529	547	564	583	602
	Polystyrene	20	21	21	21	22	22	22	23	23	23	24	24	25	25	25	26
	Mixed Plastic	3,566	3,644	3,724	3,807	3,891	3,977	4,066	4,156	4,249	4,344	4,442	4,542	4,644	4,749	4,857	4,967
Metal	Steel	5,367	5,445	5,525	5,605	5,688	5,772	5,858	5,946	6,036	6,127	6,220	6,316	6,413	6,512	6,613	6,717
	Aluminum	2,238	2,271	2,304	2,338	2,373	2,408	2,444	2,481	2,519	2,557	2,597	2,637	2,678	2,719	2,762	2,806
Glass	Flint	11,532	11,716	11,904	12,096	12,292	12,492	12,697	12,906	13,120	13,339	13,562	13,791	14,025	14,264	14,508	14,758
	Coloured	2,380	2,416	2,454	2,492	2,530	2,570	2,610	2,652	2,694	2,737	2,781	2,826	2,873	2,920	2,968	3,017
Total		**152,692**	**155,077**	**157,513**	**160,000**	**162,541**	**165,136**	**167,787**	**170,496**	**173,264**	**176,092**	**178,981**	**181,935**	**184,953**	**188,038**	**191,192**	**194,415**

Financial Analysis

Current System	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$32,024,345	$33,105,221	$34,225,025	$35,385,258	$36,587,483	$37,833,325	$39,124,478	$40,462,705	$41,849,842	$43,287,802	$44,778,577	$46,324,242	$47,926,958	$49,588,978	$51,312,648	$53,100,413
Transportation Cost (from Transfer Station to MRF)	$770,106	$793,453	$817,537	$842,383	$868,016	$894,463	$921,751	$949,907	$978,962	$1,008,946	$1,039,890	$1,071,826	$1,104,789	$1,138,813	$1,173,936	$1,210,193
Residential Promotion and Education	$920,359	$953,203	$987,299	$1,022,698	$1,059,452	$1,097,617	$1,137,251	$1,178,414	$1,221,169	$1,265,580	$1,311,717	$1,359,651	$1,409,455	$1,461,208	$1,514,990	$1,570,886
Admin and Interest on Municipal Capital	$2,504,948	$2,588,730	$2,675,475	$2,765,293	$2,858,301	$2,954,619	$3,054,372	$3,157,691	$3,264,710	$3,375,572	$3,490,422	$3,609,412	$3,732,703	$3,860,459	$3,992,852	$4,130,061
Total Collection Cost of Dual Stream System	$36,219,757	$37,440,606	$38,705,336	$40,015,633	$41,373,253	$42,780,025	$44,237,853	$45,748,718	$47,314,684	$48,937,900	$50,620,606	$52,365,131	$54,173,906	$56,049,459	$57,994,426	$60,011,553
Hamilton MRF System	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Collection Cost (to Transfer Station)	$31,358,639	$32,420,196	$33,520,116	$34,659,883	$35,841,040	$37,065,197	$38,334,030	$39,649,281	$41,012,768	$42,426,385	$43,892,101	$45,411,972	$46,988,136	$48,622,823	$50,318,357	$52,077,159
Transportation Cost (from Transfer Station to MRF)	$2,249,301	$2,321,080	$2,395,345	$2,472,187	$2,551,703	$2,633,993	$2,719,162	$2,807,319	$2,898,576	$2,993,050	$3,090,865	$3,192,146	$3,297,028	$3,405,647	$3,518,146	$3,634,676
Residential Promotion and Education	$920,359	$953,203	$987,299	$1,022,698	$1,059,452	$1,097,617	$1,137,251	$1,178,414	$1,221,169	$1,265,580	$1,311,717	$1,359,651	$1,409,455	$1,461,208	$1,514,990	$1,570,886
Admin and Interest on Municipal Capital	$2,504,948	$2,588,730	$2,675,475	$2,765,293	$2,858,301	$2,954,619	$3,054,372	$3,157,691	$3,264,710	$3,375,572	$3,490,422	$3,609,412	$3,732,703	$3,860,459	$3,992,852	$4,130,061
Total Collection Cost of Single Stream System	$37,033,246	$38,283,210	$39,578,235	$40,920,060	$42,310,496	$43,751,427	$45,244,816	$46,792,705	$48,397,223	$50,060,587	$51,785,105	$53,573,181	$55,427,322	$57,350,137	$59,344,346	$61,412,782

HAMILTON MRF SCENARIO PROJECTIONS (2020-2035)

SCENARIO 2B - City of Hamilton & Haldimand County & RM of Niagara & Norfolk County

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																	
Material		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	42,252	41,984	41,717	41,452	41,190	40,929	40,670	40,413	40,157	39,904	39,652	39,402	39,154	38,908	38,663	38,420
	OCC/OBB	16,987	16,884	16,783	16,682	16,582	16,483	16,384	16,286	16,189	16,092	15,996	15,901	15,806	15,712	15,619	15,527
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	436	441	447	454	460	466	472	479	485	492	499	505	512	519	526	533
	PET	3,226	3,271	3,315	3,361	3,407	3,454	3,501	3,550	3,599	3,648	3,698	3,749	3,801	3,854	3,907	3,961
	HDPE	1,154	1,171	1,188	1,205	1,223	1,241	1,259	1,277	1,296	1,315	1,334	1,353	1,373	1,393	1,414	1,434
	Plastic Film	1,659	1,680	1,702	1,724	1,747	1,770	1,793	1,816	1,840	1,864	1,888	1,913	1,938	1,963	1,989	2,015
	Tubs and Lids	23	23	23	24	24	24	25	25	25	26	26	26	26	27	27	27
	Polystyrene	21	21	22	22	22	23	23	24	24	24	25	25	26	26	26	27
	Mixed Plastic	5,547	5,616	5,687	5,758	5,831	5,904	5,978	6,054	6,130	6,207	6,285	6,365	6,445	6,526	6,608	6,692
Metal	Steel	3,307	3,320	3,332	3,345	3,357	3,370	3,382	3,395	3,408	3,421	3,434	3,447	3,460	3,473	3,486	3,500
	Aluminum	1,094	1,098	1,102	1,106	1,111	1,115	1,119	1,123	1,128	1,132	1,136	1,141	1,145	1,149	1,154	1,158
Glass	Flint	6,949	6,976	7,003	7,031	7,058	7,086	7,113	7,141	7,169	7,197	7,226	7,254	7,283	7,311	7,340	7,369
	Coloured	1,324	1,329	1,334	1,339	1,344	1,350	1,355	1,360	1,366	1,371	1,376	1,382	1,387	1,393	1,398	1,404
Total		**87,485**	**87,809**	**88,134**	**88,462**	**88,791**	**89,122**	**89,455**	**89,789**	**90,125**	**90,463**	**90,803**	**91,145**	**91,488**	**91,833**	**92,180**	**92,529**

Financial Analysis

Current System	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$20,867,744	$21,361,149	$21,866,371	$22,383,696	$22,913,417	$23,455,836	$24,011,260	$24,580,005	$25,162,394	$25,758,757	$26,369,435	$26,994,775	$27,635,133	$28,290,873	$28,962,371	$29,650,008
Transportation Cost (from Transfer Station to MRF)	$755,891	$771,480	$787,399	$803,654	$820,253	$837,204	$854,515	$872,192	$890,244	$908,679	$927,506	$946,733	$966,369	$986,423	$1,006,903	$1,027,820
Residential Promotion and Education	$774,989	$792,661	$810,738	$829,231	$848,149	$867,503	$887,301	$907,554	$928,274	$949,470	$971,153	$993,336	$1,016,030	$1,039,246	$1,062,997	$1,087,295
Admin and Interest on Municipal Capital	$1,835,133	$1,877,866	$1,921,607	$1,966,380	$2,012,207	$2,059,116	$2,107,131	$2,156,279	$2,206,588	$2,258,084	$2,310,796	$2,364,754	$2,419,986	$2,476,524	$2,534,399	$2,593,642
Total Collection Cost of Dual Stream System	$24,233,757	$24,803,156	$25,386,115	$25,982,961	$26,594,028	$27,219,659	$27,860,207	$28,516,030	$29,187,499	$29,874,990	$30,578,891	$31,299,599	$32,037,518	$32,793,066	$33,566,669	$34,358,764

Hamilton MRF System	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$20,241,712	$20,720,314	$21,210,380	$21,712,185	$22,226,015	$22,752,161	$23,290,923	$23,842,605	$24,407,522	$24,985,995	$25,578,352	$26,184,932	$26,806,079	$27,442,147	$28,093,500	$28,760,508
Transportation Cost (from Transfer Station to MRF)	$1,142,823	$1,167,269	$1,192,241	$1,217,749	$1,243,804	$1,270,420	$1,297,608	$1,325,380	$1,353,749	$1,382,727	$1,412,329	$1,442,567	$1,473,454	$1,505,007	$1,537,237	$1,570,161
Residential Promotion and Education	$774,989	$792,661	$810,738	$829,231	$848,149	$867,503	$887,301	$907,554	$928,274	$949,470	$971,153	$993,336	$1,016,030	$1,039,246	$1,062,997	$1,087,295
Admin and Interest on Municipal Capital	$1,835,133	$1,877,866	$1,921,607	$1,966,380	$2,012,207	$2,059,116	$2,107,131	$2,156,279	$2,206,588	$2,258,084	$2,310,796	$2,364,754	$2,419,986	$2,476,524	$2,534,399	$2,593,642
Total Collection Cost of Single Stream System	$23,994,656	$24,558,111	$25,134,966	$25,725,544	$26,330,176	$26,949,200	$27,582,962	$28,231,818	$28,896,132	$29,576,275	$30,272,631	$30,985,588	$31,715,549	$32,462,924	$33,228,132	$34,011,605

HAMILTON MRF SCENARIO PROJECTIONS (2020-2035)

SCENARIO 3 -																	
Blue Box Quantities and Composition																	
Projected Recyclabes Tonnages																	
Material		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	OCC/OBB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	PET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HDPE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Plastic Film	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Plastic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metal	Steel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aluminum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glass	Flint	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Coloured	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Financial Analysis																
Current System	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)																
Transportation Cost (from Transfer Station to MRF)																
Residential Promotion and Education																
Admin and Interest on Municipal Capital																
Total Collection Cost of Dual Stream System																
Hamilton MRF System	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)																
Transportation Cost (from Transfer Station to MRF)																
Residential Promotion and Education																
Admin and Interest on Municipal Capital																
Total Collection Cost of Single Stream System																

HAMILTON MRF SCENARIO PROJECTIONS (2020-2035)

SCENARIO Summary Descriptions

	SCENARIO			
Locations	**1**	**2A**	**2B**	**3**
BRANT, COUNTY	N	Y	N	
BRANTFORD, CITY	N	Y	N	
GUELPH, CITY	N	Y	N	
HAMILTON, CITY	Y	Y	Y	
HALDIMAND, COUNTY	N	N	Y	
HALTON, RM	N	Y	N	
NIAGARA, RM	N	N	Y	
NORFOLK, COUNTY	N	N	Y	
WATERLOO, RM	N	Y	N	
WELLINGTON, COUNTY	N	Y	N	

Brant County Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																									
Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	1,036	1,033	1,030	1,027	1,024	1,021	1,018	1,015	1,013	1,010	1,007	1,004	1,001	998	995	992	990	987	984	981	978	975	973	970
	OCC/OBB	467	466	465	463	462	461	459	458	457	455	454	453	452	450	449	448	446	445	444	443	441	440	439	437
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	16	16	16	17	17	17	17	18	18	18	19	19	19	20	20	20	21	21	21	22	22	23	23	23
	PET	80	81	83	84	85	87	88	90	91	93	95	96	98	100	101	103	105	107	109	110	112	114	116	118
	HDPE	39	40	40	41	42	43	43	44	45	46	46	47	48	49	50	51	51	52	53	54	55	56	57	58
	Plastic Film	12	12	13	13	13	13	13	14	14	14	14	15	15	15	15	16	16	16	17	17	17	17	18	18
	Tubs and Lids	7	7	7	8	8	8	8	8	8	8	9	9	9	9	9	9	9	10	10	10	10	10	10	11
	Polystyrene	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Mixed Plastic	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5
Metal	Steel	60	61	61	61	62	62	63	63	64	64	65	65	66	66	67	67	67	68	68	69	69	70	70	71
	Aluminum	22	22	22	22	23	23	23	23	23	23	24	24	24	24	24	24	25	25	25	25	25	25	26	26
Glass	Flint	147	149	150	151	152	153	154	155	156	157	158	160	161	162	163	164	165	167	168	169	170	171	173	174
	Coloured	28	28	28	29	29	29	29	30	30	30	30	30	31	31	31	31	32	32	32	32	32	33	33	33
Total		**1,919**	**1,933**	**1,946**	**1,960**	**1,975**	**1,989**	**2,003**	**2,018**	**2,032**	**2,047**	**2,061**	**2,076**	**2,091**	**2,106**	**2,121**	**2,137**	**2,152**	**2,168**	**2,183**	**2,199**	**2,215**	**2,231**	**2,247**	**2,263**

Financial Performance

Current System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$776,076	$797,297	$819,098	$841,495	$864,505	$888,144	$912,430	$937,379	$963,011	$989,343	$1,016,396	$1,044,188	$1,072,741	$1,102,074	$1,132,209	$1,163,168	$1,194,974	$1,227,649	$1,261,218	$1,295,705	$1,331,134	$1,367,533	$1,404,927	$1,443,343
Transportation Cost (from Transfer Station to MRF)	$22,365	$22,977	$23,605	$24,251	$24,914	$25,595	$26,295	$27,014	$27,752	$28,511	$29,291	$30,092	$30,915	$31,760	$32,628	$33,521	$34,437	$35,379	$36,346	$37,340	$38,361	$39,410	$40,488	$41,595
Residential Promotion and Education	$14,886	$15,293	$15,711	$16,141	$16,582	$17,035	$17,501	$17,980	$18,471	$18,976	$19,495	$20,028	$20,576	$21,139	$21,717	$22,310	$22,920	$23,547	$24,191	$24,853	$25,532	$26,230	$26,948	$27,684
Admin and Interest on Municipal Capital	$24,844	$25,523	$26,221	$26,938	$27,675	$28,431	$29,209	$30,007	$30,828	$31,671	$32,537	$33,427	$34,341	$35,280	$36,244	$37,235	$38,254	$39,300	$40,374	$41,478	$42,612	$43,778	$44,975	$46,204
Total Collection Cost of Single Stream System	$838,170	$861,089	$884,635	$908,824	$933,675	$959,206	$985,434	$1,012,380	$1,040,063	$1,068,502	$1,097,719	$1,127,735	$1,158,572	$1,190,252	$1,222,798	$1,256,234	$1,290,585	$1,325,875	$1,362,129	$1,399,375	$1,437,640	$1,476,951	$1,517,336	$1,558,827

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$776,076	$797,297	$819,098	$841,495	$864,505	$888,144	$912,430	$937,379	$963,011	$989,343	$1,016,396	$1,044,188	$1,072,741	$1,102,074	$1,132,209	$1,163,168	$1,194,974	$1,227,649	$1,261,218	$1,295,705	$1,331,134	$1,367,533	$1,404,927	$1,443,343
Transportation Cost (from Transfer Station to MRF)	$58,933	$60,375	$61,853	$63,368	$64,920	$66,512	$68,143	$69,816	$71,530	$73,287	$75,088	$76,935	$78,827	$80,768	$82,757	$84,796	$86,886	$89,029	$91,226	$93,478	$95,787	$98,154	$100,581	$103,069
Residential Promotion and Education	$14,886	$15,293	$15,711	$16,141	$16,582	$17,035	$17,501	$17,980	$18,471	$18,976	$19,495	$20,028	$20,576	$21,139	$21,717	$22,310	$22,920	$23,547	$24,191	$24,853	$25,532	$26,230	$26,948	$27,684
Admin and Interest on Municipal Capital	$24,844	$25,523	$26,221	$26,938	$27,675	$28,431	$29,209	$30,007	$30,828	$31,671	$32,537	$33,427	$34,341	$35,280	$36,244	$37,235	$38,254	$39,300	$40,374	$41,478	$42,612	$43,778	$44,975	$46,204
Total Collection Cost of Single Stream System	$874,738	$898,488	$922,883	$947,942	$973,682	$1,000,123	$1,027,283	$1,055,182	$1,083,840	$1,113,278	$1,143,516	$1,174,578	$1,206,485	$1,239,260	$1,272,926	$1,307,510	$1,343,034	$1,379,525	$1,417,009	$1,455,513	$1,495,066	$1,535,695	$1,577,430	$1,620,301

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	100%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	127.8
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$16,600.00
Incidental Costs	
Transfer Station Maintenance	$2,000
Site maintenance	$2,400
Administrative allowance	10.0%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	9.97E+04	1.00E+05	1.01E+05	1.02E+05	1.03E+05	1.03E+05	1.04E+05	1.05E+05	1.06E+05	1.06E+05	1.07E+05	1.08E+05	1.09E+05	1.09E+05	1.10E+05	1.11E+05	1.12E+05	1.13E+05	1.13E+05	1.14E+05	1.15E+05	1.16E+05	1.17E+05	1.18E+05
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	5.72E+04	5.76E+04	5.80E+04	5.84E+04	5.89E+04	5.93E+04	5.97E+04	6.01E+04	6.06E+04	6.10E+04	6.15E+04	6.19E+04	6.23E+04	6.28E+04	6.32E+04	6.37E+04	6.42E+04	6.46E+04	6.51E+04	6.56E+04	6.60E+04	6.65E+04	6.70E+04	6.75E+04
	Sulfur Oxides (kg of H+ moles-equivalent)	1.31E+04	1.32E+04	1.33E+04	1.34E+04	1.35E+04	1.36E+04	1.37E+04	1.38E+04	1.39E+04	1.40E+04	1.41E+04	1.42E+04	1.43E+04	1.44E+04	1.45E+04	1.46E+04	1.47E+04	1.48E+04	1.49E+04	1.50E+04	1.51E+04	1.52E+04	1.53E+04	1.55E+04
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	5.12E+01	5.16E+01	5.19E+01	5.23E+01	5.27E+01	5.31E+01	5.35E+01	5.38E+01	5.42E+01	5.46E+01	5.50E+01	5.54E+01	5.58E+01	5.62E+01	5.66E+01	5.70E+01	5.74E+01	5.78E+01	5.83E+01	5.87E+01	5.91E+01	5.95E+01	6.00E+01	6.04E+01
	Nitrogen Oxides (kg of PM10-equivalent)	3.79E+01	3.82E+01	3.84E+01	3.87E+01	3.90E+01	3.93E+01	3.96E+01	3.99E+01	4.01E+01	4.04E+01	4.07E+01	4.10E+01	4.13E+01	4.16E+01	4.19E+01	4.22E+01	4.25E+01	4.28E+01	4.31E+01	4.34E+01	4.37E+01	4.41E+01	4.44E+01	4.47E+01
	Sulfur Oxides (kg of PM10-equivalent)	4.29E+01	4.32E+01	4.35E+01	4.38E+01	4.41E+01	4.45E+01	4.48E+01	4.51E+01	4.54E+01	4.58E+01	4.61E+01	4.64E+01	4.68E+01	4.71E+01	4.74E+01	4.78E+01	4.81E+01	4.85E+01	4.88E+01	4.92E+01	4.95E+01	4.99E+01	5.02E+01	5.06E+01
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	6.33E+01	6.38E+01	6.42E+01	6.47E+01	6.51E+01	6.56E+01	6.61E+01	6.66E+01	6.70E+01	6.75E+01	6.80E+01	6.85E+01	6.90E+01	6.95E+01	7.00E+01	7.05E+01	7.10E+01	7.15E+01	7.20E+01	7.25E+01	7.31E+01	7.36E+01	7.41E+01	7.47E+01
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	3.54E+04	3.57E+04	3.59E+04	3.62E+04	3.64E+04	3.67E+04	3.70E+04	3.72E+04	3.75E+04	3.78E+04	3.80E+04	3.83E+04	3.86E+04	3.89E+04	3.91E+04	3.94E+04	3.97E+04	4.00E+04	4.03E+04	4.06E+04	4.09E+04	4.12E+04	4.15E+04	4.18E+04
	Carbon Monoxide (kg of O3-equivalent)	2.08E+01	2.09E+01	2.11E+01	2.13E+01	2.14E+01	2.16E+01	2.17E+01	2.19E+01	2.20E+01	2.22E+01	2.23E+01	2.25E+01	2.27E+01	2.28E+01	2.30E+01	2.32E+01	2.33E+01	2.35E+01	2.37E+01	2.38E+01	2.40E+01	2.42E+01	2.44E+01	2.45E+01

Rate of Population Change	1.01
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

City of Brantford Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																									
Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	2,877	2,870	2,863	2,856	2,849	2,842	2,835	2,828	2,821	2,814	2,807	2,800	2,793	2,786	2,779	2,772	2,765	2,759	2,752	2,745	2,738	2,731	2,725	2,718
	OCC/OBB	2,209	2,203	2,198	2,192	2,187	2,181	2,176	2,171	2,165	2,160	2,154	2,149	2,144	2,138	2,133	2,128	2,123	2,117	2,112	2,107	2,102	2,096	2,091	2,086
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	80	82	83	84	86	87	89	91	92	94	95	97	99	101	102	104	106	108	110	112	114	116	118	120
	PET	341	347	353	359	366	372	379	385	392	399	406	413	421	428	436	443	451	459	467	475	484	492	501	510
	HDPE	185	188	192	195	198	202	206	209	213	217	220	224	228	232	236	241	245	249	254	258	263	267	272	277
	Plastic Film	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubs and Lids	102	104	106	108	110	112	114	116	118	120	122	124	126	129	131	133	136	138	140	143	145	148	151	153
	Polystyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Plastic	141	143	146	148	151	153	156	159	162	165	168	170	173	177	180	183	186	189	193	196	200	203	207	210
Metal	Steel	180	182	183	185	186	187	189	190	192	193	195	196	198	199	201	202	204	205	207	208	210	212	213	215
	Aluminum	130	130	131	132	133	134	136	137	138	139	140	141	142	143	144	145	146	147	148	150	151	152	153	154
Glass	Flint	222	223	225	227	228	230	232	234	235	237	239	241	243	244	246	248	250	252	254	256	258	260	262	264
	Coloured	141	142	143	144	146	147	148	149	150	151	152	153	155	156	157	158	159	161	162	163	164	165	167	168
Total		6,607	6,615	6,665	6,716	6,767	6,818	6,870	6,922	6,975	7,028	7,081	7,135	7,189	7,244	7,299	7,355	7,411	7,467	7,524	7,581	7,638	7,696	7,755	7,814

Financial Performance

Current System - Dual Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,715,468	$1,751,770	$1,800,385	$1,850,349	$1,901,700	$1,954,476	$2,008,717	$2,064,463	$2,121,756	$2,180,639	$2,241,156	$2,303,352	$2,367,275	$2,432,972	$2,500,491	$2,569,885	$2,641,204	$2,714,503	$2,789,836	$2,867,260	$2,946,832	$3,028,612	$3,112,662	$3,199,045
Transportation Cost (from Transfer Station to MRF)	$20,187	$20,614	$21,186	$21,774	$22,379	$23,000	$23,638	$24,294	$24,968	$25,661	$26,373	$27,105	$27,857	$28,630	$29,425	$30,242	$31,081	$31,943	$32,830	$33,741	$34,677	$35,640	$36,629	$37,645
Residential Promotion and Education	$55,410	$56,583	$58,153	$59,767	$61,426	$63,130	$64,882	$66,683	$68,534	$70,435	$72,390	$74,399	$76,464	$78,586	$80,767	$83,008	$85,312	$87,680	$90,113	$92,614	$95,184	$97,825	$100,540	$103,330
Admin and Interest on Municipal Capital	$75,751	$77,354	$79,501	$81,707	$83,975	$86,305	$88,700	$91,162	$93,692	$96,292	$98,964	$101,711	$104,533	$107,434	$110,416	$113,480	$116,630	$119,866	$123,193	$126,612	$130,125	$133,737	$137,448	$141,263
Total Collection Cost of Dual Stream System	$1,866,816	$1,906,321	$1,959,225	$2,013,598	$2,069,479	$2,126,911	$2,185,937	$2,246,602	$2,308,949	$2,373,027	$2,438,883	$2,506,567	$2,576,130	$2,647,622	$2,721,099	$2,796,615	$2,874,227	$2,953,992	$3,035,972	$3,120,226	$3,206,818	$3,295,814	$3,387,279	$3,481,283

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,664,004	$1,699,217	$1,746,373	$1,794,839	$1,844,649	$1,895,842	$1,948,455	$2,002,529	$2,058,103	$2,115,220	$2,173,921	$2,234,252	$2,296,257	$2,359,982	$2,425,477	$2,492,788	$2,561,968	$2,633,068	$2,706,141	$2,781,242	$2,858,427	$2,937,754	$3,019,282	$3,103,074
Transportation Cost (from Transfer Station to MRF)	$91,324	$93,220	$95,559	$97,957	$100,416	$102,939	$105,526	$108,180	$110,902	$113,694	$116,557	$119,495	$122,507	$125,598	$128,768	$132,019	$135,355	$138,776	$142,286	$145,886	$149,579	$153,368	$157,254	$161,241
Residential Promotion and Education	$55,410	$56,583	$58,153	$59,767	$61,426	$63,130	$64,882	$66,683	$68,534	$70,435	$72,390	$74,399	$76,464	$78,586	$80,767	$83,008	$85,312	$87,680	$90,113	$92,614	$95,184	$97,825	$100,540	$103,330
Admin and Interest on Municipal Capital	$75,751	$77,354	$79,501	$81,707	$83,975	$86,305	$88,700	$91,162	$93,692	$96,292	$98,964	$101,711	$104,533	$107,434	$110,416	$113,480	$116,630	$119,866	$123,193	$126,612	$130,125	$133,737	$137,448	$141,263
Total Collection Cost of Single Stream System	$1,886,490	$1,926,374	$1,979,586	$2,034,270	$2,090,466	$2,148,216	$2,207,564	$2,268,554	$2,331,230	$2,395,641	$2,461,833	$2,529,856	$2,599,761	$2,671,601	$2,745,427	$2,821,296	$2,899,265	$2,979,390	$3,061,732	$3,146,353	$3,233,315	$3,322,684	$3,414,525	$3,508,907

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	50%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	127.8
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$40,000.00
Incidental Costs	
Transfer Station Maintenance	$4,000
Site maintenance	$15,000
Administrative allowance	10%

Environmental Impact

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	2.86E+05	2.88E+05	2.90E+05	2.93E+05	2.95E+05	2.97E+05	2.99E+05	3.02E+05	3.04E+05	3.06E+05	3.08E+05	3.11E+05	3.13E+05	3.16E+05	3.18E+05	3.20E+05	3.23E+05	3.25E+05	3.28E+05	3.30E+05	3.33E+05	3.35E+05	3.38E+05	3.40E+05
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	1.62E+05	1.63E+05	1.64E+05	1.66E+05	1.67E+05	1.68E+05	1.70E+05	1.71E+05	1.72E+05	1.73E+05	1.75E+05	1.76E+05	1.77E+05	1.79E+05	1.80E+05	1.81E+05	1.83E+05	1.84E+05	1.86E+05	1.87E+05	1.88E+05	1.90E+05	1.91E+05	1.93E+05
	Sulfur Oxides (kg of H+ moles-equivalent)	3.92E+04	3.95E+04	3.98E+04	4.01E+04	4.04E+04	4.07E+04	4.10E+04	4.13E+04	4.16E+04	4.20E+04	4.23E+04	4.26E+04	4.29E+04	4.33E+04	4.36E+04	4.39E+04	4.42E+04	4.46E+04	4.49E+04	4.53E+04	4.56E+04	4.60E+04	4.63E+04	4.67E+04
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	1.63E+02	1.64E+02	1.65E+02	1.67E+02	1.68E+02	1.69E+02	1.71E+02	1.72E+02	1.73E+02	1.74E+02	1.76E+02	1.77E+02	1.79E+02	1.80E+02	1.81E+02	1.83E+02	1.84E+02	1.85E+02	1.87E+02	1.88E+02	1.90E+02	1.91E+02	1.93E+02	1.94E+02
	Nitrogen Oxides (kg of PM10-equivalent)	1.07E+02	1.08E+02	1.09E+02	1.09E+02	1.10E+02	1.11E+02	1.12E+02	1.13E+02	1.14E+02	1.15E+02	1.15E+02	1.16E+02	1.17E+02	1.18E+02	1.19E+02	1.20E+02	1.21E+02	1.22E+02	1.23E+02	1.24E+02	1.24E+02	1.25E+02	1.26E+02	1.27E+02
	Sulfur Oxides (kg of PM10-equivalent)	1.29E+02	1.30E+02	1.31E+02	1.32E+02	1.33E+02	1.34E+02	1.35E+02	1.36E+02	1.37E+02	1.38E+02	1.39E+02	1.40E+02	1.41E+02	1.42E+02	1.43E+02	1.45E+02	1.46E+02	1.47E+02	1.48E+02	1.49E+02	1.50E+02	1.51E+02	1.52E+02	1.54E+02
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	1.79E+02	1.80E+02	1.82E+02	1.83E+02	1.85E+02	1.86E+02	1.87E+02	1.89E+02	1.90E+02	1.92E+02	1.93E+02	1.95E+02	1.96E+02	1.98E+02	1.99E+02	2.01E+02	2.02E+02	2.04E+02	2.05E+02	2.07E+02	2.08E+02	2.10E+02	2.11E+02	2.13E+02
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	1.00E+05	1.01E+05	1.02E+05	1.02E+05	1.03E+05	1.04E+05	1.05E+05	1.05E+05	1.06E+05	1.07E+05	1.08E+05	1.09E+05	1.10E+05	1.10E+05	1.11E+05	1.12E+05	1.13E+05	1.14E+05	1.15E+05	1.15E+05	1.16E+05	1.17E+05	1.18E+05	1.19E+05
	Carbon Monoxide (kg of O3-equivalent)	6.23E+01	6.28E+01	6.33E+01	6.37E+01	6.42E+01	6.47E+01	6.52E+01	6.57E+01	6.62E+01	6.67E+01	6.72E+01	6.77E+01	6.82E+01	6.87E+01	6.93E+01	6.98E+01	7.03E+01	7.09E+01	7.14E+01	7.19E+01	7.25E+01	7.30E+01	7.36E+01	7.42E+01

Rate of Population Change	1.01
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

City of Guelph Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages

Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	4,505	4,513	4,521	4,528	4,536	4,543	4,551	4,559	4,566	4,574	4,582	4,589	4,597	4,605	4,613	4,620	4,628	4,636	4,644	4,652	4,659	4,667	4,675	4,683
	OCC/OBB	1,211	1,213	1,215	1,217	1,219	1,221	1,223	1,225	1,227	1,230	1,232	1,234	1,236	1,238	1,240	1,242	1,244	1,246	1,248	1,250	1,252	1,255	1,257	1,259
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	59	60	62	63	64	66	67	69	70	72	73	75	77	78	80	82	84	85	87	89	91	93	95	97
	PET	455	465	475	486	496	507	518	530	541	553	565	578	590	603	616	630	644	658	672	687	702	717	733	749
	HDPE	200	204	209	213	218	223	228	233	238	243	248	254	259	265	271	277	283	289	295	302	308	315	322	329
	Plastic Film	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Plastic	244	250	255	261	266	272	278	284	291	297	303	310	317	324	331	338	346	353	361	369	377	385	394	402
Metal	Steel	501	507	513	519	525	532	538	544	551	557	564	570	577	584	591	598	605	612	619	626	634	641	649	657
	Aluminum	179	181	183	185	188	190	192	194	197	199	201	204	206	208	211	213	216	218	221	224	226	229	232	234
Glass	Flint	891	902	912	923	934	945	956	967	979	990	1,002	1,014	1,026	1,038	1,050	1,062	1,075	1,088	1,101	1,113	1,127	1,140	1,153	1,167
	Coloured	170	172	174	176	178	180	182	184	186	189	191	193	195	198	200	202	205	207	210	212	215	217	220	222
Total		**8,416**	**8,467**	**8,567**	**8,668**	**8,770**	**8,874**	**8,978**	**9,084**	**9,192**	**9,300**	**9,410**	**9,521**	**9,633**	**9,747**	**9,862**	**9,978**	**10,096**	**10,215**	**10,336**	**10,458**	**10,581**	**10,706**	**10,832**	**10,960**

Financial Performance

Current System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,098,724	$1,127,512	$1,163,633	$1,200,911	$1,239,383	$1,279,088	$1,320,065	$1,362,355	$1,405,999	$1,451,042	$1,497,527	$1,545,502	$1,595,014	$1,646,112	$1,698,846	$1,753,271	$1,809,439	$1,867,406	$1,927,230	$1,988,971	$2,052,689	$2,118,449	$2,186,316	$2,256,357
Transportation Cost (from Transfer Station to MRF)	$73,434	$75,358	$77,772	$80,263	$82,835	$85,488	$88,227	$91,053	$93,970	$96,981	$100,088	$103,294	$106,603	$110,018	$113,543	$117,180	$120,934	$124,809	$128,807	$132,933	$137,192	$141,587	$146,123	$150,804
Residential Promotion and Education	$72,650	$74,554	$76,942	$79,407	$81,951	$84,576	$87,286	$90,082	$92,968	$95,946	$99,020	$102,192	$105,466	$108,845	$112,332	$115,930	$119,644	$123,477	$127,433	$131,515	$135,729	$140,077	$144,564	$149,196
Admin and Interest on Municipal Capital	$343,997	$353,010	$364,319	$375,990	$388,036	$400,467	$413,296	$426,536	$440,201	$454,303	$468,857	$483,878	$499,379	$515,377	$531,888	$548,927	$566,513	$584,662	$603,392	$622,722	$642,672	$663,260	$684,509	$706,437
Total Collection Cost of Single Stream System	$1,588,805	$1,630,433	$1,682,666	$1,736,572	$1,792,205	$1,849,620	$1,908,874	$1,970,027	$2,033,139	$2,098,272	$2,165,492	$2,234,866	$2,306,462	$2,380,352	$2,456,609	$2,535,309	$2,616,530	$2,700,353	$2,786,862	$2,876,142	$2,968,282	$3,063,374	$3,161,512	$3,262,794

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,098,724	$1,127,512	$1,163,633	$1,200,911	$1,239,383	$1,279,088	$1,320,065	$1,362,355	$1,405,999	$1,451,042	$1,497,527	$1,545,502	$1,595,014	$1,646,112	$1,698,846	$1,753,271	$1,809,439	$1,867,406	$1,927,230	$1,988,971	$2,052,689	$2,118,449	$2,186,316	$2,256,357
Transportation Cost (from Transfer Station to MRF)	$138,681	$141,919	$145,683	$149,551	$153,527	$157,614	$161,816	$166,135	$170,575	$175,140	$179,833	$184,658	$189,619	$194,720	$199,964	$205,357	$210,902	$216,605	$222,469	$228,499	$234,700	$241,078	$247,637	$254,384
Residential Promotion and Education	$72,650	$74,554	$76,942	$79,407	$81,951	$84,576	$87,286	$90,082	$92,968	$95,946	$99,020	$102,192	$105,466	$108,845	$112,332	$115,930	$119,644	$123,477	$127,433	$131,515	$135,729	$140,077	$144,564	$149,196
Admin and Interest on Municipal Capital	$343,997	$353,010	$364,319	$375,990	$388,036	$400,467	$413,296	$426,536	$440,201	$454,303	$468,857	$483,878	$499,379	$515,377	$531,888	$548,927	$566,513	$584,662	$603,392	$622,722	$642,672	$663,260	$684,509	$706,437
Total Collection Cost of Single Stream System	$1,654,053	$1,696,995	$1,750,577	$1,805,859	$1,862,897	$1,921,745	$1,982,463	$2,045,108	$2,109,743	$2,176,431	$2,245,237	$2,316,230	$2,389,478	$2,465,053	$2,543,030	$2,623,486	$2,706,498	$2,792,149	$2,880,523	$2,971,707	$3,065,790	$3,162,865	$3,263,026	$3,366,373

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	50%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	120.6
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$80,000.00
Incidental Costs	
Transfer Station Maintenance	$6,000
Site maintenance	$30,000
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	3.71E+05	3.75E+05	3.80E+05	3.84E+05	3.89E+05	3.93E+05	3.98E+05	4.03E+05	4.08E+05	4.12E+05	4.17E+05	4.22E+05	4.27E+05	4.32E+05	4.37E+05	4.42E+05	4.48E+05	4.53E+05	4.58E+05	4.64E+05	4.69E+05	4.75E+05	4.80E+05	4.86E+05
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	2.10E+05	2.12E+05	2.15E+05	2.18E+05	2.20E+05	2.23E+05	2.25E+05	2.28E+05	2.31E+05	2.33E+05	2.36E+05	2.39E+05	2.42E+05	2.45E+05	2.47E+05	2.50E+05	2.53E+05	2.56E+05	2.59E+05	2.62E+05	2.66E+05	2.69E+05	2.72E+05	2.75E+05
	Sulfur Oxides (kg of H+ moles-equivalent)	5.06E+04	5.12E+04	5.18E+04	5.24E+04	5.30E+04	5.37E+04	5.43E+04	5.49E+04	5.56E+04	5.62E+04	5.69E+04	5.76E+04	5.82E+04	5.89E+04	5.96E+04	6.03E+04	6.10E+04	6.18E+04	6.25E+04	6.32E+04	6.40E+04	6.47E+04	6.55E+04	6.63E+04
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	2.09E+02	2.11E+02	2.14E+02	2.16E+02	2.19E+02	2.22E+02	2.24E+02	2.27E+02	2.30E+02	2.32E+02	2.35E+02	2.38E+02	2.41E+02	2.43E+02	2.46E+02	2.49E+02	2.52E+02	2.55E+02	2.58E+02	2.61E+02	2.64E+02	2.67E+02	2.71E+02	2.74E+02
	Nitrogen Oxides (kg of PM10-equivalent)	1.39E+02	1.41E+02	1.42E+02	1.44E+02	1.46E+02	1.47E+02	1.49E+02	1.51E+02	1.53E+02	1.54E+02	1.56E+02	1.58E+02	1.60E+02	1.62E+02	1.64E+02	1.66E+02	1.68E+02	1.70E+02	1.72E+02	1.74E+02	1.76E+02	1.78E+02	1.80E+02	1.82E+02
	Sulfur Oxides (kg of PM10-equivalent)	1.66E+02	1.68E+02	1.70E+02	1.72E+02	1.74E+02	1.76E+02	1.78E+02	1.80E+02	1.82E+02	1.84E+02	1.87E+02	1.89E+02	1.91E+02	1.93E+02	1.96E+02	1.98E+02	2.00E+02	2.03E+02	2.05E+02	2.07E+02	2.10E+02	2.12E+02	2.15E+02	2.17E+02
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	2.33E+02	2.36E+02	2.39E+02	2.41E+02	2.44E+02	2.47E+02	2.50E+02	2.53E+02	2.56E+02	2.59E+02	2.62E+02	2.65E+02	2.68E+02	2.71E+02	2.75E+02	2.78E+02	2.81E+02	2.84E+02	2.88E+02	2.91E+02	2.95E+02	2.98E+02	3.02E+02	3.05E+02
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	1.30E+05	1.32E+05	1.33E+05	1.35E+05	1.36E+05	1.38E+05	1.39E+05	1.41E+05	1.43E+05	1.44E+05	1.46E+05	1.48E+05	1.50E+05	1.51E+05	1.53E+05	1.55E+05	1.57E+05	1.59E+05	1.61E+05	1.62E+05	1.64E+05	1.66E+05	1.68E+05	1.70E+05
	Carbon Monoxide (kg of O3-equivalent)	8.04E+01	8.13E+01	8.23E+01	8.33E+01	8.43E+01	8.53E+01	8.63E+01	8.73E+01	8.83E+01	8.94E+01	9.04E+01	9.15E+01	9.26E+01	9.36E+01	9.48E+01	9.59E+01	9.70E+01	9.81E+01	9.93E+01	1.00E+02	1.02E+02	1.03E+02	1.04E+02	1.05E+02

Rate of Population Change	1.01
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

City of Hamilton Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																									
Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	19,448	19,372	19,298	19,223	19,149	19,075	19,001	18,928	18,855	18,782	18,709	18,637	18,565	18,493	18,422	18,351	18,280	18,209	18,139	18,069	17,999	17,930	17,860	17,792
	OCC/OBB	9,479	9,442	9,406	9,369	9,333	9,297	9,261	9,225	9,190	9,154	9,119	9,084	9,049	9,014	8,979	8,944	8,910	8,875	8,841	8,807	8,773	8,739	8,705	8,672
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	177	180	183	186	189	192	195	198	202	205	208	212	215	219	222	226	229	233	237	241	245	249	253	257
	PET	1,380	1,403	1,426	1,449	1,472	1,496	1,521	1,546	1,571	1,596	1,622	1,649	1,675	1,703	1,730	1,758	1,787	1,816	1,846	1,876	1,906	1,937	1,969	2,001
	HDPE	627	637	647	658	669	680	691	702	713	725	737	749	761	773	786	799	811	825	838	852	866	880	894	908
	Plastic Film	488	496	504	512	521	529	538	546	555	564	574	583	592	602	612	622	632	642	653	663	674	685	696	707
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	17	18	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	23	24	24	25	25
	Mixed Plastic	960	975	991	1,007	1,024	1,040	1,057	1,074	1,092	1,110	1,128	1,146	1,165	1,184	1,203	1,222	1,242	1,263	1,283	1,304	1,325	1,347	1,369	1,391
Metal	Steel	1,478	1,487	1,497	1,506	1,515	1,525	1,534	1,544	1,553	1,563	1,573	1,582	1,592	1,602	1,612	1,622	1,632	1,642	1,652	1,663	1,673	1,683	1,694	1,704
	Aluminum	527	530	533	537	540	543	547	550	553	557	560	564	567	571	574	578	582	585	589	592	596	600	604	607
Glass	Flint	3,226	3,246	3,267	3,287	3,307	3,328	3,348	3,369	3,390	3,411	3,432	3,453	3,475	3,496	3,518	3,540	3,562	3,584	3,606	3,628	3,651	3,674	3,696	3,719
	Coloured	615	618	622	626	630	634	638	642	646	650	654	658	662	666	670	674	678	683	687	691	695	700	704	708
Total		38,422	38,406	38,644	38,884	39,125	39,367	39,611	39,857	40,104	40,353	40,603	40,855	41,108	41,363	41,619	41,877	42,137	42,398	42,661	42,926	43,192	43,460	43,729	44,000

Financial Performance

Current System - Dual Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$7,922,612	$8,077,675	$8,290,312	$8,508,546	$8,732,525	$8,962,400	$9,198,326	$9,440,463	$9,688,974	$9,944,026	$10,205,793	$10,474,450	$10,750,179	$11,033,167	$11,323,604	$11,621,687	$11,927,616	$12,241,599	$12,563,846	$12,894,577	$13,234,014	$13,582,386	$13,939,929	$14,306,884
Transportation Cost (from Transfer Station to MRF)	$124,144	$126,574	$129,906	$133,326	$136,835	$140,437	$144,134	$147,928	$151,823	$155,819	$159,921	$164,131	$168,451	$172,886	$177,437	$182,107	$186,901	$191,821	$196,871	$202,053	$207,372	$212,831	$218,433	$224,183
Residential Promotion and Education	$145,502	$148,350	$152,255	$156,263	$160,376	$164,598	$168,931	$173,378	$177,942	$182,626	$187,433	$192,367	$197,431	$202,628	$207,962	$213,437	$219,055	$224,822	$230,740	$236,814	$243,048	$249,446	$256,012	$262,751
Admin and Interest on Municipal Capital	$567,573	$578,682	$593,915	$609,549	$625,595	$642,063	$658,965	$676,311	$694,114	$712,386	$731,139	$750,386	$770,139	$790,412	$811,219	$832,573	$854,490	$876,983	$900,069	$923,763	$948,080	$973,037	$998,651	$1,024,940
Total Collection Cost of Dual Stream System	$8,759,831	$8,931,280	$9,166,387	$9,407,683	$9,655,331	$9,909,498	$10,170,356	$10,438,080	$10,712,852	$10,994,857	$11,284,286	$11,581,334	$11,886,201	$12,199,093	$12,520,222	$12,849,804	$13,188,062	$13,535,225	$13,891,526	$14,257,207	$14,632,513	$15,017,700	$15,413,026	$15,818,758

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$7,684,934	$7,835,345	$8,041,602	$8,253,290	$8,470,549	$8,693,528	$8,922,376	$9,157,249	$9,398,304	$9,645,705	$9,899,619	$10,160,216	$10,427,674	$10,702,172	$10,983,896	$11,273,036	$11,569,788	$11,874,351	$12,186,931	$12,507,740	$12,836,994	$13,174,915	$13,521,731	$13,877,677
Transportation Cost (from Transfer Station to MRF)	$45,539	$46,435	$47,578	$48,749	$49,949	$51,179	$52,440	$53,732	$55,057	$56,414	$57,806	$59,232	$60,694	$62,193	$63,729	$65,303	$66,917	$68,571	$70,266	$72,004	$73,785	$75,611	$77,483	$79,402
Residential Promotion and Education	$145,502	$148,350	$152,255	$156,263	$160,376	$164,598	$168,931	$173,378	$177,942	$182,626	$187,433	$192,367	$197,431	$202,628	$207,962	$213,437	$219,055	$224,822	$230,740	$236,814	$243,048	$249,446	$256,012	$262,751
Admin and Interest on Municipal Capital	$567,573	$578,682	$593,915	$609,549	$625,595	$642,063	$658,965	$676,311	$694,114	$712,386	$731,139	$750,386	$770,139	$790,412	$811,219	$832,573	$854,490	$876,983	$900,069	$923,763	$948,080	$973,037	$998,651	$1,024,940
Total Collection Cost of Single Stream System	$8,443,547	$8,608,811	$8,835,350	$9,067,850	$9,306,469	$9,551,368	$9,802,712	$10,060,670	$10,325,417	$10,597,132	$10,875,997	$11,162,202	$11,455,938	$11,757,405	$12,066,806	$12,384,349	$12,710,249	$13,044,726	$13,388,006	$13,740,320	$14,101,906	$14,473,009	$14,853,877	$15,244,770

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	10%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	47.8
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$80,000.00
Incidental Costs	
Transfer Station Maintenance	$6,000
Site maintenance	$30,000
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	1.64E+06	1.65E+06	1.66E+06	1.67E+06	1.68E+06	1.69E+06	1.70E+06	1.71E+06	1.72E+06	1.73E+06	1.74E+06	1.76E+06	1.77E+06	1.78E+06	1.79E+06	1.80E+06	1.81E+06	1.82E+06	1.83E+06	1.84E+06	1.86E+06	1.87E+06	1.88E+06	1.89E+06
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	9.25E+05	9.31E+05	9.37E+05	9.42E+05	9.48E+05	9.54E+05	9.60E+05	9.66E+05	9.72E+05	9.78E+05	9.84E+05	9.90E+05	9.96E+05	1.00E+06	1.01E+06	1.01E+06	1.02E+06	1.03E+06	1.03E+06	1.04E+06	1.05E+06	1.05E+06	1.06E+06	1.07E+06
	Sulfur Oxides (kg of H+ moles-equivalent)	2.25E+05	2.26E+05	2.28E+05	2.29E+05	2.31E+05	2.32E+05	2.34E+05	2.35E+05	2.36E+05	2.38E+05	2.39E+05	2.41E+05	2.42E+05	2.44E+05	2.45E+05	2.47E+05	2.48E+05	2.50E+05	2.51E+05	2.53E+05	2.55E+05	2.56E+05	2.58E+05	2.59E+05
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	9.41E+02	9.47E+02	9.53E+02	9.59E+02	9.65E+02	9.71E+02	9.77E+02	9.83E+02	9.89E+02	9.95E+02	1.00E+03	1.01E+03	1.01E+03	1.02E+03	1.03E+03	1.03E+03	1.04E+03	1.05E+03	1.05E+03	1.06E+03	1.06E+03	1.07E+03	1.08E+03	1.08E+03
	Nitrogen Oxides (kg of PM10-equivalent)	6.12E+02	6.16E+02	6.20E+02	6.23E+02	6.27E+02	6.31E+02	6.35E+02	6.39E+02	6.43E+02	6.47E+02	6.51E+02	6.55E+02	6.59E+02	6.63E+02	6.67E+02	6.71E+02	6.76E+02	6.80E+02	6.84E+02	6.88E+02	6.93E+02	6.97E+02	7.01E+02	7.05E+02
	Sulfur Oxides (kg of PM10-equivalent)	7.39E+02	7.44E+02	7.48E+02	7.53E+02	7.57E+02	7.62E+02	7.67E+02	7.72E+02	7.76E+02	7.81E+02	7.86E+02	7.91E+02	7.96E+02	8.01E+02	8.06E+02	8.11E+02	8.16E+02	8.21E+02	8.26E+02	8.31E+02	8.36E+02	8.41E+02	8.47E+02	8.52E+02
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	1.02E+03	1.03E+03	1.03E+03	1.04E+03	1.05E+03	1.05E+03	1.06E+03	1.07E+03	1.07E+03	1.08E+03	1.09E+03	1.09E+03	1.10E+03	1.11E+03	1.11E+03	1.12E+03	1.13E+03	1.13E+03	1.14E+03	1.15E+03	1.15E+03	1.16E+03	1.17E+03	1.18E+03
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	5.73E+05	5.77E+05	5.80E+05	5.84E+05	5.87E+05	5.91E+05	5.95E+05	5.98E+05	6.02E+05	6.06E+05	6.10E+05	6.13E+05	6.17E+05	6.21E+05	6.25E+05	6.29E+05	6.33E+05	6.36E+05	6.40E+05	6.44E+05	6.48E+05	6.52E+05	6.56E+05	6.61E+05
	Carbon Monoxide (kg of O3-equivalent)	3.58E+02	3.60E+02	3.62E+02	3.65E+02	3.67E+02	3.69E+02	3.72E+02	3.74E+02	3.76E+02	3.78E+02	3.81E+02	3.83E+02	3.86E+02	3.88E+02	3.90E+02	3.93E+02	3.95E+02	3.98E+02	4.00E+02	4.03E+02	4.05E+02	4.08E+02	4.10E+02	4.13E+02

Rate of Population Change	1.01
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

Haldimand County Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages

Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Paper	Printed Paper	1,151	1,137	1,124	1,110	1,097	1,084	1,071	1,058	1,045	1,033	1,020	1,008
	OCC/OBB	825	815	805	796	786	777	767	758	749	740	731	722
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	36	37	37	37	38	38	38	38	39	39	39	40
	PET	220	222	224	226	227	229	231	233	235	237	239	240
	HDPE	4	4	4	4	4	4	4	4	4	4	4	4
	Plastic Film	117	118	119	120	121	122	123	124	125	126	127	128
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Plastic	172	174	175	177	178	179	181	182	184	185	187	188
Metal	Steel	125	125	125	124	124	124	124	123	123	123	123	122
	Aluminum	79	79	79	79	79	78	78	78	78	78	78	78
Glass	Flint	144	144	144	144	143	143	143	142	142	142	142	141
	Coloured	28	27	27	27	27	27	27	27	27	27	27	27
Total		**2,902**	**2,882**	**2,876**	**2,871**	**2,865**	**2,859**	**2,853**	**2,848**	**2,842**	**2,836**	**2,831**	**2,825**

Material		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	996	984	972	961	949	938	926	915	904	894	883	872
	OCC/OBB	714	705	697	688	680	672	664	656	648	640	633	625
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	40	40	41	41	41	42	42	42	43	43	43	44
	PET	242	244	246	248	250	252	254	256	258	260	262	264
	HDPE	4	4	4	4	4	4	4	4	4	4	4	4
	Plastic Film	129	130	131	132	133	134	135	136	137	139	140	141
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Plastic	190	191	193	194	196	197	199	201	202	204	205	207
Metal	Steel	122	122	122	121	121	121	121	121	120	120	120	120
	Aluminum	77	77	77	77	77	77	76	76	76	76	76	76
Glass	Flint	141	141	140	140	140	140	139	139	139	138	138	138
	Coloured	27	27	27	27	27	27	27	26	26	26	26	26
Total		**2,819**	**2,814**	**2,808**	**2,802**	**2,797**	**2,791**	**2,786**	**2,780**	**2,775**	**2,769**	**2,763**	**2,758**

Financial Performance

Current System - Dual Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Collection Cost (to Transfer Station)	$1,371,837	$1,389,615	$1,414,572	$1,439,978	$1,465,840	$1,492,166	$1,518,966	$1,546,246	$1,574,017	$1,602,286	$1,631,063	$1,660,357
Transportation Cost (from Transfer Station to MRF)	$359,362	$364,019	$370,557	$377,212	$383,987	$390,883	$397,903	$405,050	$412,324	$419,730	$427,268	$434,942
Residential Promotion and Education	$14,242	$14,427	$14,686	$14,950	$15,218	$15,492	$15,770	$16,053	$16,342	$16,635	$16,934	$17,238
Admin and Interest on Municipal Capital	$106,585	$107,967	$109,906	$111,880	$113,889	$115,934	$118,016	$120,136	$122,294	$124,490	$126,726	$129,002
Total Collection Cost of Dual Stream System	$1,852,027	$1,876,027	$1,909,721	$1,944,019	$1,978,934	$2,014,476	$2,050,656	$2,087,485	$2,124,977	$2,163,141	$2,201,991	$2,241,539

Current System - Dual Stream	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,690,177	$1,720,533	$1,751,433	$1,782,889	$1,814,910	$1,847,506	$1,880,687	$1,914,464	$1,948,848	$1,983,849	$2,019,479	$2,055,749
Transportation Cost (from Transfer Station to MRF)	$442,753	$450,705	$458,800	$467,040	$475,428	$483,967	$492,659	$501,507	$510,514	$519,683	$529,016	$538,517
Residential Promotion and Education	$17,548	$17,863	$18,183	$18,510	$18,842	$19,181	$19,525	$19,876	$20,233	$20,596	$20,966	$21,343
Admin and Interest on Municipal Capital	$131,319	$133,677	$136,078	$138,522	$141,010	$143,543	$146,121	$148,745	$151,416	$154,136	$156,904	$159,722
Total Collection Cost of Dual Stream System	$2,281,797	$2,322,778	$2,364,495	$2,406,961	$2,450,190	$2,494,196	$2,538,992	$2,584,592	$2,631,011	$2,678,264	$2,726,366	$2,775,331

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Collection Cost (to Transfer Station)	$1,330,682	$1,347,926	$1,372,135	$1,396,779	$1,421,865	$1,447,401	$1,473,397	$1,499,859	$1,526,796	$1,554,218	$1,582,131	$1,610,546
Transportation Cost (from Transfer Station to MRF)	$120,956	$123,177	$125,583	$128,035	$130,536	$133,085	$135,684	$138,335	$141,037	$143,792	$146,600	$149,464
Residential Promotion and Education	$14,242	$14,427	$14,686	$14,950	$15,218	$15,492	$15,770	$16,053	$16,342	$16,635	$16,934	$17,238
Admin and Interest on Municipal Capital	$106,585	$107,967	$109,906	$111,880	$113,889	$115,934	$118,016	$120,136	$122,294	$124,490	$126,726	$129,002
Total Collection Cost of Single Stream System	$1,572,466	$1,593,497	$1,622,310	$1,651,643	$1,681,508	$1,711,913	$1,742,868	$1,774,383	$1,806,468	$1,839,134	$1,872,391	$1,906,250

Hamilton MRF System - Single Stream	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,639,472	$1,668,917	$1,698,890	$1,729,403	$1,760,463	$1,792,081	$1,824,266	$1,857,030	$1,890,382	$1,924,334	$1,958,895	$1,994,076
Transportation Cost (from Transfer Station to MRF)	$152,384	$155,361	$158,396	$161,491	$164,646	$167,863	$171,143	$174,487	$177,897	$181,373	$184,918	$188,532
Residential Promotion and Education	$17,548	$17,863	$18,183	$18,510	$18,842	$19,181	$19,525	$19,876	$20,233	$20,596	$20,966	$21,343
Admin and Interest on Municipal Capital	$131,319	$133,677	$136,078	$138,522	$141,010	$143,543	$146,121	$148,745	$151,416	$154,136	$156,904	$159,722
Total Collection Cost of Single Stream System	$1,940,722	$1,975,818	$2,011,548	$2,047,926	$2,084,961	$2,122,667	$2,161,055	$2,200,138	$2,239,929	$2,280,439	$2,321,683	$2,363,673

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	75%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	84
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$80,000.00
Incidental Costs	
Transfer Station Maintenance	$6,000
Site maintenance	$30,000
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	1.44E+05	143712	143424.58	143137.73	142851.45	142565.75	142280.62	141996.06
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	8.25E+04	82335	82170.33	82005.989	81841.977	81678.293	81514.937	81351.907
	Sulfur Oxides (kg of H+ moles-equivalent)	1.91E+04	19061.8	19023.676	18985.629	18947.658	18909.762	18871.943	18834.199
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	7.59E+01	75.7482	75.596704	75.44551	75.294619	75.14403	74.993742	74.843754
	Nitrogen Oxides (kg of PM10-equivalent)	5.47E+01	54.5906	54.481419	54.372456	54.263711	54.155184	54.046873	53.93878
	Sulfur Oxides (kg of PM10-equivalent)	6.27E+01	62.5746	62.449451	62.324552	62.199903	62.075503	61.951352	61.827449
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	9.13E+01	91.1174	90.935165	90.753295	90.571788	90.390645	90.209863	90.029444
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	5.11E+04	50997.8	50895.804	50794.013	50692.425	50591.04	50489.858	50388.878
	Carbon Monoxide (kg of O3-equivalent)	3.04E+01	30.3392	30.278522	30.217965	30.157529	30.097214	30.037019	29.976945

Impact Category	Pollutant Name	2020	2021	2022	2023	2024	2025	2026	2027
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	141712.06	141428.64	141145.78	140863.49	140581.76	140300.6	140020	139739.96
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	81189.203	81026.825	80864.771	80703.042	80541.635	80380.552	80219.791	80059.351
	Sulfur Oxides (kg of H+ moles-equivalent)	18796.531	18758.938	18721.42	18683.977	18646.609	18609.316	18572.097	18534.953
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	74.694067	74.544679	74.395589	74.246798	74.098305	73.950108	73.802208	73.654603
	Nitrogen Oxides (kg of PM10-equivalent)	53.830902	53.72324	53.615794	53.508562	53.401545	53.294742	53.188152	53.081776
	Sulfur Oxides (kg of PM10-equivalent)	61.703794	61.580387	61.457226	61.334312	61.211643	61.08922	60.967041	60.845107
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	89.849385	89.669686	89.490347	89.311366	89.132743	88.954478	88.776569	88.599016
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	50288.1	50187.524	50087.149	49986.975	49887.001	49787.227	49687.652	49588.277
	Carbon Monoxide (kg of O3-equivalent)	29.916991	29.857157	29.797443	29.737848	29.678372	29.619016	29.559778	29.500658

Impact Category	Pollutant Name	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	139460.48	139181.56	138903.19	138625.39	138348.14	138071.44	137795.3	137519.71
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	79899.233	79739.434	79579.955	79420.796	79261.954	79103.43	78945.223	78787.333
	Sulfur Oxides (kg of H+ moles-equivalent)	18497.883	18460.887	18423.965	18387.118	18350.343	18313.643	18277.015	18240.461
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	73.507294	73.36028	73.213559	73.067132	72.920998	72.775156	72.629605	72.484346
	Nitrogen Oxides (kg of PM10-equivalent)	52.975613	52.869661	52.763922	52.658394	52.553077	52.447971	52.343075	52.238389
	Sulfur Oxides (kg of PM10-equivalent)	60.723417	60.60197	60.480766	60.359805	60.239085	60.118607	59.99837	59.878373
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	88.421818	88.244974	88.068484	87.892347	87.716562	87.541129	87.366047	87.191315
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	49489.101	49390.122	49291.342	49192.759	49094.374	48996.185	48898.193	48800.396
	Carbon Monoxide (kg of O3-equivalent)	29.441657	29.382773	29.324008	29.26536	29.206829	29.148415	29.090119	29.031938

Rate of Population Change	1.00
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

Halton Region Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																									
Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	26,871	27,358	27,853	28,358	28,872	29,395	29,927	30,469	31,021	31,583	32,155	32,738	33,331	33,935	34,550	35,175	35,813	36,461	37,122	37,794	38,479	39,176	39,886	40,609
	OCC/OBB	5,924	6,031	6,140	6,252	6,365	6,480	6,598	6,717	6,839	6,963	7,089	7,217	7,348	7,481	7,617	7,755	7,895	8,038	8,184	8,332	8,483	8,637	8,793	8,952
	Mixed Paper	241	245	250	254	259	264	268	273	278	283	288	294	299	304	310	315	321	327	333	339	345	351	358	364
Plastic	Polycoat	186	193	201	209	217	225	234	243	252	262	272	283	294	305	317	329	342	355	369	383	398	413	429	446
	PET	1,301	1,351	1,403	1,457	1,514	1,572	1,633	1,696	1,762	1,830	1,901	1,975	2,051	2,130	2,213	2,298	2,387	2,479	2,575	2,675	2,779	2,886	2,998	3,114
	HDPE	615	638	663	689	715	743	772	802	833	865	898	933	969	1,007	1,046	1,086	1,128	1,172	1,217	1,264	1,313	1,364	1,417	1,472
	Plastic Film	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
	Tubs and Lids	183	190	197	205	213	221	230	239	248	258	268	278	289	300	311	323	336	349	362	376	391	406	422	438
	Polystyrene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mixed Plastic	326	339	352	366	380	395	410	426	442	459	477	495	515	535	555	577	599	622	646	671	697	724	752	781
Metal	Steel	1,197	1,231	1,266	1,302	1,339	1,377	1,416	1,457	1,498	1,541	1,584	1,629	1,676	1,723	1,772	1,822	1,874	1,927	1,982	2,038	2,096	2,156	2,217	2,280
	Aluminum	502	516	531	546	561	577	594	611	628	646	664	683	702	722	743	764	786	808	831	855	879	904	929	956
Glass	Flint	3,320	3,414	3,511	3,611	3,713	3,819	3,927	4,038	4,153	4,271	4,392	4,517	4,645	4,777	4,913	5,053	5,196	5,344	5,495	5,651	5,812	5,977	6,147	6,321
	Coloured	632	650	669	688	707	727	748	769	791	814	837	860	885	910	936	962	990	1,018	1,047	1,076	1,107	1,138	1,171	1,204
Total		41,299	42,159	43,356	44,587	45,853	47,156	48,495	49,872	51,289	52,745	54,243	55,784	57,368	58,997	60,673	62,396	64,168	65,990	67,864	69,792	71,774	73,812	75,908	78,064

Financial Performance

Current System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$5,130,396	$5,341,976	$5,603,562	$5,877,957	$6,165,789	$6,467,715	$6,784,426	$7,116,646	$7,465,134	$7,830,686	$8,214,139	$8,616,369	$9,038,296	$9,480,883	$9,945,143	$10,432,137	$10,942,977	$11,478,833	$12,040,929	$12,630,549	$13,249,042	$13,897,821	$14,578,369	$15,292,243
Transportation Cost (from Transfer Station to MRF)	$48,120	$50,104	$52,558	$55,131	$57,831	$60,663	$63,633	$66,749	$70,018	$73,447	$77,043	$80,816	$84,773	$88,924	$93,279	$97,847	$102,638	$107,664	$112,936	$118,466	$124,267	$130,352	$136,735	$143,431
Residential Promotion and Education	$200,372	$208,635	$218,852	$229,568	$240,810	$252,602	$264,971	$277,946	$291,557	$305,834	$320,810	$336,519	$352,998	$370,283	$388,415	$407,435	$427,387	$448,315	$470,268	$493,296	$517,452	$542,790	$569,370	$597,251
Admin and Interest on Municipal Capital	$332,009	$345,701	$362,630	$380,387	$399,014	$418,552	$439,048	$460,547	$483,100	$506,756	$531,571	$557,601	$584,905	$613,547	$643,591	$675,107	$708,165	$742,843	$779,218	$817,375	$857,400	$899,385	$943,426	$989,624
Total Collection Cost of Single Stream System	$5,710,896	$5,946,416	$6,237,600	$6,543,043	$6,863,443	$7,199,532	$7,552,079	$7,921,889	$8,309,808	$8,716,723	$9,143,563	$9,591,305	$10,060,972	$10,553,638	$11,070,428	$11,612,525	$12,181,167	$12,777,655	$13,403,351	$14,059,686	$14,748,161	$15,470,349	$16,227,901	$17,022,548

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$5,130,396	$5,341,976	$5,603,562	$5,877,957	$6,165,789	$6,467,715	$6,784,426	$7,116,646	$7,465,134	$7,830,686	$8,214,139	$8,616,369	$9,038,296	$9,480,883	$9,945,143	$10,432,137	$10,942,977	$11,478,833	$12,040,929	$12,630,549	$13,249,042	$13,897,821	$14,578,369	$15,292,243
Transportation Cost (from Transfer Station to MRF)	$371,299	$384,579	$400,584	$417,315	$434,808	$453,099	$472,226	$492,228	$513,147	$535,026	$557,912	$581,853	$606,898	$633,101	$660,516	$689,203	$719,220	$750,633	$783,509	$817,916	$853,929	$891,625	$931,084	$972,392
Residential Promotion and Education	$200,372	$208,635	$218,852	$229,568	$240,810	$252,602	$264,971	$277,946	$291,557	$305,834	$320,810	$336,519	$352,998	$370,283	$388,415	$407,435	$427,387	$448,315	$470,268	$493,296	$517,452	$542,790	$569,370	$597,251
Admin and Interest on Municipal Capital	$332,009	$345,701	$362,630	$380,387	$399,014	$418,552	$439,048	$460,547	$483,100	$506,756	$531,571	$557,601	$584,905	$613,547	$643,591	$675,107	$708,165	$742,843	$779,218	$817,375	$857,400	$899,385	$943,426	$989,624
Total Collection Cost of Single Stream System	$6,034,076	$6,280,891	$6,585,626	$6,905,227	$7,240,420	$7,591,968	$7,960,671	$8,347,367	$8,752,937	$9,178,302	$9,624,432	$10,092,342	$10,583,097	$11,097,814	$11,637,666	$12,203,881	$12,797,750	$13,420,624	$14,073,923	$14,759,136	$15,477,823	$16,231,621	$17,022,250	$17,851,509

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	75%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	47.8
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$80,000.00
Incidental Costs	
Transfer Station Maintenance	$6,000
Site maintenance	$30,000
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	1.48E+06	1.52E+06	1.57E+06	1.61E+06	1.66E+06	1.70E+06	1.75E+06	1.80E+06	1.85E+06	1.90E+06	1.96E+06	2.01E+06	2.07E+06	2.13E+06	2.19E+06	2.25E+06	2.32E+06	2.38E+06	2.45E+06	2.52E+06	2.59E+06	2.66E+06	2.74E+06	2.82E+06
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	8.22E+05	8.45E+05	8.69E+05	8.94E+05	9.19E+05	9.46E+05	9.72E+05	1.00E+06	1.03E+06	1.06E+06	1.09E+06	1.12E+06	1.15E+06	1.18E+06	1.22E+06	1.25E+06	1.29E+06	1.32E+06	1.36E+06	1.40E+06	1.44E+06	1.48E+06	1.52E+06	1.57E+06
	Sulfur Oxides (kg of H+ moles-equivalent)	2.13E+05	2.19E+05	2.25E+05	2.32E+05	2.38E+05	2.45E+05	2.52E+05	2.59E+05	2.66E+05	2.74E+05	2.82E+05	2.90E+05	2.98E+05	3.07E+05	3.15E+05	3.24E+05	3.33E+05	3.43E+05	3.53E+05	3.63E+05	3.73E+05	3.84E+05	3.94E+05	4.06E+05
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	9.44E+02	9.71E+02	9.98E+02	1.03E+03	1.06E+03	1.09E+03	1.12E+03	1.15E+03	1.18E+03	1.21E+03	1.25E+03	1.28E+03	1.32E+03	1.36E+03	1.40E+03	1.44E+03	1.48E+03	1.52E+03	1.56E+03	1.61E+03	1.65E+03	1.70E+03	1.75E+03	1.80E+03
	Nitrogen Oxides (kg of PM10-equivalent)	5.44E+02	5.59E+02	5.75E+02	5.92E+02	6.08E+02	6.26E+02	6.44E+02	6.62E+02	6.81E+02	7.00E+02	7.20E+02	7.40E+02	7.61E+02	7.83E+02	8.05E+02	8.28E+02	8.52E+02	8.76E+02	9.01E+02	9.26E+02	9.52E+02	9.79E+02	1.01E+03	1.04E+03
	Sulfur Oxides (kg of PM10-equivalent)	7.01E+02	7.21E+02	7.41E+02	7.62E+02	7.84E+02	8.06E+02	8.29E+02	8.53E+02	8.77E+02	9.02E+02	9.28E+02	9.54E+02	9.81E+02	1.01E+03	1.04E+03	1.07E+03	1.10E+03	1.13E+03	1.16E+03	1.19E+03	1.23E+03	1.26E+03	1.30E+03	1.33E+03
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	9.09E+02	9.35E+02	9.61E+02	9.89E+02	1.02E+03	1.05E+03	1.08E+03	1.11E+03	1.14E+03	1.17E+03	1.20E+03	1.24E+03	1.27E+03	1.31E+03	1.35E+03	1.38E+03	1.42E+03	1.46E+03	1.50E+03	1.55E+03	1.59E+03	1.64E+03	1.68E+03	1.73E+03
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	5.09E+05	5.23E+05	5.38E+05	5.54E+05	5.69E+05	5.86E+05	6.02E+05	6.19E+05	6.37E+05	6.55E+05	6.74E+05	6.93E+05	7.12E+05	7.33E+05	7.53E+05	7.75E+05	7.97E+05	8.19E+05	8.43E+05	8.67E+05	8.91E+05	9.16E+05	9.43E+05	9.69E+05
	Carbon Monoxide (kg of O3-equivalent)	3.39E+02	3.49E+02	3.59E+02	3.69E+02	3.79E+02	3.90E+02	4.01E+02	4.12E+02	4.24E+02	4.36E+02	4.49E+02	4.61E+02	4.74E+02	4.88E+02	5.02E+02	5.16E+02	5.31E+02	5.46E+02	5.61E+02	5.77E+02	5.94E+02	6.10E+02	6.28E+02	6.46E+02

Rate of Population Change	1.03
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

Niagara Region Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																									
Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	21,238	21,063	20,890	20,718	20,548	20,379	20,212	20,046	19,881	19,718	19,556	19,395	19,235	19,077	18,921	18,765	18,611	18,458	18,306	18,156	18,007	17,859	17,712	17,566
	OCC/OBB	6,542	6,488	6,435	6,382	6,330	6,278	6,226	6,175	6,124	6,074	6,024	5,975	5,925	5,877	5,828	5,781	5,733	5,686	5,639	5,593	5,547	5,501	5,456	5,411
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	138	139	141	142	144	146	148	149	151	153	155	157	158	160	162	164	166	168	170	172	174	176	178	180
	PET	1,090	1,103	1,116	1,129	1,143	1,156	1,170	1,184	1,198	1,212	1,226	1,241	1,255	1,270	1,285	1,300	1,316	1,331	1,347	1,363	1,379	1,395	1,412	1,428
	HDPE	298	302	305	309	312	316	320	324	327	331	335	339	343	347	351	356	360	364	368	373	377	382	386	391
	Plastic Film	860	870	880	890	901	912	922	933	944	956	967	978	990	1,001	1,013	1,025	1,037	1,050	1,062	1,075	1,087	1,100	1,113	1,126
	Tubs and Lids	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Polystyrene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mixed Plastic	3,880	3,925	3,972	4,019	4,066	4,114	4,163	4,212	4,262	4,312	4,363	4,415	4,467	4,520	4,573	4,627	4,682	4,737	4,793	4,850	4,907	4,965	5,024	5,083
Metal	Steel	1,454	1,457	1,459	1,462	1,465	1,467	1,470	1,473	1,475	1,478	1,481	1,483	1,486	1,489	1,491	1,494	1,497	1,499	1,502	1,505	1,507	1,510	1,513	1,516
	Aluminum	400	401	402	402	403	404	404	405	406	407	407	408	409	410	410	411	412	413	413	414	415	416	416	417
Glass	Flint	2,993	2,998	3,004	3,009	3,014	3,020	3,025	3,031	3,036	3,042	3,047	3,053	3,058	3,064	3,069	3,075	3,080	3,086	3,091	3,097	3,102	3,108	3,114	3,119
	Coloured	570	571	572	573	574	575	576	577	578	579	580	581	582	584	585	586	587	588	589	590	591	592	593	594
Total		**39,465**	**39,320**	**39,391**	**39,462**	**39,533**	**39,604**	**39,676**	**39,747**	**39,819**	**39,890**	**39,962**	**40,034**	**40,106**	**40,178**	**40,251**	**40,323**	**40,396**	**40,468**	**40,541**	**40,614**	**40,687**	**40,760**	**40,834**	**40,907**

Financial Performance

Current System - Dual Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$6,658,375	$6,766,680	$6,914,437	$7,065,421	$7,219,701	$7,377,351	$7,538,443	$7,703,052	$7,871,256	$8,043,133	$8,218,762	$8,398,227	$8,581,611	$8,768,999	$8,960,479	$9,156,140	$9,356,073	$9,560,373	$9,769,133	$9,982,452	$10,200,429	$10,423,165	$10,650,765	$10,883,335
Transportation Cost (from Transfer Station to MRF)	$162,199	$164,837	$168,436	$172,114	$175,873	$179,713	$183,637	$187,647	$191,744	$195,931	$200,210	$204,581	$209,049	$213,614	$218,278	$223,044	$227,915	$232,891	$237,977	$243,173	$248,483	$253,909	$259,454	$265,119
Residential Promotion and Education	$434,787	$441,859	$451,508	$461,367	$471,441	$481,736	$492,255	$503,004	$513,987	$525,211	$536,679	$548,398	$560,373	$572,609	$585,113	$597,889	$610,945	$624,285	$637,917	$651,847	$666,080	$680,625	$695,487	$710,674
Admin and Interest on Municipal Capital	$775,634	$788,250	$805,462	$823,051	$841,023	$859,387	$878,153	$897,328	$916,922	$936,944	$957,403	$978,309	$999,671	$1,021,500	$1,043,806	$1,066,598	$1,089,889	$1,113,687	$1,138,006	$1,162,855	$1,188,247	$1,214,194	$1,240,707	$1,267,799
Total Collection Cost of Dual Stream System	$8,030,994	$8,161,626	$8,339,843	$8,521,952	$8,708,038	$8,898,186	$9,092,487	$9,291,031	$9,493,910	$9,701,219	$9,913,054	$10,129,516	$10,350,704	$10,576,722	$10,807,675	$11,043,672	$11,284,821	$11,531,237	$11,783,033	$12,040,327	$12,303,240	$12,571,893	$12,846,413	$13,126,927

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$6,458,623	$6,563,680	$6,707,004	$6,853,458	$7,003,110	$7,156,030	$7,312,289	$7,471,960	$7,635,118	$7,801,839	$7,972,200	$8,146,280	$8,324,163	$8,505,929	$8,691,665	$8,881,456	$9,075,391	$9,273,561	$9,476,059	$9,682,978	$9,894,416	$10,110,470	$10,331,242	$10,556,835
Transportation Cost (from Transfer Station to MRF)	$633,759	$644,530	$658,372	$672,512	$686,956	$701,710	$716,782	$732,178	$747,905	$763,970	$780,380	$797,143	$814,267	$831,759	$849,628	$867,880	$886,526	$905,572	$925,028	$944,902	$965,204	$985,942	$1,007,127	$1,028,767
Residential Promotion and Education	$434,787	$441,859	$451,508	$461,367	$471,441	$481,736	$492,255	$503,004	$513,987	$525,211	$536,679	$548,398	$560,373	$572,609	$585,113	$597,889	$610,945	$624,285	$637,917	$651,847	$666,080	$680,625	$695,487	$710,674
Admin and Interest on Municipal Capital	$775,634	$788,250	$805,462	$823,051	$841,023	$859,387	$878,153	$897,328	$916,922	$936,944	$957,403	$978,309	$999,671	$1,021,500	$1,043,806	$1,066,598	$1,089,889	$1,113,687	$1,138,006	$1,162,855	$1,188,247	$1,214,194	$1,240,707	$1,267,799
Total Collection Cost of Single Stream System	$8,302,804	$8,438,319	$8,622,347	$8,810,388	$9,002,530	$9,198,863	$9,399,479	$9,604,470	$9,813,932	$10,027,963	$10,246,662	$10,470,131	$10,698,474	$10,931,798	$11,170,211	$11,413,824	$11,662,750	$11,917,106	$12,177,010	$12,442,582	$12,713,947	$12,991,231	$13,274,564	$13,564,076

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	100%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	84
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$80,000.00
Incidental Costs	
Transfer Station Maintenance	$6,000
Site maintenance	$30,000
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	1.50E+06	1.50E+06	1.51E+06	1.51E+06	1.51E+06	1.51E+06	1.52E+06	1.52E+06	1.52E+06	1.52E+06	1.53E+06	1.53E+06	1.53E+06	1.54E+06	1.54E+06	1.54E+06	1.54E+06	1.55E+06	1.55E+06	1.55E+06	1.55E+06	1.56E+06	1.56E+06	1.56E+06
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	8.39E+05	8.41E+05	8.42E+05	8.44E+05	8.45E+05	8.47E+05	8.48E+05	8.50E+05	8.51E+05	8.53E+05	8.54E+05	8.56E+05	8.57E+05	8.59E+05	8.60E+05	8.62E+05	8.63E+05	8.65E+05	8.67E+05	8.68E+05	8.70E+05	8.71E+05	8.73E+05	8.74E+05
	Sulfur Oxides (kg of H+ moles-equivalent)	2.13E+05	2.13E+05	2.14E+05	2.14E+05	2.15E+05	2.15E+05	2.15E+05	2.16E+05	2.16E+05	2.16E+05	2.17E+05	2.17E+05	2.18E+05	2.18E+05	2.18E+05	2.19E+05	2.19E+05	2.20E+05	2.20E+05	2.20E+05	2.21E+05	2.21E+05	2.22E+05	2.22E+05
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	9.21E+02	9.23E+02	9.24E+02	9.26E+02	9.28E+02	9.29E+02	9.31E+02	9.33E+02	9.34E+02	9.36E+02	9.38E+02	9.39E+02	9.41E+02	9.43E+02	9.44E+02	9.46E+02	9.48E+02	9.50E+02	9.51E+02	9.53E+02	9.55E+02	9.56E+02	9.58E+02	9.60E+02
	Nitrogen Oxides (kg of PM10-equivalent)	5.56E+02	5.57E+02	5.58E+02	5.59E+02	5.60E+02	5.61E+02	5.62E+02	5.63E+02	5.64E+02	5.65E+02	5.66E+02	5.67E+02	5.68E+02	5.69E+02	5.70E+02	5.71E+02	5.72E+02	5.73E+02	5.74E+02	5.75E+02	5.76E+02	5.77E+02	5.78E+02	5.79E+02
	Sulfur Oxides (kg of PM10-equivalent)	6.98E+02	6.99E+02	7.01E+02	7.02E+02	7.03E+02	7.04E+02	7.06E+02	7.07E+02	7.08E+02	7.09E+02	7.11E+02	7.12E+02	7.13E+02	7.15E+02	7.16E+02	7.17E+02	7.18E+02	7.20E+02	7.21E+02	7.22E+02	7.24E+02	7.25E+02	7.26E+02	7.27E+02
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	9.28E+02	9.30E+02	9.31E+02	9.33E+02	9.35E+02	9.36E+02	9.38E+02	9.40E+02	9.41E+02	9.43E+02	9.45E+02	9.47E+02	9.48E+02	9.50E+02	9.52E+02	9.53E+02	9.55E+02	9.57E+02	9.59E+02	9.60E+02	9.62E+02	9.64E+02	9.65E+02	9.67E+02
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	5.20E+05	5.21E+05	5.22E+05	5.23E+05	5.24E+05	5.25E+05	5.26E+05	5.27E+05	5.28E+05	5.28E+05	5.29E+05	5.30E+05	5.31E+05	5.32E+05	5.33E+05	5.34E+05	5.35E+05	5.36E+05	5.37E+05	5.38E+05	5.39E+05	5.40E+05	5.41E+05	5.42E+05
	Carbon Monoxide (kg of O3-equivalent)	3.38E+02	3.39E+02	3.39E+02	3.40E+02	3.40E+02	3.41E+02	3.42E+02	3.42E+02	3.43E+02	3.44E+02	3.44E+02	3.45E+02	3.45E+02	3.46E+02	3.47E+02	3.47E+02	3.48E+02	3.48E+02	3.49E+02	3.50E+02	3.50E+02	3.51E+02	3.52E+02	3.52E+02

Rate of Population Change	1.00
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

Norfolk County Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages	Material	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	2,636	2,615	2,594	2,573	2,552	2,532	2,512	2,492	2,472	2,452	2,432	2,413	2,393	2,374	2,355	2,336	2,317	2,299	2,280	2,262	2,244	2,226	2,208	2,190
	OCC/OBB	985	977	969	961	954	946	938	931	924	916	909	901	894	887	880	873	866	859	852	845	838	832	825	818
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	40	41	41	42	42	43	43	44	44	45	45	46	46	47	47	48	48	49	50	50	51	51	52	53
	PET	203	205	208	210	213	215	218	221	223	226	229	231	234	237	240	243	246	249	252	255	258	261	264	267
	HDPE	99	101	102	103	104	106	107	108	109	111	112	113	115	116	118	119	120	122	123	125	126	128	129	131
	Plastic Film	31	31	32	32	32	33	33	34	34	34	35	35	36	36	36	37	37	38	38	39	39	40	40	41
	Tubs and Lids	18	19	19	19	19	19	20	20	20	20	21	21	21	21	22	22	22	22	23	23	23	24	24	24
	Polystyrene	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Mixed Plastic	8	8	8	9	9	9	9	9	9	9	9	9	10	10	10	10	10	10	10	10	11	11	11	11
Metal	Steel	153	153	154	154	154	155	155	155	156	156	156	156	157	157	157	158	158	158	159	159	159	160	160	160
	Aluminum	56	56	56	56	56	56	56	56	57	57	57	57	57	57	57	57	57	58	58	58	58	58	58	58
Glass	Flint	375	376	377	377	378	379	380	380	381	382	383	383	384	385	386	387	387	388	389	390	390	391	392	393
	Coloured	71	72	72	72	72	72	72	72	73	73	73	73	73	73	73	74	74	74	74	74	74	75	75	75
Total		**4,677**	**4,654**	**4,664**	**4,673**	**4,682**	**4,692**	**4,701**	**4,710**	**4,720**	**4,729**	**4,739**	**4,748**	**4,758**	**4,767**	**4,777**	**4,786**	**4,796**	**4,805**	**4,815**	**4,825**	**4,834**	**4,844**	**4,854**	**4,863**

Financial Performance

Current System - Dual Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,466,156	$1,488,154	$1,520,953	$1,554,475	$1,588,736	$1,623,752	$1,659,539	$1,696,115	$1,733,498	$1,771,704	$1,810,752	$1,850,661	$1,891,450	$1,933,137	$1,975,744	$2,019,289	$2,063,794	$2,109,280	$2,155,769	$2,203,282	$2,251,842	$2,301,473	$2,352,197	$2,404,040
Transportation Cost (from Transfer Station to MRF)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Residential Promotion and Education	$56,429	$57,276	$58,538	$59,828	$61,147	$62,495	$63,872	$65,280	$66,719	$68,189	$69,692	$71,228	$72,798	$74,402	$76,042	$77,718	$79,431	$81,182	$82,971	$84,800	$86,669	$88,579	$90,531	$92,526
Admin and Interest on Municipal Capital	$86,102	$87,394	$89,320	$91,289	$93,301	$95,357	$97,459	$99,607	$101,802	$104,046	$106,339	$108,683	$111,078	$113,527	$116,029	$118,586	$121,200	$123,871	$126,601	$129,391	$132,243	$135,158	$138,136	$141,181
Total Collection Cost of Dual Stream System	$1,608,688	$1,632,825	$1,668,812	$1,705,593	$1,743,184	$1,781,604	$1,820,870	$1,861,002	$1,902,019	$1,943,939	$1,986,784	$2,030,572	$2,075,326	$2,121,066	$2,167,815	$2,215,593	$2,264,425	$2,314,333	$2,365,341	$2,417,473	$2,470,754	$2,525,209	$2,580,865	$2,637,747

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,422,172	$1,443,510	$1,475,325	$1,507,841	$1,541,074	$1,575,039	$1,609,753	$1,645,232	$1,681,493	$1,718,553	$1,756,430	$1,795,141	$1,834,706	$1,875,143	$1,916,472	$1,958,711	$2,001,881	$2,046,002	$2,091,096	$2,137,184	$2,184,287	$2,232,429	$2,281,632	$2,331,919
Transportation Cost (from Transfer Station to MRF)	$168,590	$171,356	$175,034	$178,791	$182,629	$186,550	$190,555	$194,646	$198,825	$203,094	$207,454	$211,909	$216,459	$221,107	$225,855	$230,706	$235,660	$240,722	$245,892	$251,173	$256,568	$262,080	$267,709	$273,460
Residential Promotion and Education	$56,429	$57,276	$58,538	$59,828	$61,147	$62,495	$63,872	$65,280	$66,719	$68,189	$69,692	$71,228	$72,798	$74,402	$76,042	$77,718	$79,431	$81,182	$82,971	$84,800	$86,669	$88,579	$90,531	$92,526
Admin and Interest on Municipal Capital	$86,102	$87,394	$89,320	$91,289	$93,301	$95,357	$97,459	$99,607	$101,802	$104,046	$106,339	$108,683	$111,078	$113,527	$116,029	$118,586	$121,200	$123,871	$126,601	$129,391	$132,243	$135,158	$138,136	$141,181
Total Collection Cost of Single Stream System	$1,733,293	$1,759,536	$1,798,218	$1,837,750	$1,878,151	$1,919,441	$1,961,639	$2,004,765	$2,048,839	$2,093,882	$2,139,915	$2,186,961	$2,235,042	$2,284,179	$2,334,398	$2,385,720	$2,438,172	$2,491,776	$2,546,560	$2,602,548	$2,659,767	$2,718,245	$2,778,008	$2,839,086

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	100%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	193.6
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$40,000.00
Incidental Costs	
Transfer Station Maintenance	$2,000
Site maintenance	$2,400
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	**Carbon Dioxide Fossil (kg of CO2-equivalent)**	2.13E+05	213426	213852.85	214280.56	214709.12	215138.54	215568.81	215999.95	216431.95	216864.82	217298.55	217733.14	218168.61	218604.95	219042.16	219480.24	219919.2	220359.04	220799.76	221241.36	221683.84	222127.21	222571.46	223016.6
Acidification Air	**Nitrogen Oxides (kg of H+ moles-equivalent)**	1.21E+05	121242	121484.48	121727.45	121970.91	122214.85	122459.28	122704.2	122949.61	123195.51	123441.9	123688.78	123936.16	124184.03	124432.4	124681.26	124930.63	125180.49	125430.85	125681.71	125933.07	126184.94	126437.31	126690.18
	Sulfur Oxides (kg of H+ moles-equivalent)	2.88E+04	28857.6	28915.315	28973.146	29031.092	29089.154	29147.333	29205.627	29264.039	29322.567	29381.212	29439.974	29498.854	29557.852	29616.968	29676.201	29735.554	29795.025	29854.615	29914.324	29974.153	30034.101	30094.169	30154.358
Human Health Criteria Air-Point Source	**Total Particulate Matter (kg of PM10-equivalent)**	1.18E+02	118.236	118.47247	118.70942	118.94684	119.18473	119.4231	119.66195	119.90127	120.14107	120.38135	120.62212	120.86336	121.10509	121.3473	121.58999	121.83317	122.07684	122.32099	122.56563	122.81077	123.05639	123.3025	123.5491
	Nitrogen Oxides (kg of PM10-equivalent)	8.00E+01	80.16	80.32032	80.480961	80.641923	80.803206	80.964813	81.126742	81.288996	81.451574	81.614477	81.777706	81.941261	82.105144	82.269354	82.433893	82.598761	82.763958	82.929486	83.095345	83.261536	83.428059	83.594915	83.762105
	Sulfur Oxides (kg of PM10-equivalent)	9.44E+01	94.5888	94.777978	94.967534	95.157469	95.347784	95.538479	95.729556	95.921015	96.112857	96.305083	96.497693	96.690688	96.88407	97.077838	97.271994	97.466538	97.661471	97.856794	98.052507	98.248612	98.44511	98.642	98.839284
Eutrophication Air	**Nitrogen Oxides (kg of N-equivalent)**	1.34E+02	134.268	134.53654	134.80561	135.07522	135.34537	135.61606	135.88729	136.15907	136.43139	136.70425	136.97766	137.25161	137.52612	137.80117	138.07677	138.35292	138.62963	138.90689	139.1847	139.46307	139.742	140.02148	140.30153
Smog Air	**Nitrogen Oxides (kg of O3-equivalent)**	7.48E+04	74949.6	75099.499	75249.698	75400.198	75550.998	75702.1	75853.504	76005.211	76157.222	76309.536	76462.155	76615.079	76768.31	76921.846	77075.69	77229.841	77384.301	77539.07	77694.148	77849.536	78005.235	78161.246	78317.568
	Carbon Monoxide (kg of O3-equivalent)	4.58E+01	45.8916	45.983383	46.07535	46.167501	46.259836	46.352355	46.44506	46.53795	46.631026	46.724288	46.817737	46.911372	47.005195	47.099205	47.193404	47.287791	47.382366	47.477131	47.572085	47.667229	47.762564	47.858089	47.953805

Rate of Population Change	**1.00**
Rate of Increase in Plastics	**1.01**
Rate of Increase of Paper Products	**0.99**

Waterloo Region Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																									
Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	23,772	23,822	23,871	23,921	23,970	24,020	24,070	24,120	24,170	24,220	24,271	24,321	24,372	24,422	24,473	24,524	24,575	24,626	24,677	24,729	24,780	24,831	24,883	24,935
	OCC/OBB	2,919	2,925	2,931	2,938	2,944	2,950	2,956	2,962	2,968	2,974	2,981	2,987	2,993	2,999	3,005	3,012	3,018	3,024	3,030	3,037	3,043	3,049	3,056	3,062
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	387	396	405	414	423	432	442	452	462	472	483	494	505	516	527	539	551	563	576	589	602	615	629	643
	PET	1,612	1,647	1,684	1,722	1,760	1,800	1,840	1,881	1,923	1,966	2,010	2,054	2,100	2,147	2,195	2,244	2,294	2,345	2,398	2,451	2,506	2,562	2,619	2,678
	HDPE	664	679	694	710	726	742	759	775	793	810	829	847	866	885	905	925	946	967	989	1,011	1,033	1,056	1,080	1,104
	Plastic Film	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Plastic	1,154	1,180	1,206	1,233	1,261	1,289	1,317	1,347	1,377	1,408	1,439	1,471	1,504	1,538	1,572	1,607	1,643	1,680	1,717	1,755	1,795	1,835	1,876	1,918
Metal	Steel	1,110	1,124	1,138	1,151	1,166	1,180	1,194	1,209	1,223	1,238	1,253	1,269	1,284	1,300	1,316	1,332	1,348	1,365	1,381	1,398	1,415	1,432	1,450	1,468
	Aluminum	506	512	518	524	531	537	544	550	557	564	571	578	585	592	599	607	614	621	629	637	644	652	660	668
Glass	Flint	2,024	2,049	2,074	2,099	2,125	2,151	2,177	2,204	2,230	2,258	2,285	2,313	2,341	2,370	2,399	2,428	2,458	2,488	2,518	2,549	2,580	2,611	2,643	2,675
	Coloured	386	390	395	400	405	410	415	420	425	430	435	441	446	451	457	462	468	474	480	485	491	497	503	510
Total		**34,534**	**34,724**	**35,148**	**35,577**	**36,011**	**36,450**	**36,895**	**37,345**	**37,800**	**38,262**	**38,728**	**39,201**	**39,679**	**40,163**	**40,653**	**41,149**	**41,651**	**42,159**	**42,674**	**43,194**	**43,721**	**44,255**	**44,795**	**45,341**

Financial Performance

Current System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$6,866,744	$7,042,570	$7,271,059	$7,506,962	$7,750,518	$8,001,975	$8,261,591	$8,529,630	$8,806,366	$9,092,080	$9,387,063	$9,691,617	$10,006,052	$10,330,688	$10,665,857	$11,011,900	$11,369,170	$11,738,031	$12,118,860	$12,512,044	$12,917,985	$13,337,096	$13,769,805	$14,216,552
Transportation Cost (from Transfer Station to MRF)	$27,571	$28,277	$29,194	$30,141	$31,119	$32,129	$33,171	$34,247	$35,358	$36,506	$37,690	$38,913	$40,175	$41,479	$42,824	$44,214	$45,648	$47,129	$48,658	$50,237	$51,867	$53,550	$55,287	$57,081
Residential Promotion and Education	$158,226	$162,278	$167,543	$172,978	$178,590	$184,385	$190,367	$196,543	$202,920	$209,503	$216,300	$223,318	$230,563	$238,044	$245,767	$253,741	$261,973	$270,472	$279,248	$288,307	$297,661	$307,319	$317,289	$327,583
Admin and Interest on Municipal Capital	$513,666	$526,818	$543,910	$561,557	$579,776	$598,586	$618,007	$638,058	$658,759	$680,131	$702,198	$724,980	$748,501	$772,785	$797,858	$823,743	$850,469	$878,061	$906,549	$935,961	$966,328	$997,679	$1,030,048	$1,063,467
Total Collection Cost of Dual Stream System	$7,566,207	$7,759,943	$8,011,706	$8,271,638	$8,540,003	$8,817,075	$9,103,136	$9,398,478	$9,703,403	$10,018,220	$10,343,251	$10,678,827	$11,025,291	$11,382,996	$11,752,306	$12,133,597	$12,527,260	$12,933,694	$13,353,315	$13,786,550	$14,233,841	$14,695,644	$15,172,429	$15,664,683

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$6,660,742	$6,831,293	$7,052,928	$7,281,753	$7,518,002	$7,761,916	$8,013,744	$8,273,742	$8,542,175	$8,819,317	$9,105,451	$9,400,868	$9,705,870	$10,020,767	$10,345,881	$10,681,543	$11,028,095	$11,385,890	$11,755,294	$12,136,683	$12,530,445	$12,936,983	$13,356,711	$13,790,056
Transportation Cost (from Transfer Station to MRF)	$845,997	$866,965	$893,522	$920,909	$949,153	$978,280	$1,008,319	$1,039,298	$1,071,248	$1,104,199	$1,138,183	$1,173,232	$1,209,382	$1,246,665	$1,285,120	$1,324,782	$1,365,690	$1,407,884	$1,451,405	$1,496,295	$1,542,597	$1,590,356	$1,639,619	$1,690,434
Residential Promotion and Education	$158,226	$162,278	$167,543	$172,978	$178,590	$184,385	$190,367	$196,543	$202,920	$209,503	$216,300	$223,318	$230,563	$238,044	$245,767	$253,741	$261,973	$270,472	$279,248	$288,307	$297,661	$307,319	$317,289	$327,583
Admin and Interest on Municipal Capital	$513,666	$526,818	$543,910	$561,557	$579,776	$598,586	$618,007	$638,058	$658,759	$680,131	$702,198	$724,980	$748,501	$772,785	$797,858	$823,743	$850,469	$878,061	$906,549	$935,961	$966,328	$997,679	$1,030,048	$1,063,467
Total Collection Cost of Single Stream System	$8,178,631	$8,387,355	$8,657,903	$8,937,197	$9,225,521	$9,523,167	$9,830,436	$10,147,640	$10,475,101	$10,813,151	$11,162,132	$11,522,398	$11,894,316	$12,278,262	$12,674,625	$13,083,809	$13,506,227	$13,942,308	$14,392,496	$14,857,246	$15,337,031	$15,832,337	$16,343,667	$16,871,540

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	100%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	151.4
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$80,000.00
Incidental Costs	
Transfer Station Maintenance	$6,000
Site maintenance	$30,000
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	1.51E+06	1.53E+06	1.55E+06	1.57E+06	1.59E+06	1.60E+06	1.62E+06	1.64E+06	1.66E+06	1.68E+06	1.70E+06	1.73E+06	1.75E+06	1.77E+06	1.79E+06	1.81E+06	1.83E+06	1.86E+06	1.88E+06	1.90E+06	1.92E+06	1.95E+06	1.97E+06	2.00E+06
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	8.52E+05	8.62E+05	8.73E+05	8.84E+05	8.94E+05	9.05E+05	9.16E+05	9.27E+05	9.39E+05	9.50E+05	9.62E+05	9.74E+05	9.85E+05	9.97E+05	1.01E+06	1.02E+06	1.03E+06	1.05E+06	1.06E+06	1.07E+06	1.09E+06	1.10E+06	1.11E+06	1.13E+06
	Sulfur Oxides (kg of H+ moles-equivalent)	2.06E+05	2.09E+05	2.11E+05	2.14E+05	2.16E+05	2.19E+05	2.22E+05	2.24E+05	2.27E+05	2.30E+05	2.33E+05	2.35E+05	2.38E+05	2.41E+05	2.44E+05	2.47E+05	2.50E+05	2.53E+05	2.56E+05	2.59E+05	2.63E+05	2.66E+05	2.69E+05	2.72E+05
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	8.53E+02	8.63E+02	8.74E+02	8.85E+02	8.95E+02	9.06E+02	9.17E+02	9.29E+02	9.40E+02	9.51E+02	9.63E+02	9.75E+02	9.87E+02	9.99E+02	1.01E+03	1.02E+03	1.04E+03	1.05E+03	1.06E+03	1.07E+03	1.09E+03	1.10E+03	1.11E+03	1.13E+03
	Nitrogen Oxides (kg of PM10-equivalent)	5.64E+02	5.71E+02	5.78E+02	5.85E+02	5.92E+02	5.99E+02	6.07E+02	6.14E+02	6.21E+02	6.29E+02	6.37E+02	6.44E+02	6.52E+02	6.60E+02	6.68E+02	6.77E+02	6.85E+02	6.93E+02	7.02E+02	7.10E+02	7.19E+02	7.28E+02	7.36E+02	7.45E+02
	Sulfur Oxides (kg of PM10-equivalent)	6.75E+02	6.83E+02	6.92E+02	7.00E+02	7.09E+02	7.17E+02	7.26E+02	7.35E+02	7.44E+02	7.53E+02	7.62E+02	7.71E+02	7.81E+02	7.90E+02	8.00E+02	8.10E+02	8.20E+02	8.30E+02	8.40E+02	8.50E+02	8.60E+02	8.71E+02	8.81E+02	8.92E+02
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	9.42E+02	9.53E+02	9.65E+02	9.77E+02	9.89E+02	1.00E+03	1.01E+03	1.03E+03	1.04E+03	1.05E+03	1.06E+03	1.08E+03	1.09E+03	1.10E+03	1.12E+03	1.13E+03	1.14E+03	1.16E+03	1.17E+03	1.19E+03	1.20E+03	1.22E+03	1.23E+03	1.25E+03
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	5.27E+05	5.33E+05	5.40E+05	5.47E+05	5.53E+05	5.60E+05	5.67E+05	5.74E+05	5.81E+05	5.88E+05	5.95E+05	6.02E+05	6.10E+05	6.17E+05	6.25E+05	6.32E+05	6.40E+05	6.48E+05	6.56E+05	6.64E+05	6.72E+05	6.80E+05	6.88E+05	6.97E+05
	Carbon Monoxide (kg of O3-equivalent)	3.27E+02	3.31E+02	3.35E+02	3.39E+02	3.43E+02	3.47E+02	3.52E+02	3.56E+02	3.60E+02	3.65E+02	3.69E+02	3.74E+02	3.78E+02	3.83E+02	3.88E+02	3.92E+02	3.97E+02	4.02E+02	4.07E+02	4.12E+02	4.17E+02	4.22E+02	4.27E+02	4.32E+02

Rate of Population Change	1.01
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

Wellington County Profile

Blue Box Quantities and Composition

Projected Recyclabes Tonnages																									
Material		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Paper	Printed Paper	1,841	1,838	1,834	1,830	1,826	1,822	1,819	1,815	1,811	1,807	1,803	1,800	1,796	1,792	1,789	1,785	1,781	1,777	1,774	1,770	1,766	1,763	1,759	1,755
	OCC/OBB	1,530	1,527	1,524	1,521	1,517	1,514	1,511	1,508	1,505	1,502	1,499	1,495	1,492	1,489	1,486	1,483	1,480	1,477	1,474	1,471	1,468	1,465	1,462	1,459
	Mixed Paper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plastic	Polycoat	8	8	8	8	9	9	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12
	PET	362	368	375	382	389	396	403	410	417	425	433	441	449	457	465	473	482	491	499	508	518	527	537	546
	HDPE	177	180	184	187	190	194	197	201	204	208	212	216	220	224	228	232	236	240	244	249	253	258	263	267
	Plastic Film	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubs and Lids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Polystyrene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mixed Plastic	172	175	178	182	185	188	192	195	199	202	206	210	213	217	221	225	229	233	238	242	246	251	255	260
Metal	Steel	269	271	273	275	278	280	282	284	287	289	291	294	296	298	301	303	305	308	310	313	315	318	320	323
	Aluminum	133	134	135	136	137	139	140	141	142	143	144	145	147	148	149	150	151	152	154	155	156	157	159	160
Glass	Flint	364	367	370	373	376	379	382	385	388	391	395	398	401	404	407	411	414	417	421	424	427	431	434	438
	Coloured	143	144	145	146	147	149	150	151	152	153	155	156	157	158	160	161	162	163	165	166	167	169	170	171
Total		5,000	5,013	5,053	5,093	5,134	5,175	5,217	5,258	5,300	5,343	5,385	5,429	5,472	5,516	5,560	5,604	5,649	5,694	5,740	5,786	5,832	5,879	5,926	5,973

Financial Performance

Current System - Dual Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,266,435	$1,295,189	$1,331,661	$1,369,161	$1,407,717	$1,447,358	$1,488,115	$1,530,021	$1,573,106	$1,617,405	$1,662,951	$1,709,780	$1,757,927	$1,807,430	$1,858,327	$1,910,658	$1,964,462	$2,019,781	$2,076,658	$2,135,137	$2,195,263	$2,257,081	$2,320,641	$2,385,990
Transportation Cost (from Transfer Station to MRF)	$294,823	$301,517	$310,008	$318,738	$327,713	$336,942	$346,430	$356,186	$366,216	$376,528	$387,131	$398,033	$409,242	$420,766	$432,615	$444,797	$457,323	$470,201	$483,442	$497,055	$511,052	$525,444	$540,240	$555,453
Residential Promotion and Education	$54,718	$55,960	$57,536	$59,156	$60,822	$62,535	$64,296	$66,107	$67,968	$69,882	$71,850	$73,873	$75,954	$78,092	$80,292	$82,553	$84,877	$87,267	$89,725	$92,251	$94,849	$97,520	$100,266	$103,090
Admin and Interest on Municipal Capital	$83,930	$85,836	$88,253	$90,738	$93,293	$95,921	$98,622	$101,399	$104,254	$107,190	$110,209	$113,312	$116,503	$119,784	$123,157	$126,625	$130,191	$133,857	$137,626	$141,502	$145,486	$149,583	$153,796	$158,127
Total Collection Cost of Dual Stream System	$1,699,906	$1,738,502	$1,787,459	$1,837,793	$1,889,546	$1,942,755	$1,997,463	$2,053,712	$2,111,544	$2,171,005	$2,232,141	$2,294,998	$2,359,625	$2,426,072	$2,494,390	$2,564,632	$2,636,852	$2,711,106	$2,787,451	$2,865,946	$2,946,651	$3,029,628	$3,114,943	$3,202,659

Hamilton MRF System - Single Stream	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Collection Cost (to Transfer Station)	$1,228,442	$1,256,333	$1,291,712	$1,328,086	$1,365,485	$1,403,937	$1,443,472	$1,484,120	$1,525,913	$1,568,883	$1,613,062	$1,658,486	$1,705,189	$1,753,207	$1,802,578	$1,853,338	$1,905,528	$1,959,188	$2,014,359	$2,071,083	$2,129,405	$2,189,369	$2,251,021	$2,314,410
Transportation Cost (from Transfer Station to MRF)	$211,253	$215,836	$221,257	$226,817	$232,520	$238,371	$244,372	$250,528	$256,843	$263,321	$269,966	$276,782	$283,776	$290,950	$298,309	$305,859	$313,605	$321,552	$329,705	$338,069	$346,650	$355,455	$364,488	$373,756
Residential Promotion and Education	$54,718	$55,960	$57,536	$59,156	$60,822	$62,535	$64,296	$66,107	$67,968	$69,882	$71,850	$73,873	$75,954	$78,092	$80,292	$82,553	$84,877	$87,267	$89,725	$92,251	$94,849	$97,520	$100,266	$103,090
Admin and Interest on Municipal Capital	$83,930	$85,836	$88,253	$90,738	$93,293	$95,921	$98,622	$101,399	$104,254	$107,190	$110,209	$113,312	$116,503	$119,784	$123,157	$126,625	$130,191	$133,857	$137,626	$141,502	$145,486	$149,583	$153,796	$158,127
Total Collection Cost of Single Stream System	$1,578,343	$1,613,966	$1,658,758	$1,704,798	$1,752,121	$1,800,764	$1,850,762	$1,902,154	$1,954,978	$2,009,275	$2,065,087	$2,122,454	$2,181,421	$2,242,033	$2,304,335	$2,368,375	$2,434,201	$2,501,864	$2,571,414	$2,642,905	$2,716,391	$2,791,927	$2,869,571	$2,949,382

Transfer Station Cost	
Transportation	
% of Recyclables to Transfer Station	100%
Truck Capacity (tonne)	18
Cost of Truck (per hour)	$100
Turnover time (hours)	0.5
Truck average speed (km/hr)	50
Roundtrip distance (km)	198.2
Single Stream vs Dual Stream	
Percentage increase for dual steam cost	3%
Staffing	
Salaries	$40,000.00
Incidental Costs	
Transfer Station Maintenance	$4,000
Site maintenance	$30,000
Administrative allowance	10%

Environmental Impact

Impact Category	Pollutant Name	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Global Warming Air	Carbon Dioxide Fossil (kg of CO2-equivalent)	2.37E+05	2.39E+05	2.41E+05	2.43E+05	2.45E+05	2.47E+05	2.49E+05	2.51E+05	2.53E+05	2.55E+05	2.57E+05	2.59E+05	2.61E+05	2.63E+05	2.65E+05	2.67E+05	2.69E+05	2.71E+05	2.74E+05	2.76E+05	2.78E+05	2.80E+05	2.82E+05	2.85E+05
Acidification Air	Nitrogen Oxides (kg of H+ moles-equivalent)	1.35E+05	1.36E+05	1.37E+05	1.38E+05	1.39E+05	1.40E+05	1.42E+05	1.43E+05	1.44E+05	1.45E+05	1.46E+05	1.47E+05	1.49E+05	1.50E+05	1.51E+05	1.52E+05	1.53E+05	1.55E+05	1.56E+05	1.57E+05	1.58E+05	1.60E+05	1.61E+05	1.62E+05
	Sulfur Oxides (kg of H+ moles-equivalent)	3.17E+04	3.20E+04	3.22E+04	3.25E+04	3.27E+04	3.30E+04	3.33E+04	3.35E+04	3.38E+04	3.41E+04	3.43E+04	3.46E+04	3.49E+04	3.52E+04	3.54E+04	3.57E+04	3.60E+04	3.63E+04	3.66E+04	3.69E+04	3.72E+04	3.75E+04	3.78E+04	3.81E+04
Human Health Criteria Air-Point Source	Total Particulate Matter (kg of PM10-equivalent)	1.28E+02	1.29E+02	1.30E+02	1.31E+02	1.32E+02	1.33E+02	1.34E+02	1.35E+02	1.36E+02	1.38E+02	1.39E+02	1.40E+02	1.41E+02	1.42E+02	1.43E+02	1.44E+02	1.45E+02	1.47E+02	1.48E+02	1.49E+02	1.50E+02	1.51E+02	1.53E+02	1.54E+02
	Nitrogen Oxides (kg of PM10-equivalent)	8.95E+01	9.02E+01	9.09E+01	9.17E+01	9.24E+01	9.31E+01	9.39E+01	9.46E+01	9.54E+01	9.62E+01	9.69E+01	9.77E+01	9.85E+01	9.93E+01	1.00E+02	1.01E+02	1.02E+02	1.02E+02	1.03E+02	1.04E+02	1.05E+02	1.06E+02	1.07E+02	1.08E+02
	Sulfur Oxides (kg of PM10-equivalent)	1.04E+02	1.05E+02	1.06E+02	1.07E+02	1.07E+02	1.08E+02	1.09E+02	1.10E+02	1.11E+02	1.12E+02	1.13E+02	1.14E+02	1.14E+02	1.15E+02	1.16E+02	1.17E+02	1.18E+02	1.19E+02	1.20E+02	1.21E+02	1.22E+02	1.23E+02	1.24E+02	1.25E+02
Eutrophication Air	Nitrogen Oxides (kg of N-equivalent)	1.49E+02	1.50E+02	1.51E+02	1.53E+02	1.54E+02	1.55E+02	1.56E+02	1.58E+02	1.59E+02	1.60E+02	1.61E+02	1.63E+02	1.64E+02	1.65E+02	1.67E+02	1.68E+02	1.69E+02	1.71E+02	1.72E+02	1.73E+02	1.75E+02	1.76E+02	1.78E+02	1.79E+02
Smog Air	Nitrogen Oxides (kg of O3-equivalent)	8.37E+04	8.44E+04	8.50E+04	8.57E+04	8.64E+04	8.71E+04	8.78E+04	8.85E+04	8.92E+04	8.99E+04	9.06E+04	9.14E+04	9.21E+04	9.28E+04	9.36E+04	9.43E+04	9.51E+04	9.58E+04	9.66E+04	9.74E+04	9.82E+04	9.89E+04	9.97E+04	1.01E+05
	Carbon Monoxide (kg of O3-equivalent)	5.05E+01	5.09E+01	5.13E+01	5.17E+01	5.21E+01	5.26E+01	5.30E+01	5.34E+01	5.38E+01	5.43E+01	5.47E+01	5.51E+01	5.56E+01	5.60E+01	5.65E+01	5.69E+01	5.74E+01	5.78E+01	5.83E+01	5.88E+01	5.92E+01	5.97E+01	6.02E+01	6.07E+01

Rate of Population Change	1.01
Rate of Increase in Plastics	1.01
Rate of Increase of Paper Products	0.99

APPENDIX B

Municipality Outreach

City of Hamilton – Material Recycling Facility Infrastructure Planning for 2020

Contact List

Regional Municipality	Primary Contact
Halton, Regional Municipality of	Rob Rivers 905-825-6000 rob.rivers@halton.ca
Waterloo, Regional Municipality of	Joe Cardoso 519-883-5100 ext 8408 JCardoso@regionofwaterloo.ca
Niagara, Regional Municipality of	Lydia Torbicki 905-685-4225 ext 3495 lydia.torbicki@niagararegion.ca
Guelph, City of	Dean Wyman 519-822-1260 dean.wyman@guelph.ca
Brantford, City of	Dene Hodgins (519)759-1350 ext. 2279 dhodgins@brantford.ca
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City of Hamilton – Material Recycling Facility Infrastructure Planning for 2020

Questionnaire (October 22, 2014)

SNC-Lavalin Inc. has been retained by the City of Hamilton (referred to as "City") to undertake the Material Recycling Facility Infrastructure Planning for 2020 project (referred to as "The Project"). The objective of the Project is to provide a detailed review of Single Stream or Dual Stream processing options and expansion of capacity at the City's Material Recycling Facility (MRF) to provide infrastructure planning for 2020 when the current processing contract expires. To do so, a projection model will be developed to analyze Blue Box recyclables volume and characteristics for a fifteen year period between 2020 and 2035. This model will analyze the City of Hamilton and surrounding municipalities in terms of recyclable quantity projections, and collection and processing costs. The surrounding municipalities will have similar projections to determine feasible options for the Hamilton MRF.

As part of the analysis and process, we are engaging with the surrounding municipalities for interest and information regarding their current management systems. To assist with the compilation of information and data for the projection model, we would value your input by completing a small questionnaire.

Question	Response
The Project will be building on the results reported in *A Study of the Optimization of the Blue Box Material Processing System in Ontario – Final Report, June 2012 (MIPC Blue Box MRF Optimization Study)*. The study identified Hamilton as one of the 2 regional state-of-the-art MRFs that would anchor the processing and transfer system in Southwest Ontario. As such, would your municipality be interested in participating in a recyclables management system where your Blue Box recyclables are processed at a regional MRF in Hamilton? Please provide reason(s) for your response.	
Would your municipality consider other MRF options, such as partnerships, retro-fitting your existing facility, building a new facility, etc?	
What is the nature of your current Blue Box recyclables Contract (i.e., % out-sourced/% in-house)?	
What is the duration of current Contract(s)?	
Is your municipality carrying out any work/studies to assess Single Stream vs. Dual Stream processing?	

Thank you for participating in our Study. We greatly appreciate your help. Should you have any questions, please do not hesitate to contact:

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	Would your municipality be interested in participating in a recyclables management system where your Blue Box recyclables are processed at a regional MRF in Hamilton? Please provide reason(s) for your response.	Would your municipality consider other MRF options, such as partnerships, retro-fitting your existing facility, building a new facility, etc?	What is the nature of your current Blue Box recyclables Contract (i.e., % out-sourced/% in-house)?	What is the duration of current Contract(s)?	Is your municipality carrying out any work/studies to assess Single Stream vs. Dual Stream processing?
County of Brant (Municipality 1)	The County does not currently own our own MRF. The service to process our Blue Box Collected materials are currently contracted out through a competitive bid process as part of our Garbage/Recycling Collection and Processing Contract. At this time the County has not made a decision how it will tender it next Garbage/Recycling Collection and Processing Contract which will come up in 2017.	At this time we have not considered other MRF options	100% Outsourced	10 Year period , ends Nov 1, 2017	No
Haldimand County (Municipality 2)	Yes Haldimand would be interested in sending our BB material to a regional MRF for processing. We currently use the Niagara MRF for processing BB materials. Haldimand's current operational structure is to collect, aggregate and transfer materials to regional facilities (waste and recycling). Haldimand collects roughly 3,100 tonnes of BB materials annually – that tonnage does not support a MRF.	Haldimand currently does not have a MRF. We are just finishing the redevelopment of our Canborough Transfer Station. The transfer station will be operational in March 2015 with the capabilities of transferring our waste and recycling for the next 20 years plus.	We contract out 100% of the collection and processing. HGC Management currently collects curbside and Niagara holds the processing contract.	Curbside collection expires October 2016 and the processing contract expires October 2017.	No. Haldimand uses regional facilities to process our BB Materials, as such we collect based on processing capabilities.
Halton Region (Municipality 3)	Based on the current method of collection and the utilization of transfer stations where all Blue Box material collected in Halton is currently off-loaded, Halton would with minimal adjustments be able to transfer Blue Box material to a Single Stream MRF located in Hamilton when our current processing agreement expires. We would require that all Blue Box material collected in Halton may still be off-loaded at the current transfer stations we utilize, plus would need to determine the impact of transfer costs due to distance Blue Box material is to be shipped, plus any costs to Halton for processing and amount of any potential revenue from sales.	The Region of Halton will consider other partnership opportunities with a Single Stream MRF when our current contract expires in April, 2018. The Region has no plans at this time to build our own MRF.	Halton has an agreement with Emterra Environmental Limited for the receipt, processing and marketing of Blue Box material through to April, 2018. The Region pays Emterra a Unit Price per tonne to process and receives 25% of revenue earned from sales.	Current contract is for 10 years and expires April, 2018.	We are not performing any studies to asses Single Stream vs. Dual Stream. Region moved to a Single Stream program with the implementation of weekly Blue Box and GreenCart collection in April 2008.

Niagara Region (Municipality 4)	Niagara Region is interested in evaluating the option of processing recyclables at a regional MRF in Hamilton under i) single stream option and ii) dual stream option, in addition to other collection/processing options which are outlined in the subsequent pages of this survey, as part of a larger Niagara Region study beginning in 2015. The reason for the response is that Niagara is evaluating a range of options in order to identify an optimized collection/processing system that is the most cost-effective for Niagara with the highest diversion potential. Therefore, we would request access to the information/data that will allow Niagara to evaluate the option of processing recyclables at a regional MRF in Hamilton versus other processing options.	Other MRF options may be considered subject to results of cost benefit analysis and business cases.	Collection is 100% outsourced and processing labour is 100% outsourced, but the Region owns the MRF and equipment.	Processing contract expires April 6, 2018; collection contract expires March 2, 2018, both with an option of a one-year extension, subject to approval by Regional Council	Yes, the study will be initiated in 2015
Norfolk County (Municipality 5)	Always open to efficiencies. Preference in past to support local jobs. Distance of bulk material to Hamilton may be cost prohibited.	Always open to efficiencies.	100% out-sourced.	1 year collection; 6 years processing.	No.
City of Guelph (Municipality 6)	No.	No.	100% In-House	N/A	No.
Waterloo Region (Municipality 7)	No. Waterloo went through an expansion 6 years ago to increase its current program.	With its expansion years ago, Waterloo is not willing to look at something different.	N/A	N/A	Waterloo is in the process of going through an Advisory Committee to develop a Master Plan. Hard to tell what the next 15 years will be.
County of Wellington (Municipality 8)	It would only make sense if all of the County was included. If that was the case there might be some interest.	Wellington currently contracts the service, there is little for Wellington to offer into a partnership. Wellington tenders for this service.	100% Outsourced	3 years remaining	Wellington's next tender will likely include both options.
City of Brantford (Municipality 9)	Options can be reviewed/investigated at the staff level. Collection and processing operations are currently contracted out to the private sector through competitive tender process every 5-7 years.	Options can be reviewed/investigated at the staff level.	100% outsourced	N/A	No studies are currently underway for this type of assessment.

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