



## **Kingston Regional MRF Study**

Task 5: Final Report

June 10, 2015

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<b>Appendix B – Technical Memo #2 – Technical Plan and Business Case</b>
<b>Appendix C – Technical Memo #3 – Municipal Data Collection, Interest and Engagement</b>

# 1 Introduction

The City of Kingston (the City) has undertaken a study to research the optimization of the existing Materials Recovery Facility (MRF) in the City of Kingston and the potential to expand its capacity to provide processing services to municipalities in Eastern Ontario.

This study is being conducted through a joint agreement with the City and the Continuous Improvement Fund (CIF).

The study has been developed as a series of tasks, including a review of a study undertaken by Waste Diversion Ontario's Municipal Industry Program Committee (MIPC) of the Optimization of the Blue Box Material Processing System in Ontario, development of a technical plan and business case and Eastern Ontario municipal data collection, interest and engagement.

This report provides a summary of the tasks, recommendations for a collection system and processing facility, monitoring/measuring metrics, key messages for the City to share with municipalities and a discussion of potential risks and mitigation with participating municipalities.

# 2 Methodology

The following sections provide an overview of the three major tasks completed as part of this study which inform this final report.

## 2.1 Task 1 – Review of MIPC Study

Review of Waste Diversion Ontario's Municipal Industry Program Committee (MIPC) Study of the Optimization of the Blue Box Material Processing System in Ontario and relevant background documentation. MIPC commissioned a study of the optimization of the Blue Box Materials Processing System in Ontario, which was completed in 2012<sup>1</sup>. The purpose of the study was to explore what an optimized blue box materials processing system would look like, utilization of more transfer stations and regional MRFs to minimize transportation logistics, and to develop a tool for municipalities to make better informed decisions on infrastructure investments<sup>2</sup>. HDR conducted a review of the Study to identify the proposed role of the existing Kingston MRF in a regional setting, changes since completion of the study, a comparison of assumptions

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<sup>1</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>2</sup> Presentation of Findings, July 2010. <http://cif.wdo.ca/pdf/presentations/MIPC-BB-Opt-Study-July25-2012.pdf>

used in the Study, limitations of the Study, and the impact of local considerations. The results of the review were documented in Technical Memorandum #1, attached to this report in **Appendix A**. Further details on this study can be found in Section 3.

## 2.2 Task 2 – Technical Plan and Business Case

HDR conducted an extensive review of the existing MRF, including the building and equipment condition to assess the extent of any modifications and/or upgrades required to the existing MRF to enable it to manage additional material (See Section 4.2.2, 4.2.3 and 5.1.1). Process layouts and site plans were developed for alternate configurations of the MRF for the different operating options as a potential regional facility (see Section 5.1.2 to Section 5.1.6). Estimates of capital and operating costs for Single and Dual Stream facilities with an annual processing capacity of either 15,000 or 25,000 tonnes were developed (See Section 6.4 to Section 6.6).

Technical Memorandum #2 includes a review of the existing Kingston MRF, a summary of the municipal engagement process, and the Technical Plan and Business Case. This report is attached in **Appendix B** and forms the body of this final report and recommendations.

## 2.3 Task 3 - Municipal Data Collection, Interest and Engagement

A critical part of the development of a regional MRF in Eastern Ontario is consideration of the perspectives of other municipalities. An understanding of the potential for participation in a regional MRF by Eastern Ontario municipalities is important to the City to inform the decision making process regarding the viability of a regional MRF. HDR, in collaboration with the City and CIF, developed a questionnaire to gauge interest in participation in a Regional MRF from 67 municipalities located in Eastern Ontario. The results were documented in Technical Memorandum #3, attached to this report in **Appendix C**. Further details on the outcome of this task can be found in Section 6.2.

## 2.4 Task 4 – Final Report

This final report consolidates all the technical memoranda described above and summarizes the key findings of the work-to-date. Additionally, recommendations are provided on collection and processing systems, municipal engagement, and next steps.

The document is organized as follows:

- Review of the MIPC Study (Section 3)
- Description of Baseline System and Existing MRF, including the assessment of the MRF building and equipment (Section 4)
- Descriptions of MRF Scenarios (Section 5.1)
- Collection Cost Savings and Collection Approach (Section 6.1)
- Summary of Initial Municipal Interest (Section 6.2)
- Description of Transfer Haul Cost Analysis (Section 6.3)
- Costing for existing MRF modifications (Section 6.4)

- Replacement MRF Costs (Section 6.5)
- Recommendations on Processing Approach (Section 7.2)
- Monitoring/Measuring Metrics for Future Comparison (Section 8)
- Key Messages for Municipalities (Section 9)
- Discussion of potential risks and mitigation with participating municipalities (Section 10)

### 3 Review of MIPC Study

To demonstrate their commitment to improving the Blue Box program in Ontario on a systemic level, MIPC commissioned a study of the optimization of the Blue Box Materials Processing System in Ontario, which was completed in 2012<sup>3</sup>. The purpose of the study was to explore what an optimized blue box materials processing system would look like, utilization of more transfer stations and regional MRFs to minimize transportation logistics, and to develop a tool for municipalities to make better informed decisions on infrastructure investments<sup>4</sup>.

The MIPC study required the project team to develop a Geographic Information System (GIS) model that would reflect a cost-effective, efficient and successful recovery system for packaging and printed paper in Ontario, and one that would inform the decision making towards an optimized provincial system for the transfer, hauling and sorting of Blue Box materials for market<sup>5</sup>. The model optimized a system of new “greenfield” MRFs and Transfer Stations to handle a standard group of recyclable materials. The model was then compared to the existing Ontario MRF and transfer station infrastructure and conditions in order to identify gaps, and then used to develop optimized solutions for the various regions, each municipal facility and each community in Ontario.<sup>6</sup>

The modelling was segmented into four separate geographic regions and a map was developed for each region to depict the known material flow and existing public and private processing and transfer facilities handling municipal Blue Box material within Ontario<sup>7</sup>. The four Regions included:

1. Eastern Ontario;
2. Central Ontario and Greater Toronto Area (GTA);

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<sup>3</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>4</sup> Presentation of Findings, July 2010. <http://cif.wdo.ca/pdf/presentations/MIPC-BB-Opt-Study-July25-2012.pdf>

<sup>5</sup> Methodology and Model, June, 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol2.pdf>

<sup>6</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>7</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

3. Southwestern Ontario; and,
4. Northern Ontario.

The results were presented in a report for each region and included maps showing the existing infrastructure and flow of material, as well as the potential MRF and transfer stations options. Tables were also included in the results for each region summarizing each option<sup>8</sup>. The tables included the following information:

- number of facilities;
- required conversions of existing MRFs to transfer stations and upgrades to existing MRFs and transfer stations;
- total annual capital and operating cost of the option;
- investments in new facilities and conversions; and,
- relative effect on direct haul among options.

HDR conducted a review of the Eastern Ontario report; the findings are presented in Technical Memo #1 found in Appendix A. HDR assessed the changes that have taken place at the City's MRF and in Eastern Ontario since the completion of the study in 2012. There have been a number of changes to the operation of the MRF, tonnage managed and processing infrastructure in Eastern Ontario. HDR also reviewed the assumptions made in the MIPC study and some limitations to the MIPC study concerning the Kingston MRF. The results of the review can be found in Technical Memo #1, located in **Appendix A**, and were used to inform the rest of the regional MRF study.

## 4 City of Kingston Baseline System and MRF

The following sections provide an overview of the City of Kingston's curbside and depot recycling program, composition of recyclables managed at the MRF, a review of the existing MRF including an assessment of the building and equipment condition, and recycling program financial information. Further details can be found in **Appendix B**.

### 4.1 Curbside and Depot Recycling Program

The City of Kingston provides collection service to 45,399 single family households and 8,519 multi-family households<sup>9</sup>. Single family recyclables are collected in four streams using 64L blue and grey boxes for containers and fibres respectively which are collected on alternate weeks (one week blue boxes, one week grey boxes). Residents sort their containers into the blue box, fibres into the grey box and old corrugated cardboard (OCC) is bundled separately. Collection crews remove glass from the blue box at the curb and keep it separate from the rest of the recyclables.

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<sup>8</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>9</sup> Waste Diversion Ontario (WDO) Municipal Datacall 2013

Multi-family buildings use a combination of 360L carts and blue boxes for the collection of recyclables. Separate carts are provided for the collection of fibres, containers, and glass containers. Smaller buildings use blue boxes for glass.

Recyclables are collected by both Progressive/BFI<sup>10</sup> and the City of Kingston; the City only collects in the downtown core and inner city area. Materials are brought to the Kingston Area Recycling Centre (KARC), where the City of Kingston's MRF is located and either sorted in the MRF or baled (e.g. OCC). KARC is located at 196 Lappan's Lane in Kingston and is open to the public from Monday to Friday from 8 am to 5 pm and Saturdays from 8 am to 4 pm. Residents can also drop off recyclable materials directly at KARC as well as yard waste, Christmas trees, household hazardous waste, batteries and printer cartridges.

The following recyclable materials are collected (drop-off depot style) in tipping bins at the KARC; OCC, styrofoam, glass, fibres, and containers. Fibres and containers are processed in the MRF; other source separated materials are tipped directly in bunkers and baled. It is important to note that the KARC also processes recyclables from outside the City of Kingston, that being South Frontenac and Loyalist Township.

The Industrial, Commercial and Institutional (IC&I) sector can also drop off recyclables at the KARC, however, curbside collection service is not provided by the City of Kingston to this sector.

The following materials are currently acceptable in the City of Kingston's recycling program:

Blue Box

- plastic food and beverage containers
- styrofoam
- aluminum and steel cans
- glass food and beverage bottles and jars

Grey Box

- paper products
- newspapers
- boxboard
- milk & juice cartons
- juice boxes
- coffee cups
- plastic bags
- film plastic

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<sup>10</sup> Note: BFI is now operating as Progressive Waste Solutions, Inc.

#### Cardboard

- collected on grey box week
- flattened and bound or loose in the box

## 4.2 Existing City of Kingston MRF

The recyclables collected through the City of Kingston's recycling program and from other generator sources are taken to the City of Kingston's existing MRF for processing. This section provides an overview of the existing MRF operation and condition in order to provide a baseline for the comparison of future alternatives relative to the development of a regional MRF in Kingston.

### 4.2.1 Overview of Processing Operations/Methodology

The City of Kingston's MRF is located at the Kingston Area Recycling Centre (KARC) site at 196 Lappan's Lane. The MRF is located approximately in the centre of the site, accessed through the northeast entrance from Lappan's Lane. Within the KARC boundaries, there is parking for employees, an HHW depot, glass bunker, public drop-off area and a weigh scale. The entire site has an area of 16,317 m<sup>2</sup>. The existing KARC layout is presented in Figure 2-2 in Technical Memo #2.

The MRF has undergone a series of expansions over the years. The original 1,161 m<sup>2</sup> (12,500 ft<sup>2</sup>) MRF was constructed in 1989. In 1995, the MRF was expanded with an addition to the plant area of approximately 650 m<sup>2</sup> (7,000 ft<sup>2</sup>) and an additional 185 m<sup>2</sup> (2,000 ft<sup>2</sup>) of administration area. In 2008, another expansion was undertaken, with the tipping floor increased by 278 m<sup>2</sup> (3,000 ft<sup>2</sup>) and the storage area increased by 348 m<sup>2</sup> (3,750 ft<sup>2</sup>), bringing the total building area of the MRF to 2,678 m<sup>2</sup> (28,830 ft<sup>2</sup>). As per Certificate of Approval A380107 (originally issued on September 20, 1989), the storage capacity of the site is a maximum of 450 tonnes at any one time.

The MRF is owned by the City of Kingston and is currently operated by Progressive/BFI under a three year processing contract with an optional one year extension, effective September 28, 2014.<sup>11</sup> The MRF is a two stream facility (containers and fibres) which processes material from the City of Kingston, Loyalist Township and South Frontenac.

Collection vehicles arrive at the KARC and access the MRF building to unload recyclables onto the appropriate area of the tipping floor, depending on material type. Glass is sorted at the curbside and is tipped outside the MRF building and stored in a bunker.

The MRF utilizes what is referred to as a "modified" Dual Stream processing system (i.e. fibre materials and containers are sorted separately) that sorts and processes recyclable materials to be sold for further processing. The collected glass containers are

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<sup>11</sup> City of Kingston, Report to Council, April 15, 2014, Award of Contract – Supply of Operations Services for the City of Kingston Material Recovery Facility (Report No. 14-133)

stored in an outside bunker, cleaned of contaminants, and shipped when sufficient quantities have been received. The MRF also manages cardboard (OCC) separated at the curb and also delivered loose by the IC&I sector.

The MRF processed 10,995 tonnes of material in 2014, comprised of 1,805 tonnes of containers, 8,372 tonnes of fibre, 804 tonnes of glass, and 14 tonnes of scrap metal. The material received at the Kingston MRF was generated within the City of Kingston (curbside and drop-off), surrounding municipalities (Loyalist Township and South Frontenac) and the IC&I sector.

The MRF is typically<sup>12</sup> operated with 11 full time equivalent (FTE) staff per shift. Each shift is staffed by four sorters on the fibres line, four sorters on the containers line, two floor operators and one lead hand. The MRF operates with two eight-hour shifts from Monday to Thursday (first shift 6:00 am to 2:00 pm, second shift from 3:00 pm to 11:00 pm) and one eight-hour shift on Fridays (6:00 am to 2:00 pm). Each eight-hour shift includes seven hours of operation, a 30 minute lunch break and two 15 minute breaks.

The MRF's throughput is based on the number of annual operating hours and tonnes processed as follows:

- The MRF runs for 63 hours of operational time per week (14 hours of operating time per day for 4 days from Monday to Thursday and 7 hours of operating time for one day on Friday);
- The MRF operates 52 weeks per year (stat holidays are made up on the following Saturday);
- Total operational time is 3,276 hours per year (63 hours/week x 52 weeks/year);
- Fibre throughput (based on the 2014 tonnes) is 2.55 tonnes per hour (8,372 tonnes/3,276 hours per year);
- Container throughput (based on the 2014 tonnes) is 0.55 tonnes per hour (1,805 tonnes/3,276 hours per year);
- Glass throughput (based on the 2014 tonnes) is 0.25 tonnes per hour (804 tonnes/3,276 hours per year); and,
- Total throughput is 3.35 tonnes per hour (2.55 + 0.55 + 0.25 tonnes per hour).

#### **4.2.2 Existing MRF Building Condition Assessment**

An assessment of the existing MRF building was undertaken to confirm the condition of the building for its ongoing and future use. The potential redevelopment of the facility as a regional MRF may require modifications to the building to accommodate increased tonnages. The purpose of the assessment was to establish the physical condition of the building and the ability to expand, if necessary, at the current location. In general, the overall building envelope appeared to be in good general condition. Specific

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<sup>12</sup> Seasonal variations in waste quantities can result in changes to overall staff complement depending on the time of year.

observations and deficiencies observed during the building assessment by HDR can be found in Section 2.2.2 in Technical Memo #2.

#### **4.2.3 Existing MRF Equipment Condition Assessment**

As part of the City of Kingston's regional MRF Study, an assessment of the condition of all processing equipment within the existing MRF was completed. The purpose of the assessment was to determine the condition of the process equipment and estimate the useful life remaining of the various components.

Based on observations made during the field work, it was determined that the existing MRF processing equipment is in reasonably good working order and the maintenance department is making the necessary repairs to equipment when required.

If the equipment continues to be well maintained and kept reasonably clean, it should be able to operate for another 5 to 7 years. It must be understood that there will be consumable components requiring replacement throughout the operating life of the equipment such as conveyor belts, bearings and shafts, wear liners and other miscellaneous parts. Full details of the equipment condition assessment can be found in Section 2.2.3 of Technical Memo #2.

## **5 Technical Plan**

The following sections provide an overview of the potential scenarios for a modified MRF located at the existing site. For each scenario at the existing MRF, a discussion of the proposed modifications, layout and potential issues with the configuration are presented. Based on HDR's assessment of the existing MRF building and existing site layout, there are a number of issues with various aspects of reconfiguring or expanding the existing MRF that need to be considered which are discussed in this section. The alternative of replacing the existing MRF on adjacent City owned land is discussed in the Business case section of this report.

### **5.1 Potential Future City of Kingston MRF Scenarios**

The City of Kingston identified the potential opportunity to modify and reconfigure the existing MRF equipment and building, or develop a new "greenfield" MRF in order to manage blue box recyclables on a regional scale at 15,000 tpy, 20,000 tpy or 25,000 tpy.

Given the size of the processing scenarios, there is very little practical difference in the design for the range of throughputs. As a result, the study team modified the approach so that the analysis was focused on the lower and upper ends of the range, with variations in the processing approach to provide a reasonable comparison (i.e. analysis of 15,000 tpy and 25,000 tpy only). Based on the range of tonnages potentially available for processing at a regional MRF identified through the municipal engagement process, this range is also appropriate.

The potential for a new “greenfield” location for a regional MRF was discussed with the City during the project kick-off meeting. Although the focus of this analysis is on the potential redevelopment of the existing Kingston MRF; for comparison purposes, costs for a replacement MRF were developed, with the assumption it would be located on the adjacent City-owned land (i.e. immediately north) which is currently utilized for other waste management related functions.

Four options were considered for providing the required services at the existing MRF:

- a 15,000 tpy Dual Stream MRF;
- a 15,000 tpy Single Stream MRF;
- a 25,000 tpy Dual Stream MRF; and,
- a 25,000 tpy Single Stream MRF.

For the replacement MRF options; three options were considered:

- a 15,000 tpy Single Stream MRF;
- a 25,000 tpy Dual Stream MRF; and,
- a 25,000 tpy Single Stream MRF.

More detailed modelling and costing was developed for the larger Dual Stream MRF and the two Single Stream MRF options. A description of the building and processing concept for each option is presented below regarding operation, design, labour, financing, and other variable operating costs.

#### **5.1.1 Issues with Reconfiguring and/or Expanding the Current Kingston MRF**

The current building envelope only has the capacity to support a 15,000 tpy Dual Stream operation. In order to achieve increased throughput and/or convert the facility to a Single Stream system or a larger Dual Stream system, the building footprint will need to be expanded and the site layout will have to be reconfigured. A plan view site plan depicting the proposed additions to the existing MRF has been included as Figure 6-1.

The proposed modifications include:

- Increasing the building footprint to the south to increase the tipping floor area to accommodate the increased throughput;
- Increasing the building footprint to the north and west to allow for an additional bale storage area and room for the new processing arrangements;
- Relocating the Household Hazardous Waste (HHW) and public drop-off areas to the north side of Lappan's Lane;
- Installing a new inbound scale on Lappan's Lane and a new entrance to the MRF at the northwest corner of the site; and,
- Repurposing the existing scale to be an outbound scale only.

Potential issues with the Building:

- In the event the existing processing lines need to be modified to support increased material throughput, the height of the original building will have to be considered. The original building roof (as is true for the expanded portions) is an A-frame design and the highest point is at the center. The existing sorting lines are positioned in the center of the building where the roof is at its apex, and in its existing configuration there is minimal clearance between the roof of the sorting lines and the roof of the building. Any modifications to the sorting lines, particularly related to converting the facility to a Single Stream operation, will have to take into account the limited building height.
- The roofline of the existing facility slopes east and west. To maintain the existing drainage pattern and not to add an additional load to the existing roof, the addition would need to have a high point that matches the low point of the existing roof. This will reduce the available clear height in the addition which may impact operations.
- The higher roofline of the new addition may require a reinforcement of the adjacent existing 2008 roof to account for increased snow loads. Assuming the 2008 addition is compliant with the 2006 Building Code; the need to reinforce the roof will not likely trigger any additional seismic requirements.
- In addition to the limited building height, a series of columns are located at the interface between the original building and the 1995 addition. The existing layout incorporates the columns within the sorting rooms. These columns will have to be taken into account in the new Single Stream layout.
- As part of any additions to the existing building, the fire protection and natural gas piping systems will need to be expanded and reconfigured. However, the fire protection, natural gas, and service water mains enter the building on the northeast side so these mains will not need to be relocated.
- A significant rework of the MRF may be classified as a major renovation under the Ontario Building Code and may trigger a number of additional code requirements not applicable during the initial construction or subsequent additions to the MRF. These code requirements may potentially include, amongst others, structural seismic upgrades for the structures of the original building and additions prior to 2006, and ventilation upgrades to the ventilation system with gas monitoring to satisfy the Occupational Health and Safety Act requirements. HDR has not included costing for this type of work as it may be subject to specific City regulations and by-laws and would require further investigation.

### Issues with the Tipping Floor:

- The proposed expansion of the tipping floor area to the south will be similar to previous additions with the south wall removed and the existing overhead doors relocated to the new south wall. Expanding the area of the tipping floor is key to increasing the throughput capacity of the facility.
- During the existing facility assessment, it was observed that the current height of the tipping bay doors is not high enough to allow for the curbside collection trucks to fully tilt the box of the truck in order to unload material. This constraint requires the drivers to extend the truck box to approximately 75% and drive forwards and backwards, and applying the brakes in order to propel the material out of the truck. This constraint may cause restrictions on the type of trailer that can access the MRF; should municipalities choose to ship materials to Kingston's MRF using transfer trailers, it may be necessary to utilize walking floor trailers so that material can be unloaded more efficiently.
- The new structure should be designed with a higher roofline and larger roll up doors to increase the efficiency of unloading operations, streamline the truck movements and reduce the amount of damage to the structure caused by insufficient clearances. This is especially important given the proximity of the proposed addition to the southern property line which will create a tighter maneuvering space for trucks backing into the building to access the tipping floor.
- The study team estimated the square footage of the current floor based on the WDO MRF Capacity and Capability Assessment report<sup>13</sup> which stated that the MRF has approximately 1.5 days of available storage at 11,642 tpy. Estimates for the tipping floor for the various Dual and Single Stream MRF options were based on that information and the density of recyclables used to develop the MRF layouts. Table 5-1 shows the approximate available tipping floor space for each option and the storage that this represents. See the proposed layouts for each option in Section 3 of Technical Memo #2, noting the impact of the configuration of conveyors and sorting lines on the available area for the tipping floor. The storage required for each option was calculated using the approximate density of each material received, assuming that material is piled an average of 2m high on the tipping floor. Please see Appendix D of Technical Memo #2 for the calculations associated with the tipping floor area.

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<sup>13</sup> MRF Capacity and Capability Assessment Report, AECOM, 2011, on behalf of Waste Diversion Ontario

**Table 5-1: Tipping Floor Area and Storage Capacity**

Option	Tipping Floor Available (m <sup>2</sup> )	Days of Storage
15,000 Dual Stream	441	1.43
15,000 Single Stream	501	1.74
25,000 Dual Stream	441	0.86
25,000 Single Stream	501	1.04

Most of the options shown at the MRF, even with building expansion, fall short of the 2 day tipping floor storage requirement. The 2 day storage requirement is best practice for MRF design, to allow for unplanned equipment breakdowns and stoppages and peak receiving capacities during heavy collection periods. Table 5-1 shows storage capacity based on using all available storage area for each design. For designs with 0.86 day's storage, any delays beyond 1 day will require that material be stored somewhere other than on the MRF tipping floor (i.e. there is additional risk with this design).

#### Issues with the Loading Dock Area and Grading:

- The proposed additions will also require a significant rework of the surrounding grades to the west of the facility for: the enlarged bale storage area; the existing loading docks to be eliminated; and the depression area filled and compacted to support the addition.
- The loading docks will be relocated further south to accommodate the expanded footprint to the west. There is an approximate 1.2 metre (4 feet) drop from the west wall of the building to the ground elevation where the existing loading docks are located. A significant amount of engineered fill will be required to bring the elevation of the existing loading docks up to the existing floor grade.
- Further south of the proposed addition, the area adjacent to the 2008 addition will need to be excavated to create new loading docks. In addition, the relocated docks will require the area adjacent to the 1995 addition to be excavated to a depth of approximately 1.2 m. Care should be exercised in determining the extent of excavation to ensure the 1995 foundations maintain the appropriate depth of ground cover to minimize the potential of frost damage.
- The truck traffic will need to be maintained at the same elevation as the loading area to maintain a safer approach to the loading docks, meaning the circulation path will need to rise approximately 1.2m once past the loading dock to meet the new tipping floor at grade, otherwise this will create an uneven maneuvering area adjacent to the tipping floor.

### **5.1.2 Optimization of Current MRF Operations**

An assessment of the current MRF operations was completed to identify potential opportunities for optimizing the recyclables processing and maximizing the existing facility capacity. The visual assessment was completed as part of site visits to the MRF by team members from Entec Consulting, HDR, and Marshall Industrial. Some areas where MRF operational efficiencies could be realized include:

- The loader operator on the tipping floor is responsible for loading both the fibre and containers processing lines, stockpiling material as it is off-loaded from delivery vehicles, periodically storing “clean” OCC in the designated bunker as it is received, and loading material onto the baler feed conveyor from the sort line bunkers when required. As a result, material flow to both the container and fibre line is uneven, resulting in material surges and relatively low flow on the sorting lines. Sorting on these lines is hampered by these ebbs and flows.
- Baling productivity is not as high as it could be. The operator of the forklift is also the baler operator. For extended periods of time during visits to the MRF, no material was being baled, despite several bunkers being full.
- When aluminum is baled, two staff remove non-aluminum material from the cans on the baler feed conveyor. This is an inefficient sorting technique and during this time, the baler is sitting idle.

Some of the recommended adjustments to the current MRF operations in order to improve efficiencies include:

- Having the loader operator dedicated to servicing only the tipping floor;
- Using a second skid steer loader to clear the fibre bunkers and to load “clean” OCC as needed;
- The second operator should also be responsible for stockpiling and loading bales into trailers and operating the skid steer loader as needed;
- Having an additional dedicated baler operator; and,
- Ensuring that the lead hand provides more direct supervision of the entire processing operation.

In the study team’s opinion, these operational improvements would maximize processing efficiency in the existing MRF.

### **5.1.3 15,000 tpy Dual Stream MRF**

The existing Kingston MRF essentially operates as a Dual Stream MRF except that it does not currently process glass containers. With the improvements mentioned in the previous section (i.e. the addition of a skid steer loader, a dedicated baler operator and recommended staff responsibilities) and the addition of the ability to process glass containers, the existing Kingston MRF would be classified as a true 15,000 tpy Dual

Stream MRF. The MRF in its present state can be modified to accommodate glass through the Dual Stream processing system.

Equipment modifications required on the container processing line, as shown in Section 3.1.3 in Technical Memo #2, are as follows:

- In order to accept and process glass as part of the container stream, a glass breaker and removal system will need to be installed at the beginning of the line, prior to the overhead magnet. Glass that is broken and falls through the screen will then be conveyed out the west side of the building and loaded directly into a roll-off.
- To accommodate the glass breaker, the eddy current (EC) and aluminum storage bunker will need to be reconfigured. A new aluminum storage cage would be positioned directly above the baler feed conveyor. Repositioning the EC would allow a quality control (QC) sorting conveyor to be located prior to a pneumatic blowing system to move the aluminum into the storage cage, allowing for the safe removal of contaminants from the aluminum.

#### **5.1.4 15,000 tpy Single Stream MRF**

The existing processing line cannot be modified to meet the needs of Single Stream processing. Several equipment configuration options were reviewed to accommodate the requirements for a 15,000 tpy Single Stream processing system within the existing MRF building footprint. While the processing line could be physically positioned within the existing building, the identified options were not deemed viable, due to:

- Insufficient tipping floor capacity;
- Insufficient product storage capacity;
- Poor access for the direct loading of OCC to the baler feed conveyor; and,
- Lack of room to maneuver loaders and forklifts between the tipping floor, baled storage area and trailer loading docks.

As a result, a number of processing and building layouts were considered which involve an expansion of the existing building footprint. Complete details of the layout and processing system can be found in Section 3.1.4 of Technical Memo #2.

In this design:

- The existing building would be extended:
  - a) approximately 9.14m (30') to the south to provide an enlarged tipping floor;
  - b) at the north-west corner to provide additional bale storage; and,
  - c) south of the previous building expansion for additional bale storage in the area of the existing loading docks, in order to provide for additional bale storage and to reconfigure the loading docks.

- The existing loading docks would be reconfigured to better fit the proposed flow of traffic around the MRF.
- The existing space which currently comprises maintenance staff office, the scale house, the janitor's closet, staff washrooms, a kitchen, and an electrical room would be relocated to an area west of the City of Kingston's office space, to provide space for the possible addition of future optical sorting equipment on the container line.

### **5.1.5 25,000 tpy Dual Stream MRF**

The 25,000 tpy Dual Stream processing system can be positioned into the same expanded building footprint required for the Single Stream processing options; however, there are some design limitations, largely related to on-site east and west space constraints that may limit certain MRF operations, including:

- The tipping floors for incoming fibre and containers are completely isolated from the bale storage area. While this is not a problem in itself, it does not provide the flexibility that would otherwise be there if access were possible.
- Access to the baler feed conveyor for clean loads of IC&I OCC through the truck door on the north side of the building is very much restricted.
- There is only room for two presort bunkers on both the fibre and container lines.

The existing MRF will require the same building modifications as those described in Section 5.1.4. Complete details of the layout and processing system can be found in Section 3.1.5 of Technical Memo #2.

### **5.1.6 25,000 tpy Single Stream MRF**

The MRF size and general layout of the 25,000 tpy Single Stream option is basically the same as for the 15,000 tpy Single Stream option. The exception is that to provide the increased processing capacity, the system needs to be more mechanically sophisticated. The existing MRF will require the same building modifications as those described in Section 5.1.4. Complete details of the layout and processing system can be found in Section 3.1.6 of Technical Memo #2.

### **5.1.7 Modifications to the Existing KARC Site Layout**

For all of the scenarios, except the 15,000 tpy Dual Stream scenario, the following modifications to the existing site will be required to accommodate additional vehicles and the building expansion:

- A new weigh scale and scalehouse would be installed on Lappan's Lane, immediately north of the MRF to serve the MRF and the compost site;
- A new entrance to the MRF would be located at the north-west corner of the property (currently employee parking area);

- A new access road would be constructed through the existing parkette, employee parking area and glass bunker area, located as close as possible to the western-most edge of the property;
- Traffic flow on the site would be in a counter-clockwise direction around the MRF;
- All outbound vehicles would weigh out at the existing MRF scale;
- The existing HHW Depot and public drop-off area will be relocated north of Lappan's Lane; and,
- Employee parking will need to be relocated.

See Figure 6-1 for the new proposed site layout. The modifications will provide a more efficient movement of collection and transfer vehicles. Access to the site by the public will be restricted with the relocation of the HHW depot and drop-off sites which is an important safety consideration with added traffic and potentially larger vehicles.

## 6 Initial Business Case

The following provides an overview of the initial business case, based on the available options for Kingston's recyclables collection system, some of the key factors which would make a regional MRF feasible including municipal interest and transportation costs, and Single and Dual Stream processing options for the existing MRF and a replacement MRF.

The City has the option of maintaining their status quo collection system, moving to a true Dual Stream recycling (collection and processing) program or to a Single Stream collection program. As the City generates the majority of recyclables processed at the MRF, this decision goes hand-in-hand with the decision about whether the MRF remains Dual Stream or is converted to a Single Stream MRF. A discussion about Dual Stream vs Single Stream collection is presented in Section 6.1.

A survey of Eastern Ontario municipalities was undertaken to gauge interest in a regional MRF. A discussion of the results of the survey and the potential tonnages available for processing are presented in Section 6.2.

One of the most significant factors for municipalities considering sending their recyclable material to a regional MRF is transportation costs. A discussion of these costs is presented in Section 6.3.

The costs associated with the following options for the MRF are presented in Sections 6.4 and 6.5.

- maintain the status quo for the existing MRF;
- upgrade the existing MRF to a true Dual Stream MRF with a processing capacity of either 15,000 tonnes per year or 25,000 tonnes per year;

- upgrade the existing MRF to a Single Stream MRF with a processing capacity of either 15,000 tonnes per year or 25,000 tonnes per year; and,
- replacement of the existing MRF with a new MRF with a processing capacity of either 15,000 tonnes per year Single Stream or 25,000 tonnes per year (either Single or Dual Stream) on a new site.

## 6.1 Collection Cost Savings

As part of the regional MRF assessment, the City also investigated the advantages and disadvantages of moving to a Single Stream collection program. HDR used 2013 WDO Datacall information, the most recent year for which a full dataset was available, to compare Kingston's performance for a number of metrics to other selected larger municipalities in Ontario in the same and other municipal groupings and other Eastern Ontario municipalities with Dual and Single Stream programs.

Table 6-1 presents a summary of the key metrics from the 2013 WDO Datacall information for select Ontario municipalities compared to the City of Kingston. The results can be summarized as follows:

- Kingston recovers more material on a per household basis than the average for the selected municipalities using Dual Stream programs and others in the Rural Regional grouping, but less than the average for the selected municipalities using Single Stream programs.
- Kingston's gross cost per tonne is higher than the average for both the selected Single Stream and Dual Stream programs, but less than the average for other municipalities in the Rural Regional grouping.
- Kingston's gross revenue per tonne is higher than the average for the selected Single and Dual Stream programs and other municipalities in the Rural Regional grouping.
- Overall, Kingston's net costs per tonne are equivalent to the average for selected Single Stream program costs, higher than the average for selected Dual Stream programs, but less than the average for other municipalities in the Rural Regional grouping.
- Kingston's collection costs are less than the average for Single Stream and Dual Stream programs in Eastern Ontario.

**Table 6-1: Summary of Metrics for Single Stream and Dual Stream Programs, Rural Regional Municipalities and Kingston**

	Kingston	Selected Single Stream Programs		Selected Dual Stream Programs		Rural Regional	
		Average	Range	Average	Range	Average	Range
Kg/hhld	<b>175</b>	180	(101-245)	167	(94-248)	150	(94-196)
Gross Cost/tonne	<b>\$417</b>	\$395	(\$219-\$514)	\$347	(\$149-\$593)	\$424	(\$261-\$593)
Gross Revenue / tonne <sup>1</sup>	<b>\$122</b>	\$98	(\$27-\$136)	\$111	(\$38-\$156)	\$107	(\$44-\$156)
Net Cost/tonne	<b>\$296</b>	\$296	(\$147-\$415)	\$250	(\$117-\$520)	\$324	(\$158-\$520)

<sup>1</sup> Excluding those municipalities who reported no revenue

HDR also reviewed a report<sup>14</sup> authored by HDR for CIF which examined a number of published reports, studies and Datacall information (predominantly from large urban municipalities), to attempt to assess whether Single or Dual Stream recycling offers better performance. The HDR report did not conclude definitively that one system is better than the other. The report indicated that there are a number of best practices that can be applied to either system to improve capture rates, participation, diversion and to control program costs.

It appears that while Single Stream programs, on average, recover more material on a per household basis, they are overall more expensive to operate than Dual Stream programs and generate less revenue resulting in overall higher net costs on a per tonne basis. On average, Kingston's existing collection program operates quite efficiently compared to other municipalities in the same municipal groupings with higher recovery and revenue and lower costs.

There does not appear to be any conclusive evidence that indicates Kingston should move to a Single Stream recycling program. It appears that Dual Stream programs are less expensive overall. While Kingston's metrics compare favourably compared to other Dual Stream programs, there may be opportunities to reduce costs should glass not be collected in a separate stream.

## 6.2 Summary of Initial Municipal Interest

An understanding of the potential for participation in a regional MRF by Eastern Ontario municipalities is important to the City to inform the decision making process regarding the viability of a regional MRF. The current and future tonnes processed at the existing

<sup>14</sup> HDR for CIF, An Assessment of Single and Dual Stream Recycling, Including Current Program Performance in Large Ontario Municipalities, 2012, updated in March 2013.

MRF from Kingston, Loyalist Township and South Frontenac will not be sufficient to support an expanded MRF; additional tonnages from other municipalities in Eastern Ontario are required.

Table 6-2 presents the potential tonnage available based on the 2013 WDO Datacall information. Based on questionnaire results, it appears that there could be approximately 22,600 tonnes of recyclable material available for processing at a regional MRF. This material is potentially available from the City of Kingston itself and those municipalities that indicated they were interested in utilizing a regional MRF in Kingston (not including the City of Ottawa or Quinte Waste Services who indicated interest, but likely for information only<sup>15</sup>). There are an additional 14,200 tonnes which could potentially be available from those municipalities whose interest is unknown or tentative at this time.

**Table 6-2: Summary of Tonnages Potentially Available by Responses**

<b>Questionnaire Response</b>	<b>Tonnes</b>
Municipalities Indicating "Interested"	13,492
City of Kingston only	9,114
<b>Subtotal - Interested</b>	<b>22,606</b>
Interest unknown	13,046
Municipalities Indicating "Maybe Interested"	1,169
<b>Subtotal – Maybe Interested</b>	<b>14,215</b>
City of Ottawa	62,866
Quinte Waste Services	10,202
Municipalities Indicating "Not interested"	15,687
<b>Subtotal – Not Interested/Unavailable</b>	<b>88,755</b>
<b>Total Tonnage in Eastern Ontario</b>	<b>125,576</b>

Another important consideration for municipalities is hauling distance to a processing facility. The Eastern Ontario wasteshed covers a large geographic area and haul costs to Kingston could be significant. Google Maps was used to provide an estimate of the distance from each of the municipalities to Kingston. The following Table 6-3 provides a breakdown of the responses from municipalities (based on responses to the questionnaire and follow-up) according to the estimated distance of each municipality from Kingston. The distance from Kingston would represent one-way hauling of recyclables to the MRF. Note that the tonnages from the City of Kingston have not been included in the following table.

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<sup>15</sup> The Mohawks of Akwesasne did not have any datacall information available and were excluded from the totals.

**Table 6-3: Summary of Tonnages Available by Distance from Kingston**

Distance from Kingston (km)	Response from Municipalities (tonnes, number of responses)				
	Yes	Maybe	Unknown	No	Total
<50 km	3,202 (4)	753 (1)	406 (1)		<b>4,361 (6)</b>
50-100 km	14,881 (9)		981 (5)	641 (1)	<b>16,503 (15)</b>
100-150 km	2,799 (5)		2,432 (5)	6,971 (5)	<b>12,202 (15)</b>
>150 km	65,677 (5)	415 (1)	9,227 (12)	8,076 (11)	<b>83,395 (29)</b>
<b>Total number of tonnes/responses</b>	<b>86,560 (23)</b>	<b>1,168 (2)</b>	<b>13,046 (23)</b>	<b>15,688 (17)</b>	<b>116,461 (65)</b>

Note: totals may not add due to rounding,

Twenty-one municipalities are located within 100 kilometers of the City of Kingston, fifteen are located within 100 to 150 kilometers and another 29 are located more than 150 kilometers from Kingston with 18 of these located over 200 kilometers from Kingston. The information in this table was used to assist with estimating the potential tonnage available to the Kingston MRF since those municipalities located closer to Kingston, and therefore who would have lower haul costs, may be more interested in a regional MRF.

The information provided in the previous sections was based on the 2013 WDO Datacall. Table 6-4 presents high level estimates of the potential tonnages that could be available based on an assumed 1% annual increase in population. It is difficult to determine future quantities of waste due to uncertainties about what types of materials may be handled in the future with potential changes in composition, lightweighting and legislation (e.g. changes to the Waste Reduction Act with increased Extended Producer Responsibility). However, it appears that based on current composition, there could potentially be 25,000 to 29,000 tonnes of material available by 2030.

**Table 6-4: Projections of Potential Tonnage Available (2015 – 2030)**

Questionnaire Response	Tonnes of Recyclables			
	2015	2020	2025	2030
Municipalities Indicating "Interested"	13,763	14,465	15,203	15,979
Kingston	9,297	9,771	10,270	10,794
<b>Subtotal - Interested</b>	<b>23,060</b>	<b>24,237</b>	<b>25,473</b>	<b>26,772</b>
Interest unknown (<100 km)	1,415	1,487	1,563	1,643
Municipalities Indicating "Maybe Interested" (<100 km)	768	807	848	892
<b>Subtotal – Maybe Interested</b>	<b>2,183</b>	<b>2,294</b>	<b>2,411</b>	<b>2,534</b>
<b>Potentially Available</b>	<b>25,243</b>	<b>26,531</b>	<b>27,884</b>	<b>29,307</b>
Ottawa	64,130	67,401	70,839	74,452
Quinte Waste Services	10,407	10,938	11,496	12,082
Municipalities Indicating "Not interested"	16,002	16,819	17,677	18,578
Interest unknown (>100 km)	11,893	12,500	13,138	13,808
Municipalities Indicating "Maybe Interested" (>100 km)	423	445	468	491
<b>Subtotal – Not Interested/Unavailable</b>	<b>102,855</b>	<b>108,101</b>	<b>113,616</b>	<b>119,411</b>
<b>Total Tonnes in Eastern Ontario</b>	<b>128,100</b>	<b>134,634</b>	<b>141,502</b>	<b>148,720</b>

In general, the following conclusions can be made from this municipal engagement process:

- There appears to be interest in a regional MRF located in Kingston from several Eastern Ontario municipalities supporting up to a 23,000 tonnes per year MRF.
- Approximately one third of the municipalities in Eastern Ontario are located within 100 kilometres of Kingston, and 13 indicated they are interested in a regional MRF.
- The majority of municipalities (74%) in Eastern Ontario collect two or more streams of recycling.

### 6.3 Transfer Haul Cost Analyses for Potential Municipalities

Each municipality in Eastern Ontario has its own waste management system to meet the needs of their specific community and these systems vary from municipality to municipality. Collection modes vary from curbside collection, to local drop-off depots

(e.g. recycling collection using roll-off bins at the local landfill) to specific material collection/drop-off event days (e.g. for hazardous waste or waste electronics).

For recyclables, there are a variety of arrangements for transfer and/or processing:

- municipalities may transfer materials themselves to a MRF (direct haul or roll-off bins) from curbside collection or depots;
- private service providers may transfer materials to a MRF (roll-off bins) from depots; and,
- private service providers may be contracted to collect and process materials from the curb or depots.

Local waste management programs and systems are developed to balance community-specific needs and constraints, ultimately reflecting the service delivery choices (and limited options in some cases) and preferences of the residents. It is not the focus of this report to explore, analyze or suggest revisions to the local community-level waste management programs, other than to the extent of identifying possible optimizations which may be considered in the context of processing recyclables at a regional MRF.

The efficient movement of wastes relies on a number of factors, including:

- Identification of the waste source generation centres;
- Identification of the destination location (i.e. regional MRF);
- Analysis of available transport modes, including:
  - Direct haul
  - Highway transfer
- Identification of routes; and,
- Analysis of modes and routes to minimize transport energy consumption and costs.

Given the very large geographic area of Eastern Ontario and the wide distribution of waste generation, waste transport will have substantial influence on the feasibility of a regional MRF. Efficiencies of cost and fuel consumption can be achieved by consolidation of smaller loads of recyclables into larger vehicles for transporting longer distances. Curbside collection vehicles are purposely designed for local travel at low speeds, with frequent stops to allow operators to load many different small items of waste. Conversely, transfer vehicles and roll-off trucks/bins are designed to operate efficiently to move larger quantities of waste, longer distances at higher speeds, with few stops and less operator labour required.

Highway transfer trailers typically also require construction and operation of loading facilities to allow the smaller loads from depots and/or curbside packer trucks to be consolidated into larger loads. Many municipalities utilize roll-off bins for collection of materials at depots by residents in lieu of curbside collection. Bins may be directly hauled to a processor; it is unlikely that they would be emptied into a transfer trailer.

Decisions regarding use of curbside collection or drop-off depots are dependent on balancing many factors such as local population density and distribution, waste generation rates, costs, and customer expectations regarding service levels required. As mentioned previously, this analysis does not presume to have the information necessary to recommend local collection programs.

Potential transportation implications were assessed to identify costs for direct haul, transfer trailers or transfer using roll-off containers. Previous studies<sup>16</sup> estimated direct and transfer haul costs for single and Dual Stream loads on a cost per tonne-km and costs for transfer and roll-off trucks on an hourly cost basis. This estimates were applied the municipalities in Eastern Ontario to provide a high level indication of costs associated with transport/transfer of material to a regional MRF.

Full details on the estimates can be found in Section 4.3.1 of Technical Memo #2.

## 6.4 Costing for Existing Kingston MRF Modifications

Costs were developed for modifying the existing MRF to process 15,000 and 25,000 tonnes per year of Dual Stream recyclables and 15,000 and 25,000 tonnes per year of Single Stream recyclables based on the following assumptions presented in Table 6-5 below.

**Table 6-5: MRF Design Tonnage Assumptions**

Item	15,000 tonnes per year	25,000 tonnes per year
Days/year	260	260
Days/week	5	5
Shifts/day	2	2
Hrs/shift	8	8
Productive hours	14	14
Tonnes/day	58	96
Effective tonnes/hour	4.1	6.9
Design tonnes/hour	4.9	8.2

### 6.4.1 Assumptions for Cost Estimates for Building Expansion and Site Modifications

For all but the 15,000 tpy Dual Stream scenario, the existing structure and site will require modifications which were previously described in Section 5.1.1.

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<sup>16</sup> MIPC Study *Transfer Trailer and Roll-off Truck Haul Costs and Load Limits* (2012) and *Transfer of Blue Box Recyclable Materials: Factors Affecting Decision Making* (Genivar, 2009)

Costs for site works were included in the capital costs for all scenarios based on the proposed site layout presented in Figure 6-1 below, including;

- Removal of trees;
- New entrance to site;
- Grading of the area for the new building addition and road;
- New road asphalt and road structure;
- New curb and gutters;
- Relocation of existing culvert;
- Topsoil and sodding; and,
- Drainage system to drain the loading dock area.

This estimate is for work on the west side of the existing building, assuming no work needs to be done on the east side of the existing building.

### Figure 6-1: New Site Layout



In order to estimate the construction costs for the building expansion, HDR used the cost/square foot of the 2008 addition (\$133.33/sq.ft or \$1,435.15/sq. m), escalated by 4% per year for an estimated 2015 rate of \$175.46/sq. ft (\$1,887.95/sq.m). An allowance for design services has been included based on OAA guidelines for fees.

Proposed	Area	Cost
Area 1 (North of Bale Storage Area)	83.6 m <sup>2</sup> (900 ft <sup>2</sup> )	\$157,937
Area 2 (South of Bale Storage Area)	329.8 m <sup>2</sup> (3,550 ft <sup>2</sup> )	\$622,883
Area 3 (Tipping Floor)	278.7 m <sup>2</sup> (3,000 ft <sup>2</sup> )	\$526,380
<b>Subtotal</b>	<b>629.1 m<sup>2</sup> (7,450 ft<sup>2</sup>)</b>	<b>\$1,307,200</b>
Design Services		\$125,000
<b>Total</b>		<b>\$1,432,200</b>

\*Note – totals may not add due to rounding.

#### 6.4.2 Capital and Operating Cost Estimates to Modify Existing MRF

Costing information was primarily developed by Entec Consulting based on prior project experience, recent tenders and industry information. Annual capital costs were estimated assuming a 20 year depreciation term for the building and a 10 year period for all equipment, all at a 6% financing rate. Operating costs were estimated for labour and other variable operating costs.

The following assumptions were made to develop cost estimates:

- It was assumed that the 15,000 tpy Dual Stream MRF would have similar operating costs as the existing MRF with the exception of the addition of one baler operator.
- With improved efficiencies in the processing system (i.e. no aluminum sorting on the baler feed conveyor, improved operation of mobile equipment, the addition of an Eddy current separator etc.) and the addition of one more operator, the City's contracted MRF processor should be able to handle 15,000 tonnes per year with the same staff and operating hours as they do now for the current tonnage.
- Operating costs for the 15,000 Dual Stream MRF would be similar to the existing MRF except for some variable operating costs which were escalated by approximately 30% to reflect the increased costs associated with an increase in tonnage (from roughly 11,500 tpy to 15,000 tpy).
- For all the scenarios requiring expansions, new mobile equipment (e.g. loaders, skid steers etc.) would be required.

- Existing equipment was the property of the current operator and should the contract be retendered, replacement equipment may be required.
- Some new processing equipment would be required; however, as much of the existing processing equipment as possible would be utilized in the modified MRF scenarios.
- Capital costs for existing equipment (baler purchased in 2010, conveyor purchased in 2012, weigh scale purchased in 2013) for replacement of existing equipment and the expansion of the existing MRF have been included in the overall capital cost calculations for the modified existing MRF as current day costs to reflect payment of existing debt. It should be noted that the capital costs for the existing equipment and the 2009 expansion to the MRF all have different amortization periods, and depending on when the MRF is actually expanded/constructed, these capital costs will decrease.

The following Table 6-6 provides an overview of the project costs to modify the existing MRF for the four scenarios.

**Table 6-6: Projected Costs to Modify the Existing MRF**

ITEM	15,000 tpy Dual Stream	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream
<b>A. CAPITAL COSTS</b>				
Capital Cost New Equipment/Building	\$544,000	\$5,238,200	\$6,246,200	\$7,678,200
Contingency/Engineering Fees (5% And 10%)	\$81,600	\$785,730	\$936,930	\$1,151,730
Total Capital Cost Of New Equipment/Building	\$625,600	\$6,023,930	\$7,183,130	\$8,829,930
Annual Capital Costs On New Equipment/Building	\$69,547	\$650,938	\$776,972	\$979,333
Annual Capital Costs On Existing Equipment/Building	\$118,822	\$118,822	\$118,822	\$118,822
Total Annual Capital Cost	\$188,369	\$769,760	\$895,794	\$1,098,155
<b>B. OPERATING COSTS</b>				
Number Of Staff/Total Labour Cost		(29) \$1,367,080	(44) \$2,006,350	(40) \$1,847,850
Total Variable Operating Costs		\$726,900	\$952,470	\$1,109,700
Administrative Cost		\$73,641	\$101,268	\$105,385
Total Annual Operating Cost	\$2,285,887 <sup>(1)</sup>	\$2,167,621	\$3,060,088	\$3,062,935
<b>TOTAL ANNUAL COST</b>	<b>\$2,474,256</b>	<b>\$2,937,381</b>	<b>\$3,955,882</b>	<b>\$4,161,090</b>
<b>Gross Cost/tonne Processed</b>				
Capital	\$13	\$51	\$36	\$44
Operating	\$152	\$145	\$122	\$123
<b>Total</b>	<b>\$165</b>	<b>\$196</b>	<b>\$158</b>	<b>\$166</b>
Projected Revenue/tonne	\$120	\$113	\$120	\$113
<b>Net Cost/tonne</b>	<b>\$45</b>	<b>\$83</b>	<b>\$38</b>	<b>\$53</b>

<sup>(1)</sup> based on costs for the existing MRF escalation of variable costs to reflect added tonnage.

## 6.5 Replacement MRF Costs

HDR and Entec Consulting developed costs for a replacement MRF to compare costs required to modify the existing MRF as the City may also wish to consider the option of replacing the existing MRF to accommodate either additional recyclables or the required processing equipment. This is largely a function of the requirement to make modifications to the existing building structure and its ability to cost effectively accommodate these modifications.

The following assumptions were made to develop replacement MRF costs:

- A replacement MRF would be developed on the City property located to the north of the existing MRF, therefore no allowance for land purchase costs was included in the cost estimates.
- A similar estimate for site works as for the modified MRF was included to provide a more valid comparison. It should be noted that this number has only been included for comparison purposes as it is not known where a replacement facility would be sited, nor the condition of the site.
- Additional costs, not included in these cost estimates, include costs associated with permitting or approvals. These costs would be comparable for each of the options.
- Cost estimates were only developed for the 15,000 tpy Single Stream option and the two 25,000 tpy options as there would be no point in building a new 15,000 tpy Dual Stream MRF.
- Capital costs for a new MRF were estimated at \$1,292 per square metre as per the MIPC study data assumptions.
- Annual capital costs were estimated assuming a 20 year depreciation term for the building and major equipment (e.g. baler and screens) and a 10 year period for all other equipment, all at a 6% financing rate.
- As in the costing developed for the expansions to the existing MRF, it was assumed that new mobile equipment (e.g. loaders, skid steers etc.) would be required.
- It was also assumed that some new processing equipment would be required; however, as much processing equipment as possible would be utilized from the existing facility.
- Capital costs associated with the debt repayment for the existing equipment (baler purchased in 2010, conveyor purchased in 2012, weigh scale purchased in 2013) and the 2009 expansion to the MRF have been included in the overall capital costs for a replacement MRF to allow for a more direct comparison to the existing MRF modification costs. It should be noted that all these costs have different amortization periods, and depending on when a new MRF would be constructed,

these capital costs would decrease. For comparison purposes, these capital costs have been included as current day costs to reflect payment of existing debt.

#### **6.5.1 Capital and Operating Cost Estimates for a Replacement MRF**

The projected costs to replace the existing MRF for the 15,000 tpy and 25,000 tpy Single Stream options and the 25,000 tpy Dual Stream MRF are summarized in Table 6-7.

**Table 6-7: Projected Replacement MRF Costs**

ITEM	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream
Building Size (m <sup>2</sup> )	3,304	3,422	3,516
<b>A. CAPITAL COSTS</b>			
Capital Cost New Equipment/Building	\$8,854,672	\$9,555,338	\$11,108,152
Contingency/Engineering Fees (5% And 10%)	\$1,328,201	\$1,433,301	\$1,666,223
Total Capital Cost New Equipment/Building	\$10,182,873	\$10,988,638	\$12,774,375
Annual Capital Costs On New Equipment/Building	\$1,013,534	\$1,108,754	\$1,323,227
Annual Capital Costs On Existing Equipment/Building	\$118,822	\$118,822	\$118,822
Total Annual Capital Cost	<b>\$1,132,356</b>	<b>\$1,227,576</b>	<b>\$1,442,049</b>
<b>B. OPERATING COSTS</b>			
Number Of Staff/Total Labour Cost	(29) \$1,367,080	(44) \$2,006,350	(40) \$1,847,850
Total Variable Operating Costs	\$726,900	\$952,470	\$1,109,700
Administrative Cost	\$73,641	\$101,268	\$105,385
Total Annual Operating Cost	<b>\$2,167,621</b>	<b>\$3,060,088</b>	<b>\$3,062,935</b>
<b>TOTAL ANNUAL COST</b>	<b>\$3,299,976</b>	<b>\$4,287,663</b>	<b>\$4,504,985</b>
<b>Gross Cost/tonne Processed</b>			
Capital	\$75	\$49	\$58
Operating	\$145	\$122	\$123
<b>Total</b>	<b>\$220</b>	<b>\$172</b>	<b>\$180</b>
Projected Revenue/tonne	\$113	\$120	\$113
<b>Net Cost/tonne</b>	<b>\$107</b>	<b>\$51</b>	<b>\$67</b>

## 6.6 Summary of Costs for Modified MRF and Replacement MRF Scenarios

Table 6-8 presents a comparison of the capital and operating costs as well as on a gross and net cost per tonne basis for the modified MRF and the replacement MRF. The modified MRF and replacement MRF have the same labour and variable operating costs; however, the overall annual costs are much higher for the replacement MRF due to the higher capital costs associated with the new building.

It should be noted that, while every effort has been made to develop representative operating and capital estimates, these costs are not projected costs per tonne to utilize the facility.

Table 6-8: Comparison of Costs for Modified MRF and Replacement MRF Scenarios

	Modified MRF				Replacement MRF		
	15,000 tpy Dual Stream	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream
Total Capital Cost New Equipment / Building	\$625,600	\$6,023,930	\$7,183,130	\$8,829,930	\$10,182,873	\$10,988,638	\$12,774,375
Total Annual Capital Cost	\$188,369	\$769,760	\$895,794	\$1,098,155	\$1,132,356	\$1,227,576	\$1,442,049
Total Annual Operating Cost	\$2,285,887	\$2,167,621	\$3,060,088	\$3,062,935	\$2,129,401	\$3,060,088	\$3,062,935
Total Annual Cost	\$2,474,256	\$2,937,381	\$3,955,882	\$4,161,090	\$3,261,756	\$4,287,663	\$4,504,985
Gross Cost/tonne Processed							
Capital	\$13	\$51	\$36	\$44	\$75	\$49	\$58
Operating	\$152	\$145	\$122	\$123	\$145	\$122	\$123
Total	\$165	\$196	\$158	\$166	\$220	\$172	\$180
Projected Revenue/tonne	\$120	\$113	\$120	\$113	\$113	\$120	\$113
Net Cost/tonne	\$45	\$83	\$38	\$53	\$107	\$51	\$67

\*Totals may not add due to rounding

## 7 Recommendations

Based on the information presented above, the following are recommendations for the City of Kingston regarding future collection and processing approaches.

### 7.1 Collection System

HDR analyzed key metrics related to collection of Single Stream and Dual Stream material compared to the City of Kingston's program and took into consideration findings from other reports with similar analyses. As outlined in Section 6.1, there is no conclusive evidence that shows the City of Kingston should move to a Single Stream collection program. The City of Kingston could move to a true Dual Stream program (i.e. no separate collection of glass) which may reduce collection costs. Maintaining a Dual Stream program would avoid increased program costs associated with additional promotion and education required to launch a Single Stream program, and possibly new containers (if automated collection was considered).

**Recommendation:** That the City of Kingston implement a true Dual Stream curbside collection system that does not include separate glass collection at the curb by the collector. A Dual Stream curbside collection approach is consistent with the recommendations on processing technologies described in the following section.

### 7.2 Processing Technology (Single or Dual Stream) and Operation

Based on the estimates developed for modification of the existing MRF and replacement MRF scenarios, Dual Stream processing was overall less expensive than Single Stream processing.

The existing MRF could be scaled up to accommodate 15,000 tpy with minor modifications as a Dual Stream facility, but moving to a Single Stream facility requires significant investments in new equipment, making the 15,000 tpy Single Stream option more costly compared to the 15,000 tpy Dual Stream option.

Expanding the facility to accommodate 25,000 tpy, requires significant investments in new processing equipment and higher operating costs. While the Dual Stream facility has higher labour costs, the Single Stream facility has higher variable operating costs related to higher residue rates, utilities, spare parts, and maintenance which impact the net cost per tonne. Overall the 25,000 tpy Dual Stream facility had the lowest net cost (\$38/tonne).

The City has the option to merely upgrade the existing MRF to enable it to process 15,000 tpy, however, this only provides processing capacity for an additional 3,500 tonnes annually. This would provide only limited opportunities for other municipalities to utilize capacity at the MRF. As part of the municipal engagement process, 23 municipalities expressed interest in a regional MRF, including the City of Ottawa, Quinte Waste Solutions, Township of South Frontenac and Loyalist Township. Not including those communities (since Ottawa and Quinte are unlikely to utilize a MRF in Kingston

and South Frontenac and Loyalist Township already bring their material to Kingston's MRF), there could be an additional 10,483 tonnes of material that could be processed at a regional MRF.

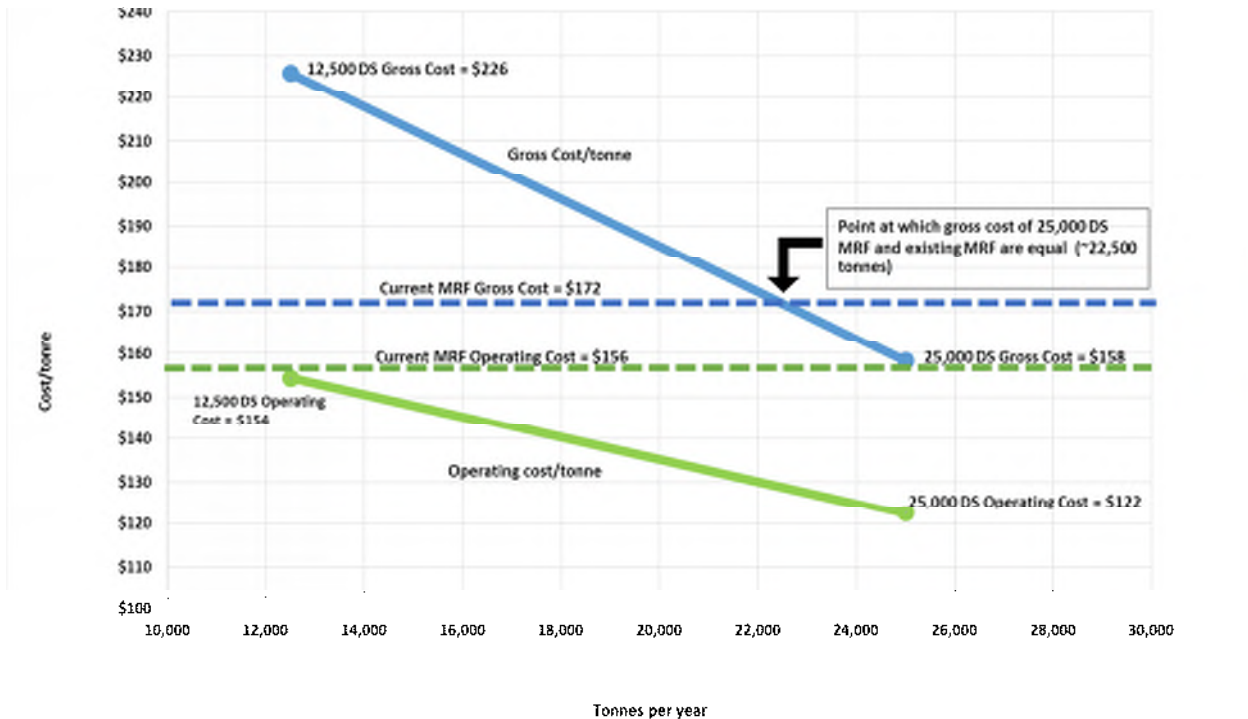
Should the City decide to expand the existing MRF to allow processing of 25,000 tpy, there would be capacity to allow processing of additional material from other municipalities and increases in tonnage due to population growth or changes to materials being processed.

Figure 7-1 below presents the gross and operating costs for the 25,000 Dual Stream MRF at full capacity and at half capacity (i.e. 12,500 tonnes). Compared to the existing MRF, the expanded Dual Stream MRF has lower operating costs at all tonnages. Operating at half capacity, up to approximately 22,500 tonnes, the expanded Dual Stream MRF has higher gross costs compared to those for the existing MRF<sup>17</sup>. For tonnages beyond 22,500, the expanded MRF has lower gross costs than the existing MRF, indicating that the expanded MRF needs a minimum of 22,500 tonnes to be more cost-effective to run compared to the existing MRF.

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<sup>17</sup> Assuming revenue of \$120/tonne for 2014 for the existing MRF for consistency.

Figure 7-1: Estimated Cost/tonne vs tonnes/year – Dual Stream (DS) MRF



**Recommendation:** That the City of Kingston further discussions with municipalities who have expressed interest to determine the feasibility of capturing sufficient recyclable material tonnage to support the expansion of the current MRF to a Dual Stream MRF with a capacity of 25,000 tpy.

## 8 Monitoring/measuring Metrics for Future Comparison between Current Operating Costs and Proposed Operating Costs

The City of Kingston maintains comprehensive records on operating and processing costs associated with the MRF for tonnages processed from the City of Kingston, South Frontenac and Loyalist Township. The City has negotiated a processing contract with their current service provider which includes a number of costs over which the City has no control (e.g. salaries, equipment costs) which are factored into the overall processing cost. Cost estimates have been developed based on current MRF costs and market prices which will assist the City in negotiating the next processing contract.

The City will need to continue to collect data on cost and revenue for WDO Datacall reporting purposes in the future. The City can develop a tracking system for key

parameters which can impact operating costs such as cost of residual disposal, equipment maintenance, spare parts, etc. To an extent, there is a certain degree of control for these costs; for instance, proper sorting will reduce the amount of residuals requiring disposal, regular maintenance will reduce downtime for unplanned breakdowns, etc.

Depending on the type and specifications of agreements set up with participating municipalities, the City may need to report on certain parameters such as tonnes processed, revenue for material streams, capital expenditures, residual disposal, contamination rates of incoming materials, etc.

## 9 Key Messages that can be Shared with Municipalities

The City of Kingston will have to develop some key messages to share with municipalities regarding the regional MRF, assuming a Dual Stream MRF.

It is likely that municipalities will have concerns over processing costs, hauling costs, risk, current contractual obligations and their current collection approach. These concerns are each discussed below.

### 9.1 Processing Costs

The cost estimates developed for the purpose of the technical plan and business case were high level estimates for equipment costs, building expansion costs and site works that ultimately have been used to recommend a preferred option.

City staff has indicated that they would prefer to charge a processing fee based on tonnes delivered to the MRF plus an administrative fee, shared costs of audits, and capital expenses. Additionally, the City will need to decide if a revenue sharing agreement will be based on revenue generated by each material stream or a basket of goods.

### 9.2 Haulage Costs

A large portion of processing costs will include haulage of materials to Kingston. Many municipalities utilize depots with roll-off containers to collect materials so no compaction is achieved. It may be possible for municipalities to develop some sort of shared hauling approach to share/reduce transfer costs.

As municipalities might try to save haulage through increased compaction, the City will need to ensure that over-compaction of materials, particularly containers, does not occur as the design of the MRF assumes a compaction ratio of no more than 2.5: 1.

### 9.3 Risk

Municipalities may be hesitant to participate in a regional MRF due to perceived risk. The City of Kingston has operated a MRF for many years and understands the potential risks associated with processing and marketing recyclables. For a regional MRF, the City of Kingston is assuming the larger portion of risk associated with the facility and will be contributing more capital to this project.

It is anticipated that the City would develop agreements similar to existing agreements with South Frontenac and Loyalist, where they share in the risks and the rewards.

By participating in a regional MRF, municipalities can benefit from economies of scale, partnership, and opportunities to improve their recycling programs. Together, municipalities can negotiate better prices for items related to waste management, such as collection services where they can demonstrate economies of scale to the market.

Municipalities will be participating in a process that is open and transparent; they will be kept informed of expenses and revenue generation through regular communication and meetings. As an example of this, municipalities involved with the regional MRF in London, Ontario participate in quarterly meetings to discuss costs, revenue and other issues such as contamination rates on inbound and outbound materials.

## 9.4 Contractual Obligations

Another factor in a municipality's decision about whether or not to participate is contractual obligations with current service providers. These contracts may be in effect for some time and additionally, may have been procured as part of a multi-municipal contract.

CIF has indicated that they may be able to provide support for municipalities to make an informed decision on the implications of breaking a contract if it makes financial sense. The City will need to inform municipalities on the timelines involved with a regional MRF (i.e. when it would be operational) so that contracts can be aligned with those dates or reviewed to analyze the impacts of penalties imposed by the service provider.

Municipalities may be provided with support through CIF to conduct a financial analysis of processing costs and revenue associated with the regional MRF compared to their existing contract provisions. A cost/benefit analysis should be conducted to provide the rationale for any changes to the contract in order that municipal staff can make informed decisions.

## 9.5 Current Collection Approach

For those municipalities operating a program where two or more streams are collected separately, there would be no issues associated with a Dual Stream regional MRF.

A Dual Stream MRF could not accept commingled materials. So, for those municipalities operating Single Stream programs, a change to how materials are collected would be required. There are 17 municipalities operating Single Stream programs, of those four have expressed interest, one municipality indicated "maybe" and eight are unknowns. Four others have indicated they are not interested.

It is possible that municipalities have not expressed interest in a regional MRF as they think that the level of effort and cost involved with switching to a Dual Stream program would be too great. CIF has indicated that there may be support and funding available

to analyze the implications of switching to a Dual Stream program. Additionally, there may be funding available for:

- a promotional and educational campaign required to inform residents of the new program;
- internal staff training; and,
- new containers.

Municipalities may receive assistance in deciding if a change to a different collection system makes financial sense and not have to undergo that analysis themselves. Also, funding may be available to reduce the financial impact of switching systems.

## 9.6 Summary of Key Messages for Municipalities

In summary, there are a number of pros and cons for participation in a Regional MRF. Table 9-1 provides a description of the pros and cons for municipalities.

**Table 9-1: Pros and Cons for Participation in a Regional MRF**

Pros	Cons
<ul style="list-style-type: none"> <li>• Support may be available from CIF to undertake a cost/benefit analysis of switching to a Dual Stream program</li> <li>• Funding may be available to support the switch if required</li> </ul>	<ul style="list-style-type: none"> <li>• May require a switch from Single Stream to Dual Stream collection</li> </ul>
<ul style="list-style-type: none"> <li>• Potential for lower processing costs and increased revenue</li> <li>• More tonnes can be diverted at a lower cost which also contributes to avoided landfill costs</li> </ul>	<ul style="list-style-type: none"> <li>• Haulage costs may increase</li> <li>• Local employment may be affected</li> </ul>
<ul style="list-style-type: none"> <li>• Support may be available to undertake a cost/benefit analysis to analyze current contract requirements and penalties</li> <li>• Timing of regional MRF may allow contract extensions or short term contracts</li> </ul>	<ul style="list-style-type: none"> <li>• May require breaking a contract or waiting until the current contract has expired.</li> </ul>

Pros	Cons
<ul style="list-style-type: none"> <li>• Risk is low, no capital requirements</li> <li>• Opportunity for leveraging multi-municipal agreements and contracts</li> <li>• Economies of scale and additional purchasing power</li> <li>• Opportunities to learn more about recyclables processing and marketing</li> <li>• Open and transparent processing arrangements</li> </ul>	

## 10 Discussion of Potential Risks and Mitigation with Participating Municipalities

One of the biggest risks to the successful operation of the regional MRF will be supply of material. The City will need to consult with Eastern Ontario municipalities to inform them about the regional MRF and the benefits of participating. The City will need to enter into a contractual arrangement with each municipality that will outline at a minimum the annual tonnage to be processed, a schedule of material delivery based upon current operation, tolerance for contamination as well as all the other terms regarding payments, revenues, penalties, etc. There is the potential risk that participating municipalities may change their mind about their interest in participating or don't deliver the specified quantities of material. This could be mitigated through contractual language regarding penalties for insufficient material supply or early contract termination.

A number of potential issues with the existing MRF building and proposed expansions were identified which could pose risks to the operation of the facility. Regarding the physical structure of the existing MRF and the proposed expansion, there is a possibility that a number of code requirements may be triggered as part of an expansion (See Section 5.1.1). As well, with the proposed layout of the 25,000 Dual Stream MRF, there may be less than one day of storage for material on the tipping floor which is less than the recommended two day storage based on best practice for MRF design. This could potentially impact operations in the case of unplanned equipment breakdowns and stoppages and peak receiving capacities during heavy collection periods. Although the 25,000 Dual Stream MRF is the preferred option, some design limitations were identified based on the preliminary layouts for access to different areas of the MRF and a limited number of presort bunkers for the fibre and container lines (see Section 5.1.5).

There is also a level of uncertainty regarding federal and provincial policies regarding waste. The anticipated new waste legislation in Ontario could have implications for the

City regarding recycling infrastructure. It is possible that should stewards be made responsible for processing material, the regional MRF could still be utilized, however, there is a possibility stewards will make their own processing arrangements. It is difficult to envision what that looks like at this time, although it could involve the public or private sector. It is possible that the government will put forward some sort of legislation in Fall 2015. It would be prudent for the City to delay a decision about the regional MRF until the implications of the new legislation are better understood.

Another risk for the City is the quality of the inbound material delivered to the MRF. Greater levels of contamination result in higher costs for residual disposal. This can be mitigated through the contract/agreement specifying tolerances/levels of contamination. This can be confirmed through inbound audits of incoming material from participating municipalities. Additionally to monitor quality, regular audits can be conducted of both sorted material and residual material. These should be conducted by an independent third party; the costs of which should be included as an operating expense in the agreement/contract with the participating municipalities and the processing operator.

The results of the inbound material audits will also be useful to the participating municipalities as it will identify areas for improvement; with their collection contractor and the public through promotion and education.

## 11 Conclusion

Based on the findings of this study, it is HDR's opinion that the City should further discussions with municipalities who have expressed interest to determine the feasibility of capturing sufficient recyclable material tonnage to support the expansion of the current MRF to a Dual Stream MRF with a capacity of 25,000 tpy. This alternative provides the lowest net cost of all the alternatives investigated, however, is dependant on the participation of a number of municipalities, beyond those currently sending material to the Kingston MRF. Based on the initial level of interest from Eastern Ontario municipalities, there would be sufficient tonnage to support a MRF of this size.

An announcement regarding new provincial waste management legislation is anticipated in the Fall of 2015. It is recommended that the City wait until details of the new legislation have been revealed before making any decision about a regional MRF so that the implications can be considered.

# Appendix A

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MIPC Study

## City of Kingston: Regional MRF Study

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### Task 2: Review of Municipal Industry Program Committee (MIPC) Study and Relevant Background Documentation

*This project has been delivered with the assistance of the Continuous Improvement Fund, a fund financed by Ontario municipalities and stewards of blue box waste in Ontario.*

*Notwithstanding this support, the views expressed are the views of the authors(s), and CIF, Waste Diversion Ontario and Stewardship Ontario accept no responsibility for these views.*

# Memo

**Date:** Monday, December 08, 2014

**Project:** City of Kingston: Regional MRF Study

**To:** Jason Hollett

**CC:** John Giles, Tyler Lasko, Carrie Nash

**From:** Jim McKay, Christine Roarke, Tessa Wilson

**Subject:** Task 2: Review of Municipal Industry Program Committee (MIPC) Study and Relevant Background Documentation

As part of the work plan developed for the City of Kingston Regional Material Recovery Facility (MRF) Study, Task 2 includes a review of Waste Diversion Ontario's Municipal Industry Program Committee (MIPC) *Study of the Optimization of the Blue Box Material Processing System in Ontario* and relevant background documentation. This memo presents the findings of the review of the MIPC study and background documentation relevant to the development of a Regional MRF in Kingston.

The purpose of this Memo is to:

- Provide an overview of the MIPC study;
- Provide an overview of how the City of Kingston MRF was considered within the MIPC Study;
- Highlight any changes since the completion of the MIPC Study potentially affecting this study;
- Provide a comparison of assumptions used in the MIPC study to the Kingston MRF;
- Limitations of the MIPC study; and,
- Describe any local considerations and adjustments required to the conclusions of the MIPC Study.

## 1 Overview of MIPC Study

The following sections provide an overview of the MIPC Study.

## 1.1 Background and Rationale

To demonstrate their commitment to improving the Blue Box program in Ontario on a systemic level, MIPC commissioned a study of the optimization of the Blue Box Materials Processing System in Ontario, which was completed in 2012<sup>1</sup>. The purpose of the study was to explore what an optimized blue box materials processing system would look like, utilization of more transfer stations and regional MRFs to minimize transportation logistics, and to develop a tool for municipalities to make better informed decisions on infrastructure investments<sup>2</sup>.

## 1.2 Study Scope

The MIPC study required the project team to develop a Geographic Information System (GIS) model that would reflect a cost-effective, efficient and successful recovery system for packaging and printed paper in Ontario, and one that would inform the decision making towards an optimized provincial system for the transfer, hauling and sorting of Blue Box materials for market<sup>3</sup>. The model optimized a system of new “greenfield” MRFs and Transfer Stations to handle a standard group of recyclable materials. The model was then compared to the existing Ontario MRF and transfer station infrastructure and conditions in order to identify gaps, and then used to develop optimized solutions for the various regions, each municipal facility and each community in Ontario.<sup>4</sup>

## 1.3 Consultation

Consultation on the study occurred at three events including one workshop and two meetings. Municipal staff was also kept informed on the project through updates from the Continuous Improvement Fund (CIF) newsletter. Comments received during the consultation program were incorporated into the report where applicable.<sup>5</sup>

## 1.4 Existing System and Model Overview

For the existing processing system, material flow and type within each municipality were mapped using data mainly from the 2010 Waste Diversion Ontario (WDO) Datacall. For each municipality, the material was identified as direct haul (material that is hauled by a curbside waste collection vehicle directly to a MRF) or transfer (material delivered to a

<sup>1</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>2</sup> Presentation of Findings, July 2010. <http://cif.wdo.ca/pdf/presentations/MIPC-BB-Opt-Study-July25-2012.pdf>

<sup>3</sup> Methodology and Model, June, 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol2.pdf>

<sup>4</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>5</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

transfer station by a collection vehicle where it is transferred to a larger vehicle and hauled to a MRF)<sup>6</sup>. Cost estimates for the existing system were based on the cost data for 2010 reported by municipalities, and was verified by WDO. The annual generation of residential printed paper and packaging material was developed based on waste characterization studies conducted through the WDO's Effectiveness and Efficiency (E&E) Fund from 2005 to 2007 and verified through annual data reported by stewards to Stewardship Ontario<sup>7</sup>.

The modelling was segmented into four separate geographic regions and a map was developed for each region to depict the known material flow and existing public and private processing and transfer facilities handling municipal Blue Box material within Ontario<sup>8</sup>. The four Regions included;

1. Eastern Ontario,
2. Central Ontario and GTA,
3. Southwestern Ontario, and
4. Northern Ontario.

## 1.5 Options Developed

The modelling addressed each Region above independently and developed a range of options for each. First a baseline was established which applied a natural growth scenario with the lowest number of MRFs. Options were then established which included increasing the number of MRFs and applying higher growth scenarios and lastly, variations using differing numbers of existing facilities were also considered<sup>9</sup>.

## 1.6 Results

The results were presented in a report for each region and included maps showing the existing infrastructure and flow of material, as well as the potential MRF and transfer stations options. Tables were also included in the results for each region summarizing each option<sup>10</sup>. The tables included the following information;

- number of facilities;

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<sup>6</sup> Methodology and Model, June, 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol2.pdf>

<sup>7</sup> Methodology and Model, June, 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol2.pdf>

<sup>8</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>9</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>10</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

- required conversions of existing MRFs to transfer stations and upgrades to existing MRFs and transfer stations;
- total annual capital and operating cost of the option;
- investments in new facilities and conversions; and,
- relative effect on direct haul among options.

### **1.6.1 Summary of Results for Eastern Ontario**

As mentioned above, the outcome of the study was a series of reports, including ones specific to regions in Ontario corresponding to geographic areas. The focus of this report is Volume 4: Eastern Ontario, A Study of the Optimization of the Blue Box Material Processing System in Ontario, Final Report, June 2012.

The baseline of the study assumed one MRF for Eastern Ontario, located in Ottawa, which would be the minimum number of MRFs for the region. Additional model options assumed various roles for a new MRF in Kingston or repurposing the existing MRF in Kingston as follows:

- Natural Growth Recovery and High Recovery Baseline – One new MRF in Ottawa only, the existing Kingston MRF would be shut down or repurposed
- Natural Growth Recovery and High Recovery Option 1 – One new MRF in Ottawa and one new MRF in Kingston
- Variation A on the Baseline – One new MRF in Ottawa, the existing Kingston MRF becomes a transfer station as do existing MRFs in Ottawa Valley and Cornwall
- Variation B on the Baseline – same as Variation A but additional MRFs in North Dundas and Glengarry are converted to transfer stations
- Natural Growth Recovery and High Recovery Variation C – same as Variation A but all existing MRFs and transfer stations are converted to transfer stations

To summarize, it was proposed that a new Regional MRF would be built in Kingston as part of Option 1 and the existing Kingston MRF would become a transfer station in all the other scenarios where the only MRF in Eastern Ontario would be located in Ottawa.

The following figures present the existing system (see Figure 1-1), the baseline system (Kingston MRF converted to transfer station managing 14,356 tonnes) (see Figure 1-2), and Option 1 (MRF in Kingston processing 35,251 tonnes) (Figure 1-3) as presented in the MIPC study (Volume 4: Eastern Ontario).

Figure 1-1: Existing System

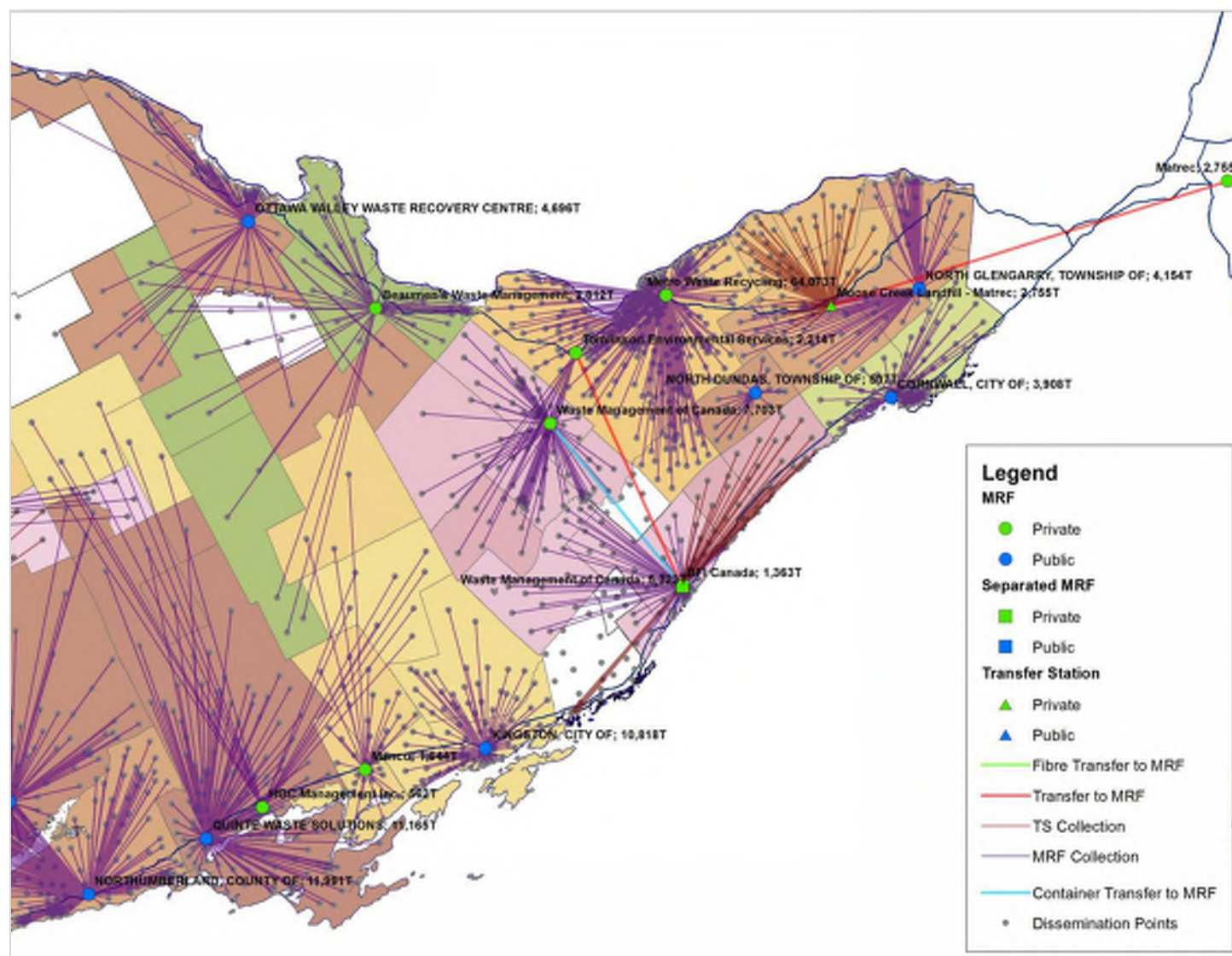


Figure 1-2: Baseline System

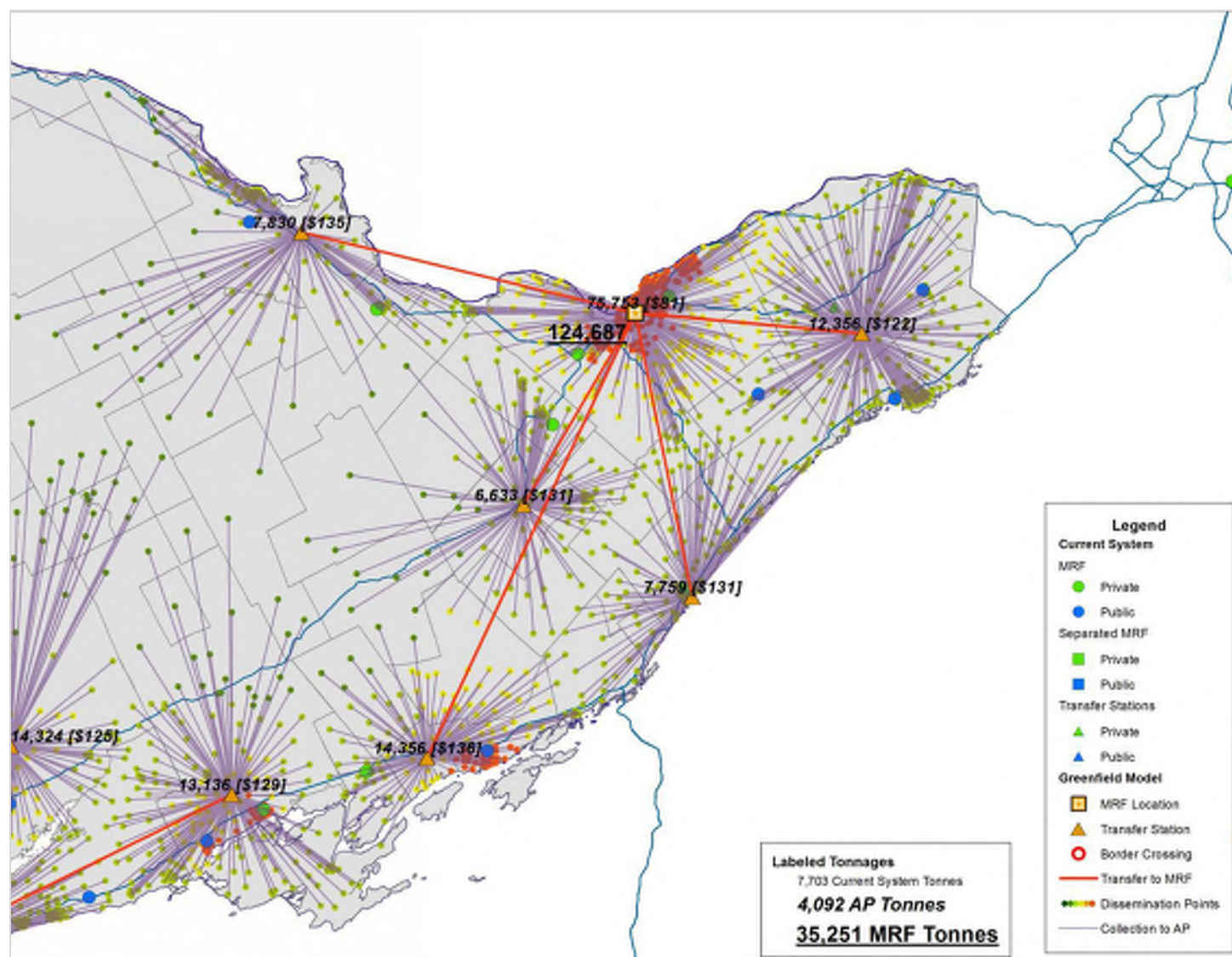
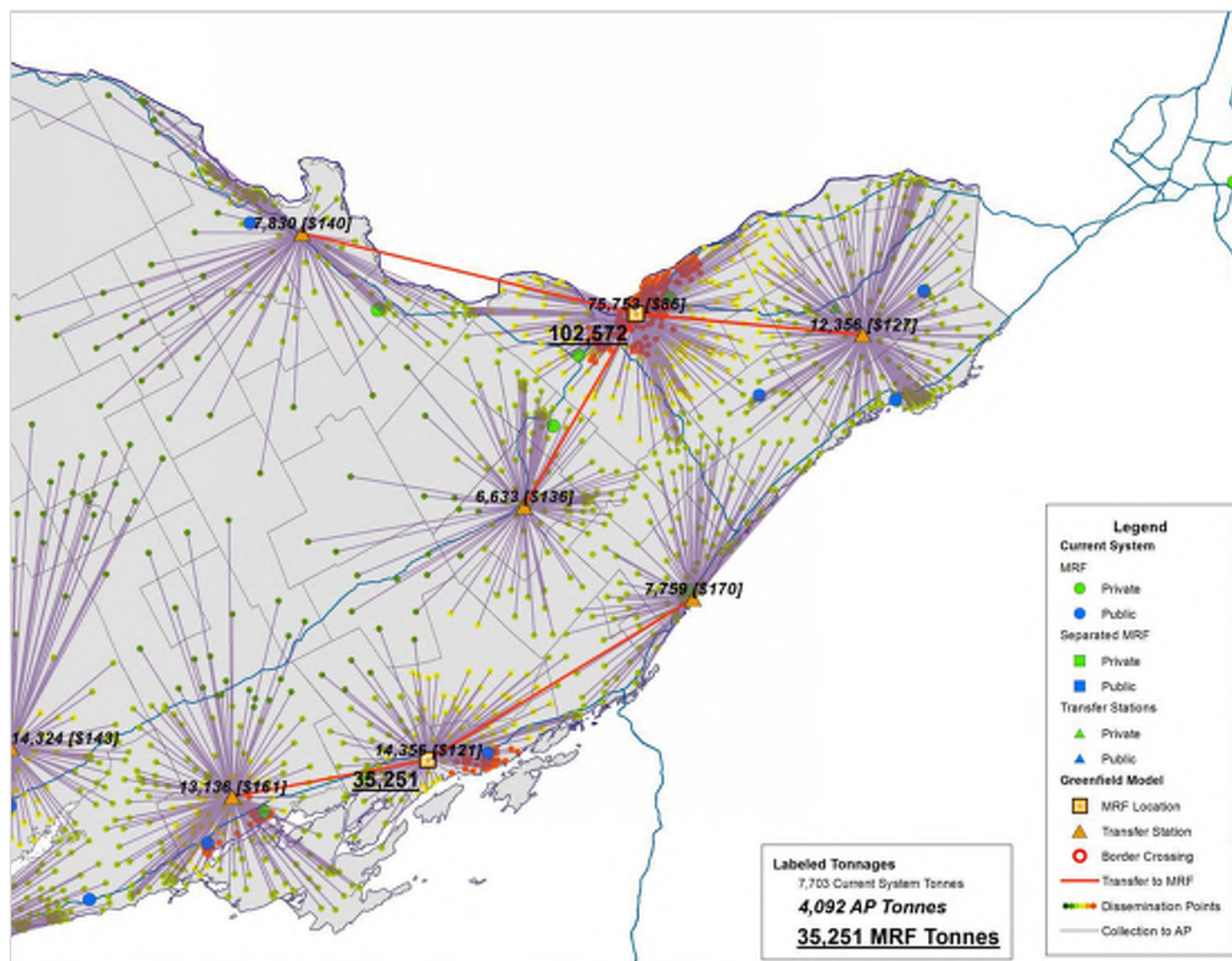


Figure 1-3: Option 1 for the Eastern Region

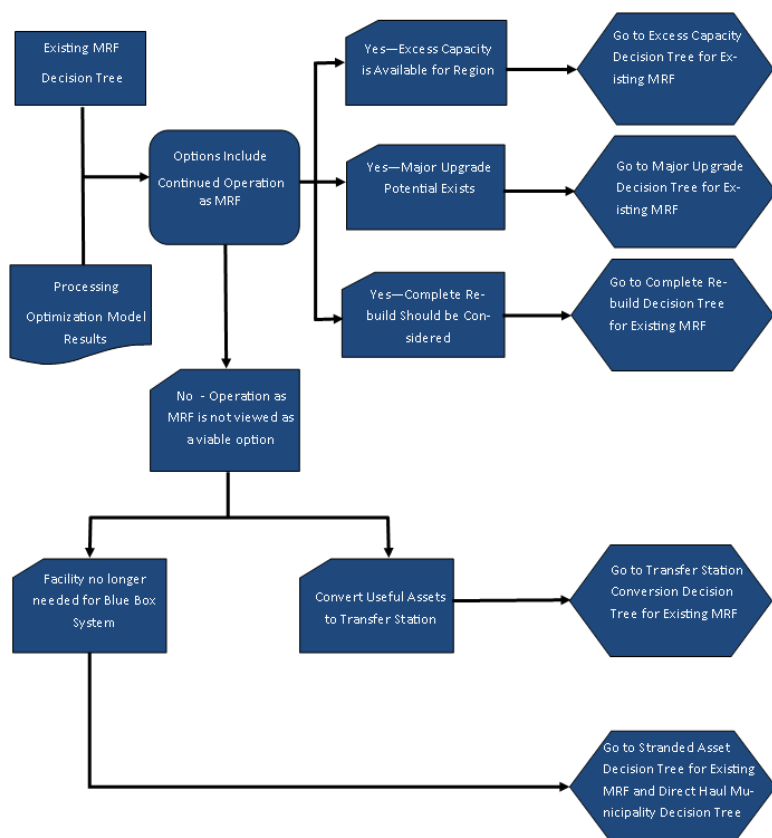


## 1.7 Transition Plans

It was concluded that the optimization of the Blue Box system for the province of Ontario would take some time as the transition from current infrastructure to a more optimized system would vary for each municipality and community<sup>11</sup>. To assist with the process, several transition plans and decision trees were developed as communities transition to the new system with options for direct haul municipalities, existing MRFs and greenfield projects (see Volume 8: Transition Plans and Decision Trees).

### 1.7.1 Transition Plan for Kingston MRF

Figure 1-4 illustrates the initial decision tree for existing MRFs. As outlined in Volume 8: Transition Plans and Decision Trees<sup>12</sup>, additional decision trees have been developed to further assess the end use of an existing MRF; whether it continues to be used as a MRF which could be used for excess capacity, upgraded or rebuilt, converted to a transfer station or becomes a stranded asset.

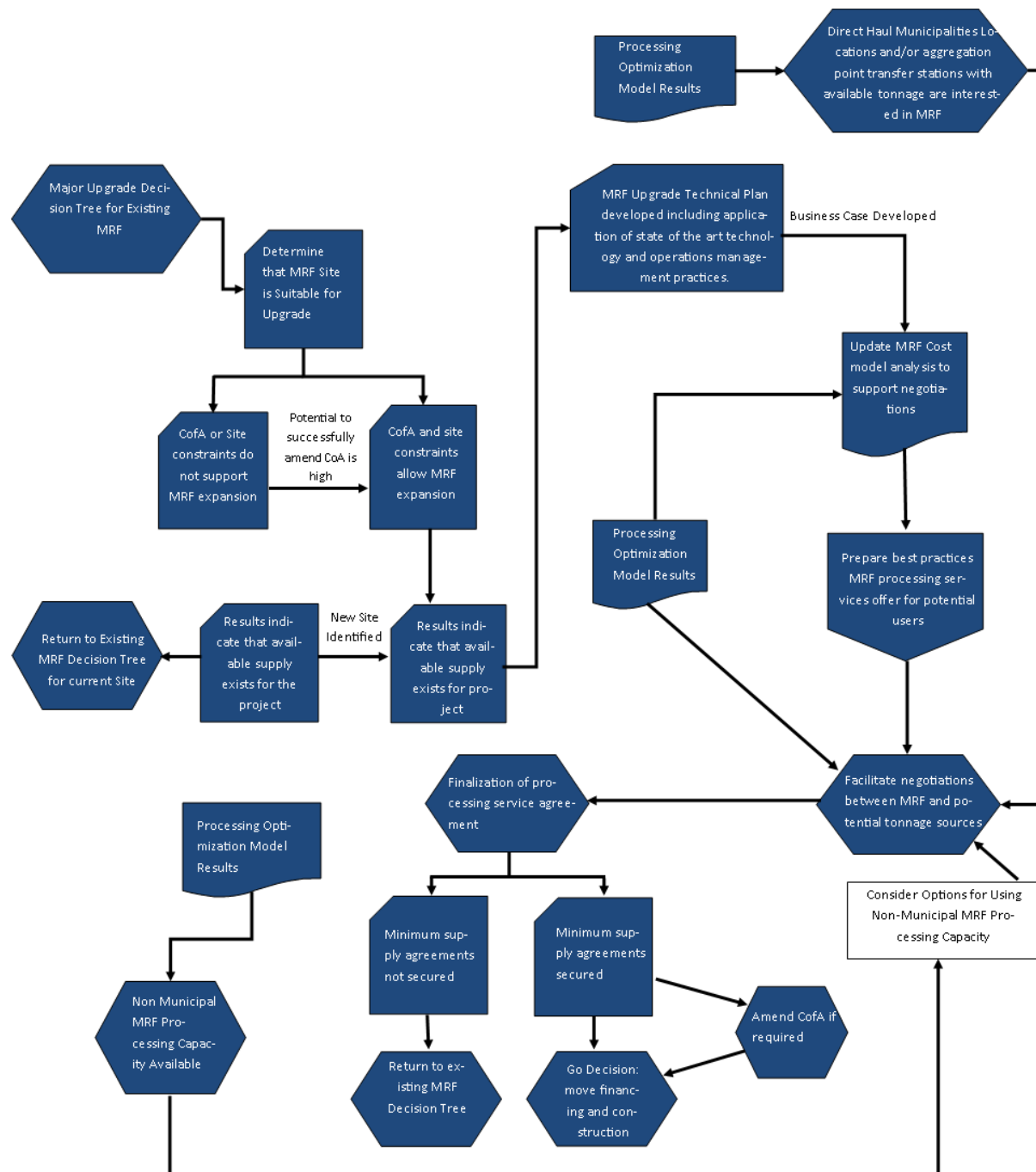


**Figure 1-4: Transition Plan for Existing MRF**

<sup>11</sup> Transition Plans and Decision Trees, June 2012.  
<http://cif.wdo.ca/pdf/reports/428/428-report-Vol8.pdf>

<sup>12</sup> Figure 3, Transition Plans and Decision Trees, June 2012.  
<http://cif.wdo.ca/pdf/reports/428/428-report-Vol8.pdf>

The decision tree for an existing MRF<sup>13</sup> is presented in Figure 1-5 below, upon which this study is based.



**Figure 1-5: Major Upgrade Decision Tree for Existing MRF**

<sup>13</sup> Figure 5, Transition Plans and Decision Trees, June 2012.  
<http://cif.wdo.ca/pdf/reports/428/428-report-Vol8.pdf>

## 1.8 Overall Study Conclusions

Once the Blue Box processing system modelling was completed, the results were analyzed and several main conclusions were drawn. The five main conclusions were as follows<sup>14</sup>;

1. Reducing the number of MRFs reduces overall processing and transfer system costs;
2. The lowest cost modelled system is the one with the fewest MRFs, however regional dynamics will dictate how much savings can actually be achieved by getting to the minimum number of MRFs;
3. The key to the hub and spoke system of facilities is highly efficient medium and large MRFs running 2-shifts per day;
4. Material can be transferred economically long distances; and,
5. Collection costs need to be studied to fully understand savings potential.

## 2 Overview of Kingston MRF within the MIPC Study

The following sections provide some background on the City's recycling program, the existing MRF and options for a MRF in Kingston as outlined in the MIPC study.

### 2.1 Overview of the City's Recycling Program

The City of Kingston provides collection service to 45,399 single family households and 8,519 multi-family households<sup>15</sup>. Single family recyclables are collected in four streams using 64L blue and grey boxes for containers and fibres respectively. Residents sort their containers into the blue box, fibres into the grey box and old corrugated cardboard (OCC) is bundled separately. Collection crews remove glass from the blue box at curbside and keep it separate from the rest of the recyclables. Clear and coloured glass is no longer kept separate. Multi-family buildings use 360L carts for the collection of recyclables. Separate carts are provided for fibres, containers, clear glass and coloured glass.

The following materials are acceptable in the City's recycling program:

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<sup>14</sup> Executive Report, June 2012. <http://cif.wdo.ca/pdf/reports/428/428-report-Vol1.pdf>

<sup>15</sup> 2013 Datacall



## 2.2 Background on the Kingston MRF

The City of Kingston's MRF is located at the Kingston Area Recycling Centre (KARC) at 196 Lappan's Lane in Kingston. Residents can drop off household hazardous waste, leaf and yard waste, and recyclables at the KARC. Collection vehicles tip fibres and containers in the MRF; glass is emptied into bunkers outside the MRF.

The MRF was constructed in 1989 and is permitted under Certificate of Approval<sup>16</sup>A380107 issued on September 20, 1989. In 1995, the MRF was expanded with an addition to the plant area of approximately 650 m<sup>2</sup> (7,000 ft.<sup>2</sup>) and an additional 185 m<sup>2</sup> (2,000 ft.<sup>2</sup>) of administration area. In 2008, another expansion was undertaken, with the tipping floor increased by 278 m<sup>2</sup> (3,000 ft.<sup>2</sup>) and the storage area increased by 348 m<sup>2</sup> (3,750 ft.<sup>2</sup>). As per the ECA, the storage capacity of the site is a maximum of 450 tonnes at any one time.

The MRF is owned by the City of Kingston and is currently operated by BFI Canada<sup>17</sup>. BFI has operated the MRF since 2006 under a 6 year contract with a one year extension. The contract expired on September 27, 2014 and City Council recently awarded BFI a three year processing contract with an optional one year extension.<sup>18</sup> The MRF is a two stream facility (containers and fibres) which processes material from the City of Kingston, Loyalist Township and South Frontenac.

<sup>16</sup> Now known as an Environmental Compliance Approval or ECA

<sup>17</sup> BFI changed its name to Progressive Waste Solutions in 2011.

<sup>18</sup> City of Kingston, Report to Council, April 15, 2014, Award of Contract – Supply of Operations Services for the City of Kingston Material Recovery Facility (Report No. 14-133)

As presented below in Table 2-1, in 2013, approximately 12,400 tonnes of material was received at the Kingston MRF generated within the City of Kingston (79.41%), surrounding municipalities (Loyalist Township (9.22%) and South Frontenac (8.45%) and the industrial, commercial and institutional (IC&I) sector (2.92%).<sup>19</sup> Approximately 11,500 tonnes of material were marketed in 2013<sup>20</sup> which includes 8,426 tonnes of fibres, 2,142 tonnes of containers, 940 tonnes of glass, 1.63 tonnes of textiles and 11.22 tonnes of scrap metal.

**Table 2-1: Recyclable Material Managed at Kingston MRF (2013)**

Source of Material	Tonnes
City of Kingston	9,859.75
Loyalist Township	1,144.61
South Frontenac Township <sup>21</sup>	1,049.53
IC&I	362.93
Total Tonnes of Material Delivered to MRF <sup>1</sup>	12,416.82
Total Tonnes of Material Marketed <sup>2</sup>	11,521.64

<sup>1</sup> Incoming Tonnages 2013

<sup>2</sup> Marketed Tonnes by Commodity 2013

Table 2-2 presents the projected tonnes for 2014. The City has anticipated that the amount of newspapers will continue to decrease in the future as readers switch to electronic alternatives, resulting in fewer tonnes overall requiring management. The 2014 tonnes includes material from the residential sector as well as from the IC&I sector.

**Table 2-2: Projected Tonnes of Material Managed (2014)**

Material Stream	Projected Tonnes (2014)
Fibres	8,068
Containers	2,740
Subtotal	10,808
Glass	672
Total	11,480

Source: City of Kingston - Current MRF Info

The MRF is operated with 11 full time equivalent (FTEs) staff per shift. Each shift is staffed by four sorters on the fibres line, four sorters on the containers line, two floor

<sup>19</sup> City of Kingston – Incoming Tonnages - 2013

<sup>20</sup> City of Kingston – Marketed Tonnes by Commodity - 2013

<sup>21</sup> It appears that South Frontenac generates more material than reported here, based on 2013 WDO Datacall

operators and one lead hand. The MRF operates with two eight-hour shifts from Monday to Thursday (first shift 6:00 am to 2:00 pm, second shift from 3:00 pm to 11:00 pm) and one eight-hour shift on Fridays (6:00 am to 2:00 pm). Each eight-hour shift includes seven hours of operation, a 30 minute lunch break and two 15 minute breaks.

The MRF's throughput is based on the number of annual operating hours and tonnes processed as follows:

- The MRF runs for 63 hours of operational time per week (14 hours of operating time per day for 4 days from Monday to Thursday and 7 hours of operating time for one day on Friday)
- The MRF operates 52 weeks per year
- Total operational time is 3,276 hours per year (63 hours/week x 52 weeks/year)
- Fibre throughput (based on the 2014 projected tonnes) is 2.5 tonnes per hour (8,068 tonnes/3,276 hours per year)
- Container throughput (based on the 2014 projected tonnes) is 0.8 tonnes per hour (2,740 tonnes/3,276 hours per year)
- Total throughput is 3.3 tonnes per hour (2.5 tph + 0.8 tph)

## 2.3 Options for a MRF in Kingston

As described in Section 1.6.1, only Option 1 in the MIPC study considers a new MRF in Kingston. In all other scenarios, Kingston's existing MRF is shut down, repurposed or converted to a transfer station. The various scenarios are presented in Table 2-3.

In the MIPC study, Option 1 assumes that new MRF in Kingston would need capacity to process the 35,251 tonnes of material from the municipalities listed below (based on 2010 Datacall). This option assumed material from the Quinte Region would be processed at the Kingston MRF since this area would be closer to Kingston than a MRF located in the Central Region. The addition of material from the Quinte area resulted in an increase in per tonne operating costs for the Eastern Region due to the longer haul distance. The addition of a MRF in Kingston, as part of Option 1, combined with a primary MRF in Ottawa resulted in increased processing system costs by 10%.

The new MRF in Kingston could receive material from Brockville, Quinte West, Leeds and the Thousand Islands, Elizabethtown-Kitley, Prescott, Front of Yonge, North Grenville, Gananoque, Frontenac Islands, Augusta, Athens, Merrickville-Wolford, South Frontenac, North Dundas, Stone Mills, Greater Napanee, Edwardsburgh/Cardinal, South Dundas, Addington Highlands, Central Frontenac, Deseronto and Mohawks of the Bay of Quinte. This material would either be directly hauled to the MRF or shipped via transfer station.

Under the baseline system with a single Eastern Ontario MRF located in Ottawa, the existing Kingston MRF would be shut down or repurposed. In all the other Baseline scenarios with the only MRF located in Ottawa, Kingston's existing MRF would be converted to a transfer station and manage approximately 14,350 tonnes of recyclables generated within the City of Kingston and from surrounding municipalities.

**Table 2-3: Options for Kingston MRF in MIPC Study Scenarios**

Kingston MRF options	Baseline (New MRF in Ottawa)	Option 1 (New MRFs in Ottawa and Kingston)	Baseline A (New MRF in Ottawa, 4 MRFs become transfer stations)	Baseline B (New MRF in Ottawa, 5 MRFs become transfer stations)	Baseline C (New MRF in Ottawa, 11 MRFs become transfer stations)
Existing MRF shut down or repurposed	✓				
New MRF in Kingston		✓			
Existing MRF converted to transfer station			✓	✓	✓

### 3 Changes since Completion of the MIPC Study

This section presents a number of changes that have taken place at the City's MRF and in Eastern Ontario since the completion of the MIPC Study in 2012. In general, there have been operational changes at the Kingston MRF itself, changes in the sources and quantities of material processed at the Kingston MRF since 2010, and there have been changes to the infrastructure in Eastern Ontario through acquisitions and development of processing/transfer facilities.

#### 3.1 Changes to the MRF

It appears that throughput of the Kingston MRF has changed from 2011 to 2014. A 2011 report prepared by AECOM indicated that "approximately 0.40 tonnes per hour of containers were processed and 2.7 tonnes per hour of fibres were processed in 2011<sup>22</sup>." Currently, the throughput of fibres is 2.5 tonnes per hour and for containers, the throughput is 0.8 tonnes per hour (tph). The throughput of the container line has been increased now that containers are being processed during both shifts; previously they were only processed during the morning shift.

<sup>22</sup> City of Kingston, MRF Capacity and Capability Assessment Report, AECOM, 2011

Additionally, the operating hours appear to have changed. AECOM identified the operating hours as being from 6:30 am to 11:30 pm Monday to Thursday (morning and afternoon shifts) and 6:30 am to 5:00 pm on Friday (morning shift only). The MRF now operates from 6:00 am to 11:00 pm from Monday to Thursday and 6:00 am to 2:00 pm on Fridays.

### **3.2 Changes in Tonnage Managed**

The MIPC study indicated that Kingston's MRF managed 10,818 tonnes (2010 WDO Datacall) from the Township of Frontenac Islands, Township of Loyalist, Township of South Frontenac and from the City of Kingston itself.

The City is now managing recyclables generated by the residential and IC&I sector in the City of Kingston as well as residential material from Loyalist Township and South Frontenac. Material is no longer received from the Township of Frontenac Islands. In 2014, the MRF is projected to manage 11,480 tonnes (10,808 without glass).

### **3.3 Infrastructure Changes**

Since the completion of the MIPC study, Lafleche Environmental Inc. opened a transfer station in 2012 in Belleville which accepts residential and commercial waste (formerly the Rancor Wood Recycling site). In 2013, area municipalities (Quinte West, Belleville, Prince Edward County) awarded a five year contract to Matrec (parent company of Lafleche) for waste collection including garbage, recyclables and organics. It is assumed that recyclables would be transferred from the transfer station to a Matrec MRF in Quebec.

Another waste management facility in Eastern Ontario is undergoing a permitting/approval process at the time of writing of this report. An amendment is being sought for the ECA for a waste management facility located outside of Belleville which would be permitted to transfer recyclables. It is unknown at this time what the status of the approval for this site is; it was posted to the Environmental Registry in April 2014.<sup>23</sup>

## **4 Comparison of Assumptions**

The MIPC study included significant cost modelling for various MRF and transfer station scenarios. This section discusses some of the assumptions used in the MIPC study and how they compare to Kingston's MRF currently.

In general, costs were developed in the MIPC study for six types of facilities:

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<sup>23</sup> EBR Registry Number 012-1610

- Dual Stream Small MRF – 6 tonnes per hour (tph)
- Dual Stream Medium MRF – 14 tph
- Single Stream Small MRF – 14 tph
- Single Stream Intermediate – 20 tph
- Single Stream Medium – 32 tph
- Single Stream Large – 64 tph

Theoretically, the Kingston MRF would be categorized as a Small Dual Stream MRF operating with two shifts. Kingston's MRF falls between a one-shift and two shift facility in terms of the number of FTEs, sorters and the annual incoming tonnes. In the MIPC study, the operating budget modelling<sup>24</sup> assumes a dual stream MRF is managing 10,492 tonnes annually. With the addition of a second shift, this tonnage is doubled. The annual tonnage currently managed at Kingston's MRF is approximately the same as that assumed for a single-shift dual stream MRF. In part due to the lesser amount of material managed, the throughput at Kingston's MRF is 3.3tph, while the MIPC study assumes that a small dual stream MRF would have a throughput of 6 tph.

The MIPC study included estimates for capital and operating costs based on certain assumptions, primarily regarding labour. These costs were used to develop MRF cost curves. Capital costs were developed for the above types of facilities. For labour assumptions<sup>25</sup>, costs were developed for each type of facility, but further refined for one and two shift scenarios.

Table 4-1 presents a comparison of some of the cost model assumptions used in the MIPC study compared to the existing Kingston MRF. It was assumed that the maximum capacity of the MRF would be achieved by running for 6 days a week on a full two-shift schedule. Currently, the MRF operates for 5 days only, with only one shift on Fridays. The practical maximum capacity<sup>26</sup> of 14,414 tpy is based on 14 hours per day, 6 days per week, 52 weeks per year which works out to 4,368 hours per year with a throughput of 3.3tph. Based on the 2014 projected tonnes of 10,808 (not including glass), the MRF is currently operating at 75% capacity.

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<sup>24</sup> Table 6: Operating Budget Summary - Volume 3: Cost Modelling

<sup>25</sup> Table 5: Labour Assumptions - Volume 3: Cost Modelling

<sup>26</sup> Based on similar calculations in MRF Capacity and Capability Assessment Report, AECOM, 2011

**Table 4-1: Comparison of Cost Model Assumptions**

Category	MIPC Study	Existing Kingston MRF
Type of facility	Dual Stream Small Facility	Dual Stream Small Facility
Assumed Average operating % of rated capacity	85%	75%
Assumed Productive hours per 8 hour shift	7.5	7
Sorting tph/sorter	0.50	0.41
Level of mechanization	Mechanical glass separation and manual sort for other materials	Glass is kept separate in outside bunker, manual sort for other materials

Source: MIPC Study: Volume 3 Cost Modelling, Table 3

Table 4-1 below presents a comparison of Kingston's MRF to one and two shift small dual stream MRF scenarios used in the MIPC Study for the labour assumptions used to develop the costing.

**Table 4-2: Comparison of Labour Assumptions**

Category	MIPC Study		Kingston MRF
Number of shifts	One shift	Two shifts	Two shifts Mon-Thurs, one shift Friday
Type of Processing	Dual Stream Processing	Dual Stream Processing	Dual Stream Processing
Sorter productivity (tph/sorter)	0.50	0.50	0.41
# sorters	13	26	16
Total FTE	17	33	22

Source: MIPC Study: Volume 3 Cost Modeling, Table 5

## 5 Limitations of the MIPC Study

The following points outline a number of limitations of the MIPC study that will be considered during the development of the Technical Plan and Business Case.

1. Option 1 assumes that there would be a MRF in Ottawa with a capacity of 102,572 tonnes as well as a MRF in Kingston with a capacity of 35,521 tonnes and that material from Eastern Ontario municipalities would be processed at the closest MRF depending on geographic proximity. None of the options considered a Regional MRF located in Kingston only. It was assumed that the

primary MRF would be located in Ottawa given the volume of material generated within the City of Ottawa. Should Ottawa continue to make use of a private facility, the primary Regional MRF could be located in Kingston which is the premise upon which this Regional MRF study is based. In this scenario, that material which was slated to be processed at the Ottawa MRF could be available to Kingston. The MIPC study assumed material would flow to the closest public MRF (see Table 7 in Volume 4: Eastern Ontario). Should additional material be available to a MRF located in Kingston, the cost per tonne would decrease compared to the estimates in the MIPC study which were based on the assumption that there would be two MRFs (one in Ottawa and one in Kingston).

2. The MIPC study had to make a number of assumptions in order to develop a standard set of costs for various facilities, which included costing for new MRF facilities only. Therefore the costs used to develop the recommendations in the MIPC study would not reflect the fact that there is already an existing MRF in Kingston which could be upgraded at a lower cost than constructing a new facility. The cost per tonne would be lower for an upgraded facility than for a new facility due to the reduced capital costs. This will be reflected in the new system costs developed for a Regional MRF in Kingston based on upgrading the existing MRF.
3. For system modelling purposes, single stream collection (i.e. all recyclables are collected commingled) was assumed for two main reasons; 1) cost estimates would be more conservative (since processing costs can be higher than for dual stream recycling) and 2) there appears to be overall system benefits as single stream collection systems are implemented. As part of the study, estimates for Kingston to modify their collection system will be developed to identify any potential savings in collection costs to move to single stream collection (or some variation from their existing 4-stream collection system).
4. In its current state, the existing MRF in Kingston does not satisfy some of the assumptions for a small MRF as described in the MIPC study (e.g. number of FTE, annual incoming tonnes). The existing MRF could be considered a small dual-stream MRF operating on two shifts, however, due to current limitations in the MRF operation, has a throughput more comparable to a small single-shift dual stream MRF. The upgrades being considered in the Technical Plan will place the MRF more in line with the MIPC assumptions for labour and throughput for a small two-shift dual stream MRF, medium dual stream MRF or a small single stream MRF. A comparison of the assumptions used in the MIPC study is presented in Section 4 of this Technical Memo.
5. The MIPC study assumes that all existing private MRFs and transfer stations would become transfer stations, under Baseline C (e.g. Manco, Tomlinson

Environmental Services, Waste Management facilities in Beckwith and Brockville) with the exception of Metro Waste Recycling in Ottawa. It is unclear why the MIPC study has assumed that these private facilities would convert their operations and would not continue to operate as normal, providing services to surrounding municipalities and/or businesses. This study will assume that private operations would continue to operate as normal, and that material which may be processed privately could also be available to a Regional MRF in Kingston.

## 6 Impact of Local Considerations

In the context of a Regional MRF in Kingston only, there is some uncertainty in the potential tonnages available for processing, due to the fact that there may be potentially more municipalities that may wish to send material to the Kingston MRF instead of to the Ottawa MRF and the likelihood of private MRFs and transfer stations remaining in existence. As part of this study, the level of interest of Eastern Ontario municipalities in utilizing processing capacity at the Kingston was assessed using a survey and follow up phone calls, the results of which will be documented in Technical Memo #2. It appears that there will be sufficient tonnage to make a Regional MRF in Kingston a viable option. This study will be examining four options for providing the required services at the existing MRF; a 15,000 tonnes/year dual stream MRF, a 15,000 tonnes/year single stream MRF, a 25,000 tonnes/year dual stream MRF, and a 25,000 tonnes/year single stream MRF, any of which would be capable of processing the potential tonnage available. Part of the decision making process and business case development will also include an assessment of the types of programs in surrounding municipalities (e.g. single or dual stream) to assist with estimating the potential tonnage available for processing. Dual stream collection programs have more processing options as material that is not commingled can be processed at either a single or dual stream facility.

One of the issues raised as a result of the municipal engagement portion of the study was contract alignment. Many municipalities have existing contracts with private service providers, either for processing only or for collection and processing. Some municipalities have joined with other municipalities to negotiate better contracts with private service providers for multi-municipal collection and processing of recyclables. It will be important to be aware of some of these contractual obligations when planning for the Regional MRF.

Transfer will be another important local consideration as many municipalities are located at a distance from Kingston that direct haul is not cost-effective. An assessment of haul distances and times will be conducted as part of the Technical Plan and

Business Case in order to identify hauling options for municipalities sending material to Kingston's MRF.

## 7 Conclusions

The MIPC study provides a baseline upon which the City can compare the assumptions used to develop a Regional MRF in Kingston. The results will differ from the MIPC study due to the fact that the existing MRF will be used in some capacity, thereby reducing the capital costs and will reflect some of the local considerations in Eastern Ontario.

The MIPC study provides a number of parameters relating to potential designs of MRFs that the City can consider; a small dual stream MRF operating on one or two shifts, a medium dual stream MRF or a small single stream MRF, depending on the tonnage potentially available for processing.

With respect to deciding on the potential size of the facility, the City will have the information necessary to:

- estimate the potential tonnes available as a result of interest expressed through the municipal engagement portion of the study,
- identify those municipalities who operate single or dual stream collection; and,
- Identify contract end dates either through discussions with the municipalities themselves or information available through CIF.

Both the Technical Plan and Business Plan will allow the City to assess the details of the preferred scenario against the assumptions in the MIPC study and will assist the City with their decision about whether or not to proceed with the development of a Regional MRF in Kingston.

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# Appendix B

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Technical Plan and Business Case



## **Kingston Regional MRF Study**

Task 3: Technical Plan and Business Case Development

Technical Memorandum #2 - FINAL

June 2, 2015

This Project has been delivered with the assistance of the Continuous Improvement Fund, a fund financed by Ontario municipalities and stewards of blue box waste in Ontario. Notwithstanding this support, the views expressed are the views of the author(s), and CIF, Waste Diversion Ontario and Stewardship Ontario accept no responsibility for these views.

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# 1 Introduction

Task 3 of the Kingston Regional Material Recovery Facility (MRF) Study encompasses the development of a Technical Plan and Business Case to assist in identifying a preferred approach for the development of a regional MRF to serve Kingston and other municipalities in Eastern Ontario. This technical memo includes a review of the existing Kingston MRF, to establish its current condition and operating parameters, in order to establish a baseline for further assessment, a summary of the municipal engagement process, the Technical Plan and Business Case.

A critical part of the regional MRF study is confirmation of municipal interest. This memo also provides a summary of the results of the municipal engagement process used to confirm the tonnage of material potentially available for processing. Expansion of the City of Kingston's MRF is predicated on additional quantities of material requiring processing from other Eastern Ontario municipalities. For more information on municipal engagement through this process and in particular, indications of interest in participating from neighbouring municipalities, please see the Task 4 memo entitled "Municipal Data Collection, Interest & Engagement".

In order to develop the Technical Plan, the study team, composed of staff from HDR, Entec Consulting and Marshall Industrial conducted site visits to the existing Kingston MRF. A review of the building and equipment condition was conducted in order to assess the extent of any modifications and/or upgrades required to the existing MRF to enable it to handle additional material. Machinex Industries also assisted with the development of process layouts and site plans for alternate configurations of the MRF for the different operating options as a potential regional facility. Three operating scenarios for a regional MRF, as identified by the City, were then developed at a conceptual level of detail to facilitate a comparison of the options to the baseline.

As part of the Business Case development, capital and operating costs were developed by Entec Consulting and HDR for a MRF capable of processing 15,000 tonnes per year (tpy) and 25,000 tpy of recyclables in either Dual Stream or Single Stream (all materials commingled) configurations. These options were developed as a potential modification and/or an expansion of the existing MRF as well as a new replacement MRF.

## 2 City of Kingston Baseline System

The following sections provide an overview of the City of Kingston's curbside and depot recycling program, composition of recyclables managed at the MRF, a review of the existing MRF including an assessment of the building and equipment condition, and recycling program financial information.

### 2.1 Curbside and Depot Recycling Program

This section provides an overview of the City of Kingston's current recyclables collection program, including how recyclables are collected, both curbside and at the recycling depot, the material types currently accepted and an estimate of material composition and quantities generated/managed.

### 2.1.1 Recyclables Collection

The City of Kingston provides collection service to 45,399 single family households and 8,519 multi-family households<sup>1</sup>. Single family recyclables are collected in four streams using 64L blue and grey boxes for containers and fibres respectively which are collected on alternate weeks (one week blue boxes, one week grey boxes). Residents sort their containers into the blue box, fibres into the grey box and old corrugated cardboard (OCC) is bundled separately. Collection crews remove glass from the blue box at the curb and keep it separate from the rest of the recyclables. Clear and coloured glass is no longer kept separate.

Multi-family buildings use combination of 360L carts and blue boxes for the collection of recyclables. Separate carts are provided for the collection of fibres, containers, and glass containers. Smaller buildings use blue boxes for glass.

Recyclables are collected by both Progressive/BFI<sup>2</sup> and the City of Kingston; the City only collects in the downtown core and inner city area. Materials are brought to the Kingston Area Recycling Centre (KARC), where the City of Kingston's MRF is located and either sorted in the MRF or baled (e.g. OCC). KARC is located at 196 Lappan's Lane in Kingston and is open to the public from Monday to Friday from 8 am to 5 pm and Saturdays from 8 am to 4 pm. Residents can also drop off recyclable materials directly at KARC as well as yard waste, Christmas trees, household hazardous waste, batteries and printer cartridges. Figure 2-1 presents a view of KARC from Lappan's Lane.

**Figure 2-1: Kingston Area Recycling Centre (KARC)**



The following recyclable materials are collected in tipping bins at the KARC; OCC, styrofoam, glass, fibres, and containers. Fibres and containers are processed in the MRF; other source separated materials are tipped directly in bunkers and baled. It is important to note that the KARC also processes recyclables from outside the City of Kingston, that being South Frontenac and Loyalist Township.

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<sup>1</sup> Waste Diversion Ontario (WDO) Municipal Datacall 2013

<sup>2</sup> Note: BFI is now operating as Progressive Waste Solutions, Inc.

The Industrial, Commercial and Institutional (IC&I) sector can also drop off recyclables at the KARC, however, curbside collection service is not provided by the City of Kingston to this sector.

The following materials are currently acceptable in the City of Kingston's recycling program:

#### Blue Box

- plastic food and beverage containers
- styrofoam
- aluminum and steel cans
- glass food and beverage bottles and jars

#### Grey Box

- paper products
- newspapers
- boxboard
- milk & juice cartons
- juice boxes
- coffee cups
- plastic bags
- film plastic

#### Cardboard

- collected on grey box week
- flattened and bound or loose in the box

### **2.1.2 Projected Tonnes of Recyclables**

The following Table 2-1 presents the actual tonnes for 2012 to 2014, the budgeted tonnes for 2015 to 2018 and the projected tonnes to 2030 for recyclables managed at the MRF collected and received at the MRF for processing from the City of Kingston, South Frontenac and Loyalist Township.

Overall, the quantities of recyclables potentially managed at the MRF from existing sources, are projected to increase minimally, due to estimated decreases in tonnages of newsprint, boxboard and mixed glass from 2015 to 2030 and minimal increases in tonnages of other materials.

Table 2-1: Actual, Budgeted and Projected Tonnes of Recyclables (2012 – 2030)

	2012 Actual	2013 Actual	2014 Actual	2015 Budget	2016 Budget	2017 Budget	2018 Budget	2020 Projected	2022 Projected	2024 Projected	2026 Projected	2028 Projected	2030 Projected	Assumed Rate of Increase
Newsprint	6,243	5,962	5,717	5,550	5,525	5,500	5,475	5,425	5,376	5,327	5,278	5,230	5,182	-0.5%
Cardboard	1,907	2,077	1,967	1,920	1,930	1,940	1,950	1,970	1,990	2,011	2,031	2,052	2,073	0.5%
Boxboard	385	387	383	345	340	335	330	320	310	301	292	283	275	-1.5%
Polycoat	105	119	108	105	110	110	115	125	136	148	161	175	191	4.3%
#1 PET	448	460	470	485	490	495	500	510	520	531	541	552	563	1.0%
#2 HDPE	157	162	159	168	170	173	175	179	183	187	192	196	201	1.2%
#2, #4 & #5 Film	168	188	196	177	180	183	185	189	193	198	202	206	211	1.1%
All Plastics (no bottles)	492	561	556	560	590	620	640	680	723	769	817	868	923	3.1%
#6 Polystyrene	36	46	40	42	42	42	42	42	42	42	42	42	43	0.1%
Aluminum	193	212	194	200	202	205	207	211	215	220	224	229	233	1.0%
Steel	371	394	386	380	380	375	375	376	377	377	378	379	380	0.1%
Clear Glass	248	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Mixed Glass	764	941	804	890	880	870	860	840	821	802	783	765	747	-1.2%
Total	11,519	11,508	10,981	10,822	10,839	10,848	10,854	10,868	10,887	10,912	10,943	10,979	11,022	

Source: 2015 Revenue and Tonnage Projections  
emailed by J. Giles on Feb 11, 2015

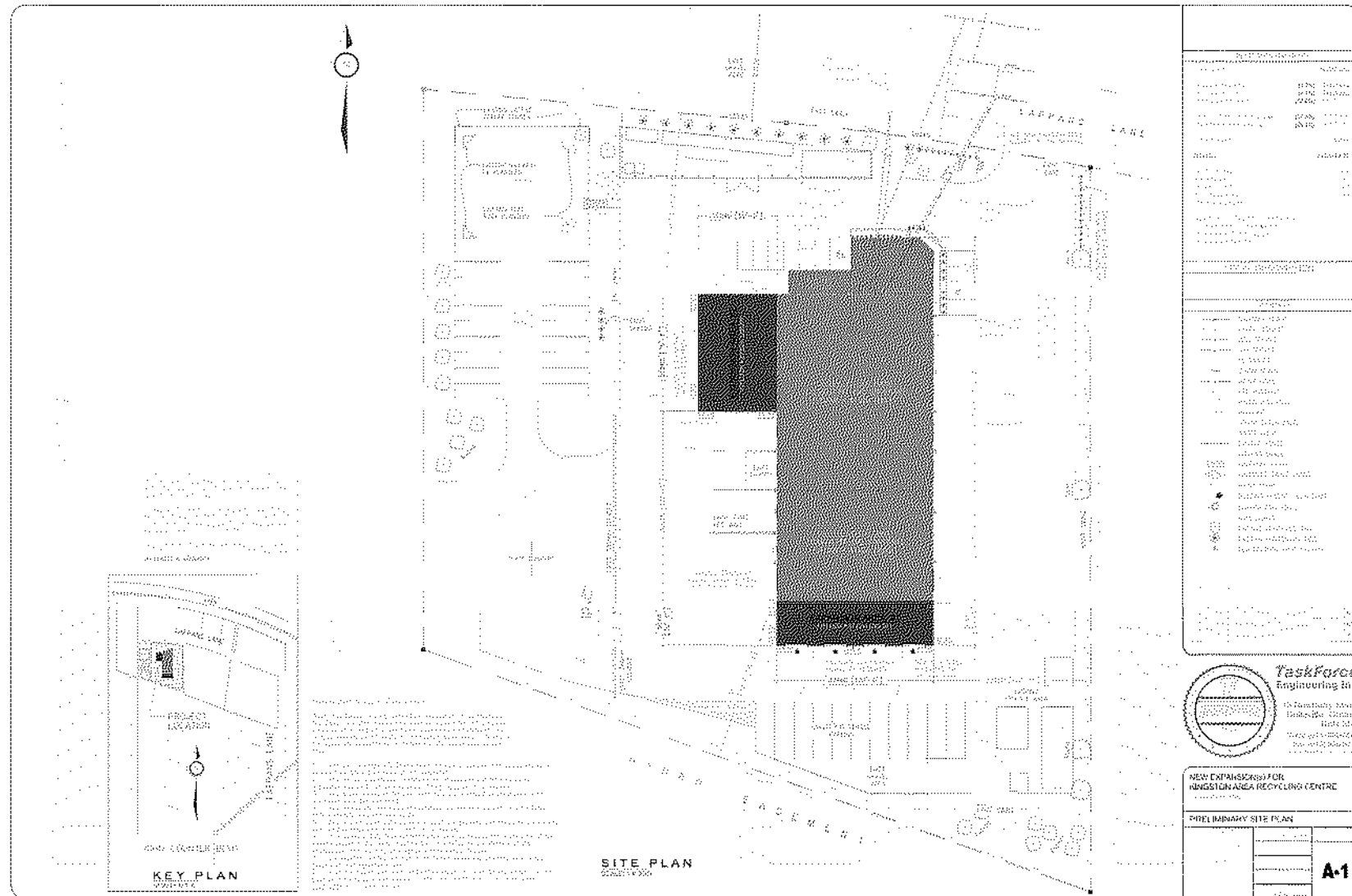
## 2.2 Existing City of Kingston MRF

The recyclables collected through the City of Kingston's recycling program and from other generator sources are taken to the City of Kingston's existing MRF for processing. This section provides an overview of the existing MRF operation and condition in order to provide a baseline for the comparison of future alternatives relative to the development of a regional MRF in Kingston.

### 2.2.1 Overview of Processing Operations/Methodology

The City of Kingston's MRF is located at the Kingston Area Recycling Centre (KARC) site at 196 Lappan's Lane. The MRF is located approximately in the centre of the site, accessed through the northeast entrance from Lappan's Lane. Within the KARC boundaries, there is parking for employees, an HHW depot, glass bunker, public drop-off area and a weigh scale. The entire site has an area of 16,317 m<sup>2</sup>. The existing KARC layout is presented in Figure 2-2.

Figure 2-2: Existing Site Layout



The MRF has undergone a series of expansions over the years. The original 1,161 m<sup>2</sup> (12,500 ft<sup>2</sup>) MRF was constructed in 1989. In 1995, the MRF was expanded with an addition to the plant area of approximately 650 m<sup>2</sup> (7,000 ft<sup>2</sup>) (noted as Expansion Area #1 on Figure 2-2) and an additional 185 m<sup>2</sup> (2,000 ft<sup>2</sup>) of administration area. In 2008, another expansion (noted as Expansion Area #2 on Figure 2-2) was undertaken, with the tipping floor increased by 278 m<sup>2</sup> (3,000 ft<sup>2</sup>) and the storage area increased by 348 m<sup>2</sup> (3,750 ft<sup>2</sup>), bringing the total building area of the MRF to 2,678 m<sup>2</sup> (28,830 ft<sup>2</sup>). As per Certificate of Approval A380107 (originally issued on September 20, 1989), the storage capacity of the site is a maximum of 450 tonnes at any one time.

The MRF is owned by the City of Kingston and is currently operated by Progressive/BFI. Progressive/BFI has operated the MRF since 2006 under a 6 year contract with a one year extension. The contract expired on September 27, 2014; City Council awarded Progressive/BFI a three year processing contract with an optional one year extension.<sup>3</sup> The MRF is a two stream facility (containers and fibres) which processes material from the City of Kingston, Loyalist Township and South Frontenac. Collection vehicles arrive at the KARC and access the MRF building to unload recyclables onto the appropriate area of the tipping floor, depending on material type. Glass is sorted at the curbside and is tipped outside the MRF building and stored in a bunker.

The MRF utilizes what is referred to as a “modified” Dual Stream processing system (i.e. fibre materials and containers are sorted separately) that sorts and processes recyclable materials to be sold for further processing. The collected glass containers are stored in an outside bunker, cleaned of contaminants, and shipped when sufficient quantities have been received. The MRF also manages cardboard (OCC) separated at the curb and also delivered loose by the IC&I sector.

The MRF processed 10,995 tonnes of material in 2014, comprised of 1,805 tonnes of containers, 8,372 tonnes of fibre, 804 tonnes of glass, and 14 tonnes of scrap metal. The material received at the Kingston MRF was generated within the City of Kingston (curbside and drop-off), surrounding municipalities (Loyalist Township and South Frontenac) and the IC&I sector.

The MRF is typically<sup>4</sup> operated with 11 full time equivalent (FTE) staff per shift. Each shift is staffed by four sorters on the fibres line, four sorters on the containers line, two floor operators and one lead hand. The MRF operates with two eight-hour shifts from Monday to Thursday (first shift 6:00 am to 2:00 pm, second shift from 3:00 pm to 11:00 pm) and one eight-hour shift on Fridays (6:00 am to 2:00 pm). Each eight-hour shift includes seven hours of operation, a 30 minute lunch break and two 15 minute breaks.

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<sup>3</sup> City of Kingston, Report to Council, April 15, 2014, Award of Contract – Supply of Operations Services for the City of Kingston Material Recovery Facility (Report No. 14-133)

<sup>4</sup> Seasonal variations in waste quantities can result in changes to overall staff complement depending on the time of year.

The MRF's throughput is based on the number of annual operating hours and tonnes processed as follows:

- The MRF runs for 63 hours of operational time per week (14 hours of operating time per day for 4 days from Monday to Thursday and 7 hours of operating time for one day on Friday)
- The MRF operates 52 weeks per year (stat holidays are made up on the following Saturday)
- Total operational time is 3,276 hours per year (63 hours/week x 52 weeks/year)
- Fibre throughput (based on the 2014 tonnes) is 2.55 tonnes per hour (8,372 tonnes/3,276 hours per year)
- Container throughput (based on the 2014 tonnes) is 0.55 tonnes per hour (1,805 tonnes/3,276 hours per year)
- Glass throughput (based on the 2014 tonnes) is 0.25 tonnes per hour (804 tonnes/3,276 hours per year)
- Total throughput is 3.35 tonnes per hour (2.55 + 0.55 + 0.25 tonnes per hour).

## 2.2.2 Existing MRF Building Condition Assessment

The following sections present the results of the MRF building assessment conducted by HDR and a discussion of the issues associated with reconfiguring and/or expanding the MRF.

### 2.2.2.1 Scope of Assessment

An assessment of the existing MRF building was undertaken to confirm the condition of the building for its ongoing and future use. The potential redevelopment of the facility as a regional MRF may require modifications to the building to accommodate increased tonnages. The purpose of the assessment was to establish the physical condition of the building and the ability to expand, if necessary, at the current location.

The assessment was carried out by HDR's James Huang and Jeff Martirano on December 9, 2014 during normal operating hours of the facility. The condition of the building envelope, fire protection, natural gas, service water, and HVAC systems were evaluated. Relevant photos from this inspection are included in **Appendix A**.

Prior to completing this assessment, HDR reviewed the Capacity and Capability Assessment Report prepared in January, 2011 by AECOM. This report contains detailed information on the building design, square footage of different areas, and history of expansions. This report should be referenced for this information and is not duplicated in this report. In general, HDR concurs with the overall useful life assessments of the building envelope, fire protection, and HVAC systems which AECOM projected in its report. Rather than restate information previously documented in that report, the following sections focus on system specific findings and their effects on the feasibility of expanding the existing facility to accommodate future expansion.

### 2.2.2.2 Existing MRF Building Structure

In general, the overall building envelope appeared to be in good general condition and the following are some specific observations and deficiencies made by HDR during the site visit.

- 1) There was no observed cracking or scoring on the exterior perimeter block walls and foundation.
- 2) The metal siding was in good condition with the exception of some minor damage to the metal cladding, typically around the perimeter of the roll up doors.
- 3) The parging on the exterior of the administrative building foundation wall was flaking off and should be scraped and repaired.
- 4) The roof drains for the entire facility deposit water at the base of the building, potentially leading to pooling and/or freezing water which could damage the foundation and present safety issues. It should be noted that while no damage of the foundation was observed beyond staining and discolouration, other damage may still be occurring below grade.
- 5) Weeds were observed to be growing from the roof gutter on the east side of the building. These gutters should be cleaned of debris.
- 6) Staining was observed beneath the louvres on the east side of the building; possibly as a result of the gutters overflowing in this location or wind-driven precipitation. A change to a stormproof louvre type in addition to proper caulking around the perimeter of the louvre will help alleviate the water infiltration.
- 7) Although not part of the building structure, the interior building insulation vapour retarder was observed to be degrading in several contained locations, particularly in the original building. The vapour retarder was torn and falling down with its insulation exposed in many locations on the roof and walls. This type of degradation is quite typical of mechanical damage or possible moisture infiltration through the building envelope.
- 8) According to plant personnel, there are leaks in the roof in some locations throughout the facility. HDR was unable to gain access to the roof to determine the extent of any degradation to the roof itself and plant personnel believe the leaks are occurring at the roof joints. They have indicated the leaky water is not contaminated with rust which supports the position that the metal roof itself is not degrading. An inspection of the metal roof and its lap joints is recommended.
- 9) The tipping floor roll-up doors are slightly bent outward from fibre and containers being pushed against them by a loader.
- 10) The majority of the interior structural columns are not protected by bollards or concrete encasement and a few have suffered minor impact damage from front end loaders. One column in particular has significant damage and is visibly bowed and structurally compromised as evident by the gap at the roof joint. It is recommended that this column be further assessed for repair or replacement by

a structural engineer. In general, it is recommended that all exposed interior columns be protected from impacts by either encasement in concrete to a height of 1.07m or have 1.07m bollards placed around each column.

- 11) The original building and 1995 addition were built to the older versions of the Ontario Building Code enforced at that period. Since 2006, the Ontario Building Code has evolved to include a new seismic requirement for structures. Typically structures preceding the 2006 Code do not comply with the new seismic requirements. The 2008 additions to the facility fall under the 2006 Code and should be compliant.
- 12) A haze was noted in the MRF during the visit but plant personnel noted an air quality study was recently undertaken with no issues detected.
- 13) The facility is equipped with a hydraulically operated wet sprinkler system. According to the inspection tag on the fire protection valve station, the fire protection system was recently inspected in September, 2014 and the alarms, static and residual water pressure, and water flow time was all checked. Prior to this inspection, the system was previously inspected in February, 2014.
- 14) The facility is equipped with a central air system which provides heating and cooling to the fibre and container sorting lines as well as to the administrative building. According to the Supervisor of Solid Waste Disposal, these components are inspected routinely and belts and filters are changed on a quarterly basis. Performing this routine preventative maintenance is critical to extending the useful life of the equipment.
- 15) In addition to the central air system, the facility contains approximately 16 natural gas fired unit heaters which supply heat in the wintertime. According to plant personnel these are all functional, though one was observed to be purposely removed from operation on the north side of the building.
- 16) The facility utilizes service water for cleaning purposes and a valve for a hose attachment was observed on a structural column on the south side of the building. The valve was not leaking and there were no deficiencies noted. In addition, the facility utilizes compressed air for cleaning purposes and to sort feedstock. A compressor and tank was observed below the fibre sorting line and was observed to cycle on during the site visit. No deficiencies were noted.
- 17) A new electrical room was added as part of the addition in 1995. A December 2008 Electrical System report indicated a 600v, 400 amp service. A proper electrical load study should be carried out to gauge system capacity for additional loads.

### **2.2.3 Existing MRF Equipment Condition Assessment**

As part of the City of Kingston's regional MRF Study, an assessment of the condition of all processing equipment within the existing MRF was completed. The purpose of the

assessment was to determine the condition of the process equipment and estimate the useful life remaining of the various components.

The assessment was carried out by Bob Marshall of Marshall Industrial and Jeff Martirano of HDR on August 13, 2014 during normal operating hours of the facility. All of the process equipment was inspected to determine its mechanical and operational condition and the remaining useful life. The equipment items reviewed and the specific aspects assessed are documented in the “Equipment Condition Matrix” found in **Appendix B**. Additionally, a list of the processing machinery at KARC as provided by the City can be found in **Appendix B**. As applicable to the specific equipment item, the following Table 2-2 outlines how the equipment was assessed.

**Table 2-2: Equipment Assessment Criteria**

Component	Criteria and Method of Assessment
Equipment drive condition	<ul style="list-style-type: none"> <li>Assessed through hand touch temperature test (when too hot to touch this usually indicates an overheating motor).</li> </ul>
Drive seal condition	<ul style="list-style-type: none"> <li>Assessed visually (looking for fluid leakage on gear box).</li> </ul>
Drive oscillation	<ul style="list-style-type: none"> <li>Assessed visually (severe oscillation is typically indicative of warped/bent shafts).</li> </ul>
Bearings	<ul style="list-style-type: none"> <li>Assessed through hand touch temperature test and audibly (overheating or excessive noise is typically indicative of a damaged bearing, low oil or damaged gears).</li> </ul>
Idlers	<ul style="list-style-type: none"> <li>Assessed visually for obvious issues such as misalignment, improper rotation, worn idlers, debris build-up etc.</li> </ul>
Head and tail shafts	<ul style="list-style-type: none"> <li>Assessed visually for obvious issues such as misalignment, improper rotation, etc.</li> </ul>
Belt condition	<ul style="list-style-type: none"> <li>Assessed visually for obvious issues such as excessive wear, tears, holes, etc.</li> </ul>
Belt splice	<ul style="list-style-type: none"> <li>Assessed visually for obvious issues such as improper connection, tears at the splice, etc.</li> </ul>
Belt tracking	<ul style="list-style-type: none"> <li>Assessed visually for obvious issues such as tracking to one side (Note: poor belt tracking is a common occurrence at MRFs and it is acknowledged that belts can often still convey material reasonably well even if off track. As a result, this assessment was limited to noting of fairly severe cases of tracking issues where the belt was observed to be contacting and nearly contacting the side walls).</li> </ul>
General	<ul style="list-style-type: none"> <li>Condition of the baler including operation, structural, auto-tier and hydraulic system.</li> </ul>
Other equipment	<ul style="list-style-type: none"> <li>Reviewed other equipment including the plastic perforators, ferrous metal (Fe) separator and the eddy</li> </ul>

Component	Criteria and Method of Assessment
	current separator.

Specific aspects reviewed for each piece of equipment are shown in the “Equipment Condition Matrix” worksheets included in **Appendix B**. The worksheets are separated by equipment type. For each piece of equipment assessed, the aspects reviewed were assigned indicators which are described on the worksheet under abbreviations. Comments have also been provided where areas of concern were identified.

Where items are noted as “NOA” (No Access) on the worksheet, they were typically not reviewed due to access issues. For example, there are some bearings, motors and other equipment components at the MRF that are inaccessible unless accessed using a scissor lift or other specialized equipment. Notwithstanding the fact that some equipment components could not be accessed and reviewed, the review team indicated that sufficient investigation was done on these pieces of equipment to establish that there were no major equipment concerns. Equipment drives, bearings and idlers (typically the items that could not always be access and reviewed) do not represent large cost items.

Based on observations made during the field work, it was determined that the existing MRF process equipment is in reasonably good working order and the maintenance department is making the necessary repairs to equipment when required. The conveyor belts on the fibre and container sorting lines should be replaced soon as they are worn and torn.

If the equipment continues to be well maintained and kept reasonably clean, it should be able to operate for another 5 to 7 years. It must be understood that there will be consumable components requiring replacement throughout the operating life of the equipment such as conveyor belts, bearings and shafts, wear liners and other miscellaneous parts.

## 2.3 Comparison of Select WDO Datacall Metrics

As part of the regional MRF assessment, the City also wishes to investigate the advantages and disadvantages of moving to a Single Stream collection program. HDR used 2013 WDO Datacall information, the most recent year for which a full dataset was available, to compare Kingston’s performance for a number of metrics to other municipalities with Dual and Single Stream programs.

In terms of municipal groupings used by WDO for the Datacall process, Kingston is considered to be in the “Rural Regional” category. Information from municipal websites was used as well as 2013 WDO Datacall, to compile information about other recycling programs. HDR compiled data from the four largest WDO municipal groupings (Large Urban, Urban Regional, Medium Urban, Rural Regional) in order to include some municipalities more comparable to Kingston in terms of population, number and type of households. Kingston’s current performance was compared to a larger group of

comparative Dual Stream programs in four municipal groupings and to other municipalities within the WDO Rural Regional Group.

The municipalities in the large urban municipal grouping, although far larger than the City of Kingston in terms of tonnes of blue box material marketed and households served, were included since they are predominantly Single Stream programs. These large urban programs have been used as comparators in many studies about Single Stream programs; however, since they are so much larger than the City of Kingston, other municipal groupings were included in the analysis to provide a broader representation of Single and Dual Stream programs. This resulted in the identification of 24 municipalities with similar Dual Stream programs and 8 municipalities operating Single Stream programs.

Municipal recycling programs were categorized as either Single or Dual Stream programs, even though some municipal recycling programs collect more than two separate streams of material (e.g. Kingston, and Bruce Area Recycling). There may be other municipalities who also collect more than two streams; however, it was not always evident from information available how materials were handled during collection. Where applicable, this information was used to compare metrics for Single and Dual Stream programs for these four groups.

To conduct an assessment of the difference between Single and Dual Stream recycling programs, the following metrics were used; materials recovered, costs (collection, gross cost per tonne of recyclables marketed, net cost), and revenue. The following sections provide an overview of the results of the assessment using 2013 WDO Datacall as appropriate. It should be noted that a single year of data may not be representative for some municipalities; for instance, program changes such as new contracts or adjusted services may skew results. Supporting tables and graphs can be found in **Appendix C**.

### **Materials Recovered**

WDO calculates the tonnes of recyclables collected as a function of the number of households and reports it on a kilogram per household (kg/hhld) basis. The average kg/hhld for Single Stream programs was 180 kg/hhld compared to 167 kg/hhld for Dual Stream programs. Kingston recovered 175 kg/hhld which is in the mid-range between Single and Dual Stream programs.

Within the Rural Regional municipal grouping, Kingston performed better than the average of 150 kg/hhld. Recovered material rates ranged from a low of 94 kg/hhld (Chatham-Kent) to a high of 196 kg/hhld (Sudbury).

### **Costs and Revenue**

Comparing collection costs is difficult due to differences in population, density, type of collection (manual vs automated), and containers (bags, boxes or carts). Single Stream collection has the potential to be more cost-efficient through reduced stop times and more efficient use of vehicles (e.g. one compartment not topping out before the other). Automated, cart-based Single Stream collection would demonstrate further cost savings

through the reduction in number and size of collection crews, improved route efficiency and reduced worker compensation costs.

### **Gross Cost**

The gross cost per tonne includes items such as costs for collection, depot and processing costs for municipal and contracted service providers, promotion/education, interest on municipal capital and administrative costs etc. as per the reported WDO datasets.

The average gross cost for Single Stream programs was \$395/tonne; Dual Stream programs had a gross cost of \$347/tonne. Kingston's gross cost, at \$417/tonne was higher than the average for both Single Stream and Dual Stream programs. There is a considerable range between costs for Single Stream programs; from \$219/tonne for Halton Region (noting that limited revenue was reported) to \$514/tonne for Northumberland County. For Dual Stream programs, costs ranged from \$149/tonne for Thunder Bay (note that no revenue was reported so this number is the net cost per tonne) to \$593/tonne for Muskoka.

In the Regional Rural municipal grouping, Kingston's gross cost of \$417/tonne is less than the average gross cost of \$424/tonne. Gross cost per tonne marketed ranged from \$261 for Chatham-Kent (note that very limited revenue was reported so this number is close to the \$260 net cost per tonne) to \$593 for Muskoka. It should be noted that revenue may be part of operating contracts for some municipalities; the amounts of which would be contractually confidential. This contributes to the large range of gross costs per tonne which may not be reflective of true costs.

### **Revenue**

The average gross revenue per tonne of recyclables marketed was \$98/tonne for Single Stream programs. The average gross revenue for Dual Stream programs was \$111/tonne. It should be noted that three municipalities reported no revenue (Thunder Bay, Barrie and Chatham-Kent). These municipalities were not included in the calculations for average gross revenue as the results would have been skewed. Kingston's gross revenue was \$122/tonne, well above the average for both types of programs.

The average gross revenue for Single Stream programs was approximately \$98/tonne, ranging from \$27/tonne (Halton Region) to \$136/tonne (Sarnia). For Dual Stream programs, the average was approximately \$111/tonne, ranging from \$38/tonne (Sault Ste. Marie) to \$156/tonne (Bruce Area).

For the Regional Rural municipal grouping, Kingston's revenue was in the upper range of the municipalities at \$122/tonne compared to the average revenue of \$107/tonne. Revenue ranged from \$44/tonne marketed (Kawartha Lakes) to \$156/tonne marketed (Bruce Area).

## **Net Cost**

Net cost is calculated by subtracting the revenue from the gross costs. The average net cost for Single Stream programs was \$296/tonne compared to an average net cost of \$250/tonne for Dual Stream programs; a difference of \$46/tonne. Overall, Kingston's net costs at \$296/tonne are equivalent to Single Stream program costs and greater than Dual Stream program costs.

There are many factors influencing costs, ranging from frequency in collection, geographic area, changes to programs, types and lengths of contracts, maturity of program, types of customers (single family, multi-family) etc. Single Stream program net costs ranged from \$147 (Sarnia) to \$415 (Northumberland County) per tonne; Dual Stream program net costs ranged even more widely from \$117 (Peterborough) to \$520 (Muskoka) per tonne.

Kingston's net cost, at \$296/tonne, was lower than the average net cost for the Rural Regional municipal grouping at \$324/tonne. Net costs ranged from \$158/tonne (North Bay) to \$520/tonne (Muskoka).

## **Examination of Differences in Recycling Programs**

The information presented above does not take into consideration differences in recycling programs operated by municipalities. There are differences in collection frequencies (weekly, every two weeks, alternating weeks), collection containers (boxes, bags, carts), density (urban, suburban or rural), and types of material collected, to name just a few. To illustrate this, HDR collected 2013 WDO Datacall information from municipalities with similar populations to Kingston. Table 2-3 presents metrics for the cities of Kingston, Barrie and Sudbury. Kingston's program is probably most comparable to those programs operated by the Cities of Barrie and Sudbury. Even though the municipalities are similarly sized, there are differences in the types of recycling programs operated by each municipality, including materials collected, user pay systems and frequency of collection, which among other factors, contribute to the differences in tonnes of Blue Box material marketed, and costs.

Both Barrie and Sudbury use boxes and have bag limits in place; however, both collect weekly, compared to alternating weeks collection for Kingston. Like Kingston, Barrie operates a Dual Stream recycling program, but recovers more material, and has lower net costs. Sudbury operates a Single Stream program and although the net costs are higher than Kingston's, recovers more material and has a lower overall collection cost per tonne marketed than Kingston.

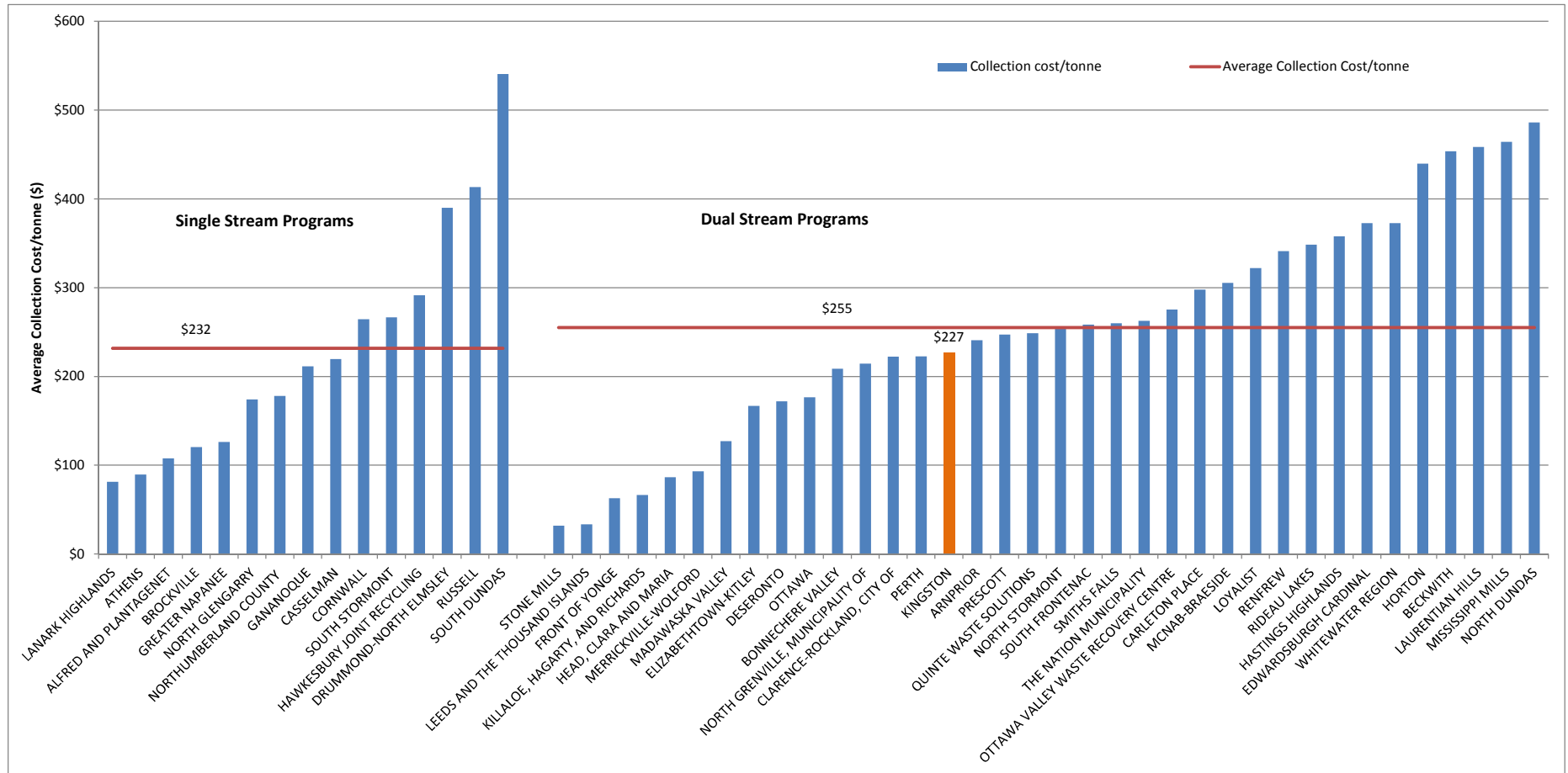
**Table 2-3: Comparison of Similar Sized Municipalities**

	<b>Kingston</b>	<b>Barrie</b>	<b>Sudbury</b>
Number of Households (hhld)	<b>53,998</b>	57,774	60,492 (+13,696 served through depots)
Type of Container	<b>Boxes</b>	Boxes	Boxes
User Pay	<b>1 bag limit, tags @ \$2</b>	1 bag limit, tags @ \$3	3 bag limit, tags @\$2
Type of Program	<b>Dual Stream</b>	Dual Stream	Single Stream
Frequency of Collection	<b>Alternating weeks</b>	weekly	weekly
Blue Box Tonnes Marketed	<b>9,114</b>	11,725	13,457
Net Cost Per Tonne Marketed	<b>\$296</b>	\$174	\$331
Recovered kg/hhld	<b>175</b>	212	196
Collection costs	<b>\$2,068,163</b>	\$1,592,983	\$2,984,964
Collection costs/tonne marketed	<b>\$227</b>	\$136	\$222

### **Eastern Ontario Collection Costs**

Based on 2013 WDO Datacall, residential collection costs were calculated on a per tonne basis for Single Stream and Dual Stream programs in Eastern Ontario and are presented in Figure 2-3. On average, Single Stream programs had collection costs of \$232/tonne whereas Dual Stream programs had collection costs of \$255/tonne. Kingston's collection cost was \$227 which is below the average cost for Single and Dual Stream collection costs. It should be noted that outliers were removed for the calculation of collection costs as follows; Algonquins of Pikwakanagan - \$792/tonne; Montague - \$1056/tonne; Mohawks of the Bay of Quinte - \$698/tonne; and, North Frontenac \$2/tonne.

**Figure 2-3: Eastern Ontario Collection Costs (2013)**



### 3 Technical Plan

The following sections provide an overview of the potential scenarios for a modified MRF located at the existing site. For each scenario at the existing MRF, a discussion of the proposed modifications, layout and potential issues with the configuration are presented. Based on HDR's assessment of the existing MRF building and existing site layout, there are a number of issues with various aspects of reconfiguring or expanding the existing MRF that need to be considered which are discussed in this section. The alternative of replacing the existing MRF on adjacent City owned land is discussed in the Business case section of this report.

#### 3.1 Potential Future City of Kingston MRF Scenarios

The City of Kingston identified the potential opportunity to modify and reconfigure the existing MRF equipment and building, or develop a new "greenfield" MRF in order to manage blue box recyclables on a regional scale at 15,000 tpy, 20,000 tpy or 25,000 tpy.

Given the size of the processing scenarios, there is very little practical difference in the design for the range of throughputs. As a result, the study team has proposed that the analysis be focused on the lower and upper ends of the range, with variations in the processing approach to provide a reasonable comparison (i.e. analysis of 15,000 tpy and 25,000 tpy only). Based on the range of tonnages potentially available for processing at a regional MRF identified through the municipal engagement process, this range is also appropriate.

The potential for a new "greenfield" location for a regional MRF was discussed with the City during the project kick-off meeting. The City indicated they are not currently aware of, or have available to it, property suitable for development and use as a regional facility. Although the focus of this analysis is on the potential redevelopment of the existing Kingston MRF; for comparison purposes, costs for a replacement MRF were developed, with the assumption it would be located on the adjacent City-owned land (i.e. immediately north) which is currently utilized for other waste management related functions.

Four options were considered for providing the required services at the existing MRF:

- a 15,000 tpy Dual Stream MRF;
- a 15,000 tpy Single Stream MRF;
- a 25,000 tpy Dual Stream MRF; and,
- a 25,000 tpy Single Stream MRF.

For the replacement MRF options; three options were considered;

- a 15,000 tpy Single Stream MRF;
- a 25,000 tpy Dual Stream MRF; and,
- a 25,000 tpy Single Stream MRF.

More detailed modelling and costing was developed for the larger Dual Stream MRF and the two Single Stream MRF options. A description of the building and processing concept for each option is presented below regarding operation, design, labour, financing, and other variable operating costs.

#### 3.1.1.1 Issues with Reconfiguring and/or Expanding the Current Kingston MRF

The current building envelope only has the capacity to support a 15,000 tpy Dual Stream operation. In order to achieve increased throughput and/or convert the facility to a Single Stream system or a larger Dual Stream system, the building footprint will need to be expanded and the site layout will have to be reconfigured. A plan view site plan depicting the proposed additions to the existing MRF has been included as Figure 3-1.

Figure 3-1: New Site Layout



The proposed modifications include:

- Increasing the building footprint to the south to increase the tipping floor area to accommodate the increased throughput.
- Increasing the building footprint to the north and west to allow for an additional bale storage area and room for the new processing arrangements.
- Relocating the Household Hazardous Waste (HHW) and public drop-off areas to the north side of Lappan's Lane.
- Installing a new inbound scale on Lappan's Lane and a new entrance to the MRF at the northwest corner of the site.
- Repurposing the existing scale to be an outbound scale only.

#### Issues with the Building

- In the event the existing processing lines need to be modified to support increased material throughput, the height of the original building will have to be considered. The original building roof (as is true for the expanded portions) is an A-frame design and the highest point is at the center. The existing sorting lines are positioned in the center of the building where the roof is at its apex, and in its existing configuration there is minimal clearance between the roof of the sorting lines and the roof of the building. Any modifications to the sorting lines, particularly related to converting the facility to a Single Stream operation, will have to take into account the limited building height.
- The roofline of the existing facility slopes east and west. To maintain the existing drainage pattern and not to add an additional load to the existing roof, the addition would need to have a high point that matches the low point of the existing roof. This will reduce the available clear height in the addition which may impact operations.
- The higher roofline of the new addition may require a reinforcement of the adjacent existing 2008 roof to account for increased snow loads. Assuming the 2008 addition is compliant with the 2006 Building Code; the need to reinforce the roof will not likely trigger any additional seismic requirements.
- In addition to the limited building height, a series of columns are located at the interface between the original building and the 1995 addition. The existing layout incorporates the columns within the sorting rooms. These columns will have to be taken into account in the new Single Stream layout.
- As part of any additions to the existing building, the fire protection and natural gas piping systems will need to be expanded and reconfigured. However, the fire protection, natural gas, and service water mains enter the building on the northeast side so these mains will not need to be relocated.
- A significant rework of the MRF may be classified as a major renovation under the Ontario Building Code and may trigger a number of additional code requirements not enforced during the initial construction or subsequent additions to the MRF. These code requirements may potentially include, amongst others, structural seismic upgrades for the structures of the original building and additions prior to 2006, and ventilation upgrades to the ventilation system with gas monitoring to satisfy the Occupational Health and Safety Act requirements.

HDR has not included costing for this type of work as it may be subject to specific City regulations and by-laws and would require further investigation.

#### Issues with the Tipping Floor

- The proposed expansion of the tipping floor area to the south will be similar to previous additions with the south wall removed and the existing overhead doors relocated to the new south wall. Expanding the area of the tipping floor is key to increasing the throughput capacity of the facility.
- During the existing facility assessment, it was observed that the current height of the tipping bay doors is not high enough to allow for the curbside collection trucks to fully tilt the box of the truck in order to unload material. This constraint requires the drivers to extend the truck box to approximately 75% and drive forwards and backwards, and applying the brakes in order to propel the material out of the truck. This constraint may cause restrictions on the type of trailer that can access the MRF; should municipalities choose to ship materials to Kingston's MRF using transfer trailers, it may be necessary to utilize walking floor trailers so that material can be unloaded more efficiently.
- The new structure should be designed with a higher roofline and larger roll up doors to increase the efficiency of unloading operations, streamline the truck movements and reduce the amount of damage to the structure caused by insufficient clearances. This is especially important given the proximity of the proposed addition to the southern property line which will create a tighter maneuvering space for trucks backing into the building to access the tipping floor.
- The study team estimated the square footage of the current floor based on the WDO MRF Capacity and Capability Assessment report<sup>5</sup> which stated that the MRF has approximately 1.5 days of available storage at 11,642 tpy. Estimates for the tipping floor for the various Dual and Single Stream MRF options were based on that information and the density of recyclables used to develop the MRF layouts. Table 3-1 shows the approximate available tipping floor space for each option and the storage that this represents. The storage required for each option was calculated using the approximate density of each material received, assuming that material is piled an average of 2m high on the tipping floor. Please see the layouts of the MRFs in the next section to see how the tipping floor areas are configured and Appendix D for the calculations associated with the tipping floor area.

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<sup>5</sup> MRF Capacity and Capability Assessment Report, AECOM, 2011, on behalf of Waste Diversion Ontario

**Table 3-1: Tipping Floor Area and Storage Capacity**

Option	Tipping Floor Available (m <sup>2</sup> )	Days of Storage
15,000 Dual Stream	441	1.43
15,000 Single Stream	501	1.74
25,000 Dual Stream	441	0.86
25,000 Single Stream	501	1.04

Most of the options shown at the MRF, even with building expansion, fall short of the 2 day tipping floor storage requirement. The 2 day storage requirement is best practice for MRF design, to allow for unplanned equipment breakdowns and stoppages and peak receiving capacities during heavy collection periods. Table 3-1 shows storage capacity based on using all available storage area for each design. For designs with 0.86 day's storage, any delays beyond 1 day will require that material be stored somewhere other than on the MRF tipping floor (i.e. there is additional risk with this design).

#### Issues with the Loading Dock Area and Grading

- The proposed additions will also require a significant rework of the surrounding grades to the west of the facility for: the enlarged bale storage area; the existing loading docks to be eliminated; and the depression area filled and compacted to support the addition.
- The loading docks will be relocated further south to accommodate the expanded footprint to the west. There is an approximate 1.2 metre (4 feet) drop from the west wall of the building to the ground elevation where the existing loading docks are located. A significant amount of engineered fill will be required to bring the elevation of the existing loading docks up to the existing floor grade.
- Further south of the proposed addition, the area adjacent to the 2008 addition will need to be excavated to create new loading docks. In addition, the relocated docks will require the area adjacent to the 1995 addition to be excavated to a depth of approximately 1.2 m. Care should be exercised in determining the extent of excavation to ensure the 1995 foundations maintain the appropriate depth of ground cover to minimize the potential of frost damage.
- The truck traffic will need to be maintained at the same elevation as the loading area to maintain a safer approach to the loading docks, meaning the circulation path will need to rise approximately 1.2m once past the loading dock to meet the new tipping floor at grade, otherwise this will create an uneven maneuvering area adjacent to the tipping floor.

### 3.1.2 Optimization of Current MRF Operations

An assessment of the current MRF operations was completed to identify potential opportunities for optimizing the recyclables processing and maximizing the existing facility capacity. The visual assessment was completed as part of site visits to the MRF by team members from Entec Consulting, HDR, and Marshall Industrial. Some areas where MRF operational efficiencies could be realized include:

- The loader operator on the tipping floor is responsible for loading both the fibre and containers processing lines, stockpiling material as it is off-loaded from delivery vehicles, periodically storing “clean” OCC in the designated bunker as it is received, and loading material onto the baler feed conveyor from the sort line bunkers when required. As a result, material flow to both the container and fibre line is uneven, resulting in material surges and relatively low flow on the sorting lines. Sorting on these lines is hampered by these ebbs and flows.
- Baling productivity is not as high as it could be. The operator of the forklift is also the baler operator. For extended periods of time during visits to the MRF, no material was being baled, despite several bunkers being full.
- When aluminum is baled, two staff remove non-aluminum material from the cans on the baler feed conveyor. This is an inefficient sorting technique and during this time, the baler is sitting idle.

Some of the recommended adjustments to the current MRF operations in order to improve efficiencies include:

- Having the loader operator dedicated to servicing only the tipping floor;
- Using a second skid steer loader to clear the fibre bunkers and to load “clean” OCC as needed;
- The second operator should also be responsible for stockpiling and loading bales into trailers and operating the skid steer loader as needed;
- Having an additional dedicated baler operator; and,
- Ensuring that the lead hand provides more direct supervision of the entire processing operation.

In the study team’s opinion, these operational improvements would maximize processing efficiency in the existing MRF.

### **3.1.3 15,000 tpy Dual Stream MRF**

The existing Kingston MRF essentially operates as a Dual Stream MRF except that it does not currently process glass containers. With the improvements mentioned in the previous section (i.e. the addition of a skid steer loader, a dedicated baler operator and recommended staff responsibilities) and the addition of the ability to process glass containers, the existing Kingston MRF would be classified as a true 15,000 tpy Dual Stream MRF. The MRF in its present state can be modified to accommodate glass through the Dual Stream processing system.

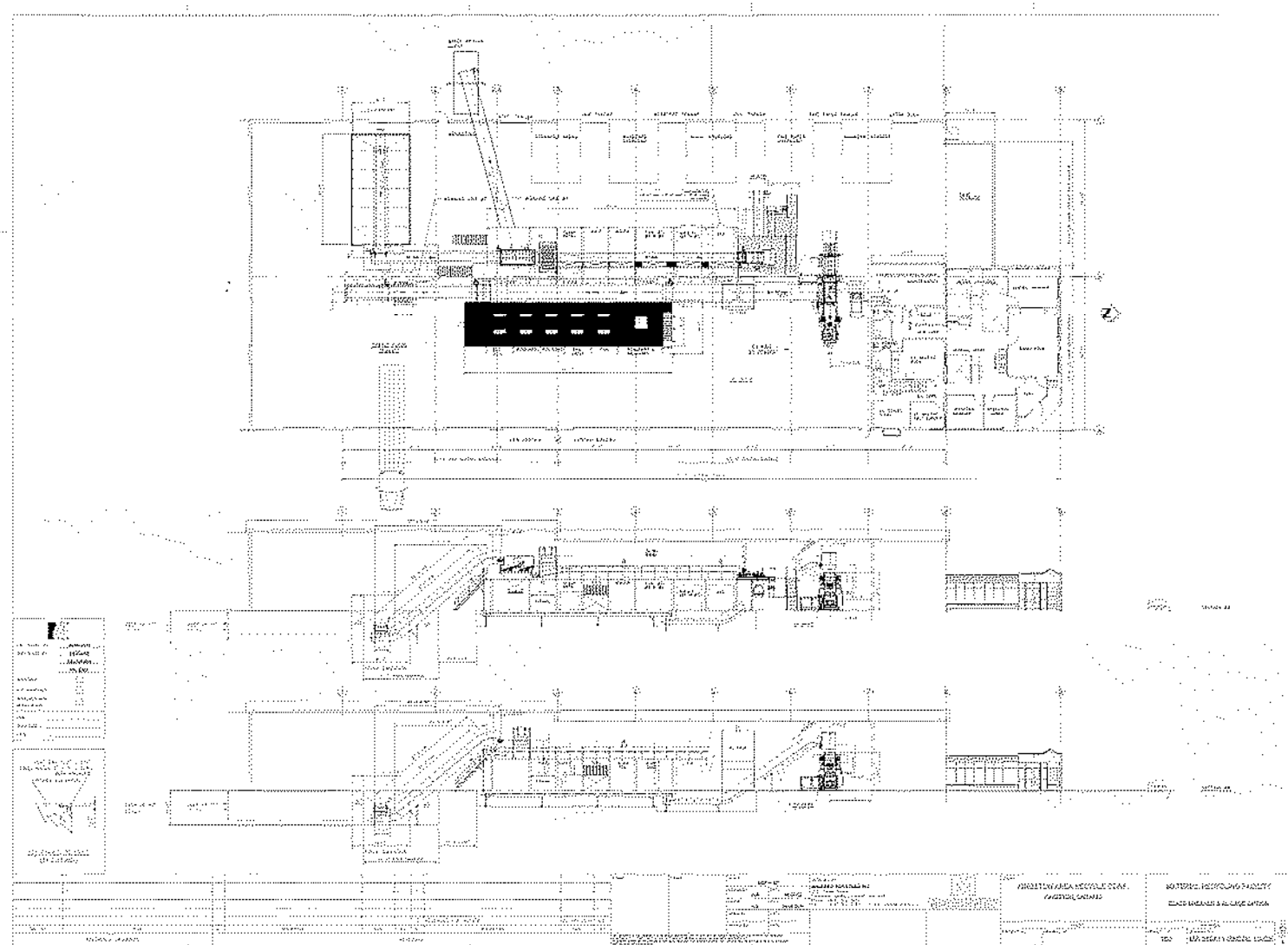
Equipment modifications required on the container processing line, as shown in Figure 3-2 are as follows:

- In order to accept and process glass as part of the container stream, a glass breaker and removal system will need to be installed at the beginning of the line, prior to the overhead magnet. Glass that is broken and falls through the screen

will then be conveyed out the west side of the building and loaded directly into a roll-off.

- To accommodate the glass breaker, the eddy current (EC) and aluminum storage bunker will need to be reconfigured. A new aluminum storage cage would be positioned directly above the baler feed conveyor. Repositioning the EC would allow a quality control (QC) sorting conveyor to be located prior to a pneumatic blowing system to move the aluminum into the storage cage, allowing for the safe removal of contaminants from the aluminum.

**Figure 3-2: 15,000 tpy Dual Stream MRF Layout**



### 3.1.4 15,000 tpy Single Stream MRF

The existing processing line cannot be modified to meet the needs of Single Stream processing. Several equipment configuration options were reviewed to accommodate the requirements for a 15,000 tpy Single Stream processing system within the existing MRF building footprint. While the processing line could be physically positioned within the existing building, the identified options were not deemed viable, due to:

- Insufficient tipping floor capacity;
- Insufficient product storage capacity;
- Poor access for the direct loading of OCC to the baler feed conveyor; and,
- Lack of room to maneuver loaders and forklifts between the tipping floor, baled storage area and trailer loading docks.

As a result, a number of processing and building layouts were considered which involve an expansion of the existing building footprint. At a conceptual level of detail, Figure 3-3 shows the design concept considered most feasible. In this design:

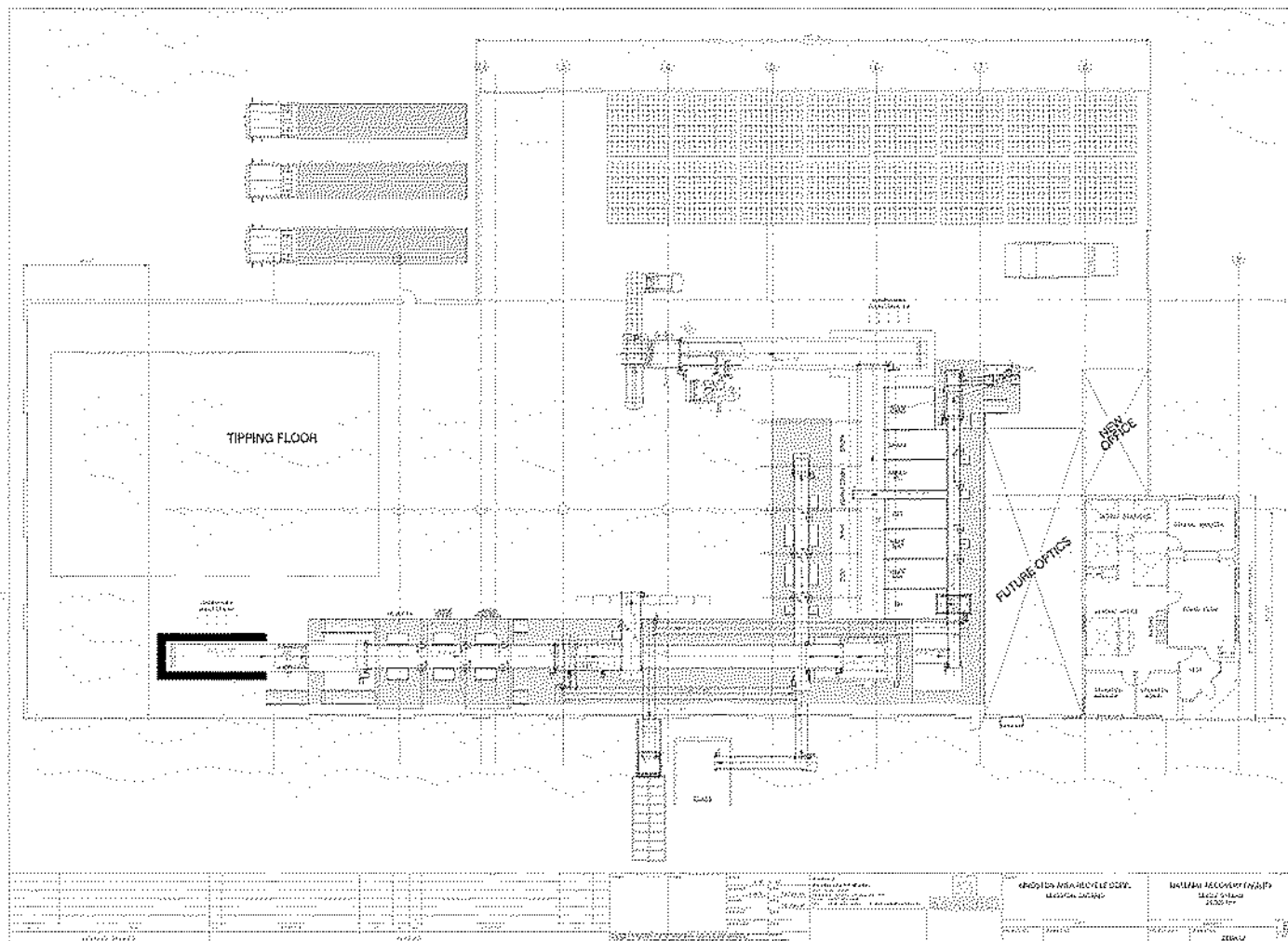
- The existing building would be extended approximately 9.14m (30') to the south to provide an enlarged tipping floor. The west wall of the tipping floor would require support to allow it to be used as a push wall for incoming recyclables. Stackable concrete blocks located approximately along column line 2X (see Figure 3-3) would also be required to define the north limit of the tipping floor.
- The existing building would be extended:
  - a) At the north-west corner, north of column line 8, to provide additional bale storage,
  - b) South of the previous building expansion (between column line 8 and 5) for additional bale storage, in the area of the existing loading docks, in order to provide for additional bale storage and to reconfigure the loading docks, and,
  - c) The existing loading docks would be reconfigured as shown to better fit the proposed flow of traffic around the MRF.
- The existing space which currently comprises maintenance staff office, the scale house, the janitor's closet, staff washrooms, a kitchen, and an electrical room would be relocated to an area west of the City of Kingston's office space, to provide space for the possible addition of future optical sorting equipment on the container line.

It should be noted that the rooflines of the bale storage area and the expansion area #2 do not have to match. It is anticipated that, unless there is an operational reason, the bale storage roofline can follow the height of the original building. Given the bale storage area is structurally independent of the main building including Expansion Area # 2, having a lower roof line has no impact on the existing structure and any impact on a lower roof line can be engineered in.

The proposed Single Stream processing system, as shown in Figure 3-3 would consist of the following components:

- An in-floor feed conveyor.
- A back scraping drum to even out the flow of material on the incline.
- A presort area with provision for 3 material sorts (bulky rejects, steel and film) with the ability to split the bunkers to provide additional sorts. The middle bunker is aligned with the truck door on the east wall to allow direct removal of a roll-off placed under the sorting line.
- A 2-deck OCC screen and fines screen. OCC travelling over the screen is transferred to the floor. A QC sort station allows removal of contaminants.
- The unders from the OCC screen, minus the fines (2" minus), continue on to a ballistic separator which separates the majority of the containers from the fibre. Containers pass on to a container sort line and fibres pass on to a fibre sort line.
- Three sorting bunkers are provided for fibre, with ONP falling off the end of the line as a negative sort material.
- Seven bunkers are provided for sorted containers, including one for ferrous (overhead magnet) and one for aluminum (eddy current).
- A QC sort station is available to remove any contaminants that may still be in the aluminum stream before it is blown pneumatically into a storage cage.
- Glass removed from the processing line is conveyed through a basic glass cleanup system and then deposited into a storage bunker at ground level outside the south wall of the building.
- Clean loads of OCC can be delivered through the door on the north side of the bale storage area, and OCC can be loaded directly from the floor onto the baler feed conveyor.

**Figure 3-3: 15,000 tpy Single Stream MRF Layout**



### 3.1.5 25,000 tpy Dual Stream MRF

The 25,000 tpy Dual Stream processing system can be positioned into the same expanded building footprint required for the Single Stream processing options; however, there are some design limitations, largely related to on-site east and west space constraints that may limit certain MRF operations, including:

- The tipping floors for incoming fibre and containers are completely isolated from the bale storage area. While this is not a problem in itself, it does not provide the flexibility that would otherwise be there if access were possible.
- Access to the baler feed conveyor for clean loads of IC&I OCC through the truck door on the north side of the building is very much restricted.
- There is only room for two presort bunkers on both the fibre and container lines.

The existing MRF will require the same building modifications as those described in Section 3.1.4. At a conceptual level of detail, Figure 3-4 shows the design concept considered most feasible for this option.

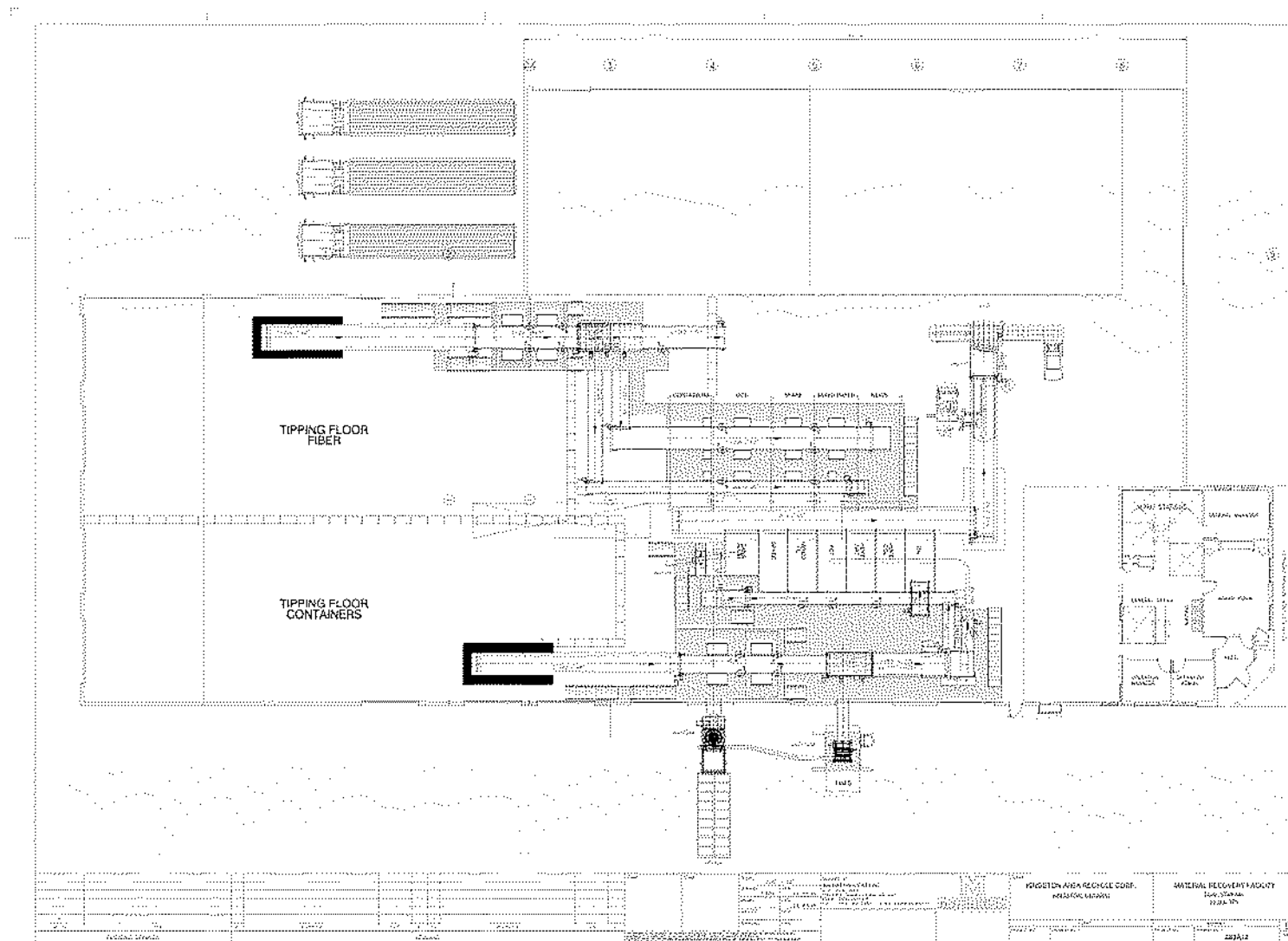
The proposed fibre processing system consists of:

- An in-floor hopper and inclined conveyor leading material to a presort area;
- Two material presort bunkers;
- A 2-deck OCC screen and fines screen;
- Two fibre sorting lines positioned over floor level bunkers; and,
- 4 bunkers for positively sorted material and one for negatively sorted ONP.

The proposed container processing system consists of:

- An in-floor hopper and inclined conveyor leading material to a presort area;
- A two bunker presort area;
- A glass breaker screen to remove minus 2" fines. These are conveyed to a basic glass cleanup system outside the building;
- Paper and other residue removed from the glass travels to an adjacent compactor;
- PET is removed by optical sorter, passes by a QC sort station and is pneumatically conveyed to a dedicated bunker;
- Ferrous is removed by overhead magnet;
- Remaining containers are manually sorted into 5 bunkers;
- Aluminum is removed by eddy current. Following a QC sort, aluminum is blown into a storage cage; and,
- All remaining residue is then transferred via conveyor to a compactor located outside the south wall of the MRF.

**Figure 3-4: 25,000 tpy Dual Stream MRF Layout**



### 3.1.6 25,000 tpy Single Stream MRF

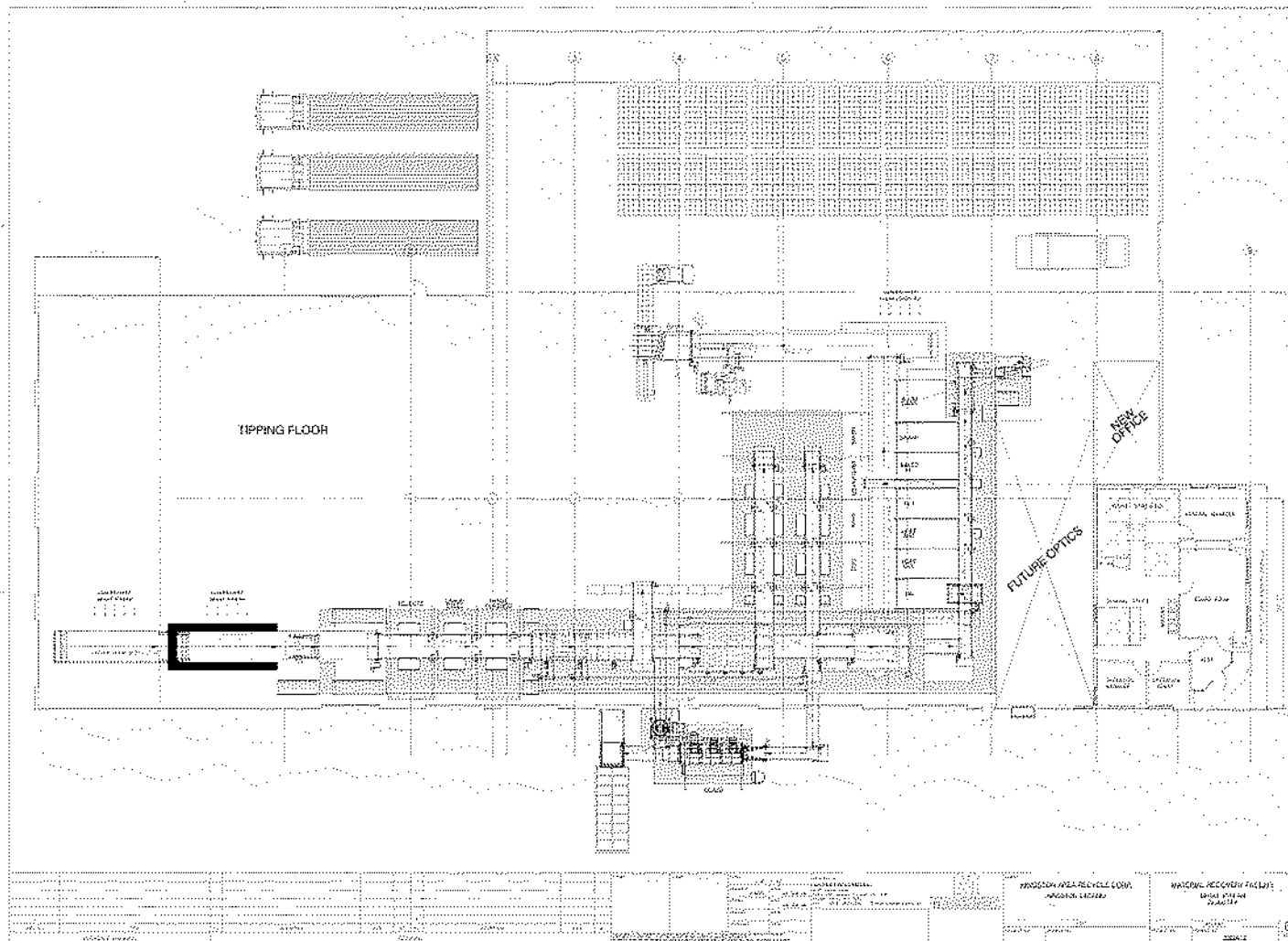
The MRF size and general layout of the 25,000 tpy Single Stream option is basically the same as for the 15,000 tpy Single Stream option. The exception is that to provide the increased processing capacity, the system needs to be more mechanically sophisticated. The existing MRF will require the same building modifications as those described in Section 3.1.4. At a conceptual level of detail, Figure 3-5 shows the design concept considered most feasible for this option.

The proposed processing system consists of:

- A drum feeder which provides for incoming material storage and even system feeding. This feeder also allows the front-end loader more time to tend to cleaning and stockpiling delivered material on the tipping floor, since the loader does not need to constantly feed the in-feed conveyor.
- Secondary access to an in-floor feed conveyor (for clean material loads delivered to the tipping floor).
- A presort area with provision for 3 material sorts (bulky rejects, steel and film) with the ability to split the bunkers to provide additional sorts. The middle bunker is again aligned with the truck door on the east wall to allow direct removal of a roll-off placed under the sorting line.
- A 3-deck OCC screen and fines screen. OCC travelling over the screen is transferred to the floor. A QC sort station allows removal of contaminants from the OCC.
- The unders from the OCC screen (other than the 2" minus fines) continue on to an ONP screen which separates the majority of containers from fibre. Containers pass on to a container sort line and fibres pass on to a fibre sort line.
- Three sorting bunkers are provided for fibre, with ONP falling off the end of the line as a negative sort material.
- Seven bunkers are provided for sorted containers, including one for ferrous (overhead magnet) and one for aluminum (eddy current).
- PET is removed by an optical sorter, passes by a QC sort station and is pneumatically conveyed to a dedicated bunker.
- Small chutes along the fibre sorting line and a transfer conveyor allow for removal of residue from the fibre line. Similarly, rejects from the container line are transferred to a compactor outside the east wall of the building and mixed paper removed from the container line can be sent from the container sorting area to the mixed paper bunker via a small transfer conveyor.
- Glass removed from the processing line is conveyed to a glass cleanup system outside the south wall of the building and when clean, deposited into a bunker at ground level.

- Clean loads of OCC can be delivered through the door on the north side of the bale storage area, and OCC can be loaded directly from the floor onto the baler feed conveyor.

**Figure 3-5: 25,000 tpy Single Stream MRF Layout**



### 3.1.7 Modifications to the Existing KARC Site Layout

For all of the scenarios, except the 15,000 tpy Dual Stream scenario, the following modifications to the existing site will be required to accommodate additional vehicles and the building expansion:

- A new weigh scale and scalehouse would be installed on Lappan's Lane, immediately north of the MRF to serve the MRF and the compost site.
- A new entrance to the MRF would be located at the north-west corner of the property (currently employee parking area).
- A new access road would be constructed through the existing parkette, employee parking area and glass bunker area, located as close as possible to the western-most edge of the property.
- Traffic flow on the site would be in a counter-clockwise direction around the MRF.
- All outbound vehicles would weigh out at the existing MRF scale.
- The existing HHW Depot and public drop-off area will be relocated north of Lappan's Lane.
- Employee parking will need to be relocated.

See Figure 3-1 for the new proposed site layout. The modifications will provide a more efficient movement of collection and transfer vehicles. Access to the site by the public will be restricted with the relocation of the HHW depot and drop-off sites which is an important safety consideration with added traffic and potentially larger vehicles.

## 4 Initial Business Case

The following provides an overview of the initial business case, based on the available options for Kingston's recyclables collection system, some of the key factors which would make a regional MRF feasible including municipal interest and transportation costs, and Single and Dual Stream processing options for the existing MRF and a replacement MRF.

The City has the option of maintaining their status quo collection system, moving to a true Dual Stream recycling (collection and processing) program or to a Single Stream collection program. As the City generates the majority of recyclables processed at the MRF, this decision goes hand-in-hand with the decision about whether the MRF remains Dual Stream or is converted to a Single Stream MRF. A discussion about Dual Stream vs Single Stream collection is presented in Section 4.1.

A survey of Eastern Ontario municipalities was undertaken to gauge interest in a regional MRF. A discussion of the results of the survey and the potential tonnages available for processing are presented in Section 4.2.

One of the most significant factors for municipalities considering sending their recyclable material to a regional MRF is transportation costs. A discussion of these costs is presented in Section 4.3.

The costs associated with the following options for the MRF are presented in Sections 4.4, 4.5 and 2.1

- maintain the status quo for the existing MRF;
- upgrade the existing MRF to a true Dual Stream MRF with a processing capacity of either 15,000 tonnes per year or 25,000 tonnes per year;
- upgrade the existing MRF to a Single Stream MRF with a processing capacity of either 15,000 tonnes per year or 25,000 tonnes per year; and,
- replacement of the existing MRF with a new MRF with a processing capacity of either 15,000 tonnes per year Single Stream or 25,000 tonnes per year (either Single or Dual Stream) on a new site.

#### 4.1 Collection Cost Savings

HDR analyzed 2013 WDO Datacall (see Section 2.3) to compare Kingston's performance against other selected larger municipalities in Ontario in the same and other municipal groupings and other Eastern Ontario municipalities.

Table 4-1 presents a summary of the key metrics from the 2013 WDO Datacall information for select Ontario municipalities compared to the City of Kingston. The results can be summarized as follows:

- Kingston recovers more material on a per household basis than the average for the selected municipalities using Dual Stream programs and others in the Rural Regional grouping, but less than the average for the selected municipalities using Single Stream programs.
- Kingston's gross cost per tonne is higher than the average for both the selected Single Stream and Dual Stream programs, but less than the average for other municipalities in the Rural Regional grouping.
- Kingston's gross revenue per tonne is higher than the average for the selected Single and Dual Stream programs and other municipalities in the Rural Regional grouping.
- Overall, Kingston's net costs per tonne are equivalent to the average for selected Single Stream program costs, higher than the average for selected Dual Stream programs, but less than the average for other municipalities in the Rural Regional grouping.
- Kingston's collection costs are less than the average for Single Stream and Dual Stream programs in Eastern Ontario.

**Table 4-1: Summary of Metrics for Single Stream and Dual Stream Programs, Rural Regional Municipalities and Kingston**

	Kingston	Selected Single Stream Programs		Selected Dual Stream Programs		Rural Regional	
		Average	Range	Average	Range	Average	Range
Kg/hhld	<b>175</b>	180	(101-245)	167	(94-248)	150	(94-196)
Gross Cost/tonne	<b>\$417</b>	\$395	(\$219-\$514)	\$347	(\$149-\$593)	\$424	(\$261-\$593)
Gross Revenue / tonne <sup>1</sup>	<b>\$122</b>	\$98	(\$27-\$136)	\$111	(\$38-\$156)	\$107	(\$44-\$156)
Net Cost/tonne	<b>\$296</b>	\$296	(\$147-\$415)	\$250	(\$117-\$520)	\$324	(\$158-\$520)

<sup>1</sup> Excluding those municipalities who reported no revenue

HDR also reviewed a report<sup>6</sup> authored by HDR for CIF which examined a number of published reports, studies and Datacall information (predominantly from large urban municipalities), to attempt to assess whether Single or Dual Stream recycling offers better performance. The HDR report did not conclude definitively that one system is better than the other. The report indicated that there are a number of best practices that can be applied to either system to improve capture rates, participation, diversion and to control program costs.

It appears that while Single Stream programs, on average, recover more material on a per household basis, they are overall more expensive to operate than Dual Stream programs and generate less revenue resulting in overall higher net costs on a per tonne basis. On average, Kingston's existing collection program operates quite efficiently compared to other municipalities in the same municipal groupings with higher recovery and revenue and lower costs.

There does not appear to be any conclusive evidence that indicates Kingston should move to a Single Stream recycling program. It appears that Dual Stream programs are less expensive overall. While Kingston's metrics compare favourably compared to other Dual Stream programs, there may be opportunities to reduce costs should glass not be collected in a separate stream.

## 4.2 Summary of Initial Municipal Interest

Potential participation in the regional MRF by Eastern Ontario municipalities will be important to the City to inform the decision making process regarding the viability of a regional MRF. Larger MRFs are more cost efficient due to the economies of scale; the

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<sup>6</sup> HDR for CIF, An Assessment of Single and Dual Stream Recycling, Including Current Program Performance in Large Ontario Municipalities, 2012, updated in March 2013.

potential size of the proposed regional MRF will be developed based on preliminary estimates of potential tonnages available for processing. The current and future tonnes processed at the existing MRF from Kingston, Loyalist Township and South Frontenac will not be sufficient to support an expanded MRF; additional tonnages from other municipalities in Eastern Ontario are required.

Table 4-2 presents the potential tonnage available based on the 2013 WDO Datacall information. Based on questionnaire results, it appears that there could be approximately 22,600 tonnes of recyclable material available for processing at a regional MRF. This material is potentially available from the City of Kingston itself and those municipalities that indicated they were interested in utilizing a regional MRF in Kingston (not including the City of Ottawa or Quinte Waste Services who indicated interest, but likely for information only). There are an additional 14,200 tonnes which could potentially be available from those municipalities whose interest is unknown or tentative at this time<sup>7</sup>.

The tonnages from the City of Ottawa and Quinte Waste Services, have been kept separate so as not to skew results and since it is unlikely they would participate.

**Table 4-2: Summary of Tonnages Potentially Available by Responses**

<b>Questionnaire Response</b>	<b>Tonnes</b>
Municipalities Indicating "Interested"	13,492
City of Kingston only	9,114
<b>Subtotal - Interested</b>	<b>22,606</b>
Interest unknown	13,046
Municipalities Indicating "Maybe Interested"	1,169
<b>Subtotal – Maybe Interested</b>	<b>14,215</b>
City of Ottawa	62,866
Quinte Waste Services	10,202
Municipalities Indicating "Not interested"	15,687
<b>Subtotal – Not Interested/Unavailable</b>	<b>88,755</b>
<b>Total Tonnage in Eastern Ontario</b>	<b>125,576</b>

Another important consideration for municipalities is hauling distance to a processing facility. The Eastern Ontario wasteshed covers a large geographic area and haul costs to Kingston could be significant. Google Maps was used to provide an estimate of the distance from each of the municipalities to Kingston. The following Table 4-3 provides a breakdown of the responses from municipalities (based on responses to the questionnaire and follow-up) according to the estimated distance of each municipality from Kingston. The distance from Kingston would represent one-way hauling of recyclables to the MRF. Note that the tonnages from the City of Kingston have not been included in the following table.

<sup>7</sup> The Mohawks of Akwesasne did not have any datacall information available and were excluded from the totals.

**Table 4-3: Summary of Tonnages Available by Distance from Kingston**

Distance from Kingston (km)	Response from Municipalities (tonnes, number of responses)				
	Yes	Maybe	Unknown	No	Total
<50 km	3,202 (4)	753 (1)	406 (1)		<b>4,361 (6)</b>
50-100 km	14,881 (9)		981 (5)	641 (1)	<b>16,503 (15)</b>
100-150 km	2,799 (5)		2,432 (5)	6,971 (5)	<b>12,202 (15)</b>
>150 km	65,677 (5)	415 (1)	9,227 (12)	8,076 (11)	<b>83,395 (29)</b>
<b>Total number of tonnes/responses</b>	<b>86,560 (23)</b>	<b>1,168 (2)</b>	<b>13,046 (23)</b>	<b>15,688 (17)</b>	<b>116,461 (65)</b>

Note: totals may not add due to rounding

Twenty-one municipalities are located within 100 kilometers of the City of Kingston, fifteen are located within 100 to 150 kilometers and another 29 are located more than 150 kilometers from Kingston with 18 of these located over 200 kilometers from Kingston. The information in this table was used to assist with estimating the potential tonnage available to the Kingston MRF since those municipalities located closer to Kingston, and therefore who would have lower haul costs, may be more interested in a regional MRF.

The information provided in the previous sections was based on the 2013 WDO Datacall. Table 4-4 presents high level estimates of the potential tonnages that could be available based on an assumed 1% annual increase in population. It is difficult to determine future quantities of waste due to uncertainties about what types of materials may be handled in the future with potential changes in composition, lightweighting and legislation (e.g. changes to the Waste Reduction Act with increased Extended Producer Responsibility). However, it appears that based on current composition, there could potentially be 25,000 to 29,000 tonnes of material available by 2030.

**Table 4-4: Projections of Potential Tonnage Available (2015 – 2030)**

Questionnaire Response	Tonnes of Recyclables			
	2015	2020	2025	2030
Municipalities Indicating "Interested"	13,763	14,465	15,203	15,979
Kingston	9,297	9,771	10,270	10,794
<b>Subtotal - Interested</b>	<b>23,060</b>	<b>24,237</b>	<b>25,473</b>	<b>26,772</b>
Interest unknown (<100 km)	1,415	1,487	1,563	1,643
Municipalities Indicating "Maybe Interested" (<100 km)	768	807	848	892
<b>Subtotal – Maybe Interested</b>	<b>2,183</b>	<b>2,294</b>	<b>2,411</b>	<b>2,534</b>
<b>Potentially Available</b>	<b>25,243</b>	<b>26,531</b>	<b>27,884</b>	<b>29,307</b>
Ottawa	64,130	67,401	70,839	74,452
Quinte Waste Services	10,407	10,938	11,496	12,082
Municipalities Indicating "Not interested"	16,002	16,819	17,677	18,578
Interest unknown (>100 km)	11,893	12,500	13,138	13,808
Municipalities Indicating "Maybe Interested" (>100 km)	423	445	468	491
<b>Subtotal – Not Interested/Unavailable</b>	<b>102,855</b>	<b>108,101</b>	<b>113,616</b>	<b>119,411</b>
<b>Total Tonnes in Eastern Ontario</b>	<b>128,100</b>	<b>134,634</b>	<b>141,502</b>	<b>148,720</b>

In general, the following conclusions can be made from this municipal engagement process.

- There appears to be interest in a regional MRF located in Kingston from several Eastern Ontario municipalities supporting up to a 23,000 tonnes per year MRF.
- Approximately one third of the municipalities in Eastern Ontario are located within 100 kilometres of Kingston, and 13 indicated they are interested in a regional MRF.
- The majority of municipalities (74%) in Eastern Ontario collect two or more streams of recycling.

### 4.3 Transfer Haul Cost Analyses for Potential Municipalities

Each municipality in Eastern Ontario has its own waste management system to meet the needs of their specific community and these systems vary from municipality to municipality. Collection modes vary from curbside collection, to local drop-off depots

(e.g. recycling collection using roll-off bins at the local landfill) to specific material collection/drop-off event days (e.g. for hazardous waste or waste electronics).

For recyclables, there are a variety of arrangements for transfer and/or processing;

- municipalities may transfer materials themselves to a MRF (direct haul or roll-off bins) from curbside collection or depots;
- private service providers may transfer materials to a MRF (roll-off bins) from depots; and,
- private service providers may be contracted to collect and process materials from the curb or depots.

Local waste management programs and systems are developed to balance community-specific needs and constraints, ultimately reflecting the service delivery choices (and limited options in some cases) and preferences of the residents. It is not the focus of this report to explore, analyze or suggest revisions to the local community-level waste management programs, other than to the extent of identifying possible optimizations which may be considered in the context of processing recyclables at a regional MRF.

The efficient movement of wastes relies on a number of factors, including:

- Identification of the waste source generation centres;
- Identification of the destination location (i.e. regional MRF);
- Analysis of available transport modes, including:
  - Direct haul
  - Highway transfer
- Identification of routes; and,
- Analysis of modes and routes to minimize transport energy consumption and costs.

Given the very large geographic area of Eastern Ontario and the wide distribution of waste generation, waste transport will have substantial influence on the feasibility of a regional MRF. Efficiencies of cost and fuel consumption can be achieved by consolidation of smaller loads of recyclables into larger vehicles for transporting longer distances. Curbside collection vehicles are purposely designed for local travel at low speeds, with frequent stops to allow operators to load many different small items of waste. Conversely, transfer vehicles and roll-off trucks/bins are designed to operate efficiently to move larger quantities of waste, longer distances at higher speeds, with few stops and less operator labour required.

Highway transfer trailers typically also require construction and operation of loading facilities to allow the smaller loads from depots and/or curbside packer trucks to be consolidated into larger loads. Many municipalities utilize roll-off bins for collection of materials at depots by residents in lieu of curbside collection. Bins may be directly hauled to a processor; it is unlikely that they would be emptied into a transfer trailer.

Decisions regarding use of curbside collection or drop-off depots are dependent on balancing many factors such as local population density and distribution, waste generation rates, costs, and customer expectations regarding service levels required. As mentioned previously, this analysis does not presume to have the information necessary to recommend local collection programs.

#### **4.3.1 Assessing Potential Transportation Implications**

A break point analysis between curbside packer trucks and transfer hauling vehicles provides an indication of the optimal travel distance that each type of equipment should be used for hauling of waste and guidance on potential locations for transfer stations. The break point analysis is accomplished by determining the all-in capital, operating, maintenance, fuel and labour costs for each type of vehicle operating at its full load capacity over various haul distances. The all-in costs are then converted to a unit cost per tonne of waste hauled.

To complete the transportation impact analysis, three sources of information were used to develop preliminary costing scenarios:

- WDO Datacall information on bin removal/hauling;
- The assumptions used in the MIPC Study (see Table 4-5: MIPC Study Transfer Trailer and Roll-off Truck Haul Costs and Load Limits); and,
- The costs found in the 2009 report prepared by Genivar for CIF on “*Transfer of Blue Box Recyclable Materials: Factors Affecting Decision Making*” (the Genivar report).

The Genivar report was used as the basis for developing transportation costs for municipalities for the regional MRF Study. The report was developed to assist with decisions about whether it was more efficient to develop transfer and hauling capacity in place of MRFs, specifically examining transfer and haul costs. The report analyzed transfer station sizing/costs and haul costs for six scenarios:

- 1) 2,500 tpy of Single Stream materials;
- 2) 2,500 tpy of Dual Stream materials;
- 3) 5,000 tpy of Single Stream materials;
- 4) 5,000 tpy of Dual Stream materials;
- 5) 10,000 tpy of Single Stream materials; and,
- 6) 10,000 tpy of Dual Stream materials.

Two types of transfer stations were analyzed; a traditional transfer station and a “transtor” type transfer station.

The report provided graphs of where haul costs and transfer costs intersect, representing the break-even point at which the round trip haul distance costs are the same as transfer costs. The ability to use this information is hampered by two facts:

- 1) 60 of the 66 Eastern Ontario Municipalities generate less than 2,500 tpy and therefore, based on this approach, these 60 municipalities would be required to

direct haul materials to a Kingston MRF, in some cases over hundreds of kilometres; and,

- 2) the majority of municipalities either direct haul their blue box materials to a processor or transfer recyclables using roll-off containers where the consideration of roll-off containers was excluded from the study.

Those municipalities generating more than 2,500 tonnes of recyclables annually already have their own MRF or use a private MRF (e.g. Ottawa) and have no need for a transfer station nor would they likely participate in a regional MRF project. In addition, the underlying assumption for transfer costs include the cost of a transfer station (amortized capital plus operating costs) for each individual municipality and do not take into account potential local partnerships.

Since HDR assumed that most individual municipalities are unlikely to build a new transfer station to enable them to transfer blue box materials to the regional MRF, the other alternative as per the report is direct haul. While this may be an option for some of the municipalities located close to Kingston, or who generate small amounts of materials that require very few trips, for the most part, this option would be too costly, time consuming, and potentially has a greater environmental impact. Another option that could be considered is smaller regional transfer stations servicing several small municipalities that would increase the overall tonnes flowing through the facility and therefore making it more economically viable.

Based on the 2013<sup>8</sup> reported costs for bin/roll-off removal, HDR calculated haul costs on a per tonne basis; however, these costs vary widely depending on how services are being procured and provided and may not be indicative of true costs. The cost for bin/roll-off removal ranges from \$5/tonne (North Grenville and South Stormont) to over \$1,200/tonne (Leeds and the Thousand Islands, Tay Valley). The average cost for the 18 municipalities who reported bin/roll-off removal costs was \$260/tonne. It is unknown how the reported costs are calculated as the majority of the services are provided by private contractor and the services are likely procured on either a per tonne or per lift basis.

The MIPC study made certain assumptions<sup>9</sup> for the regional MRF study; those relevant to the hauling portion of this study are presented in the following table.

**Table 4-5: MIPC Study Transfer Trailer and Roll-off Truck Haul Costs and Load Limits**

Item	Transfer Trailer	Roll-off Truck
Haul cost	\$100/hour	\$90/hour
Load limit	24.1 tonnes	18.3 tonnes

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<sup>8</sup> Waste Diversion Ontario (WDO) Municipal Datacall 2013

<sup>9</sup> <http://cif.wdo.ca/pdf/orw/apr12/MRF-Study-Data-Assumptions.pdf>

The Genivar report also made assumptions about direct haul costs<sup>10</sup> and transfer haul costs<sup>11</sup>. Note that the direct haul costs include the capital cost of either a Dual or Single compartment collection truck. Costs include assumptions for labour, fuel, average speed including an allowance for loading/unloading. Table 4-6 and Table 4-7 provide the estimated cost of direct haul and transfer from the Genivar report. Please see Appendix D for additional information regarding the calculations for the typical payload.

**Table 4-6: Direct Haul Unit Costs Estimates (Genivar Report)**

	Dual Stream	Single Stream
Typical Payload in Collection Truck	3.1 tonnes	3.5 tonnes
Total Cost per Truck-Hour of Haul (\$/hr)	\$102.5	\$100.2
Total Cost per Tonne-Hour of Haul (\$/tonne-hr)	\$33.1	\$28.6
Total Cost per Tonne-km of Haul (\$/tonne-km)	\$0.47	\$0.41

The direct haul costs for Dual Stream are greater than those for Single Stream due to the assumption that the payload for the Dual compartment would be lower as one of the two compartments usually tops out before the other.

**Table 4-7: Transfer Haul Unit Costs Estimates (Genivar Report)**

Traditional Transfer Station (top-loading trailers, no compactor)			
	Dual Stream		Single Stream
	25% containers	75% fibres	Commingled
Trailer type	140 yd <sup>3</sup> open top	140 yd <sup>3</sup> open top	140 yd <sup>3</sup> open top
Typical Payload in Trailer (tonnes)	6.4	32.1	12.8
Total Cost per Truck-Hour of Haul (\$/hr)	\$111.7	\$117.9	\$111.7
Total Cost per Tonne-Hour of Haul (\$/tonne-hr)	\$17.5	\$3.7	\$8.7
Total Cost per Tonne-km of Haul (\$/tonne-km)	\$0.25	\$0.05	\$0.12
Blended Cost per Tonne-km	\$0.10		\$0.12

<sup>10</sup> Table C1 – Direct Haul Unit Costs Estimate

<sup>11</sup> Table C2 – Transfer Haul Unit Costs Estimate

Based on the information provided in Table 4-5, Table 4-6, and Table 4-7 above, an estimate of approximate haul costs has been provided for each of the distance groupings identified. This information is presented in Table 4-8 below. Please note, these are high level cost estimates based on available information. Additional information will need to be sought, potentially through a competitive procurement process, to confirm the specific costs.

Table 4-8: Estimated Haul Cost Implications

Municipality	Tonnes	Distance from Kingston (km)	SS or DS	Potential Annual Transport/Transfer Costs		
				Roll-off <sup>1</sup>	Direct Haul <sup>2</sup>	Transfer <sup>3</sup>
Interested						
Ottawa, City Of	62,866	197	DS		\$10,155,404	\$2,972,313
Quinte Waste Solutions	10,202	94	n/a		\$901,430	\$191,794
Kingston, City Of	9,114	n/a	DS			
South Frontenac, Township Of	1,960	40	DS	\$14,463	\$73,714	\$15,684
Clarence-Rockland, City Of	1,566	234	DS		\$300,559	\$87,968
Brockville, City Of	1,506	85	SS		\$104,956	\$30,719
Edwardsburgh Cardinal, Township Of	1,064	121	DS		\$121,027	\$25,750
Loyalist, Township Of	1,047	24	DS		\$23,621	\$5,026
Mississippi Mills, Town Of	745	131	DS		\$79,982	\$23,409
Elizabethtown-Kitley, Township Of	710	96	DS		\$64,104	\$13,639
Arnprior, Town Of	606	160	DS		\$79,539	\$23,280
Smiths Falls, Town Of	593	97	DS		\$54,082	\$11,507
Stone Mills, Township Of	541	51	SS		\$25,937	\$5,519
Drummond-North Elmsley, Township Of	535	96	SS		\$42,122	\$12,328
South Dundas, Township Of	504	147	SS		\$60,732	\$17,775
South Glengarry, Township Of	380	212	DS		\$66,123	\$19,353
Front Of Yonge, Township Of	350	64	DS	\$2,585	\$21,115	\$4,493
Lanark Highlands, Township Of	322	115	SS	\$5,535	\$30,321	\$8,874
Central Frontenac, Township Of	277	72	DS		\$18,772	\$3,994
Head, Clara & Maria, Township Of	258	324	DS		\$68,599	\$20,078
Deseronto, Town Of	166	55	DS		\$8,588	\$1,827
North Frontenac, Township Of	165	113	DS	\$2,838	\$15,279	\$4,472
Frontenac Islands, Township Of	149	16	DS		\$2,239	\$476
Leeds And The Thousand Islands, Township Of	46	38	DS	\$225	\$1,635	\$348
Subtotal (24 Municipalities)	95,673					
Maybe (Questionnaire indicated “unable to answer at this time”)						
Greater Napanee, Town Of	753	40	SS	\$3,706	\$24,714	\$7,233
Whitewater Region, Township Of	415	211	DS		\$71,830	\$21,023
Subtotal (2 Municipalities)	1,169					
Unknown						
Cornwall, City Of	3,344	182	SS		\$499,035	\$146,059
Hawkesbury Joint Recycling	1,381	251	SS		\$284,262	\$83,199
North Grenville, Township Of	1,236	144	DS	\$18,230	\$167,249	\$35,585
North Glengarry, Township Of	1,054	223	SS		\$192,734	\$56,410
Alfred & Plantagenet, Township Of	720	237	SS		\$139,944	\$40,959
Deep River, Town Of	656	288	SS		\$154,882	\$45,331
Carleton Place, Town Of	625	118	DS		\$60,443	\$17,691
North Dundas, Township Of	544	160	DS		\$71,381	\$20,892
Perth, Town Of	519	84	DS		\$41,018	\$8,727
Brudenell, Lyndoch And Raglan, Township Of	496	201	DS	\$13,424	\$81,800	\$23,941
Gananoque, Town Of	406	34	SS		\$11,322	\$ 3,314
Madawaska Valley, Township Of	393	210	DS	\$11,600	\$67,697	\$19,814
Prescott, Town Of	275	105	DS		\$27,119	\$5,770
Hastings Highlands, Municipality Of	226	208	DS	\$5,546	\$38,468	\$11,259
Merrickville-Wolford, Village Of	202	128	DS		\$21,218	\$6,210
Athens, Township Of	189	69	SS	\$1,859	\$10,696	\$3,130
Killaloe, Hagarty, And Richards, Township Of	179	230	DS	\$5,296	\$33,850	\$9,907
Mohawks Of The Bay Of Quinte	170	59	SS		\$8,237	\$2,411
Laurentian Hills, Town Of	154	286	DS		\$36,209	\$10,598
Montague, Township Of	95	109	DS		\$9,760	\$2,077
Wollaston, Township Of	79	173	DS	\$1,549	\$11,170	\$3,269
Tay Valley, Township Of	75	86	DS	\$921	\$6,058	\$1,289
Algonquins Of Pikwakanagan	27	68	DS		\$1,737	\$ 369
Subtotal (23 Municipalities)	13,046					
Not Interested						
Northumberland, County Of	5,920	143	SS		\$694,211	\$203,184
Ottawa Valley Waste Recovery Centre	3,292	237	DS		\$639,783	\$187,254
Russell, Township Of	1,240	183	SS		\$186,088	\$54,465
The Nation, Municipality	753	220	DS		\$135,926	\$39,783
Rideau Lakes, Township Of	641	70	DS		\$42,158	\$8,970
South Stormont, Township Of	625	167	SS	\$10,759	\$85,593	\$25,051

Municipality	Tonnes	Distance from Kingston (km)	SS or DS	Potential Annual Transport/Transfer Costs		
				Roll-off <sup>1</sup>	Direct Haul <sup>2</sup>	Transfer <sup>3</sup>
Interested						
Renfrew, Town Of	488	189	DS		\$75,650	\$22,142
McNab-Braeside, Township Of	469	172	DS		\$66,185	\$19,371
Beckwith, Township Of	418	123	DS		\$48,290	\$10,274
North Stormont, Township Of	405	160	DS		\$60,978	\$ 12,974
Greater Madawaska, Township Of	266	147	DS		\$32,022	\$9,372
Bonnechere Valley, Township Of	264	221	DS	\$7,794	\$47,864	\$14,009
Casselman, Village Of	246	201	SS		\$40,619	\$11,889
Augusta, Township Of	236	101	DS		\$22,450	\$4,777
Horton, Township Of	186	190	DS		\$29,033	\$8,497
Addington Highlands, Township Of	131	141	DS	\$2,580	\$15,165	\$4,439
Admaston/Bromley, Township Of	105	205	DS	\$2,592	\$17,718	\$ 5,186
Mohawk Council Of Akwesasne	n/a	182			n/a	n/a
Subtotal (18 Municipalities)	15,688					
Total Tonnes in Eastern Ontario (67 municipalities)	125,576					

<sup>1</sup> Roll-off costs calculated by dividing the annual tonnage by the load limit identified in Table 5-7 to calculate the number of lifts based on a 40yd rolloff bin. The number of lifts was multiplied by the haul cost in Table 5-7 and multiplied by the kilometres to/from Kingston. These costs were only calculated for those municipalities who reported bin/roll-off removal costs.

<sup>2</sup> Direct Haul costs were based on the annual tonnage multiplied by the \$/tonne-km cost from Table 5-8 for either Dual or Single Stream programs multiplied by the kilometres to/from Kingston.

<sup>3</sup> Transfer Haul costs were calculated by multiplying the annual tonnage by the blended cost per tonne-km from Table 5-9 for either Dual or Single Stream programs and multiplied by the kilometres to/from Kingston.

## 4.4 Costing for Existing Kingston MRF Modifications

Costs were developed for modifying the existing MRF to process 15,000 and 25,000 tonnes per year of Dual Stream recyclables and 15,000 and 25,000 tonnes per year of Single Stream recyclables based on the following assumptions.

**Table 4-9: MRF Design Tonnage Assumptions**

Item	15,000 tonnes per year	25,000 tonnes per year
Days/year	260	260
Days/week	5	5
Shifts/day	2	2
Hrs/shift	8	8
Productive hours	14	14
Tonnes/day	58	96
Effective tonnes/hour	4.1	6.9
Design tonnes/hour	4.9	8.2

### 4.4.1 Assumptions for Cost Estimates for Building Expansion and Site Modifications

For all but the 15,000 tpy Dual Stream scenario, the existing structure and site will require modifications which were previously described in Section 3.1.1.1.

A rough order of magnitude estimate for the site work construction would be approximate \$650,000, based on the following items:

- Removal of trees;
- New entrance to site;
- Grading of the area for the new building addition and road;
- New road asphalt and road structure;
- New curb and gutters;
- Relocation of existing culvert;
- Topsoil and sodding; and,
- Drainage system to drain loading dock area.

This estimate is for work on the west side of the existing building, assuming no work needs to be done on the east side of the existing building. Please see Figure 3-1 for the new site layout.

In order to estimate the construction costs for the expansion, HDR used the cost/square foot of the 2008 addition (\$133.33/sq.ft or \$1,435.15/sq. m), escalated by 4% per year for an estimated 2015 rate of \$175.46/sq. ft (\$1,887.95/sq.m). An allowance for design services has been included based on OAA guidelines for fees.

<b>Proposed</b>	<b>Area</b>	<b>Cost</b>
Area 1 (North of Bale Storage Area)	83.6 m <sup>2</sup> (900 ft <sup>2</sup> )	\$157,937
Area 2 (South of Bale Storage Area)	329.8 m <sup>2</sup> (3,550 ft <sup>2</sup> )	\$622,883
Area 3 (Tipping Floor)	278.7 m <sup>2</sup> (3,000 ft <sup>2</sup> )	\$526,380
<b>Subtotal</b>	<b>629.1 m<sup>2</sup> (7,450 ft<sup>2</sup>)</b>	<b>\$1,307,200</b>
Design Services		\$125,000
<b>Total</b>		<b>\$1,432,200</b>

\*Note – totals may not add due to rounding.

#### **4.4.2 Capital and Operating Cost Estimates to Modify Existing MRF**

Costing information was primarily developed by Entec Consulting based on prior project experience, recent tenders and industry information. Annual capital costs were estimated assuming a 20 year depreciation term for the building and a 10 year period for all equipment, all at a 6% financing rate. Operating costs were estimated for labour and other variable operating costs. It was assumed that the 15,000 tpy Dual Stream MRF would have similar operating costs as the existing MRF with the exception of the addition of one baler operator.

It is anticipated that with improved efficiencies in the processing system (i.e. no aluminum sorting on the baler feed conveyor, improved operation of mobile equipment, the addition of an Eddy current separator etc.) and the addition of one more operator, the City's contracted MRF processor should be able to handle 15,000 tonnes per year with the same staff and operating hours as they do now for the current tonnage.

HDR estimated the operating costs for the existing MRF based on information provided by the City (Expenses and Revenue, 2013) which was used for the 2013 Datacall Section 4.2 Blue Box Cost Summary. In Table 4-10 below, HDR included the Blue Box Material Handling Costs (including the direct processing cost for the BFI contract as well as other miscellaneous expenses), the Blue Box Processing Facility Cost as per this information, plus the estimated cost for an additional baler operator and used these estimates for the operating costs of the 15,000 tpy Dual Stream facility.

To account for the extra costs associated with the approximate 30% increase in tonnage (from roughly 11,500 tpy to 15,000 tpy), the following variable costs were increased by the same percentage; direct processing cost (BFI contract), equipment repairs and maintenance, processing equipment fuel, baling wire, equipment rentals, miscellaneous supplies, recyclables shipping and duty residuals disposal and utilities (hydro).

Table 4-10: Current MRF Costs Projected for 15,000 tpy Dual Stream MRF

	Tonnes Processed Annually	11,508	15,000
	Projection Factor		1.3034
Item	Cost Item	Current MRF Costs	Projected Costs for Modified MRF
Capital Costs			
	Existing Capital Costs (2009 Expansion, 2010 Baler, 2012 Conveyor, 2013 Weigh Scale)	\$118,822	\$118,822
Operating Costs			
	Blue Box Processing Material Handling Cost		
BFI Processing	Direct Processing Cost (BFI Contract)	\$960,573	\$1,252,050
	Additional baler operator		\$62,400
	Total	\$960,573	\$1,314,450
City Processing	Foreman/Supervisors - Heather & John	\$63,829	\$63,829
	Training	\$1,043	\$1,043
	Equipment Repairs and Maintenance	\$59,647	\$77,747
	Processing Equipment Fuel (propane)	\$838	\$1,092
	Baling Wire	\$42,753	\$55,726
	Processing Equipment Insurance	\$6,233	\$6,233
	Equipment Rentals	\$1,064	\$1,387
	Miscellaneous Supplies	\$22,158	\$28,881
	Recyclables Shipping and Duty	\$33,556	\$43,738
	Residuals Disposal	\$64,366	\$113,850
	Other - Scale Operations and Groundskeeping (staff)	\$107,696	\$107,696
	Other - Plant and Equipment Maintenance (staff)	\$51,041	\$51,041
	Other - Marketing and Research (staff)	\$24,907	\$24,907
	Other - Protective Clothing	\$1,385	\$1,385
	Total	\$480,517	\$578,556
	Blue Box Processing Facility Cost		
	Building Repairs and Maintenance	\$15,627	\$15,627
	Building Insurance	\$6,233	\$6,233
	Site Maintenance	\$22,070	\$22,070
	Janitorial Services - Janitor's time	\$6,298	\$6,298
	Utilities - Hydro	\$84,429	\$110,048
	Fire Alarm and Sprinkler Maintenance	\$2,365	\$2,365
	Site Security	\$685	\$685
	Taxes	\$71,593	\$71,593
	Other - Pest Control	\$2,751	\$2,751
	Other - Misc. Contracted Services	\$22,187	\$22,187
	Other - Solid Waste Clerk	\$14,943	\$14,943
	Other - Interdepartmental charges (commissioner)	\$34,267	\$34,267
	Total	\$283,448	\$309,067
Other Costs	Administrative	\$67,015	\$83,815
	Total Operating Costs	\$1,791,553	\$2,285,887
	Total Capital Costs	\$118,822	\$118,822
	Total Annual Cost	\$1,910,375	\$2,404,709
	indicates variable costs that have been increased to reflect the costs associated with additional tonnes managed		

Source: City of Kingston Data – Expenses and Revenue 2013. Costs in this table are based on those used for 2013 WDO Municipal Datacall and have been factored up to reflect estimated costs for the entire tonnage processed, not just the portion relating to the City of Kingston.

The costs in Table 4-10 were used as the basis for the 15,000 tpy Dual Stream MRF in Table 4-11. Note that additional capital costs for the new equipment/building have been added to the existing operating and capital costs presented in Table 4-10 on which the 15,000 tpy Dual Stream MRF costs were based.

For all the scenarios requiring expansions, it was assumed that new mobile equipment (e.g. loaders, skid steers etc.) would be required. HDR assumed that equipment was the property of the current operator and should the contract be retendered, replacement equipment may be required. It was also assumed that some new processing equipment would be required; however, as much of the existing processing equipment as possible would be utilized in the modified MRF scenarios. As such, capital costs for replacement of existing equipment and the expansion of the existing MRF have been included in the overall capital cost calculations for the modified existing MRF. It should be noted that the capital costs for the existing equipment ( baler purchased in 2010, conveyor purchased in 2012, weigh scale purchased in 2013) and the 2009 expansion to the MRF all have different amortization periods, and depending on when the MRF is actually expanded/constructed, these capital costs will decrease. For comparison purposes, these capital costs have been included as current day costs to reflect payment of existing debt. Similarly, these capital costs have also been included in the capital cost calculations for the replacement MRF options.

The following Table 4-11 provides an overview of the project costs to modify the existing MRF for the four scenarios.

Table 4-11: Projected Costs to Modify the Existing MRF

ITEM	15,000 tpy Dual Stream	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream
<b>A. CAPITAL COSTS</b>				
<b>Cost Breakdown for Processing Equipment</b>				
Conveyors	\$103,000	\$725,000	\$964,000	\$1,025,000
Screens	\$60,000	\$346,000	\$193,000	\$735,000
Other Equipment (OH mag, compactor, glass system, etc.)	\$50,000	\$198,000	\$548,000	\$995,000
Baler	\$0	\$92,000	\$92,000	\$92,000
<b>Processing Equipment Total</b>	<b>\$213,000</b>	<b>\$1,361,000</b>	<b>\$1,797,000</b>	<b>\$2,847,000</b>
Mobile Equip Costs:	\$55,000	\$235,000	\$245,000	\$245,000
Other Capital Costs(steel, freight, controls, scalehouse,etc)	\$276,000	\$1,560,000	\$2,122,000	\$2,504,000
Building Expansion	\$0	\$1,432,200	\$1,432,200	\$1,432,200
Site Works	\$0	\$650,000	\$650,000	\$650,000
<b>SUB-TOTAL NEW CAPITAL COST:</b>	<b>\$544,000</b>	<b>\$5,238,200</b>	<b>\$6,246,200</b>	<b>\$7,678,200</b>
Contingency (5%):	\$27,200	\$261,910	\$312,310	\$383,910
Engineering (10%)	\$54,400	\$523,820	\$624,620	\$767,820
<b>TOTAL CAPITAL COST ON NEW EQUIPMENT/BUILDING</b>	<b>\$625,600</b>	<b>\$6,023,930</b>	<b>\$7,183,130</b>	<b>\$8,829,930</b>
Annual Capital Costs on New Equipment/Building	\$69,547	\$650,938	\$776,972	\$979,333
Annual Capital Costs on Existing Equipment/Building	\$118,822	\$118,822	\$118,822	\$118,822
<b>TOTAL ANNUAL CAPITAL COST</b>	<b>\$188,369</b>	<b>\$769,760</b>	<b>\$895,794</b>	<b>\$1,098,155</b>
<b>B. OPERATING COSTS</b>				
<b>LABOUR COSTS</b>				
Plant Manager		1 \$65,000	1 \$65,000	1 \$65,000
Foreman		2 \$90,000	2 \$90,000	2 \$90,000
Baler Operators		2 \$124,800	2 \$124,800	2 \$124,800
Vehicle Operators		3 \$124,800	4 \$166,400	4 \$166,400
Sorters		14 \$436,800	26 \$811,200	22 \$686,400
Labourer		2 \$49,920	3 \$74,880	3 \$74,880
Equipment Maintenance		1 \$62,400	2 \$124,800	2 \$124,800
Weigh Scale Operator		1 \$41,600	1 \$41,600	1 \$41,600
Marketing & research		1 \$24,960	1 \$24,960	1 \$24,960
Admin & Clerical		1 \$31,200	1 \$31,200	1 \$31,200
Groundskeeper		1 \$24,960	1 \$24,960	1 \$24,960
Benefits		27 % \$290,640	27 % \$426,550	27 % \$392,850
<b>TOTAL LABOUR COST</b>		<b>29 \$1,367,080</b>	<b>44 \$2,006,350</b>	<b>40 \$1,847,850</b>
<b>VARIABLE OPERATING COSTS</b>				
Baling Wire		\$50,420	\$88,430	\$84,040
Residue Disposal		\$179,700	\$240,080	\$299,500
Fuel & Oil		\$50,000	\$60,000	\$60,000
Utilities (Elec.+Water)		\$118,300	\$145,600	\$163,800
Insurance+Taxes		\$80,000	\$90,000	\$90,000
Spare Parts		\$27,220	\$35,940	\$56,940
Security		\$1,000	\$1,000	\$1,000
Office (general)		\$30,000	\$50,000	\$50,000
Equipment Maintenance		\$81,660	\$107,820	\$170,820
Other (site & bldg maint, shipping, contracted services, etc.)		\$108,600	\$133,600	\$133,600
<b>TOTAL VARIABLE OPERATING COSTS</b>		<b>\$726,900</b>	<b>\$952,470</b>	<b>\$1,109,700</b>
Administrative Cost		\$73,641	\$101,268	\$105,385
<b>TOTAL ANNUAL OPERATING COST</b>	<b>\$2,285,887<sup>(1)</sup></b>	<b>\$2,167,621</b>	<b>\$3,060,088</b>	<b>\$3,062,935</b>
<b>TOTAL ANNUAL COST</b>	<b>\$2,474,256</b>	<b>\$2,937,381</b>	<b>\$3,955,882</b>	<b>\$4,161,090</b>
<b>Gross Cost/tonne Processed</b>				
Capital	\$13	\$51	\$36	\$44
Operating	\$152	\$145	\$122	\$123
<b>Total</b>	<b>\$165</b>	<b>\$196</b>	<b>\$158</b>	<b>\$166</b>
Projected Revenue/tonne	\$120	\$113	\$120	\$113
<b>Net Cost/tonne</b>	<b>\$45</b>	<b>\$83</b>	<b>\$38</b>	<b>\$53</b>

<sup>(1)</sup> See Table 4-10 for a breakdown of Total Annual Operating Cost

## 4.5 Replacement MRF Costs

HDR and Entec Consulting developed costs for a replacement MRF to compare costs required to modify the existing MRF. The City may also wish to consider the option of replacing the existing MRF to accommodate either additional recyclables or the required processing equipment. This is largely a function of the requirement to make modifications to the existing building structure and its ability to cost effectively accommodate these modifications.

### 4.5.1 Assumptions for Replacement MRF Costs

It is assumed that a replacement MRF would be developed on the City property located to the north of the existing MRF, therefore no allowance for land costs was included in the cost estimates. A similar estimate for site works as for the modified MRF was included to provide a more valid comparison. It should be noted that this number has only been included for comparison purposes as it is not known where a replacement facility would be sited, nor the condition of the site. Additional costs, not included in these cost estimates, include costs associated with permitting or approvals. These costs would be comparable for each of the options. Cost estimates were only developed for the 15,000 tpy Single Stream option and the two 25,000 tpy options.

Capital costs for a new MRF were estimated at \$1,292 per square metre as per the MIPC study data assumptions. Annual capital costs were estimated assuming a 20 year depreciation term for the building and major equipment (e.g. baler and screens) and a 10 year period for all other equipment, all at a 6% financing rate. As in the costing developed for the expansions to the existing MRF, it was assumed that new mobile equipment (e.g. loaders, skid steers etc.) would be required. It was also assumed that some new processing equipment would be required; however, as much processing equipment as possible would be utilized from the existing facility.

Capital costs associated with the debt repayment for the existing equipment ( baler purchased in 2010, conveyor purchased in 2012, weigh scale purchased in 2013) and the 2009 expansion to the MRF have been included in the overall capital costs for a replacement MRF to allow for a more direct comparison to the existing MRF modification costs. It should be noted that all these costs have different amortization periods, and depending on when a new MRF would be constructed, these capital costs would decrease. For comparison purposes, these capital costs have been included as current day costs to reflect payment of existing debt.

### 4.5.2 Capital and Operating Cost Estimates for a Replacement MRF

The projected costs to replace the existing MRF for the 15,000 tpy and 25,000 tpy Single Stream options and the 25,000 tpy Dual Stream MRF are summarized in Table Table 4-12.

Table 4-12: Projected Replacement MRF Costs

ITEM	15,000 tpy Dual Stream	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream
<b>A. CAPITAL COSTS</b>				
<b>Cost Breakdown for Processing Equipment</b>				
Conveyors		\$725,000	\$964,000	\$1,025,000
Screens		\$346,000	\$193,000	\$735,000
Other (OH mag, compactor, glass system, etc.)		\$198,000	\$548,000	\$995,000
Baler		\$92,000	\$92,000	\$92,000
<b>Processing Equipment Total</b>		<b>\$1,361,000</b>	<b>\$1,797,000</b>	<b>\$2,847,000</b>
Mobile Equip Costs:		\$235,000	\$245,000	\$245,000
Other Capital Costs(steel, freight, controls, scalehouse, etc)		\$2,340,000	\$2,442,000	\$2,824,000
Building		\$4,268,672	\$4,421,338	\$4,542,152
Site Works		\$650,000	\$650,000	\$650,000
<b>SUB-TOTAL CAPITAL COST NEW EQUIPMENT/BUILDING:</b>		<b>\$8,854,672</b>	<b>\$9,555,338</b>	<b>\$11,108,152</b>
Contingency (5%):		\$442,734	\$477,767	\$555,408
Engineering (10%)		\$885,467	\$955,534	\$1,110,815
<b>TOTAL CAPITAL COST NEW EQUIPMENT/BUILDING:</b>		<b>\$10,182,873</b>	<b>\$10,988,638</b>	<b>\$12,774,375</b>
Annual Capital Costs on New Equipment/Building		\$1,013,534	\$1,108,754	\$1,323,227
Annual Capital Costs on Existing Equipment/Building		\$118,822	\$118,822	\$118,822
<b>TOTAL ANNUAL CAPITAL COST</b>		<b>\$1,132,356</b>	<b>\$1,227,576</b>	<b>\$1,442,049</b>
Building Size (m <sup>2</sup> )		3,304	3,422	3,516
<b>B. OPERATING COSTS</b>				
<b>LABOUR COSTS</b>				
Plant Manager	1	\$65,000	1	\$65,000
Foreman	2	\$90,000	2	\$90,000
Baler Operators	2	\$124,800	2	\$124,800
Vehicle Operators	3	\$124,800	4	\$166,400
Sorters	14	\$436,800	26	\$811,200
Labourer	2	\$49,920	3	\$74,880
Equipment Maintenance	1	\$62,400	2	\$124,800
Weigh Scale Operator	1	\$41,600	1	\$41,600
Marketing & research	1	\$24,960	1	\$24,960
Admin & Clerical	1	\$31,200	1	\$31,200
Groundskeeper	1	\$24,960	1	\$24,960
Benefits	27 %	\$290,640	27 %	\$426,550
<b>TOTAL LABOUR COST</b>	<b>29</b>	<b>\$1,367,080</b>	<b>44</b>	<b>\$2,006,350</b>
<b>VARIABLE OPERATING COSTS</b>				
Baling Wire		\$50,420	\$88,430	\$84,040
Residue Disposal		\$179,700	\$240,080	\$299,500
Fuel & Oil		\$50,000	\$60,000	\$60,000
Utilities (Ele.+Water)		\$118,300	\$145,600	\$163,800
Insurance+Taxes		\$80,000	\$90,000	\$90,000
Spare Parts		\$27,220	\$35,940	\$56,940
Security		\$1,000	\$1,000	\$1,000
Office (general)		\$30,000	\$50,000	\$50,000
Equipment Maintenance		\$81,660	\$107,820	\$170,820
Other (site & bldg maint, shipping, contracted services, etc.)		\$108,600	\$133,600	\$133,600
<b>TOTAL VARIABLE OPERATING COSTS</b>		<b>\$726,900</b>	<b>\$952,470</b>	<b>\$1,109,700</b>
Administrative Cost		\$73,641	\$101,268	\$105,385
<b>TOTAL ANNUAL OPERATING COST</b>		<b>\$2,167,621</b>	<b>\$3,060,088</b>	<b>\$3,062,935</b>
<b>TOTAL ANNUAL COST</b>		<b>\$3,299,976</b>	<b>\$4,287,663</b>	<b>\$4,504,985</b>
<b>Gross Cost/tonne Processed</b>				
Capital		\$75	\$49	\$58
Operating		<u>\$145</u>	<u>\$122</u>	<u>\$123</u>
<b>Total</b>		<b>\$220</b>	<b>\$172</b>	<b>\$180</b>
Projected Revenue/tonne		\$113	\$120	\$113
<b>Net Cost/tonne</b>		<b>\$107</b>	<b>\$51</b>	<b>\$67</b>

## 4.6 Summary of Costs for Modified MRF and Replacement MRF Scenarios

Table 4-13 presents a comparison of the capital and operating costs as well as on a gross and net cost per tonne basis for the modified MRF and the replacement MRF. The modified MRF and replacement MRF have the same labour and variable operating costs; however, the overall annual costs are much higher for the replacement MRF due to the higher capital costs associated with the new building.

It should be noted that, while every effort has been made to develop representative operating and capital estimates, these costs are not projected costs per tonne to utilize the facility.

Table 4-13: Comparison of Costs for Modified MRF and Replacement MRF Scenarios

	Modified MRF				Replacement MRF		
	15,000 tpy Dual Stream	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream	15,000 tpy Single Stream	25,000 tpy Dual Stream	25,000 tpy Single Stream
Total Capital Cost New Equipment/Building	\$625,600	\$6,023,930	\$7,183,130	\$8,829,930	\$10,182,873	\$10,988,638	\$12,774,375
Total Annual Capital Cost	\$188,369	\$769,760	\$895,794	\$1,098,155	\$1,132,356	\$1,227,576	\$1,442,049
Total Annual Operating Cost	\$2,285,887	\$2,167,621	\$3,060,088	\$3,062,935	\$2,129,401	\$3,060,088	\$3,062,935
Total Annual Cost	\$2,474,256	\$2,937,381	\$3,955,882	\$4,161,090	\$3,261,756	\$4,287,663	\$4,504,985
Gross Cost/tonne Processed							
Capital	\$13	\$51	\$36	\$44	\$75	\$49	\$58
Operating	\$152	\$145	\$122	\$123	\$145	\$122	\$123
Total	\$165	\$196	\$158	\$166	\$220	\$172	\$180
Projected Revenue/tonne	\$120	\$113	\$120	\$113	\$113	\$120	\$113
Net Cost/tonne	\$45	\$83	\$38	\$53	\$107	\$51	\$67

\*Totals may not add due to rounding

## 5 Next Steps

Upon the City's review of this document, the following next steps will be completed;

- Teleconference with the City and HDR to discuss and validate the information presented in this report.
- Discuss preliminary recommendations on collection and processing.
- Obtain City of Kingston feedback on the feasibility of a regional MRF and preferred MRF scenario (size, technology and location).
- Receipt of consolidated edits to the report.
- Issuance of a revised report.

A draft final report will be prepared based on this and other technical memoranda prepared to date and will include;

- Recommendations on processing technology (single or dual stream) and operation;
- Recommendations on Kingston's collection system;
- Monitoring/measuring metrics for future comparison between current operating costs and proposed operating costs;
- Key messages that can be shared with municipalities;
- Discussion of potential risks and mitigation with participating municipalities; and,
- Appendices containing the review of the MIPC study and municipal engagement results.

Once the final report is complete, HDR will develop and deliver a presentation of the results of the study to the EITP Committee.

# A

Photos of MRF Assessment



Photo 1 - Administrative Addition (1995) with MRF in background



Photo 2 - MRF with 2008 Addition, 1995 Addition (reclad to Match 2008) and Original facility (L to R) with weigh scale in foreground



Photo 3 - West Side of KARC – Existing Parking



Photo 4 - 2008 Bale Storage Addition



Photo 5 – Existing Loading Docks (Original Building and 1995 Addition (L to R))



Photo 6 – West Side of MRF – 1995 Addition and 2008 Addition (L to R)



Photo 7 – Area of Proposed Enlarged Bale Storage and new Loading Docks



Photo 8 – South end of MRF – Tipping Floor (2008 Addition)



Photo 9 – Tipping Floor – Note Damage at Top of Door (Truck is not fully raised)



Photo 10 – Tipping Floor with City Recycling Vehicle



Photo 11 – Tipping Floor with City Recycling Vehicle (Not fully raised)



Photo 12 – Tipping Floor Overhead Door Pushed Out by Stockpile of Material



Photo 13 – East Side of MRF with Tipping Area for Private and Commercial Vehicles



Photo 14 – East Side of MRF – Note Damage along Overhead Door Frames



Photo 15 – East Side of MRF – Note Downspout Discharges Directly to Asphalt



Photo 15 – North West Corner of MRF – Note Downspout Discharges Directly to Asphalt



Photo 15 – North West Corner of MRF – Note Plant Growth due to Improper Drainage



Photo 16 – 1995 Administrative Addition – Note Improper Discharge and Mold/Mildew on Wall



Photo 17 – Unprotected Structural Column Adjacent to Fibre Line



Photo 18 – Structural Column within Containers Line



Photo 19 – Overview of Bale Storage Area



Photo 20 – Overview of Bale Storage Area – Note Barrier around Structural Columns (2008 Addition)



Photo 21 – Overview of Bale Storage Area – Note Structural Separation between Original Building and 2008 Addition



Photo 22 – Overview of Bale Storage Area – Note Unprotected Structural Columns between Original Building and 1995 Addition



Photo 23 – Unprotected Structural Column Adjacent to Fibre Line



Photo 24 – Damaged Structural Column At Juncture of Original Building and 1995 Addition

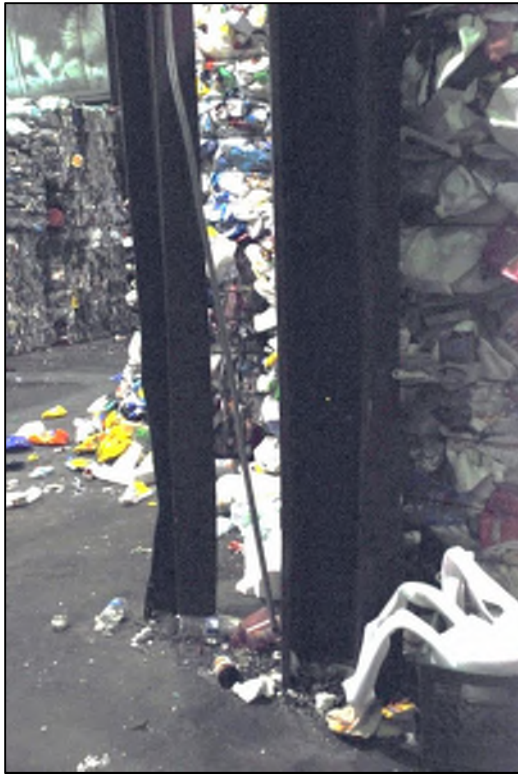


Photo 25 – Damaged Structural Column Visibly Bowed At Juncture of Original Building and 1995 Addition



Photo 26 – Uneven Gap at Roof - Top of Damaged Structural Column At Juncture of Original Building and 1995 Addition



Photo 27 – Unprotected Structural Column at Junction of Original Building and 2008 Addition



Photo 28 – West Wall of Original Building – Damaged Vapour Retarder



Photo 29 – West Side of Original Building – Damaged Vapour Retarder – Potential Roof Leak



Photo 30 –Mechanical Damaged Vapour Retarder Above Overhead Door



Photo 31 – Incomplete Fire Protection of Structural Column at Original Building Office Area



Photo 32 – Water Infiltration at Louvres on East Wall of Original Building



Photo 33 – Water Infiltration at Louvres on East Wall of Original Building



Photo 34 – Water Infiltration at Louvres on East Wall of Original Building



Photo 35 – Incoming Gas Service



Photo 36 – Sprinkler Valves

**tyco** Fire & Security **SimplexGrinnell**

THIS AREA EQUIPPED WITH:

WET SYS. ☒ DELUGE VALVE ☐  
 DRY SYS. ☐ RATE OF RISE VALVE ☐  
 ANTI-FREEZE ☐ THERMAL CONTROL VALVE ☐  
 PRE-ACTION VALVE ☐ OTHER ☐

VALVE SERIAL NO. \_\_\_\_\_

STATIC WATER P.S.I. 68/65 64

RESIDUAL WATER P.S.I. 64 62 61

DID ALARMS OPERATE? Y Yes Yes

AIR PRESSURE ✓ 6.1 ✓

AIR PRESSURE TRIP POINT ✓ 4.0 ✓

TRIP TIME (SEC.) ✓ 1.14 ✓

WATER FLOW TIME (SEC.) 63 <75 99

LOW POINTS DRAINED ✓ 4/10 ✓

WATER SUPPLY & VALVE LEFT OPEN Yes Yes Yes

NO. LOW POINTS TO BE DRAINED: ☒

INSPECTION MADE AND WITNESSED BY

DATE & TIME	MADE BY	WITNESSED BY
<u>Sept 04, 13 PM</u>	<u>D.F.</u>	<u>D.S.</u>
<u>11/10/14</u>	<u>D.F.</u>	<u>Paul A. J.</u>
<u>Sept 12, 14 PM</u>	<u>D.F.</u>	<u>M.P.</u>

2014.12.9 16:27

Photo 37 – Sprinkler Valves Inspection Tag



Photo 38 – Incoming Electrical Service Transformer



Photo 39 – Electrical Room ( 1995 Addition) 1 of 5 (L to R)



Photo 40 – Electrical Room ( 1995 Addition) 2 of 5 (L to R)



Photo 41 – Electrical Room ( 1995 Addition) 3 of 5 (L to R)



Photo 42 – Electrical Room ( 1995 Addition) 4 of 5 (L to R)



Photo 43 – Electrical Room ( 1995 Addition) 5 of 5 (L to R)



## B

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MRF Equipment and Condition  
Assessment





Roller Conveyors

Equip. #	Line	Description <i><b>ROLLER CHAIN CONVEYORS</b></i>	Model	Belting		Drive				Head Shaft	Tail Shaft	Chain Rollers	Frame	General Condition	Comments
				Belt	Cleats	Temp.	Leakage	Oscillation	Noise						
	Fiber	Fibre In-feed Conveyor	Suspended Chain	G	G	G	N	N	N	G	G	N/A	G	Good	Good overall condition. Was completely overhauled 2 years ago. 3 years before next overhaul.
	Fiber	Fiber Incline Transfer Conveyor	Suspended Chain	G	G	G	N	N	N	G	G	N/A	G	Good	Good overall condition. Was completely overhauled 3 years ago. 2 years before next overhaul.
	Container	Container In-Feed Conveyor	Z Pan Chain Roller	G	G	G	N	N	N	G	G	G	G	Good	Good overall condition. Conveyor is only 2 years old
	Container	Container Incline Transfer Conveyor	Z Pan Chain Roller	G	G	G	N	N	N	G	G	G	G	Good	Good overall condition. Conveyor is only 2 years old
	Baler Feed	Baler Reclaim Conveyor	Suspended Chain	G	G	G	N	N	N	G	G	N/A	G	Good	Good overall condition. Belt, backer bars and wear guides were replaced last year. Chains are in fair shape but are scheduled for replacement next year.
	Baler Feed	Baler Feed Conveyor	Suspended Chain	G	G	G	N	N	N	G	G	N/A	G	Good	Good overall condition. Conveyor was total overhauled last year.
		<b>ABBREVIATIONS</b> G - Good M - Monitor DB - Debris Build-up R- Repairs Required N/A - Not Applicable NOA - No Access to inspect closely N - No Y - Yes Cont.- Container													

Aluminum & Ferrous Separators

Equipment #	Line	Description <i>AL &amp; FE SEPARATORS</i>	Model	Belting				Drive				Head Shaft	Tail Shaft	Rotor	Frame	General Condition	Comments
				Belt	Splice	Cleats	Tracking	Temp.	Leakage	Oscillation	Noise						
ECS-58	CONT.	Eddy Current Separator		G	N/A	N/A	G	G	N	Y	N	G	G	NOA	G	Good	The Eddy current is functioning reasonably well. All bearings are running at a normal temperature. The belt drive has an oscillation which may be caused by a distorted drive shaft. Trajectory of aluminum is good. Guarding made it not possible to do a close inspection of the rotor shell.
M-34	CONT.	Over-Belt Ferrous Separator		G	G	G	G	G	N	N	N	G	G	N/A	G	Good	Overall good condition. Separating Ferrous well.
		<b>ABBREVIATIONS</b> G - Good M - Monitor DB - Debris Build-up R- Repairs Required N/A - Not Applicable NOA - No Access to inspect closely N - No Y - Yes Cont.- Container															

Perforators

Equipment #	Line	Description	Model	Comments
		<i>Perforator</i>		
	Container	Economy Mod 4200 Plastic Perforator South unit	4200	Structurally ok, Mechanical components work well. Spikes on drum are due for replacement.
	Container	Economy Mod 4200 Plastic Perforator North unit	4200	Structurally ok, Mechanical components work well. Spikes on drum are due for replacement. Floor plate is worn through and needs to be replaced.

ABC 8043 Auto Tie Baler - During Operation

INSPECTION DESCRIPTION:	Condition			Comments
	Good	Monitor	Repair	
<i>During Operation</i>				
Main Ram Cycle time, under load	G			16 Seconds
Operating Pressure	G			2980 PSI in Tie Cycle
Smoothness of cycle (any banging noise when shearing or grinding sounds)	G			
Fluffers	G			
Auto Tier twisters function properly forward & reverse	G			
Auto Tier Inserters function properly (in & out of chamber and pick up all wires)	G			
Auto Tier Wire Cutter functions properly	G			
Bale wire knots are satisfactory	G			
Bale Quality is satisfactory	G			
Extrusion Cylinder functioning properly	G			
Baler cycles properly	G			
Touch screen responds to commands from operator	G			
Infrared cycling sensors functioning properly	G			
Oil Filter Gauges	G			
Air to Oil Coolers function properly	G			
Hydraulic Oil temperature		M		Was 100 deg. which is ok but on hot days goes up to 130 deg. (too hot)
Hydraulic Oil Level	G			
All Safety Interlocks & E Stops function properly	G			
Bale Length Counter functions properly	G			
All Electrical Motors Function properly (Low noise & heat)	G			
Power Pack Oil Leaks	G			
Hydraulic Cylinder Oil Leaks	G			
Hydraulic Hose Oil Leaks	G			

General Comments or Damage Detail:

Baler operates well. Bale quality is good and the shear works well.

ABC 8043 Auto Tie Baler - Out of Operation

INSPECTION DESCRIPTION:	Condition			Comments
	Good	Monitor	Repair	
<i>Out of Operation</i>				
Main Frame & Extrusion Chamber, signs of damage of structural fatigue	G			
Extrusion Chamber , Tension Bars & Pins Condition	G			
Main Cylinder Mounting Brackets	G			
Main Cylinder Condition, Rod & Barrel	G			
Extrusion Chamber Cylinder Rod & Barrel	G			
Fluffer Inserter Cylinders, Rod & Barrels	G			
Oil Leaks Power Pack	G			
Oil Leaks, Fittings & remote valves	G			
Oil Leaks, Hydraulic Hoses	G			
Hydraulic Hose Condition, Main Cylinder	G			
Hydraulic Hose Condition, Auxiliary	G			
Shear Gap		M		1/8" Gap between shear blades. Stationary shear slightly flared
Condition of Shears	G			
Bale Chamber Floor Condition	G			Good shape, slight wear, less than 1/8"
Chamber Sides (inside)	G			
Extrusion Chamber Hinges & Pins to main frame	G			
Main Control Panel condition	G			
Operator Control Panel condition	G			
Electrical Conduit condition	G			

General Comments or Damage Detail:

ABC 8043 Auto Tier - Out of Operation

INSPECTION DESCRIPTION:	Condition			Comments
	Good	Monitor	Repair	
<i>Auto Tier Out of Operation</i>				
Auto Tier Frame Condition	G			
Inserters	G			
Needle Heads	G			
Twister Shafts	G			
Cutters	G			
Twister Hooks	G			
Hydraulic Motor, Inserters	G			
Hydraulic Motor, Twister Shafts	G			
Gears	G			
Roller Chains	G			
Needle Alignment	G			
Needle Head Rollers	G			
On-side Wire Guides	G			
Off-Side Wire Guides	G			
Wire Feed System Rollers	G			
Ceramic Bushings	G			
Wire Rack Frames	G			
	G			

General Comments or Damage Detail:

Auto Tie unit is in good shape and operates well. Slight wear on replaceable parts. The occasional bale wire is missed but no cause for concern.

# Ambaco (American Baler Co.)

## Baler (Economy)

Model : 8043HS-10150P

Serial # 9108109

Purchased 2008

## Machinex

### Containers Conveyors

<u>Our</u> <u>Designation</u>		<u>Drive Motor</u>	<u>Belt Type</u>	<u>Dimensions</u>	<u>Machinex</u> <u>Designation</u>	
C-1	Receiving conveyor	2 hp. 230/3/60	Steel	36" x 70' 6"	C-1	Purchased
C-2	Feeding (up) conveyor	5 hp. 230/3/60	Rubber Bed / Steel	30" x 103' 6"	C-2	2010
	Magnetic separator	2 hp. 575/3/60	Rubber slider	30" x 14' 5"	M-3	
C-3	Sort line conveyor	3 hp. 230/3/60	Rubber slider	30" x 164' 6"	C-4	

### Fibers Conveyors

C-4	Receiving conveyor	2 hp. 230/3/60	Rubber / chain	42" x 26' 6"	P-1
C-5	Feeding (up) conveyor	5 hp. 230/3/60	Rubber / chain	42" x 82'	P-2
C-6	Transfer conveyor	1 hp. 575/3/60	Rubber slider	48" x 32' 9"	P-3
C-7	Sort line conveyor	3 hp. 230/3/60	Rubber slider	42" x 106' 6"	P-4

### Baler Conveyors

C-8	Reclaim (transit) conveyor	5 hp. 575/3/60	Rubber / chain	48" x 123' 6"	B-1	
C-9	Baler feed conveyor	10 hp. 575/3/60	Rubber / chain	60" x 114' 6"	B-2	Completeh

### Perforators

PF1	#1 Plastics Perforator	Model # 4200	Serial # 9064P	PP-5	2004
PF2	#2 Plastics Perforator	Model # 4200	Serial # 9065P	PP-6	2004

### Eddy Current

EC-1	Aluminum Eddy Current	ECS-1	Serial # ECS-015L	EC-5	2006
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# C

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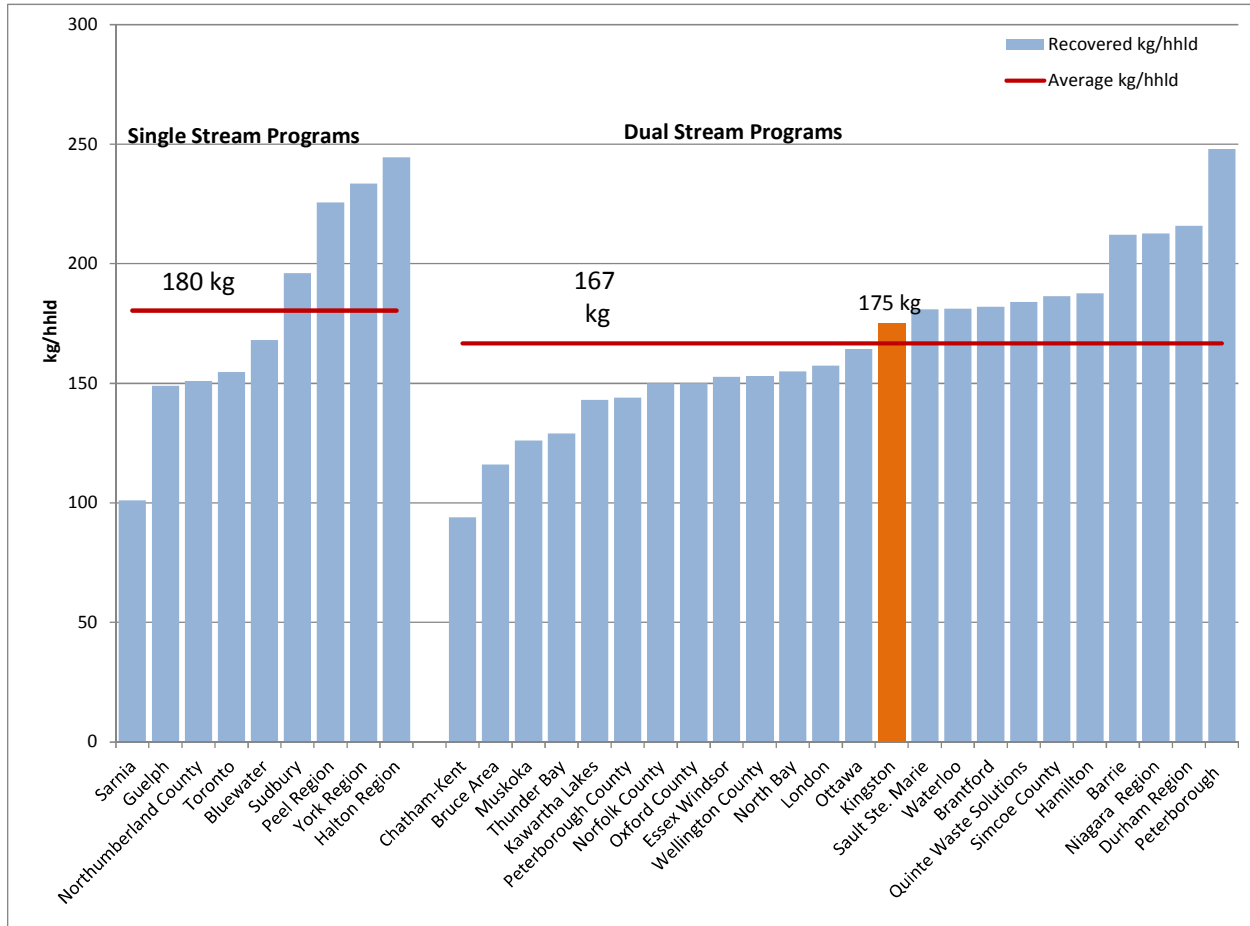
WDO Datacall Information

## Collection System Cost Savings

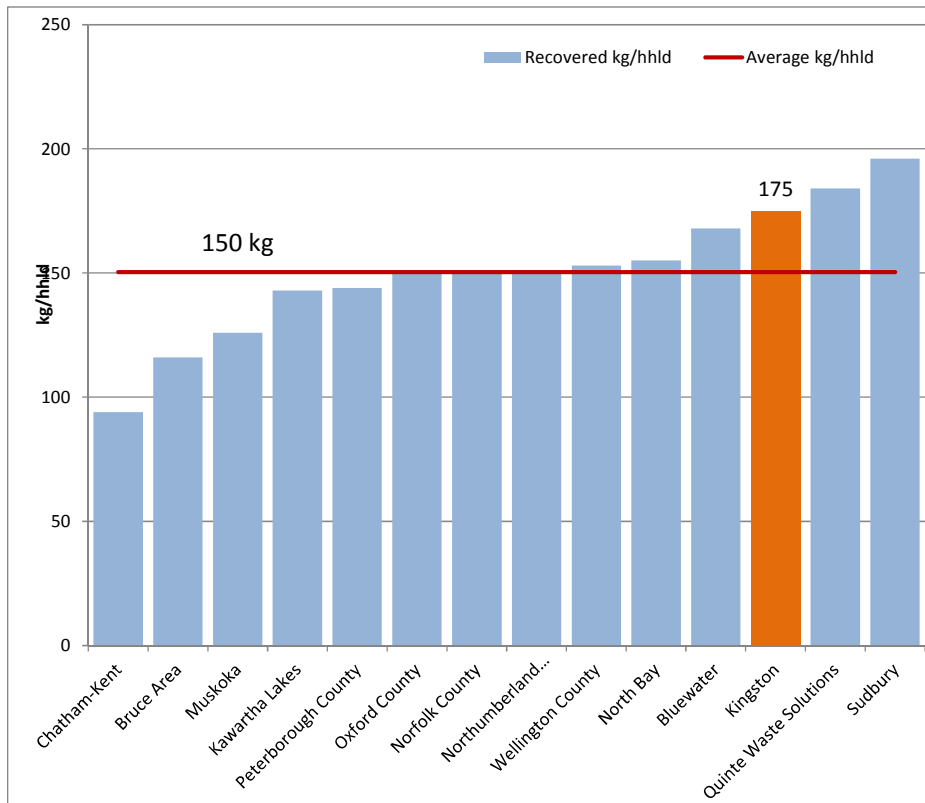
**Table 1: Municipalities by Municipal Grouping, Tonnes and Type of Program**

Municipal Grouping	Program Name	Calculated Blue Box Tonnes Marketed	Type of Program
Large Urban	Toronto	150,742	Single Stream
	Peel Region	92,688	Single Stream
	York Region	74,677	Single Stream
	Halton Region	43,542	Single Stream
	Hamilton	40,292	Dual Stream
	London	26,333	Dual Stream
Urban Regional	Ottawa	62,866	Dual Stream
	Durham Region	45,939	Dual Stream
	Niagara Region	38,702	Dual Stream
	Waterloo	34,768	Dual Stream
	Simcoe County	26,043	Dual Stream
	Essex Windsor	25,081	Dual Stream
Medium Urban	Barrie	11,725	Dual Stream
	Guelph	8,882	Single Stream
	Peterborough	8,551	Dual Stream
	Brantford	7,553	Dual Stream
	Sault Ste. Marie	6,241	Dual Stream
	Thunder Bay	5,812	Dual Stream
	Sarnia	4,901	Single Stream
Rural Regional	Sudbury	13,457	Single Stream
	Bluewater	11,699	Single Stream
	Quinte Waste Solutions	10,202	Dual Stream
	Kingston	9,114	Dual Stream
	Oxford County	6,739	Dual Stream
	Northumberland County	5,920	Dual Stream
	Muskoka	5,794	Dual Stream
	Kawartha Lakes	5,660	Dual Stream
	Wellington County	5,029	Dual Stream
	Peterborough County	4,868	Dual Stream
	Chatham-Kent	4,489	Dual Stream
	Norfolk County	4,468	Dual Stream
	North Bay	3,739	Dual Stream
	Bruce Area	3,642	Dual Stream

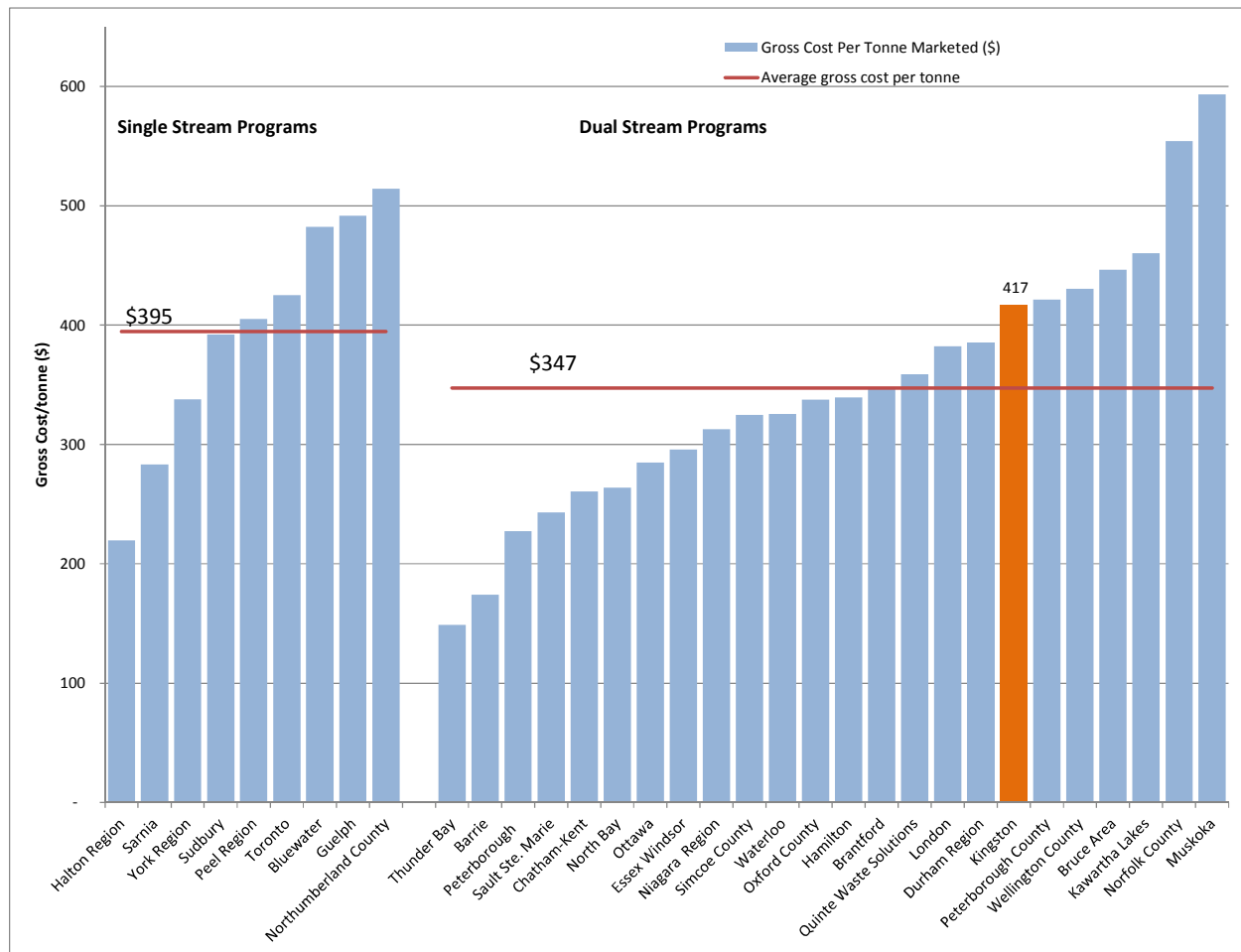
**Figure 1: Comparison of Kilograms Recovered per Household for Selected Single and Dual Stream Programs (2013)**



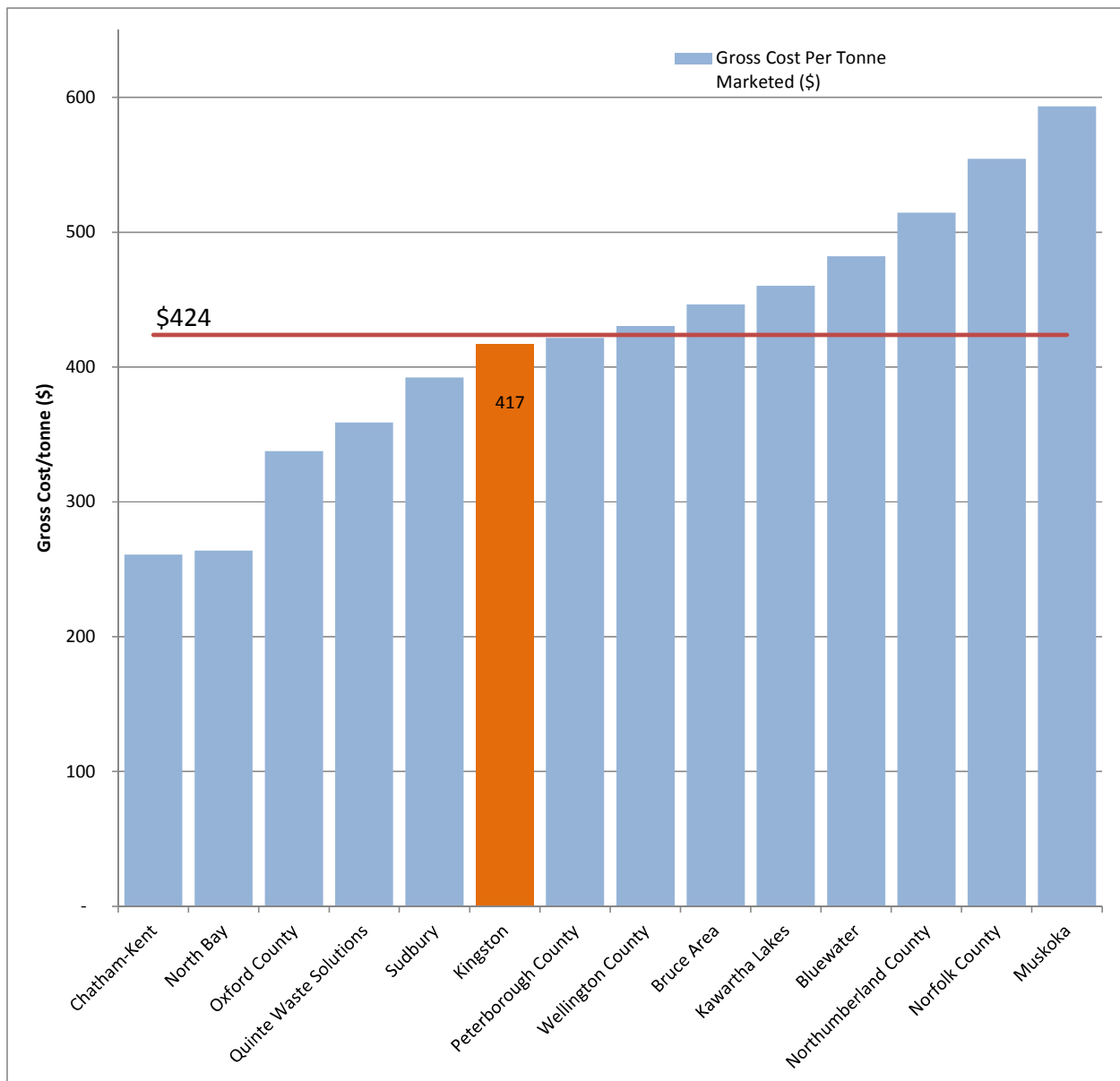
**Figure 2: Recovered Material for Rural Regional Municipal Grouping (kg/hhld)**



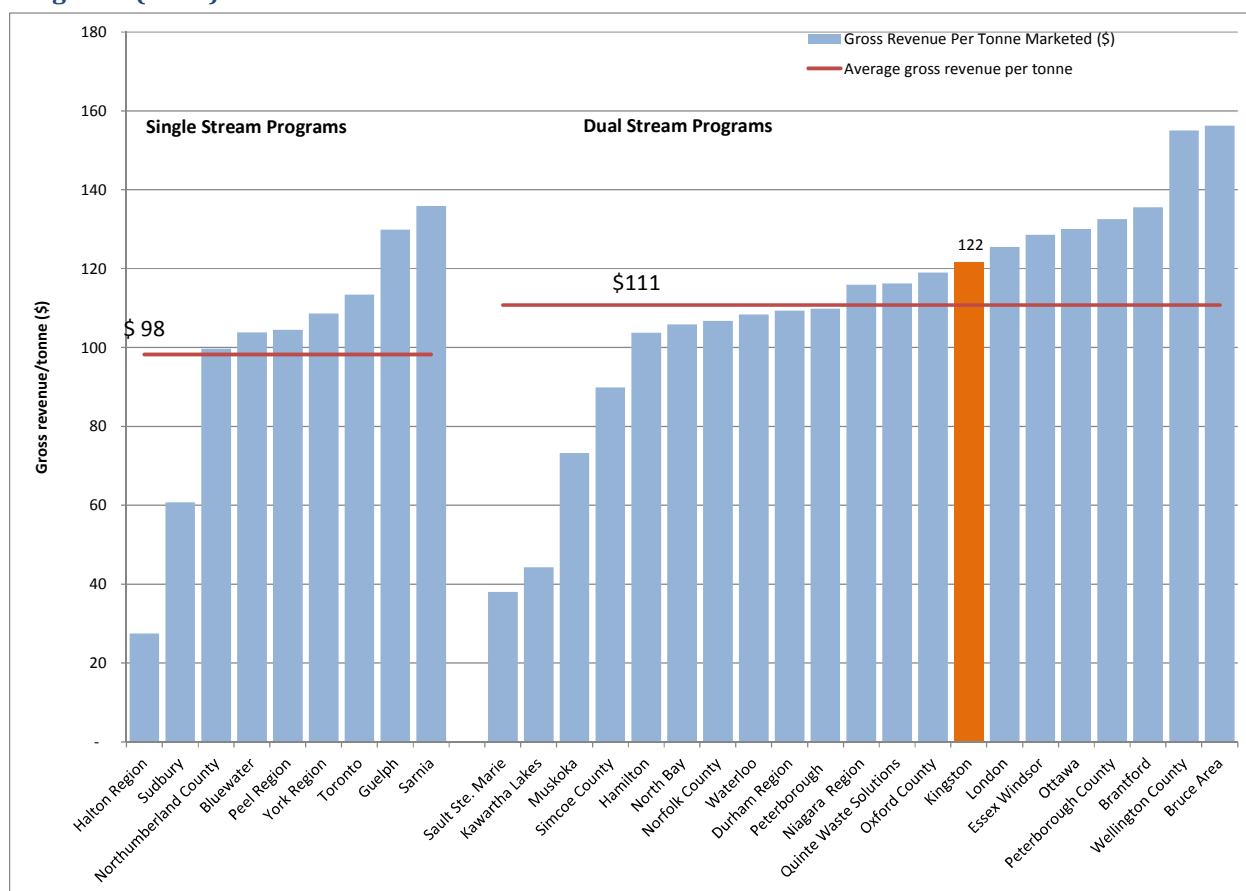
**Figure 3: Comparison of Gross Cost Per Tonne for Selected Single and Dual Stream Recycling Programs (2013)**



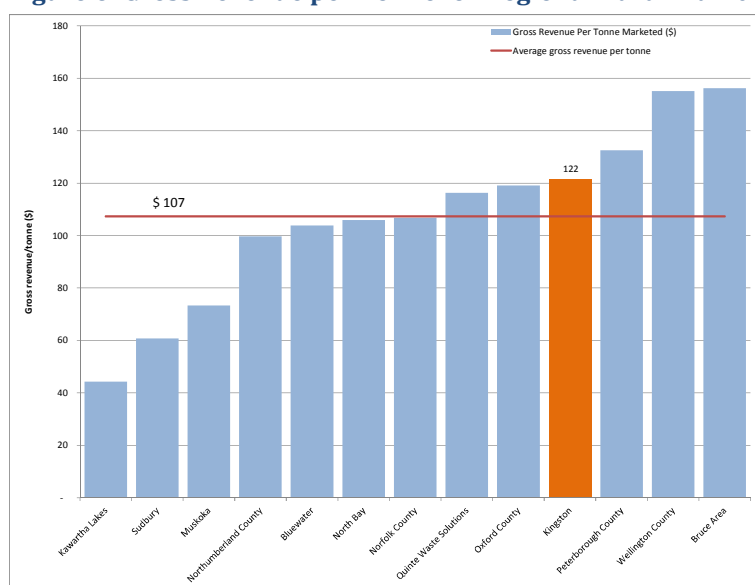
**Figure 4: Gross Costs per Tonne for Regional Rural Municipal Grouping (2013)**



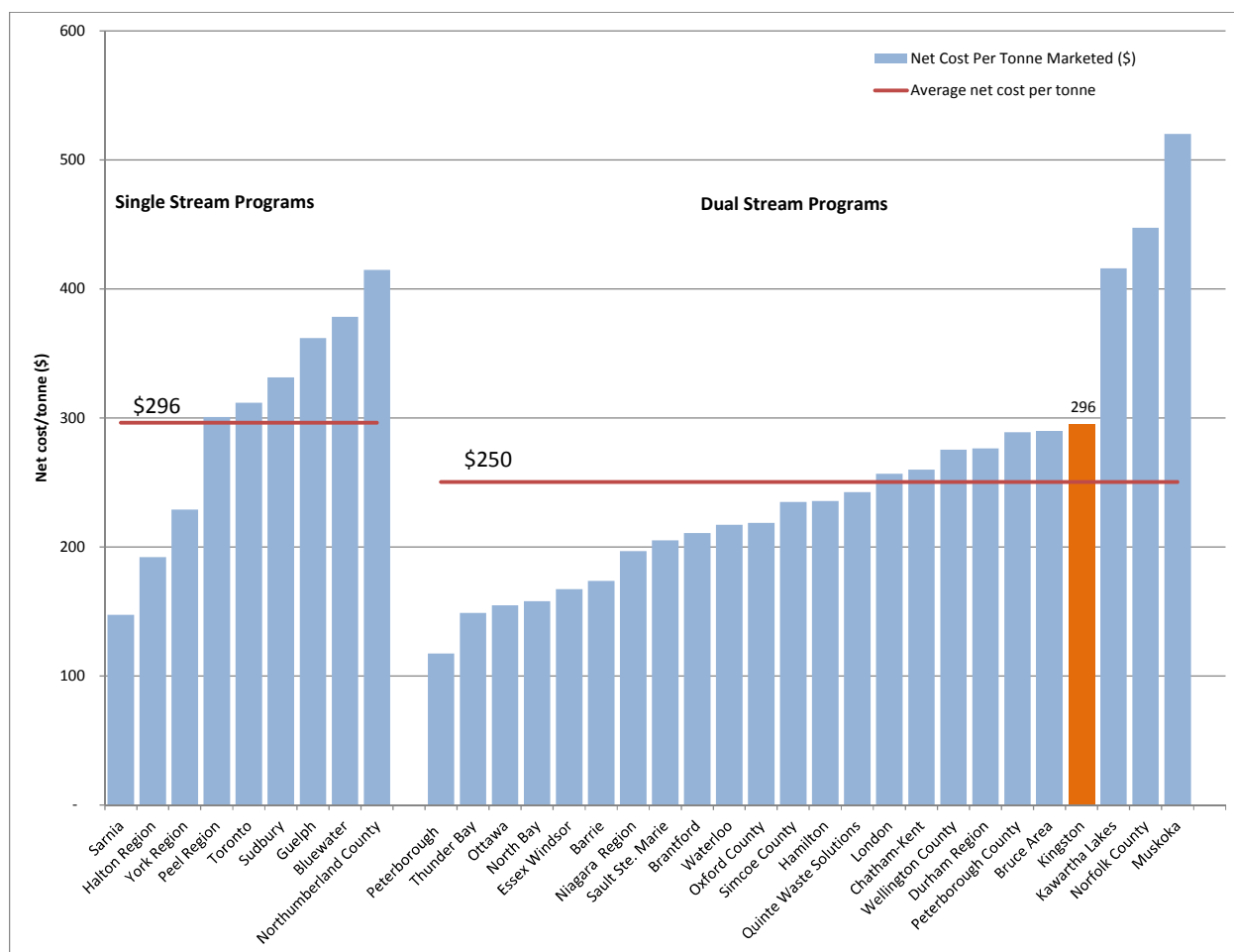
**Figure 5: Comparison of Gross Revenue Per Tonne for Selected Single and Dual Stream Recycling Programs (2013)**



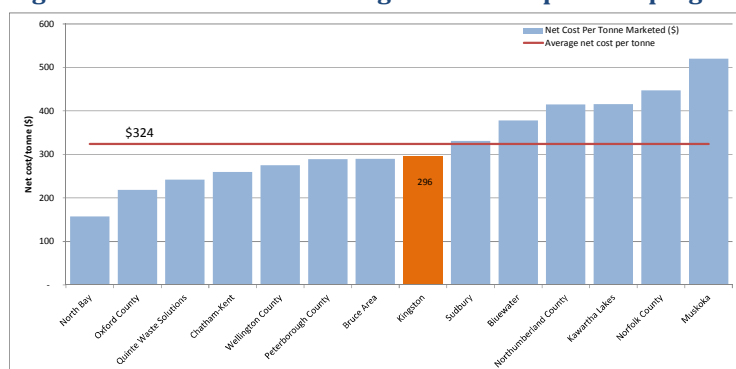
**Figure 6: Gross Revenue per Tonne for Regional Rural Municipal Grouping**



**Figure 7: Comparison of Net Cost Per Tonne for Selected Single and Dual Stream Recycling Programs (2013)**



**Figure 8: Net Cost for Rural Regional Municipal Grouping**



# D

Tipping Floor and Payload Calculations

Table 1: Tipping Floor Calculations

	15,000 SS	25,000 SS	15,000 Dual		25,000 Dual	
			Fibre 68%	Containers 32%	Fibre 68%	Containers 32%
tpy	15,000	25,000	10,200	4,800	17,000	8,000
tpd (260 days)	58	96	39	18	65	31
2 day storage	115	192	78	37	131	62
kg/day	115,385	192,308	78,462	36,923	130,769	61,538
volume @100 kg/m <sup>3</sup>	1154	1923	523	738	872	1231
m <sup>2</sup> @2 m depth	577	962	262	369	436	615
available storage (m2)	501	501	209	233	209	233
% of 2 day storage	87%	52%	80%	63%	48%	38%
days of storage	<b>1.74</b>	<b>1.04</b>	<b>1.60</b>	<b>1.26</b>	<b>0.96</b>	<b>0.76</b>
average			<b>1.43</b>		<b>0.86</b>	

Table 2: Payload Calculation

	2 - stream		single stream
	25% Containers	75% fibres	Commingled
on floor density kg/m3	50	150	100
compaction ratio	1.2	2	1.2
volume of 100 cu yd trailer in cubic meters	76	76	76
volume based on compaction ratio and 76 m3 (100 cu yd trailer)	91.2	152	91.2
payload in 76 m3 (100 cu yd) trailer (kilograms)	4560	22800	9120
volume of 140 cu yd trailer in cubic meters	107	107	107
effective volume in 107 m3 (140 cu yd trailer)	128.4	214	128.4
payload in 107 m3 (140 cu yd) trailer (kilograms)	6420	32100	12840
payload in 107 m3 (140 cu yd) trailer (tonnes)	6.4	32.1	12.8

Source: Table A2 and C2 in the Genivar Report

# Appendix C

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Tech Memo 3



# Technical Memo #3

Date: Friday, December 12, 2014

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Project: City of Kingston, Regional MRF Study, HDR Project Number 236113

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To: Tyler Lasko, John Giles, Jason Hollett, Carrie Nash

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From: Jim McKay, Christine Roarke

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Subject: Task 4: Municipal Data Collection, Interest & Engagement

## 1 Introduction & Background

The City of Kingston (the City) is undertaking a study to analyse the potential for development of a Regional Materials Recovery Facility (MRF) in Kingston. The study is comprised of a number of tasks including;

- Review of Waste Diversion Ontario's Municipal Industry Program Committee (MIPC) *Study of the Optimization of the Blue Box Material Processing System in Ontario* and Relevant Background Documentation as it relates to both the existing MRF and any future use;
- Technical Plan and Business Case Development for a regional MRF in Kingston;
- Municipal Data Collection, Interest and Engagement related to potential municipalities utilizing a regional MRF in Kingston; and,
- Final Report and Presentation.

A critical part of the development of a regional MRF in Eastern Ontario is consideration of the perspectives of other municipalities. Potential participation in the regional MRF by Eastern Ontario municipalities will be important to the City to inform the decision making process regarding the viability of a regional MRF. Larger MRFs are more cost efficient due to the economies of scale; the potential size of the proposed regional MRF will be developed based on preliminary estimates of potential tonnages available for processing. The current and future tonnes processed at the existing MRF from Kingston, Loyalist Township and South Frontenac will not be sufficient to support an expanded MRF; additional tonnages from other municipalities in Eastern Ontario are required.

The purpose of this Technical Memorandum is to document the methodology and outcome of the municipal engagement process, as part of Task 4 of the regional MRF study. The technical plan and business case will be developed based on estimates of potential tonnages available from Eastern Ontario municipalities from information received through the municipal engagement process.



## 2 Methodology

HDR developed a municipal questionnaire in conjunction with the City and the Continuous Improvement Fund (CIF) that was intended to confirm the following information with 67 municipalities located in Eastern Ontario:

- how many streams of recyclables are collected, and what recyclables are collected in those streams (e.g. fibres, containers, cardboard, etc.);
- type and size of containers used to collect recyclables from single and multi-family residences and depots;
- how recyclables are delivered to the processor (e.g. collection vehicles, front-end containers, roll-off containers);
- percentage of types of collection vehicles;
- if recyclables are compacted in the collection vehicle/container and the compaction ratio;
- types of generators receiving collection (e.g. single family, multi-family, small businesses);
- frequency of collection; and,
- whether there is interest from the surveyed municipality in potentially working in collaboration with the City of Kingston to receive recyclables processing services at a regional MRF located in Kingston at some time in the future.

CIF assisted with providing the contact information for each Eastern Ontario municipality receiving a copy of the questionnaire. CIF initially contacted each municipality in advance to inform them of the study and the purpose of the questionnaire.

The contact list included 83 contacts for the 67 municipalities in Eastern Ontario (note; the original contact list included 67 municipalities which included Township of Billings but not Loyalist Township – see Section 2.1 for a description of the anomalies). It should be noted that there was more than one contact listed for some municipalities. The list of municipalities that were contacted can be found in **Appendix A**.

HDR drafted an introductory letter to accompany the questionnaire which was used by CIF to develop an e-bulletin including a link to the questionnaire which was sent to all of the contacts on the Eastern Ontario municipality list.

The e-bulletin was sent out on September 11, 2014 with a request to complete the questionnaire by October 3, 2014. A copy of the e-bulletin can be found in **Appendix B**. On September 24, 2014, HDR followed up with 33 contacts that had not opened the e-bulletin. HDR phoned everyone on the list, spoke to about one third of the contacts and resent the e-bulletin either to the original contact or another designate to ensure the email with the link to the questionnaire would be delivered to the correct person. On October 1, 2014, HDR followed up with another 18 contacts that had opened up the e-bulletin but had not completed the questionnaire. A copy of the e-bulletin was resent to these contacts as a reminder.



In order to keep the questionnaire as short as possible, supplementary information required for the study was obtained through CIF from the Municipal Datacall process to minimize the time required by respondents when completing the questionnaire.

On October 3, 2014, the questionnaire results were compiled using Survey Monkey's export feature. The results can be found in **Appendix C**.

On October 17, 2014, HDR and the City of Kingston had a teleconference to discuss the questionnaire results to-date. It was decided that further follow-up would be conducted with a number of municipalities that had not yet responded to the survey. HDR followed up the following week with the twelve municipalities identified by the City including;

- City of Cornwall,
- Township of Edwardsburgh Cardinal,
- Township of Elizabethtown-Kitley,
- Town of Gananoque,
- Town of Greater Napanee,
- Town of Perth,
- Town of Prescott,
- Township of Rideau Lakes,
- Town of Smiths Falls,
- Township of Stone Mills,
- Town of Deseronto,
- Mohawks of The Bay of Quinte

HDR contacted each representative of the above noted municipalities and either spoke to the contact or left a voicemail. An email outlining the purpose of the follow-up call (i.e. just to confirm interest) with a copy of the original CIF e-bulletin was sent to five contacts who indicated they were not aware of the study or had misplaced the email. Seven responses were obtained (including one completed questionnaire), and HDR was unable to get responses from the other five contacts despite repeated attempts.

## 2.1 Anomalies

Upon compiling the results with the Datacall information, HDR noticed that there were discrepancies in the information provided for some of the contacts as follows:

- Loyalist Township was omitted because it was excluded from the original MIPC study list; HDR followed up with a phone call and emailed the questionnaire on October 9, 2014.
- The Mohawk Council of Akwesasne was on the contact list but had no Datacall information; HDR followed up with CIF who confirmed that the Mohawk Council of Akwesasne did not submit any Datacall information for 2013. HDR followed up with the Mohawk Council of Akwesasne, and upon speaking to the contact, learned that they had replied by email to the questionnaire indicating they would not be filling out the questionnaire as they currently work with the City of Cornwall MRF and confirming that they were not interested. The project team was unable to include this municipality in the analysis as no Datacall information was available and therefore, no information was



available about the tonnes generated or the type of program operated by this municipality.

- The Township of Billings was deleted from the contact list as they are located on Manitoulin Island and were mistakenly included as part of the Eastern Ontario municipalities list.
- Some Datacall information for the Town of Deep River was missing. HDR obtained the information from CIF.

### 3 Summary of Responses

In total, 67 municipalities were on the contact list once it was modified to include all Eastern Ontario municipalities. Of these municipalities, 41 municipalities completed questionnaires and one municipality responded via email to CIF. Of the remaining 25 municipalities that did not complete a questionnaire, twelve municipalities were identified for further follow-up. HDR was able to get in touch with seven of the twelve municipalities; five municipalities could not be reached. In total, responses were obtained from 49 municipalities, either via the questionnaire or a follow-up phone call or email.

The following Table 3-1 presents the results of the communication with municipalities regarding their level of interest in the regional MRF, determined through the results of the questionnaire and the second round of follow-up.

The responses from municipalities were grouped according to whether or not they were interested (i.e. interested in potentially working in collaboration with the City of Kingston to receive recyclables processing services at a regional MRF located in Kingston at some time in the future), potentially interested or not interested (based on the questionnaire and follow-up). Additionally those municipalities who did not respond to the questionnaire or follow-up were grouped as “interest unknown”.

In general, those municipalities that indicated they were not interested cited the following reasons;

- distance from Kingston,
- transportation costs,
- operate their own MRF, and
- have existing contracts with a MRF/transfer station/private service provider.



**Table 3-1: Summary of Responses**

Municipality	Tonnes	Distance from Kingston (km)
<b>Interested</b>		
Ottawa, City Of	62,866	197
Quinte Waste Solutions	10,202	94
Kingston, City Of	9,114	0
South Frontenac, Township Of	1,960	40
Clarence-Rockland, City Of	1,566	234
Brockville, City Of	1,506	85
Edwardsburgh Cardinal, Township Of	1,064	121
Loyalist, Township Of	1,047	24
Mississippi Mills, Town Of	745	131
Elizabethtown-Kitley, Township Of	710	96
Arnprior, Town Of	606	160
Smiths Falls, Town Of	593	97
Stone Mills, Township Of	541	51
Drummond-North Elmsley, Township Of	535	96
South Dundas, Township Of	504	147
South Glengarry, Township Of	380	212
Front Of Yonge, Township Of	350	64
Lanark Highlands, Township Of	322	115
Central Frontenac, Township Of	277	72
Head, Clara & Maria, Township Of	258	324
Deseronto, Town Of	166	55
North Frontenac, Township Of	165	113
Frontenac Islands, Township Of	149	16
Leeds And The Thousand Islands, Township Of	46	38
<b>Subtotal (24 Municipalities)</b>	<b>95,673</b>	
<b>Maybe (Questionnaire indicated "unable to answer at this time")</b>		
Greater Napanee, Town Of	753	40
Whitewater Region, Township Of	415	211
<b>Subtotal (2 Municipalities)</b>	<b>1,169</b>	

**Table 3-2: Summary of Responses (continued)**

Unknown		
Cornwall, City Of	3,344	182
Hawkesbury Joint Recycling	1,381	251
North Grenville, Township Of	1,236	144
North Glengarry, Township Of	1,054	223
Alfred & Plantagenet, Township Of	720	237
Deep River, Town Of	656	288
Carleton Place, Town Of	625	118
North Dundas, Township Of	544	160
Perth, Town Of	519	84
Brudenell, Lyndoch And Raglan, Township Of	496	201
Gananoque, Town Of	406	34
Madawaska Valley, Township Of	393	210
Prescott, Town Of	275	105
Hastings Highlands, Municipality Of	226	208
Merrickville-Wolford, Village Of	202	128
Athens, Township Of	189	69
Killaloe, Hagarty, And Richards, Township Of	179	230
Mohawks Of The Bay Of Quinte	170	59
Laurentian Hills, Town Of	154	286
Montague, Township Of	95	109
Wollaston, Township Of	79	173
Tay Valley, Township Of	75	86
Algonquins Of Pikwakanagan	27	68
Subtotal (23 Municipalities)	13,046	

**Table 3-3: Summary of Responses (continued)**

Not Interested		
Northumberland, County Of	5,920	143
Ottawa Valley Waste Recovery Centre	3,292	237
Russell, Township Of	1,240	183
The Nation, Municipality	753	220
Rideau Lakes, Township Of	641	70
South Stormont, Township Of	625	167
Renfrew, Town Of	488	189
McNab-Braeside, Township Of	469	172
Beckwith, Township Of	418	123
North Stormont, Township Of	405	160
Greater Madawaska, Township Of	266	147
Bonnechere Valley, Township Of	264	221
Casselman, Village Of	246	201
Augusta, Township Of	236	101
Horton, Township Of	186	190
Addington Highlands, Township Of	131	141
Admaston/Bromley, Township Of	105	205
Mohawk Council Of Akwesasne	n/a	182
Subtotal (18 Municipalities)	15,688	
Total Tonnes in Eastern Ontario (67 municipalities)	125,576	

## 4 Analysis of Responses

The following sections provide an overview of the potential tonnage of recyclables available, how the recyclables are collected, and the potential tonnage available by interest and distance based on the results of the questionnaire and follow-up. Note that the Mohawk Council of Akwesasne has not been included in any of the tables below as Datacall information was unavailable for this program, including tonnages and type of program.

### 4.1 Potential Tonnage Available by Responses

Table 4-1 presents the potential tonnage available based on the 2013 WDO Datacall information. Based on questionnaire results, it appears that there could be approximately 22,600 tonnes of recyclable material available for processing at a regional MRF. This material is potentially available from the City of Kingston itself and those municipalities that indicated they were interested in utilizing a regional MRF in Kingston (not including the City of Ottawa or Quinte Waste Services). There are an additional 14,200 tonnes which could potentially be available from those municipalities whose interest is unknown or tentative at this time.

The tonnages from Northumberland County, the City of Ottawa and Quinte Waste Services, have been kept separate so as not to skew results and since it is unlikely they would participate. The City of Ottawa and Quinte Waste Services expressed interest in the regional MRF; Northumberland County indicated they are not interested. The City of Ottawa contracts with a private processing facility located in Ottawa for recyclables processing. Northumberland County and Quinte Waste Services not only own and operate their own MRF but also provide collection and/or processing services to nearby municipalities.

There is some potential that in the future, material could be available from those municipalities not currently interested as issues such as the expiry of existing contracts may be resolved depending on the timing of the MRF expansion. At this time these tonnages (approximately 89,000 tonnes) have been assumed as unavailable to a regional MRF in Kingston.

Loyalist Township has been considered as “interested” even though they did not respond to the questionnaire or follow up as they already receive processing services at Kingston’s MRF.

**Table 4-1: Summary of Tonnages Potentially Available by Responses**

Questionnaire Response	Tonnes
Municipalities Indicating "Interested"	13,492
Kingston only	9,114
Subtotal - Interested	22,606
Interest unknown	13,046
Municipalities Indicating "Maybe Interested"	1,169
Subtotal – Maybe Interested	14,215

Questionnaire Response	Tonnes
Ottawa	62,866
Quinte Waste Services	10,202
Northumberland County	5,920
Municipalities Indicating "Not interested"	9,767
Subtotal – Not Interested/Unavailable	88,755
<b>Total Tonnage in Eastern Ontario</b>	<b>125,576</b>

## 4.2 Potential Tonnage Available by Types of Programs

WDO Datacall information also provided information about the types of recycling collection programs operated in Eastern Ontario; single stream collection and two or more stream collection. Table 4-2 presents the responses by municipalities to the questionnaire and follow-up categorized by the type of recycling collection program they operate (from the information in the WDO Datacall). Some municipalities collect recyclable materials in a number of streams, both curbside and at depots. These municipalities have been captured under “Two + Stream Recycling Collection” in the table below along with those municipalities who operate conventional two stream recycling collection programs.

**Table 4-2: Types of Programs Categorized by Interest Level**

Type of Program	Number of Responses	Tonnes (2013)
<b>Two + Stream Recycling Collection</b>		
Yes (includes Kingston)	18	19,739
Yes (Ottawa, Quinte only)	2	73,068
No	13	7,656
Maybe	1	415
Unknown	15	5,126
Subtotal	49	106,004
<b>Single Stream Recycling Collection</b>		
Yes	4	2,866
No	3	2,112
No (Northumberland County Only)	1	5,920
Maybe	1	753
Unknown	8	7,920
Subtotal	17	19,571
<b>Total</b>	<b>66</b>	<b>125,575</b>

It appears that the majority of programs consist of collection of two or more streams of recyclables and account for approximately 84% of the material collected. This information is important in the development of the Technical Plan and Business Case. A dual stream MRF would not be able to accept single stream materials, thereby potentially eliminating approximately 19,000 tonnes of material in the Eastern Ontario watershed (not all of which would be available anyway).

There are a number of advantages and disadvantages to single and dual stream collection programs and MRFs. Single stream collection programs offer efficiencies in collection, although

this may be attributed to automated collection, and potentially in hauling materials. Single stream MRFs are reported to be more expensive from a capital and operating cost perspective, although they provide flexibility in processing either separated and commingled material.

Dual stream collection programs are more expensive to operate and transportation costs can be higher with vehicle compartments “topping out”. Dual stream MRFs are reported to be less expensive to operate as a significant portion of sorting has already been done by residents; however, they cannot process commingled material.

A single stream MRF may provide more flexibility with respect to collection options; this could make a single stream regional MRF proposition more attractive and feasible for municipalities to participate in as significant changes to recyclables collection would not be required. In fact, collection and potentially haulage may be easier and less expensive. However, based on the responses, there are fewer tonnes available (approximately 2,900 tonnes from interested municipalities). However, should the business case indicate that a dual stream MRF be developed based on processing costs, there appears to be sufficient tonnage available from those interested municipalities operating a two plus stream collection program (approximately 19,000 tonnes, which includes the City of Kingston).

### 4.3 Potential Tonnage Available by Distance from Kingston

Another important consideration for municipalities is hauling distance to a processing facility. The Eastern Ontario watershed covers a large geographic area and haul costs to Kingston could be significant. Google Maps was used to provide an estimate of the distance from each of the municipalities to Kingston. The following Table 4-3 provides a breakdown of the responses from municipalities (based on responses to the questionnaire and follow-up) according to the estimated distance of each municipality from Kingston. The distance from Kingston would represent one-way hauling of recyclables to the MRF. Note that the tonnages from the City of Kingston have not been included in the following table.

**Table 4-3: Summary of Tonnages Available by Distance from Kingston**

Distance from Kingston (km)	Response from Municipalities (tonnes, number of responses)				
	Yes	Maybe	Unknown	No	Total
<50 km	3,202 (4)	753 (1)	406 (1)		4,361 (6)
50-100 km	14,881 (9)		981 (5)	641 (1)	16,503 (15)
100-150 km	2,799 (5)		2,432 (5)	6,971 (5)	12,202 (15)
>150 km	65,677 (5)	415 (1)	9,227 (12)	8,076 (11)	83,395 (29)
Total number of tonnes/responses	86,560 (23)	1,168 (2)	13,046 (23)	15,688 (17)	116,461 (65)

Note: totals may not add due to rounding

Twenty-one municipalities are located within 100 kilometers of the City of Kingston, fifteen are located within 100 to 150 kilometers and another 29 are located more than 150 kilometers from Kingston with 18 of these located over 200 kilometers from Kingston. The information in this table was used in Section 4.4 (see Table 4-4) to assist with estimating the potential tonnage



available to the Kingston MRF since those municipalities located closer to Kingston, and therefore who would have lower haul costs, may be more interested in a regional MRF .

#### 4.4 Potential Tonnage Available by Interest and Distance

Table 4-4 presents estimates of the potential recyclables tonnage available to the Kingston MRF based on the information provided in

Table 4-1 and Table 4-3. It was assumed that those municipalities within a 100 km radius of Kingston would be more likely to be interested in receiving processing services at a regional MRF and were therefore included in the tonnages which were potentially available to the Kingston MRF, even if they responded as “maybe” or did not respond to the questionnaire or follow-up. It is also possible that some tonnage may be available from those municipalities who either did not respond to the questionnaire or indicated “maybe” and are located greater than 100 kilometers from the City.

Approximately 22,000 tonnes could be available from those municipalities who indicated they were interested, regardless of how far they are located from Kingston and from the City of Kingston itself, but not including Ottawa or Quinte Waste Services. Another 2,140 tonnes could be available from municipalities who did not indicate interest, purely based on proximity to Kingston (within 100 km), bringing the potential available tonnage close to the 25,000 tonne mark.

It was assumed that tonnages from those municipalities who indicated they were not interested (including Northumberland County), interest unknown or tentative and located greater than 100 km from Kingston would likely not be available for processing, consisting of almost 28,000 tonnes. It was assumed that tonnages (approximately 73,000 tonnes) from Ottawa and Quinte Waste Services also would not be available, even though they expressed interest.

**Table 4-4: Potential Tonnage Available based on Responses and Distance**

Questionnaire Response	Tonnes
Municipalities Indicating "Interested"	13,492
Kingston	9,114
Subtotal - Interested	22,606
Interest unknown (<100 km)	1,387
Municipalities Indicating "Maybe Interested" (<100 km)	753
Subtotal – Maybe Interested	2,140
Potentially Available	24,746
Ottawa	62,866
Quinte Waste Services	10,202
Municipalities Indicating "Not interested"	9,767
Northumberland County	5,920
Interest unknown (>100 km)	11,659
Municipalities Indicating "Maybe Interested" (>100 km)	415
Subtotal – Not Interested/Unavailable	100,828



Questionnaire Response	Tonnes
Total Tonnes in Eastern Ontario	125,576

\*Totals may not add due to rounding

## 5 Conclusions

The analysis of responses provided by municipalities, potential tonnages available based on interest and distance, as well as information provided through the WDO Datacall will be used in the development of the technical plan and business case.

In general, the following conclusions can be made from this municipal engagement process.

1. Based on the results of the questionnaire and follow-up, there appears to be interest in a regional MRF located in Kingston from several Eastern Ontario municipalities. At a minimum, there is sufficient interest to support the consideration of a 15,000 tonnes per year MRF. If all of the municipalities who indicated an interest were to participate, approximately 22,600 tonnes of recyclable materials would be available for processing supporting a 25,000 tonnes per year MRF.
2. Based on proximity to Kingston and level of interest, there is almost 25,000 tonnes of recyclables available from municipalities whose interest was confirmed, unknown or tentative (excluding Ottawa) located within a reasonable hauling distance (e.g. 100 km) from Kingston.
3. It will be important to consider the distance of municipalities from the regional MRF as haul costs increase with distance. Approximately one third of the municipalities in Eastern Ontario are located within 100 kilometers of Kingston, of these 13 indicated they are interested in a regional MRF. Another 10 municipalities indicated they are interested in the regional MRF but are located over 100 kilometers from Kingston, in some cases over 200 kilometers away which could make hauling cost-prohibitive. Haul costs will be estimated as part of the technical plan.
4. The majority of municipalities (74%) in Eastern Ontario collect two or more streams of recycling. This material can be processed at either a dual stream or single stream MRF. The business case will determine the cost differential between a single and dual stream facility. Beyond cost implications of single and dual stream MRFs, flexibility for participating municipalities in the collection and transportation of recyclables will be a critical part of the development of business case. Should the business case determine that a single stream MRF is recommended, it will be able to process material from both dual and single stream collection programs (at minimum, approximately 22,600 tonnes of material from interested municipalities). Should a dual stream MRF be recommended, there appears to be sufficient tonnage with approximately 19,700 tonnes of material from those 18 municipalities indicating interest and operating dual stream collection programs (including the City of Kingston) to support a dual stream MRF option.
5. It will also be important to consider contract expiration dates for this project. The alignment of contract expiration dates will need to be considered for the commencement of operations for the MRF. Five Lanark County municipalities (Mississippi Mills, Carleton

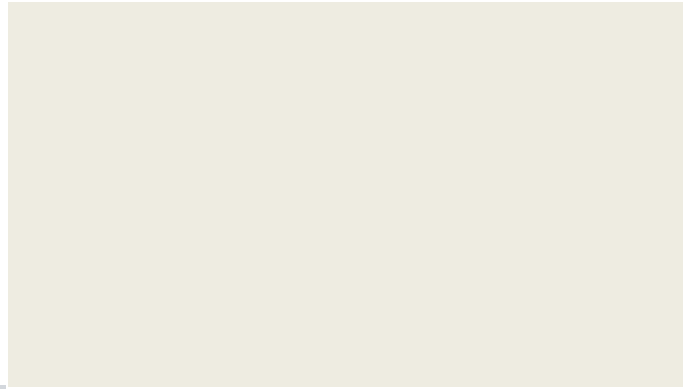


Place, Townships of Drummond/North Elmsley, Beckwith and Montague) have entered into a multi-municipal service agreement<sup>1</sup> for collection and processing with Waste Management which commenced on June 1, 2013 for a 7 year period with a provision to extend the contract by one year or other term as agreed upon by both parties<sup>2</sup>. Other nearby municipalities have indicated they will be aligning their contracts with this date in the future as well to negotiate more favourable contracts with private service providers to realize cost savings through greater economies of scale.

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<sup>1</sup> [http://cif.wdo.ca/pdf/reports/153-Carlton\\_Place\\_Final\\_Report.pdf](http://cif.wdo.ca/pdf/reports/153-Carlton_Place_Final_Report.pdf)

<sup>2</sup> [http://cif.wdo.ca/projects/documents/709-Carleton\\_Place\\_RFP.pdf](http://cif.wdo.ca/projects/documents/709-Carleton_Place_RFP.pdf)



# A

List of Municipalities



#### List of Municipalities on Contact List

AKWESASNE, MOHAWK COUNCIL OF  
ADDINGTON HIGHLANDS, TOWNSHIP OF  
ADMASTON/BROMLEY, TOWNSHIP OF  
ALFRED & PLANTAGENET, TOWNSHIP OF  
ALGONQUINS OF PIKWAKANAGAN  
ARNPRIOR, TOWN OF  
ATHENS, TOWNSHIP OF  
AUGUSTA, TOWNSHIP OF  
BECKWITH, TOWNSHIP OF  
BONNECHERE VALLEY, TOWNSHIP OF  
BROCKVILLE, CITY OF  
BRUDENELL, LYNDONCH AND RAGLAN, TOWNSHIP OF  
CARLETON PLACE, TOWN OF  
CASSELMAN, VILLAGE OF  
CENTRAL FRONTENAC, TOWNSHIP OF  
CLARENCE-ROCKLAND, CITY OF  
CORNWALL, CITY OF  
DEEP RIVER, TOWN OF  
DESERONTO, TOWN OF  
DRUMMOND-NORTH ELMSLEY, TOWNSHIP OF  
EDWARDSBURGH CARDINAL, TOWNSHIP OF  
ELIZABETHTOWN-KITLEY, TOWNSHIP OF  
FRONT OF YONGE, TOWNSHIP OF  
FRONTENAC ISLANDS, TOWNSHIP OF  
GANANOQUE, TOWN OF  
GREATER MADAWASKA, TOWNSHIP OF  
GREATER NAPANEE, TOWNSHIP OF  
HASTINGS HIGHLANDS, MUNICIPALITY OF  
HAWKESBURY JOINT RECYCLING  
HEAD, CLARA & MARIA, TOWNSHIP OF  
HORTON, TOWNSHIP OF  
KILLALOE, HAGARTY, AND RICHARDS, TOWNSHIP OF  
KINGSTON, CITY OF  
LANARK HIGHLANDS, TOWNSHIP OF  
LAURENTIAN HILLS, TOWN OF  
LEEDS AND THE THOUSAND ISLANDS, TOWNSHIP OF  
LOYALIST, TOWNSHIP OF  
MADAWASKA VALLEY, TOWNSHIP OF  
MCNAB-BRAESIDE, TOWNSHIP OF  
MERRICKVILLE-WOLFORD, VILLAGE OF  
MISSISSIPPI MILLS, TOWN OF  
Mohawks of the Bay of Quinte  
MONTAGUE, TOWNSHIP OF  
NORTH DUNDAS, TOWNSHIP OF  
NORTH FRONTENAC, TOWNSHIP OF  
NORTH GLENGARRY, TOWNSHIP OF  
NORTH GRENVILLE, TOWNSHIP OF  
NORTH STORMONT, TOWNSHIP OF  
NORTHUMBERLAND, COUNTY OF  
OTTAWA VALLEY WASTE RECOVERY CENTRE  
OTTAWA, CITY OF  
PERTH, TOWN OF  
PRESCOTT, TOWN OF  
QUINTE WASTE SOLUTIONS  
RENFREW, TOWN OF  
RIDEAU LAKES, TOWNSHIP OF  
RUSSELL, TOWNSHIP OF  
SMITHS FALLS, TOWN OF  
SOUTH DUNDAS, TOWNSHIP OF  
SOUTH FRONTENAC, TOWNSHIP OF  
SOUTH GLENGARRY, TOWNSHIP OF  
SOUTH STORMONT, TOWNSHIP OF  
STONE MILLS, TOWNSHIP OF  
TAY VALLEY, TOWNSHIP OF  
THE NATION, MUNICIPALITY  
WHITEWATER REGION, TOWNSHIP OF  
WOLLASTON, TOWNSHIP OF



B

e-Bulletin



## **ATTENTION: EASTERN ONTARIO MUNICIPALITIES**

Hello,

The City of Kingston (Kingston) has initiated a study to investigate the development of a blue box processing facility to service portions of Eastern Ontario, with funding through the Continuous Improvement Fund (CIF).

### *Study Background*

Over the past decade, several studies have been completed looking at a range of blue box material processing options leading up to this investigation. The most recent study identified the Material Recovery Facility (MRF) located in Kingston as a potential “hub” where material could be received and processed from across Eastern Ontario. Information specific to Kingston can be found in Volume 4: Eastern Ontario. As an extension of this work, Kingston will apply local analysis and assess the interest level of neighbouring municipalities to determine the cost implications and feasibility of the study’s recommendations.

- [MIPC Blue Box MRF Optimization study report](#)
- [Volume 4 Eastern Ontario](#)

### *This Project*

On behalf of Kingston and CIF, HDR Corporation (HDR) has been retained to support the completion of both a technical review of the existing MRF facility as well as to reach out to municipalities in the Eastern Ontario watershed to identify potential interest in participating in a Regional MRF scenario. The HDR assessment specifically will include:

1. A MRF assessment including the development of a technical plan and the development of a business case; and,
2. The collection of municipal data, interest and potential opportunities for engagement.

The City of Kingston has a set of overall guiding principles that we want to make you aware of:

1. Kingston wants to develop a facility with municipal partners who will share savings created through economies of scale.

2. Kingston is interested in an arrangement where municipalities will be involved in a cost and revenue sharing business opportunity with the initial capital investment being borne by Kingston.
3. Kingston is looking for municipal partners interested in establishing long term processing agreements (estimated at 7 to 10 years) to support the initial capital investment required to upgrade or rebuild the existing facility.

### *Seeking Your Input*

As part of the study, HDR is conducting a survey of municipalities within a reasonable hauling distance of Kingston to gather information on the quantity and composition of recyclables which could potentially be processed at a Kingston MRF and the interest/ability of municipalities to participate in a Regional MRF scenario.

We would very much appreciate your input into this study. We have prepared a short survey to obtain more information about your recycling program which should only take a few minutes of your time. When completing this survey, we want you to be aware of a few very important details:

1. This is step one in a multi-step process. There will be many discussions as this investigation moves forward and additional opportunities for input on everything from governance and agreements to cost sharing and terms of contracts.
2. This survey is purely a solicitation of interest at this point and by no means represents a commitment by any party to participation in the future.

**We would appreciate responses back from you no later than Friday, October 3, 2014.**

**[Click here to Access the Survey](#)**

Over the next couple of weeks you may be contacted by a representative of HDR to discuss this survey further.

We thank you for your consideration of this important study. If you have any questions, please contact any one of the undersigned at your convenience.

Sincerely,



**City of Kingston**



**Continuous Improvement  
Fund**



**HDR Corporation**



John Giles  
Solid Waste Manager  
[jgiles@cityofkingston.ca](mailto:jgiles@cityofkingston.ca)  
(613) 546-4291 ext. 2701



Carrie Nash  
CIF Project Manager  
[CarrieNash@wdo.ca](mailto:CarrieNash@wdo.ca)  
(519) 858-2396



Jim McKay  
Vice President  
[Jim.mckay@hdrinc.com](mailto:Jim.mckay@hdrinc.com)  
(289) 695-4690

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Continuous Improvement Fund  
92 Caplan Avenue  
Barrie, ON L4N 0Z7



C

Responses to Questionnaire

Please provide your contact information						How many streams are the recyclables collected in?	Please describe the streams	What type of collection containers are used to collect recyclables from SINGLE FAMILY homes? Please check all that apply.	What type of collection containers are used to collect recyclables from MULTI-FAMILY residences? Please check all that apply.	What type of collection containers are used to collect recyclables at DEPOT/S? (if applicable). Please check all that apply.	How are recyclables delivered to your processor?	If you selected Collection Vehicles, please indicate percentage of collection fleet												Are your recyclables mechanically compacted in collection vehicles?	If yes, please indicate the compaction ratio if available	
Name	Title	Municipality	Phone	Cell	Email	One, Two, Three or more	(e.g. cardboard, fibres, containers)	Boxes, Bags, Recycling, Front-End Containers or Roll-Off Containers	Boxes, Bags, Recycling Carts, Front-End Containers, Roll-Off Containers	Boxes, Bags, Recycling Carts, Front-End Containers, Roll-Off Containers	Collection Vehicles, Front-end Containers, Roll-off Containers	Side Loaders (Over the Top)	Manual Single Stream Vehicle	Side Loaders (Compacted)	Front Loader	Bank-mounted Single Stream Vehicle	Automated Single Stream Vehicle	Manual Multi-Stream Vehicle	Automated Multi-Stream Vehicle	Rear Loader	Collection trailer	Stake truck	Other (please specify):	Yes or No	Ratio	
Chris Sellaity	Director of Public Works	Township of South Stormont	613 334-6889 ext. 241	613 330-3081	csellaity@southstormont.ca	One		Boxes, Bags	Boxes, Bags	Roll-Off Containers	Collection Vehicles			100										Yes		
Carol Dwyer	Deputy Clerk	Township of Frontenac Islands	613-544-6348	613-484-3754	cdwyer@kios.net	Two	All paper and cardboard. Mixed cans and plastics	Boxes	Recycling Carts - (360, (95 gallon)	Roll-Off Containers - (30 m3 (40 yd3))	Collection Vehicles													No		
Chris Bazinet	Public Works Manager	Municipality of South Dundas	613 784 5267		cbazinet@southdundas.com	Two	containers one week, fibres the rest	Boxes	Boxes	NA	Collection Vehicles			100										Yes		
Minny McCusker	CAO/Clerk	The Nation Municipality	613-764-5444	n/a	rmccusker@nationmunicip.ca	One	tin cans, aluminum cans, fire paper, cardboard, PET, plastic tubs and lids,	Boxes	Boxes	NA	Collection Vehicles							100%						No		
Dana Leongre	Environment Manager	City of Clarence-Rockland	613 446-8022 ext 2296	613 219 8153	dlongre@clarence-rockland.ca	Two	blue box containers - (plastic) back box (fibres, OCC)	Boxes	Boxes	Roll-off Containers - (15 m3 (20 yd3))	Collection Vehicles										66			Yes		
Cory Smith	Public Works Technologist	Mississippi Mills	(613) 256-2054 ext 229	613 913-6857	csmith@mississippimills.ca	One	We collect recyclables in single stream collection. All containers 1.7 with the exception of #6 Styrofoam. In addition, fibres, glass and metal containers are all collected at the same time.	Boxes	Boxes, Recycling Carts - (130L (35 gallon)), Front-End Containers - (2.2 m3 (4 yd3))	Front-end Containers - (3 m3 (4 yd3)), Roll-off Containers - (23 m3 (30 yd3))	Collection Vehicles				5						95			Yes	0 - 1:1	
Marinda Reid	Chief CAO	United Townships of Head-Chester	613-585-2525	n/a	brachon@headchester.com	Two	paper/cardboard - everything else	Boxes	Boxes	NA	Collection Vehicles											100		No		
Ryan Frew	Director of Public Works	Township of McNab/Braeside	613-623-8756 x 227	-	rfrew@mcnabbraeside.com	Two	Fibres and Containers	Boxes	Boxes	Recycling Carts - (360L (95 gallon))	Collection Vehicles				100%									Yes		
Steven Hodson	Environmental Services Manager	Township of Whitewater Region	613) 646-2282	(613) 635-1517	shodson@whitewaterregion.ca	Two	Co-mingled containers and papers/fibres	Boxes	Boxes	NA	Collection Vehicles	100%												No		
Lane Cloux	Engineering Technician	Town of Renfrew	613-433-2816	613-433-2859	lcloux@renfrew.ca	Two	Fiber and Comingled	Boxes, Bags	Boxes, Bags	NA	Collection Vehicles													No		
Marc Chénier	CAO	Village Of Casselman	613-764-3139	613-223-8485	mchenier@casselman.ca	NA		Boxes, Bags	NA	NA	NA													No		
Ewen MacDonald	General Manager Infrastructure	Township of South Glengarry	613 347-1166	613 930-3890	ewen@southglengarry.com	One		Boxes, Bags	Boxes, Bags, Recycling Carts - (130L (35 gallon))	Roll-off Containers - (15 m3 (20 yd3))	Collection Vehicles	1												No		
Jack Pauli	Clerk Tr.	Township of Addington Highlands	613) 336-2286	None	clerk@additionhighlands.ca	Two	Glass, tin, plastic comingled: cardboard and board & paper separate	Roll-Off Containers	Roll-Off Containers	Roll-Off Containers	Roll-Off Containers													No		
Alain L. Castonguay	Director of Environmental Services	Village of Casselman	613 764-3139 ext 399	613 223-8975	acastonguay@casselman.ca	One	metal cans, bottles and jars, corrugated cardboard, newspapers and magazines	Boxes	NA	NA	Collection Vehicles										100			No		
Keith Miller	Road Manager	Township of Stone Mills	613-378-1435	613-530-5521	kmiller@stonemills.com	Three	board and plastic containers	Roll-Off Containers - (12 m3 (15 yd3))	Boxes	Roll-off Containers - (12 m3 (15 yd3))	Roll-Off Containers - (12 m3 (15 yd3))													No		
Sue McCrae	General Manager	Ottawa Valley Waste Recovery	613 735 7537	613 4013998	smcrae@ovwr.com	Two	We have recycling bins at our three landfill sites, paper and cardboard are together, plastic and cans are together, polystyrene is by its self, glass is collected in a enclosed area and is reused for road building material, we also collect tires,electronics and white goods for recycling.	Boxes ( but selected a size for Front-end = 3 m3 (4 yd3))	Boxes, Recycling Carts - (240L (65 gallon))	Roll-off Containers (30 m3 (40 yd3))	Collection Vehicles, Roll-Off Containers (30 m3 (40 yd3))													No		
Elaine Croy	Clerk	Township of Front of Yonge	613-923-2251	n/a	ecroy@frontofyonge.com	Four	corrugated cardboard, fibres (paper, board, etc), plastic containers, styrofoam	Bags	Bags	Roll-off Containers - (30 m3 (40 yd3))	Roll-Off Containers - (30 m3 (40 yd3))													No		
Bryan Martin	CAO	Township of Boncheres Valley	613-628-3101 ext.222	613-281-1777	bryann@eganville.com	Two	We also have an electronic bin and separate bin for aluminum and metal cans.	Boxes	Boxes	Roll-off Containers - (8 m3 (10 yd3), 30 m3 (40 yd3))	Collection Vehicles, Roll-Off Containers - 6 m3 (8 yd3), 30 m3 (40 yd3)															
Glenn Barnes	CAO	Montague	613 283-7478	613 283-7478	gbarnes@township.montague.on.ca	One		Boxes	Boxes	NA	Collection Vehicles													Yes		
Joy Kehoe	Deputy Treasurer	Township of Beckwith	613-257-1539	do not have one	jkehoe@twp.beckwith.com	One		Boxes	NA	NA	Collection Vehicles (But selected a size for Roll-off containers = 30 m3 (40 yd3))												both our garbage and our recyclables are collected by the same vehicle	Yes		
Karl Allen	Plant Manager	Northumberland County	905 349 3600 ext 4223	905 376 0425	kallen@northumberlandcounty.ca	One		Boxes, Bags	Boxes, Bags	Boxes, Bags	Collection Vehides, Roll-Off Containers				60						40			Yes	2:1 - 3:1	
Annette Louis	Clerk-Treasurer	Township of Admaston/Bromley	613-432-2885	613-312-9534	info@admastonbromley.com	Three	Co-Mingle (plastic and cans) - Fibres - cardboard	NA	NA	Roll-off Containers - (30 m3 (40 yd3))	Collection Vehicles													No		
Deanna Stettel	Environmental Engineering Officer	Town of Amprior	613-623-4231 ext 1832	n/a	dstettel@amprior.ca	Two	1- Fibres (cardboard, paper, newsprint) 2- Co-mingled (glass, tin, plastic)	Boxes	Boxes, Bags	Recycling Carts - (360L (95 gallon), Front-end Containers - (4.6 m3 (6 yd3))	Collection Vehicles			85	15									No		
Jackie McLean	CAO/Clerk	Township of Horton	613 432-6271	n/a	mmclaren@hortontownship.ca	One	Note: we currently have 1 stream but we can foresee that our contractor will put for two streams (fiber and all else) for our next contract	Boxes	Boxes	Roll-off Containers - (30 m3 (40 yd3))	Collection Vehicles, Roll-Off Containers - (20 m3 (40 yd3))			100										No		
Marie Dearing	Public Works Manager	Township of Greater Madawaska	613-750-2214	613-401-2435	mdearing@greatermadawaska.ca	Three	Cardboard Fibres Mixed Containers	NA	NA	Roll-off Containers - (30 m3 (40 yd3))	Roll-Off Containers - (30 m3 (40 yd3))													No		
Kristie Clement	Manager of Environmental Compliance	Town of Greater Napanee	613-354-5931 ext 2104	613-561-2941	kcllement@greaternapanee.ca	Two	Blue box & Gray Box	Boxes	Boxes	Roll-off Containers - (23 m3 (30 yd3))	Collection Vehicles, Roll-Off Containers														No	
Cathie Green	Public Works Assistant	Township of Lanark Highlands	613 259 2398 Ext 249	613 259 2398 Ext 249	cgreen@lanarkhighlands.ca	Two	Fibres & co-mingled containers	Boxes	Boxes	Roll-off Containers - (15 m3 (20 yd3))	Roll-Off Containers - (15 m3 (20 yd3))													Yes		
Dylna Brock	environmental safety services manager	Township of Wolfston	613 337 5731	1111111111	dylna@bellnet.ca	NA		NA	NA	NA	NA														No	
Cameron Neale	Pig Coord, Recycling&Material Divison	City of Ottawa	613-580-2424 ext.25102	613-525-4395	cameron.neale@ottawa.ca	Two	Fibre&new 8. occ, boardboard containers: polycost, Pet, hdx, mixed 3-7, aluminum, steeltin, glass (mixed,clear)	Boxes	Recouling Carts - (360L (95 gallon)), Front-End Containers - (4.6 m3 (6 yd3))	Front-end Containers - (4.6 m3 (6 yd3)), Roll-off Containers - (23 m3 (30 yd3))	Collection Vehicles				20	5						75		Yes		
RICK LOUIE	GENERAL MANAGER Environmental Services	QUINTE WASTE SOLUTIONS	613-394-6266	NA	rick@QUINTECYCLING.ORG	Four	ON THE TRUCKS: MIXED FIBRES, MIXED CONTAINERS, GLASS, OCC, AT THE PLANT WE WILL ACCEPT ANY SORTED MATERIAL OR THE ABOVE	Boxes, Bags, Recycling Carts - (360L (95 gallon)	Boxes, Recycling Carts - (360L (95 gallon)	Boxes, Bags, Recycling Carts - (360L (95 gallon)), Roll-Off Containers - (8 m3 (10 yd3))	Collection Vehicles, Front-end Containers (But Selected size for both Front-End and Roll-off- (3 m3 (4 yd3)), 8 m3 (10 yd3))	20	1		1 one day of 0 the week		0	0	20	0	1	0	0	Delivered to contractors transfer station for shipping	No	
Brenda DeFosse	Waste / Recycling Coordinator	Township of North Frontenac	613-479-2231 Ext. 227	n/a	wastemgmts@northfrontenac.ca	NA		Roll-Off Containers - (20 m3 (40 yd3))	NA	Roll-off Containers - (23 m3 (30 yd3), 30 m3 (40 yd3))	Roll-Off Containers - (23 m3 (30 yd3), 30 m3 (40 yd3))													No		
Chris Wood	Solid Waste Officer	City of Brockville	613)342-8772 Ext 8220	613)802-0453	cwood@brockville.com	One	Mixed residential Recyclables - Glass, Metal, Plastic and fibres	Boxes, Bags	Boxes, Bags, Recycling Carts - (130L (35 gallon))	NA	Collection Vehicles													Yes	2:1 - 3:1	
Michelle Jones	Supervisor, Properties & Environmental Services	Township of Rideau Lakes	613-828-2251	613-828-2251	michelle@rideaulakes.on.ca	Two	Fibres and Containers	Bags	Bags	Roll-off Containers (30 m3 (40 yd3))	Roll-Off Containers (30 m3 (40 yd3))													No		
John Giles	Solid Waste Manager	Kingston	613-326-4251 x2791	613-326-4251	giles@cityofkingston.ca	Four	cardboard, fibres, containers, glass	Boxes	Boxes, Bags (but selected a size for Carts = 130L (35 gallon))	Front-end Containers - (12.2 m3 (15 yd3))	Collection Vehicles													No		
Amanda Alexander	Administrative Assistant	Township of North Stormont	613-684-2821	n/a	alang@northstormont.ca	One		Boxes	Boxes, Bags (but selected a size for Carts = 130L (35 gallon))	Roll-off Containers - (3 m3 (4 yd3))	Collection Vehicles			100%										No		
Jonathan Bourgon	Manager of Infrastructure Services	Township of Russell	613-443-5078 ext 222	613-443-5078	jbourgon@bourgonrussell.ca	One	All recyclables	Boxes	Boxes, Front-end Containers - (3 m3 (4 yd3))	Boxes, Front-end Containers - (3 m3 (4 yd3))	Collection Vehicles (But selected a size for Front-off containers = 3 m3 (4 yd3))	25%	75%										Yes	2:1 - 3:1		
Caroline Arcand	Executive Director, Groupe Converse	Hawkesbury	613 632-4869	613 282-4874	carand@groupeconverse.ca	NA	5- plastic, cardboard, fibres, metal, aluminum	Roll-Off Containers	NA	NA	NA													No		
Kyle Libbott	Public Works Coordinator/ Waste Management Supervisor	Township of Central Frontenac	613-279-2935 x 261	613-449-1494	klabbott@centralfrontenac.ca	Four	we collect mixed glass, cans and plastics together, styrofoam, mixed fibres and easily compacted cardboard	NA	NA	Roll-off Containers - (30 m3 (40 yd3))	Roll-Off Containers - (30 m3 (40 yd3))													No		
Mark Segsworth	Public Works Manager	Township of South Frontenac	613-376-3900 x3322	000-000-0000	msegsworth@southfrontenac.ca	Two	Mostly like the City	Boxes, Bags	Boxes, Recycling Carts - (360L (95 gallon))	Roll-off Containers - (15 m3 (20 yd3))	Collection Vehicles, Roll-Off Containers - (15 m3 (20 yd3))	90	10											No		
Michael Tow	Director of Public Works	Township of Leeds and the Thousand Lakes	613-659-2415	613-659-2415	michaelow@sympatico.ca	Two	1- fibres, paper, cardboard, etc. 2- containers, bottles, etc	Boxes	Boxes	NA	Collection Vehicles													Yes		
Chris Wood	Waste / Recycling Coordinator	Township of North Frontenac	613-479-2231 Ext. 227	n/a	wastemgmts@northfrontenac.ca	NA	Dept Set-up at waste site(s) for drop off by residents. Streams are as follows: 1) cans and plastics; 2) coloured glass; 3) clear glass; 4) corrugated cardboard; 5) boardbox and paper; 6) bulky rigid plastics; 7) styrofoam packaging.	Roll-Off Containers - (20 m3 (40 yd3))	NA	Roll-off Containers - (23 m3 (30 yd3), 30 m3 (40 yd3))	Roll-Off Containers - (23 m3 (30 yd3), 30 m3 (40 yd3))													No		
Michelle Jones	Solid Waste Manager	Kingston	613-326-4251 x2791	613-326-4251	michelle@rideaulakes.on.ca	Two	Fibres and Containers	Bags	Bags	Roll-off Containers (30 m3 (40 yd3))	Roll-Off Containers (30 m3 (40 yd3))													No		
John Giles	Solid Waste Manager	Kingston	613-326-4251 x2791	613-326-4251	giles@cityofkingston.ca	Four	cardboard, fibres, containers, glass	Boxes	Boxes, Bags (but selected a size for Carts = 130L (35 gallon))	Front-end Containers - (12.2 m3 (15 yd3))	Collection Vehicles													No		

Please provide your contact information			What is the approximate haul distance from your collection/transfer facility to your processing facility? (kilometers)	Who do you collect from? Please provide a rough percentage split of the types of generators you collect from based on total tonnage collected (e.g. 75% single family, 15% multi-residential, 10% small businesses)					How often are recyclables collected?	Would your municipality be interested in potentially working in collaboration with the City of Kingston to receive recyclables processing services at a Regional MRF located in Kingston at some time in the future?	If no, please provide an explanation as to what considerations or constraints would prevent such an arrangement.	Additional Comments
Name	Title	Municipality	<10 km, 10-25km, 25-50km, >50km	Single family residential	Multi-residential	Small commercial establishments (e.g. BIA)	Small ICS (Industrial, commercial and institutional) e.g. schools	Large ICS e.g. college, university, hospital	Once a week, Twice a Week, Once Every other week, Monthly, Other	Yes or No	Open-Ended Response	Open-Ended Response
Ross Cellatelly	Director of Public Works	Township of South Stormont	10 - 25km	100	10	10	10	10	Once every other week	Yes	Currently under contract with City of Cornwall	
Carol Dwyre	Deputy Clerk	Township of Frontenac Islands	>50 km	98.5%	1.5%	1.5%	1.5%	1.5%	Collected at depot 2-4 times per week (when open)	Yes		
Chris Bazinet	Public Works Manager	Municipality of South Dundas	>50 km	90	5	5	5	5	Once a week	Yes		
Mary McCullagh	CAO/Clerk	The Nation Municipality	10 - 25km	90%	10%	10%	10%	10%	Once a week	No	Too far travelling (as much as 2 hours one way)	
Dennis Longacre	Environment Manager	City of Clarence-Rockland	25-50 km	85	10	10	10	10	Once a week	Yes		our contract expires in April 2016 and we anticipate going to Tender for a new contract in early 2015 (May). A transfer station in the area of our municipality would be required in order to make it financially feasible for Mississippi Mills to send our material to Kingston for processing. Currently our material is short hauled to a transfer station (less than 5 km from our municipal boundary) then gets loaded on a walking floor to go to our processor. This transfer station is operated by our contractor. Without bulk transfer, it would be too costly to send our materials to Kingston.
Cory Smith	Public Works Technologist	Mississippi Mills	>50 km	95	1	2	2	2	Once a week	Yes		
Michelle Reath	Chief CAO	United Township of Head, Office CAO	>50 km	95	1	2	2	2	Once every other week	Yes		
Bryan Frew	Director of Public Works	Township of McHabit/Braceville	10 - 25km	95%	1%	5%	5%	5%	Once every other week	No	Currently there is a local processing facility within 20 km of the Township. At this time I do not see a cost benefit to ship our recyclables to Kingston for processing.	
Steven Hodson	Environmental Services Manager	Township of Whitewater Region	25-50 km	96%	1%	1%	3%	3%	Once every other week	Unable to answer that at this time.		
Lane Cleroux	Engineering Technician	Town of Renfrew	<10 km	61	8	13	18	18	Twice a week	No	There is a MRF located in Renfrew	Questions 15-20: Our Contractor looks after all collection pickup
Marc Chénier	CAO	Village Of Casselman	>50 km	100	100	100	100	100	Once a week	No	distance from the municipality to Kingston	
Ewen MacDonald	General Manager	Township of South Gengarry	10-25km, 25-50km	80	5	5	10	10	Once every other week	Yes	No collection services provided by municipality. Homeowners must deliver to depot sites.	
Jack Pauli	Clerk Tr.	Township of Addington Highlands	>50 km	99%	1%	1%	1%	1%	Once a week	No	Distance & associated costs	
Alan L. Castonguay	Director of Environmental Services	Village of Casselman	>50 km	100	100	100	100	100	Once a week	No	distance from the municipality to Kingston	
Keith Miller	Road Manager	Township of Stone Mills	<10 km, 10-25km, 25-50km, >50km	100%	100%	100%	100%	100%	Once a week	No	Municipality operated MRF. Local Jobs and Centre is part of an Integrated Waste Management System. Collection distances from Processing Centre vary across the 5 Partner Communities Pembroke, Petawawa, Laurentian Valley and from the Depot Communities North Algona Wilberforce and Bonnechere Valley.	Collection is currently handled by individual contracts administered through the Municipalities so information on types of vehicles used for Curbside Collection is not easily available.
Sue McCrae	General Manager	Ottawa Valley Waste Recovery	>50km	100%	100%	100%	100%	100%	Containers one week and Fibres the next	No		
Elaise Covey	Clerk	Township of Front of Yonge	>50 km	97%	1%	2%	2%	2%	Once a week	Yes		
Bryan Martin	CAO	Township of Bonnechere Valley	10 - 25km, 25-50km	90	5	5	5	5	Once a week	No	Currently our haul costs are minimal as the distance to the MRF is minimal and we currently don't pay any tipping fees on material and are paid if cardboard is source sorted per tonne.	
Glenn Barnes	CAO	Montague	>50 km	100%	100%	100%	100%	100%	Once a week	No	I ticked no as this gives opportunity to explain - Council might be interested, but new transfer facility built in township (Maitre) and township negotiated contract in 2013 extends for 6 more years and then is renewable. Company contracted for collection picks up both garbage and recycles in the same vehicle. The municipality does not own any capital associated with waste management as we contract out the various services	please see previous question
Joy Kehoe	Deputy Treasurer	Township of Beckwith	>50 km	100%	100%	100%	100%	100%	Once a week	No	Northumberland has invested in its infrastructure and will continue to own and operate a MRF. Northumberland is and has acted as a regional MRF since 2001. We process materials from the City of Kawartha Lakes and have recently entered into a long term contract. We will continue to seek additional recyclable materials to process at our MRF in order to lower our costs and increase local employment opportunities.	
Karl Allen	Plant Manager	Northumberland County	25-50 km	80	10	5	2	3	Once a week	No	Recyclables are collected at the depots twice a week. Then picked up at the depots by Beaumont's Waste Management Systems on a monthly basis for processing.	We deal with a local collection business - Beaumont Waste Management Systems Limited, Renfrew ON and they have their own agreements in place for processing recyclables.
Annette Louis	Clerk-Treasurer	Township of Admaston/Bromley	10 - 25km	100%	100%	100%	100%	100%	Once every other week	Yes		
Deanna Streifel	Environmental Engineering Officer	Town of Arnprior	25-50 km	78	10	10	1	1	Once every other week	No	gravel costs, green house gas emissions in the trucking of the material	The distance.
Mackie Mid-aven	CAO/Clerk	Township of Horton	<10 km	85	5	10	10	10	Once every other week	No		
James Downing	Public Works Manager	Township of Greater Madawaska	>50 km	100%	100%	100%	100%	100%	Once a week	Yes	Always interested in considering alternatives that could be more cost effective than our current system. 90% of our collection is via depots. We truck roll-off bins to Beckwith Transfer Stn (LaPêche). Materials are then trucked to St Hubert, QC.	
Kristie Clement	Manager of Environmental Compliance	Town of Greater Napanee	<10 km	90%	6%	2%	1%	1%	Once a week, Once every other week, Blue Box one week, Gray the next	Unknown. All decisions such as this would be dependent on Council decisions.		
Cathie Green	Public Works Assistant	Township of Lanark Highlands	25-50 km	85	10	0	5	0	Once a week	Yes		
Dylinna Brock	environmental safety services manager	Township of Wellston										
Cameron Neale	Pig Coord, Recycling&Material Division	City of Ottawa	10 - 25km	86.5	13	0.5			Once a week	Yes	Ottawa collects 67,000 tonnes per year. Savings achieved would have to offset cost of transportation of material. Some survey questions are radio buttons but should be checkboxes. Ottawa uses 2.4 & 6.8 yd FEL bins for multi-residential collection.	
RICK CLOW	GENERAL MANAGER	QUINTE WASTE SOLUTIONS	<10 km	75	10	5	5	5	Once a week, Twice a Week, Once Every other week, Monthly, QWS SERVES NINE MUNICIPALITIES WITH A VARIETY OF SERVICES	Yes		QWS OPERATES BOTH THE COLLECTION AND PROCESSING THIS WE HAUL DIRECT TO OUR PROCESSING FACILITY We currently have 6 years left on our existing contract so at the next renewal everything could change but I don't see a decrease in service as acceptable to either residents or our council.
Bob Moore	Assistant	Drummond/North Elmsley Town	>50 km	98	2				Once a week	Yes		
Amanda Alexandre	Administrative Assistant	Township of North Stormont	<10 km	75	10	15	0	0	Once every other week	No	Transportation costs would be a problem as Kingston is 2.5 hours away	
Jonathan Bourgon	Manager of Infrastructure Services	Township of Russell	>50 km	80%	10%	8%	2%		Once a week	No	The distance of hauling would increase the price of collection.	Good initiative, but I consider our Township to be a bit to far from Kingston. There's currently a MRF much closer from us.
Caroline Arcand	Executive Director, Groupe Convois	Hawkesbury										
Kyle Labbett	Public Works Coordinator/ Waste Management Supervisor	Township of Central Frontenac	>50 km	93%	1%	5%	1-2%	zero	the 40 yard bins are trucked out whenever they are full. Residents can bring their recycling to the waste sites whenever they like	Yes		
Mark Segsworth	Public Works Manager	Township of South Frontenac	25-50 km	95	5				Once a week	Yes		I would like to discuss this issue further.
Michael Tow	Director of Public Works	Township of Leeds and the Town of	25-50 km	75	10	10	5		Once a week	Yes		
Brenda Defosse	Waste / Recycling Coordinator	Township of North Frontenac	>50 km	99.9%	n/a	1%	n/a	n/a	We operate blue box recycling depots at our municipal waste sites and residents bring their recycling to the depots during site open hours; cardboard is baled prior to transfer to the processing facility; cans and plastics are compacted prior to transfer to the processing facility; clear and coloured glass are kept separate in a container with a separation wall.	Yes	Transfer to Kingston will be a minimum of 1.5 hours one way.	
Chris Wood	Solid Waste Officer	City of Brockville	>50 km	79%	18%	3%	0	0	Once a week	Yes	Current contract until 2022 provides for collection of recyclables only and does not control processing and transfer (which are done through IBM in the transfer station then require negotiation. To change that would require negotiation.	Our recyclables leave the Waste Management MRF at 1380 California Avenue and are transported to Guelph's MRF. I believe the use a transport trailer for the baled goods.
Michelle Jones	Supervisor, Properties & Environmental Services	Township of Rideau Lakes	>50 km	95	5				Once a week	No	We have a new 10 year agreement with our contractor. It is in effect until 2024. Possible consideration to collaborating with Kingston after 2024.	