Stewardship Ontario
Federation of Canadian Municipalities

Benchmarking and Best Practices Project #63
MRF Regionalization in Eastern Ontario
Review of Options for RARE Facility in Alexandria
Final Report

25 March 2007

Stewardship Ontario
26 Wellington Street East, Suite 601
Toronto, ON M5E 1S2

Submitted By:

GENIVAR

MacViro

Table of Contents

List of Tables

List of Figures

Appendices

This Project has been delivered with the assistance of Stewardship Ontario's Effectiveness and Efficiency 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 the Association of Municipalities of Ontario and Stewardship Ontario accept no responsibility for these views.

1. Introduction

The Recyclage Alexandria Recycling (équipe), or RARE, operates a Materials Recovery Facility (MRF) located in Alexandria in Eastern Ontario. This MRF currently processes recyclables from five municipalities.

Smaller programs in Ontario tend to have the highest operating costs and lower overall efficiencies. This is primarily attributable to the fact that these smaller programs cannot achieve the economies of scale necessary for them to achieve the lower costs associated with the larger programs in the province.

The purpose of the study is to examine the potential economic and environmental benefits of a new regional MRF to process recyclables from the Town of Alexandria, North Glengarry, South Glengarry and surrounding municipalities. The study examines various collection and processing options to determine the most cost effective and efficient overall recycling system.

1.1 Outline of Report

Section 2 describes the methodology of the analysis and outlines the factors that determined the project scope. Section 3 includes the data gathered and assumptions made to analyse the scenarios. In Section 4, the results of the alternative systems analysis are presented. Chapter 5 presents the recommendations and implementation strategy.

2. Existing RARE Facility

2.1 Current Configuration

The RARE Materials Recovery Facility (MRF) is located in Alexandria in South Eastern Ontario. The facility currently processes recyclables from Casselman, Hawkesbury, North and South Glengarry, and North Stormont. Table 2-1 below shows the tonnes marketed and the number of sorts per municipality.

Table 2-1: Municipalities and Tonnages Currently Processed at RARE

Municipality	2005 Quantities (te)	No. of Sorts
North Glengarry	1,200	1
Champlain, Hawkesbury, East Hawkesbury	1,030	4
South Glengarry	840	1
Casselman	290	1
North Stormont	300	1
TOTAL	**3,660**	

The RARE facility employs a single processing line to do each of a containers sort, fibres sort and a single stream recyclables sort (See Figures 2-1 through 2-3).

Figure 2-1: RARE Tipping Floor and Sorting Line

Figure 2-2: RARE OCC Storage Area and Baler

Figure 2-3: Sorting Room

The facility, at approximately 12,000 ft2 in size, is tight even to manage the quantity of materials being processed currently. This is primarily due to two facts:

1. The facility is required to process three streams of materials on one line; and
2. The facility uses semi-skilled labour resulting in slower sorting rates than would be otherwise achieved using regularly skilled sort staff.

The facility has been well set up to manage the three different streams of materials (within its limitations). The bunker configurations are such that both fibres and containers can be processed on the lines without having to empty bunkers between sorts. This saves a lot of time and effort. Additional cages and rolling dumpsters are used to manage other materials not contained in the bunkers (i.e., aseptics, polycoat, aluminum foil, clear glass, coloured glass). These additional sorts are completed through the use of a large number of additional containers/drums to hold the various streams of materials to be sorted.

When sorting the single stream materials, the line is slowed down to allow the sorters more time to pull off each of the various materials. The facility could not handle a straight single stream of materials consistently particularly with the large volume of OCC that would arrive. The only way that the facility could handle a single stream of materials would be by putting on an addition and a new front end to separate the fibres from containers. This approach is technically feasible and, as such, allowed the study to continue to look for additional partners to make the retrofit more cost-effective. Regionalization partners are examined in Chapter 4. The next chapter examines the requirements and costs for the retrofit to the RARE facility to manage a larger volume of single stream materials

3. Managing Single Stream – Retrofit Requirements

Many of the smaller municipalities in eastern Ontario have either already chosen single stream or are leaning towards single stream recyclables collection as their preferred option. This is due to a number of factors including:

- Influence from Quebec where most programs are single stream;
- Ease of collection for residents, potentially increasing diversion;
- More operators potentially available for bidding as no special collection vehicles are required; and
- Lower overall collection costs.

Therefore, it was determined that it would be best that the RARE facility, if it was going to expand, be able to manage single stream recyclables. In order for the RARE facility to effectively manage single stream materials, a new front end would be required. However, the existing facility is not nearly large enough to install new equipment to separate the single stream into fibres and containers, which could then be processed on the current line in the plant.

The Project Team met with the program operators to review potential options for the facility. It was determined that the best option would be to build a new 120’ x 60’ extension to the south side of the building that would act as a new tipping floor and infeed area (Figure 3-1).

Figure 3-1: Location of Proposed Expansion

The addition would provide the RARE facility with enough storage so that it would be able to handle 10,000 tpy, up from the current 4,000 tpy.

The equipment required for the front end processing system is outlined in Table 3-1. Overall it is estimated that the capital cost for the equipment would be approximately $1,000,000, including approximately $150,000 for the building.

Table 3-1: Proposed Equipment for the RARE Facility to Process Single Stream Material

		Dimensions (ft) L	W	Est. Cost
C1	Raised Infeed Pit	20	5	$ 40,000
C2	Infeed Incline Conveyor	20	5	$ 35,000
C3	OCC Pre-sort Conveyor	35	5	$ 60,000
FR1	Flats/Rounds Screen	20	8	$ 150,000
C4	Containers Reclaim Conveyor	35	4	$ 55,000
C5	Fibres Overs Conveyor	18	5	$ 30,000
C6	Fibres Transfer Conveyor	33	5	$ 60,000
C7	Fibres Reversing Conveyor	20	5	$ 35,000
	Subtotal			**$ 465,000**
	Controls, Electrical, Structural			$ 175,000
	Design and Installation			$ 80,000
	Subtotal - Equipment (Installed)			**$ 720,000**
	Building	120	60	$ 150,000
	Total - Building and Equipment			**$ 870,000**
	Contingency			$ 125,000
	Total			**$ 995,000**

The new process would be as follows:

- The trucks would arrive at the facility and back into the new coverall building; emptying their load onto the tipping floor;
- A front end loader would either move the materials to a pile on the tipping floor, against the push wall, or directly into the infeed conveyor;
- The materials would travel up the infeed conveyor to a pre-sort station where bags and oversized materials and metals would be removed and dropped into rolloff containers;
- The materials would then travel over the OCC screen. The OCC would be carried forward and dropped into a pile in approximately the same location as it is currently piled (Figure 2-2);

- The “unders” that fall through the OCC screen (i.e., the remaining fibres and all containers) would then travel up and onto a “flats/rounds” screen that separates the fibres (flats) from the containers (rounds);
- Depending on what materials are being processed at the time (the shift would be split between fibres and containers) the fibres would either go directly to the current infeed conveyor to the sorting room or be conveyed to one of the bunkers, reconfigured for fibres and containers only (currently there are three bunkers). When the shift changes to sorting containers, they would be conveyed directly to the infeed conveyor to the sort room and the fibres would be conveyed to a bunker.
- Sorted materials would be stored in bunkers, cages and rolloffs as is currently done; being baled in one of the two balers as necessary.

This configuration should be capable of processing a minimum of 10 tonnes per hour of material; more than five times the current throughput of the facility.

Importantly, the semi-skilled workers could continue to be employed in the facility on the main sorting line (not in the pre-sort which requires a lot of work and skilled hands to remove materials quickly).

Overall the facility would only see its staff equivalent increase by two people (in the pre-sort).

The capital cost implications associated with the retrofit equipment are shown in Table 3-2.

Table 3-2: Capital Cost Implications of the Retrofit Equipment

Total Cost for Retrofits		$	995,000
Annualized Cost (10 years @ 6.25%)		$	137,000
	TPY		
Incremental Cost Based on xxxx Tonnes Per Year	4,000	$	34.30
	5,000	$	27.40
	6,000	$	22.80
	7,000	$	19.60
	8,000	$	17.10
	9,000	$	15.20
	10,000	$	13.70

It can be seen from Table 3-2 that based on a capital cost of $1,000,000, amortized over ten years at 6.25%, the annual cost would be $137,000.[1] The implications of regionalization are very clear from Table 3-2; the greater the number of tonnes processed, the lower the incremental capital cost per tonne related to the retrofits. Assuming only the municipalities currently being served by RARE continue to use the facility but move to single stream, there would be no additional

[1] The amortization period of 10 years is consistent with WDO funding for major retrofits. Amortizing over a more typical seven year period would add approximately $5 to $10 per tonne (10,000 tpy to 4,000 tpy respectively).

cost for the labour for the facility as the cost for the additional two sorters would be offset by the savings of not having a second partial or full shift. In fact, it would be possible to reduce labour costs as the materials would be processed in less than one shift per day.

The costs for the retrofit when monetized over a greater number of tonnes means that the cost per tonne decreases accordingly. Assuming the facility could double its inbound tonnage to 8,000 tpy, the incremental cost would be only $17.10 per tonne. If the facility could attract 10,000 tonnes, representing approximately 80% of the available tonnage within the municipalities included in the study area, the incremental cost would be less than $14 per tonne. There would be no additional labour costs under any scenario outlined herein. Overall, it is expected that the cost to process single stream recyclables, assuming 10,000 tpy throughput, would be in order of $200 per tonne (gross – no revenues).

These costs are carried forward when examining the various options for municipalities as shown in Chapter 6.

4. Regionalizing Operations – Collection Options

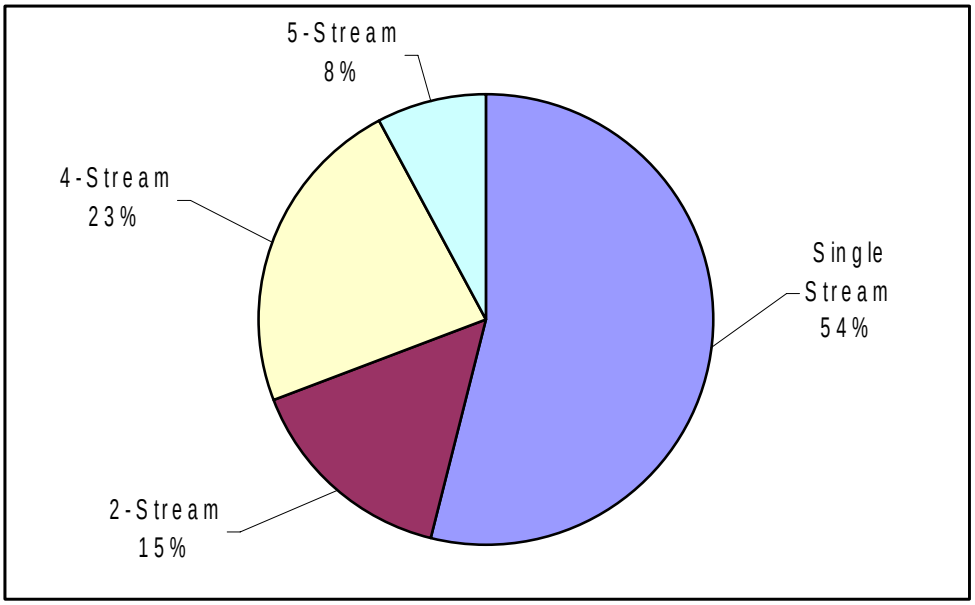
The second part of the study, after examining whether or not a regional single stream MRF could be technically established at the RARE site, was to look at surrounding municipalities who were interested in a regional MRF and obtaining their tonnage and program information. Table 4-1 shows the municipalities and tonnage information.

Table 4-1: Municipalities and Tonnages Potentially Available for Processing

Municipality	2005 Quantities (te)	No. of Sorts
Alfred & Plantagenet	460	1
Clarence Rockland	1,780	2
Cornwall	2,250	5
The Nation	640	1
North Dundas	700	4
Russell	1,340	1
South Dundas	790	2
South Stormont	650	4
TOTAL	**8,610**	

The tonnes available for processing from the surrounding municipalities are approximately 8,600 tonnes per year. Including the RARE tonnes, the quantity available for processing at a regional southeastern Ontario MRF would therefore total 12,270 tonnes per year. The thirteen municipalities collect a different number of streams of recyclables. Figure 4-1 illustrates the breakdown of the programs (on a tonnage basis).

Figure 4-1: Number of Sorts Currently in Study Area Municipalities



4.1 Refined Scope

There are a number of difficulties in assuming that all municipalities could simply shift to single stream collection making a regional MRF immediately possible and reasonable:

- Choosing one collection system will involve big changes for many municipalities
- Costs associated with municipalities changing programs;
- Collection vehicles currently being used (can it accommodate both options?);
- Need a certain number of tonnes to make it cost effective for collection;
- Possible requirements for transfer as direct haul distances may be too far;
- Impacts of other MRFs currently and potentially within the study area; and
- Timing of the collection contract (i.e., when can a change be made).

Recognizing the above limitation with a regionalized MRF in Alexandria, the Study Team examined a number of options.

Number of Streams

As shown in Figure 4-1, there are a different number of streams collected among the thirteen municipalities. The study team decided to focus on single stream and 2-stream collection and processing for the following reasons:

- **Participation** – generally, the fewer streams households have to separate at home the easier it is for residents to recycle and therefore can lead to greater participation in municipal recycling programs
- **Collection Savings** – collection staff will spend less time sorting curbside materials and dumping materials at the transfer station/MRF therefore, staff will be able to move through collection routes faster which will save on operational costs.
- **Collection Vehicles Savings** – collection vehicles have high operational requirements because of their physically demanding nature and repetitive motion. The compaction process can be operated as many as 1,500,000 times over their 10-year life. The more compartments a collection vehicle has, the more maintenance will be required.

Processing Facility

If all municipalities were to transport their materials to Alexandria, the distance travelled by collection vehicles would greatly increase for a majority of the municipalities. The Study Team looked at other existing MRFs that could potentially take some or all of the recyclables generated in the Study Area. The following two facilities are large enough to accommodate the materials generated in the Study Area:

- **Laflèche Environmental** – This facility is located in Moose Creek, Ontario and currently collects materials from Alfred and Plantagenet, The Nation, and Russell for transfer to MRFs in Quebec. Laflèche was undertaking a business case for the establishment of a MRF at Moose Creek at the time of the study therefore, both single stream and 2-stream processing was considered for this facility.

- **Metro Waste Recycling** – This facility is located in Ottawa, Ontario and processes 2-stream materials. Metro currently processes waste from the City of Clarence Rockland. As this is a fully developed large 2-stream facility, only 2-stream scenarios were considered for this facility.

Collection Options

As the cost of fuel rises, the potential increase in hauling distance could greatly impact collection costs for municipalities. The Study Team modelled direct haul options and compared those results with a transfer haul option.

Collection and Processing Scenarios

Upon identifying the possible collection and processing options, the Study Team came up with seven scenarios to model (Scenarios A through G) described in Table 4-2.

Table 4-2: Collection and Processing Scenarios Analysed in the Study

Scenario	Description of Collection and Processing Scenario
A – SS Direct Haul to RARE	Direct haul to and single-stream processing at RARE
B – SS Direct Haul to Laflèche	Direct haul to and single-stream processing at Laflèche
C – SS Minimum Trucks, Direct Haul to RARE or Laflèche	Direct haul to and single-stream processing at the closest facility (RARE or Laflèche). The following municipalities would have their recyclables processed at RARE (i.e., are closest to RARE and therefore require the least amount of trucks for collection): • Hawkesbury, East Hawkesbury, Champlain • North Glengarry • South Glengarry All other municipalities would have their recyclables processed at Laflèche.
D – 2S Direct Haul to RARE	Direct haul to and 2-stream processing at RARE
E – 2S Direct Haul to Laflèche	Direct haul to and 2-stream processing at Laflèche
F – 2S Direct Haul to Ottawa	Direct haul to and 2-stream processing at Metro Waste Ottawa. For municipalities with co-collection of garbage and recycling, it was assumed that the municipalities would purchase collection vehicles for separate garbage and recycling collection. Two model runs were completed for both garbage and recycling collection and the number of trucks required to collect each stream were added together. The 2 runs are as follows:

Scenario	Description of Collection and Processing Scenario
	• recyclables direct hauled to Ottawa for processing • garbage direct hauled to Laflèche
G – 2S Minimum Trucks, Transfer at RARE or Laflèche, Process in Ottawa	Direct haul to the closest transfer station (RARE or Laflèche), transfer hauling to and processing at Metro Waste Ottawa. This scenario assumes that a transfer station would be located at RARE and Laflèche. The following municipalities would have their recyclables transferred at RARE (i.e., are closest to RARE and therefore require the least amount of trucks for collection): • Hawkesbury, East Hawkesbury, Champlain • North Glengarry • South Glengarry All other municipalities would have their recyclables transferred at Laflèche. All recyclables would then be hauled to Metro Waste Ottawa.

5. Background

5.1 Collection Cost Model

An in-house Collection Cost Model (CCM) was utilised to determine the number of collection vehicles that would be required. This model examines the various collection factors of existing and proposed municipal programs for the purpose of reviewing costs and efficiencies. Model runs were completed for each municipality for the scenarios mentioned in Table 2-3 above using assumptions and data mentioned below.

5.2 Background Information

Data Gathering

To run the CCM, data were gathered and a number of assumptions were made. Municipalities were contacted through RARE staff and asked for the following information:

- Frequency and type of collection program;
- Details on collection vehicles (i.e. fleet size and characteristics, hours operating);
- Estimated loads per day and tonnes per truck collected; and
- Number of hours collection staff work per day.

Assumptions

Assumptions about collection factors were made by the Study Team and later confirmed and/or updated by most municipalities. The assumptions made for each municipality are presented in Table A-1 in Appendix A.

The participation rate is the percentage of households that are participating in the recycling program. The setout frequency is the percentage indicating how often households that are participating in the recycling program are setting containers out at the curb for pick up. As a majority of households will participate in garbage collection, the participation rate and setout frequency for recyclables is highest for those programs that collect recyclables and garbage together. Households with weekly collection will have less material set out at the curb compared to households with bi-weekly collection. The participation rates and setout frequency for recyclables are shown for the different collection options in Table 5-1 below.

Table 5-1: Participation Rate and Setout Frequency

Collection Program	Participation Rate (%)	Setout Frequency (%)
Recyclables co-collected weekly with garbage	98	95
Recyclables collected weekly	85	70
Recyclables collected bi-weekly or alternate fibres and containers	85	85

The time per setout is the time required by the operator to get out of the collection vehicle, put the contents in the collection vehicle, place the curbside container back at the curb correctly and return to the collection vehicle. The times vary based on collection option. For example, homes with weekly recycling collection will have fewer materials set out at the curb compared to homes with biweekly collection and therefore, less time is required for staff to collect. Table 5-2 shows the time per setout for the different collection options.

Table 5-2: Time per Setout

Collection Program	Single Stream Time per Setout (seconds)	2-Stream Time per Setout (seconds)	Other Streams (seconds)
Recyclables collected weekly	12	18	
Recyclables collected bi-weekly	16	24	
Recyclables and garbage co-collected weekly	16	16	
Recyclables and garbage co-collected bi-weekly	20	20	
4-Stream collection	-	-	40
5-Stream collection	-	-	50

Dumping time is the time required to empty each truck at the MRF or transfer station. Table 5-3 shows the dumping time for the different recycling programs.

Table 5-3: Dumping Time

Number of Streams	Dumping Time (min)
Single Stream	10
Garbage and Recycling Together	15
2-Stream	15
4-Stream	20
5-Stream	25

Google Maps Canada™ was utilised to determine the average distance travelled, speed and time spent transporting recyclables from the centre of each municipality to the processing facilities.

6. Results

6.1 Number of Collection Vehicles

Prior to modelling Scenarios A through G, municipalities were asked how many collection vehicles were currently being used. The first run modelled the current collection program to see if the assumptions made gave accurate and known results.

The next set of runs determined the number of collection vehicles required for Scenarios A through G. The main difference between the scenarios was where the recyclables were processed: RARE, Laflèche, or Ottawa. The number of collection vehicles required for all scenarios are summarised in Table 6-1.

Scenario C requires the least amount of collection vehicles. This option assumes both RARE and Laflèche accepting single stream materials directly hauled from the closest municipality. Directly hauling 2-stream materials to Laflèche (Scenario B) requires the next lowest number of collection vehicles. Option F directly hauls materials from each municipality to Metro Waste and requires the longest distance collection trucks have to travel, so it is expected that this option would require the greatest number of trucks.

6.2 Processing Costs

The costs to process single stream or 2-stream recyclables are presented in Table 6-2. RARE processing costs were given by RARE staff. The Laflèche processing costs were assumed, as no data were available. The size and scope were considered and compared to other facilities of a similar size and scope where costs were better known (i.e., through the WDO datacall). The City of Ottawa was contacted to find out the Metro Waste processing costs for both fibres and containers. Containers are more expensive (between $180-$190 per tonne) to process but represent approximately 30% of the recyclables. Fibres represent about 70% of the recyclables but are cheaper to process (between $50-$60 per tonne). The costs were averaged based on the percentage of fibres and containers collected.

Table 6-1: Processing Costs

MRF	Cost per Tonne
RARE – Single Stream	$200
RARE – 2-Stream	$175
Lafleche – Single Stream	$175
Lafleche – 2-Stream	$150
Metro Waste – 2-Stream	$100

Single stream facilities require more sorting equipment to effectively separate the mixed materials coming in, making it more expensive than 2-stream facilities.

Table 6-2: Summary of Number of Trucks Required for Each Scenario

			Single Stream			2-Stream			
		Scenario	A	B	C	D	E	F	G
Municipality	Current Number of Trucks Reported by Municipalities	Modelling Current Collection Program	Direct Haul to RARE	Direct Haul to Lafleche	Min. Trucks Direct Haul to RARE or Lafleche	Direct Haul to RARE	Direct Haul to Lafleche	Direct Haul to Ottawa	Min. Trucks, Transfer at RARE or Lafleche, Process in Ottawa
Alfred & Plantagenet	1	1.2	1.3	1.3	1.3	1.3	1.2	1.6	1.2
Casselman	1	1.0	1.0	0.8	0.8	1.1	0.9	1.1	0.9
Clarence Rockland	no data	2.2	3.0	2.3	2.3	3.5	2.7	2.6	2.7
Champlain, Hawkesbury, East Hawkesbury	2	2.6	1.4	1.5	1.4	1.8	1.9	2.5	1.8
Cornwall	no data	2.3	1.4	1.3	1.3	1.7	1.6	2.4	1.6
North Glengarry	2	1.8	1.5	1.7	1.5	1.5	1.7	2.4	1.5
The Nation	1	1.7	2.5	1.7	1.7	2.5	1.7	3.5	1.7
North Dundas	no data	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5
North Stormont	1	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4
Russell	2	2.4	2.5	2.4	2.4	2.4	2.4	3.2	2.4
South Dundas	2	2.9	3.0	2.9	2.9	3.1	2.9	4.8	2.9
South Glengarry	1	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.4
South Stormont	2	1.0	0.9	0.8	0.8	1.1	1.0	1.8	1.0
		Best Case Total*	**19.6**	**17.7**	**17.3**	**21.6**	**19.4**	**27.5**	**19.0**

*** "Best Case" assumes municipalities sharing collection vehicles.**

The Ottawa facility is the cheapest because it is a 2-stream facility and has a much larger capacity than RARE and Laflèche.

It should be noted that the costs per tonne in Table 6-2 do not include any revenues from the sale of materials, but rather represent only the costs to process the materials. Revenue costs were not included since they would be the same for each processing option.

6.3 Transfer Stations

For Scenario G, it is assumed that RARE and Laflèche would be turned into transfer stations. Waste would be collected from the municipalities and hauled to the closest transfer station (RARE or Laflèche). The waste would then be transfer-hauled to Ottawa for processing. The hauling cost per kilometre is estimated to be $0.20. The cost to transfer materials at the transfer station is estimated to be $35 per tonne.

6.4 Overall Cost Summary

Table 6-3 summarises the overall costs per scenario.

Table 6-3: Overall Costs – By Scenario

	Single Stream			2-Stream			
Scenario	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Costs	**Direct Haul to RARE**	**Direct Haul to Lafleche**	**Min. Trucks, Direct Haul to and Processed at RARE or Lafleche**	**Direct Haul to RARE**	**Direct Haul to Lafleche**	**Direct Haul to Ottawa**	**Min. Trucks, Transfer at RARE or Lafleche, Process in Ottawa**
Transfer Hauling Costs							$160,000
Transfer Station Costs	-	-	-	-	-	-	$429,000
Processing Costs	$2,452,000	$2,145,000	$2,222,000	$2,145,000	$1,839,000	$1,226,000	$1,226,000
Number of Trucks	19.6	17.7	17.3	21.6	19.4	27.5	19.0
Costs for Trucks*	$2,937,000	$2,647,000	$2,601,000	$3,242,000	$2,902,000	$4,121,000	$2,842,000
Total Best Case Costs	**$5,389,000**	**$4,792,000**	**$4,823,000**	**$5,387,000**	**$4,741,000**	**$5,347,000**	**$4,657,000**
Overall Cost Ranking	7	3	4	6	2	5	1

* Assumes $150,000 annual capital and operating truck cost

Scenario G assumes that transfer stations are located at RARE and Laflèche where materials are transferred then hauled to Ottawa for processing. This is the most economic option due to the low 2-stream processing costs in Ottawa and the efficient hauling method.

Sending recyclables to Laflèche for 2-stream or single stream processing are the next best options, in terms of overall cost. This is a result of low processing costs and number of collection vehicles required (75% of the municipalities are closer to Laflèche than RARE).

Single stream processing costs at RARE are the most expensive among the processing options and is therefore the most expensive scenario.

Option F is the most expensive scenario due to the large number of trucks required to directly haul materials from the centre of each municipality to Metro Waste in Ottawa for 2-stream processing.

6.5 Potential Environmental Benefits

The potential environmental benefits associated with the regionalization of the recycling programs within the study area will arise from:

- Reducing the number of collection vehicles (2 to 3 potentially fewer vehicles); and
- Reducing the number of operating hours of recycling facilities.

With combined tenders for the collection of recyclables, it would be possible for the combined municipalities to decrease the number of collection vehicles on the road by two (if two stream collection is implemented) or three (if single stream collection is implemented) and materials were processed using the RARE, Laflèche and Ottawa facilities. However, if some municipalities determined it more cost effective to have the City of Ottawa process their materials (i.e., assuming that the Laflèche facility does not proceed), these savings would be offset by increased fuel consumed to transfer the materials to the City of Ottawa.

Larger facilities are capable of operating at much higher throughput rates per hour, thus the total number of operating hours for the equivalent number of tonnes is significantly reduced. For example, most small recycling facilities (less than 5,000 tonnes per year) have throughput rates of less than five tonnes per hour (RARE is currently less than five tonnes per hour). This compares to a larger regional facility as is used in the City of Ottawa, which would operate at a throughput rate of 30-35 tonnes per hour (combined fibres facility and containers facility). Instead of operating a plant for an entire year to process up to 10,000 tonnes of material over eight hours per shift, the Ottawa plant will be able to process that same quantity of material in just one sixth of that time. It should be recognized however that the Ottawa facilities have more moving parts, i.e., more conveyors, which will require more electricity. However, overall, the savings in energy consumption are expected to be significant as the overall plant is much more efficient at moving and sorting materials.

Overall, because there are limited data available on the energy consumed by recycling facilities, it is not readily clear as to how much energy would be saved processing materials at a larger facility.

Adding together the collection and processing environmental impacts, as much more energy is consumed in the collection of materials than in the processing, it is likely that there would be some environmental benefits to regionalization, but they would be minimal.

7. Recommendations

Overall, the results of the study suggest that it does not make financial sense to expand the operations at RARE for that location to act as a regional processing centre for eastern Ontario. In fact, the results suggest that it makes sense for RARE to only process materials from its immediate neighbours.

The best opportunity for most of the municipalities in eastern Ontario is for them to pursue using Ottawa's facilities for the processing of their materials. Ottawa's low cost per tonne, achieved through economies of scale, makes it difficult for small MRFs to compete.

The one option that may prove more beneficial may be sending materials to a newly constructed MRF in Moose Creek, which is more central to the study area. However, without knowing the size, scope of services and the cost of the Lafleche facility, or if in fact it will even be built, it is not possible at this time to draw that as a firm conclusion.

One other recommendation arising from the study is that municipalities in Eastern Ontario should work together in developing tenders/contracts for the provision of waste management collection services for recyclables and garbage. The area municipalities in York Region successfully worked together to save money on collection services by releasing one RFP for collection for all six municipalities. It is possible that the area municipalities in Stormont, Dundas and Glengarry working together could realize similar savings. It is recommended that the municipalities follow up with York Region and/or Stewardship Ontario to determine the best approach to releasing a common RFP document for collection services.

Appendix A: Background Information

Table A-1 - Current Municipal Waste Management Collection Programs

	Alfred & Plantagenet	Casselman	Clarence Rockland	Champlain, Hawkesbury, East Hawkesbury	Cornwall	North Glengarry	The Nation	North Dundas	North Stormont	Russell	South Dundas	South Glengarry	South Stormont
Garbage	Weekly	Weekly	Weekly 3 Bag-limit	Champlain - 3 bag limit, Hakesbury & East Hawkesbury-no limit	Weekly	Weekly	1 x /week	weekly		weekly	weekly	weekly	weekly
Recycling	Weekly	Weekly	Weekly One week containers other week fibers	Rural Bi-W / Urban Weekly	Biweekly	Weekly	1 x /week	Bi-Weekly	Bi-Weekly	weekly	Alternate week	Bi-Weekly	Bi-weekly
Collection method	1 stream garbage & recycling both on split trucks	1 stream separate truck	2 trucks garbage / 2 trucks recycling	4 stream Owned Labrie Truck	5 Stream - occ, col. Glass,clear glass,cont.,obb,onp	1 stream	1 stream garbage & recycling both on split trucks	4 Stream	1 Compactor	1 stream garbage & recycling both on split trucks	fibres then containers (co-mingled)	1	4 stream
Number of trucks collecting	1	1		2	3 trucks @ 8hrs 2 trucks @ 3hrs	1 Rec.Trailer - 1 day 2 Rec. Trucks - 4 days 1 Garbage - 4 days 2 Garbage - 1 day	1	5	1 garbage 1 recycling	2	Monday (1) Tues-Fri (2)	1	2
Number of days collecting	5	2		1 truck - 5 days (Hawkesbury) 1 truck - 4 days (2 days in Champlain)	5	5 Days	4	5 Days	4 garbage 2 recycling	5	5	4	5
Cubic yard per truck	32 yds 60% garbage 40% recycling			35 cubic yards	30 cubic yards + 5 yds for occ at rear	Rec Tr = 24 1 truck = 24 1 truck = 32	32 yds 60% garbage 40% recycling	30 cubic yards	33 garbage 35 recycling	1 at 32 1 at 25	20 cubic yds per truck (12 yds garbage 8 yds recycling)		30 cubic yards + 5 yds for occ at rear
Hours work per truck	10 hrs per day			8 hours per day per truck	3 truck @ 8hrs 2 truck @ 3hrs	Rec Tra=8/day 1Rec Tru=4/day 2Rec Tru=8/day	8	8hrs x 2 men	44 garbage 20 recycling	Approx. 7 hours /truck/day for both garbage & recycling	Mon 12 hrs Tues - Fri 8.5	10 hrs/day	5 hrs per truck
Loads per day	1.5 per day			1 load per truck	2 ft 1 pt	Rec Tra=3 for 1 day 1 Rec Tru=1for 1 day 2 Rec Tru=1ea for 4 day	2	2	1 garbage 1 recycling	1	1 load / day / truck	1day/1 load 3days/2load *	2
Tonnage per truck	7 tons garb 3 tons recycling	5		from 2 mt to 3 mt	3.5 ft 1.5 pt	Rec Tra=1.5 1 Rec Tru=2 2 Rec Tru=1.3	average 3	1.5 mt - 2 mt	8 garbage 4 recycling	one at 12 one at 11	7-8 tons garb 1 to 1 1/2 tons recycling	2 mt to 3 mt	1.35 mt per truck

*
ft -full time
pt-part time

* 2nd week
1day/1 load 2days/2load
1 day 3 loads