

MRF Optimization Study  
Report on Collection Options and Processing  
Options for the City and County of Peterborough  
(E&E Project 198)



Submitted to:

City of Peterborough  
Finance and Administration Services  
City Hall, 500 George Street North  
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Attn: Ms. Melanie Kawalec  
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Submitted by:



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27 April 2007



5879

April 27, 2007

Melanie Kawalec  
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City of Peterborough  
Waste Management Division  
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Peterborough, ON  
K9H 3R9

**Re: MRF Optimization Study – Report on Collection Options and Processing Options  
for the City and County of Peterborough**

Dear Melanie:

Please find enclosed our revised copy of the Report on Collection Options and Processing Options for the City and County of Peterborough as part of the MRF Optimization Study. It incorporates the changes requested in the draft reports. The additional work on regionalization with surrounding municipalities is included in the report now, i.e., we are not providing separate collection and processing reports. This is important as it provide a more integrated approach to the issue within the City and County.

If you have any questions, please do not hesitate to call me at (905) 475-7270, Ext. 466.

Very truly yours,

GENIVAR Ontario Inc.

A handwritten signature in black ink, appearing to read "Daniel Lantz", written over a faint, light-colored rectangular stamp or watermark.

Daniel Lantz, M.Sc., MBA, MCIWM  
Project Manager

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## 2. Introduction

### 2.1 Introduction

The City and County of Peterborough are currently undertaking a study to evaluate the collection and processing options for recyclables and collection options for source separated organics, leaf and yard wastes and garbage.

The collection contracts are under a business review for garbage, green waste and recycling for the City. The County collection contracts expire at the end of March 2008. The City and County are interested in analyzing alternative collection options.

The City of Peterborough owns a Materials Recovery Facility (MRF) located within City boundaries that currently processes five-stream source separated recyclables from both the City and County of Peterborough.

The City is planning to either upgrade its MRF within the next five years or send recyclables to another MRF where there is merchant capacity available. The City has yet to decide on the processing type but is considering both single stream and two-stream recycling options.

The first part of this study examines various collection options to determine the most cost effective and efficient overall residential collection system for garbage, recycling, green waste and household organics for the City and recycling and household organics collection for the County. The second part of the study examines processing options. Specifically in the examination of recyclables processing, the City and County have a number of options available:

- Continue operating the existing facility (base case);
- Close the existing facility, build a transfer station and ship all materials to:
  - Durham Region;
  - Northumberland County; and/or
  - Quinte Waste Solutions.
- Close the existing facility and build a new facility for Peterborough City and County only; and
- Close the existing facility; ship the materials to another facility (as described above) for an interim period of time; build a new regional facility at some period of time into the future (e.g., five years).

In starting the examination of options for the City/County of Peterborough, it became apparent that there were other possible regional MRF opportunities. A group, with representatives from each of the municipalities above, plus Kawartha Lakes, was convened to discuss the regionalization of recyclables processing. This report outlines the preliminary results of these investigations.

## 2.2 Outline of Report

Section 2 outlines the collection options analysed in the study and describes the methodology used in the analyses. Section 3 includes the data gathered and assumptions made completing the analyses. In Section 4, the results of the alternative collection option analysis are presented. Section 5 presents the recommendations and implementation strategy for the collection aspects. Section 6 examines the various MRF processing options for the City and County of Peterborough, including their own facility, and options for the use of the Durham Region, Northumberland County and/or Quinte Waste Solutions facilities. Section 7 outlines the costs of the various scenarios and Section 8 presents the conclusions and considerations for the processing aspects of the study.

## 3. Methodology

### 3.1 Collection Cost Model

An in-house Collection Cost Model (CCM) was utilized to determine the number of collection vehicles that would be required for the various collection options. This model examines the collection factors of existing and proposed municipal programs for the purpose of reviewing costs and efficiencies.

### 3.2 Review of Current Collection Programs

The City is responsible for the collection of garbage, recyclables and green waste from residential and downtown business improvement areas (DBIA). The County is responsible for the collection of recyclables. Both the City and the County will be responsible for curbside source-separated organics (SSO) collection.

Table 2-1 shows the current collection programs for both the City and County of Peterborough.

**Table 3-1 Current Recycling Program**

Program	City of Peterborough	County of Peterborough
Garbage	Weekly collection provided by Public Works	<i>Weekly collection provided by private sector</i>
Recycling	Five-stream collection provided weekly by Private Sector	Five-stream collection provided weekly
Leaf & Yard Waste	Weekly collection during the growing season (April through November) provided by Public Works	<i>No program</i>
Household Organics	Pilot stage for 625 households collection provided weekly by Public Works	Pilot stage for households collection provided weekly, and depot

The County currently collects recyclables from all households, including those households located along private roads. These homes drop their recyclables off at a Common Collection Area (CCA).

### 3.3 Future Collection Programs

The City is considering updating its MRF and changing the collection program to either two-stream or single stream recycling within the next 5 years. Accordingly, the City and County recycling collection programs will change. Both the City and County are currently undertaking a pilot residential organics collection program (the City's since 2001) and the County is also undertaking a pilot drop-off organics program initiated in July 2006. This program will be expanded to all residences in the City by spring 2008 and potentially in the County by 2011. The County is not responsible for the collection of garbage.

The City and County are interested in analyzing a variety of collection programs to determine the most economic and efficient overall collection program. There are twelve collection options for the City including three for garbage, five for recycling, and four for leaf and yard waste. Co-

collection of SSO is included for the three material types. For the County, there are 3 recycling options and one SSO option examined. Table 2-2 describes the sixteen collection scenarios analysed in the Study.

**Table 3-2 Collection Scenarios Analysed in the Study**

Scenario	Scenario Description
<i>City Collection Scenarios</i>	
1	Garbage collected weekly
2	Garbage collected biweekly
3	Garbage and source-separated organics (SSO) co-collected weekly
4	Two-stream recyclables collected weekly with SSO on a three-compartment vehicle
5	Two-stream recyclables collected weekly on a two-compartment vehicle
6	Two-stream alternating fibres and containers co-collected weekly with SSO on a two-compartment vehicle
7	Single stream recyclables co-collected weekly with SSO
8	Single stream recyclables collected weekly
9	SSO and green waste (GW) co-collected weekly between April through November and SSO collected between December through March
10	Commingled SSO and GW collected weekly in a single compartment vehicle between April through November and SSO collected between December through March
11	Seasonal GW collected weekly
12	Seasonal GW collected weekly and biweekly collection in the summer
<i>County Collection Scenarios</i>	
13	Two-stream recyclables collected weekly with source-separated organics (SSO) on a three-compartment vehicle
14	Two-stream recyclables collected weekly on two-compartment vehicle
15	Two-stream alternating fibres and containers collected weekly with SSO on a two-compartment vehicle
16	Weekly SSO collection

## 4. Background

### 4.1 Background Information

To run the Collection Cost Model (CCM), data were gathered from the City and County staff. They were asked for the following information:

- Details on collection vehicles (i.e., fleet size and characteristics, hours operating);
- Estimated loads per day and tonnes per truck collected; and
- Hours worked per day by collection staff.

#### 4.1.1 City Scenarios

City staff provided detailed information on the total number of stops made by City collection staff as well as the tonnes collected per year for each material type.

##### Number of Households

The City collects waste from single-family dwellings (SFD), small multi-family dwellings (MFD), the Downtown Business Improvement Area (DBIA), and the IC&I sector. The number of stops per building type for each material stream is shown in Table 3-1 below.

**Table 4-1 Number of City Stops per Material Type**

Material Type	SFD	Small MFD	DBIA	IC&I	Total # of Stops
Recycling	23,990	200	500	125	<b>24,815</b>
Garbage	23,990	500		1,725 (1)	<b>26,215</b>
Green Waste	23,990	500		200	<b>24,590</b>
SSO (2)	23,990	500			<b>24,490</b>

(1) Includes both DBIA and IC&I.

(2) SSO service could be extended to the IC&I area however for the purposes of this study, it has not been included, as neither the number of stops or the quantities that could be collected is known. In addition, the collection frequency for the IC&I sector would most likely dictate a separate collection system (i.e., daily or every other day collection required).

##### Tonnes of Material Collected

For recycling, garbage, and leaf and yard waste quantities, the tonnes collected per year are based on projections taken from data between 2004 and 2006. Yard waste quantities are based on tonnes collected from April through December.

For source-separated organics (SSO) collection, it was assumed that each household would generate 4 kg per week and that 60% of households would participate (i.e.,  $23,990 \times 52 \times 0.6 \times 0.4\text{kg} = 2,993$  tonnes (3,000 tonnes)).

The tonnes collected for the four types of material are shown in Table 3-2.

**Table 4-2 Quantity of Materials Available for Collection**

Material	Tonnes per Year
Garbage	13,000
Recyclables	14,000
Leaf and Yard Waste*	4,500
Source Separated Organics	3,000

\* The tonnes of Leaf and Yard waste represent the tonnes collected from April through December.

## 4.1.2 County Scenarios

Modelling the County proved to be difficult for a number of reasons including the large number of seasonal residents, the vast area, and the large amount of Common Collection Area's (CCAs). The difficulties and solutions are discussed below.

### Collection Routes

The County will be changing its entire collection route structure. The current collection route structure has collection vehicles travelling all across the County each day. The new routes will collect materials from specific municipalities on specific collection days (Monday to Friday). Table 4-3 shows the new collection route schedule.

**Table 4-3 New County Collection Route Schedule**

Collection Day	Local Municipalities
Monday	North Kawartha
Tuesday	Douro-Dummer, Asphodel-Norwood
Wednesday	Otonabee-S. Monaghan
Thursday	Smith-Ennismore-Lakefield
Friday	Cavan-Millbrook-N. Monaghan

Havelock-Belmont-Methuen and Galway-Cavendish-Harvey drop their recyclables at CCAs located in neighbouring local municipalities.

### Number of Households

For the recycling and recycling with SSO scenarios (Scenarios 13-15), material will be collected from all households, including those households located on private roads through the Common Collection Areas (CCAs). Approximately 3,600 homes in the County (or 16% of all County homes) leave their recyclables at over 250 CCAs. To account for this in the modelling, the number of stops for collection operators was calculated by taking the total number of households in the County, subtracting those households that use CCAs and then adding the total number of CCAs for each collection day. Table 4-4 shows the total number of households, CCAs, and percentage of homes dropping material off at CCAs.

**Table 4-4 Total number of households, CCAs, and percentage of homes utilizing CCAs in County**

Collection Day	Total Number of HHs	HHs Using CCAs	% of HHs using CCAs	Total Number of CCAs	Number of Stops (for model)	% of CCA
Monday	5,037	2,119	42%	138	3,056	54%
Tuesday	3,764	149	4%	18	3,633	7%
Wednesday	4,589	325	7%	26	4,290	10%
Thursday	5,335	990	19%	71	4,416	28%
Friday	3,607	20	1%	2	3,589	1%
<b>TOTAL</b>	<b>22,332</b>	<b>3,603</b>	<b>16%</b>	<b>255</b>	<b>18,984</b>	

Seasonal residents occupy the majority of homes located along the private roads and generally set out less waste. Due to the inconvenience and difficulties of managing SSO for seasonal residents (i.e., they leave Sunday, food waste would have to sit out for collection during the week; who would take back in the container; possible increased problems with vectors, etc.), for the purposes of modelling the SSO-only option, it was assumed that those homes located on private roads would not be included in the SSO collection program. This reduced the number of households, as shown in Table 4-5.

**Table 4-5 Number of County Households Eligible for SSO Collection (Households Not Located on Private Roads)**

Collection Day	Number of Households
Monday	2,527
Tuesday	3,603
Wednesday	4,114
Thursday	4,410
Friday	3,506
<b>TOTAL</b>	<b>18,160</b>

### Tonnes of Material Collected

Seasonal residents, those living in the County during the warmer months (May through October), account for approximately 34% of the County households. As a result, the County's peak season was modelled, as this provides the maximum number of collection vehicles that would be required.

The County estimates that approximately 61% of materials generated throughout the year are generated during the peak season. Recyclables are collected from the Bluebox curbside program, cardboard collection program, and trailer park depots. The tonnes of recyclables collected were reported for 2005 and 2006 and the percent-increase was determined. This percentage was used to project the tonnes collected in 2008 (end of the collection contract). The estimated amount of recyclables requiring collection in the peak season of 2008 is 2,750 tonnes per year. It was assumed that the split between fibres and containers is 70% to 30%, respectively.

For source-separated organics (SSO) collection, it was assumed that each household would generate 4 kg per week. Since many residents compost their food waste, and since a majority of households in the peak season are seasonal residents, it was assumed that there would be 60% participation in the program. The estimated amount of SSO requiring collection in 2008 is 1,400 tonnes per year and approximately 1,600 tonnes per year in 2011 (i.e., when the program would be rolled out across the County)<sup>1</sup>

Since the model runs were completed for each collection day, the tonnes of recyclables and SSO per collection day were calculated based on the percent of households in each collection zone.

Table 4-6 shows the approximate tonnes of recyclables and SSO during the peak season available for collection in 2008.

**Table 4-6 Peak Season Tonnes Collected in 2008**

Collection Day	Recyclables (tpy)	SSO (tpy)
Monday	619	192
Tuesday	463	274
Wednesday	564	313
Thursday	656	336
Friday	443	267
<b>TOTAL</b>	<b>2,745</b>	<b>1,382</b>

### Other Collection Factors for Modelling

The County provided tonnage, household and population numbers for the five collection zones. To determine the distance from the centre of each collection zone to the processing facility, the County noted the location of the population centres for each of the local municipalities. The distance from this location to the processing facility was determined. In collection zones where there is more than one local municipality, the distance was calculated using a weighted average based on household counts from each local municipality. This same methodology was used to determine the time and speed for collection vehicles to travel from the collection zone to the processing facility.

Each collection day was modelled and the collection day requiring the largest number of trucks was recorded as the number of trucks required for that scenario.

## 4.2 Model Assumptions

Along with actual data provided from the City and County, assumptions about collection programs were made by the consultants and later updated and/or confirmed by City and County staff.

<sup>1</sup> For consistency in the modelling with the other streams and with the City, 2008 was used as the modelling year. It is estimated that even with the growth in the County and the increase the quantity of food waste that could be collected in that year, there would be no additional trucks required (i.e., the growth could be accommodated by the fleet estimated for 2008.)

### Participation Rate and Setout Frequency

The participation rate is the percentage of households that are participating in the curbside collection program. The set-out frequency is the percentage indicating how often households that are participating in the collection program are setting containers out at the curb for pick up.

Households with weekly garbage collection tend to have less material setout at the curb compared to households with biweekly collection (a lower set-out frequency). The County, in general, has a low participation rate and set-out frequency due to the high number of seasonal residences. The participation rates and set-out frequency are shown for the different collection options in Table 4-7 below.

**Table 4-7 Participation Rate and Setout Frequency**

Collection Program	City		County	
	Participation Rate (%)	Setout Frequency (%)	Participation Rate (%)	Setout Frequency (%)
Garbage collected weekly (2-bag limit)	100	95	n/a	n/a
Garbage collected biweekly (3-bag limit)	100	98	n/a	n/a
Garbage and SSO co-collected weekly	100	95	n/a	n/a
Two-stream recyclables co-collected weekly with SSO	90	85	85	75
Two-stream recyclables collected weekly	90	80	85	70
Two-stream alternating fibres and containers co-collected weekly with SSO	90	85	85	75
Single stream recyclables co-collected weekly with SSO	90	85	85	75
Single stream recyclables collected weekly	90	80	85	70
SSO and green waste co-collected weekly, or commingled collection	90	80	85	70
Green waste collected weekly in growing season	90	80	85	70
Green waste collected weekly in growing season, biweekly in summer	90	80	85	70
SSO collected weekly	n/a	n/a	85	70

### Time per Stop

The time per stop 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 and material being collected. For example, leaf and yard waste and garbage are typically heavier than recyclables and therefore collection staff requires more time to collect these materials. Homes with weekly 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 3-8 shows the time per stop for the different collection options and material types.

**Table 4-8 Time per Stop**

Collection Program	Time per Stop (seconds)
Garbage collected weekly (2-bag limit)	12
Garbage collected biweekly (3-bag limit)	15
Garbage and SSO co-collected weekly	16
Two-stream recyclables co-collected weekly with SSO	30
Two-stream recyclables collected weekly	20
Two-stream alternating fibres and containers co-collected weekly with SSO	16
Single stream recyclables co-collected weekly with SSO	16
Single stream recyclables collected weekly	12
SSO and green waste (GW) co-collected weekly	22
Commingled SSO and GW collection	20
GW collected weekly in growing season	20
GW collected weekly in growing season, biweekly in summer	20
SSO collected weekly	10

### Dumping Time

Dumping time is the time required to empty each truck at the landfill, MRF, or composting facility. For modelling purposes, as a centralized composting site has not yet been located, it is assumed that the landfill and centralized composting facility will be located at the Peterborough Waste Management Facility (PWMF). The MRF is located approximately ten minutes from the PWMF. Table 3-9 shows the dumping time for the different collection programs.

**Table 4-9 Dumping Time**

Material Type	Dumping Time (minutes)
Garbage	10
Garbage and SSO	15
Two-stream recyclables and SSO	45
Alternating fibres and containers and SSO	35
Two-stream recyclables	20
Single stream recyclables and SSO	35
Single stream recyclables	15
SSO and green waste co-collected	20
Commingled SSO and GW	20
Green waste	20
SSO	10

## 5. Results

### 5.1 Number of Collection Vehicles

Prior to modelling the sixteen scenarios, City and County staff were asked how many collection vehicles were currently being used. For the City, the first run modelled the current collection program to see if the assumptions gave accurate and known results.

The same could not be completed for the County since the collection routes will change significantly, making it extremely difficult to model. As the County is in the process of changing all of its collection programs, it was determined that modelling the old system would be senseless. Instead, the Project Team sat down with representatives from the County and developed modelling assumptions from first principles.

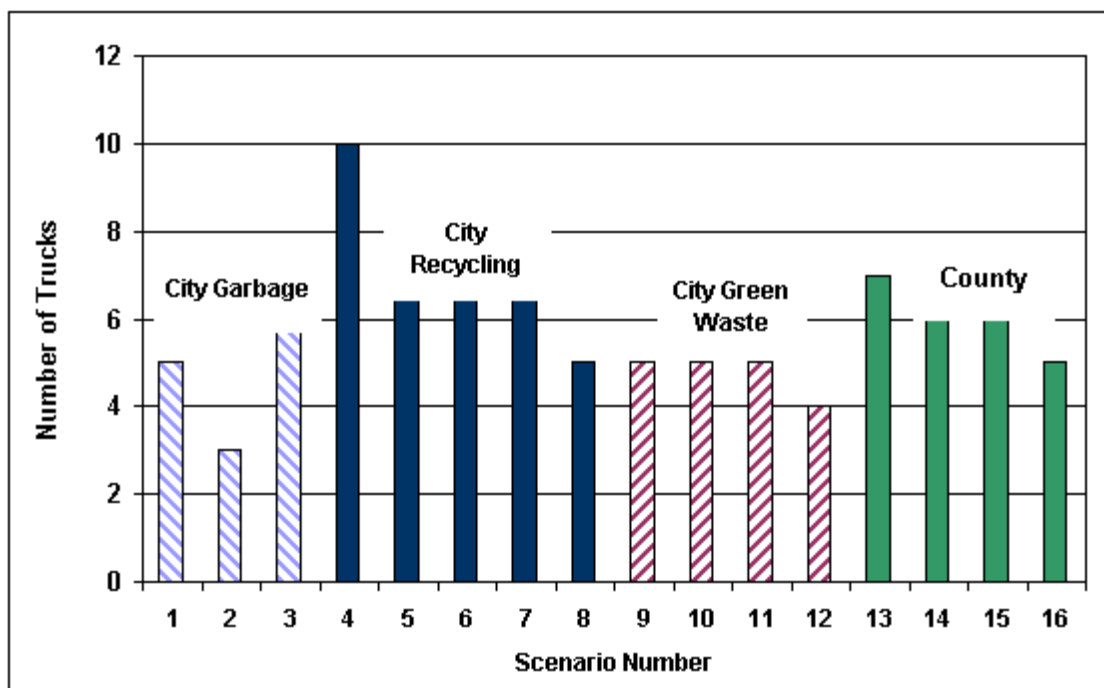
The next set of runs determined the number of collection vehicles required for Scenarios 1 through 16. It was assumed that if the model output was within 0.2 or less of a truck, then the number of trucks required would be rounded down based on the rationale that having 0.2 or less of a truck can be overcome by having trucks work overtime. For example, if the output for the number of trucks gave 4.2 trucks, the number of trucks required for that scenario would be 4.0. Conversely, if the output for a scenario gave 5.6 trucks, the number of trucks required was rounded up to 6.0.

The number of collection vehicles required for all scenarios are summarized in Table 5-1 and illustrated in Figure 5-1.

**Table 5-1 Summary of Number of Trucks Required for Each Scenario**

Scenario Description		Number of Trucks Required
<b>Current City Garbage</b>		<b>4.0</b>
1	Garbage collected weekly	5.0
2	Garbage collected biweekly	3.0
3	Garbage and source-separated organics (SSO) co-collected weekly	6.0
<b>Current City Recycling</b>		<b>11.0</b>
4	City 2-stream collected weekly with SSO (3 comp)	10.0
5	City 2-stream collected weekly	7.0
6	City 2-stream alternating fibres and containers collected weekly with SSO (2 comp)	7.0
7	City single stream recyclables collected weekly with SSO	7.0
8	City single stream collected weekly	5.0
<b>Current City LYW</b>		<b>5.0</b>
9	SSO and green waste (GW) co-collected weekly	5.0
10	Commingled SSO and GW weekly	5.0
11	City seasonal GW collected weekly	5.0
12	City seasonal GW collected weekly, biweekly in summer	4.0
<b>County</b>		
13	County 2-stream collected weekly with SSO (3 comp)	7.0
14	County 2-stream collected weekly	6.0
15	County 2-stream alternating fibres and containers collected weekly with SSO (2 comp)	6.0
16	SSO collected weekly	5.0

**Figure 5-1 Number of Collection Vehicles Required**



### 5.1.1 City Results

As shown in the above table and figure, one collection vehicle could be saved if the City moved from weekly garbage collection to biweekly garbage collection. The primary reason is that biweekly collection reduces the amount of driving time, as each home is only collected at half the frequency, the driving distances are reduced accordingly.

There is little difference in the number of collection vehicles for single stream with SSO, two-stream recycling, and two-stream alternating fibres and containers with SSO collection. In all three scenarios, two materials of similar weight are collected and require about the same amount of time for operators to collect.

Single stream recyclables collected weekly (Scenario 8) involves the least amount of time for operators to collect at the curb. Dumping single stream recyclables at the MRF also requires less time than most of the other options.

Scenario 6 requires the greatest number of trucks, as collecting and sorting fibres, containers and SSO using a 3-compartment vehicle takes the longest amount of time. Another factor is the time required to dump the materials at the MRF and the centralized composting facility.

For leaf and yard waste collection, if the City moved to seasonal weekly collection and biweekly collection in the summer (Scenario 12), approximately one truck could be saved compared to weekly seasonal leaf and yard waste collection (Scenario 11). This is also effective considering that less material is generated in the summer months.

There is little difference between co-collecting leaf and yard waste and SSO and collecting commingled SSO and green waste (Scenarios 9 and 10, respectively). In both these scenarios, green waste and SSO are collected during the growing season and then SSO only is collected for the winter months.

### 5.1.2 County Results

There is little difference between collecting two-stream recyclables weekly and co-collecting SSO and alternating fibres and containers weekly (Scenarios 14 and 15). Collecting three-streams on one vehicle requires one more truck for collection. Collecting SSO on a single compartment truck requires one less truck than Scenarios 14 and 15.

## 5.2 Overall Collection Systems for the City

A matrix was developed to determine the possible overall collection systems for the City of Peterborough. With the twelve collection scenarios for the City, there are twenty-four (24) possible overall collection systems, labelled Scenarios A through X in Table 4-2 below.

**Table 5-2 Overall Collection Scenarios for the City of Peterborough**

Scenario	1	2	3	4	5	6	7	8	9	10	11	12	Total # of trucks	Rank
A	x			x							x		20.0	24
B	x			x								x	19.0	23
C	x				x				x				17.0	15
D	x				x					x			17.0	15
E	x					x					x		17.0	15
F	x					x						x	16.0	12
G	x						x				x		17.0	15
H	x						x					x	16.0	12
I	x							x	x				15.0	5
J	x							x		x			15.0	5
K		x		x							x		18.0	21
L		x		x								x	17.0	15
M		x			x				x				15.0	5
N		x			x					x			15.0	5
O		x				x					x		15.0	5
P		x				x						x	14.0	3
Q		x					x				x		15.0	5
R		x					x					x	14.0	3
S		x						x	x				13.0	1
T		x						x		x			13.0	1
U			x		x						x		18.0	21
V			x		x							x	17.0	15
W			x					x			x		16.0	12
X			x					x				x	15.0	5

- 1 - Weekly garbage
- 2 - Bi-weekly garbage
- 3 - Weekly garbage and SSO

- 4 - Weekly 2-S and SSO
- 5 - Weekly 2-S
- 6 - Weekly 2-S alt F&C with SSO
- 7 - Weekly SS with SSO
- 8 - Weekly SS

- 9 - Weekly SSO and GW
- 10 - Commingled SSO and GW
- 11 - Weekly GW
- 12 - GW weekly in growing season, bi-weekly in summer

The number of trucks required for the overall collection systems varies from 13 trucks to 20 trucks. Two collection scenarios require 13 vehicles. Two collection scenarios require 14 collection vehicles. Six collection scenarios require 15 trucks. The top four overall collection scenarios are described below:

**1. Scenario T – 13 trucks**

- Biweekly garbage collection;
- Weekly collection of single stream recyclables; and
- Commingled collection of SSO and leaf and yard waste.

**1. Scenario S – 13 Trucks**

- Biweekly garbage collection;

- Weekly collection of single stream recyclables; and
- Weekly co-collection of SSO and leaf and yard waste.

### 3. Scenario P – 14 trucks

- Biweekly garbage collection;
- Weekly co-collection of SSO and alternating fibres and containers; and
- Weekly collection of leaf and yard waste in the growing season and biweekly collection in the summer.

### 3. Scenario R – 14 trucks

- Biweekly garbage collection;
- Weekly co-collection of single stream recyclables and SSO; and
- Weekly collection of leaf and yard waste in the growing season and biweekly collection in the summer.

A key consideration resulting from this analysis:

- Each of the top five options includes biweekly garbage collection. The benefits of biweekly garbage, beyond saving collection vehicles and collection costs, include the fact that it increases diversion from disposal.

In Durham Region, the introduction of biweekly garbage collection, and the introduction of a three bag limit (biweekly) for garbage, the quantity of recyclables collected went up between 30% and 50% in Whitby and Oshawa. Other municipalities in Ontario have seen similar results.<sup>2</sup>

When residents do not have the “easy” option of throwing their materials, i.e., including recyclables and organics, into the garbage for weekly pickup, they are more likely to take the time to divert materials to the most frequently collected service. This is particularly true for organics. The impact of a small bag limit helps, as people do not like to have to pay extra for garbage collection. As recycling and SSO collection is “free”, i.e., paid for from the tax bill and garbage collection to three bags is also “free”, people will gravitate to these “free” services to avoid paying extra. This drives increased diversion.

Therefore, biweekly garbage with a strict bag limit should be considered part of any change/solution for collection in the City (and County).

## 5.3 Overall Collection Systems for the County

Of the four collection scenarios, there are a total of three (3) possible collection systems for the County, labelled Scenarios A through C. Table 5-3 shows the matrix for the County systems.

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<sup>2</sup> Halton Region in their pilot, Peel Region in their rollout, the Town of Markham in their program all saw large increases in diversion from just the addition of the SSO program. Biweekly garbage in Markham plus the SSO program now had the Town at an estimated 65% diversion. The City of Toronto has had biweekly garbage collection for more than 18 months with great success in diversion from single family dwellings. They are now talking about moving to user pay to push diversion even higher. Peel Region is planning on moving to biweekly garbage, as ultimately is the Region of Niagara as a means of increasing diversion from disposal. All these municipalities have bag limits as a starting point for changing disposal patterns of their respective residents.

**Table 5-3 Overall Collection Scenarios for the County of Peterborough**

Scenario	13	14	15	16	Total # of trucks	Rank
<b>A</b>	x				7.0	2
<b>B</b>		x		x	11.0	3
<b>C</b>			x		6.0	1

13 - Weekly 2-S and SSO

14 - Weekly 2-S

15 - Weekly 2-S alt F&C with SSO

16 - Weekly SSO

Weekly co-collection of SSO with two-stream alternating fibres and containers requires the least number of trucks (6.0). Scenario A, two-stream recyclables co-collected weekly on a three-compartment truck is next, requires 7.0 trucks. Collecting two-stream recyclables on a two-compartment truck and collecting SSO on a single compartment truck requires almost twice as many collection vehicles as Scenario C.

## 6. Recommendations

### 6.1 Recycling Program

There are advantages and disadvantages for both single and two-stream recycling programs. The top ten systems include six scenarios with single stream recycling and four scenarios with two-stream recycling. The cost of single versus two stream recyclables processing and other factors (public acceptance, willingness to separate materials, ease within all dwelling types) all have to be considered before a decision on which approach to adopt. Generally, for single stream recycling to be cost effective for both collection and processing (i.e., when compared to two stream recycling), a minimum of 50,000 tpy is required to justify the high capital cost associated with single stream recycling processing equipment and the large number of sorters required to enable the program to meet end market specifications on the materials.

The County considered a two-stream recycling program only. Collecting two-stream recyclables separately from collecting SSO weekly (Scenario B) means that collection vehicles are travelling along the vast County area twice. The big challenge for County programs is accommodating the large area with the great distances between households, therefore, implementing separate SSO collection and recyclables collection is not economical or efficient. Processing options for the City and County are addressed in Sections 6 through 8.

### 6.2 Garbage Collection

Biweekly collection has been implemented in Durham Region, the City of Toronto and is proposed for Peel and Niagara Regions and has increased the participation in recycling and SSO programs. Durham saw recyclables tonnages increase by up to 50% in some municipalities moving to biweekly garbage.

Seven of the ten scenarios requiring the fewest collection vehicles include biweekly garbage collection. The City could save at least two collection vehicles if it implemented a biweekly garbage collection. Aside from saving on collection vehicle costs, the City could also benefit from increased participation in diversion programs.

### 6.3 Leaf and Yard Waste Collection

Six of the top ten scenarios include collecting SSO and leaf and yard waste together, weekly (similar results for both co-collection and commingled collection). This scenario involves leaf and yard waste and SSO co-collected during the seasonal months and SSO collected alone in the non-seasonal months (December through March). Utilizing one truck to collect SSO only in the winter months is an expensive collection method and is not considered economically feasible.

Three of the top ten scenarios include leaf and yard waste collected weekly in the growing season and biweekly in the summer months. This is similar to other municipal programs in which there is weekly green waste collection in the spring and fall, but no collection in the summer.

The City could also consider banning grass clippings from leaf and yard waste collection as grass adds significant weight to the leaf and yard waste bags. The City could promote grasscycling through an educational campaign, highlighting the advantages of leaving the grass on the lawn.

Grass bans are in place and have worked effectively in municipalities such as the City of Toronto and Durham Region. Reducing the tonnes of green leaf and yard set out at the curb could further reduce the number of collection vehicles required.

## 6.4 Other Considerations

Overall, the decision on collection must consider the following elements:

- “Maintaining” service levels, e.g., less garbage collection has to be offset with more SSO collection;
- Reducing service levels to promote other programs/diversion (i.e., biweekly garbage with bag limits will reduce overall garbage disposal rates and increase diversion through recycling and organics collection programs);
- Willingness of the public to accept changes to service levels;
- Applicability to those receiving the service (e.g., is there space available for multiple streams of recyclables to be collected in multi-family dwellings or would more frequent single stream collection promote more diversion?);
- Does the collection system make sense on a cost-benefit basis (i.e., collecting SSO from seasonal households in the County that go “home” at the end of every weekend may not warrant the expense or the nuisance factors relative to the amount diverted. It may make more sense to promote more backyard composting);
- Competition in the marketplace (i.e., does higher service level which means more trucks preclude smaller operators from bidding to the program?);
- Are there other programs that would be more/just as beneficial? (e.g., banning grass collection, promoting grasscycling. Grass would not have to be collected and water use in the City would decrease as grass clipping left on the lawn helps retain moisture in the soil); and
- The cost of recyclables processing of single or two stream materials (i.e., City/County have to look at total system costs, not collection or processing costs in isolation);

This list is not exhaustive, but identifies the need to examine many factors in addition to selecting the system that results in the lowest number of collection vehicles.

## 7. Regionalizing Processing – Background Information

Shortly into the start of the Collection and MRF Optimization Study, it was determined that there were possibilities beyond simply either extending the life of the Peterborough MRF or building a new MRF to accept the City and County's materials for the next 10 to 15 years. The County of Northumberland has its own MRF, located in Grafton, with some spare capacity for container materials at this time and possibly all materials if they proceed with a retrofit. Quinte Waste Solutions has their own MRF, located in Trenton, and it has capacity for container materials. However, they are also in the planning process for a new facility. Durham Region is in the process of building a new 100,000 tpy facility of which they will only require half when it opens in 2007. The City of Kawartha Lakes currently sends fibres to Toronto and containers to Northumberland County for processing.

Looking at the facilities within 100km of Peterborough, it was determined that it may make more sense to regionalize the operations of one or two facilities within that group, than it would be to continue to operate four (including Peterborough) MRFs, particularly considering the definite economy of scale cost-benefits associated with larger MRFs.

An application was made to Stewardship Ontario to expand the Peterborough Study to examine regionalization opportunities for the following municipalities:

- Peterborough City/County;
- City of Kawartha Lakes;
- Region of Durham;
- Northumberland County; and
- Centre and South Hastings (Quinte).

The approval was granted. The group met four times over the course of completing the regionalization study. The results of the investigations are included herein.

### 7.1 City/County of Peterborough MRF

Peterborough's MRF is now more than 15 years old. It has undergone one major retrofit and a number of smaller upgrades as necessary to keep the plant operational and able to process the following materials:

- |                            |                 |                          |
|----------------------------|-----------------|--------------------------|
| • ONP                      | • PET           | • Polycoat and Aseptics  |
| • OCC                      | • HDPE          | • Steel Cans             |
| • OBB                      | • Tubs and Lids | • Aluminum Cans          |
| • Magazines and Catalogues | • Plastic Film  | • Aluminum Pie Plates    |
| • Residential Mixed Paper  | • Polystyrene   | • Glass Bottles and Jars |

A meeting was held with City and County staff and the current MRF operator to discuss the current operations and potential for continued long term operations. The facility, processing more than 15,000 tpy, is at the point where it cannot effectively handle materials throughout the

entire year. The peak periods in the summer months, with the increase in quantities as a result of the seasonal residents in the County means those materials are being stored in a temporary storage area outside and processed on additional shifts. Considering the growth in the quantities to be managed each year, anticipated to be between 5% and 10% (i.e., an increase of between 700 and 1,400 tonnes of recyclables to be collected each year), and with the impact of the introduction of curbside source-separated organics taken into account, it was determined that the City/County could continue to operate the facility, with only a minor investment (approximately \$60,000) for another two years. The seasonality of the quantities being collected, with a large peak in the summer months from cottagers was considered a larger issue than the overall increases in quantities to be managed per year.

However, after a two year horizon, it was determined that major upgrades would be required to the equipment and more room would be required. As there is no room to expand the facility as it has space constraints on all sides, it was determined that a new facility would be required (or alternatives for processing made).

## 7.2 Northumberland County

Northumberland County operates a single stream facility processing approximately 15,000 tonnes of material per year. They process all dry materials currently, although they are in the process of transitioning their dry stream program over to a recyclables program only. The program includes the same materials as in the Peterborough program (except polystyrene).

Northumberland County could technically accept two stream materials from Peterborough, as they have direct infeeds to both the containers line and fibres lines within the plant. The MRF has capacity to accept both streams of materials, however there would be implications on the staffing of the facility (i.e., having to move to more than one shift per day on the fibres portion of the system).

Northumberland County received approval for \$401,634 funding (with GST) from Stewardship Ontario to undertake a major retrofit of their plant that would allow them to increase their throughput rate to a minimum of ten tonnes per hour. This will help the County to manage additional materials more efficiently and cost effectively. The costs presented herein assume the retrofit proceeds.

## 7.3 Quinte Waste Solutions

Quinte Waste Solution's facility is approximately the same age as the Peterborough facility. The facility is currently processing approximately 13,000 tpy of material. Their facility is able to process a fibres stream and a containers stream (Glass is separated at the curb). The program includes the same materials as in the Peterborough program.

The facility is quickly reaching capacity and does not have any room to expand, being constrained to a small site. It is anticipated that they will soon be investigating opportunities to establish a new facility.

In speaking with Quinte Waste Solutions, they indicated that they would be able to take just the containers stream from Peterborough City/County.

## 7.4 Durham Region

Durham Region is in the process of building a brand new state-of-the-art two stream MRF on the site of their existing facility (where fibres are shipped directly to the end market and containers to a secondary processing facility within the Region). The facility will have the capacity to process up to 100,000 tonnes per year of materials over two extended (i.e., 10 hours per shift rather than the typical eight) shifts per day and will have a throughput capacity of approximately 30 tonnes per hour across the two lines. When the facility opens later in 2007, it will be processing the equivalent of more than 50,000 tonnes of two stream materials per year.

Durham will be capable of processing all of the materials within the Peterborough program with the exception of polystyrene and plastic film, which would have to be removed from the inbound materials prior to being accepted by the Region's facility.

In speaking with representatives from the Region, it was indicated that they would accept all materials from Peterborough, excluding plastic film and polystyrene.

## 8. Analysis of Options

### 8.1 Status Quo

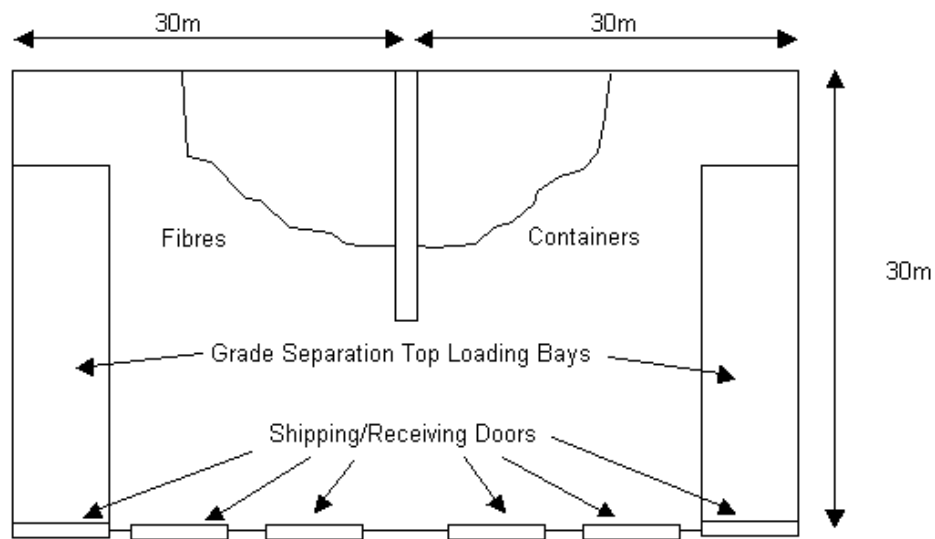
The City and County of Peterborough currently pay approximately \$90 per tonne for processing their materials. However, it should be noted that there are minimal capital costs included in the costs. As outlined above, it is not possible for the facility to continue to operate for an extended period. Discussions between the facility's operator, City and County staff and the consulting team suggested that with approximately \$30,000 per year in upgrade costs (primarily to the building, tipping floor and baler), the facility should be able to continue to process materials for another two years. After that period of time, its ability to continue to operate cost effectively is questionable as the equipment will be in need of a major overall or retrofit.

### 8.2 Shipping to Other Municipalities

In order for the City/County to consider shipping materials to another municipality, a new transfer station would be required. A preliminary design is shown in Figure 8-1 and the costs are outlined in Table 8-1. The cost estimates assume a new building on a serviced piece of property. It may be possible for the City to retrofit the existing MRF into a transfer station for less cost than outlined in Table 8-1. However, for the purposes of this examination, a new transfer station and the costs as shown are assumed.

**Figure 8-1: Peterborough Transfer Station Preliminary Design**

15,000 tpy                      Two stream recyclables  
 Blended density of 100 kg/m<sup>3</sup>      Assumes equal volumes of fibres and containers  
 Total volume = 60 tpd x 100 kg/m<sup>3</sup> = 600 m<sup>3</sup>/day  
 Total storage for fibres = 300 m<sup>3</sup> x 2 days = 600 m<sup>3</sup>  
 Total storage for containers = 300 m<sup>3</sup> x 2 days = 600 m<sup>3</sup>  
 Using a 3.5 m high push wall, with materials stored to 3m  
 Assume a 2 transfer bay facility; one for fibres, one for containers



Overall, it is estimated that a new transfer station would have a cost of approximately \$2.7 million. At an annual cost of \$270,000, monetized over 15,000 tonnes of fibres and containers, the cost per tonne is approximately \$18.

**Table 8-1: Peterborough Transfer Station Preliminary Cost Estimate**

<u>Building</u>		
Building and floor	30m x 60m @ \$800/m <sup>2</sup>	\$ 1,440,000
Mechanical/electrical room	100m <sup>2</sup> @ \$1000/m <sup>2</sup>	\$ 100,000
Truck doors	6 @ \$25000	\$ 150,000
HVAC, other equipment incl. electrical/lighting		\$ 100,000
		<u>\$ 1,790,000</u>
 <u>Immediate site works</u>		
Concrete pad at doors	10m x 60m x \$100/m <sup>2</sup>	\$ 60,000
Concrete ramp for bays		\$ 50,000
Allowance for paving		\$ 50,000
Allowance for site works (survey, soil sampling, clearing, etc.)		\$ 40,000
Allowance for stormwater management		\$ 50,000
		<u>\$ 250,000</u>
	Sub-total	\$ 2,040,000
	Unforeseen, contingencies (20%)	\$ 400,000
	Engineering, contract admin (13%)	\$ 260,000
	<b>TOTAL</b>	<b><u>\$ 2,700,000</u></b>
 Excludes scales, scalehouse, other site works		
	<b>Annualized Cost</b>	<b>\$ 270,000</b>
	<b>Annualized Cost/te</b>	<b>\$ 18</b>

Outlined in Tables 8-2 through 8-4 are three options for shipping to other municipalities.

**Table 8-2: Option #1: All Materials to Durham Region**

Quantities	
Fibres	10,500
Containers	4,500
<b>Total</b>	<b>15,000</b>

**Option #1: Ship All to Durham Region**

	Combined/Avg F&C	Fibres	Containers	Gross
Collection	\$ 130			\$ 1,950,000
Transfer Stn	\$ 18			\$ 270,000
Transferring	\$ 25			\$ 375,000
Processing	\$ 68			\$ 1,020,000
<b>Gross Cost</b>	<b>\$ 241</b>			<b>\$ 3,615,000</b>
Revenues	\$ 115			\$ 1,725,000
Admin. Costs	\$ 12			\$ 172,500
<b>Net Revenues</b>	<b>\$ 104</b>			<b>\$ 1,552,500</b>
<b>Net Costs</b>	<b>\$ 138</b>			<b>\$ 2,062,500</b>

\*Numbers may not add due to rounding

### 8.2.1 Option #1: All Materials to Durham Region

Under this option (Table 8-2), the City/County would shut down its MRF, build a new transfer station and ship all of their materials to Durham Region. Durham Region's MRF, with a capacity of 100,000 tonnes per year would have more than sufficient spare capacity to accept Peterborough's materials (i.e., the Region is expecting to utilize between 50,000 and 55,000 tpy at start-up in 2007). The Region has indicated that they would charge the City/County a gross processing fee of \$68 per tonne. In addition, the Region indicated that they would give 90% of the revenues for the mix of materials to the City/County, charging 10% of the gross revenues as an administration charge for the management of the contract, marketing materials, etc.

Therefore, combining collection costs of \$130 per tonne, with transfer station costs of \$18 per tonne, transferring/shipping costs of \$25 per tonne and gross processing costs as assigned by the Region of Durham of \$63 per tonne, the total gross cost is \$241 per tonne or approximately \$3.6 million per year.<sup>3,4</sup>

Assuming a basket of goods value of \$115 per tonne (i.e., approximate current average from the CSR Price Sheet), subtracting 10% for administration costs, the overall net revenues average \$104 per tonne. Subtracting the revenues from the total gross transfer and processing costs, the net cost is \$8 per tonne. Adding in collection costs, the net cost for Peterborough City/County is approximately \$138 per tonne or about \$2.1 million per year.

<sup>3</sup> For the purposes of these analyses, it is assumed that all options will have the same curbside collection costs of \$130 per tonne.

<sup>4</sup> The distance from Peterborough to Durham Region's facility and the distance from Peterborough to Northumberland County's facility are almost identical (<5km difference). Therefore, the same transferring/shipping costs are assigned to both options.

This is the lowest cost transfer option.

**Table 8-3: Option #1: All Materials to Durham Region**

### **8.2.2 Option #2: All Materials to Northumberland County**

Under this option, the City/County would shut down its MRF, build a new transfer station and ship all of their materials to Northumberland County. Working with Northumberland County staff, assuming that the County utilizes their funding from Stewardship Ontario for the new equipment and then assuming that the efficiency improvements are realized, the Northumberland MRF would be able to double its annual throughput (i.e., they would move back to one shift per day for their own materials leaving an entire shift per day for other municipalities' materials). Under this scenario, the County has estimated that the charge to the City/County would be \$82 per tonne. Under this option, Northumberland County would retain all revenues.

Therefore, combining collection costs of \$130 per tonne, with transfer station costs of \$18 per tonne, transferring/shipping costs of \$25 per tonne and the net processing costs as assigned by Northumberland County of \$82 per tonne, the total net cost is \$255 per tonne or approximately \$3.8 million per year.

This is the highest cost transfer option.

**Table 8-4: All Materials to Northumberland County**

Quantities	
Fibres	10,500
Containers	4,500
<b>Total</b>	<b>15,000</b>

**Option #2: Ship All to Northumberland (1)**

	Combined/Avg F&C	Fibres	Containers	Gross
Collection	\$ 130			\$ 1,950,000
Transfer Stn	\$ 18			\$ 270,000
Transferring	\$ 25			\$ 375,000
Processing	\$ 82			\$ 1,230,000
<b>Gross Cost</b>	<b>\$ 255</b>			<b>\$ 3,825,000</b>
Revenues	\$ -			\$ -
Admin. Costs	\$ -			\$ -
Net Revenues	\$ -			\$ -
<b>Net Costs</b>	<b>\$ 255</b>			<b>\$ 3,825,000</b>

\*Numbers may not add due to rounding

(1) Assumes Northumberland retrofits their facility with funding from Stewardship Ontario

### 8.2.3 Option #3: All Fibres to Durham Region; All Containers to Northumberland County or Quinte Waste Solutions

Under this option, the City/County would shut down its MRF, build a new transfer station and ship all fibres to Durham Region. A cost for fibres only was requested from Durham Region, but unfortunately a cost was not available at the time of completing this draft report. Looking at typical fibres processing costs from other programs, a gross processing fee of \$40 per tonne has been assigned. It is also assumed that Durham Region would continue to offer 90% of the revenues for the fibres to the City/County, charging 10% of the gross revenues as an administration charge for the management of the contract, marketing materials, etc.

All of the container materials would have to be transferred and shipped to either Northumberland County or Quinte Waste Solutions. Both indicated that they would accept Peterborough’s container materials at zero cost and that either municipality would cover the cost of transferring to their respective MRFs for the containers (i.e., therefore, no costs are shown under the containers column). However, both indicated that Peterborough would not be entitled to any revenues from the sale of the containers (i.e., therefore there are no revenues shown under the containers column).

Therefore, combining collection costs of \$130 per tonne, with transfer station costs of \$18 per tonne, transferring/shipping costs of \$25 per tonne for fibres only and gross processing costs estimated that would be charged by the Region of Durham of \$40 per tonne, the total gross cost is \$194 per tonne or approximately \$2.9 million per year.<sup>5,6,7</sup>

<sup>5</sup> For the purposes of these analyses, it is assumed that all options will have the same curbside collection costs of \$130 per tonne.

<sup>6</sup> The distance from Peterborough to Durham Region’s facility and the distance from Peterborough to Northumberland County’s facility are almost identical (<5km difference). Therefore, the same transferring/shipping costs are assigned to both options.

Assuming a basket of goods value of \$70 per tonne for fibres only (i.e., approximate current average from the CSR Price Sheet), subtracting 10% for administration costs, the overall net revenues average \$63 per tonne. Subtracting the revenues from the total gross transfer and processing costs, the net cost is \$19 per tonne. Adding in collection costs, the net cost for Peterborough City/County is approximately \$149 per tonne or about \$2.2 million per year.

This is the second lowest cost transferring option.

**Table 8-5: All Fibres to Durham Region; All Containers to Northumberland County or Quinte Waste Solutions**

Quantities	
Fibres	10,500
Containers	4,500
<b>Total</b>	<b>15,000</b>

**Option #3: Ship Fibres to Durham; Containers to Quinte or to Northumberland**

	Combined/Avg F&C	Fibres	Containers	Gross
Collection	\$ 130			\$ 1,950,000
Transfer Stn	\$ 18			\$ 270,000
Transferring	\$ 18	\$ 25		\$ 262,500
Processing	\$ 28	\$ 40	\$ -	\$ 420,000
<b>Gross Cost</b>	<b>\$ 194</b>			<b>\$ 2,902,500</b>
Revenues	\$ 49	\$ 70	\$ -	\$ 735,000
Admin. Costs	\$ 5	\$ 7	\$ -	\$ 73,500
<b>Net Revenues</b>	<b>\$ 44</b>			<b>\$ 661,500</b>
<b>Net Costs</b>	<b>\$ 149</b>			<b>\$ 2,241,000</b>

\*Numbers may not add due to rounding

(1) Assumes Northumberland retrofits their facility with funding from Stewardship Ontario

<sup>7</sup> The combined cost represented the weighted average of costs/revenues recognizing a zero cost for transfer and processing of containers and a zero revenue for containers, combined with the transferring and processing costs for fibres and the revenues for fibres.

## 8.2.4 Building a New Materials Recovery Facility in Peterborough

The final option that was examined was having Peterborough build a new MRF to process the City and County's materials. The cost for a 15,000 tonne per year facility is outlined in Table 8-5. The assumptions for the facility are as follows:

## 15,000 Tonnes Per Year Throughput

Material arriving - two separate streams - commingled fibres and commingled containers, set-out in rigid containers, i.e., not a bag-based program

Delivery - both streams arriving on a daily basis (i.e., either 2 compartment trucks or portion of fleet collecting fibres and portion of fleet collecting containers)

Material characteristics - mixed fibres @ 250 kg/m<sup>3</sup> loose density and mixed containers @ 70 kg/m<sup>3</sup> loose density

MRF site size	16,000 m <sup>2</sup>	
	1.6 ha	
MRF building size	2,400 m <sup>2</sup>	
MRF throughput tonnes per year	15,000 tonnes	
Operating days per year	250 dpy	
Tonnes per day	60 tpd	
Percentage containers	30%	2.8 tph
Percentage fibres	70%	6.5 tph
Shifts per day	1 shift each cons & fibres	
Effective hours per shift	6.5 hours	
Total tonnes per hour	9.2 tph	

### Major Operating Cost Elements:

**Labour:** (costs cited include full burden, i.e., benefits etc )

sorting - fibres line	6 per shift \$10/hr	8 per shift \$15/hr
sorting - containers line	7 per shift \$10/hr	9 per shift \$15/hr
baling	1 per shift \$12/hr	1 per shift \$17/hr
rolling stock	2 per shift \$14/hr	2 per shift \$18/hr
scale operator	0 per shift \$12/hr	0 per shift \$17/hr
general labour	0 per shift \$10/hr	1 per shift \$15/hr

**Other Human Resources** (costs cited include full burden, i.e., benefits etc ):

operations supervisory staff	1 per shift \$15/hr	1 per shift \$20/hr
management staff	1 per day \$25/hr	1 per day \$30/hr
maintenance staff (mechanic)	1 per shift \$22/hr	1 per shift \$25/hr

**Table 8-6: Preliminary Estimate of Costs for a 15,000 tpy MRF****Building and Equipment Capital**

tpy	Interest Rate	Term (yrs)	Total Capital		Annual Cost		\$/te		Equipment Building Land
			low	high	low	high	low	high	
15,000	6.0%	10	\$2,108,000	\$2,935,000	\$ 286,000	\$ 399,000	\$ 19.07	\$ 26.60	
15,000	6.0%	20	\$2,630,000	\$3,510,000	\$ 216,000	\$ 289,000	\$ 14.40	\$ 19.27	
15,000	6.0%	25	\$ 160,000	\$ 400,000	\$ 12,000	\$ 30,000	\$ 0.80	\$ 2.00	

**Labour**

tpy	Number of Staff		# shifts per day	@ pay rate		Annual Cost		\$/te	
	low	high		low	high	low	high	low	high
15,000	13	18	1	\$ 10	\$ 15	\$ 260,000	\$ 540,000	\$ 17.33	\$ 36.00
15,000	1	1	1	\$ 12	\$ 17	\$ 24,000	\$ 34,000	\$ 1.60	\$ 2.27
15,000	2	2	1	\$ 14	\$ 18	\$ 56,000	\$ 72,000	\$ 3.73	\$ 4.80
15,000	1	1	1	\$ 15	\$ 20	\$ 30,000	\$ 40,000	\$ 2.00	\$ 2.67
15,000	1	1	1	\$ 22	\$ 25	\$ 44,000	\$ 50,000	\$ 2.93	\$ 3.33
15,000	1	1	1	\$ 25	\$ 30	\$ 50,000	\$ 60,000	\$ 3.33	\$ 4.00
Total Labour						\$ 464,000	\$ 796,000	\$ 30.93	\$ 53.07

**Other Costs - General Operating**

tpy		Annual Cost		\$/te	
		low	high	low	high
15,000	Property Taxes	\$ 39,000	\$ 78,000	\$ 2.60	\$ 5.20
15,000	General Operating	\$ 460,000	\$ 785,000	\$ 30.67	\$ 52.33

<b>Totals</b>	<b>\$1,438,000</b>	<b>\$2,299,000</b>	<b>\$ 97.67</b>	<b>\$ 156.47</b>
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<b>Totals Without Land</b>	<b>\$1,426,000</b>	<b>\$2,269,000</b>	<b>\$ 96.87</b>	<b>\$ 154.47</b>
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It should be noted that the facility would be processing the 15,000 tonnes per year over one shift. Therefore, the overall capacity for the facility would be in excess of 30,000 tonnes per year assuming that two shifts were used. If the facility processed 30,000 tonnes per year, the overall costs would decrease by approximately \$15 to \$25 per tonne, as the capital would be better utilized.

For the purposes of this exercise, as all of the options examined herein are assuming the processing of 15,000 tonnes per year, that same quantity will be assumed for the new MRF. The costs associated with this option are outlined in Table 8-6. With the increased competition recently in the MRF Design/Build/Operate field, a cost of slightly below the midpoint of the range of costs, i.e., \$120 per tonne, has been assumed.

Assuming collection costs of \$130 per tonne and processing costs of \$120 per tonne, the new MRF would result in total collection and processing gross costs of \$250 per tonne or approximately \$3.75 million per year. Assuming that the City/County receives an average basket of goods revenue of \$115 per tonne, the overall net costs would be just \$5 for processing or with collection costs, \$135 per tonne net. This equates to an annual cost of approximately \$2 million per year.

Comparing the four options, the results are as shown in Table 8-7 (lowest to highest):

**Table 8-7: All Materials to a New MRF in Peterborough**

Quantities	
Fibres	10,500
Containers	4,500
<b>Total</b>	<b>15,000</b>

**Option #4: Peterborough MRF**

	Combined/Avg F&C	Fibres	Containers	Gross
Collection	\$ 130			\$ 1,950,000
Transfer Stn	\$ -			\$ -
Transferring	\$ -			\$ -
Processing	\$ 120			\$ 1,800,000
<b>Gross Cost</b>	<b>\$ 250</b>			<b>\$ 3,750,000</b>
Revenues	\$ 115			\$ 1,725,000
Admin. Costs	\$ -			\$ -
<b>Net Revenues</b>	<b>\$ 115</b>			<b>\$ 1,725,000</b>
<b>Net Costs</b>	<b>\$ 135</b>			<b>\$ 2,025,000</b>

\*Numbers may not add due to rounding

**Table 8-8: Summary of Options from Lowest to Highest Cost**

Option #1: New Peterborough MRF	\$135/te	\$2.025 million
Option #2: All Materials to Durham Region	\$138/te	\$2.062 million
Option #4: Fibres to Durham; Containers to Quinte Or Northumberland	\$149/te	\$2.241 million
Option #3: All Materials to Northumberland	\$255/te	\$3.825 million

At the confidence levels for the estimating of costs for this study, Options #1 and #2 are equivalent in cost. Therefore, the decision of which one to take will require the completion of an RFP process where the market prices for a new transfer station and/or a new MRF are determined. Alternatively, the City and County would have to consider other non-financial factors (e.g., loss of control, confidence in end markets, etc.) to determine the preferred option.

## 9. Conclusions and Considerations

In addition to looking at options for the City and County of Peterborough, options for Kawartha Lakes, Quinte Waste Solutions and Northumberland County were considered. Outlined below is a summary of points for consideration.

1. Initially it was thought that an east-west corridor teaming of Quinte and Northumberland County would make the most sense. However, Quinte Waste Solutions has an extremely cost effective collection contract that can be extended at the will of Quinte (no option to decline available to the contractor) through 2012. Quinte has determined, based on the results of other collection contracts that are being signed, that it will be in their best interest to continue with the same collection system. As such there is no cost benefit to moving to single stream collection and sending materials to Northumberland County's facility to increase its throughput (Northumberland's processing costs are higher than Quinte's).
2. As Northumberland County collects all materials in a single stream, it is not possible for Quinte Waste Solutions to process their materials. Quinte Waste Solutions is looking at building a new facility sometime within the next three years (approximately). Because of the collection contract, they will not be considering a single stream system. However, they will be considering a two stream processing system. This is because of the improvements in two stream processing technologies and the fact that up to 50% of the glass could be removed from the system through the LCBO deposit-return system which would make the management of the rest of the glass in the containers stream less of an issue (e.g., maintenance, sorter requirements, total value, etc.). In order for there to be an opportunity for regionalization of the materials along the Quinte-Northumberland corridor, one of the two programs would have to change to single or two stream collection respectively. This will not likely occur within the next five years.
3. Kawartha Lakes does not have their own facility, nor have they expressed an interest in building a new facility. With Durham Region having a new, highly cost effective two stream facility combined with the fact that Kawartha Lakes currently sends their fibres to Metro Waste Paper Recovery in Toronto for processing, it is likely that the fibres, at a minimum will end up being processed at Durham's new facility. It would be cost beneficial, considering the price offered to the City/County of Peterborough for their combined fibres and containers, for Kawartha Lakes to seek a price from Durham for all materials.
4. Durham Region has a facility with a capacity of up to 100,000 tonnes per year, but will only be using approximately 50-55,000 tonnes of that capacity in the first year. Therefore, there is capacity available to the marketplace. To best utilize a second shift, it would be most advantageous to have as many tonnes as possible to reach the full capacity of the MRF (or pay a penalty for half shift sorters, etc.). Durham would have capacity for both Peterborough and Kawartha Lakes for a minimum of the next five years whereupon they may need the capacity for their own use. This is a very viable alternative to regionalize the three municipalities.

5. There is one additional regionalization opportunity in about five years. At this time, the Northumberland County MRF is quite old, and it may make the most sense to develop a new facility. Peterborough City and County need time to get County Council approval for their proposed new facility site (across from the Bensfort Road Landfill). Peterborough City and County will need time to work through all of the required levels of approvals (City/County Waste Management Committee, City Council, County Council and Township Council as it relates to zoning amendments) for their proposed new facility site (within the property known as the Peterborough County/City Waste Management Facility). As such, adding the approvals time (up to 12 months) with the RFP and facility building time of approximately 18 to 24 months, seeking a new facility in three to five years would fit well with Durham's need for its own capacity (point 4 above). In the interim, Peterborough, Kawartha Lakes and Northumberland County should consider evaluating the opportunity of building a combined facility to serve the three municipalities. This facility could also serve areas to the north of Peterborough County.

This would make the most economic sense if Northumberland County decided not to proceed with the retrofit at this time. Otherwise, with their facility's upgrades, the benefit of regionalizing operations may not be as apparent. However, as this study shows, there is little opportunity to increase the quantity of material going to Northumberland County in the short or medium term such that investing in the retrofit may not be the best approach for the County in the long term considering other factors, e.g., labour rates.

6. In January 2007, it was announced that a new MRF in the National Grocer's building, that could process more than 100,000 tpy of single stream recyclables was going to be developed by Courtice Auto Wreckers (Skip Ambrose). This facility would have sufficient capacity for all materials from all municipalities party to this regionalization study. At the time of the completion of this study, the facility was moving forward with obtaining the necessary approvals and purchasing and installing sorting equipment. At this time, however, the cost for processing materials is not known.

Overall there are minimal opportunities to regionalize the operations of the facilities at this time, with the exception of materials from Peterborough and the fibres from Kawartha Lakes being processed by Durham's new facility. Other contractual benefits precludes other opportunities at this time. This does not mean that regionalization should be discounted in the future. As described in the final paragraph under point 5 above, it may make sense for Peterborough to only ship materials to Durham's facility for the next five to seven years. Within seven years Durham will need the additional capacity such that it may not be available to the others. Therefore, other arrangements would have to be made anyhow.

Working with Northumberland County and Kawartha Lakes, Peterborough could establish one larger (upwards of 50,000 tpy) MRF to process materials from the three area municipalities (location would have to be determined and it is not presumed to be in Peterborough). It is recommended that the group continue to meet to investigate this opportunity and to ensure that processing contracts, obligations are coordinated such that the timing of the new facility could best benefit the combined group.

Quinte is looking to "regionalize" to the east. If that occurs, there would be no benefit to them being part of the ongoing work for a regional facility in the Kawartha Lakes, Peterborough,

Northumberland triangle. However, should their regionalization plans not proceed, then they should consider working with the other municipalities.