

# *Final Report*

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## **CIF 124: City of Stratford Multi-residential Program Enhancement Project**

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Prepared for: Continuous Improvement Fund  
Prepared by: 2cg Waste Management Consulting Services  
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The report has been prepared by:  
2cg Waste Management Consulting Services,  
451 Ferndale Avenue, London, Ont. N6C 2Z2  
Paul van der Werf Tel: 519-645-7733  
Email: paulv@2cg.ca

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## Appendix 1 - Data Collection Form

## **Executive Overview**

### **E1.0 Introduction**

Previous work completed under Stewardship Ontario Effectiveness & Efficiency Program, E&E Project #76, focused on developing revised communications material for the City of Stratford's (City) recycling program. During this project the need to upgrade multi-residential recycling was identified. This current project focused on Stratford's multi-residential recycling program. Waste Diversion Ontario's (WDO) Continuous Improvement Fund (CIF) provided funding for the project. 2cg Waste Management Consultant Services was contracted to assist Stratford staff in completing this project. The Project took place between April 2009 and July 2010.

This project had 3 main components:

1. Recycling program review, and baseline monitoring:
  - Inventory of recycling carts
  - Assessment of recycling performance (i.e., estimate of how much is being recycled)
  - Assessment of barriers (i.e., review of factors that may be prohibiting increased recycling performance)
2. Implementation of recycling program upgrades:
  - Add new recycling carts and re-label all carts
  - Provide residents with in-unit mini Blue Boxes
  - Develop & delivery new promotion & education printed materials to all residents and buildings
3. Post-implementation monitoring
  - Inventory of recycling carts
  - Assessment of recycling performance
  - Assessment of barriers

### **E2.0 Background**

The City of Stratford, with a population of about 30,500, has approximately 79 multi-residential buildings (i.e. 6 units or greater) with approximately 3,452 units (unit numbers are from the 2009 Datacall) and includes multi-residential buildings and townhouses (townhouses have curbside Blue Box collection). There are 10,131 curbside households for a total of 13,583 households; multi-residential representing about 1/3 of all households.

Stratford operates a multi-stream recycling program, and as a result, buildings, even smaller ones, need up to five carts to capture the streams separately. The City estimated that there were 342 recycling carts at multi-residential buildings at the start of this project. A contractor (Brian Leyser Recycling) services multi-residential buildings recycling carts as well as recyclables from the commercial sector on the same route.

### **E3.0 Baseline & Post Implementation Monitoring**

Baseline (June 2009) and post-implementation (June 2010) monitoring was completed at all buildings. Recycling in each building was examined to assess:

- Inventory of carts including volume and condition;
- Assessment of recycling performance; and
- Assessment of barriers to recycling.

The following **Performance** based information was collected:

- Number and type of carts;
- Cart fullness (empty,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , Full);
- Any visible overflow, contamination or stream mixing;
- Presence of cardboard; and
- Any barriers to recycling.

The following **Barriers** based information was collected:

- Condition of labels on carts;
- Distance between building and carts;
- Recycling capacity for high volume recyclables (i.e. paper, plastic);
- Recycling capacity at large buildings/complexes;
- Presence of recycling signage/information; and
- Cardboard/boxboard recycling opportunity.

### **E4.0 Program Enhancements**

Program enhancements were implemented after the completion of baseline monitoring. A total of 73 carts were delivered to buildings in November and December 2009. Approximately 9 buildings received carts that previously had none. Approximately 14 buildings received additional carts or had broken carts replaced.

Approximately 75% of apartment units received 3 gallon in-unit Blue Boxes, along with a letter from the City and a flyer describing the upgrades to the multi-residential recycling program. Promotional posters were also delivered to superintendents at this time.

Stickers were purchased to re-label recycling carts.

## E5.0 Project Results

Table 3.1 presents an overview of baseline and post-implementation recycling capacity

Table 3.1: Baseline and Post-implementation recycling capacity

79 buildings (60 collection points <sup>1</sup> ) 2,358 units	Paper carts <sup>2</sup>	Container Carts <sup>2</sup>	Volume – litres	Capacity litres/unit <sup>3</sup>	Capacity units/cart <sup>4</sup>
Baseline - June 2009	54	181	67,080	28	10:1
Post-Implementation June 2010	64	228	78,840	33	8:1
% Change	19%	26%	18%	18%	-20%
<b>Recommended Best Practices</b>				<b>50 litres/unit</b>	<b>7:1</b>

Table 3.1 Notes:

1. Collection points are fewer than buildings as some buildings are clustered and share a collection point
2. Paper & container carts were roll-out carts, either 240 litres (65 gallons) or 360 litres (95 gallons) in size
3. Capacity per unit is a measure of how much space is available to residents to recycle, CIF Best Practices ratio recommends a minimum of 50 litres per unit
4. The recommended Units:Cart ratio is 7 units to every 1 carts (7:1)

Previous E&E projects has found that increasing capacity has a positive impact on increasing recycling, particularly when the capacity levels are below the recommended best practices levels of 50 litres per units. Data for the actual tonnes recycled from the multi-residential buildings, is not known as recyclables from buildings are collected on the same routes as curbside households. As a result, tonnes collected were estimated. To determine the amount recycled, visual audits were completed at all buildings. Quantities were estimated based on cart fullness and density factors for the difference materials. The estimated quantities recycled are shown in Table 3.2, below.

Table 3.2: Estimated quantities recycled, before and after project implementation

	Baseline June 2009 <sup>1</sup>	Post- implementation June 2010 <sup>1</sup>	Percent Change
Estimated recycled kg/unit/year	42	53	24%
Total of all Blue Box materials <sup>2</sup>	180	180	
Recycling rate <sup>3</sup>	23%	29%	24%

Table 3.2 Notes:

1. Baseline & post-implementation data are based estimated quantities from visual inspections of carts
2. This is the estimated generation rate and it is based on findings from other Ontario municipalities from Stewardship Ontario Waste Audits completed at seven municipalities in Ontario. The range of generation rates was 180 to 300 kg per unit per year and the average was 212 kg/unit/year. As a smaller municipality, the lower end of the range was used for Stratford.

The data reported in Table 3.2 above, indicates a positive result for this project. When compared with partial data of Stratford's total Blue Box materials collected between 2009 and 2010, that indicate a general downward trend in total tonnage, the results for this project look even more positive. Table 3.3 shows all tonnes collected from Stratford's Blue Box program, including the multi-residential tonnes, for the first quarter periods of 2009 and 2010. It shows there was an 8% decrease of recyclables collected between the two years.

Table 3.2: Total Blue Box Tonnes, Multi-res and Curbside

	2009	2010	Percent Change
January	242	205	-15%
February	202	171	-15%
March	222	228	3%
April	226	218	-4%
<b>Total</b>	<b>892</b>	<b>822</b>	<b>-8%</b>

Table 3.3: Total Program Tonnes compared to estimated Multi-res recycling rates

	2009	2010	Percent change	Notes
January	242 te	205 te	-15%	All municipal Blue Box tonnes – curbside + Multi-res
February	202 te	171 te	-15%	
March	222 te	228 te	3%	
April	226 te	218 te	-4%	
June	42 kg/unit/year	53 kg/unit/year	24%	Multi-res only estimated kg/unit/yr

Cart fullness, contamination and stream mixing showed a general decrease after program implementation.

Barriers to recycling were addressed by purchasing new stickers for carts, delivering additional carts to increase capacity and replace broken carts, delivering flyers and posters containing recycling information and supplying residents with in-unit Blue Boxes to make recycling more convenient.

#### E5.0 Recommendations

It is **recommended** that the further capacity for recycling be provided, with a goal of reaching the recommended best practice level of 50 litres per unit.

It is **recommended** that the remaining 25% of multi-residential units receive in-unit Blue Boxes to facilitate recycling.

It is **recommended** that carts for glass be used for another recycling stream and that large Blue Boxes (approx. 25 gallon) be placed at buildings for collection of glass. This will also help to improve the capacity available for other recycling streams (paper and plastics).

It is **recommended** that Stratford provide P&E materials to residents and building staff and managers on a regular basis.

It is **recommended** that the multi-residential database of contact information and cart inventory continue to be updated on a regular basis.

It is **recommended** that the upgraded multi-residential recycling program continue to be monitored on a regular basis and changes in recycling volume be documented.



It is **recommended** that when the City's recycling contract comes up for renewal, the following be considered:

- that cardboard and boxboard be added to the City's recycling program and collection contract and the corresponding infrastructure (i.e. OCC carts/bins) be put into place.
- that the City consider switching to a 2-stream recycling system

## **1.0 Introduction**

As with other municipalities, municipal recycling efforts have been focused on single family homes and less so on multi-residential recycling. As a result there is often little quantitative data available on current collection capacity, tonnes collected, capture rate and overall current system costs.

E&E Project #76 focused on developing revised communications material for the City of Stratford's recycling program. During this project the need to upgrade multi-residential recycling was identified.

The City would like to upgrade its multi-residential recycling program and to move the capture rate closer to the 60% target. They applied for and received funding from the Continuous Improvement Fund (CIF).

This approved project had 3 main components:

1. Recycling program review including an inventory of infrastructure and assessment of recycling performance and barriers;
2. Implementation of recycling program upgrades; and
3. Program tracking and post-implementation monitoring.

The project outcomes were increased recycling capacity through the addition of carts, increased convenience for recycling by providing in-unit Blue Boxes and tracking of changes in volume of recyclables collected.

### **1.1 Background**

The City conducted initial data collection and estimates were utilized for the CIF proposal. This data was refined during this project.

The City of Stratford, with a population of about 30,500, has approximately 79 multi-residential buildings with approximately 3,252 units (unit numbers are from the 2008 Datacall) and includes multi-residential buildings and townhouses (townhouses have curbside Blue Box collection).

A contractor (Brian Leyser Recycling) services multi-residential buildings recycling carts as well as recyclables from the commercial sector on the same route. Recyclables are collected in five separate streams. Table 1.1 depicts these streams as well as the estimated number of carts in service by stream. Multi-residential buildings have up to

five carts. The City estimated that there were 342 recycling carts at multi-residential buildings at the start of this project.

Table 1.1. Recyclable Streams and Carts in Service

Streams	Number of Carts
Paper (Old newspaper (ONP) and magazines)	83
Clear Glass	65
Coloured Glass	61
Plastics	58
Metal (steel and aluminum cans)	75
	342

The carts are an unknown mix of 240 litre and 360 litre carts. Using 300 litres as an average it is estimated that there is about 102,600 litres of recycling capacity or about 32 litres per multi-residential unit. On this basis there is approximately one cart per 9.5 units.

There is presently no provision for the collection of old cardboard and fine paper. Fine paper is typically mixed with the newspaper and magazines and is not separated.

It should be noted that cart numbers are out of date (approximately from 2000) and carts have been added and removed on a regular basis. During this project, the entire multi-residential recycling program database was updated.

## **2.0 Methods**

### **2.1 Recycling Program Review**

The current recycling in each multi-residential building was examined to assess:

- Inventory of carts including volume and condition;
- Assessment of recycling performance; and
- Assessment of barriers to recycling.

Recycling data from each multi-residential building was collected through one visit to each building in June 2009. 2cg personnel rode in the City contractor's recycling vehicle (Photo 1) and collected the information for approximately 1/3 of the buildings. The remainder of the buildings were visited independently by the City and 2cg personnel in a City pick-up truck. Baseline data was collected to establish a recycling average for each building.



**Photo 1. Brian Leyser Recycling Collection Vehicle**

The following **Performance** based information was collected on the collection day or one day prior:

- Number and type of carts;
- Cart fullness (empty,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , Full);
- Any visible overflow, contamination or stream mixing;
- Presence of cardboard; and
- Any barriers to recycling.

The following **Barriers** based information was collected on the collection day or one day prior:

- Condition of labels on carts;
- Distance between building and carts;
- Recycling capacity for high volume recyclables (i.e. paper, plastic);
- Recycling capacity at large buildings/complexes;
- Presence of recycling signage/information; and
- Cardboard/boxboard recycling opportunity.

Table 2.1 in Appendix 1 depicts the data collection sheet.

Where possible, contact information was also collected for each building. This information was used to compile a database for future projects and recycling information dissemination. Superintendents were contacted at some of the buildings and interviewed about the recycling program, problems/barriers to recycling and P&E material.

## 2.2 Implementation of Recycling Program Upgrades

Seventy three carts were delivered to buildings in November and December 2009.

Small in-unit Blue Boxes were purchased and delivered to approximately 75% of apartment units in February and March 2010, along with a letter from the City and a flyer describing the upgrades to the multi-residential recycling program.

Stickers were purchased to re-label recycling carts.

## 2.3 Program tracking and Post-implementation Monitoring

The same **performance** based information was collected during post-implementation monitoring as for baseline data collection. Recycling data from each multi-residential building was collected through one visit to each building in April 2010. 2cg personnel rode in the City contractor's recycling vehicle and collected the information for approximately 1/3 of the buildings. The City and 2cg personnel in a City pick-up truck visited the remainder of the buildings independently. Post-implementation data was collected to determine if improvements to the recycling program have increased recycling rate.

## 3.0 Results

### 3.1 Recycling Program Review

During baseline data collection, all 79 multi-residential buildings (with more than 6 units) were counted with an approximate total of 2,358 units. These buildings represent 60 collection points. This is less than the total number of buildings because approximately 33 of the buildings are part of a number of complexes, each with one collection point (Photo 4). There was an inventory of 235 carts at these collection points.



**Photo 4. Collection Point for Multiple Buildings**

### 3.1.1 Inventory of Carts Including Volume and Condition

Table 3.1 presents an overview of recycling capacity during baseline monitoring.

**Table 3.1 Baseline Recycling Capacity**

Total Buildings	Total Units	Total Carts at 60 CP	Paper	Container	Volume	Capacity	Units/Cart
			#	#	L	Litre/unit	capacity
79	2,358	235	54	181	67,080	28	10

The majority of collection points have 5 carts, one for each recycling stream (Photo 5). Some buildings only have 2 carts and supplement their recycling with Blue Boxes (Photo 6), while 11 buildings/complexes were identified as multi-residential buildings that had no recycling carts.



**Photo 5. Five Stream Recycling Carts**



**Photo 6. Carts Supplemented with Blue Boxes**

Carts are a mixture of 240L and 360L sizes. Seven buildings also have a total of 12 carts with a volume of 120L that are mainly used to collect clear and colored glass.

Numerous carts have cracks, broken handles and/or missing lids. It was **recommended** that these carts be replaced.

Overall system capacity is 67,080 litres (67.1 m<sup>3</sup>). This capacity is substantially lower than the capacity estimated by the City at 102,600 litres. The actual inventory of carts was considerably lower than initial City estimates (approximately 107 carts less). Less carts, as well as smaller carts (more 240L carts than 360L carts) contributed to this discrepancy in capacity.

System capacity of 67,080 litres is equivalent to 29 litres per unit which is substantially lower than the CIF recommendation of 50 litres per unit.

### 3.1.2 Baseline Assessment of Recycling Performance

#### Fullness

Fullness of each recycling cart was documented during baseline data collection (Photo 7 and 8). Table 3.2 depicts these results. Average fullness for paper and plastic carts was 70%. Approximately 81% of paper carts were over 50% full, with 60% of carts being over 75% full. Similarly, approximately 81% of carts were over 50% full, with 74% of carts being over 75% full. Approximately 60% of metal carts were over 50% full. Clear and colored glass carts contained very little glass. Actual glass content is likely even lower, as fullness was based on cart fullness and these two carts often included other recyclables.



Photo 7. Paper Cart 100% Full



Photo 8. Metal Cart 75% Full

Table 3.2 Overall Average of Recycling Cart Fullness

Fullness (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
70	70	45	30	20

Cart fullness depended somewhat on building type and demographics. Larger buildings, as well as higher income housing and buildings with seniors had much higher recycling rates for paper and plastic than lower income housing. Noteworthy is that collection points servicing multiple buildings had very few carts that were at capacity. However, many recyclables were observed in the garbage bins next to the recycling carts.

#### Contamination

Contamination (containing any non-recyclable materials) was assessed (Photo 9). Table 3.3 depicts these results. Contamination in paper carts consisted mainly of cardboard/boxboard, which is not collected at most collection points in the multi-residential recycling program. Contamination in plastic carts consisted of plastic packaging and rigid non-recyclable plastics (e.g. Tupperware).



**Photo 9. Contamination (paper cups, plastic bag)**

Contamination in paper carts was higher in higher income housing areas, likely because residents would like to recycle OCC/OBB. Contamination in plastic carts was higher in lower income housing areas.

**Table 3.3 Percentage of Recycling Carts with Contamination**

Contamination (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
19	17	2	2	3

***Stream Mixing***

Stream mixing in recycling carts was assessed (Photo 10). Table 3.4 depicts these results. Relatively few paper, plastic and metal carts showed stream mixing. Clear and colored glass contained high amounts of stream mixing, likely due to capacity issues with plastic recycling. These carts were often used for overflow of plastic and/or metal recyclables. Labels on recycling carts were very degraded, which often leads to stream mixing (residents unsure which cart is for which stream), however, numerous carts had home-made labels affixed to them or written directly on the lid.



**Photo 10. Stream Mixing**



**Table 3.4 Percentage of Recycling Carts with Stream Mixing**

Mixing (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
4	0	8	30	53

Overflow

Overflow of recycling carts was assessed (Photo 11). Table 3.5 depicts these results. Plastic carts had the most overflow due to insufficient capacity. Clear and colored glass carts did not overflow due to glass content but often contained plastic overflow (i.e. stream mixing). In the case where glass carts overflowed, they included significant stream mixing. The contractor indicated they would not collect these bins until this issue is resolved.



**Photo 11. Plastic Overflow in Garbage Bag**

**Table 3.5 Percentage of Recycling Carts with Overflow**

Overflow (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
2	13	0	0	0

It was **recommended** that extra plastic carts be delivered to buildings that routinely have issues with plastics recycling capacity.

Presence of Cardboard/Boxboard

Approximately 10% of collection points had some form of cardboard/boxboard (OCC/OBB) recycling infrastructure. Four buildings have an OCC bin (Photo 12). A number of collection points store cardboard in Blue Boxes or bundled beside the paper cart (Photo 13). Pickup of loose OCC/OBB seems to depend on the collection vehicle servicing these buildings.



Photo 12. Cardboard Bin beside Waste Bin



Photo 13. Boxboard in Blue Boxes

### 3.1.3 Barriers to Recycling

Barriers to recycling are any issues that make it inconvenient or difficult for tenants to recycle properly. Most buildings had some barriers to recycling. The most common barriers included:

- Degraded labels on carts (Photo 14) (resulting in stream mixing and contamination);
- Large distance between building and carts (Photo 15);
- Limited capacity for specific recyclables (i.e. plastic, paper);
- Insufficient recycling capacity for large buildings or building complexes (i.e. insufficient collection points);
- No or very little recycling signage/information; and
- No cardboard/boxboard recycling opportunity at many buildings.



Photo 14. Degraded Label on Cart



Photo 15. Distance between Building and Recycling Collection Point

### **3.1.4 Recommendations**

After the initial review of the multi-residential recycling program and baseline data collection, the following recommendations were made:

There is a considerable mix of recycling cart sizes in service in the City's recycling program. It was **recommended** that uniform carts be purchased and delivered to buildings to replace cracked or broken carts, as well as carts that do not provide enough capacity.

It was **recommended** that plastic and/or paper recycling capacity be increased (additional carts) in buildings that routinely have issues with recycling capacity for these streams.

There is very little colored glass being recycled. It was **recommended** that carts for colored glass be removed or used for another recycling stream. If removal of colored glass recycling is not an option, it was **recommended** that smaller carts or Blue Boxes be used.

It was **recommended** that new P&E material be delivered to multi-residential buildings, as well as affixing new stickers to all recycling carts to facilitate improved recycling (i.e. decrease stream mixing and contamination).

It is **recommended** that cardboard/boxboard material be added to the City's recycling program and the corresponding infrastructure (i.e. OCC carts/bins) be put into place.

## **3.2 Implementation of Recycling Upgrades**

### **3.2.1 Cart Delivery**

A total of 73 carts were delivered to buildings in November and December 2009. Approximately 9 buildings received carts that previously had none. Approximately 14 buildings received additional carts or had broken carts replaced.

### **3.2.2 In-unit Blue boxes and P&E Material**

Approximately 75% of apartment units received 3 gallon in-unit Blue Boxes, along with a letter from the City and a flyer describing the upgrades to the multi-residential recycling program. 2cg and City staff delivered the Blue Boxes over 4 days in February and March 2010 (Photos 16 and 17). Promotional posters were also delivered to superintendents at this time.



**Photo 16. Blue Box Delivery**



**Photo 17. Blue Boxes placed outside apartments**

The flyer that was distributed is shown below.

**Do not recycle**

**PLASTIC**  
Toys  
Makeup jars  
Caulking tubes  
Plastic food wrap  
Garden products bags  
Drinking cups  
Motor oil jugs  
Plant trays and flower pots  
Styrofoam cups  
Dishes and egg cartons (polystyrene or Styro-foam)

**GLASS**  
Drinking glasses, dishes  
Cups, crystal  
Window glass  
Light bulbs  
Mirrors  
Pottery  
Pots and pans  
Makeup containers

**PAPER/FIBRE**  
Tissues  
Waxed paper  
Foil gift wrap  
Waxed cardboard  
Foil wrapping paper  
Ice cream cartons  
Chip bags

**METAL**  
Food-contaminated foil  
Coat hangers  
Pots  
Batteries

**Stratford Recycles**

Take a moment to sort and recycle. Every time you place materials in your recycling container you accomplish at least three good deeds for the day. First, you are diverting waste from the landfill, and thus extending its life. Second, you are ensuring materials such as aluminum and paper that have many lives, can be used and reused to their fullest. And third, you are helping to save money.

**THINK BLUE LIVE GREEN**

**Drop Everything!**  
All that stuff that isn't garbage, and doesn't go in your blue recycling bin, can now be dropped off at convenient collection depots, for reuse, recycling or responsible disposal:  
• Leftover paint and solvents, empty oil containers and used oil filters, antifreeze, propane tanks, fertilizers and pesticides, non-rechargeable batteries, televisions, computers and peripherals, fax machines and printers.  
Do your bit to keep our communities livable. Learn more at the website hosted by Stewardship Ontario and Ontario Electronic Stewardship:  
[dowhatyoucan.ca](http://dowhatyoucan.ca)

**RECYCLING MOMENTS: A CHANCE Encounter**

**RECYCLE OFTEN**

**Your Guide To Recycling.**

The project has been delivered with the assistance of Waste Diversion Ontario's Continuous Improvement Fund, financed by Ontario municipalities and stewards of blue bin waste in Ontario.

Printed on 100% recycled paper.

## Stratford's Recycling Guide.

Cans	Fibres	Plastic Containers	Clear Glass	Coloured Glass
<p><b>Stream 1: Cans</b></p> <ul style="list-style-type: none"> <li>Jar lids</li> <li>Soft drink cans</li> </ul>	<p><b>Stream 2: Fibres</b></p> <ul style="list-style-type: none"> <li>Newspaper and flyers</li> <li>Telephone books</li> <li>Hand and soft cover books (remove covers)</li> <li>Paper gift wrap/greeting cards</li> <li>Clean paper shopping bags or paper packaging</li> </ul>	<p><b>Stream 3: Plastic Containers</b></p> <ul style="list-style-type: none"> <li>Plastic bottles, jars and jugs</li> <li>Plastic egg cartons</li> <li>Jar lids (plastic)</li> <li>Bakery and take out plastics</li> </ul>	<p><b>Stream 4: Clear Glass</b></p> <ul style="list-style-type: none"> <li>Glass bottles and jars for food and drink</li> </ul>	<p><b>Stream 5: Coloured Glass</b></p> <ul style="list-style-type: none"> <li>Glass bottles and jars for food and drink</li> </ul>
<p>Aluminum &amp; Metal Food Cans</p> <p>Aluminum Trays, Pie Plates &amp; Foil</p>	<p>Newspapers, Magazines &amp; Catalogues</p> <p>Household Paper</p>	<p>Detergent Bottles, Tubs &amp; Pails</p> <p>Plastic Bottles &amp; Containers</p> <p>Margarine, Yogurt &amp; Ice Cream Tubs</p>	<p>Clear Glass Food &amp; Drink</p> <p>Clear Glass Bowls &amp; Canning Jars</p>	<p>Coloured Glass Jars/Bottles</p>

Need More Information? Call 519-271-0250 ext. 279 or visit [www.city.stratford.on.ca](http://www.city.stratford.on.ca)

### 3.2.3 Stickers

Stickers were purchased to re-label recycling carts. Some stickers were applied to carts, however, upon inspection a few days later, these stickers had started to disintegrate and peel off. The stickers were not appropriate for outdoor use.

New stickers have been ordered. These will be affixed to carts during the summer of 2010. Additional funding was provided by CIF for the purchase of new stickers.

### 3.3 Post-implementation Monitoring

#### 3.3.1 Inventory of Carts Including Volume and Condition

Table 3.6 presents an overview of recycling capacity during post-implementation monitoring.

**Table 3.6 Baseline Recycling Capacity**

Total Buildings	Total Units	Total Carts at 60 CP	Paper	Container	Volume	Capacity	Units/Cart
			#	#	L	Litre/unit	capacity
79	2,358	292	64	228	78,840	33	8

The majority of collection points now have 4-5 carts, one for each recycling stream. Some buildings still supplement their recycling with Blue Boxes due to a lack of space for additional recycling carts. Two buildings did not want recycling carts.

All new carts that were delivered are 240L. There is still a mix of 240L and 360L carts used for multi-residential recycling.

The majority of carts that had cracks, broken handles and/or missing lids were replaced.

Overall system capacity increased from 67,080 litres to 78,840 litres (78.8 m<sup>3</sup>). The actual inventory of carts is now 292 (up from 235).

There has been an increase from 28 litres per unit to 33 litres per unit of recycling capacity.

### 3.3.2 Assessment of Recycling Performance

Table 3.7: Estimated quantities recycled, before and after project implementation

	Baseline June 2009 <sup>1</sup>	Post- implementation June 2010 <sup>1</sup>	Percent Change
Total litres of recyclables <sup>2</sup>	36,070	44,585	
Estimate of total full carts (i.e. tonnes) <sup>3</sup>	100	124	
Total units	2,358	2,358	
Estimated recycled kg/unit/year <sup>4</sup>	42	53	24%
Total of all Blue Box materials <sup>5</sup>	180	180	
Recycling rate <sup>6</sup>	23%	29%	24%

Table 3.7 Notes:

1. Baseline & post-implementation data are based estimated quantities from visual inspections of carts
2. Sum of all full and part full carts observed converted to total volume in litres
3. Total litres is converted into equivalent 360 litres carts (eg: 36,070 litres/360 litres = 100 carts). It is estimated that one 360 litres cart collects 1 tonne per year, so 100 full carts is approximately 100 tonnes collected per year.
4. Total tonnes is divided by number of units to determine kg/unit/year – this is an estimate based on one set of visual inspections.
5. This is the estimated generation rate and it is based on findings from other Ontario municipalities from Stewardship Ontario Waste Audits completed at seven municipalities in Ontario. The range of generation rates was 180 to 300 kg per unit per year and the average was 212 kg/unit/year. As a smaller municipality, the lower end of the range was used for Stratford.

The data reported in Table 3.7 above, indicates a positive result for this project. When compared with partial data of Stratford’s total Blue Box materials collected between 2009 and 2010, that indicate a general downward trend in total tonnage, the results for this project look even more positive. Table 3.8 shows all tonnes collected from Stratford’s Blue Box program, including the multi-residential tonnes, for the first quarter periods of 2009 and 2010. It shows there was an 8% decrease of recyclables collected between the two years.

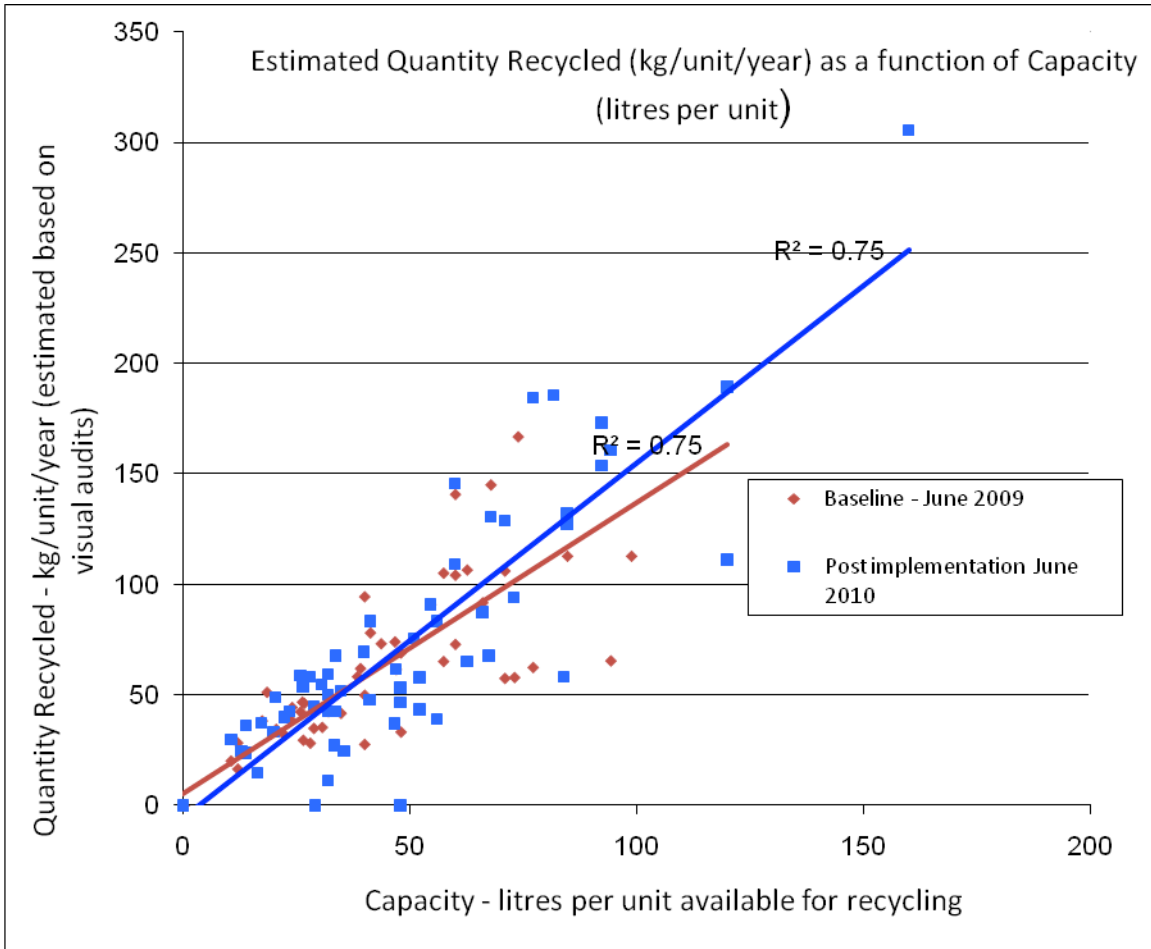
Table 3.8: Total Blue Box Tonnes, Multi-res and Curbside

	2009	2010	Percent Change
January	242	205	-15%
February	202	171	-15%
March	222	228	3%
April	226	218	-4%
Total	892	822	-8%

Table 3.7 above indicates that the project enhancements had a positive impact on recycling performance. Between baseline and post-implementation results there is a 24% estimated increase in recyclables being collected. Because the data is based on visual audits and not actual weigh scale data it is recommended that similar such visual audit be conducted on a routine basis to gauge overall recycling performance within the multi-residential program.

The main project enhancements were: increase the number of recycling carts, provide in-unit containers to residents, and provide P&E printed materials to residents. Graph 1, below illustrates a strong correlation between the number of carts (capacity) at a building and the recycling rate. The R squared coefficient is  $R=0.75$ , which indicates a strong correlation. This result has been indicated in previous E&E projects which have found a correlation between recycling capacity and recycling rates E&E 301 (waste audit analysis) and E&E 197 (London)





**Fullness**

Fullness of each recycling cart was documented during post-implementation data collection. Table 3.8 depicts these results. Average fullness for paper and plastic carts was 70%. Approximately 88% of paper carts were over 50% full, with 69% of carts being over 75% full. Similarly, approximately 83% of plastic carts were over 50% full, with 70% of carts being over 75% full. Approximately 59% of metal carts were over 50% full. Clear and colored glass carts contained low amounts of glass. Actual glass content is likely even lower, as fullness was based on cart fullness and these two carts often included other recyclables.

**Table 3.8 Overall Average of Recycling Cart Fullness Post-implementation**

Fullness (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
70	70	50	30	20

Post-implementation monitoring revealed that overall average cart fullness did not change from baseline data collection. However, the percentage of paper carts over 50% full and 75% full increased by 7% and 9% respectively. Plastic carts over 50% full increased by 3% while plastic carts over 75% full decreased by 4%. Metal carts over 50% full increased by 1%.

Contamination

Contamination (containing any non-recyclable materials) was assessed. Table 3.9 depicts these results. Contamination in paper carts consisted mainly of cardboard/boxboard, which is not collected at most collection points in the multi-residential recycling program. Contamination in plastic carts consisted of plastic packaging and rigid non-recyclable plastics (e.g. Tupperware).

**Table 3.9 Percentage of Recycling Carts with Contamination**

Contamination (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
27	11	0	8	2

Post-implementation monitoring showed an increase in paper contamination of 8%, a decrease in plastic and metal contamination of 6% and 2% respectively, an increase in clear glass contamination of 6% and a decrease in colored glass contamination of 1%.

Stream Mixing

Stream mixing in recycling carts was assessed. Table 3.10 depicts these results. Relatively few paper, plastic and metal carts showed stream mixing. Clear and colored glass contained high amounts of stream mixing, likely due to capacity issues with plastic recycling. These carts were often used for overflow of plastic and/or metal recyclables. New labels had not been placed on recycling carts.

**Table 3.10 Percentage of Recycling Carts with Stream Mixing**

Mixing (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
0	3	5	22	48

Post-implementation monitoring showed a decrease in paper mixing of 4%, an increase in plastic mixing of 3% and decreases in metal, clear and colored glass mixing of 5%, 8% and 5% respectively.

Overflow

Overflow of recycling carts was assessed. Table 3.11 depicts these results. Plastic carts still had the most overflow due to insufficient capacity, however, the percentage of

overflow decreased from 13% to 8% of carts. Clear and colored glass carts did not overflow due to glass content but often contained plastic overflow (i.e. stream mixing). In the cases where glass carts overflowed, they included significant stream mixing. The contractor indicated they would not collect these bins until this issue is resolved.

**Table 3.11 Percentage of Recycling Carts with Overflow**

Overflow (%)				
Paper	Plastic	Metal	Clear Glass	Colored Glass
2	8	0	0	0

Extra plastic carts were delivered to buildings that routinely had issues with plastics recycling capacity. Post-implementation monitoring showed no change in plastic, metal, clear and colored glass overflow. Plastic overflow decreased by 5%.

*Presence of Cardboard/Boxboard*

Approximately 10% of collection points had some form of cardboard/boxboard (OCC/OBB) recycling infrastructure. Four buildings have an OCC bin. A number of collection points still store cardboard in Blue Boxes or bundled beside the paper cart. Pickup of loose OCC/OBB seems to depend on the collection vehicle servicing these buildings.

**3.3.3 Barriers to Recycling**

Some of the barriers to recycling that were identified during baseline data collection (see Section 3.1.3) were addressed during the roll-out phase of the program. Most buildings had some barriers to recycling. The following barriers were addressed:

- Degraded labels on carts – **labels have been ordered and will be applied to carts during the summer of 2010 ;**
- Large distance between building and carts – **no change;**
- Limited capacity for specific recyclables – **additional carts were delivered;**
- Insufficient recycling capacity for large buildings or building complexes – **additional carts were delivered;**
- No or very little recycling signage/information – **flyers were delivered to residents and posters given to superintendents;** and
- No cardboard/boxboard recycling opportunity at many buildings – **no change.**

An additional barrier that was addressed was convenience. Small in-unit Blue Boxes were delivered to approximately 75% of multi-residential units to promote recycling and make it more convenient for residents to take their recyclables to the recycling carts.

#### 4.0 Conclusions

This project was undertaken to upgrade the multi-residential recycling in Stratford, through increased capacity (i.e. more carts, in-unit blue boxes) and updated P&E material. All multi-residential buildings with more than 6 units were included in this project. Baseline monitoring of cart inventory, including volume and condition, as well as recycling performance measures and barriers to recycling were conducted in June 2009.

Site visit conclusions were as follows:

- All superintendents and staff contacted were supportive of improvements to the recycling program
- New stickers are required for carts at all buildings
- Posters/signs were welcomed by building staff. In most buildings, little recycling signage is currently being used

The next stage of the project focused on the implementation of recycling program upgrades. Additional carts were delivered in November and December 2009. Small in-unit blue boxes and P&E material were delivered in February and March 2010. Post-implementation monitoring was conducted in April 2010.

In summary the City carried out the following:

- Database completion
  - Collected additional contact information
  - Completed inventory of carts.
- Added more capacity (carts, in-unit blue boxes) to buildings
  - New carts (73) delivered to buildings, replacing broken carts and increasing capacity from 28L to 33L/unit
  - Delivered 3 gallon in-unit blue boxes to 75% of multi-residential units to facilitate recycling
- Increased Promotion and Education (P&E) material
  - Replaced all stickers on carts to facilitate improved recycling (although they degraded and need to be replaced again)-
  - Delivered P&E material to buildings

#### 5.0 Recommendations

There are a number of final recommendations.

It is **recommended** that the further capacity for recycling be provided, with a goal of reaching the recommended best practice level of 50 litres per unit.

It is **recommended** that the remaining 25% of multi-residential units receive in-unit blue boxes to facilitate recycling.

There is very little colored glass being recycled. It is **recommended** that carts for glass be used for another recycling stream and that large Blue Boxes (approx. 25 gallon) be placed at buildings for collection of glass. This will also help to improve the capacity available for other recycling streams (paper and plastics).

It is **recommended** that the multi-residential database of contact information and cart inventory continue to be updated on a regular basis.

It is **recommended** that the upgraded multi-residential recycling program continue to be monitored on a regular basis and changes in recycling volume be documented.

It is **recommended** that when the City's recycling contract comes up for renewal, the following be considered:

- that cardboard and boxboard be added to the City's recycling program and collection contract and the corresponding infrastructure (i.e. OCC carts/bins) be put into place.
- that the City consider switching to a 2-stream recycling system.

# Appendix 1 Data Collection Form

Stratford Multi-Residential Recycling Program Collection Form							
Building Address:				Collection Period:			
Date Checked:				Checker:			
	Paper		Container				
			Plastic	Metal	Cl Glass	Co Glass	
CP #1							
Size of Cart							
% Fullness							
Contamination							
Mixing							
Overflow							
OCC/OBB							

Size of Cart – 1 = 120L, 2 = 240L, 3 = 360L      Scale - 1=perfect, 2=medium, 3=severe  
 1. Estimate fullness in % (0,25,50,75,100)      2. Contaminated (garbage present) - scale 1-3  
 3. Mixing - scale 1-3      4. Overflow - scale 1-3  
 5. OCC - 1=none/little, 2=medium, 3=a lot

Notes: - labelling, barriers
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Date Checked:				Checker:			
	Paper		Container				
			Plastic	Metal	Cl Glass	Co Glass	
CP #1							
Size of Cart							
% Fullness							
Contamination							
Mixing							
Overflow							
OCC/OBB							

Notes: - labelling, barriers
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