



# Segregated Curbside Glass Collection Pilot Final Report



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## Executive Summary

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In September 2018, The Continuous Improvement Fund (CIF) and Stewardship Ontario (SO) began a segregated curbside glass collection pilot in the County of Northumberland. This pilot project was researched and implemented by ReMM Group.

The collection pilot took place along two – one hundred home routes in differing demographic areas within the town of Cobourg, Ontario. Prior to and during the pilot, the affected homes were hand delivered the required information to participate in the pilot collection, as well as a 16-gallon yellow glass collection box. Further information was provided via a designated web-link for pilot participants.

The pilot included two – fifty home curbside waste composition studies (one pre-pilot and one mid-pilot) and four route analysis studies spread out through-out the pilot timeline.

### Key findings:

- Participation by residents was consistent through-out the pilot collection period with approximately 10% of yellow boxes being put to the curb weekly for collection
- 90% of obligated glass put out for recycling was put in a yellow box for collection, the remaining 10% was included in the bagged single-stream recycling
- During the baseline waste audit in September 2018, glass equated to 7.4% of the recycling stream. In the February 2019 audit, it had increased to 21%
- In a survey of participants, it was stated that they only put their yellow box out every 4-6 weeks at which time it was approximately  $\frac{1}{2}$  to  $\frac{3}{4}$  full.
- Contamination found in the yellow glass boxes over the course of the six-month pilot was minimal and not enough to weigh, based on weekly driver observations.
- The estimated incremental increase in collection costs (capital and labour) exceeds the potential savings that could be gained due to selling the glass for cullet versus the surcharge paid for mixed broken glass (MBG); however the glass quality ensures it could be used for “bottle to bottle” applications versus lower-end sandblasting or fibre glass type applications.

Overall, resident cooperation and interest in the pilot project was very good. Those residents surveyed conveyed an understanding for their municipal recycling program, and a willingness to do their part to optimize the value of glass for recycling. Those who did not participate in the pilot glass collection were also noted to have very high contamination in their recycling or did not put out recycling at all.

The pilot concluded that in a collection system, such as Northumberland County’s (curbside clear bag or recycling box), this is an effective method to collect a clean stream of mixed glass. Glass collected in this manner requires only minimal cleaning or sorting and can be shipped directly from the MRF to a glass re-processor to be used as cullet in new bottle manufacturing.

## Background

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During the past 20 years, the Ontario Blue Box Program (OBPP) has evolved and there has been a shift from multi-stream curbside collection to single and two-stream collection. The co-mingling of glass with other materials has caused a host of issues in the MRF processing system and has had a detrimental impact on MRF commodity values. Most glass collected through the OBPP is currently processed into what is called “mixed broken glass” (MBG). The markets for MBG are very limited, with the majority of Ontario material going to NexCycle Industries (a division of Strategic Materials) for reprocessing. A portion of the residential glass collected in the Ontario Blue Box Program (OBPP) is used as roadbed material within landfill confines. As well, there is a substantive amount of residential glass that is heavily contaminated and is landfilled.

As of 2019 the Recycling Fee Schedule for NexCycle is as follows:

<b>Non-Glass Residue Level % (NGR)</b>	<b>Recycling Fee per Short Ton</b>
6-10%	-\$5.00 to -\$10.00
11-14%	-\$20.00
15-19%	-\$25.00
<i>NexCycle is focused on driving MRF NGR% consistently down below 20% and for continued improvement</i>	
20-24%	-\$35.00 *subject to rejection
25-29%	-\$50.00 *subject to rejection

When clear and coloured glass was originally collected source separated, the commodities could be sold for use in higher value recycling options and had positive revenue. Ontario programs now pay a surcharge to have their MBG recycled or use it for applications that may not be deemed as diversion by under the BBPP.

## Other Jurisdictions and Influencers

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### Eco Entreprises Quebec – Innovative Glass Works Plan

Eco Enterprises Quebec (EEQ) announced the Innovative Glass Works Plan in January 2016. This Plan focused on providing a solution to the problems of glass collection via curbside recycling in Quebec.

Industry stewards invested \$12.2 million dollars in the plan:

- Implementation of pilot projects to experiment with glass sorting and processing equipment in five Quebec sorting centres (\$8 million)
- Providing glass sorting and processing system to the future sorting centre in the west end of the City of Montreal, based on findings and lessons learned from the five pilot projects (\$2.5 million)
- Supported the development of glass markets (\$1.7 million)

EEQ partnered with Machinex and Krysteline Technologies to provide glass clean up equipment for this Plan. This equipment came from England and Australia and was the first of its kind in North America.

Four specific equipment types were tested with varying levels of efficacy:

EEQ Innovative Glass Works Equipment Tested		
Equipment Type	Description	Findings
Flip-Flow screen	Screening and sizing separation	Essential for separating glass into fractions – (Spaleck or Bivitec)
Imploder	Breaking glass into smaller pieces	Effective to produce small size glass for remote locations
Zig Zag	Removes lightweight materials	Trenso very efficient
Air Lift Channel Feeder	Removes lightweight materials	Not well adapted to handle volume fluctuations

#### Results:

- Average purity level of more than 99%, exceeding target of 95%
- 23,000 tons of glass processed at pilot project facilities
- Four out of five sorting centres achieved a 100% recycling rate for their glass

#### Markets:

- Sandblasting, filtration, mineral wool production, micronized glass for cement additives, road infrastructure and local uses such as path paving and horticulture

#### Post Project Recommendations:

- Recommend increasing education campaigns to reduce unwanted materials, and adding specialized equipment to remove items such as straws, crayons and toothbrushes
- Attempt to minimize the amount of snow in the sorting centres

- Before signing for equipment ensure:
  - Supplier is accountable for after-sales service
  - Warranty terms and conditions are sufficient
  - Formalized contracts between the Supplier and their sub-contractors
  - A list of spare parts is included in the contract
  - Rapid access to spare parts (within 48 hours)
- Produce large size glass wherever possible, small size only in remote areas
- Colour sorting and removal of unwanted materials is necessary to feed glass bottle market
- The use of glass as daily cover needs to stop, and investment made in alternatives

### **Next Steps:**

EEQ will work with all Quebec sorting centres over the next four years to set up glass processing equipment resulting in a further investment of \$23 million. This includes updating some of the pilot project equipment based on the results.

### **City of Kingston, Ontario**

The City of Kingston is a small city of 54,646 households located in Eastern Ontario along the 401 corridor. In 2017 (per RPRA Datacall Results) Kingston marketed 8,277 tonnes of recyclables, of which 717 tonnes or 8.7% were glass.

Kingston is one of the last municipal programs to continue to sort glass curbside. Their collection contractor, Waste Connections sorts blue box contents into Papers, Clear/Coloured Glass and all other Containers. Residents are not provided a special box for glass, rather they are asked to place glass containers on top of all other recyclables in their box and the driver is instructed to sort it out before tipping the remaining Containers into the appropriate compartment.

It appears from discussion with City staff that some collection drivers undertake the glass sorting process and others default all to the Container stream of the truck. This may be based on quality of residents sorting, and collection conditions that day (heavy day, weather issues etc.). Back at the MRF, the mixed clear/coloured glass is tipped into a special bunker. The glass is then sorted manually on the ground by MRF staff to remove any contamination prior to loading and shipping to NexCycle. The contamination comes from Containers overflowing in to the glass compartment in the truck, and from materials being caught in the “sweep” as the glass is tipped into the bunker. Glass is sorted into the compartment closest to the cab of the truck and therefore has to travel the length of the body before being ejected. Any remaining Papers/Containers or other small fines are all swept out with the glass. Since hand-sorting out contamination must be done from the ground and outside, this process is labour-intensive.

The process of curbside glass sortation has been done since program inception, and the only change is that it is now a mix of clear and coloured glass which saves time on collection and space at the MRF. The sorted glass is shipped to NexCycle in Guelph where it is further cleaned/sorted and used in both recycled glass production and sold to the fibreglass market. Kingston is paid for the sorted glass at a rate of \$8-10 tonne (depending on quality and market values), which helps offset the cost of shipping but

does not net a profit. Having a cleaner stream of glass guarantees Kingston a market for their material, where other programs with dirtier mixed broken glass struggle to find market alternatives and pay penalties if NexCycle is willing to accept it.

As of the writing of this report (July 2019) the results of the Collection Tender have not been published. Kingston staff stated that all collection options were being looked at in this new tender, including going to two-stream.

## British Columbia

The BC Recycling Regulation, amended in 2011, requires businesses that supply printed-paper and packaging to assume the responsibility for the cost of collecting, sorting and recycling these materials. Recycle BC is a non-profit stewardship organization that is funded by these industry stewards to finance residential recycling programs for printed paper and packaging throughout British Columbia. Recycle BC provides recycling services either directly to communities or by working in partnerships with local governments, private companies and/or other organizations. In 2018, 183,900 tonnes of material was collected from 1.85 million households. Of this, 15,162 tonnes were glass containers. Approximately 186,000 tonnes of material is collected annually from households and depots. Recycle BC was originally launched in 2014 as Multi-Material BC (MMBC).

### Recycle BC and the Return-It Deposit-Refund Program

British Columbia Recycling Regulation (2004) mandates beverage producers operate a deposit-refund system. All ready-to-drink beverages sold in the province are required to be offered for sale in recyclable or refillable containers. All are subject to a deposit except for milk and milk substitutes. To carry out deposit-refund obligations within a common province-wide system, beverage producers have formed two stewardship agencies. [Brewers Distributor Ltd. \(BDL\)](#) serves as a stewardship agency for most domestic beer and some cider brands. [Encorp Pacific \(Canada\)](#) serves as the industry's container stewardship agency for all other beverage types including wine, coolers, spirits, some import beer and all non-alcoholic beverages.

Beverage containers can be returned to either retailers or special Return-It depots regulated by Encorp. Retailers must, by law, take back what they sell, up to 24 containers per person per day. The "Return-It" program has a documented recovery rate for glass of 92%.

Non-deposit glass bottles and jars are accepted in the Recycle BC program through a variety of depot collection sites and via segregated curbside collection in selected areas.

### Recycle BC Segregated Curbside Glass Collection

In 2014, when the Recycle BC program was launched, it was decided to exclude the remaining non-deposit glass bottles and jars from the container stream, or the single-stream material collected at the curb. A staged approach was used to implement this modification to the generally accepted practice of container glass collection at the curb. As of early 2019, segregated curbside collection is offered to 48% of households with the remaining 52% of residents being required to use a drop-off depot to discard their non-deposit glass.

For those that have segregated curbside collection, a designated glass recycling box was provided.

The Recycle BC program uses three types of collection trucks:

1. Top loader with additional panels

The top loader had additional panels added for the glass compartment, and retrofits made to the top of the divider to help prevent spillover of other material into the glass. This truck had the highest level of contamination originating both from the side bucket tipping and from the “sweep” as heavier glass pulled paper etc. stuck in the truck body with it onto the tip floor.



2. Split packer

The split packer has a three cubic metre gravity fed compartment that is used to collect the segregated glass. Feedback from BC representatives are that this truck works well for this type of collection. There have been no issues with tipping of the segregated compartment, nor cross contamination issues. The Collection Contractor (Emterra) states that the additional capital expenditure for this truck is off-set by the additional payload capacity and the ease of tipping the glass.



3. Designated “Once per Month” Collection

The City of Port Moody has chosen to do glass collection once per month. They use a 5-tonne truck and collect glass on a designated route. While this allows for a very clean sort during collection, it is very costly to do a designated route (truck/driver). On the other three “non-collection” weeks, it increases the residents’ propensity to put the glass in with their other recyclables.



## Conclusions

The consensus amongst those involved in the Recycle BC program is that the split packer with a separate glass compartment is the most effective method with the least contamination. However, it does require a higher cost capital investment than the “over the top” truck. No cost comparison or time and motion study could be found comparing the three methods currently being used in BC.

## Ontario Deposit Return Program for Beer, Wine and Spirits

The Ontario Deposit Return Program (ODRP), is a regulation of the province of Ontario. This regulation took effect on February 5, 2007 and applies to manufacturers, wineries and stores licensed to sell alcohol. Under the Program, a mandatory deposit fee is collected at the point of sale of alcoholic beverages based on their container size. This deposit is fully refunded to the consumer, once the containers are returned to the Beer Store or a designated return location. This deposit return system has proven to be an effective way of increasing recovery rates for glass and preventing it from ending up in landfills.

The documented average rate of return in 2018 ([The Beer Store Responsible Stewardship 2018](#)) for ODRP containers was 81% (up 2% since 2015) and Beer Store System containers 87% (down 5% since 2015). Curbside composition studies completed by CIF and Stewardship Ontario in 2018 and 2019 showed the following rates of ODRP glass in the garbage and recycling streams:

*As a percentage of the applicable waste stream	Garbage		Recycling		
	All Recyclable Glass	ODRP Glass	All Recyclable Glass	ODRP Glass	ODRP Glass portion of Recyclable Glass
Single-Family	.89%	.16%	12.59%	3.77%	29.90%
Multi-Family	2.65%	.65%	6.37%	.99%	15.56%

## The Ontario Pilot Methodology

### Partner Municipality

The County of Northumberland is a rural-regional southeastern Ontario community located along Highway 401 between Toronto and Kingston. Northumberland County is the Upper Tier Municipality servicing 39,166 permanent and seasonal households in the townships of Alwick/Haldimand, Brighton, Cobourg, Cramahe, Hamilton and municipalities of Port Hope and Trent Hills.

Northumberland owns and operates its own Material Recycling Facility (MRF) located in Grafton. The MRF provides recycling processing services as follows:

Municipality	Households	2017 Tonnage	2017 Glass Portion
<b>County of Northumberland</b>	39,166	6,061	638
<b>City of Kawartha Lakes</b>	37,683	5,723	544
Total Processed at MRF:	<b>77,364</b>	<b>11,784</b>	<b>1,182</b>
Percentage of Glass:			<b>10%</b>

Green for Life (GFL) is the collection contractor for Northumberland and uses a two-stream collection truck to collect waste and residential blue box recyclables in a single-stream format weekly. Residents are encouraged to use blue boxes, but bagged material is also accepted due to historical program policies. The material coming in from City of Kawartha Lakes (CKL) for processing is collected two-stream and delivered to Northumberland MRF on alternating weeks.

Mixed broken glass makes up approximately 10% by weight of the recyclables processed and marketed from this MRF. In 2018, glass meeting the contamination threshold was sent directly to NexCycle Industries in Guelph for recycling. During winter months when contamination levels exceeded the allowable amounts, glass was sent to the City of Guelph MRF for further processing prior to going to NexCycle for recycling.

### County of Northumberland 2018 Glass Disposition and Associated Costs

County of Northumberland 2018 Glass Disposition and Associated Costs					
Tonnes	Primary Destination	End Disposition	Tipping Fee	Freight/Tonne	Total Cost
<b>337</b>	Guelph Re-Sort	NexCycle for recycled glass applications	\$85/tonne	\$45/tonne	\$ 43,810
<b>321</b>	City of Kawartha Lakes	Landfill		Return freight covered by CKL	Unknown
<b>646</b>	NexCycle	Recycled glass applications	\$40/tonne	\$45/tonne	\$ 54,910
<b>39</b>	Northumberland Landfill	Used for road base		Not provided by municipality	unknown

See notes below

\$ 98,720

**Important Notes on table above:**

- The figures above do not include the following:
  - Cost of haulage of CKL glass back to their site, or any end of life costs associated
  - Cost of haulage of the landfill cover portion to Northumberland's landfill
  - Lost revenues for Northumberland or CKL due to loss of diversion in Datacall (percentage of funding for level of performance)
  
- In 2019, glass was shipped to NexCycle in January and February, beyond that all glass was re-directed to the Northumberland landfill to be used as road bed material with the following associated impacts:
  - Decrease in diversion by +/- 1000 tonnes (based on previous years tonnage)
  - Decrease in Blue Box Program Funding
  - Reduced costs in haulage going direct to landfill facility, and offset of previous cost of road bed material

## Project Logistics

### Pilot Area

The collection pilot was undertaken on two – one hundred home routes in the town of Cobourg, each with varying demographics. Each home was provided with a yellow 14-gallon recycling box that was hand delivered one week prior to the start of collection. The collection pilot was conducted between September 25, 2018 to March 26, 2019. The timing was planned to ensure the results would show any potential variances in material volume, quality and resident behavior across three distinct Ontario seasons.

### Collection Container

The project team decided to use a standard 16-gallon recycling box, yellow in colour, to make it easier for the driver to differentiate it from the boxes used for regular collection. Instructions encouraged residents to only put the box out when it was at least half full to optimize collection efficiencies.

Boxes were purchased from Nova Products. 250 boxes were purchased at a base cost of \$6.00/box and a landed cost of \$8.76 (excluding HST). Each box contained a custom hot stop (see photo) on the front and the standard CIF/SO funding recognition on the side. The 50 additional boxes were purchased to accommodate potential breakage or to provide an additional box for those requiring additional capacity. No additional boxes were required during the pilot and two boxes were refused during the initial delivery by home-owners not wishing to participate.



### Collection Method

For the purpose of this pilot project the glass set out in yellow boxes was collected utilizing a designated pick-up truck. The driver assigned to collect the glass from the two pilot areas each week was always tasked with documenting the number of yellow box set-outs and any noticeable contamination found in the boxes.

The original project plan provided an option to rent a customized collection truck to be used for collection in the pilot areas. Pricing was obtained from Joe Johnson Equipment (JJEI). Two different truck styles were priced out (automated and manual). Either option equated to a monthly rental fee of \$11,000 (plus any applicable licensing and insurance). Further, JJEI required that the project partners – The Continuous Improvement Fund, Stewardship Ontario and County of Northumberland commit to finding a buyer for the used truck after the six-month rental. This option would have added an additional \$66,000 plus associated licensing and insurance costs to the project. It was therefore decided not to include this element to the study.

The estimated cost of the additional compartment on a standard dual-compaction truck (5 yd<sup>3</sup>) per Joe Johnson Equipment is \$20,000. Amortized over the standard seven years used for budgeting purposes would be \$2,857/year plus any required maintenance. This methodology was not deemed to be worthwhile for the pilot project, so was also eliminated.

## Promotion and Education

The residents in the two – one hundred household pilot areas were informed of the upcoming pilot collection project by a hand-delivered information sheet on Tuesday, September 11, 2018. This information sheet (see Appendix C) provided the following information:

1. The reason for the pilot project;
2. The routes/homes selected for the pilot project;
3. The length of the pilot project;
4. Information regarding the new glass collection receptacle that will be provided to residents;
5. Information regarding the pick-up truck collecting the glass from the curbside;
6. Log-in information to a designated “pilot member” only information page on the County website; and
7. Contact information of County staff should residents have questions/concerns regarding the pilot project.

The residents were notified that they would be receiving their yellow boxes a week later, and that the pilot start date would be Tuesday, September 25<sup>th</sup>, 2018.

All promotional material and associated website work was completed by County of Northumberland staff at no extra cost to the project. Delivery of promotional material was undertaken by County and project management staff.

### ***Pilot Participant Website Page***

In an effort to minimize calls through to the Administration Hotline, a designated webpage was set up for the viewing of those participating in the collection pilot. This webpage contained a detailed list of Frequently Asked Questions that project staff felt would address the majority of inquiries. Traffic to the website page was minimal. Discussions with pilot participants during the waste audits and subsequent door-to-door notification delivery determined that those who participated found the original informational sheet thorough and the directions clear. The Administration Hotline received a small number of calls; one by a resident refusing to participate and requesting the box removed from her property and two during the Curbside Waste Composition Study to ensure the Contractor was permitted to be undertaking the waste study.

## Project Performance Measurement

### 1. Curbside

#### Driver Observations

The route driver provided a count and analysis on the yellow boxes set out for collection for 10 weeks out of the pilot duration. On average, 9 homes per week had their yellow boxes out for collection, with those boxes being  $\frac{1}{2}$  to  $\frac{3}{4}$  full. The contamination in the glass set-out in the yellow boxes was negligible and consisted of straws in bottles. Note that lids on bottles and jars are not considered contamination in this study.

**Pilot Route Inspection** - Project staff completed three route analysis during the duration of the pilot project with the following results:

#### October 12, 2018 – Driver meeting

- The route driver stated that the participation rate for the first three weeks of collection had been between 5-7%
- Yellow boxes were being put out once they were  $\frac{1}{2}$  to  $\frac{3}{4}$  full, which was consistent with the instructions provided to residents in order to optimize collection efforts

#### October 30, 2018 – Route Analysis

- 140 of the 200 homes had waste set outs this week or 70% of pilot area homes
- 9 yellow boxes were set out or 6.4% of those who had waste set outs
  - Only three deposit-return bottles were part of the set-outs
  - The remaining glass was juice bottles, pickle jars etc.
  - There was no contamination in any of the boxes observed
  - Most of the glass bottles had the lids removed, the lids were seen in the recycling bags
- The other recycling and garbage was visually assessed at 60 homes along the pilot routes. This involved viewing the contents and shaking the bags to listen for glass or assess the weight. During this process only two households had apparent glass in their recycling bag (one bottle in each).
- Resident contact – spoke with six residents. Each said they are using the yellow box and save it up until around half full to put it out. This was once per month on average. All were positive about the pilot and understood what it was attempting to achieve.

#### January 22, 2019 – Route Analysis

- 120 of the 200 homes had waste set outs or 60% of pilot area homes
- 10 yellow boxes were set out or 8.33% of those with waste set outs
  - The majority of boxes were out on Meredith Avenue – 80%
  - The driver stated that other than a couple straws, the material was uncontaminated
- 27 homes with waste set outs were visually analyzed for glass in the other recycling and garbage streams, none was observed

- General observation – the recycling bags contained significantly more non-recyclables than the recycling boxes, mainly unacceptable packaging and toys. About 90% of recycling was set out in bags.

**Material Composition Studies** – The project plan had included three studies over the six-month timeline. Due to constraints at the MRF, the plan was modified to undertake two. The composition studies included the recycling, glass and waste streams. Fifty homes were selected from the two hundred homes included in the pilot area.

For these composition studies, five sorts were undertaken:

- Recyclable Non-Glass Containers (to include film plastic)
- Recyclable Paper (to include ONP, OMG, OBB, OCC)
- Non-Deposit Container Glass
- ODRP Glass
- Waste (to include all organic materials, MHSW, Electronics, and other items not included in any of the above categories)

For ease of reading, the waste composition study results have been summarized and provided in a comparison format. The initial study was completed in September 2018, the week prior to the start of collection. The second study was completed in February 2019, four months into the pilot duration.

Garbage Composition			Recycling Composition		
Material (in kgs)	Baseline)	Mid Pilot	Material (in kgs)	Baseline	Mid Pilot
Garbage	314.16	429.44	Garbage	25.70	5.90
Container Glass	0.76	0.27	Container Glass	8.98	18.23
Deposit Glass	0.00	1.36	Deposit Glass	3.32	14.72
Other Glass	2.02	0.00	Other Glass	0.26	0.00
Other Recyclables	13.13	8.30	Other Recyclables	127.98	116.55
<b>Total:</b>	<b>330.07</b>	<b>439.37</b>	<b>Total:</b>	<b>166.24</b>	<b>155.40</b>

A total of 496.31 kgs was sampled from the 50 chosen homes during the baseline study, and 594.77 kgs from the same homes in the mid-pilot study. This equated to an average of 9.9 kgs of total waste generated per household in September, and 11.79 kgs per household in February. Of note, in September the waste was all dry, in February due to consistent freezing rain the material had a higher moisture content.

**Waste Composition Highlights:**

Garbage Composition Proportions			Recycling Composition Proportions		
Material	Baseline	Mid Pilot	Material	Baseline	Mid Pilot
Garbage	95.18%	97.74%	Garbage	15.46%	3.79%
Container Glass	0.23%	0.06%	Container Glass	5.40%	11.73%
Deposit Glass	0.00%	0.31%	Deposit Glass	2.00%	9.47%
Other Glass	0.61%	0.00%	Other Glass	0.16%	0.00%
Other Recyclables	3.98%	1.89%	Other Recyclables	76.99%	75.00%

**Baseline Study:**

Garbage Stream

- The garbage contained 4.21% recyclable material
- No deposit return glass was found in the garbage, and only .23% or .76 kgs of other recyclable container glass

Recycling Stream

- The recycling stream contained 15.62% garbage or non-recyclables
- Container glass made up 7.4% of the recycling stream, with ODRP glass being 27% of the glass portion of the recyclables

**Mid-Pilot Study:**

Garbage Stream

- The garbage contained 2.6% recyclable material
- Less than 1% (1.59 kgs) of the garbage stream was recyclable glass, 86% (1.36 kgs) of that glass was eligible for deposit return

Recycling Stream

- The recycling stream contained 3.79% garbage
- 21% of the recycling stream was container glass, with 45% of that glass being eligible for deposit return

Glass in Recycling Stream

- Of the 147 kgs of recycling audited in the study, 33 kgs (21%) was glass
- 91% of glass collected in the study was put out in yellow boxes and the remaining 9% found in the mixed recycling. Five (5) out of the fifty (50) homes collected for this study had yellow boxes out with their recycling set out.



- 40% (13 kgs) of the container glass found in the recyclable was eligible for deposit return – this is significantly higher than in the baseline study. Winter weather may have contributed to the reluctance of home-owners to participate in the ODRP program

**Other Observations:**

- The amount of glass set out in February was almost triple of that set out during the Baseline period
- There was 50% less recycling found in the garbage stream in the mid-pilot study
- Garbage in the recycling stream was significantly less in February. This was attributed to less “wishful recycling” items and other divertible waste such as textiles and electronics being put out in the September study period. People tend not to be cleaning closets and discarding these types of items in February.

**Overall Curbside Conclusions:**

- Residents saved up their glass for approximately a month before placing the box at the curb, at which time it was only ½ to ¾ full. This information was gained through one-on-one discussions with the residents and based on the driver log of yellow box set outs.
- During the majority of the pilot months, the deposit-return material found in the recycling stream was minimal. There was a small uptick found in the amount in the final audit completed in February.
- The project team had originally believed that the low weekly set-out rate was due to lack of participation, but after do visual analysis of the other recycling/garbage and speaking with residents it was understood that glass containers for recycling are a minimal portion of the waste stream, further minimized when using the ODRP program.

**2. Other Methods of Performance Measurement**

**Door-to-Door Visits:**

Project staff took advantage of the requirement to deliver project conclusion information notices to speak with as many residents as possible.

**Visit Feedback received:**

- The majority of residents spoken to stated that they used the yellow box during the pilot period
- Most residents found that they only needed to set out the box once per month, and at that point it was ½ to ¾ full
- No one provided any negative feedback on the requirement to place glass in a separate box, rather they felt that if it increased its recyclability then it was worth the small amount of effort
- Two residents stated that they chose to put the box out at less than ½ full due to potential weight concerns
- Many residents spoke of the upcoming changes to the program (single-stream to two-stream) and all communicated positivity around this change

### Survey of Participants:

The pilot conclusion information flyer contained a link to a survey webpage and included the chance to win one of four \$50 Canadian Tire gift cards for completing the survey.

The survey only received a small number of responses (seven pilot participants), however the responses to the online survey questions as noted below were consistent with verbal responses provided to the project team during the door-to-door flyer distribution, the two route analysis studies and the set out log kept by the collection driver.

Survey Results			
Did you use the yellow box?	7 - yes		
How often did you put it out?	2 - bi-weekly	2 - monthly	3 - once during pilot
How full was it when put out?	2 - less than 1/2	4 - half full	1 - full
Do you participate in ODRP?	6 - yes	1 - no	
Does weather affect your participation in ODRP?	6 - no	1 - no ODRP glass	

## Analysis of Study Results

### 1. Quality and Quantity of Glass

#### Quantity

In the two Northumberland waste composition studies the amount of container glass in the recycling stream was 7.4% (pre-yellow box) and 22% (mid-pilot) for an average of 14.7%.

Since this study was only able to provide two verified data points, we summarized the raw data captured in the CIF/SO Curbside Waste Composition Studies 2018/19. The average percentage of recyclable glass found in this study was 14% of the recycling stream. This is consistent with our average findings and a good number to use for estimating annual quantities and related collection costs.

CIF/SO Curbside Waste Composition Study Results				
Season		Stream	Kgs/hh/wk	Kgs/hh/yr
Fall 2018	Average	Glass	0.34	
Spring 2019	Average	Glass	0.39	
Summer 2018	Average	Glass	0.31	
Winter 2019	Average	Glass	0.32	
	<b>Average</b>	<b>Glass</b>	<b>0.34</b>	<b>17.68</b>
Fall 2018	Average	Recycling	2.55	
Spring 2019	Average	Recycling	2.53	
Summer 2018	Average	Recycling	2.68	
Winter 2019	Average	Recycling	2.14	
	<b>Average</b>	<b>Recycling</b>	<b>2.48</b>	<b>128.7</b>
<b>Average Recyclable Glass Portion of the Recycling Stream:</b>				<b>14%</b>

#### Quality

It is important to differentiate here between set-out contamination and process contamination.



**Set-out contamination** would be a result of the resident placing other recyclable materials or non-recyclables in the yellow box along with their recyclable container glass

**Process contamination** is other recyclables or non-recyclables ending up in the glass pile on the tip floor as a result of the “sweep” as the glass was being tipped from a standard curbside recycling truck, or inside the truck if the partitions allowed for contamination to over-flow from one compartment to

another. As the glass was collected via a designated pick-up truck for this pilot, this type of contamination would not be applicable.

The driver and route analysis completed by project staff both found the Set-out contamination was very minimal. Contamination found during the pilot consisted of straws and cigarette butts being found in a small number of bottles and some mason jars put out in error (wishful recycling).

## 2. ODRP Glass Found in Recycling

Ontario Deposit Return Program Glass Found in Curbside Recycling				
Glass Type		Baseline Study	Mid-Pilot Study	Average Glass Ratios by Type
Non-Alcoholic Container Glass		8.98 kgs	18.23 kgs	64%
ODRP Glass		3.32 kgs	14.72 kgs	36%

## 3. Segregated Glass Collection Labour

As this pilot did not utilize a curbside collection truck to collection the glass from the yellow boxes, time and motion measurements specific to these routes could not be made. However, anecdotal information provided by contractors in British Columbia where glass is collected separate, state that the incremental increase in driver labour is approximately 10 seconds per stop.

Stop Count Labour Increase Estimations	
Average two-stream stop time with recycling boxes and minimal sorting	20 seconds
Incremental additional stop time per set-out yellow box	10 seconds
Average set-out rate for yellow boxes	Every 3-4 weeks
Incremental additional collection labour per week	3.5 seconds or 17%

#### 4. Capital Cost Increase for Three-Compartment Trucks

Based on cost estimates provided by Joe Johnson Equipment, the required retro-fit to a dual-compaction truck to add a third compartment for glass was \$20,000. Based on the GAP amortization of this type of truck, that equates to \$2,857 per truck per year over seven years.

#### 5. Cost Comparison Estimates

Calculations for Estimated Collection Cost Increase for Segregated Glass	
Average estimated current stop time (seconds)	20
Estimated incremental stop time increase	17%
Glass compartment capital cost/yr. amortized over 7 years x 9 trucks	\$25,714.29
Current cost per stop	\$68.64
Incremental stop cost increase due to labour (assume 30% of stop cost)	\$3.50
Incremental stop cost increase due to capital	\$.66
Estimated new stop cost	\$72.80
Household/stop count	39166
Current estimated annual cost	\$2,688,354.24
Estimated new annual cost with segregated glass collection	\$2,851,149.53
<b>Estimated annual cost increase</b>	<b>\$162,795.29</b>

Glass Revenue/Surcharge Calculations					
*Figures in Tonnes	Surcharge	Haulage	Glass clean-up	Tonnage	Total
Current cost	\$40	\$45	\$130	646	\$138,890
Potential cost (collected segregated)	-\$10	\$45		646	\$ 22,610
	<b>Estimated annual savings</b>				<b>\$116,280</b>

Estimated Datacall Funding for Glass Diverted through BBPP			
2017 Cost/Tonne	Funding/Tonne @ 50%	Glass Tonnage	
\$382	\$191	646	<b>\$123,400</b>

**Notes:**

This estimate is low. Had the glass been collected segregated or put through a clean-up system, the associated costs would have increased the eligible program costs and thus the funding. This figure is simply used to highlight that +/- 50% of municipal program costs are covered and this should be considered in any analysis. Glass used as landfill road bed material or alternative cover is not eligible for BBPP funding.

## Scenarios

Scenario 1 – Clean Glass Recycling versus Non-Diversion use at Landfill		
	Segregated collection and recycling	Co-collection and landfill road bed use*
Est. Cost Increase for segregated collection	\$162,795	n/a
Glass cost for recycling at end-processor	\$ 22,610	n/a
BBPP Funding*	(\$146,657)	n/a
Haulage to landfill (est. at \$20/tonne x 646)**	n/a	\$ 12,920
Increased residue haulage and landfill cost***	n/a	unknown
<b>Estimated total cost:</b>	<b>\$ 38,748</b>	<b>\$ 12,920</b>
*BBPP funding estimated based on costs		
**Haulage to landfill truck/labour estimated		
***MBG loss to residue and associated costs unknown (labour, truck, and actual landfill costs)		

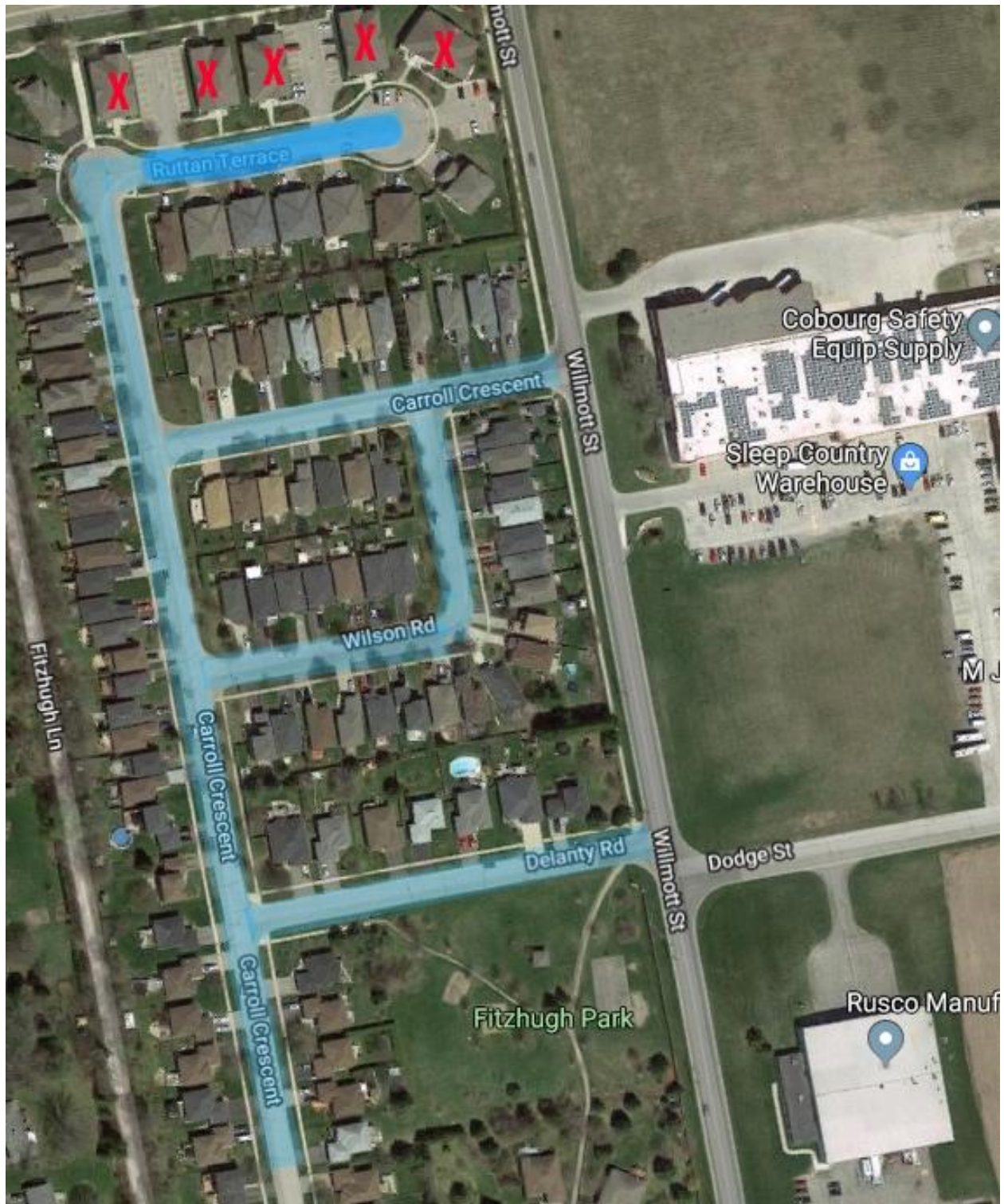
Scenario 2 – Clean Glass Recycling versus MBG Clean-up and Recycling		
	Segregated collection and recycling	MBG off-site clean-up and recycling
Est. Cost Increase for segregated collection	\$162,795	n/a
Glass cost for recycling at end-processor	\$ 22,610	\$138,890
Increased residue haulage and landfill cost**	n/a	unknown
BBPP Funding*	(\$146,657)	(\$123,400)
<b>Estimated total cost:</b>	<b>\$ 38,748</b>	<b>\$ 15,490</b>
*BBPP funding estimated based on costs		
**MBG loss to residue and associated costs unknown (labour, truck, and actual landfill costs)		

**Note:** Unless otherwise specified, all cost and tonnage figures used in this analysis are estimates based on the best available data. Any planned program modifications should be made based on actual figures for the specific MRF or program.

## Other Considerations

- Estimates were used in development of the cost increases and annual savings noted above. Other areas that will impact these costs/savings that have not been studied as part of this project are:
  - Reduced wear and tear on MRF processing equipment
  - Potential increase in revenue (or reduction in downgrades) of other marketed materials that have been previously impacted by MBG contamination
  - Estimates used for increased collection labour costs should be ground-truthed by a contractor currently collecting in the manner, or proper time and motion studies
  - Capital cost estimates were based on a modified three-stream compaction truck, with the small volume of glass in the system, and annual incremental decreases as brands switch to other packaging formats, a lower cost option for collecting segregated glass could be utilized
  - The intrinsic value of recycling glass at the top of the hierarchy – glass bottle to glass bottle has not been calculated in this document
  - The negative impact/costs associated with MBG lost in the residue and being landfilled was not included in this document as the MGB portion of residue was not available
  - Loss of Datacall BBPP funding for glass not diverted
- Improving promotion and education of the Ontario Deposit Return Program will help to further reduce the amount of container glass in the system. The waste composition study data from this project showed that 30% of the glass set out was ODRP material.
- This study does not look at viable collection options for fully-automated curbside programs. Programs that are utilizing full automation would need to find a method to capture the glass in a manner that could be lifted into the truck without driver assistance.
- Segregated glass collection will allow for higher end uses for the residential glass such as; bottle to bottle. MRF clean-up systems will only allow for lower end uses of the recovered materials.

## Appendix A – Pilot Collection Areas







# bag YOUR BAGS ... The Right Way!



Step

1 Stuff all of your plastic bags and plastic stretchy outer-wrap into **ONE clear or clear-blue bag**

2 Tie the bag closed at the top

3 Set-out at the curb on your collection day and tie it to your heavier bags on windy days



**Do not mix** plastic bags and plastic stretchy outer-wrap in with your other recycling items, such as cans, bottles, newspapers;

**Do not use** grocery bags as your 'Bag of Bags'. Our collectors at the curb and sorters at the Recycling Plant need to be able to see into the bag!

## What Goes into My Bag of Bags?

- Examples Include:** Bread bags  
Frozen food bags  
Produce bags  
Bubble wrap  
Water softener salt bags  
Dry cleaning bags  
Grocery/retail bags (plastic)  
Newspaper bags  
Milk bags (emptied and rinsed)  
Plastic outer wrap from pop cases toilet tissue, paper towels



# What Can I Not Recycle?



## **POTS, PANS & COAT HANGERS**

Place in scrap metal bin at Landfill or Transfer Stations.



## **PET & ANIMAL WASTE OR LITTER**

Put in the Garbage.



## **TEXTILES**

Give away, donate or put in the Garbage.



## **FOOD**

Place in your backyard composter or put in the Garbage.



## **STYROFOAM**

Styrofoam of any kind & plastic cutlery put in the Garbage.



## **STRAPPING, ROPE, STRING & HOSES**

Put in the Garbage.



## **FACIAL TISSUES & PAPER TOWELS**

Place in your backyard composter or put in the Garbage.



## **EMPTY PROPANE TANKS & PAINT CONTAINERS WITH PAINT INSIDE**

**Take to Hazardous Waste.**

For more information call: 1-866-293-8379.



## **TOYS**

Give away or put in the Garbage. Toys and items that no longer conform to safety standards can be taken to the Hazardous Waste Depots in June.



## **BROKEN GLASS & NAILS**

Place sharp objects in a puncture safe container (sealable box) or protective wrap, and put them in the Garbage.

# RECYCLING



**Plastic beverage containers**



**Boxed beverage containers**



**Plastic tubs & lids**



**Metal food & beverage containers**



**Aluminum Cans, foil, trays & pie plates**



**Glass bottles & jars (food & beverage)**



**Paperbacks & telephone books**



**Paper cups, paper plates, paper take-out containers**



**Fine paper, envelopes, magazines**



**Corrugated cardboard**



**Boxboard (empty cereal, tissue boxes, etc)**



**Newspapers**

## Appendix C – Yellow Box Promotional Material



### Glass Recycling Pilot Project Coming to Your Neighbourhood

Beginning on September 25th, 2018 a temporary collection program will take place in your neighbourhood to test a different way to collect glass bottles and jars for recycling.

A yellow recycling box similar to a standard blue box will be delivered to your home the week of September 17th, 2018. Inside each yellow box will be a set of instructions on how the study will work, and what is accepted in the box.

#### Why are we doing this?

Glass can easily break during collection. When broken glass mixes with paper and other containers in the recycling truck it becomes difficult to properly recycle these materials, which reduces the quantity and quality of glass that is captured for recycling.

Broken glass is also a safety hazard to

collectors and sorters at the Material Recovery Facility in Grafton.

This study will determine if collecting glass bottles and jars separately from other recyclable material will increase its value and recyclability. Your participation will be key in determining the effectiveness of this study.

If you have any questions, or do not receive your yellow box by September 21st, please do not hesitate to contact me:

Dan Orr  
Education & Communications Coordinator  
Northumberland County  
905-372-3329 ext. 2316  
[orrd@northumberlandcounty.ca](mailto:orrd@northumberlandcounty.ca)  
Visit [northumberlandcounty.ca/yellowbox](http://northumberlandcounty.ca/yellowbox)

July 2019





# Thank you for using The Yellow Box

**The pilot project has now ended.** We would like to thank you for your efforts in separating your glass bottles and jars throughout the last few months.

**The pilot was a success!** Although successful, we will not be rolling this project out at the current time. We have gathered a significant amount of data which you can see on the back-side of this page. This data will be used by municipalities all across Ontario to study the feasibility of separating glass bottles and jars into a dedicated box for collection.

**You may keep the yellow box.** You are more than welcome to use the yellow box as a set out option for your recyclables, or for anything else. If you do not wish to keep the box please call or email us, and we will arrange to pick it up.

**We do want to hear from you!** Please visit [northumberlandcounty.ca/yellowbox](http://northumberlandcounty.ca/yellowbox) to complete an online survey. You will be entered into a draw to win one of five Canadian Tire gift cards, valued at \$50 each. The chance of winning is 1 in 40!



For more information on our programs and services, please contact us

**1-866-293-8379**

[northumberlandcounty.ca](http://northumberlandcounty.ca)  
[wastedept@northumberlandcounty.ca](mailto:wastedept@northumberlandcounty.ca)