CIF Project No. 929: Multi-Residential Recycling FEL Container Wrap Pilot





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Prepared by:
City of Ottawa
Laureen DiNardo, Project Manager
Environmental Programs
Public Works and Environmental Services
(613) 580-2424 ext: 14809



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Executive Summary

The City of Ottawa, Ontario (Ottawa) is always looking for new and innovative ways to improve waste diversion amongst residents. The intent of this pilot project was to apply colorful vinyl wraps to recycling front-end loader (FEL) containers in a multi-residential community to fulfill two main purposes: improve recycling rates and decrease contamination rates. Additionally, the vinyl used in the wraps aimed to discourage graffiti on the bin, ultimately reducing costs for clean-up.

Two waste audits were conducted as part of the pilot. Ottawa retained a consultant to conduct a baseline audit in November 2017 prior to the wrapping of the bins. The wrapped bins were installed at the beginning of December 2017 and a subsequent waste audit was conducted in June 2018.

Based on the findings of the waste audits and the results of an outreach survey, it was determined that the bin wrap pilot met its objectives. The overall recycling rate increased from 6.8% to 8.9% and the contamination rates decrease from 13% to 7% for Fibres and 38% to 28% for GMP - Mixed Containers. Feedback from a resident survey further supported the success of the pilot.

With the increased amount of recycling and savings associated with reduced contamination, the estimated payback periods were as follows:

| Bin Type | Wrapped Bin Costs | | Bin Type Wrapped Bin Costs | | Offsets/ Wrapped Bin/Year | Payback Period |
|-------------|-------------------|------------|----------------------------|-------------|------------------------------|----------------|
| GMP – Mixed | Wrap Only | \$695.21 | \$100.70 | 6.90 Years | | |
| Containers | Including New Bin | \$2,120.21 | \$100.70 | 21.05 Years | | |
| Fibre | Wrap Only | \$655.67 | \$82.87 | 7.91 Years | | |
| | Including New Bin | \$1,550.67 | | 18.71 Years | | |

The pilot outcome suggests that the bin wraps are an effective tool to utilize in the most problematic areas with low recycling rates and high contamination rates when the capital expenditure for new bins is anticipated. The City of Ottawa will be reviewing this approach as part of the long-term waste management strategy.



1.0 Introduction

The City of Ottawa, Ontario (Ottawa) is always looking for new and innovative ways to improve waste diversion amongst its residents. Ottawa has adopted the blue/black box program with a blue bin for Glass Metal Plastic (GMP – Mixed Containers) and black bin for Fiber. This works well with single family dwellings however, the bins in the multi-residential sector do not follow this color convention and therefore it can be confusing for residents to know how to dispose and recycle materials appropriately.

The intent of this pilot project was to apply colorful vinyl wraps to recycling front-end loader (FEL) containers in a multi-residential community. These wraps would replace the current instructional stickers (pictures below).





The vinyl wraps aimed to fulfill two main purposes:

- 1. Improve recycling rates
- 2. Decrease contamination rates

By providing easy to understand and visual information to residents about what material should be placed in each container, the goal was to minimize confusion. Front-End containers would have clear messaging on what belongs in each recycling stream. GMP - Mixed Containers and Fibre containers would each have their own unique graphics and colours.

A further benefit of wrapping the bins included minimizing the amount of graffiti created on the bin. The vibrant design on the vinyl wraps intended to diminish the blank space on the containers, making it less appealing for graffiti. The wraps have an anti-graffiti sealant making it easier to clean which ultimately leads to lower costs associated with graffiti removal.

To track the impact of the vinyl wraps, the City retained the services of Viridis Environmental Inc. to conduct pre and post project waste audits. They prepared pre and post wrap audit reports that can be found in *Appendix A*.



2.0 Background

The goal for this pilot was to improve recycling rates and reduce contamination in the multi-residential sector. Historically the multi-residential sector's performance with respect to recycling is well below what is typically observed with single family dwellings. The pilot area selected was comprised of eight addresses with a mixture of walk-ups and townhomes totaling 600 units.

2.1 Community Profile

The community chosen for this pilot is part of Ottawa Community Housing and is situated downtown. This community is home to a large population of immigrants where language can be a barrier in communicating information with respect to waste management. It is also a transient community, so there are always new people living in this community.



2.2 Waste Management System

The community's waste management system is comprised of outdoor front-loading bins. There are bins for GMP - Mixed Containers, Fibre and garbage but there is no organics program at this location. A summary of the waste management system is in Table 1 below.



Table 1: Waste Management System Overview for Wiggins Private (2017/2018)

| Multi- Residential Service | Service Description (curbside/Depot weekly/bi-weekly single/two/multi stream) | Collection Provider | Processing Provider |
|----------------------------------|--|---------------------|---------------------|
| Garbage | Outdoor front loading bins Weekly collection | Waste Connection | Cascades |
| Recycling | Outdoor front loading bins Fibre – weekly collection GMP - Mixed Containers – bi-weekly collection Organics – no organics program | Waste Connection | Cascades |



2.3 Current Waste Management Performance

According to the Solid Waste Performance report that was prepared in 2014, multi-residential diversion rate was 16.4% and within that, Ottawa Community Housing neighborhoods' had the lowest diversion rate of 9%.



2.4 Program Challenges

The development of this pilot was a result of a number of factors. The first is the poor recycling performance for multi-residential recycling with diversion rates below 20%. Secondly, many of the bins are located outside and can be targets for Graffiti. Finally, the Chair of Ottawa Community Housing wanted Solid Waste to improve diversion at these locations.

Multi-residential recycling can be difficult. Since these dwellings house many new Canadians, there are language barriers as well as cultural differences in waste management from other countries. The wraps create visual information of what should be in the bins breaking down language barriers and teaching new Canadians how to properly manage waste. The aim was to reduce contamination levels and increase recycling for these locations while diminishing graffiti.

Staff felt that this pilot had the potential to benefit the community in the following ways;

- increased participation by using the bins as advertising;
- increased recycling by being more visible and easier to understand; and,
- decreased costs by reducing the non-recyclable materials in the recycling streams (contamination)

3.0 Approach

3.1 Set up and implementation

3.1.1 Description

There were a number of tasks to be considered when launching the pilot. The following were the key steps for this pilot project:

- Identify a pilot location
- Design the wraps
- Draft an audit plan to include the number of bins collected, a pre & post wrap audit, collection contractor & schedule for the audit
- Determine audit period
- Purchase new bins
- Wrap the bins (completed on waste contractor's site)
- Conduct a pre-wrapped audit
- Develop and implement a communication for residents with respect to the wrapped bins prior to their installation
- Install the wrapped bins and remove the old bins
- Conduct a post-wrapped audit 6 months after the installation of the bins



Survey the residents after the post wrapped audit on the effectiveness of the wraps

3.1.2 Set Up and Implementation Challenges and Solutions

There were a number of challenges addressed as part of the set up and implementation of this pilot. They include the following:

- Needed a person on-site at the audit location to receive the waste waste contractor would not dump the material at the audit location without someone present.
- Coordination of audit staff with arrival of material. Didn't make sense to pay the
 consultant to wait around City staff arrived on-site for 8am (earliest the waste
 would arrive) and had the consultant arrive around 8:30 so if the truck was late,
 the consultant wasn't waiting for too long.
- There were a lot of people hours required to move garbage inside the building and to move the unaudited portion to the waste bins. When feasible, site staff used front-end loaders to move the material not being audited into the waste bins. The City provided the auditors with large rolling carts to bring the material being audited into the building.

3.2 Monitoring and Measurement Methodology

3.2.1 Overview

To determine the effectiveness of the project, a comprehensive pre & post waste audit and resident feedback survey was completed.

3.2.3 Waste Audits (including scheduling, sampling process, and sort procedures)

3.2.3.1 Collection Timeline and Sampling Details

The baseline waste and recycling audit of Wiggins Private was conducted during the month of November 2017. Garbage and recycling samples were collected on four consecutive Wednesdays including November 8, 15, 22, and 29. The samples were delivered to Trail Road Landfill Site (TRLS) just outside the old Household Hazardous Waste (HHW) building. The collection details are shown in Table 2.

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Table 2: Waste Collection Details for Wiggins Private - November 2017

| Waste Stream | 2017-11-08 - Sample Bins Collected | 2017-11-15 - Sample Bins Collected | 2017-11-22 - Sample Bins Collected | 2017-11-29 - Sample Bins Collected | Total Bins at Wiggins Private | Collection Service |
|------------------|--|--|--|--|----------------------------------|--------------------|
| Garbage | 6 | 6 | 6 | 6 | 15 | Weekly |
| Fibre | 10 | 10 | 10 | 10 | 10 | Weekly |
| Mixed Containers | 0 | 11 | | 11 | 11 | Every 2 Weeks |

The June 2018 waste and recycling audit of Wiggins Private was conducted on 4 consecutive Wednesdays including June 6, 13, 20, and 27. The samples were delivered to TRLS just outside the old Household Hazardous Waste (HHW) building. The collection details are shown in Table 3.

Table 3: Waste Collection Details for Wiggins Private – June 2018

| Waste Stream | 2018-06-06- Sample Bins Collected | 2018-06-13 - Sample Bins Collected | 2018-06-20 - Sample Bins Collected | 2018-06-27 - Sample Bins Collected | Total Bins at Wiggins Private | Collection Service |
|------------------|---|--|--|--|----------------------------------|--------------------|
| Garbage | 6 | 6 | 6 | 6 | 15 | Weekly |
| Fibre | 10 | 10 | 10 | 10 | 10 | Weekly |
| Mixed Containers | 0 | 11 | 0 | 11 | 11 | Every 2 Weeks |

A total of 15 garbage bins, 10 fibre bins, and 11 GMP - mixed containers bins (all frontend loading) service 600 units. As part of the Stewardship Ontario waste audit methodology and also consistent with previous City waste audits, a sample size of 100 units was determined to be appropriate for providing a reasonable level of confidence in the waste audit figures.

For each waste stream, all collected audit materials were mixed and separated into 2 piles. One of the piles was then randomly selected for sorting and weighing. Table 4 below outlines the sampling calculations.

Table 4 Audit Sampling Calculations

| Waste Stream | Total Community Bins | Estimated Service of Units / Bin | Collected Sample Sort Selection |
|--------------|-------------------------|----------------------------------|---------------------------------------|
| Garbage | 15 | 40 | 6 Bins / 2 piles = 3 Bins randomly |
| | | | selected and sorted ~ 120 units |
| Fibre | 10 | 60 | 10 Bins / 2 piles = 5 Bins randomly |
| | | | selected and sorted ~ 300 units* |
| GMP - Mixed | 11 | 54.5 | 11 Bins / 2 piles = 5.5 Bins randomly |
| Containers | | | selected and sorted ~ 300 units |

^{*} The only exception to this procedure was on November 8, when close to the entire sample of Fibre recycling was sorted.



3.2.3.2 Sorting Procedure

The selected piles of garbage and recycling were moved inside the HHW building for sorting and weighing while the remaining piles were disposed of in roll-off containers for garbage and recycling provided by the TRLS.

The audit crew, consisting of 8-10 members on average, proceeded to sort the Garbage stream first by placing portions of the pile on the sort tables. The crew then sorted the material into the waste categories specified in the Request for Proposal (see Appendix A). The empty sort containers used to contain the material were tared on the digital scale first and then weighing of the sorted material was conducted. The weights were recorded on the data entry forms. The same procedure was followed for both Fibre recycling and GMP - Mixed Containers recycling, which were sorted respectively after the Garbage sample was completed. Once material had been weighed, it was taken out to the roll-off containers for disposal and recycling.

3.2.3.3 Data Collection

There were two primary sources of data for the results in this report. The first source was the overall weight totals from the TRLS scale for the Garbage, Fibre, and GMP - Mixed Containers delivered to the site. The second source of data were the weights taken during the sort used to determine waste composition. The composition of the waste streams was determined by applying the proportions of the material categories in each waste stream by the overall TRLS scale weight for the waste stream. This procedure was repeated for each weekly sample with the final totals reflecting the sum of estimated weights for the material categories in each waste stream.

The weights derived from the overall hauling totals and waste sort were used to calculate the performance metrics of recycling rate as well as the capture rates, and contamination rates in the Fibre and GMP - Mixed Containers recycling programs.

3.2.3.4 Qualitative Research (resident surveys)

In November 2017, a door-to-door flyer & brochure delivery was conducted to approximately 585 units. The documentation delivered outlined the new labels on the bins in the community and a brochure indicating a list of acceptable recycling material and which bin the item belongs. A copy of the door flyer and brochure can be found in *Appendix E*.





In the summer of 2018, an outreach event was scheduled. The objective of the outreach event was to obtain and document feedback from residents on the new recycling bin wraps recently installed in the neighborhood. An outreach event was coordinated in collaboration with Ottawa Community Housing staff.

It was recommended that an outreach event take place on the weekend in order to improve attendance. The event took place on Saturday August 11 from 1:00 p.m. to 3:00 p.m.

An invitation was delivered door-to-door one (1) week prior to the event date. Posters were distributed to lobbies and posted on each floor of the buildings. The invitation included information on a draw for a \$100.00 gift card.

An information booth with interactive children games was also set up, staff assisted residents on completing the questionnaire, in order to have their name enter the draw. The event included light refreshments (juice/cookies).



4.0 Project Results and Analysis

4.1 Project Results

4.1.1 Results from Waste Audits

The table below shows the overall results corrected for contamination within the recycling streams. The figures in blue show weights for acceptable materials while the **red** figures identify weights of contamination within the recycling programs.

In overall terms, the estimated pre-wrap **recycling rate** was **6.8%**. The **capture rates** of Fibre and GMP - Mixed Containers recycling streams were **29%** and **16%** respectively. With respect to **contamination rates**, the overall results were **13%** for Fibre and **38%** for GMP - Mixed Containers. The total amount of contamination was estimated at 379 kg in the recycling streams, so the amount of landfilled waste was estimated at totalling 20,104 kg (19,725 kg in garbage bins + 379 kg contamination in recycling bins).

Table 5: Wiggins Private Sample Weights and Totals Estimate – November 2017

| Waste Stream | Landfill (kg) | Fibre (kg) | GMP - Mixed Containers (kg) | Total Waste (kg) | Total Recyclables (kg) | Capture Rate |
|----------------|---------------|---------------|-----------------------------------|------------------------|------------------------------|-----------------|
| Fibres | 2,703 | 1,113 | 67 | 3,884 | 1,180 | 29% |
| GMP - Mixed | | | | | | |
| Containers | 1,855 | 33 | 347 | 2,234 | 380 | 16% |
| Compostables | 5,758 | 53 | 22 | 5,833 | 75 | n/a |
| Other | 9,409 | 81 | 123 | 9,614 | 204 | n/a |
| Total Weight | 19,725 | 1,280 | 559 | 21,565 | 1,839 | |
| | | | | | | |
| Contamination | | | | | | |
| Rate | | 13% | 38% | | | |
| Recycling Rate | | | | | 6.8% | |

In the pre-audit, a total of **13.7%** of the landfill waste could have been diverted via the existing **Fibre recycling program** by recycling Printed Paper (7.4%), Cardboard (3.3%), Boxboard – All Types/Molded Pulp (3%), and Kraft Paper (0.1%). Finally, although each item in the GMP - Mixed Containers program is below 2% individually, the acceptable **GMP - Mixed Containers** categories collectively accounted for **9.4%** of the landfilled weight. Therefore, in theory, about **23.10%** of the landfilled waste could have been collected in current recycling program (0.5% from cross-contaminated materials in dual stream).



The table below shows the overall post-wrap results corrected for contamination within the recycling streams. The figures in blue show weights for acceptable materials while the **red** figures identify weights of contamination within the recycling programs. In overall terms, the estimated **recycling rate** is **8.9%**. The **capture rates** of Fibre and GMP - Mixed Containers recycling streams are **40%** and **23%** respectively. With respect to **contamination rates**, the overall results were **7%** for Fibre and **28%** for GMP - Mixed Containers. The total amount of contamination was estimated at 308 kg in the recycling streams, so the amount of landfilled waste would effectively rise to 20,633 kg (20,325 kg in garbage bins + 308 kg contamination in recycling bins).

Table 6 Wiggins Private Sample Weights and Totals Estimate – June 2018¹

| Waste Stream | Landfill (kg) | Fibre (kg) | GMP - Mixed Containers (kg) | Total Waste (kg) | Total Recyclables (kg) | Capture Rate |
|--------------------|------------------|---------------|--------------------------------------|------------------------|------------------------------|-----------------|
| Fibres | 2,182 | 1501 | 93 | 3777 | 1594 | 40% |
| GMP - Mixed | | | | | | |
| Containers | 1,720 | 19 | 520 | 2259 | 539 | 23% |
| Compostables | 8,444 | 8 | 6 | 8457 | 14 | n/a |
| Other | 7,980 | 82 | 100 | 8216 | 182 | n/a |
| Total Weight | 20,326 | 1610 | 719 | 22709 | 2329 | |
| | | | | | | |
| Contamination Rate | | 7% | 28% | | | |
| Recycling Rate | | | | | 8.9% | |

In the post-audit, a total of **10.7%** of the landfill waste could have been diverted via the existing **Fibre recycling program** by diverting Printed Paper (4.7%), Cardboard (3.0%), Boxboard – All Types/Molded Pulp (3.1%) and Kraft Paper (0.4%). Finally, although each item in the GMP - Mixed Containers program is below 2% individually with the exception of **#1 PET Bottles and Jars – Non Alcoholic (2.1%)**, the acceptable **GMP - Mixed Containers** categories collectively accounted for **8.5**% of the landfilled weight. Therefore, in theory, about **19.20**% of the landfilled waste in June 2018, could have been collected in current recycling programs.

¹ Where numbers do not add, this is due to rounding.



4.1.2 Results of Qualitative Research Survey Analysis

In August 2018, all residents of the Community were invited to "Meet the City Recycling Team" (see *Appendix H*). Approximately 25 residents (including children) attended the Saturday event and 14 people completed a questionnaire (see *Appendix D*). Given the extensive promotion of the event, there was low participation.

A version of an online questionnaire and copies were available on-hand. Staff attending the event, assisted residents with completing the survey.

The residents were enthusiastic in their responses and this was reflected in the results.

Questionnaire details can be found in *Appendix I*. A summary of the results is below.

- 71% recycle on a regular basis
- 79% agreed bins are conveniently located on site
- 62% of respondents will dispose of their material in the garbage when unsure where the item belongs. 38% referred to the bin label.
- Respondents are very clear as to which color of bin the fibre belongs. 88% responded it belongs in the yellow bin
- A photo and an illustration of a plastic bottle was shown to the residents and the question was 'which one was clearer?' 79% responded the actual photo of the bottle was clearer vs 21% responding the illustration version 2
- The responses regarding the question "If you do not recycle what are the reasons?
 - No room to store recycling in unit 7%
 - Locations of bins 7%
 - Bins too smelly 7%

4.2 Analysis of Results

With respect to performance metrics, the June 2018 sample had higher capture rates for Fibre and GMP - Mixed Containers than November 2017. The Fibre capture rate in June 2018 was 40% compared to 29% in November 2017. For GMP - Mixed Containers, the capture rate in June 2018 was 23% compared to 16% in November 2017. Contamination rates also improved in the June 2018 sample with 7% for Fibre and 28% for GMP - Mixed Containers as compared to the November 2017 contamination rates of 13% for Fibre and 38% for GMP - Mixed Containers. Finally, the overall recycling rate in June 2018 increased to 8.9% compared to the 6.8% recycling rate estimated in November 2017 as can be seen in the table below.

^

² Since the sample set was small, more research is needed to determine if a real picture is more effective than an illustration version.



Table 7: Comparison of November 2017 and June 2018 Audit Sample Results

| Waste Stream | Total Waste (Kg) Change Nov/17 to June/18 | Total Recyclables (kg) Change Nov/17 to June/18 | | Capture Rate Change Nov/17 to June/18 | Contamination Rate Change Nov/17 to June/18 |
|--------------|---|---|----|---|---|
| Fibres | -107 | +414 | | +11% | -6% |
| GMP - Mixed | | | | +7% | -10% |
| Containers | +25 | +159 | | 1770 | -10/0 |
| Compostables | +2,624 | -61 | | n/a | n/a |
| Other | -1,452 | -22 | | n/a | n/a |
| | | | | Overall Recycling | |
| Total Weight | +1,090 | +490 | Ra | ate Change = +2.1% | |

The tonnage data in Appendix B, shows that Ottawa recycling tonnages do not experience seasonal variances. Table 8 demonstrates that the wrapped bin tonnage increased by up to 22%. Interestingly, during the same period, Single Family and Multi-residential collection tonnages showed decreased amounts in contrast to the pilot area.

Table 8: Comparison of November 2017 and June 2018 Tonnages

| | Fibr | es (Tonna | ge) | GMP - | - Mixed Co (Tonnage | |
|--------------------------|--------|-----------|--------|--------|------------------------|--------|
| Ottawa Recycling Program | Nov-17 | Jun-18 | Change | Nov-17 | Jun-18 | Change |
| Single Family Blue Box | 3868 | 3117 | -24% | 1958 | 1891 | -4% |
| Multi-Residential | 616 | 519 | -19% | 242 | 236 | -3% |
| Community - Pilot Area | 1.28 | 1.61 | 20% | 0.56 | 0.72 | 22% |



4.3 Lessons Learned/Key Observations

The following are points for consideration when looking at conducting a similar pilot.

Wrap Design & Installation

- Language barrier It is common to have a multi-culturally diverse neighborhood in Ottawa, which results in language barriers. Relying on images of recyclables (visuals) is an effective way to address language barriers. The cartoon image utilized in this project was not the preferred choice of residents for "clarity" however, Ottawa is planning to do further research on this design choice to determine its impact on a larger audience.
- New Bins For this project, new bins were purchased. Issues regarding dents and rust of older bins made adhering the vinyl challenging. Installers recommend clean, freshly painted bins with minimal dents and rust for best results (if installing on bins that are less than 2 years old)
- Durability majority of bins are located outside and exposed to a variety of weather conditions. Using a 3M 180CV3 (or similar) vinyl laminate with an over laminate sealer may enhance the lifespan of a front-end bin and it also allows for easy removal of graffiti. The 3M product has a 10-year warranty.
- Unforeseen costs Due to weather changes the wraps were installed on the waste contractor's site for a fee. There was also an unforeseen additional cost for the waste contractor to remove locking bars prior to the wrap installation and then reinstall after all the bins had been wrapped.
- Wrapping If the wraps are to be installed on-site, it is important to note that the Vinyl requires temperatures of at least 10 degrees Celsius.
- Removal and Delivery When removing and replacing wrapped bins, it is important to ensure that all bins are empty.

Monitoring and Measuring

- Data collection In the original proposal, onboard scales were identified as the
 mechanism for the ongoing monitoring and measuring of the recycling materials
 collected. Once reviewed, there were concerns that the data was not reliable
 due to inconsistent readings from operators and/or technology issues. Problems
 were associated with new drivers, new trucks, system malfunctions such as invehicle tablet failures. Instead, overall reported tonnages for the multi-residential
 sector were used to determine seasonal variances to compare to the audit
 findings. That data can be found in Appendix B.
- Waste Audit Sample Size It is important to determine, in advance, how much waste is to be audited. The sample set on 100 units so calculations had to be done to determine how much of the load was to be audited. Unfortunately, the consultant audited all the garbage the first week which was too much to audit and



- statistically unnecessary. This needs to be clearly communicated in the scope of work for budgeting purpose.
- Communication with Consultant In the scope of work it is important to clearly communicate the level of effort (or understanding of the level of effort) in the moving of material. Determine the collection schedule for the material – the week before the audit, need two collection days – wanted to ensure the following week only contained one week's worth of garbage for the start of the audit.
- Communication with Community When scheduling any changes in the collection day for the audit period it is valuable to notify the housing complex as some bins needed to be brought outside.
- Staffing Need to have City staff on-site during the collection to ensure the fullest bins were collected for garbage and all GMP - Mixed Containers & fibre bins were emptied.
- Audit Location Good to have the consultant visit the audit location in advance to know what equipment they need to bring and confirm what is provided on-site. Preference to have a covered space – there was a challenge to dumping materials into the audit building with the Front-End Vehicles. Waste needed to be audited inside the building due to inclement weather to reduce impact on results.

Community Outreach

- Held a community outreach event to solicit feedback included incentive prize for survey participation and snacks and activities for the kids.
- Poor participation in the community outreach event over 500 invitations were delivered door-to-door, only 20 - 25 people (including kids) showed up, and only 14 people completed the survey. In the future, it was suggested that staff attend an existing community event to minimize costs and improve participation.

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5.0 Project Budget

| Item | Cost |
|--|----------|
| Design and Installation of Wraps (21) | \$10,925 |
| Purchase of New Bins 10 - 2 yard Fibre | \$8,950 |
| Purchase of New Bins 11 - 2 yard GMP - Mixed Containers | \$15,675 |
| Removal/Installation of Locking Bars on GMP -Mixed Container bins | \$435 |
| Contracted Services to collect waste for the audit (pre & post wrap) | \$12,800 |
| Waste Audit (pre & post wrap) | \$24,280 |
| Communication Material – brochure 'Which bin to put it in?' | \$300 |
| Communication Material – door hanger | \$223 |
| Event Poster | \$154 |
| Event Invitation | \$174 |
| Outreach event | \$577 |
| Total Cost of Project | \$74,493 |

Table 8 Summary of Staff Time to Support Pilot

| Task | FTE Hours |
|--|----------------|
| RFP Development | |
| Wrap Tender | 4 |
| Waste Audit Collection Tender | 7 |
| Waste Audits Tender | 7 |
| Waste Audit Oversight | |
| 2 days/week for 4 weeks for two audit events | 32 |
| Outreach Event | |
| Preparation of Communication Material | 4 |
| Event Coordination | 7 |
| Event | 3 |
| Tota | I FTE Hours 64 |

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6.0 Cost Benefit Analysis

The following table shows a summary of the cost/benefit analysis for this type of program. The more detailed calculations can be found in *Appendix C*.

Table 9: Summary of Cost Benefit Analysis

| Bin Type | Wrapped Bin Costs | | Wrapped Bin Costs | | Offsets/ Wrapped Bin/Year | Payback Period |
|-------------|-------------------|------------|-------------------|-------------|------------------------------|----------------|
| GMP – Mixed | Wrap Only | \$695.21 | ¢100.70 | 6.90 Years | | |
| Containers | Including New Bin | \$2,120.21 | \$100.70 | 21.05 Years | | |
| Fibre | Wrap Only | \$655.67 | \$82.87 | 7.91 Years | | |
| | Including New Bin | \$1,550.67 | | 18.71 Years | | |

As part of the Cost Benefit Analysis, it is important to note the following:

- The collection contractor is responsible for all maintenance of the bins as part of
 the contract; including graffiti. Graffiti is a small fraction of the ongoing
 maintenance needs of the bins. Research into graffiti costs associated with the
 pilot area suggested previous costs were zero and limited data tracking of graffiti
 is completed. No graffiti was found on the pilot bins, no savings with respect
 graffiti removal were realized.
- The life expectancy of a bin is typically 10 years.
- Since the revenue for both Fibre and GMP Mixed Containers fluctuate, the CIF Ontario Market Trends Price Sheet 2018 Yearly Average Composite Index was used to calculate the revenue per tonne (https://thecif.ca/cif-price-sheet/accessed June/18)
- The payback period can vary significantly depending on the market rate for material on any given month.
- Further research suggested that savings of 10% may be realized in wrap design and installation with greater volume of bins wrapped (~10% for 50 bins and 20% for 100 bins).

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7.0 Conclusions

Based on the findings of the waste audits and the results of the outreach survey, it was determined that the bin wrap pilot met its objectives. The overall recycling rate increased from 6.8% to 8.9% and the contamination rate decreased from 13% to 7% for Fibre and 38% to 28% for GMP - Mixed Containers. The results of the survey further supported the accomplishments of the pilot based on feedback from the respondents.

It should be noted that this project was a small piece in a long-term communication strategy. The wrapped bins findings suggest that the project had the potential to improve recycling system performance with due consideration of cost containment. Furthermore, the wraps provided numerous synergistic benefits including increased marketing (or impressions) of the recycling program and graffiti deterrence.

For other Ontario municipalities considering wrapping front-end bins, the results show that it would be advantageous to:

- implement and harmonize recycling program shifts before designing and installing wraps in order to have a lasting impact (preferably province-wide obligated recyclable materials).
- align wrap installation timing with an annual bin replacement strategy to reduce capital and/or bin cleaning & painting costs.
- complete a detailed cost benefit analysis based on local program circumstances.

Although the pilot met its objectives, without further analysis, it would appear to be too costly to expand City-wide. Considering budget limitations, the bin wraps are an effective tool that might be best utilized in problematic areas with low recycling rates and high contamination rates. The City of Ottawa will be looking at such a strategy as part of the long-term planning process.

CIF Project No.:929

Appendix A – Waste Audit Reports

Wiggins Private Multi-Residential Community Waste and Recycling Audit – November 2017

PREPARED FOR:



Laureen DiNardo Project Manager, Environmental Programs Business & Technical Support Services Public Works & Environmental Services Department Phone: 613-580-2424 ext.14809

PREPARED BY:

Viridis Environmental Inc. 777 Kingfisher Crescent Ottawa, ON, K1E 2L5 Phone: (613) 845-9819

Fax: (613) 482-4879 viridis@rogers.com

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EXECUTIVE SUMMARY

As part of on-going efforts to improve the waste diversion rates across the residential and multi-residential sectors, the City of Ottawa (City) commissions periodic waste audits of the garbage and recycling/composting streams. The purpose of these audits is to determine the overall waste diversion rate as well as composition of the waste streams and the associated capture rates and contamination rates of the waste diversion programs. The City identified the multi-residential community of Wiggins Private (600 units) to be audited in order to provide a baseline measurement of waste diversion and then a subsequent measurement after the implementation of the City's pilot Bin-Wrap program slated for early 2018. This report represents the baseline measurement of the waste composition and diversion status at Wiggins Private as of November 2017. The waste audit was conducted on waste and recyclables collected on November 8, 15, 22, and 29 and delivered to the Trail Road Landfill Site (TRLS).

The table below shows the overall results corrected for contamination within the recycling streams. The figures in **green** show weights for acceptable materials while the **red** figures identify weights of contamination within the recycling programs. In overall terms, the estimated **waste diversion rate** is **6.8%**. The **capture rates** of Fibre and Mixed Containers recycling streams are **29%** and **16%** respectively. With respect to **contamination rates**, the overall results were **13%** for Fibre and **38%** for Mixed Containers. The total amount of contamination was estimated at 379 kg in the recycling streams, so the amount of landfilled waste would effectively rise to 20,104 kg (19,725 kg in garbage bins + 379 kg contamination in recycling bins).

Wiggins Private Sample Weights and Totals Estimate – November 2017

| Waste Stream | Landfill (kg) | Fibre (kg) | Mixed Containers (kg) | Total (kg) | Capture Rate |
|-----------------------------|---------------|------------|-----------------------|------------|--------------|
| Acceptable Fibre | 2,703 | 1,113 | 67 | 3,884 | 29% |
| Acceptable Mixed Containers | 1,855 | 33 | 347 | 2,234 | 16% |
| Compostables | 5,758 | 53 | 22 | 5,833 | n/a |
| Other | 9,409 | 81 | 123 | 9,614 | n/a |
| Total Weight | 19,725 | 1,280 | 560 | 21,565 | |
| Contamination Rate | | 13% | 38% | | |
| Diversion Rate | | | | 6.8% | |

In summary terms, **32.1%**, or almost one-third of the landfill waste could have been **composted** if Food Waste (23.2%), Tissue/Towelling (3.6%), Soil and Sod (3.1%), and Pet Waste – other than Dog waste (2.2%) were included in a future program. A total of **13.7%** of the landfill waste could have been diverted via the existing **Fibre recycling program** by diverting Printed Paper (7.4%), Cardboard (3.3%), Boxboard – All Types (2.3%), Boxboard/Cores/Molded Pulp (0.7%) and Kraft Paper (0.1%). Finally, although each item in the Mixed Containers program is below 2% individually, the acceptable **Mixed Containers** categories collectively accounted for **9.4%** of the landfilled weight. Therefore, in theory, about **55%** or slightly over half of the landfilled waste could have been diverted to a current recycling program and a future composting program.

In terms of hazardous materials, they were negligible in terms of weights. Other Hazardous Wastes (paint, tubes, etc.) were 0.2% in terms of overall generation across all streams and Batteries were 0.1%. However, strictly speaking they should not be disposed of in the solid non-hazardous waste stream. In the November 8 sample, a **barbecue propane tank** was found mixed in with the Garbage sample. It should be made clear to all parties at Wiggins Private that this is not acceptable, although it is possible the propane tank did not originate at Wiggins Private.

Biomedical waste was encountered in the form of **needles** of which many were uncapped. In particular, during the November 15 sample, a compromised sharps container containing several needles was found in the Garbage sample and many of the needles had spilled out. The presence of a sharps container in the solid non-hazardous garbage stream suggests that procedures at Wiggins Private need review to ensure biomedical waste such as sharps are not disposed of in the solid non-hazardous waste stream.

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APPENDIX A – WASTE CATEGORIES

1.0 Introduction

The City of Ottawa (City) provides waste collection services for the residential and multi-residential sectors within its borders. The waste streams available include landfill garbage, fibre recycling, mixed containers recycling, and organics composting. In the case of the residential service, the waste collection system for divertible material includes the Black Box (fibre), Blue Box (mixed containers), and Green Bin (organics composting). In the case of multi-residential dwellings, the collection of landfill garbage, fibre, and mixed containers is standard and some, although not all, multi-residential units receive Green Bin service as well.

As part of on-going efforts to improve the waste diversion rates across the residential and multi-residential sectors, the City commissions periodic waste audits of the garbage and recycling/composting streams. The purpose of these audits is to determine the overall waste diversion rate as well as composition of the waste streams and the associated capture rates and contamination rates of the waste diversion programs. The City identified the multi-residential community of Wiggins Private (600 units) to be audited in order to provide a baseline measurement of waste diversion and then a subsequent measurement after the implementation of the City's pilot Bin-Wrap program slated for early 2018.

This report represents the baseline measurement of the waste composition and diversion status at Wiggins Private as of November 2017. The waste audit was conducted on waste and recyclables collected on November 8, 15, 22, and 29 and delivered to the Trail Road Landfill Site (TRLS). The waste and recycling samples were sorted and weighed by Viridis Environmental Incorporated (Viridis) in partnership with Rideau Social Enterprises (RSE), both located in Ottawa.

2.0 Methodology

2.1 Sample Timeline and Definition

The baseline waste and recycling audit of Wiggins Private was conducted during the month of November 2017. Garbage and recycling samples were collected on 4 consecutive Wednesdays including November 8, 15, 22, and 29. The samples were delivered to TRLS just outside the old Household Hazardous Waste (HHW) building. The sample details are shown in Table 1.

Table 1: Waste Collection Details for Wiggins Private – November 2017

| Waste Stream | 2017-11-08 - Sample Bins Collected | 2017-11-15 - Sample Bins Collected | 2017-11-22 - Sample Bins Collected | 2017-11-29 - Sample Bins Collected | Total Bins at Wiggins Private | Collection Service |
|------------------|--|--|--|--|----------------------------------|--------------------|
| Garbage | 6 | 6 | 6 | 6 | 15 | Weekly |
| Fibre | 10 | 10 | 10 | 10 | 10 | Weekly |
| Mixed Containers | 0 | 11 | | 11 | 11 | Every 2 Weeks |

There are a total of 15 garbage bins, 10 fibre bins, and 11 mixed containers bins (all front end load) servicing a total of 600 units. As part of the Stewardship Ontario waste audit methodology and also consistent with previous City waste audits, a sample size of 100 units was determined to be appropriate for providing a reasonable level of confidence in the waste audit figures.

In the case of the **Garbage** stream, this meant that of the 15 bins on site, approximately 3 of them would, on average, contain waste from approximately 120 multi-residential units. The City delivered 6 bins worth of garbage to TRLS each Wednesday which was separated into 2 piles and one of the piles randomly selected for sorting and weighing. The selected pile could reasonably be assumed to comprise approximately 120 units worth of waste (3 bins equivalent * 40 units average per bin) and thus meeting the target sample size of at least 100 units. The only exception to this procedure was the November 8 sample when close to the entire sample of Garbage was sorted.

For **Fibre recycling**, all of the bins at Wiggins Private were collected each week and delivered to TRLS. Similar to Garbage, the 10 bins worth of material were separated into 2 piles and one of the piles randomly selected for sorting and weighing. The selected pile could reasonably be assumed to comprise approximately 300 units worth of waste (5 bins equivalent * 60 units average per bin) and thus meeting the target sample size of at least 100 units. The only exception to this procedure was the November 8 sample when close to the entire sample of Fibre recycling was sorted.

For **Mixed Containers recycling**, all of the bins at Wiggins Private were collected every 2 weeks and delivered to TRLS. Similar to Mixed Fibre, the 11 bins worth of material were separated into 2 piles and one of the piles randomly selected for sorting and weighing. The selected pile could reasonably be assumed to comprise approximately 300 units worth of waste (5.5 bins equivalent * 54.5 units average per bin) and thus meeting the target sample size of at least 100 units.

2.2 Sorting Procedure

The selected piles of garbage and recycling were moved inside the HHW building for sorting and weighing while the remaining piles were disposed of in roll-off containers for garbage and recycling provided by the TRLS. The audit crew, consisting of 8-10 members on average, proceeded to sort the Garbage stream first by placing portions of the pile on the sort tables. The crew then sorted the material into the waste categories specified in the Request for Proposal (see Appendix A). The empty sort containers used to contain the material were tared on the digital scale first and then weighing of the sorted material was conducted. The weights were recorded on the data entry forms. The same procedure was followed for both Fibre recycling and Mixed Containers recycling which were sorted respectively after the Garbage sample was completed. Once material had been weighed, it was taken out to the roll-off containers for garbage and recycling for disposal.

2.3 Data Collection

There were two primary sources of data for the results in this report. The first source was the overall weight totals from the TRLS scale for the Garbage, Fibre, and Mixed Containers delivered to the site. The second source of data were the weights taken during the sort used to determine waste composition. The composition of the waste streams was determined by applying the proportions of the material categories in each waste stream by the overall TRLS scale weight for the waste stream. This procedure was repeated for each weekly sample with the final totals reflecting the sum of estimated weights for the material categories in each waste stream.

The weights derived from the overall hauling totals and waste sort were used to calculate the performance metrics of diversion rate as well as the capture rates and contamination rates in the Fibre and Mixed Containers recycling programs.

3.0 Results

3.1 Overall Totals

Table 2 shows a total of 9,730 kg of material across all waste streams was delivered to TRLS during the audit. Of this total, 7,890 kg were Garbage, 1,280 kg were in the Fibre recycling stream, and 560 kg were in the Mixed Containers Stream. As discussed in Section 2.1, 6 out of 15 garbage bins were delivered each week, so the 7,890 kg did not reflect all the garbage generated at Wiggins Private. Consequently, the 7,890 kg was prorated to reflect the estimated garbage generated from all 15 bins during November 2017. The average weight per garbage bin was estimated at 328.75 kg. With 15 garbage bins collected each week for 4 weeks, this equates to 60 garbage bins total * 328.75 kg or 19,725 kg total for Garbage. The Fibres and Mixed Containers recycling streams did not require any proration because all materials in those recycling bins were delivered to TRLS in November 2017.

Based on the hauling totals alone, the diversion rate would suggest 9%, but this is not entirely accurate because it does not account for any contamination within the Fibre and Mixed Containers Recycling streams. The contamination within the recycling streams was accounted for during the sort and is shown in the figures in the subsequent tables.

Table 2: Wiggins Private Sample Weights and Totals Estimate – November 2017

| Date | Containers (kg) | Total (kg) | Diversion Rate | | |
|------------------------------------|-----------------|------------|----------------|--------|----|
| | Garbage (kg) | Fibre (kg) | , 0, | | |
| 08-Nov-17 | 2,290 | 450 | 0 | 2,740 | |
| 15-Nov-17 | 1,920 | 260 | 320 | 2,500 | |
| 22-Nov-17 | 1,760 | 370 | 0 | 2,130 | |
| 29-Nov-17 | 1,920 | 200 | 240 | 2,360 | |
| | 7,890 | 1,280 | 560 | 9,730 | |
| | | | | | |
| Total Dumpsters Collected (Sample) | 24 | 40 | 22 | | |
| Weight per dumpster (kg) | 328.75 | 32.00 | 25.45 | | |
| Actual Dumpsters | 60 | 40 | 22 | | |
| Total Actual Weight (kg) | 19,725 | 1,280 | 560 | 21,565 | 9% |
| Weekly Generation (kg) | 4,931 | 320 | 140 | 5,391 | 9% |
| kg/unit/week (600 units) | 8.2 | 0.5 | 0.2 | 9.0 | 9% |

Table 3 shows the overall results corrected for contamination within the recycling streams. The figures in **green** show weights for acceptable materials while the **red** figures identify weights of contamination within the recycling programs. In overall terms, the estimated **waste diversion rate** is **6.8%**. The **capture rates** of Fibre and Mixed Containers recycling streams are **29%** and **16%** respectively. With respect to **contamination rates**, the overall results were **13%** for Fibre and **38%** for Mixed Containers. The total amount of contamination was estimated at 379 kg in the recycling streams, so the amount of landfilled waste would effectively rise to 20,104 kg (19,725 kg in garbage bins + 379 kg contamination in recycling bins).

Table 3: Corrected Wiggins Private Sample Weights and Totals Estimate – November 2017

| Waste Stream | Landfill (kg) | Fibre (kg) | Mixed Containers (kg) | Total (kg) | Capture Rate |
|-----------------------------|---------------|------------|-----------------------|------------|--------------|
| Acceptable Fibre | 2,703 | 1,113 | 67 | 3,884 | 29% |
| Acceptable Mixed Containers | 1,855 | 33 | 347 | 2,234 | 16% |
| Compostables | 5,758 | 53 | 22 | 5,833 | n/a |
| Other | 9,409 | 81 | 123 | 9,614 | n/a |
| Total Weight | 19,725 | 1,280 | 560 | 21,565 | |
| Contamination Rate | | 13% | 38% | | |
| Diversion Rate | | | | 6.8% | |

3.2 **Waste Stream Composition**

Table 4 provides the complete breakdown of garbage and recycling composition estimated for Wiggins Private in November 2017. There were a total of 67 material categories used during the waste sort. The figures in green represent acceptable material in the Fibre or Mixed Containers recycling stream while red represents contamination. The weights, percentages of composition, total generation, and capture rates are shown in the columns for each material category.

Table 4: Detailed Garbage and Recycling Waste Stream Composition - November 2017

| | MATERIAL CATEGORY | Landfill | % of Landfill | Fibre | % of Fibre | Mixed Containers | % of Mixed Containers | Total Generation (kg) | % of Total | Capture Rate |
|---------|---|--------------|------------------|--------------|---------------|---------------------|-----------------------|--------------------------|---------------|-----------------|
| | | Weights (kg) | | Weights (kg) | | Weights (kg) | | | | |
| | 1. ACCEPTABLE FIBRE | 2,703 | 13.7% | 1,113 | 87.0% | 67 | 12.0% | 3,884 | 18.0% | 28.7% |
| Paper | Printed Paper | 1,452 | 7.4% | 378 | 29.5% | 32 | 5.6% | 1,861 | 8.6% | 20.3% |
| Paper | Cardboard | 644 | 3.3% | 572 | 44.7% | 17 | 3.1% | 1,234 | 5.7% | 46.4% |
| Paper | Boxboard - All Types | 449 | 2.3% | 128 | 10.0% | 16 | 2.8% | 593 | 2.8% | 21.6% |
| Paper | Boxboard/Cores/Molded Pulp | 140 | 0.7% | 28 | 2.1% | 3 | 0.5% | 170 | 0.8% | 16.2% |
| Paper | Kraft Paper | 18 | 0.1% | 7 | 0.6% | 0 | 0.0% | 26 | 0.1% | 28.7% |
| | 2. ACCEPTABLE MIXED CONTAINERS | 1,855 | 9.4% | 33 | 2.6% | 347 | 62.0% | 2,234 | 10.4% | 15.5% |
| Glass | Clear Glass - Food and Beverage | 324 | 1.6% | 1 | 0.1% | 68 | 12.1% | 393 | 1.8% | 17.2% |
| Glass | Clear Glass - Alcoholic Beverage | 30 | 0.2% | 0 | 0.0% | 8.5 | 1.5% | 38 | 0.2% | 22.0% |
| Glass | Coloured Glass - Food and Beverage | 19 | 0.1% | 0 | 0.0% | 16 | 2.8% | 34 | 0.2% | 45.3% |
| Glass | Coloured Glass - Alcoholic Beverage | 98 | 0.5% | 2 | 0.2% | 11.8 | 2.1% | 112 | 0.5% | 10.5% |
| Metal | Aluminum Food and Beverage | 80 | 0.4% | 1 | 0.1% | 11.7 | 2.1% | 93 | 0.4% | 12.5% |
| Metal | Aluminum Food and Beverage - Alcoholic | 24 | 0.1% | 1 | 0.1% | 5 | 0.8% | 30 | 0.1% | 15.5% |
| Metal | Aluminum Foil and Trays | 49 | 0.2% | 1 | 0.0% | 1 | 0.2% | 51 | 0.2% | 2.7% |
| Metal | Aluminum Aerosol Cans | 2 | 0.0% | 0 | 0.0% | 0 | 0.0% | 2 | 0.0% | 0.0% |
| Metal | Steel Food and Beverage Cans | 272 | 1.4% | 2 | 0.2% | 45 | 8.0% | 319 | 1.5% | 14.1% |
| Metal | Steel Aerosol Container | 16 | 0.1% | 0 | 0.0% | 2 | 0.3% | 18 | 0.1% | 8.6% |
| Metal | Paint Cans | 12 | 0.1% | 0 | 0.0% | 0 | 0.0% | 12 | 0.1% | 0.0% |
| Paper | Asceptic Containers - non Alcoholic | 28 | 0.1% | 1 | 0.0% | 1 | 0.1% | 29 | 0.1% | 2.2% |
| Paper | Asceptic Containers - Alcoholic | 3 | 0.0% | 0 | 0.0% | 0 | 0.0% | 3 | 0.0% | 0.0% |
| Paper | Gable Top Cartons | 57 | 0.3% | 8 | 0.6% | 8.5 | 1.5% | 73 | 0.3% | 11.6% |
| Paper | Polycoated Paper Ice Cream Containers | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0.0% |
| Paper | Spiral Wound | 17 | 0.1% | 1 | 0.1% | 3 | 0.5% | 21 | 0.1% | 13.8% |
| Plastic | #1 PET Bottles and Jars - non alcoholic | 371 | 1.9% | 5 | 0.4% | 83 | 14.8% | 459 | 2.1% | 18.0% |
| Plastic | #1 PET Bottles and Jars - non alcoholic >= 5 L | 2 | 0.0% | 0 | 0.0% | 1 | 0.1% | 3 | 0.0% | 20.9% |
| Plastic | #1 PET Bottles - alcoholic beverages | 1 | 0.0% | 0 | 0.0% | 0 | 0.1% | 1 | 0.0% | 26.6% |
| Plastic | #1 PET Thermoform - Clear | 80 | 0.4% | 4 | 0.3% | 19 | 3.4% | 103 | 0.5% | 18.3% |
| Plastic | #1 PET Thermoform - Coloured | 31 | 0.2% | 0 | 0.0% | 2 | 0.4% | 33 | 0.2% | 6.7% |
| Plastic | #2 - HDPE Bottles and Jugs non-alcoholic | 190 | 1.0% | 2 | 0.2% | 40 | 7.2% | 232 | 1.1% | 17.4% |
| Plastic | #2 HDPE Bottles and Jars - non alcoholic >= 5 L | 17 | 0.1% | 1 | 0.1% | 5 | 0.8% | 23 | 0.1% | 20.8% |
| Plastic | #2 HDPE Bottles - alcoholic beverages | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | n/a |
| Plastic | #2 HDPE - Other HDPE containers | 4 | 0.0% | 0 | 0.0% | 0 | 0.0% | 4 | 0.0% | 0.0% |
| Plastic | #5 PP Bottles | 2 | 0.0% | 0 | 0.0% | 0 | 0.1% | 2 | 0.0% | 14.1% |
| Plastic | #5 -Other PP Containers | 114 | 0.6% | 2 | 0.1% | 17 | 3.0% | 133 | 0.6% | 12.8% |
| Plastic | Other Rigid Plastic Packaging (#3, #4, #7) | 11 | 0.1% | 1 | 0.1% | 0 | 0.1% | 13 | 0.1% | 2.9% |
| Plastic | Large HDPE & PP Pails and Lids (< 5 L > 20 L) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0.0% |

Table 4: Detailed Garbage and Recycling Waste Stream Composition – November 2017 (Continued)

| | | | % of | | % of | Mixed | % of Mixed | Total | % of | Capture |
|----------|---|--------------|----------|--------------|--------|--------------|------------|-----------------|--------|---------|
| | MATERIAL CATEGORY | Landfill | Landfill | Fibre | Fibre | Containers | Containers | Generation (kg) | Total | Rate |
| | | Weights (kg) | | Weights (kg) | | Weights (kg) | | | | |
| | 3. COMPOSTABLES | 5,758 | 29.2% | 53 | 4.1% | 22 | 4.0% | 5,833 | 27.0% | |
| Organic | Food Waste | 4,575 | 23.2% | 49 | 3.8% | 22 | 4.0% | 4,646 | 21.5% | |
| Organic | Tissue/Towelling | 718 | 3.6% | 4 | 0.3% | 0 | 0.0% | 722 | 3.3% | |
| Organic | Pet Waste - other than Dog waste | 437 | 2.2% | 0 | 0.0% | 0 | 0.0% | 437 | 2.0% | |
| Organics | Other | 28 | 0.1% | 0 | 0.0% | 0 | 0.0% | 28 | 0.1% | |
| | 4. OTHER WASTE MATERIALS | 9,409 | 47.7% | 81 | 6.4% | 123 | 22.0% | 9,614 | 44.6% | |
| Other | Textiles | 1,262 | 6.4% | 4 | 0.3% | 7.8 | 1.4% | 1,275 | 5.9% | |
| Glass | Other Glass | 178 | 0.9% | 1 | 0.1% | 4 | 0.7% | 182 | 0.8% | |
| Paper | Bleached Long Polycoat Fibre | 64 | 0.3% | 4 | 0.3% | 3 | 0.6% | 71 | 0.3% | |
| Paper | Paper Laminate Packaging- all types | 25 | 0.1% | 4 | 0.3% | 0 | 0.0% | 29 | 0.1% | |
| Plastic | #1 PET Thermoform - Clear - Blister Packaging | 5 | 0.0% | 0 | 0.0% | 1 | 0.1% | 6 | 0.0% | |
| Plastic | Flexible Film Plastic - LDPE and HDPE | 786 | 4.0% | 11 | 0.8% | 25 | 4.4% | 821 | 3.8% | |
| Plastic | LDPE/HDPE Film - Products - non-packaging | 106 | 0.5% | 0 | 0.0% | 10 | 1.7% | 115 | 0.5% | |
| Plastic | #6 PS - Expanded Polystyrene | 99 | 0.5% | 4 | 0.3% | 2 | 0.3% | 105 | 0.5% | |
| Plastic | #6 PS - Non-expanded Polystyrene | 72 | 0.4% | 2 | 0.1% | 7 | 1.2% | 81 | 0.4% | |
| Plastic | Plastic Laminates and Other Film Packaging | 139 | 0.7% | 1 | 0.1% | 2 | 0.3% | 142 | 0.7% | |
| Plastic | Other Rigid Non-Container or Unmarked Packaging | 1 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 0.0% | |
| Plastic | Other Plastics - (non-packaging/durable) | 506 | 2.6% | 6 | 0.5% | 26 | 4.6% | 537 | 2.5% | |
| Metal | Other Aluminum (non-packaging) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Metal | Other Steel (non-packaging) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Other | Building Renovations | 1,988 | 10.1% | 19 | 1.5% | 0 | 0.0% | 2,007 | 9.3% | |
| Other | WEEE - Phase 1 and Phase 2 | 301 | 1.5% | 0 | 0.0% | 1 | 0.1% | 302 | 1.4% | |
| Other | Electronics and Electrical | 177 | 0.9% | 1 | 0.1% | 6 | 1.1% | 185 | 0.9% | |
| Other | Certified Compostable Plastic Liners | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Other | Bulkies | 371 | 1.9% | 0 | 0.0% | 0 | 0.0% | 371 | 1.7% | |
| Other | Scrap Metal | 657 | 3.3% | 3 | 0.2% | 25 | 4.4% | 685 | 3.2% | |
| Other | Diapers and Sanitary Products | 1,153 | 5.8% | 5 | 0.4% | 0 | 0.1% | 1,158 | 5.4% | |
| Other | Pet Waste - Dog Waste | 144 | 0.7% | 5 | 0.4% | 2 | 0.3% | 151 | 0.7% | |
| Other | Soil and Sod | 604 | 3.1% | 0 | 0.0% | 0 | 0.0% | 604 | 2.8% | |
| Other | Empty Coffee Capsules | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Other | Full Coffee Capsules | 13 | 0.1% | 0 | 0.0% | 2 | 0.4% | 15 | 0.1% | |
| HHW | Pressurized Containers | 24 | 0.1% | 0 | 0.0% | 0 | 0.0% | 24 | 0.1% | |
| HHW | Batteries | 16 | 0.1% | 0 | 0.0% | 0 | 0.0% | 16 | 0.1% | |
| HHW | Other Hazardous Waste (paint, tubes, etc.) | 52 | 0.3% | 1 | 0.1% | 0 | 0.0% | 53 | 0.2% | |
| Other | Other | 669 | 3.4% | 10 | 0.8% | 1 | 0.2% | 680 | 3.2% | |
| Total | | 19,725 | 100.0% | 1,280 | 100.0% | 560 | 100.0% | 21,565 | 100.0% | |

3.3 **Garbage Stream Composition**

A total of 19,725 kg of material was estimated directly as originating from the garbage dumpsters. The top items by weight in the Garbage steam are listed below and each accounted for greater than 2% of the landfill total. Of the 67 material categories, 14 of them accounted for 81% of the estimated landfilled weight.

| Rank | Material Category | Weight (kg) | Percentage |
|------|--|-------------|------------|
| 1 | Food Waste | 4,575 | 23.2% |
| 2 | Building Renovations | 1,988 | 10.1% |
| 3 | Printed Paper | 1,452 | 7.4% |
| 4 | Textiles | 1,262 | 6.4% |
| 5 | Diapers and Sanitary Products | 1,153 | 5.8% |
| 6 | Flexible Film Plastic - LDPE and HDPE | 786 | 4.0% |
| 7 | Tissue/Towelling | 718 | 3.6% |
| 8 | Other | 669 | 3.4% |
| 9 | Scrap Metal | 657 | 3.3% |
| 10 | Cardboard | 644 | 3.3% |
| 11 | Soil and Sod | 604 | 3.1% |
| 12 | Other Plastics - (non-packaging/durable) | 506 | 2.6% |
| 13 | Boxboard - All Types | 449 | 2.3% |
| 14 | Pet Waste - other than Dog waste | 437 | 2.2% |
| | Top Material Weight | 15,899 | 80.6% |
| | Total Landfill Weight | 19,725 | 100.0% |

The most significant landfilled material was Food Waste at 23.2% or almost one-quarter of the total landfilled weight and could have been composted if a Green Bin program were implemented. Building Renovations accounted for 10.1% of the total and included items such as wood, bricks, insulation, ceiling tiles, soffits, floor tiles, gyproc/drywall, and cement. Printed Paper at 7.4% was significant and could have been recycled within the Fibre recycling program. Textiles comprised 6.4% and included a range of items such as clothes, area rugs, luggage, blankets, and shoes mainly. It is understood that Wiggins Private has bed bug issues within some of the units and so some of the textiles could have either been actually or suspected of being infested. Diapers and Sanitary Products made up 5.8% and there is currently no diversion option available. Flexible Film Plastic – LDPE and HDPE accounted for 4.0% of the total and consisted of plastic bags and other film plastics which are not readily recyclable in the Mixed Containers program. Tissue/Towelling was found to be about 3.6% and could have been composted if a Green Bin program were implemented.

The material category of **Other** at **3.4%** contained a mix of many different items, not of which are readily recyclable. Examples include patient glucose/calcium IV bags, plastic/nylon/metal lawnmower bags, cigarette butts, umbrellas, binders, tires, carpet washer, rubber mats, etc. Scrap Metal at 3.3% included door hinges, latches, pump, car parts, tubes, racks, pots, platforms, muffin molds, fans, etc. It is suspected that some occupants may think that all types of metal are accepted in the Mixed Containers program even though the items listed above are contaminants. Cardboard accounted for 3.3% and was recyclable in the Fibre recycling program. Soil and Sod was present in large quantity during the November 15 sample and overall at 3.1%. This material could have been diverted to a Green Bin program or otherwise used for landscaping purposes. Other Plastics – Non-Packaging/Durable) comprised 2.6% and included crates, toys, hangers, tarps, CD cases, tubing, etc. Boxboard – All Types was found at 2.3% of total landfill and was recyclable in the Fibre recycling program. Pet Waste – other than Dog waste, consisting primarily of kitty litter, comprised 2.2% and could have been diverted to a Green bin program.

In summary terms, **32.1%**, or almost one-third of the landfill waste could have been **composted** if Food Waste (23.2%), Tissue/Towelling (3.6%), Soil and Sod (3.1%), and Pet Waste – other than Dog waste (2.2%) were included in a future program. A total of **13.7%** of the landfill waste could have been diverted via the existing **Fibre recycling program** if Printed Paper (7.4%), Cardboard (3.3%), Boxboard – All Types (2.3%), Boxboard/Cores/Molded Pulp (0.7%) and Kraft Paper (0.1%). Finally, although each item in the Mixed Containers program is below 2% individually, the acceptable **Mixed Containers** categories collectively accounted for **9.4%** of the landfilled weight. Therefore, in theory, about **55%** or slightly over half of the landfilled waste could have been diverted in a current recycling program and a future composting program.

3.4 Fibre Recycling Stream Composition

A total of 1,280 kg of material originated from the Fibre recycling bins. The top 10 items by weight in the Fibre Recycling steam are listed below and collectively account for 95% of the Fibre recycling stream weight.

| Rank | Material Category | Weight (kg) | Percentage |
|------|---------------------------------------|-------------|------------|
| 1 | Cardboard | 572 | 44.7% |
| 2 | Printed Paper | 378 | 29.5% |
| 3 | Boxboard - All Types | 128 | 10.0% |
| 4 | Food Waste | 49 | 3.8% |
| 5 | Boxboard/Cores/Molded Pulp | 28 | 2.1% |
| 6 | Building Renovations | 19 | 1.5% |
| 7 | Flexible Film Plastic - LDPE and HDPE | 11 | 0.8% |
| 8 | Other | 10 | 0.8% |
| 9 | Kraft Paper | 7 | 0.6% |
| 10 | Gable Top Cartons | 8 | 0.6% |
| | Top Material Weight | 1,210 | 94.5% |
| | Total Fibre Recycling Stream Weight | 1,280 | 100.0% |

Acceptable paper fibres including Cardboard, Printed Paper, Boxboard – All Types, Boxboard/Cores/Molded Pulp and Kraft Paper comprised **87.0**% of the total weight. Total **contaminants** accounted for **13**% of which Food Waste (3.8%) and Building Renovations (1.5%) were the most significant.

3.5 **Mixed Containers Recycling Stream Composition**

A total of 560 kg of material originated from the Mixed Containers recycling bins. The top 20 items by weight in the Mixed Containers Recycling steam are listed below and collectively account for 91% of the weight.

| Rank | Material Category | Weight (kg) | Percentage |
|------|---|-------------|------------|
| 1 | #1 PET Bottles and Jars - non alcoholic | 83 | 14.8% |
| 2 | Clear Glass - Food and Beverage | 68 | 12.1% |
| 3 | Steel Food and Beverage Cans | 45 | 8.0% |
| 4 | #2 - HDPE Bottles and Jugs non-alcoholic | 40 | 7.2% |
| 5 | Printed Paper | 32 | 5.6% |
| 6 | Scrap Metal | 25 | 4.4% |
| 7 | Other Plastics - (non-packaging/durable) | 26 | 4.6% |
| 8 | Flexible Film Plastic - LDPE and HDPE | 25 | 4.4% |
| 9 | Food Waste | 22 | 4.0% |
| 10 | #1 PET Thermoform - Clear | 19 | 3.4% |
| 11 | #5 -Other PP Containers | 17 | 3.0% |
| 12 | Cardboard | 17 | 3.1% |
| 13 | Boxboard - All Types | 16 | 2.8% |
| 14 | Coloured Glass - Food and Beverage | 16 | 2.8% |
| 15 | Coloured Glass - Alcoholic Beverage | 12 | 2.1% |
| 16 | Aluminum Food and Beverage | 12 | 2.1% |
| 17 | LDPE/HDPE Film - Products - non-packaging | 10 | 1.7% |
| 18 | Gable Top Cartons | 8 | 1.5% |
| 19 | Clear Glass - Alcoholic Beverage | 8 | 1.5% |
| 20 | Textiles | 8 | 1.4% |
| | Top Material Weight | 507 | 90.5% |
| | Total Fibre Recycling Stream Weight | 560 | 100.0% |

Overall, acceptable material made up 62% of the Mixed Containers recycling stream as shown in **Table 4.** Contamination made up the remaining 38% and included a mix of recyclable paper, scrap metal, non-recyclable plastics, food waste, and textiles. Although the estimated weights of contamination are not large in the context of the overall waste generation, in a relative sense, occupants would seem to require some guidance regarding acceptable and unacceptable materials for Mixed Containers recycling.

Other Observations- Hazardous Items 3.6

In terms of hazardous materials, they were negligible in terms of weights. Other Hazardous Wastes (paint, tubes, etc.) were 0.2% in terms of overall generation across all streams and batteries were 0.1%. However, strictly speaking they should not be disposed of in the solid non-hazardous waste stream.

In the November 8 sample, a barbecue propane tank was found mixed in with the Garbage sample. This suggests that the tank had been tossed into one of the front-end load bins at Wiggins Private and then emptied into the garbage collection vehicle. Given that the collection vehicle has a compression ram to compact the garbage, there was a definite chance the tank could have been ruptured potentially leading to a very serious health and safety issue either in the truck itself or when the garbage was dumped outside of the HHW building. Fortunately, the tank did not appear to be ruptured and was placed inside the designated storage area for hazardous waste at TRLS. It should be made clear to all parties at Wiggins Private that this is not acceptable, although it is possible the propane tank did not originate at Wiggins Private. It is not known if this instance was an isolated incident or more frequent since it only was observed once during the audit.

Biomedical waste was encountered in the form of **needles** of which many were uncapped. In particular, during the November 15 sample, a compromised sharps container containing several needles was found in the Garbage sample and many of the needles had spilled out. The audit crew exercised extreme caution and deposited the needles back into the undamaged sharps container used during the audit for containing them. After the audit, the sharps container was disposed of at a Shoppers Drugmart pharmacy that provided the initial empty container for the audit. The presence of a sharps container in the solid non-hazardous garbage stream suggests that procedures at Wiggins Private need review to ensure biomedical waste such as sharps are not disposed of in the solid nonhazardous waste stream

Wiggins Private Multi-Residential Community Waste and Recycling Audit – June 2018

PREPARED FOR:



Laureen DiNardo Project Manager, Environmental Programs Business & Technical Support Services Public Works & Environmental Services Department Phone: 613-580-2424 ext.14809

PREPARED BY:



Viridis Environmental Inc. 777 Kingfisher Crescent Ottawa, ON, K1E 2L5 Phone: (613) 845-9819 Fax: (613) 482-4879

viridis@rogers.com

EXECUTIVE SUMMARY

As part of on-going efforts to improve the waste diversion rates across the residential and multi-residential sectors, the City of Ottawa (City) commissions periodic waste audits of the garbage and recycling/composting streams. The purpose of these audits is to determine the overall waste diversion rate as well as composition of the waste streams and the associated capture rates and contamination rates of the waste diversion programs. The City identified the multi-residential community of Wiggins Private (600 units) to be audited in order to provide a baseline measurement of waste diversion and then a subsequent measurement after the implementation of the City's pilot Bin-Wrap program slated for early 2018. This report represents the June 2018 measurement of the waste composition and diversion status at Wiggins Private and follows from the November 2017 sample. The waste audit was conducted on waste and recyclables collected on June 6, 13, 20, and 27 and delivered to the Trail Road Landfill Site (TRLS).

The table below shows the overall results corrected for contamination within the recycling streams. The figures in **green** show weights for acceptable materials while the **red** figures identify weights of contamination within the recycling programs. In overall terms, the estimated **waste diversion rate** is **8.9%**. The **capture rates** of Fibre and Mixed Containers recycling streams are **40%** and **23%** respectively. With respect to **contamination rates**, the overall results were **7%** for Fibre and **28%** for Mixed Containers. The total amount of contamination was estimated at 308 kg in the recycling streams, so the amount of landfilled waste would effectively rise to 20,633 kg (20,325 kg in garbage bins + 308 kg contamination in recycling bins).

Wiggins Private Sample Weights and Totals Estimate – June 2018¹

| Waste Stream | Landfill (kg) | Fibre (kg) | Mixed Containers (kg) | Total (kg) | Capture Rate |
|-----------------------------|---------------|------------|-----------------------|------------|--------------|
| Acceptable Fibre | 2,182 | 1,501 | 93 | 3,777 | 40% |
| Acceptable Mixed Containers | 1,720 | 19 | 520 | 2,259 | 23% |
| Compostables | 8,444 | 8 | 6 | 8,457 | n/a |
| Other | 7,980 | 82 | 100 | 8,162 | n/a |
| Total Weight | 20,325 | 1,610 | 720 | 22,655 | |
| Contamination Rate | | 7% | 28% | | |
| Diversion Rate | | | | 8.9% | |

In summary terms, **41.5%**, of the landfill waste could have been **composted** if Food Waste (16.6%), Tissue/Towelling (2.7%), and Pet Waste – other than Dog waste (2.0%) were included in a future program and if **Leaf and Yard Waste (LYW 20.3%)** were disposed of **correctly in the existing LYW collection program at Wiggins Private.** A total of **10.7%** of the landfill waste could have been diverted via the existing **Fibre recycling program** by diverting Printed Paper (4.7%), Cardboard (3.0%), Boxboard – All Types (2.3%), Boxboard/Cores/Molded Pulp (0.4%) and Kraft Paper (0.4%). Finally, although each item in the Mixed Containers program is below 2% individually with the exception of #1 **PET Bottles and Jars – Non Alcoholic (2.1%)**, the acceptable **Mixed Containers** categories collectively accounted for **8.5%** of the landfilled

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¹ Where numbers do not add, this is due to rounding.

weight. Therefore, in theory, about **61%** or almost two-thirds of the landfilled waste in June 2018 could have been diverted to a current recycling program and a future composting program.

In terms of hazardous materials, they were negligible in terms of weights. Other Hazardous Wastes (paint, tubes, etc.) were 0.2% in terms of overall generation across all streams and batteries were almost 0%. However, strictly speaking they should not be disposed of in the solid non-hazardous waste stream.

In the June 6 sample, **two small fire extinguishers** were found mixed in with the Garbage sample. It should be made clear to all parties at Wiggins Private that this is not acceptable, although it is possible the fire extinguishers did not originate at Wiggins Private.

Biomedical waste was encountered in the form of **needles** of which a few were uncapped. In particular, during the June 6 sample, an intact sharps container containing several needles was found in the Garbage sample. Although the sharps container did not appear compromised, the presence of a sharps container in the solid non-hazardous garbage stream suggests that procedures at Wiggins Private need review to ensure biomedical waste such as sharps are not disposed of in the solid non-hazardous waste stream.

With respect to performance metrics, the June 2018 sample had higher capture rates for Fibre and Mixed Containers than in November 2017. The Fibre capture rate in June 2018 was 40% compared to 29% in November 2017. For Mixed Containers, the capture rate in June 2018 was 23% compared to 16% in November 2017. Contamination rates also improved in the June 2018 sample with 7% for Fibre and 28% for Mixed Containers as compared to the November 2017 contamination rates of 13% for Fibre and 38% for Mixed Containers. Finally, the overall diversion rate in June 2018 increased to 8.9% compared to the 6.8% diversion rate estimated in November 2017.

Comparison of November 2017 and June 2018 Sample Results

| | | | | | Mixed | Mixed | | | | |
|-----------------------------|-----------------|-----------------|--------------|--------------|-----------------|-------------------|--------------|--------------|--------------|----------------|
| | Landfill (kg) - | Landfill (kg) - | Fibre (kg) - | Fibre (kg) - | Containers (kg) | Containers (kg) - | Total (kg) - | Total (kg) - | Capture Rate | Capture Rate - |
| Waste Stream | Nov 2017 | June 2018 | Nov 2017 | June 2018 | Nov 2017 | June 2018 | Nov 2017 | June 2018 | Nov 2017 | June 2018 |
| Acceptable Fibre | 2,703 | 2,182 | 1,113 | 1,501 | 67 | 93 | 3,884 | 3,777 | 29% | 40% |
| Acceptable Mixed Containers | 1,855 | 1,720 | 33 | 19 | 347 | 520 | 2,234 | 2,259 | 16% | 23% |
| Compostables | 5,758 | 8,444 | 53 | 8 | 22 | 6 | 5,833 | 8,457 | n/a | n/a |
| Other | 9,409 | 7,980 | 81 | 82 | 123 | 100 | 9,614 | 8,162 | n/a | n/a |
| Total Weight | 19,725 | 20,325 | 1,280 | 1,610 | 560 | 720 | 21,565 | 22,655 | | |
| | | | | | | | | | | |
| Performance Metrics | | | | | | | | | | |
| Contamination Rate | | | 13% | 7% | 38% | 28% | | | | |
| Diversion Rate | | | | | | | 6.8% | 8.9% | | |

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APPENDIX A – WASTE CATEGORIES

1.0 Introduction

The City of Ottawa (City) provides waste collection services for the residential and multi-residential sectors within its borders. The waste streams available include landfill garbage, fibre recycling, mixed containers recycling, and organics composting. In the case of the residential service, the waste collection system for divertible material includes the Black Box (fibre), Blue Box (mixed containers), and Green Bin (organics composting). In the case of multi-residential dwellings, the collection of landfill garbage, fibre, and mixed containers is standard and some, although not all, multi-residential units receive Green Bin service as well.

As part of on-going efforts to improve the waste diversion rates across the residential and multi-residential sectors, the City commissions periodic waste audits of the garbage and recycling/composting streams. The purpose of these audits is to determine the overall waste diversion rate as well as composition of the waste streams and the associated capture rates and contamination rates of the waste diversion programs. The City identified the multi-residential community of Wiggins Private (600 units) to be audited in order to provide a baseline measurement of waste diversion and then a subsequent measurement after the implementation of the City's pilot Bin-Wrap program slated for early 2018.

This report represents the June 2018 measurement of the waste composition and diversion status at Wiggins Private after the pilot Bin-Wrap program was implemented in January 2018. The waste audit was conducted on waste and recyclables collected on June 6, 13, 20, and 27 and delivered to the Trail Road Landfill Site (TRLS). The waste and recycling samples were sorted and weighed by Viridis Environmental Incorporated (Viridis) in partnership with Rideau Social Enterprises (RSE), both located in Ottawa.

2.0 Methodology

2.1 Sample Timeline and Definition

The June 2018 waste and recycling audit of Wiggins Private was conducted on 4 consecutive Wednesdays including June 6, 13, 20, and 27. The samples were delivered to TRLS just outside the old Household Hazardous Waste (HHW) building. The sample details are shown in **Table 1**.

Table 1: Waste Collection Details for Wiggins Private – June 2018

| Waste Stream | 2018-06-06- Sample Bins Collected | 2018-06-13 - Sample Bins Collected | 2018-06-20 - Sample Bins Collected | 2018-06-27 - Sample Bins Collected | Total Bins at Wiggins Private | Collection Service | |
|------------------|---|--|--|--|----------------------------------|--------------------|--|
| Garbage | 6 | 6 | 6 | 6 | 15 | Weekly | |
| Fibre | 10 | 10 | 10 | 10 | 10 | Weekly | |
| Mixed Containers | 0 | 11 | 0 | 11 | 11 | Every 2 Weeks | |

There are a total of 15 garbage bins, 10 fibre bins, and 11 mixed containers bins (all front end load) servicing a total of 600 units. As part of the Stewardship Ontario waste audit methodology and also consistent with previous City waste audits, a sample size of 100 units was determined to be appropriate for providing a reasonable level of confidence in the waste audit figures.

In the case of the **Garbage** stream, this meant that of the 15 bins on site, approximately 3 of them would, on average, contain waste from approximately 120 multi-residential units. The City delivered 6 bins worth of garbage to TRLS each Wednesday which was separated into 2 piles and one of the piles randomly selected for sorting and weighing. The selected pile could reasonably be assumed to comprise approximately 120 units worth of waste (3 bins equivalent * 40 units average per bin) and thus meeting the target sample size of at least 100 units.

For **Fibre recycling**, all of the bins at Wiggins Private were collected each week and delivered to TRLS. Similar to Garbage, the 10 bins worth of material were separated into 2 piles and one of the piles randomly selected for sorting and weighing. The selected pile could reasonably be assumed to comprise approximately 300 units worth of waste (5 bins equivalent * 60 units average per bin) and thus meeting the target sample size of at least 100 units.

For **Mixed Containers recycling**, all of the bins at Wiggins Private were collected every 2 weeks and delivered to TRLS. Similar to Mixed Fibre, the 11 bins worth of material were separated into 2 piles and one of the piles randomly selected for sorting and weighing. The selected pile could reasonably be assumed to comprise approximately 300 units worth of waste (5.5 bins equivalent * 54.5 units average per bin) and thus meeting the target sample size of at least 100 units.

2.2 Sorting Procedure

The selected piles of garbage and recycling were moved inside the HHW building for sorting and weighing while the remaining piles were disposed of in roll-off containers provided by the TRLS. The audit crew, consisting of 8-10 members on average, proceeded to sort the Garbage stream first by placing portions of the pile on the sort tables. The crew then sorted the material into the waste categories specified in the Request for Proposal (see Appendix A). The empty sort containers used to contain the material were tared on the digital scale first and then weighing of the sorted material was conducted. The weights were recorded on the data entry forms. The same procedure was followed for both Fibre recycling and Mixed Containers recycling which were sorted respectively after the Garbage sample was completed. Once material had been weighed, it was taken out to the roll-off containers for disposal.

2.3 Data Collection

There were two primary sources of data for the results in this report. The first source was the overall weight totals from the TRLS scale for the Garbage, Fibre, and Mixed Containers delivered to the site. The second source of data were the weights taken during the sort used to determine waste composition. The composition of the waste streams was determined by applying the proportions of the material categories in each waste stream by the overall TRLS scale weight for the waste stream. This procedure was repeated for each weekly sample with the final totals reflecting the sum of estimated weights for the material categories in each waste stream.

The weights derived from the overall hauling totals and waste sort were used to calculate the performance metrics of diversion rate as well as the capture rates and contamination rates in the Fibre and Mixed Containers recycling programs.

3.0 Results

3.1 Overall Totals

Table 2 shows a total of 22,655 kg of material across all waste streams was delivered to TRLS during the audit. Of this total, 8,130 kg were Garbage, 1,610 kg were in the Fibre recycling stream, and 720 kg were in the Mixed Containers Stream. As discussed in Section 2.1, 6 out of 15 garbage bins were delivered each week, so the 8,130 kg did not reflect all the garbage generated at Wiggins Private. Consequently, the 8,130 kg was prorated to reflect the estimated garbage generated from all 15 bins during June 2018. The average weight per garbage bin was estimated at 338.75 kg. With 15 garbage bins collected each week for 4 weeks, this equates to 60 garbage bins total * 338.75 kg or 20,325 kg total for Garbage. The Fibres and Mixed Containers recycling streams did not require any proration because all materials in those recycling bins were delivered to TRLS in June 2018.

Based on the hauling totals alone, the diversion rate would suggest 10%, but this is not entirely accurate because it does not account for any contamination within the Fibre and Mixed Containers Recycling streams. The contamination within the recycling streams was accounted for during the sort and is shown in the figures in the subsequent tables.

Table 2: Wiggins Private Sample Weights and Totals Estimate – June 2018

| Date Garbage (kg) Fibre (kg) Containers (kg) Total (kg) Diversi | | | | | | | |
|---|--------------|------------|-----------------|------------|----------------|--|--|
| Date | Garbage (kg) | rible (kg) | Containers (kg) | TOTAL (Kg) | Diversion Rate | | |
| | | | | | | | |
| 06-Jun-18 | 2,370 | 490 | 0 | 2,860 | | | |
| 13-Jun-18 | 1,940 | 400 | 440 | 2,780 | | | |
| 20-Jun-18 | 2,090 | 350 | 0 | 2,440 | | | |
| 27-Jun-18 | 1,730 | 370 | 280 | 2,380 | | | |
| | 8,130 | 1,610 | 720 | 10,460 | | | |
| | | | | | | | |
| Total Dumpsters Collected (Sample) | 24 | 40 | 22 | | | | |
| Weight per dumpster (kg) | 338.75 | 40.25 | 32.73 | | | | |
| Actual Dumpsters | 60 | 40 | 22 | | | | |
| Total Actual Weight (kg) | 20,325 | 1,610 | 720 | 22,655 | 10% | | |
| Weekly Generation (kg) | 5,081 | 403 | 180 | 5,664 | 10% | | |
| kg/unit/week (600 units) | 8.5 | 0.7 | 0.3 | 9.4 | 10% | | |

Table 3 shows the overall results corrected for contamination within the recycling streams. The figures in **green** show weights for acceptable materials while the **red** figures identify weights of contamination within the recycling programs. In overall terms, the estimated **waste diversion rate** is **8.9%**. The **capture rates** of Fibre and Mixed Containers recycling streams are **40%** and **23%** respectively. With respect to **contamination rates**, the overall results were **7%** for Fibre and **28%** for Mixed Containers. The total amount of contamination was estimated at 308 kg in the recycling streams, so the amount of landfilled waste would effectively rise to 20,633 kg (20,325 kg in garbage bins + 308 kg contamination in recycling bins).

Table 3: Corrected Wiggins Private Sample Weights and Totals Estimate – June 2018

| Waste Stream | Landfill (kg) | Fibre (kg) | Mixed Containers (kg) | Total (kg) | Capture Rate |
|-----------------------------|---------------|------------|-----------------------|------------|--------------|
| Acceptable Fibre | 2,182 | 1,501 | 93 | 3,777 | 40% |
| Acceptable Mixed Containers | 1,720 | 19 | 520 | 2,259 | 23% |
| Compostables | 8,444 | 8 | 6 | 8,457 | n/a |
| Other | 7,980 | 82 | 100 | 8,162 | n/a |
| Total Weight | 20,325 | 1,610 | 720 | 22,655 | |
| Contamination Rate | | 7% | 28% | | |
| Diversion Rate | | | | 8.9% | |

3.2 Waste Stream Composition

Table 4 provides the complete breakdown of garbage and recycling composition estimated for Wiggins Private in June 2018. There were a total of 67 material categories used during the waste sort. The figures in **green** represent acceptable material in the Fibre or Mixed Containers recycling stream while **red** represents contamination. The weights, percentages of composition, total generation, and capture rates are shown in the columns for each material category.

Table 4: Detailed Garbage and Recycling Waste Stream Composition – June 2018

| | | | % of | | % of | Mixed | % of Mixed | Total | % of | Capture |
|---------|---|--------------|----------|--------------|-------|--------------|------------|-----------------|-------|---------|
| | MATERIAL CATEGORY | Landfill | Landfill | Fibre | Fibre | Containers | Containers | Generation (kg) | Total | Rate |
| | | Weights (kg) | | Weights (kg) | | Weights (kg) | | | | |
| | 1. ACCEPTABLE FIBRE | 2,182 | 10.7% | 1,501 | 93.3% | 93 | 13.0% | 3,777 | 16.7% | 39.8% |
| Paper | Printed Paper | 945 | 4.7% | 734 | 45.6% | 77 | 10.8% | 1,757 | 7.8% | 41.8% |
| Paper | Cardboard | 612 | 3.0% | 603 | 37.5% | 0 | 0.0% | 1,215 | 5.4% | 49.6% |
| Paper | Boxboard - All Types | 458 | 2.3% | 124 | 7.7% | 11 | 1.5% | 594 | 2.6% | 20.9% |
| Paper | Boxboard/Cores/Molded Pulp | 91 | 0.4% | 21 | 1.3% | 3 | 0.5% | 116 | 0.5% | 18.3% |
| Paper | Kraft Paper | 75 | 0.4% | 19 | 1.2% | 1 | 0.2% | 95 | 0.4% | 19.7% |
| | 2. ACCEPTABLE MIXED CONTAINERS | 1,720 | 8.5% | 19 | 1.2% | 520 | 72.3% | 2,259 | 10.0% | 23.0% |
| Glass | Clear Glass - Food and Beverage | 326 | 1.6% | 1 | 0.0% | 123 | 17.1% | 450 | 2.0% | 27.3% |
| Glass | Clear Glass - Alcoholic Beverage | 44 | 0.2% | 1 | 0.1% | 9.1 | 1.3% | 54 | 0.2% | 16.7% |
| Glass | Coloured Glass - Food and Beverage | 36 | 0.2% | 0 | 0.0% | 15 | 2.1% | 51 | 0.2% | 29.8% |
| Glass | Coloured Glass - Alcoholic Beverage | 37 | 0.2% | 0 | 0.0% | 6.9 | 1.0% | 44 | 0.2% | 15.9% |
| Metal | Aluminum Food and Beverage | 71 | 0.3% | 0 | 0.0% | 22.2 | 3.1% | 94 | 0.4% | 23.8% |
| Metal | Aluminum Food and Beverage - Alcoholic | 27 | 0.1% | 0 | 0.0% | 13 | 1.8% | 40 | 0.2% | 31.9% |
| Metal | Aluminum Foil and Trays | 54 | 0.3% | 0 | 0.0% | 2 | 0.3% | 57 | 0.2% | 3.8% |
| Metal | Aluminum Aerosol Cans | 3 | 0.0% | 0 | 0.0% | 0 | 0.0% | 3 | 0.0% | 0.0% |
| Metal | Steel Food and Beverage Cans | 153 | 0.8% | 0 | 0.0% | 44 | 6.1% | 197 | 0.9% | 22.3% |
| Metal | Steel Aerosol Container | 34 | 0.2% | 2 | 0.1% | 2 | 0.3% | 37 | 0.2% | 5.4% |
| Metal | Paint Cans | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | n/a |
| Paper | Asceptic Containers - non Alcoholic | 30 | 0.1% | 2 | 0.1% | 10 | 1.3% | 41 | 0.2% | 23.6% |
| Paper | Asceptic Containers - Alcoholic | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | n/a |
| Paper | Gable Top Cartons | 50 | 0.2% | 6 | 0.3% | 14.3 | 2.0% | 69 | 0.3% | 20.6% |
| Paper | Polycoated Paper Ice Cream Containers | 3 | 0.0% | 0 | 0.0% | 1 | 0.1% | 4 | 0.0% | 21.4% |
| Paper | Spiral Wound | 19 | 0.1% | 0 | 0.0% | 2 | 0.3% | 21 | 0.1% | 11.0% |
| Plastic | #1 PET Bottles and Jars - non alcoholic | 427 | 2.1% | 3 | 0.2% | 110 | 15.3% | 540 | 2.4% | 20.4% |
| Plastic | #1 PET Bottles and Jars - non alcoholic >= 5 L | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | n/a |
| Plastic | #1 PET Bottles - alcoholic beverages | 2 | 0.0% | 0 | 0.0% | 0 | 0.0% | 2 | 0.0% | 5.7% |
| Plastic | #1 PET Thermoform - Clear | 96 | 0.5% | 2 | 0.1% | 40 | 5.6% | 138 | 0.6% | 29.4% |
| Plastic | #1 PET Thermoform - Coloured | 9 | 0.0% | 0 | 0.0% | 4 | 0.6% | 13 | 0.1% | 32.6% |
| Plastic | #2 - HDPE Bottles and Jugs non-alcoholic | 148 | 0.7% | 2 | 0.1% | 46 | 6.4% | 196 | 0.9% | 23.6% |
| Plastic | #2 HDPE Bottles and Jars - non alcoholic >= 5 L | 21 | 0.1% | 0 | 0.0% | 13 | 1.8% | 34 | 0.2% | 37.3% |
| Plastic | #2 HDPE Bottles - alcoholic beverages | 1 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 0.0% | n/a |
| Plastic | #2 HDPE - Other HDPE containers | 4 | 0.0% | 0 | 0.0% | 0 | 0.0% | 4 | 0.0% | 0.0% |
| Plastic | #5 PP Bottles | 10 | 0.1% | 0 | 0.0% | 1 | 0.2% | 12 | 0.1% | 12.1% |
| Plastic | #5 -Other PP Containers | 114 | 0.6% | 0 | 0.0% | 38 | 5.3% | 152 | 0.7% | 25.0% |
| Plastic | Other Rigid Plastic Packaging (#3, #4, #7) | 3 | 0.0% | 0 | 0.0% | 2 | 0.3% | 5 | 0.0% | 42.5% |
| Plastic | Large HDPE & PP Pails and Lids (< 5 L > 20 L) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | n/a |

Table 4: Detailed Garbage and Recycling Waste Stream Composition – June 2018 (Continued)

| | MATERIAL CATEGORY | Landfill | % of Landfill | Fibre | % of Fibre | Mixed Containers | % of Mixed Containers | Total Generation (kg) | % of Total | Capture Rate |
|----------|---|--------------|------------------|--------------|---------------|---------------------|--------------------------|--------------------------|---------------|-----------------|
| | | Weights (kg) | | Weights (kg) | | Weights (kg) | | | | |
| | 3. COMPOSTABLES | 8,444 | 41.5% | 8 | 0.5% | 6 | 0.8% | 8,457 | 37.3% | |
| Organic | Food Waste | 3,366 | 16.6% | 3 | 0.2% | 6 | 0.8% | 3,375 | 14.9% | |
| Organic | Tissue/Towelling | 541 | 2.7% | 3 | 0.2% | 0 | 0.0% | 545 | 2.4% | |
| Organic | Pet Waste - other than Dog waste | 414 | 2.0% | 0 | 0.0% | 0 | 0.0% | 414 | 1.8% | |
| Organics | Other - LYW | 4,123 | 20.3% | 1 | 0.1% | 0 | 0.0% | 4,124 | 18.2% | |
| | 4. OTHER WASTE MATERIALS | 7,980 | 39.3% | 82 | 5.1% | 100 | 13.9% | 8,162 | 36.0% | |
| Other | Textiles | 1,742 | 8.6% | 6 | 0.4% | 3.1 | 0.4% | 1,751 | 7.7% | |
| Glass | Other Glass | 309 | 1.5% | 1 | 0.1% | 9 | 1.3% | 319 | 1.4% | |
| Paper | Bleached Long Polycoat Fibre | 35 | 0.2% | 2 | 0.1% | 4 | 0.5% | 41 | 0.2% | |
| Paper | Paper Laminate Packaging- all types | 9 | 0.0% | 2 | 0.1% | 3 | 0.4% | 14 | 0.1% | |
| Plastic | #1 PET Thermoform - Clear - Blister Packaging | 5 | 0.0% | 0 | 0.0% | 0 | 0.0% | 5 | 0.0% | |
| Plastic | Flexible Film Plastic - LDPE and HDPE | 618 | 3.0% | 8 | 0.5% | 32 | 4.5% | 658 | 2.9% | |
| Plastic | LDPE/HDPE Film - Products - non-packaging | 170 | 0.8% | 0 | 0.0% | 0 | 0.0% | 170 | 0.8% | |
| Plastic | #6 PS - Expanded Polystyrene | 84 | 0.4% | 2 | 0.1% | 3 | 0.3% | 89 | 0.4% | |
| Plastic | #6 PS - Non-expanded Polystyrene | 35 | 0.2% | 0 | 0.0% | 5 | 0.7% | 40 | 0.2% | |
| Plastic | Plastic Laminates and Other Film Packaging | 163 | 0.8% | 2 | 0.1% | 1 | 0.1% | 166 | 0.7% | |
| Plastic | Other Rigid Non-Container or Unmarked Packaging | 4 | 0.0% | 2 | 0.1% | 1 | 0.1% | 6 | 0.0% | |
| Plastic | Other Plastics - (non-packaging/durable) | 608 | 3.0% | 4 | 0.2% | 19 | 2.6% | 630 | 2.8% | |
| Metal | Other Aluminum (non-packaging) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Metal | Other Steel (non-packaging) | 0 | 0.0% | 1 | 0.0% | 0 | 0.0% | 1 | 0.0% | |
| Other | Building Renovations | 1,908 | 9.4% | 6 | 0.4% | 1 | 0.1% | 1,916 | 8.5% | |
| Other | WEEE - Phase 1 and Phase 2 | 295 | 1.5% | 0 | 0.0% | 1 | 0.2% | 296 | 1.3% | |
| Other | Electronics and Electrical | 65 | 0.3% | 0 | 0.0% | 1 | 0.1% | 65 | 0.3% | |
| Other | Certified Compostable Plastic Liners | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Other | Bulkies | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Other | Scrap Metal | 373 | 1.8% | 1 | 0.0% | 5 | 0.7% | 379 | 1.7% | |
| Other | Diapers and Sanitary Products | 992 | 4.9% | 4 | 0.2% | 0 | 0.0% | 996 | 4.4% | |
| Other | Pet Waste - Dog Waste | 26 | 0.1% | 0 | 0.0% | 0 | 0.0% | 27 | 0.1% | |
| Other | Soil and Sod | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Other | Empty Coffee Capsules | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Other | Full Coffee Capsules | 1 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 0.0% | |
| HHW | Pressurized Containers | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| HHW | Batteries | 7 | 0.0% | 0 | 0.0% | 0 | 0.0% | 7 | 0.0% | |
| HHW | Other Hazardous Waste (paint, tubes, etc.) | 32 | 0.2% | 0 | 0.0% | 0 | 0.0% | 32 | 0.1% | |
| Other | Other | 498 | 2.4% | 40 | 2.5% | 14 | 1.9% | 552 | 2.4% | |
| Total | | 20,325 | 100.0% | 1,610 | 100.0% | 720 | 100.0% | 22,655 | 100.0% | |

3.3 Garbage Stream Composition

A total of 20,325 kg of material was estimated directly as originating from the garbage dumpsters. The top items by weight in the Garbage steam are listed below and each accounted for greater than 2% of the landfill total. Of the 67 material categories, 14 of them accounted for 85% of the estimated landfilled weight.

| Rank | Material Category | Weight (kg) | Percentage |
|------|--|-------------|------------|
| 1 | Other - LYW | 4,123 | 20.3% |
| 2 | Food Waste | 3,366 | 16.6% |
| 3 | Building Renovations | 1,908 | 9.4% |
| 4 | Textiles | 1,742 | 8.6% |
| 5 | Diapers and Sanitary Products | 992 | 4.9% |
| 6 | Printed Paper | 945 | 4.7% |
| 7 | Flexible Film Plastic - LDPE and HDPE | 618 | 3.0% |
| 8 | Cardboard | 612 | 3.0% |
| 9 | Other Plastics - (non-packaging/durable) | 608 | 3.0% |
| 10 | Tissue/Towelling | 541 | 2.7% |
| 11 | Other | 498 | 2.4% |
| 12 | Boxboard - All Types | 458 | 2.3% |
| 13 | #1 PET Bottles and Jars - non alcoholic | 427 | 2.1% |
| 14 | Pet Waste - other than Dog waste | 414 | 2.0% |
| | Top Material Weight | 17,252 | 84.9% |
| | Total Landfill Weight | 20,325 | 100.0% |

The most significant landfilled material was Leaf and Yard Waste at 20.3% or almost one-fifth of the total landfilled weight and could have been diverted to the existing LYW collection program. Food Waste comprised 16.6% of the total and could have been composted if a Green Bin program were implemented. Building Renovations accounted for 9.4% of the total and included items such as wood, floor tiles, gyproc/drywall, and cement. Textiles comprised 8.6% and included a range of items such as clothes, area rugs, luggage, blankets, and shoes mainly. It is understood that Wiggins Private has bed bug issues within some of the units and so some of the textiles could have either been actually or suspected of being infested. Diapers and Sanitary Products made up 4.9% and there is currently no diversion option available. Printed Paper at 4.7% was significant and could have been recycled within the Fibre recycling program. Flexible Film Plastic – LDPE and HDPE accounted for 3.0% of the total and consisted of plastic bags and other film plastics which are not readily recyclable in the Mixed Containers program. Cardboard accounted for 3.0% and was recyclable in the Fibre recycling program. Other Plastics – Non-Packaging/Durable) comprised 3.0% and included crates, toys, hangers, tarps, CD cases, tubing, etc. Tissue/Towelling was found to be about 2.7% and could have been composted if a Green Bin program were implemented.

The material category of **Other** at **2.4%** contained a mix of many different items, none of which are readily recyclable. Examples include toys, wooden cutting board, cigarette butts, cosmetics, binders,

toilet parts, nitrile gloves, gel-paks, election signs, a box containing the cremated remains and effects from a cat, chalk, picture frames, etc. **Boxboard** – **All Types** was found at **2.3%** of total landfill and was recyclable in the Fibre recycling program. #1 **PET Bottles and Jars** – **non-alcoholic** accounted for **2.1%** and could have been recycled in the Mixed Containers program. **Pet Waste** – **other than Dog waste**, consisting primarily of kitty litter, comprised **2.0%** and could have been diverted to a Green bin program.

In summary terms, **41.5%**, of the landfill waste could have been **composted** if Food Waste (16.6%), Tissue/Towelling (2.7%), and Pet Waste – other than Dog waste (2.0%) were included in a future program and if **Leaf and Yard Waste (LYW 20.3%)** were disposed of **correctly in the existing LYW collection program at Wiggins Private.** A total of **10.7%** of the landfill waste could have been diverted via the existing **Fibre recycling program** by diverting Printed Paper (4.7%), Cardboard (3.0%), Boxboard – All Types (2.3%), Boxboard/Cores/Molded Pulp (0.4%) and Kraft Paper (0.4%). Finally, although each item in the Mixed Containers program is below 2% individually with the exception of #1 **PET Bottles and Jars – Non Alcoholic (2.1%)**, the acceptable **Mixed Containers** categories collectively accounted for **8.5%** of the landfilled weight. Therefore, in theory, about **61%** or almost two-thirds of the landfilled waste in June 2018 could have been diverted to a current recycling program and a future composting program.

3.4 Fibre Recycling Stream Composition

A total of 1,610 kg of material originated from the Fibre recycling bins. The top 10 items by weight in the Fibre Recycling steam are listed below and collectively account for 97% of the Fibre recycling stream weight.

| Rank | Material Category | Weight (kg) | Percentage |
|------|---------------------------------------|-------------|------------|
| 1 | Printed Paper | 734 | 45.6% |
| 2 | Cardboard | 603 | 37.5% |
| 3 | Boxboard - All Types | 124 | 7.7% |
| 4 | Other | 40 | 2.5% |
| 5 | Boxboard/Cores/Molded Pulp | 21 | 1.3% |
| 6 | Kraft Paper | 19 | 1.2% |
| 7 | Flexible Film Plastic - LDPE and HDPE | 8 | 0.5% |
| 8 | Textiles | 6 | 0.4% |
| 9 | Building Renovations | 6 | 0.4% |
| 10 | Gable Top Cartons | 6 | 0.3% |
| | Top Material Weight | 1,568 | 97.4% |
| | Total Fibre Recycling Stream Weight | 1,610 | 100.0% |

Acceptable paper fibres including Printed Paper, Cardboard, Boxboard – All Types, Boxboard/Cores/Molded Pulp and Kraft Paper comprised 93.3% of the total weight. Total contaminants accounted for 7% of which Other (2.5%) and Flexible Film Plastic – LDPE and HDPE (0.5%) were the most significant.

3.5 Mixed Containers Recycling Stream Composition

A total of 720 kg of material originated from the Mixed Containers recycling bins. The top 20 items by weight in the Mixed Containers Recycling steam are listed below and collectively account for 89% of the weight.

| Rank | Material Category | Weight (kg) | Percentage |
|------|---|-------------|------------|
| 1 | Clear Glass - Food and Beverage | 123 | 17.1% |
| 2 | #1 PET Bottles and Jars - non alcoholic | 110 | 15.3% |
| 3 | Printed Paper | 77 | 10.8% |
| 4 | #2 - HDPE Bottles and Jugs non-alcoholic | 46 | 6.4% |
| 5 | Steel Food and Beverage Cans | 44 | 6.1% |
| 6 | #1 PET Thermoform - Clear | 40 | 5.6% |
| 7 | #5 -Other PP Containers | 38 | 5.3% |
| 8 | Aluminum Food and Beverage | 22 | 3.1% |
| 9 | Other Plastics - (non-packaging/durable) | 19 | 2.6% |
| 10 | Coloured Glass - Food and Beverage | 15 | 2.1% |
| 11 | Gable Top Cartons | 14 | 2.0% |
| 12 | Other | 14 | 1.9% |
| 13 | Aluminum Food and Beverage - Alcoholic | 13 | 1.8% |
| 14 | #2 HDPE Bottles and Jars - non alcoholic >= 5 L | 13 | 1.8% |
| 15 | Boxboard - All Types | 11 | 1.5% |
| 16 | Asceptic Containers - non Alcoholic | 10 | 1.3% |
| 17 | Clear Glass - Alcoholic Beverage | 9 | 1.3% |
| 18 | Other Glass | 9 | 1.3% |
| 19 | Coloured Glass - Alcoholic Beverage | 7 | 1.0% |
| 20 | Food Waste | 6 | 0.8% |
| | Top Material Weight | 640 | 89.0% |
| | Total Fibre Recycling Stream Weight | 720 | 100.0% |

Overall, acceptable material made up 72% of the Mixed Containers recycling stream as shown in **Table 4.** Contamination made up the remaining 28% and included a mix of recyclable paper, non-recyclable plastics, non-recyclable glass, and food waste primarily. Although the estimated weights of contamination are not large in the context of the overall waste generation, in a relative sense, occupants would seem to require some guidance regarding acceptable and unacceptable materials for Mixed Containers recycling.

3.6 Other Observations- Hazardous Items

In terms of hazardous materials, they were negligible in terms of weights. Other Hazardous Wastes (paint, tubes, etc.) were 0.2% in terms of overall generation across all streams and batteries were almost 0%. However, strictly speaking they should not be disposed of in the solid non-hazardous waste stream.

In the June 6 sample, **two small fire extinguishers** were found mixed in with the Garbage sample. It should be made clear to all parties at Wiggins Private that this is not acceptable, although it is possible the fire extinguishers did not originate at Wiggins Private.

Biomedical waste was encountered in the form of **needles** of which a few were uncapped. In particular, during the June 6 sample, an intact sharps container containing several needles was found in the Garbage sample. Although the sharps container did not appear compromised, the presence of a sharps container in the solid non-hazardous garbage stream suggests that procedures at Wiggins Private need review to ensure biomedical waste such as sharps are not disposed of in the solid non-hazardous waste stream.

3.7 Comparison of the November 2017 and June 2018 Sample Results

Table 5 shows the overall comparison between the November 2017 and June 2018 sample results. In overall terms, the total waste generation was very similar with 21.6 tonnes in November 2017 compared to 22.7 tonnes in June 2018. In the June 2018 sample, the absolute totals of acceptable recycling materials was higher for both Fibre and Mixed Containers. Specifically, 1.5 tonnes of acceptable fibre in June 2018 were recycled compared to 1.1 tonnes in November 2017. For Mixed Containers, 520 kg were recycled in June 2018 compared to 347 kg in November 2017. In terms of landfill amounts, the November 2017 sample showed 20.1 tonnes (includes contaminants in recycling program allocated to the 19.7 tonnes of landfill) while June 2018 has a total of 20.6 tonnes landfilled including contamination from the recycling programs.

With respect to performance metrics, the June 2018 sample had higher capture rates for Fibre and Mixed Containers than in November 2017. The Fibre capture rate in June 2018 was 40% compared to 29% in November 2017. For Mixed Containers, the capture rate in June 2018 was 23% compared to 16% in November 2017. Contamination rates also improved in the June 2018 sample with 7% for Fibre and 28% for Mixed Containers as compared to the November 2017 contamination rates of 13% for Fibre and 38% for Mixed Containers. Finally, the overall diversion rate in June 2018 increased to 8.9% compared to the 6.8% diversion rate estimated in November 2017.

Table 5: Comparison of November 2017 and June 2018 Sample Results

| | | | | | Mixed | Mixed | | | | |
|-----------------------------|-----------------|-----------------|--------------|--------------|-----------------|-------------------|--------------|--------------|--------------|----------------|
| | Landfill (kg) - | Landfill (kg) - | Fibre (kg) - | Fibre (kg) - | Containers (kg) | Containers (kg) - | Total (kg) - | Total (kg) - | Capture Rate | Capture Rate - |
| Waste Stream | Nov 2017 | June 2018 | Nov 2017 | June 2018 | Nov 2017 | June 2018 | Nov 2017 | June 2018 | Nov 2017 | June 2018 |
| Acceptable Fibre | 2,703 | 2,182 | 1,113 | 1,501 | 67 | 93 | 3,884 | 3,777 | 29% | 40% |
| Acceptable Mixed Containers | 1,855 | 1,720 | 33 | 19 | 347 | 520 | 2,234 | 2,259 | 16% | 23% |
| Compostables | 5,758 | 8,444 | 53 | 8 | 22 | 6 | 5,833 | 8,457 | n/a | n/a |
| Other | 9,409 | 7,980 | 81 | 82 | 123 | 100 | 9,614 | 8,162 | n/a | n/a |
| Total Weight | 19,725 | 20,325 | 1,280 | 1,610 | 560 | 720 | 21,565 | 22,655 | | |
| | | | | | | | | | | |
| Performance Metrics | | | | | | | | | | |
| Contamination Rate | | | 13% | 7% | 38% | 28% | | | | |
| Diversion Rate | | | | | | | 6.8% | 8.9% | | · |

Appendix A

| Bin wrap project - Material (| rial Categories - Audit. Fall 2017 - Spring 2018 | |
|--|--|--------|
| Material Category | Description / Examples | |
| | | |
| PRINTED PAPER | | Stream |
| Newsprint - Daily and weekly, magazines and catalogues, | Daily and weekly newspapers published by the Canadian Newspaper Association (CNA) and the Ontario Community | |
| directories/telephone books and other printed paper | Newspapers Association (OCNA); Globe and Mail, Toronto Star, Hamilton Spectator, community newspapers. Consult Stawardship Optario's list of OCNA/CNA publications. No | Fibre |
| | inserts, flyers and magazines from newspapers. | |
| | Non OCNA/CNA publications (e.g. TV guides, Auto Trader, Real Estate News) plus inserts and flyers from OCNA/CNA | |
| | newspapers. Consult Stewardship Ontario's list of OCNA/CNA | Fibre |
| | publications. Hictages glossy liyers and advertising distributed with newspapers. | |
| | Glossy magazines, catalogues, calendars, annual reports and product manuals (must be bound, i.e. stapled or glued). | Fibre |
| | Telephone books and other directories such as the Yellow Pages | Fibre |
| | Mixed fine paper, bills and statements, ad mail, etc. Includes non-newsprint flyers and advertising, promotional calendars | Fibre |
| | Writing paper, office paper, soft or hard covered books, paper envelopes (blank), gift cards, purchased calendars, gift wrap, | Fibre |
| | construction paper, pnotographs | |
| PAPER PACKAGING | | |

| Gable Top Containers - with or without plastic cap/spout | Polycoat containers with a gable shaped top, milk and milk substitutes like soy, almond and rice milk, juices, some foods, | QMC |
|--|--|---------|
| removed, containing no food waste | sugar, molasses etc. | |
| Aseptic Containers (excluding alcoholic beverages) | Polycoat fibre and foil containers (e.g. Tetra Pak) for soy, almond and rice milk, juice boxes, water, soup, sauces etc. | GMP |
| Aseptic Containers - alcoholic beverages | Polycoat fibre and foil containers (e.g. Tetra Pak) for wine and other spirits | GMP |
| Spiral Wound Containers | Polycoat or paper containers with steel bottoms include chip containers, frozen concentrate juices, pre-packaged cookie dough, etc. May also have foil and/or plastic on ends. | GMP |
| Polycoated Paper Ice Cream Containers | Polycoated paper ice cream containers, typically with a lid, excluding boxboard folded ice cream boxes. | GMP |
| Bleached Long Polycoat Fibre | Food containers with white fibre and a rolled or folded rim, includes Michelina's frozen food, KFC tubs. | Garbage |
| Paper Laminate Packaging - all types | Paper with aluminum foil, paper with plastic, multi-layered paper. Includes some cookie bags, dog food bags, paper granola bar wrappers, laminated paper carry out bags, butcher's meat wrap, popcorn bags, waxed paper etc. | Garbage |
| Kraft Paper | Kraft paper bags and wrap, grocery or retail bags, potato bags, some pet food bags, includes brown, white, and coloured kraft paper and bags. No bags with bonded plastic or foil liners/layers/coatings. | Flbre |
| Corrugated Cardboard - all types | Includes micro-flute corrugated containers, waxed corrugated containers, electronic product boxes such as television and computer boxes, boxes used to direct mail for residential consumers, takeout pizza boxes. | Fibre |

| Boxboard - all types | Wet-strength boxboard & frozen food boxes e.g. frozen pizza boxes, frozen nugget and meatball boxes. Also includes food packaging such as fast food containers, ice cream boxes, cartons such as fry/onion ring boxes, paper plates and tissue boxes. | Fibre |
|--|--|---------|
| Boxboard/Cores/Molded Pulp | Boxboard, paperboard, cereal box, shoe box, cores from toilet paper/ toweling/gift wrap, etc. Molded pulp packaging such as egg cartons, drink trays, other trays, molded pulp flower pots/trays, etc. | Fibre |
| PI ASTICS | | |
| | the market and a selection of the select | |
| # I PET Bouldes and Jars (excluding alcoholic beverages) | # I prastic bottles and jars including pop, juice, cooking oil, honey, dish soap, etc. | GMP |
| #1 PET Bottles and Jars ≥ 5 L (excluding alcoholic beverages) | #1 plastic bottles and jars including pop, juice, cooking oil, honey, dish soap, etc. | GMP |
| #1 PET Bottles (alcoholic beverages) | #1 plastic bottles used to contain alcoholic beverages | GMP |
| #1 PET Thermoform - Clear | #1 clamshells, #1 egg cartons, #1 trays etc. | GMP |
| #1 PET Thermoform - Clear - Blister Packaging | #1 blister packaging | Garbage |
| #1 PET Thermoform - Coloured | #1 coloured PET microwaveable trays, etc. | GMP |
| #2 HDPE Bottles and Jugs (excluding alcoholic beverages) | #2 plastic bottles and jugs, juice, milk, laundry soap, shampoo, windshield washer fluid, etc. | GMP |
| #2 HDPE Bottles and Jugs ≥ 5 L (excluding alcoholic beverage) | #2 plastic bottles and jugs equal to or greater than 5 L | GMP |
| #2 HDPE Bottles (alcoholic | #2 plastic bottles used to contain alcoholic beverages | GMP |

| beverage containers) | | |
|---|--|---------|
| #2 Other HDPE Containers | Other #2 containers such as margarine and yogurt containers made from HDPE | GMP |
| Flexible Film Plastic – LDPE & HDPE | HDPE & LDPE film, dry cleaning bags, bread bags, frozen food bags, milk bags, toilet paper and paper towel over-wrap, lawn seed bags, grocery and retail carry-out bags Non-packaging HDPE & LDPE film (e.g. kitchen catchers, sandwich and freezer bags, etc.) goes in LDPE/HDPE Film - Products (non-backaging) | Garbage |
| LDPE/HDPE Film - Products (non-packaging) | garbage bags, kitchen catchers, zip lock bags, leaf bags | Garbage |
| #5 PP Bottles | # 5 plastic bottles includes nutritional supplement drinks, shampoos, etc. | GMP |
| #5 Other PP Containers | # 5 containers such as margarine and yogurt containers and other containers made from PP, including tubs and lids with resin codes #5 PP | GMP |
| #6 PS - Expanded Polystyrene | # 6 Foam take-out containers such as drink cups, large, white packaging foam, meat trays, etc. | Garbage |
| #6 PS - Non-expanded Polystyrene | #6 Polystyrene clear clamshell containers such as berry and muffin containers, opaque clamshell containers such as food take-out containers, yogurt containers, rigid trays, small milk or cream containers for hot beverages, cold drink cups (e.g. iced cappuccino cups) | GMP |
| Plastic Laminates and Other Film Packaging | Laminated plastic film and bags that are at least 85% plastic (by weight). Includes chip bags, vacuum sealed bags, cereal liners, candy wraps, pasta bags, boil in a bag, plastic based food pouches, etc. | Garbage |

| Other Bigid Plactic Dackaging | Other rigid containers (#3 #4 & #7) plant nots and trays pails | |
|--|--|---------|
| | etc. | GMP |
| Other Rigid Non-Container or Unmarked Packaging | Non-PET blister packaging, toothpaste container, deodorant container, six pack rings, etc. | Garbage |
| Large HDPE & PP Pails & Lids | Equal to or greater than 5 litres and less than 20 litres | GMP |
| Other Plastics - (non- packaging/durable) | Rubbermaid tubs, toys etc. | Garbage |
| METALS | | |
| Aluminum- food and beverage Containers (excluding alcoholic beverage containers) | Single-serve juice/soft drink cans, pet food cans, food cans (e.g. sardine cans) | GMP |
| Aluminum (alcoholic beverage containers) | Aluminum cans and bottles used to contain alcoholic beverages | GMP |
| Aluminum Foil & Foil Trays | Aluminum foil wrap, pie plates, baking trays, etc. | GMP |
| Aluminum Aerosols | Aluminum aerosol containers, hair products, etc. | GMP |
| Other Aluminum (non-packaging) | Aluminum siding, baking trays etc. | Garbage |
| Steel Food and Beverage Cans | Apple juice, soup, beans, peach cans, etc. | GMP |
| Steel Aerosol Container | Empty spray paint cans, cooking oil, whipped cream, etc. | GMP |
| Other steel (non-packaging) | Non-packaging steel products including baking trays, frying pans etc. | Garbage |
| GLASS | | |
| Clear Glass - food and beverage (excluding alcoholic beverage containers) | Food containers such as pickle jars, salsa jars and diary tubs, cosmetic containers for creams, beverage bottles | GMP |
| Clear Glass - alcoholic beverage | Wine bottles, spirit bottles, single-serve cooler bottles, beer | GMP |

| containers | bottles | |
|--|--|---------|
| Coloured Glass - food and beverage (excluding alcoholic beverage containers) | Olive oil bottles, balsamic vinegar | GMP |
| Coloured Glass - alcoholic beverage containers | Wine bottles, spirit bottles, single-serve cooler bottles, beer bottles | GMP |
| Other Glass - non-Blue Box | Dishes, ceramics, window glass | Garbage |
| MUNICIPAL HAZARDOUS OR S | SPECIAL WASTE | |
| Pressurized Containers | All pressurized cylinders used for compressed gases including propane, helium, welding/brazing gases, etc. | МНМ |
| Batteries (Consumer-Type Portable) | All batteries (primary and secondary) | МНМ |
| MHSW - Other | Paints, stains, coating, fertilizers, oil filters, paint thinners, fluorescent tubes, etc. | HHW |
| ORGANICS | | |
| Food Waste | Includes coffee grounds and filters, pet food, tea bags | Garbage |
| Tissue/Towelling | Food-soiled paper towels, napkins, tissues, muffin wrappers | Garbage |
| Pet Waste - Other than Dog Waste | Kitty litter, animal feces, bedding | Garbage |
| Organics - other | Ashes, cotton balls, dryer lint, floor sweepings, vacuum bags and vacuum contents, pet fur, hair and feathers, wooden popsicle sticks and toothpicks | Garbage |
| OTHER MATERIALS | | |

| Construction and Renovation | Lumber, wood off-cuts, drywall, ceramic tiles, plaster, etc. | Garbage |
|--------------------------------------|--|---------|
| Diapers and Sanitary Products | Diapers, incontinent pads, and sanitary products. | Garbage |
| Pet Waste - Dog Waste | Dog waste. | Garbage |
| Textiles | Clothing, linen, shoes, mats, etc. | Garbage |
| WEEE - Phase 1 and 2 | All Phase 1 and 2 WEEE items. | E-waste |
| Electronics and Electrical | Electronic toys, power tools, non-WEEE, etc. | Garbage |
| Certified Compostable Plastic Liners | Certified compostable plastic liners | Garbage |
| Scrap Metal | Pots, pans, cutlery, hangers, small tools, etc. All non-steel metals (to be combined with other steel) | Garbage |
| Bulkies | Sofas, mattresses and furniture | Garbage |
| Soil and Sod | Larger quantities of soil not attached to plants and sod, larger than small offcuts of sod | Garbage |
| Empty Coffee Capsules | All single use coffee capsules that have been opened and emptied-filter can still be intact | Garbage |
| Full Coffee Capsules | All single use coffee capsules that are not emptied | Garbage |
| Other Waste | All other materials not classified elsewhere, wooden fruit crates, wax candles, furnace filters, ceramics, multi-material items, home healthcare waste, etc. | Garbage |
| | TICHES, HOLLIC HOGHEN CARGO, CIC. | |

Appendix B – City of Ottawa Tonnage Report 2016-2018

Appendix B - City of Ottawa Tonnage Report 2016-18

| Appendix B | - | | Tonn | | | |
|-------------------------|-----------|---------------|--------|-----------|---------------|--------|
| Collection Month | Resid | lential Conta | | | sidential Fib | re |
| | Multi-res | Curbside | Total | Multi-res | Curbside | Total |
| 2016/Jan | 214.2 | 1666.4 | 1880.6 | 491.9 | 3083.1 | 3574.9 |
| 2016/Feb | 214.3 | 1484.0 | 1698.3 | 473.3 | 2612.8 | 3086.1 |
| 2016/Mar | 226.2 | 1536.7 | 1762.9 | 554.5 | 2902.0 | 3456.5 |
| 2016/Apr | 222.1 | 1563.1 | 1785.2 | 549.6 | 3169.2 | 3718.7 |
| 2016/May | 229.8 | 1643.0 | 1872.7 | 543.9 | 3157.5 | 3701.4 |
| 2016/Jun | 217.0 | 1644.5 | 1861.5 | 523.6 | 2983.3 | 3506.9 |
| 2016/Jul | 209.6 | 1518.9 | 1728.5 | 500.4 | 2715.1 | 3215.5 |
| 2016/Aug | 238.6 | 1602.6 | 1841.2 | 553.6 | 2872.5 | 3426.0 |
| 2016/Sep | 224.0 | 1571.2 | 1795.2 | 579.2 | 3123.8 | 3703.0 |
| 2016/Oct | 217.3 | 1529.6 | 1746.9 | 523.0 | 2877.5 | 3400.5 |
| 2016/Nov | 226.3 | 1628.8 | 1855.1 | 590.2 | 3297.3 | 3887.5 |
| 2016/Dec | 227.4 | 1642.2 | 1869.6 | 590.4 | 3184.9 | 3775.3 |
| 2017/Jan | 248.5 | 1865.1 | 2113.6 | 553.8 | 3372.7 | 3926.5 |
| 2017/Feb | 216.0 | 1506.6 | 1722.6 | 469.4 | 2355.4 | 2824.8 |
| 2017/Mar | 237.1 | 1623.3 | 1860.4 | 529.0 | 2777.4 | 3306.3 |
| 2017/Apr | 219.6 | 1563.8 | 1783.4 | 543.4 | 2995.0 | 3538.4 |
| 2017/May | 259.0 | 1781.6 | 2040.6 | 654.0 | 3383.2 | 4037.2 |
| 2017/Jun | 238.3 | 1736.4 | 1974.7 | 590.9 | 3113.3 | 3704.1 |
| 2017/Jul | 234.3 | 1601.4 | 1835.7 | 549.2 | 2845.8 | 3394.9 |
| 2017/Aug | 247.8 | 1699.4 | 1947.2 | 554.0 | 2946.8 | 3500.7 |
| 2017/Sep | 231.0 | 1568.3 | 1799.3 | 543.3 | 2898.2 | 3441.5 |
| 2017/Oct | 241.1 | 1672.5 | 1913.6 | 544.4 | 2859.2 | 3403.7 |
| 2017/Nov | 242.6 | 1715.5 | 1958.1 | 616.6 | 3251.6 | 3868.2 |
| 2017/Dec | 236.8 | 1612.6 | 1849.4 | 554.1 | 2885.4 | 3439.5 |
| 2018/Jan | 264.4 | 1954.0 | 2218.4 | 533.5 | 3192.6 | 3726.1 |
| 2018/Feb | 226.0 | 1519.6 | 1745.6 | 460.0 | 2262.2 | 2722.2 |
| 2018/Mar | 237.4 | 1557.4 | 1794.8 | 506.2 | 2465.3 | 2971.6 |
| 2018/Apr | 240.4 | 1608.2 | 1848.5 | 504.5 | 2615.6 | 3120.1 |
| 2018/May | 264.0 | 1890.7 | 2154.7 | 573.6 | 3039.2 | 3612.8 |
| 2018/Jun | 236.8 | 1654.1 | 1890.9 | 516.7 | 2600.3 | 3117.1 |
| 2018/Jul | 257.3 | 1675.2 | 1932.5 | 519.9 | 2623.4 | 3143.3 |
| 2018/Aug | 263.2 | 1734.0 | 1997.1 | 559.6 | 2735.5 | 3295.2 |
| 2018/Sep | 231.4 | 1572.6 | 1804.0 | 507.5 | 2518.8 | 3026.3 |
| 2018/Oct | 266.4 | 1795.7 | 2062.1 | 547.7 | 2746.1 | 3293.8 |

Appendix C – Cost Benefit Analysis

Appendix C Cost Benefit Analysis GMP - Mixed Containers

| Fxnenditures | | Hnits | Total | | Total/Rin | Total/Bin (new hin) |
|--------------|---|-------|--------------|------|-----------|-----------------------------|
| | | 3 | 2 | | | י סכמו/ סווו (ווכיאי סוווי) |
| | GMP - Capital Costs of 2 yrd Bin | 11 | \$ 15,675.00 | \$ (| \$ - | 1,425.00 |
| | Wrap Tender (FTE Hours) | 4 | \$ 64.00 | \$ | 12.19 \$ | 12.19 |
| | Wrap Design and Installation (@54ftz = ~\$10/ftz) | 21 | \$ 10,925.00 | \$ | 520.24 \$ | 520.24 |
| | GMP - Removal of Bars on Bins for wrapping | 11 | \$ 435.00 | \$ | 39.55 \$ | 39.55 |
| | Promotion and Education Costs | 21 | \$ 2,588.00 | \$ | 123.24 \$ | 123.24 |
| | Total Expenditure | | | 9 \$ | 695.21 \$ | 2,120.21 |

| Tonnage | | Pre-Audit (kg) | Pre-Audit (kg) Post-Audit (kg) Change (kg) | Change (kg) | Increased Tonnes/Bin/Mnth Increased Tonnes/Bin/Week | Increased Tonnes/Bin/Week |
|---------|--|----------------|--|--------------|---|---------------------------|
| | Total Change in Recycing Tonnage | 347 | 520 | 173 | 0.02 | 6800.0 |
| | | Pre-Audit | Post-Audit | Estimated | Estimated Tonnage | Estimated Tonnage |
| | | Contamination | Contamination | Tonnage | Reduced/Bin/Mnth | Reduced/Bin/Week |
| | | | | Reduced/Mnth | | |
| | Contamination (10% post-audit GMP tonnage) | 38% | 78% | 0.074 | 0.01 | 0.0017 |

| Savings | | Tonnage/Bin | Tonnage/ Bin Offsets / Tonne | Total | Total Notes |
|---------|---|-------------|------------------------------|------------------|---|
| | | / Year | | Offsets/Bin/Year | |
| | | | | | CIF Ontario Market Trends Price Sheet - 2018 Yearly Average |
| | | | | | Container Composite Index used for revenue per tonne. |
| | Increased Recycling Revenue | 0.20 | \$ 233.00 | \$ | 47.64 https://thecif.ca/cif-price-sheet/ (accessed June/18) |
| | Savings of Recycling sent to Landfill | 0.20 | \$ 30.00 | \$ | 6.13 Savings associated with not landfilling additional recyclables |
| | | | | | Savings associated with processing 10% less contamination. Does |
| | Savings of Costs to Collect and Process Contamination | 0.00 | \$ 535.00 \$ | | 46.93 not include processing costs for additional recyclables. |
| | Total Savings | | | \$ 100.70 | |

| Payback Period - | Payback Period - Wrapped GMP-Mixed Containers FE-Bin | | |
|------------------|--|----------------|------------|
| | Expenditures (not including bins) | \$ 695.21 | |
| | Expenditures with New Bins | \$ 2,120.21 | |
| | Savings/Bin/Year | \$ 100.70 | |
| | Payback Period (not including bins) | 6.90 | 6.90 Years |
| | Payback Period with New Bins | 21.05 Years | Years |

| S | |
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| ш. | |

Expenditures

Total/Bin (new bin) 895.00

Total/Bin

Total \$8,950

Units 10

Fibres - Capital Costs of 2 yrd Bin

| | Wrap Tender (FTE Hours) | 4 | \$ 64.00 | \$ 12.19 | \$ 12.19 | |
|---------|---|----------------|-----------------|------------------|--|--|
| | Wrap Design and Installation (@54ftz = $^{\circ}$ \$10/ftz) | 21 | \$ 10,925.00 | \$ 520.24 | \$ 520.24 | |
| | Promotion and Education Costs | 21 | \$ 2,588.00 | \$ 123.24 | \$ 123.24 | |
| | Total Expenditure | | | \$ 655.67 | \$ 1,550.67 | |
| | | | | | | |
| Tonnage | | Pre-Audit (kg) | Post-Audit (kg) | Change (kg) | Increased Tonnes/Bin/Mnth | Increased Tonnes/Bin/Week |
| | Total Change in Recycing Tonnage | 1113 | 1501 | 388 | 0.04 | 2600:0 |
| | | Pre-Audit | Post-Audit | . Estimated | Estimated Tonnage | Estimated Tonnage |
| | | Contamination | Contamination | Tonnage | Reduced/Bin/Mnth | Reduced/Bin/Week |
| | | | | Reduced/Mnth | | |
| | Contamination (6% post-audit Fibres tonnage) | 13% | %L | 0.10 | 0.01 | 0.0025 |
| | | | | | | |
| Savings | | Tonnage/Bin/ | Offsets/Tonne | | Total Notes | |
| | | Year | | Offsets/Bin/Year | | |
| | | | | | CIF Ontario Market Trends Pri | CIF Ontario Market Trends Price Sheet - 2018 Yearly Average |
| | | | | | Fibre Composite Index used for revenue per tonne. | or revenue per tonne. |
| | Increased Recycling Revenue | 0.50 | \$ 80.00 | \$ | 40.35 https://thecif.ca/cif-price-sheet/ (accessed June/18) | et/ (accessed June/18) |
| | Savings of Recycling sent to Landfill | 0.50 | \$ 30.00 | \$ | 15.13 Savings associated with not landfilling recyclables | ndfilling recyclables |
| | | | | | Savings associated with proce | Savings associated with processing 6% less contamination. Does |
| | Savings of Costs to Collect and Process Contamination | 0.13 | \$ 210.00 | \$ | 27.38 not include processing costs for additional recyclables. | or additional recyclables. |
| | Total Savings | | | \$ 82.87 | | |
| | | | | | | |

| Payback Period - | Payback Period - Wrapped Fibre FE-Bin | | Г |
|------------------|---------------------------------------|-------------|----------------|
| | Expenditures (not including bins) | \$ 655.67 | T ₂ |
| | Expenditures with New Bins | \$ 1,550.67 | 12 |
| | Savings/Bin/Year | \$ 82.87 | |
| | Payback Period (not including bins) | 7.91 | 7.91 Years |
| | Payback Period with New Bins | 18.71 | 18.71 Years |

Expenditure Details

| Operational Costs | | | | |
|---|------|-----------------------|---------|--------|
| Item |) | Cost | Per Bin | Bin |
| Wrap Tender Staff Time (4 hours FTE @ \$64/hr) | \$ | 256.00 \$ | | 12.19 |
| Design and Installation of Wraps (21 bins) | \$ 1 | 10,925.00 | \$ | 520.24 |
| Purchase of New Bins 11 – GMP 2 yard Containers | \$ 1 | 15,675.00 \$ 1,425.00 | \$ 1,4 | 25.00 |
| Purchase of New Bins 10 – Fibre 2 yard Containers | \$ | 8,950.00 | ٠Λ. | 895.00 |
| Removal/Installation of Locking Bars on GMP Bins for wrapping of \$ | \$ | 435.00 \$ | | 39.55 |

| Promotion and Education Costs | | | | | |
|-------------------------------|----------|---------------|--------------------|------|--------------|
| | Design | Production | u | Dist | Distribution |
| | | | | | 600 units |
| | | | Staff Cost/hour | Ş | \$ 64.00 |
| | | | Staff Hours | | |
| Door Hanger & Brochure \$ | 100.00 | \$ 523.00 | 0 5 | Ş | 320.00 |
| Poster & Invitation \$ | 100.00 | \$ 328.00 | 0 5 | Ş | 320.00 |
| Event \$ | 1 | \$ 577.00 | 0 5 | Ş | 320.00 |
| Total Cost | 5 200.00 | \$ 1,428.00 | 0 | \$ | 960.00 |
| | | | | \$ | \$ 2,588.00 |
| | | Total Bins: | ls: 21 | | |
| | | P&E Cost/Bin: | in: | \$ | 123.24 |

Tonnage AnalysisPre-Audit Table

| Waste Stream | Landfill (kg) | Fibre (kg) | GMP - Mixed | Total Waste | GMP - Mixed Total Waste Total Recyclables Capture Rate | Capture Rate |
|------------------------|---------------|------------|-----------------|-------------|--|---------------------|
| | | | Containers (kg) | | | |
| Fibres | 2,703 | 1,113 | 49 | 3,884 | 1,180 | %67 |
| GMP - Mixed Containers | 1,855 | 33 | 248 | 2,234 | 088 | 16% |
| Compostabes | 5,758 | 53 | 77 | 5,833 | 22 | n/a |
| Other | 604'6 | 81 | 123 | 9,614 | 204 | n/a |
| Total Weight | 19,725 | 1,280 | 655 | 21,565 | 1,839 | |
| | | | | | | |
| Contamination Rate | | 13% | %88 | | | |
| Recycling Rate | | | | %8.9 | | |

Post-Audit Table

| Waste Stream | Landfill (kg) | Fibre (kg) | GMP - Mixed | Total Waste | GMP - Mixed Total Waste Total Recyclables Capture Rate | Capture Rate |
|------------------------|---------------|------------|-----------------|--------------------|--|---------------------|
| | | | Containers (kg) | | | |
| Fibres | 2,182 | 1,501 | 86 | 3,777 | 1,594 | 40% |
| GMP - Mixed Containers | 1,720 | 19 | 250 | 2,259 | 539 | 23% |
| Compostabes | 8,444 | 8 | 9 | 8,457 | 14 | n/a |
| Other | 086'2 | 82 | 100 | 8,216 | 182 | n/a |
| Total Weight | 50,326 | 1,610 | 119 | 52,709 | 2,329 | |
| | | | | | | |
| Contamination Rate | | %2 | %87 | | | |
| Recycling Rate | | | | 8.9% | | |

| Est | Estimated Tonnages | nages | |
|--------------------------|---------------------------|--------------------|--------|
| GMP | | Fibres | |
| | | Total | |
| Total Contamination (kg) | | Contaminati | |
| @ 28% | 199.00 | 199.00 on (kg) @7% | 109.00 |
| | | Estimated | |
| | | Contaminati | |
| Estimated Contamination | | on (kg) | |
| (kg) @38% | 273.22 | @13% | 209.30 |
| | | Difference | |
| Difference (kg) | 74.22 | (kg) | 100.30 |
| | | Difference | |
| Difference (tonnes) | 0.074 | (tonnages) | 0.1003 |
| | | | |
| Change in Contamination | | | |
| Fibres | %9 | | |
| GMP | 10% | | |
| | | | |

Appendix D – Resident Questionnaire



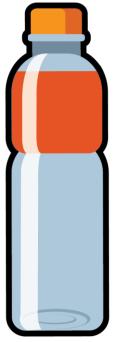
Multi-Residential Recycling Bin Wrap Pilot

Thank you for agreeing to participate. It will only take a few minutes to complete. All of your answers are private and confidential.

| 1. | | cycle on a regular basis. Yes Sometime No |
|----|-----|---|
| 2. | | e location of the recycling bin is convenient. Yes |
| | | Somewhat |
| | | No |
| 3. | ans | en you are not sure of what is and is not recyclable, where do you look for swers? Refer to the label on the bin Check the brochure, "which bin to put it in?" Visit the Waste Explorer Other, please specify |
| 4. | | nly use if not receiving any feedback with part 1. When you are not sure nich recyclables are part of the Ottawa's recycling program do you |
| | WII | |
| | | Refer to the label on |
| | | Check the brochure, "which bin do I put it in?" Visit the Waste Explorer |
| | | Other, please specify. |
| | _ | |
| 5. | | nich bin do you put paper in? Yellow Grey |
| | | Black/Garbage |



6. Which image is clearer?





7. If you do NOT recycle, check all the reasons that apply;

| IVUL | IIIIC | rested |
|------|-------|--------|

- Location of bins
- ☐ Bins are smelly
- □ Bins are always full
- □ No room to store my recycling in my unit
- □ Difficult to transfer materials to the bins
- □ Not Applicable
- □ Other reasons:

8. If you would like to provide information to make recycling easier, what would it be?

Appendix E – Door Hanger and Brochure



Recycling just got easier

The **recycling bins** in your community have a **new look!** The new labels on the bins are a quick guide for disposing your recyclables.

Please sort your items according to the labels on the recycling bins or as shown in the attached *Which bin to put it in?* brochure.

Not sure where something goes? Visit ottawa.ca/wasteexplorer







Il est plus facile que jamais de l'ecycle l'evos articles

Les bacs de recyclage dans votre communauté ont changé d'apparence! Consultez les étiquettes sur vos bacs pour connaître les articles pouvant y être déposés.

Procédez à un tri des articles recyclables en consultant les étiquettes sur les bacs ou en lisant le dépliant *Dans quel bac le mettre?*

Vous ne savez pas trop dans quel bac déposer les articles? Consultez ottawa.ca/navigateurdedechets











• LCBO and beer bottles III III Can be returned to the Beer Store

unwanted household items such as <u>clean</u> plastic bags, medications, hangers, car batteries and more Visit ottawa.ca/tib for details.

for refund.

Take it Back!

Household hazardous waste Check depot dates and locations online at ottawa.ca/hhw or call 3-1-1.

Electronic Waste

Large bulky items/
Appliances/
Construction material
Don't pace furniture (sdas, mattresses, etc.) and construction renovation material in the gathage bin. Contact your gropety manager for proper disposal information or call 3-1-1.

Leaf and yard waste Call 3-1-1 for collection

Fat Oil and Grease
Put in a milk carton in your green bin; OR in your garbage, NOT down your sink or toilet!



















Déchets

savez pas où ça va?



Appendix H – Event Invitation



You're Invited!

Nous vous invitons!

Come meet the City's Recycling Team

We would love to hear your thoughts on recycling in your neighbourhood.

Lori Heath Park behind 731 Chapel Street in the middle of Wiggins Crescent Saturday, August 11 1 to 3 pm

*Rain date: Sunday, August 12, 1 to 3 pm À venir rencontrer l'équipe de recyclage de la Ville.

À nous donner votre avis sur le recyclage dans votre quartier.

Parc Lori-Heath derrière le 731, rue Chapel au milieu du croissant Wiggins Samedi 11 août de 13 h à 15 h

*en cas de pluie : dimanche 12 août, de 13 h à 15 h

Refreshments, kid's games, and a prize to be won



Rafraîchissements, jeux pour enfants et prix à gagner



You're Invited!

Come meet the City's Recycling Team

Would love to hear your thoughts on recycling in your neighbourhood.

Lori Heath Park
behind 731 Chapel Street
in the middle of Wiggins Crescent

Saturday, August 11 1-3 p.m.

*Rain date: Sunday, August 12, 1-3 p.m.

Name

Apt. Number

Bring this card to the event and give us your feedback and be entered in a draw for a \$100.00 gift card. *One entry per household

Refreshments, kid's games, and a prize to be won



Nous vous invitons!

À venir rencontrer l'équipe de recyclage de la Ville

À nous donner votre avis sur le recyclage dans votre quartier. Parc Lori-Heath derrière le 731, rue Chapel au milieu du croissant Wiggins

> Samedi 11 août de 13 h à 15 h

*en cas de pluie : dimanche 12 août, de 13 h à 15 h

Nom

Numéro app.

Apportez cette carte à l'événement, faites-nous part de vos commentaires et courez la chance de gagner une carte-cadeau d'une valeur de 100 \$. *Limite d'une carte par foyer Rafraîchissements, jeux pour enfants et prix à gagner

Appendix I – Survey Results

Multi-Residential Recycling Bin Wrap Pilot

| Status: | Closed | Partial completes: |
|-------------|------------|--------------------|
| Start date: | 2018-08-10 | Screened out: |
| End date: | 2018-08-16 | Reached end: |
| Live: | 7 days | Total responded: |
| Questions: | 8 | |
| Languages: | en, fr | |

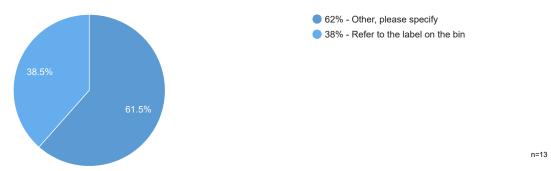
1. I recycle on a regular basis.

| Response | Total % of responses | % |
|----------|-----------------------|-----|
| Yes | 10 | 71% |
| Sometime | 3 | 21% |
| No | 1 | 7% |
| | Total respondents: 14 | |

2. The location of the recycling bin is convenient.

| Response | Total | % of responses | | | | | % |
|----------|--|----------------|-----|-----|-----|-----|-----|
| Yes | 11 | | | | | | 79% |
| Somewhat | 2 | | | | | | 14% |
| No | 1 | | | | | | 7% |
| | Total respondents: 14 Skipped question: 0 | 0% | 20% | 40% | 60% | 80% | |

3. (When you are not sure of what is and is not recyclable, where do you look for answers? (leave question open for them to answer - unaided)



4. Only use if not receiving any feedback with part 1. When you are not sure which recyclables are part of the Ottawa's recycling program do you...

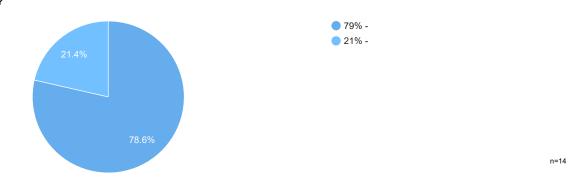
| Response | Total % o | f responses | | | | % |
|--|---|-------------|-----|-----|-----|----|
| Other, please specify | 0 | | | | | 0% |
| Visit the Waste Explorer | 0 | | | | | 0% |
| Refer to the label on the bin | 0 | | | | | 0% |
| Check the brochure 'What bin to put it in' | 0 | | | | | 0% |
| | Total respondents: 0 Skipped question: 14 | 20% | 40% | 60% | 80% | |

0 (0%) 0 (0%) 14 (100%)

5. Which bin would you put paper in?

| Response | Total % of responses | % |
|---------------|--|-----|
| Yellow | 12 | 86% |
| Grey | 2 | 14% |
| black/garbage | 0 | 0% |
| | Total respondents: 14 Skipped question: 0 0% 20% 40% 60% 80% | |

6. Which one is clearer?



7. If you do NOT recycle, please check all the reasons that apply;

| Response | Total | % of responses | | | | % |
|---|--|----------------|-----|-----|-----|-----|
| Does not apply | 9 | | | | | 64% |
| Other, please specify | 2 | | | | | 14% |
| No room to store my recycling in my unit | 1 | | | | | 7% |
| Locations of bins | 1 | | | | | 7% |
| Bins are smelly | 1 | | | | | 7% |
| Difficult to transport material to the bins | 0 | | | | | 0% |
| Not interested | 0 | | | | | 0% |
| Bins are always full | 0 | | | | | 0% |
| | Total respondents: 14 Skipped question: 0 | 0% 20% | 40% | 60% | 80% | |

8. If you would like to provide information to make recycling easier, what would it be?

| Respondents | 9 | | | | | | 64% |
|--|---------------------|----|-----|-----|-----|-----|-----|
| | Skipped question: 5 | 0% | 20% | 40% | 60% | 80% | |
| Would love to see green bins here at OCH | | | | | | | |
| More pictures on bin | | | | | | | |
| More kid friendly recycling options. Recycling volunteers to assist. | | | | | | | |
| Bring back the green bin. | | | | | | | |
| Green bins. | | | | | | | |
| Des bacs dans parc | | | | | | | |
| Hard to open for kids | | | | | | | |
| Closer bins. | | | | | | | |
| Provide bins for each individual household | | | | | | | |