# COUNTY OF DUFFERIN <br> MANAGING BAGGED MATERIAL CURBSIDE VS. MRF <br> CIF Project Number 1104 

Final Report
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Prepared for:
Resource Productivity and Recover Authority
Continuous Improvement Fund

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## Table of Contents

ACKNOWLEDGMENT ..... 2
1.0 Introduction ..... 4
2.0 Background ..... 5
2.1 Community Profile ..... 5
2.2 Waste Management System ..... 5
2.3 Program Challenges .....  6
3.0 Approach ..... 7
3.3 Monitoring and Measurement Methodology ..... 7
4.0 Results ..... 7
4.1 Measuring Bagged Materials in Recycling Program ..... 7
4.2 Debagging Recycling Materials during Curbside Collection ..... 8
4.2.1 Time to Debag during Collection ..... 8
4.2.2 Cost of Debagging during collection ..... 9
4.3 Bagged Recycling Materials at Processing Facility ..... 9
4.3.1 Cost of processing materials ..... 9
5.0 Analysis - Impact of Bags on Operations ..... 10
5.1 Qualitative Observations ..... 10
6.0 Project Budget ..... 12
7.0 Conclusions ..... 12
7.1 Future Studies and Lessons Learned ..... 12
LIST OF TAbles
Table 1: Number of Households in Dufferin County (2016) ..... 5
Table 2: Waste Management System Overview for Dufferin County (2020) ..... 6
Table 3: Waste Management System Overview for Dufferin County (2018) ..... 6
Table 4: Average Time Per Stop for Bagged vs. Debagged with All Containers ..... 8
Table 5: Calculated Cost to Debag Materials Curbside for Dufferin County. ..... 9
Table 6: Total annual processing savings associated with lower percentage of bagged material ..... 10
Table 7: Project Budget, Approved and Actual ..... 12
List of Figures
Figure 1: Map of Dufferin County - Google Maps (April 21, 2020) ..... 5
Figure 2: Overall Setout Type Percentage Bags/Bins/Both ..... 8
Figure 3: Comparing annual estimated cost to process bags at the MRF versus Debagging at Curb ..... 10
LIST OF APPENDICES
Appendix A: Dufferin County Curbside Debagging Time Study, Fall 2019 ..... 14

### 1.0 INTRODUCTION

This project aimed to assist Dufferin County in formulating guidance on the management of bagged recyclables. Dufferin County (the County) completed an analysis of the cost to debag recyclables during curbside collection in order to compare it to the cost associated with processing bagged materials at the Material Recycling Facility (MRF). The County initiated the project to inform the procurement of processing recycling materials.

In 2019, during a Curbside Neighbourhood Campaign initiated to decrease Blue Box contamination, the County observed that approximately $36 \%$ of households in urban areas used blue bags for their recyclables (either exclusively, or with blue boxes). The County allows blue transparent bags as "overflow" from blue boxes, however it seemed that many residents were using them instead of blue boxes. The County understands that there are some residents that use blue bags, due to high winds and ease of set-out (especially in the rural areas).

As the County was undertaking procurement for recyclables processing, a figure of approximately $33-36 \%$ blue bags was thought to pose a challenge to processors, potentially requiring capital investment (e.g. bag breaker equipment) and increased operating costs (labour and maintenance), ultimately resulting in a higher price per tonne fee.

Therefore, the County was interested to compare collection costs associated with debagging recyclables at the curb versus the processing fee at the MRF (of loose and bagged recyclables). It was anticipated that the price for processing would be higher for bagged recycling material, and data was needed to compare the relative costs of removing the materials from bags during collection. To prepare for the analysis, the County requested costing options for varying percentages of inbound bagged materials from proponents in the processing RFP released in 2019.

This project provided some insight to the County however, it should be noted shortcomings included limited collection study collection debag sampling (four days in October) and no evaluation of other factors influencing costs such as enforcement and contamination.

### 2.0 BACKGROUND

### 2.1 COMMUNITY PROFILE

The County of Dufferin sits on the fringe of the Greater Toronto Area, about 100 kilometres northwest of Toronto (see Figure 1).

It is largely a rural county with three urban settlement areas. The County consists of eight lower-tier municipalities, Orangeville, Shelburne, Grand Valley, Mono, Mulmur, Melancthon, Amaranth and East Garafraxa. Dufferin is home to over 61,000 residents and consists of approximately 16,685 single-detached homes and 2,760 semi-detached/row homes [Statistics Canada, 2016]. Households are spread across rural and urban settings.


Figure 1: Map of Dufferin County - Google Maps (April 21, 2020)

Table 1: Number of Households in Dufferin County (2016)

| Municipality | Population | Single Family <br> Households | Multi Family <br> Households <br> (including semi- <br> detached/row <br> homes) | Total Households |
| :---: | :---: | :---: | :---: | :---: |
| Dufferin County | 61,000 | 16,685 | 2,760 | 19,445 |

### 2.2 WASTE MANAGEMENT SYSTEM

Dufferin County Waste Services provides weekly collection of waste throughout the County, which includes garbage, recycling and organics. The County also provides yard waste, bulky items and curbside battery collection on specific schedules, as well as household hazardous and electronic waste events. The waste management system is summarized in the table below.

Table 2: Waste Management System Overview for Dufferin County (2020)

| Single Family Service | Service Description <br> (curbside/Depot <br> wkly/bi-wkly <br> single/two/multi stream) | Collection <br> Provider | Processing <br> Provider |
| :--- | :--- | :---: | :---: |
| Garbage | Curbside 1 Clear Bag Weekly. <br> Extra bags require PAYT tags | GFL | Michigan Landfill |
| Recycling | Single Stream materials <br> collected weekly in blue <br> boxes | GFL | Waste Management <br> (Emterra starts June <br> 2020) |
| Organics | Co-collected with Recycling <br> weekly (except in Shelburne, <br> where Organics and Garbage <br> are co-collected) | GFL | Convertus |

Residents are provided with two blue boxes per household, and replacements are provided free of charge. Additional blue boxes may be purchased for $\$ 5$, which is below cost. The Single Stream Blue Box program allows residents to place as much material at the curb as they generate and allows blue-tinted transparent bags as overflow. Bags for recycling were recognized as a convenience to residents; households in areas with high winds and weekenders whom do not want blue boxes sitting at their curb for an entire week often use bags. Additionally, some residents prefer to solely use bags. Households that use only blue bags (no blue boxes) are collected as per normal, without penalty. The current waste management performance is summarized in the table below.

Table 3: Waste Management System Overview for Dufferin County (2018)

|  |  | Blue Box <br> Recycling |  | Total Waste Diversion |  | Disposal |  | Generation (Total) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Units | rate | \% of total | rate | $\%$ of total | Units | Rate | Units | $\%$ of total |
| Single Family and MultiFamily ( $22,072 \mathrm{HHs}$ ) | tonnes | 5,287 | 48.9\% | 11,820 | 57.4\% | 8,768 | 42.6\% | 20,588 | 100\% |
|  | Kg/hhld | 240 |  | 536 |  | 397 |  | 933 |  |

### 2.3 PROGRAM CHALLENGES

Municipal recycling program cost is a key consideration in accessing current levels of blue box funding. As municipalities look toward transitioning blue box programs to producers, alternative ways to save costs and maintain program services are being pursued.

To inform decision making with regards to the recent recyclables processing RFP and compare with an alternative option, the County decided to complete a study on debagging recyclables during curbside collection. The intended outcome of the study was to explore and address the potential challenge of debagging materials during curbside collection and the incremental cost of expanding curbside debagging County-wide.

### 3.0 APPROACH

In order to compare the management of bagged materials during collection to MRF processing, the County completed a time, motion, and cost study for debagging material curbside as well as a detailed analysis of RFP submissions for processing.

### 3.3 MONITORING AND MEASUREMENT METHODOLOGY

There are three components involved in monitoring and measuring:

1. Data from curbside program to determine baseline percentage of household setouts with "bagged" materials;
2. Fall 2019 study of 4 routes/areas with a total of 1,200 households on the amount time to collect "regular boxes/bagged materials" vs. "unbagging materials at the curb" completed by AET Group Inc (see
3. 
4. 
5. Appendix A); and
6. Comparison of incremental costs associated with curbside debagging vs. increased costs for processing bagged materials at the MRF.

### 4.0 RESULTS

The following section provides a summary of data collected for comparison in managing bagged material in the recycling system.

### 4.1 MEASURING BAGGED MATERIALS IN RECYCLING PROGRAM

The 2019 Curbside Neighbourhood Campaign noted that approximately 36\% of households in urban areas used blue bags for their recyclables (either exclusively, or with blue boxes). The County incorporated a more detailed set-out data collection procedure during the study completed by AET in fall 2019 (see

Appendix A). This was to provide insight into rural bagged setouts and confirm utilization of bags by a representative sample of County-wide households.

During four days in October, a total of 1,574 setouts were observed over 1,200 homes. The most likely container to encounter was a recycling bin/box (64.68\%) followed by bags (30.81\%) - see Figure 2.


Figure 2: Overall Setout Type Percentage Bags/Bins/Both

When comparing homes using bins vs bags, AET observed that $67.50 \%$ of homes used only bins, $8.62 \%$ used only bags, and $23.88 \%$ of homes deployed a mix of both bags and bins. At least one bag was set out in 149 of the $600(24.83 \%)$ rural homes and 141 of the 600 (23.5\%) urban homes.

### 4.2 DEBAGGING RECYCLING MATERIALS DURING CURBSIDE COLLECTION

### 4.2.1 TIME TO DEBAG DURING COLLECTION

Of the 1,200 stops observed in the Debagging Study, 600 were considered "bagged" blocks, where operations were timed as "status quo", and the other 600 were "debagged" blocks, where all bag setouts were opened and emptied into the truck. When comparing blocks, debagging more than doubled the average stop per household (See Table 4).

Table 4: Average Time Per Stop for Bagged vs. Debagged with All Containers

| Bagged Collection <br> (Status Quo) |  | Debagged Collection |  |
| :---: | :---: | :---: | :---: |
| 0.15 DM | 9 SECONDS | 0.34 DM | 20.4 SECONDS |

### 4.2.2 COST OF DEBAGGING DURING COLLECTION

Curbside debagging of material would add time to the overall collection of recycling in the County (on average 10.8 seconds per household). There would be an expected additional 45.35 truck hours of hands on material time required each week to service all 19,445 curbside collection households (with $76.4 \%$ participation rate).

Using an estimated rate of \$50 per truck hour, this would translate to an additional \$2,267 per week in collection costs. This number is assuming the same number of vehicles and employees would be deployed with no additional capital costs or travel accrued by requiring additional vehicles. Additional time was not accounted for emptying the receptacles that are filled with emptied bags (typically, the fastened green bin would be full after $\sim 150$ homes). As the current collection contract extends until 2022, the County is aware that there may an opportunity to obtain a better rate for the debagging, having it worked into the bid price.

Table 5: Calculated Cost to Debag Materials Curbside for Dufferin County

| Average Stop Time per house for Debagged route | 0.34 | Decimal Minutes |
| :--- | ---: | :--- |
| Average Stop Time per house for Bagged route | 0.15 | Decimal Minutes |
| Difference in Stop Time per household with Debagging during route | 0.18 | Decimal Minutes |
| If debagged for 14,860 + multiple 10.8 second average per household | $2,721.15$ | Decimal Minutes |
| Decimal Minutes Converted to Hours | 45.35 | Hours |
| Total Additional Cost Weekly @ rate of \$50 x Truck Hours | $\$ 2,267.50$ |  |
| Total Additional Cost Yearly @ 52 weeks of collection | $\$ 117,910.00$ |  |

${ }^{\dagger} 19,445$ Total Households adjusted for a Participation Rate of $76.42 \%$ (i.e. not all households require a stop)

It should also be noted that if the County chose to remove bags entirely from the recycling program that there could be additional costs. The debagging study showed that the time it takes to collect a bag of recycling is 3.6 seconds versus 7.8 seconds per box (see Appendix $A$ - section 3.4). The additional time to collect is associated primarily with returning the empty bin to the curb.

### 4.3 BAGGED RECYCLING MATERIALS AT PROCESSING FACILITY

### 4.3.1 COST OF PROCESSING MATERIALS

Also, in the Fall of 2019, the County released an RFP for recycling processing to commence June 2020. The RFP outlined that $33 \%$ of materials inbound to the MRF were bagged by households and a 15-20\% contamination rate.

With the idea that the County may introduce debagging during collection, proponents were requested to provide a price per tonne associated with a $5 \%$ level of bagged material. The following table provides an annualized processing savings with a lower percentage of bagged materials managed at the MRF.

Table 6: Total annual processing savings associated with lower percentage of bagged material

|  | Debagged material at curb Processing Savings <br> (5\% vs. 33\% bagged material with 15-20\% contamination) |
| :--- | :---: |
| Annual Contracted Total Cost | $\$ 8,800.00$ |

### 5.0 ANALYSIS - IMPACT OF BAGS ON OPERATIONS

Below is a summary table to compare the costs associated with the management of bags.
The total costs calculated to debag at curb was an estimated $\$ 117,000$ annually. Currently, the County pays a price per stop for collection. The price would likely increase per stop if debagging was incorporated into the contract. However, given that the collection fee of $\$ 50$ per hour was utilized in the calculation, it is unlikely the total price would be as high if this was included in the collection contract from the beginning.

Price proposals received from processors showed either no or limited (1\%) price adjustments associated with larger percentages of bagged materials. The total contract price increase to process $33 \%$ of bagged material was $\$ 8,800$ annually. This is likely due to the fact that the receiving facility has bag breaking equipment already operating and no additional capital investments in the MRF would be required.


Figure 3: Comparing annual estimated cost to process bags at the MRF versus Debagging at Curb

When evaluating the wholistic impact of additional costs associated with managing bags, a percentage increase in overall contract cost showed that bags at the MRF would only represent a $1 \%$ change in total cost versus a $17 \%$ change estimated with curbside collection.

### 5.1 QUALITATIVE OBSERVATIONS

There are benefits to the current model of allowing bagged recycling material. In more rural areas with long driveways residents might begrudge retrieving empty bins following collection. Additionally, on certain roads with fast traffic and tight shoulders, bins can be swept away or blown into ditches. High winds can also contribute to scattered material, particularly in more rural areas.

Contrarily, disallowing bags could have benefits. Most relevantly, any incremental cost associated with the debagging of material either at the curb or at the MRF would be a non-issue. Additionally, it would reduce a source of plastic waste and possibly reduce contamination rates.

Collection employees, unsurprisingly, prefer not opening the bags at the curb. The bags can be cumbersome especially with inclement weather and gloves. It was the general suggestion of the collection employees that they would prefer residents to only use boxes.

### 6.0 PROJECT BUDGET

The following table provides a brief summary comparing the planned and approved project budget.

Table 7: Project Budget, Approved and Actual

| Category | Description | Total Cost Proposed | CIF Share (100\%) | Total Actual Cost |
| :---: | :---: | :---: | :---: | :---: |
| Contractor -Time and Motion Study | AET Curbside Debagging Study | \$20,000 | \$20,000 | \$14,125 |
| Other Costs | Collection Contractor overtime ( $\$ 110 / \mathrm{hr}$ ) for debagging study | \$2,200 | \$0 | \$0 |
| Monitor and Final Report | Monitoring and Final Report (in-kind) | \$0 | \$0 | \$0 |
| Total |  | \$22,200 | \$22,600 | \$14,125 |

### 7.0 CONCLUSIONS

The results of this study were quite beneficial to Dufferin County Waste Services. This project was a introductory analysis of cost implications of managing bagged materials at the curb versus processing at the MRF.

Overall, the analysis showed that removing recyclable materials from bags (debagging) at the curb during collection, in this circumstance, is more expensive than processing the bagged material at the MRF. This is especially true because the receiving facility has already invested and is operating bagbreaking systems.

When reviewing RFP results, it should be noted that pricing for higher levels of contamination, from $15-20 \%$ to $20 \%$ plus, increased fees the price per tonne. Therefore, the price to manage higher levels of contamination were driving the total processing cost, not the percentage of inbound bagged materials. Again, this is likely due to the bidders having pre-existing bag breaking equipment and labour in MRFs to manage bagged materials.

### 7.1 FUTURE STUDIES AND LESSONS LEARNED

To further explore and more accurately conclude the cost implications of bagged recycling, it is suggested that further studies be conducted.

- Four seasonal analysis would see different patterns in weather and generation rates. If collection operators were allowed more experience and specialized equipment, it could translate to a reduction in the time debagging during collection. Other case studies could be researched to see the cost associated; particularly in municipalities that have switched from strictly bags to bins or carts. As with all quantitative studies, the larger the sample, generally the more reliable the data. With an exact replication of the methodology of this study an even more accurate conclusion could be drawn.
- Review of full collection procedures including enforcement. During the debagging study, drivers did not dispense Oops Stickers and/or leave any material behind for By-law related infractions (for ex. Garbage placed in the recycling bag). This was either because the recycling material placed at the curb was sorted properly, or because the driver opted to not be as diligent with his/her visual screening of the material due to the fact that they were being watched and assessed for the purposes of the study. In future studies, Oops Stickering timing and related costs (i.e. enforcement) should be added to the data collection as it should be factored as a component of the collection contractor costs.
- Consideration of composition of materials in bags vs. boxes. Additional studies could be conducted to analyze the material. Waste audits comparing bagged versus loose boxed material might show differences in contamination rates and moisture amounts which would also influence processing costs.
- Impact of bags on litter and moisture rates. Finally, although Dufferin allows residents to use blue tinted bags for overflow purposes, further research comparing the generation of litter resulting from curbside collection of recycling in bags versus boxes would be beneficial.

Appendix A: Dufferin County Curbside Debagging Time Study, Fall 2019

# Dufferin County Curbside Debagging Time Study 

## Fall 2019

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## TABLE OF CONTENTS

1.0 INTRODUCTION ..... 1
1.1 Background ..... 1
1.2 Objectives ..... 1
2.0 APPROACH AND METHODOLOGY ..... 1
2.1 Sample Size and Sample Selection Procedure ..... 1
2.2 Data Collection ..... 2
2.2.1 Debagging Process ..... 2
2.2.2 Data Recording .....  3
2.3 Assumptions ..... 4
3.0 SUMMARY OF Curbside Observation RESULTS ..... 5
3.1 Participation Rates ..... 5
3.2 Recycling Container Type and Count Results ..... 5
3.3 Rejection Stickers ..... 6
3.4 Time Results ..... 7
3.5 Impact of Bags ..... 8
3.5.1 Time Impact of Debagging ..... 8
3.5.2 Material Impact of Bags ..... 9
3.6 Cost Analysis ..... 9
3.6.1 Cost of Debagging ..... 9
3.6.2 Calculation of Debagging Cost ..... 10
3.6.3 Cost of Transition from Bagged to Bins ..... 10
3.6.4 Calculation of Bag to Bin Cost ..... 10
4.0 QUALITATIVE OBSERVATIONS ..... 11
4.1 Seasonal Observations ..... 11
4.2 Future Studies ..... 12
5.0 CONCLUSION ..... 12
LIST OF TABLES
Table 2.1 Selected Sample Zones and Characteristics ..... 2
Table 3.1 Recycling Stream Participation Rates by Zone and Overall ..... 5
Table 3.2 Types and Counts of Recycling Containers ..... 5
Table 3.3 Average Time per Stop for Bagged vs. Debagged with All Containers ..... 7
Table 3.4 Average Time per Bag for Bagged vs. Debagged Stops with Bags Only ..... 7
Table 3.5 Average Time per Bin for All Stops with Bins Only ..... 8
Table 3.6 Count and Weight of Bags by Zone/Day ..... 9
LIST OF FIGURES
Figure 2.1 Field Log Sheet ..... 3
Figure 2 Picture of Observed Collection ..... 4
Figure 3.1 Overall Setout Type Percentage Bags/Bins/Both ..... 6

### 1.0 INTRODUCTION

### 1.1 Background

AET Group Inc. (AET) was contracted by the Continuous Improvement Fund to analyze the time and cost impact of curbside debagging of recycling in Dufferin County. Currently, Dufferin County collects curbside recycling through a single-stream blue box system and for overflow allows residents to place their recyclables within clear/blue-tinted bags. Residents are also permitted to bundle their material for collection.

Debagging refers to the collection operator opening the bagged recycling and emptying it into the vehicle at the point of collection. This strategy would avoid the need to debag at the material recovery facility. The additional curbside debagging cost is considered at an overtime fee of \$110 per truck hour of collection.

### 1.2 Objectives

The purpose of the study is to quantify measurable impacts of debagging curbside recyclable material and to depict the characteristics of the various recycling setouts, including:

- Provide counts and types of recycling containers (bins, bags, bundles, \& carts);
- Outline time impacts of debagging recycling material at the curb;
- Calculate additional collection cost at an hourly overtime rate of $\$ 110$ per truck and
- Provide the weight of empty bags expected per household and overall.


### 2.0 APPROACH AND METHODOLOGY

### 2.1 Sample Size and Sample Selection Procedure

Dufferin County consists of approximately 16,685 single-detached homes and 2,760 semidetached/row homes [Statistics Canada, 2016] From this population of 19,445, a sample size of 1,200 single-detached homes were selected. The 1,200 homes were divided into 4 zones/routes of 300 each to be observed over one week (Mon-Thurs) in the Fall of 2019.

Table 2.1 Selected Sample Zones and Characteristics

| Dufferin County Time Study Sample Zones Fall 2019 |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Date | Urban/Rural | Number of <br> Homes | Streams Collected | Number of <br> Employees |  |  |  |
| Monday, October 21st | Orangeville | Urban | 300 | Recycling \& Organics | 2 Operators |  |  |
| Tuesday, October 22 | Mon | Mono | Rural | 300 | Recycling \& Organics |  |  |
| 1 Operator |  |  |  |  |  |  |  |
| Wednesday, October 30 $0^{\text {th }}$ | Shelburne | Urban | 300 | Recycling Only | 2 Operators |  |  |
| Thursday, October 24 ${ }^{\text {th }}$ | Amaranth | Rural | 300 | Recycling Only | 1 Operator |  |  |

The time study took place during the week of October $21^{\text {st }}$ to October $24^{\text {th }}, 2019$, with October $30^{\text {th }}$ replacing October $23^{\text {rd }}$ due to a traffic collision involving the earmarked hauler vehicle.

The routes were selected to give a diversely representative sample depicting the demographics of Dufferin County as a whole. Half the zones were designed to be more rural (Mono \& Amaranth) while the other two were more urban (Orangeville \& Shelburne).

Beyond the geographical differences, collection varied through the zones. Half the zones had two collection employees on the hauler vehicle (Orangeville \& Shelburne) while Mono \& Amaranth only had one. The Orangeville \& Mono hauler operators collected organics in the same vehicle while Shelburne \& Amaranth only collected recycling.

### 2.2 Data Collection

A team of AET employees were dispatched each morning, meeting the collection operator(s) on their predetermined route. AET followed in a separate vehicle, recording the pertinent data.

The 300 homes were broken into four sections of 75 . The collection operators were instructed to collect bagged or debag for a block of 75 homes in a row; being notified when to switch by AET signalling with a honk.

### 2.2.1 Debagging Process

During the designated blocks of 75 homes, collection operators were requested to open any recycling bags placed on the curb for collection. Their typical discretion determined what would be accepted or rejected regarding opaque bags or bags expected to have contamination. If a bag was placed within a bin it would be opened during the debagging section of homes. Collection operators would typically bring the bag to the truck, using their regular collection gloves, rip the bag and spill the contents. Once entirely emptied, the bag was placed in a receptacle affixed to
the truck. The emptied bag receptacle was fashioned from a standard green bin with a volleyballsized hole cut in the lid.

### 2.2.2 Data Recording

AET recorded the time spent by collection operators when handling the recycling. Time spent driving between stops, adjusting truck doors, and collecting organics was disregarded and not recorded. Only "hands on time" was recorded, that is time spent with recycling material or container being touched by the collection operator. For bags, this would be from the moment the first bag was touched until the last bag left the operators hand, whether into the body of the truck or the empty bag being placed into the receptacle. Similarly, if the recyclable material was in a bin or cart, the time was recorded starting when the hand touched the first container and ended when the last bin/cart was returned to the curb. This was repeated for every stop until the sample route was complete. In most cases it was reasonable to discern organics stream from recycling; however, occasionally the collection operator would address the green bin without finishing all the recycling. In these rare cases, organics time was included in the recorded stop time.

To record time, a software application "Timestudy Stopwatch" was utilized allowing for timestamps to be recorded, saved, and uploaded while in the field. The application allows for "laps" and outputs in several industry standard time forms exportable in .csv format. For the purpose of this study, AET chose to use Decimal Minutes as the unit of time measurement due to its ease in comparing and analyzing. Decimal Minutes are a represented by one minute divided by 100. For example:

$$
\begin{aligned}
& \text { 1.00DM }=1 \text { Minute } \\
& \text { 0.50DM }=30 \text { Seconds }
\end{aligned}
$$

|  | Zone: |  | $\square$ Bagged | $\square$ Debagged |  | Date: |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \# | Address | Bags | Bins | Bundled/Loose | Sticker | Time | Comment |
| 1 |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |

Figure 2.1 Field Log Sheet

During the observed collection AET utilized a clipboard with field log sheets (Figure 2.1) to mark details about the zone, section and specific homes. On each log sheet was noted: the date, zone, and whether the section was bagged or debagged. For each home passed on the route, AET noted: the address and count of each material container type.

While concurrently recording time and setout counts, AET staff would communicate to ensure times and setouts were properly linked. The timestamp number would be recorded in the "comment" column of the log sheet every several stops.

For further redundancy, a GoPro camera was mounted to the side mirror allowing for an extra angle and a source in the event of lost data.


Figure 2 Picture of Observed Collection

### 2.3 Assumptions

The Sample and methods were designed to give the most representative depiction possible. Although, it is safe to assume there were unique anomalies about these specific homes and dates. Different times of year, weather, worker experience level and resident generation could all have independent impacts on collection time. For the purpose of this report, the numbers will be considered an accurate representation.

### 3.0 SUMMARY OF CURBSIDE OBSERVATION RESULTS

The following section provides a summary of data collected on setout type and collection time of the recycling stream. The information included was collected in the Fall of 2019, Dufferin County.

### 3.1 Participation Rates

1,200 homes were selected as the sample for the study, 917 of the homes placed at least one recyclable item at the curb for collection during the study. The overall participation rate was $76.42 \%$ of homes sampled with the highest participation of $86.33 \%$ in Orangeville and the lowest 65.00\% in Amaranth.

Table 3.1 Recycling Stream Participation Rates by Zone and Overall
Recycling Participation Rates

| Zone | Orangeville | Mono | Shelburne | Amaranth | All Zones |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Sample Size | 300 | 300 | 300 | 300 | 1200 |
| Participants | 259 | 208 | 255 | 195 | 917 |
| Participation Rates | $86.33 \%$ | $69.33 \%$ | $85.00 \%$ | $65.00 \%$ | $76.42 \%$ |
| Zone | Orangeville | Mono | Shelburne | Amaranth | All Zones |

### 3.2 Recycling Container Type and Count Results

Table 3.2 Types and Counts of Recycling Containers
Types and Counts of Recycling Containers

| Zone | Orangeville | Mono | Shelburne | Amaranth | All Zones |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Count of Carts | 0 | 0 | 4 | 5 | 9 |
| Count of Bags | 120 | 108 | 122 | 135 | 485 |
| Count of Bundles/Loose | 12 | 12 | 24 | 14 | 62 |
| Count of Bins | 299 | 224 | 303 | 192 | 1018 |

A total of 1,574 setouts were observed over the 1200 homes. The most likely container to encounter is a recycling bin/box (64.68\%), followed by bags (30.81\%). Bundled and loose material comprised $3.94 \%$ while carts were the rarest at $0.57 \%$.


Figure 3.1 Overall Setout Type Percentage Bags/Bins/Both
When comparing homes usage of bins vs bags, AET observed that $67.50 \%$ of homes used only bins, $8.62 \%$ used only bags, and $23.88 \%$ of homes deployed a mix of both bags and bins. 149 of the $600(24.83 \%)$ rural homes and 141 of the $600(23.5 \%)$ urban homes set out at least one bag.

### 3.3 Rejection Stickers

The field log sheet was organized with a column to make note of any rejection stickers placed by collection operators. Throughout the 1200 household stops sampled, there were zero occurrences of material being affixed with a rejection sticker.

### 3.4 Time Results

Table 3.3 Average Stop Time by Zone with Descriptors

| Date | Location | Average Stop by Zone with Descriptors |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Urban/Rural | Streams Collected | Number of Employees | Average <br> Stop for <br> Bagged <br> Block (DM) | Average <br> Stop for <br> Debagged <br> Block (DM) | Average <br> Stop for <br> Bagged <br> Block <br> (sec) | Average Stop for Debagged Block (sec) |
| Monday, Oct 21 ${ }^{\text {st }}$ | Orangeville | Urban | Recycling \& Organics | 2 Operators | 0.14 | 0.24 | 8.33 | 14.63 |
| Tuesday, Oct 22nd | Mono | Rural | Recycling \& Organics | 1 Operator | 0.13 | 0.27 | 8.04 | 16.42 |
| $\begin{aligned} & \text { Wednesda } \\ & \mathrm{y}, \text { Oct } 30^{\mathrm{th}} \\ & \hline \end{aligned}$ | Shelburne | Urban | $\begin{gathered} \text { Recycling } \\ \text { Only } \\ \hline \end{gathered}$ | 2 Operators | 0.14 | 0.35 | 8.70 | 21.00 |
| Thursday, Oct $24^{\text {th }}$ | Amaranth | Rural | Recycling Only | 1 Operator | 0.20 | 0.49 | 11.92 | 29.75 |

The times depicted represent the average time for the 150 households observed in each zone in the bagged blocks and the 150 households in the debagged blocks. These households didn't all have bagged material or even necessarily have any material at all, however, the time it took was averaged to represent the full blocks of 150 homes regardless of material or container type. The only adjusted variable was whether the waste collector was opening the bags in the given block or loading them into the truck bagged.

Table 3.3 Average Time per Stop for Bagged vs. Debagged with All Containers

| Average Time (DM) Per Stop for Bagged vs. Debagged All Containers |  |
| :---: | :---: |
| Bagged | Debagged |
| 0.15 | 0.34 |

Of the 1200 stops observed, 600 were in bagged blocks and 600 were debagged. When comparing full blocks, debagging more than doubled the average stop per household versus stops without debagging; 0.15DM vs 0.34DM. This is average time across all recycling stops within the block of homes that had a time associated (including stops with no bagged material). Stops that didn't have any setouts did not contribute to the average time.

Table 3.4 Average Time per Bag for Bagged vs. Debagged Stops with Bags Only Average Time (DM) Per Bag for Bagged vs. Debagged Stops with Bags Only

| Bagged | Debagged |
| :---: | :---: |
| 0.06 | 0.30 |

When all other stops were excluded, calculating for households with only bagged material, AET was able to calculate the average time spent per bag. The individual stop time was divided by the number of bags at the household and then averaged. Overall, the average time to collect a closed bag is 0.06 decimal minutes; $20 \%$ of the time that is required for debagging.

Table 3.5 Average Time per Bin for All Stops with Bins Only
Average Time (DM) Per Bin for All Stops with Bins Only

### 0.13

Calculating households with only bin setouts in a similar manner showed an average of 0.13 decimal minutes per bin. Unlike for bagged material, bin time requires returning the empty bin to the curb.

### 3.5 Impact of Bags

### 3.5.1 Time Impact of Debagging

Waste collectors were recorded collecting material for 300 households, split into blocks of 75 homes bagged or debagged. Households that had no setouts were not included in the average time. All stops that had a time associated were included, regardless of container type or count. AET was able to calculate the average time per house for each of the blocks by totalling hands on time and dividing by the number of homes with stops within the block (Table 3.4). This method allows for all the demographics to be represented equally for 600 homes debagged and 600 homes bagged.

When looking at an average hands-on time of 0.15 DM for a bagged recycling collection vs 0.34 DM for a debagged collection, we have an increase of 0.18 DM per stop; more than double the time. Extrapolated over the 19,445 single-family households of Dufferin County, this would equate to an additional 45.35 truck hours of hands-on time per week (note: figures rounded to nearest 0.01). This calculation assumes recycling participation rates (percentage of households with a recycling stop) and percentage of households using bags in the sample areas are consistent across the whole county (i.e. additional time for collection with existing rates of bag use).

If Dufferin implemented a ban on bagged recycling, opting for bins instead, there would be an increase of truck time as well (i.e. it takes longer to empty a bin than it does to throw full bag in). Assuming one bag would be replaced by one bin, replacing the 485 bags in our sample represented as an average time of $0.06 \mathrm{DM} / \mathrm{bag}$ with bins at $0.13 \mathrm{DM} / \mathrm{bin}$ would see an increase 0.07 DM per replaced bag. Assuming $485 \mathrm{bags} / 1200$ households is representative for the remaining 18,245 households, an additional 8.88 hauler vehicle hours would be required each week for all of Dufferin County.

### 3.5.2 Material Impact of Bags

Beyond the collection and processing of recycling material within the bags, it is necessary to factor the physical bags themselves.

Table 3.6 Count and Weight of Bags by Zone/Day

| Count and Weight of Bags by Zone/Day |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Zone | Date | Count of <br> Bags | Weight of All Bags <br> $(\mathrm{kg})$ | Average <br> Weight per <br> Bag (g) |
| Orangeville | Monday, October 21st | 118 | $\mathrm{~N} / \mathrm{A}^{*}$ | $\mathrm{~N} / \mathrm{A}^{*}$ |
| Mono | Tuesday, October 22nd | 80 | 4.50 kg | 56.25 g |
| Shelburne | Wednesday, October 30th | 122 | 5.11 kg | 41.89 g |
| Amaranth | Thursday, October 24th | 133 | 3.41 kg | 25.64 g |

*Monday hauler vehicle wasn't equipped to collect bags.
The weight of the bags for the three days (Tuesday-Thursday) totalled 13.02 kg from a sampled 900 homes. Tuesday and Wednesday both experienced especially rainy weather accounting for a much higher average weight per bag. Based on the numbers collected, the average bag weight was 41.25 grams. Assuming a similar weight and frequency, it would be expected to collect roughly 302.85 kilograms of bags for the entire 19,445 household population per week.

### 3.6 Cost Analysis

### 3.6.1 Cost of Debagging

Curbside debagging of material would add time to the collection of recycling in Dufferin County. As outlined above, expected additional 45.35 truck hours of hands on material time would be required each week to service all 19,445 curbside collection households. This time, billed at the overtime rate of $\$ 110$ per truck hour, would translate to an additional $\$ 4,989$ per week. This number is assuming the same number of vehicles and employees would be deployed with no additional capital costs or travel accrued by requiring additional vehicles. Additional time not accounted for could be associated with emptying the receptacles that are filled with emptied bags (typically, the fastened green bin would be full after ~150 homes).

### 3.6.2 Calculation of Debagging Cost

| Average Stop Time for Debagged | $\begin{aligned} & 0.34 \\ & 0.15 \end{aligned}$ |  | Decimal Minutes Decimal Minutes Decimal Minutes |
| :---: | :---: | :---: | :---: |
| Less: Average Stop Time for Bagged |  |  |  |
| Variance* |  | 0.18 |  |
| Extrapolated over 14,860+ Stops |  | 2,721.15 | Decimal Minutes |
| Decimal Minutes Converted to Hours |  | 45.35 | Hours |
| Total Additional Cost Weekly @ rate of \$110/Truck Hours | \$ | 4,988.78 |  |
| Total Additional Cost Yearly | \$ | 259,416.45 |  |

† 19,445 Total Households adjusted for a Participation Rate of 76.42\%
(i.e. not all households require a stop)
*This calculation compares the blocks of households that were debagged to the blocks that were bagged; including all households with any recycling material.

### 3.6.3 Cost of Transition from Bagged to Bins

If Dufferin County were to move away from allowing bagged material, opting for the replacement with strictly blue bins there would be an additional time associated and therefore cost. A calculated increase of 8.88 truck hours per week would translate to an additional cost of $\$ 976$ per week (\$50,771/year).

The cost of switching to bins was calculated differently than the cost of bagged vs debagged. This is to account for the individual time of each bag and could only be calculated for houses with exclusively bins and exclusively bags. It was also assumed that one full bag would be replaced by one bin.

### 3.6.4 Calculation of Bag to Bin Cost

| Total Count of Bags at Households with only Bags | 135 | Bags |
| :---: | :---: | :---: |
| Total Hands-on Time at Households with only Bags | 8.06 | Decimal Minutes |
| Time per Bag | 0.06 | Decimal Minutes |
| Total Count of Bins at Households with only Bins | 805 | Bins |
| Total Hands-on Time at Households with only Bins | 102.64 | Decimal Minutes |
| Time per Bin | 0.13 | Decimal Minutes |
| Average Time per Bin | 0.13 | Decimal Minutes |
| Average Time per Bag | 0.06 | Decimal Minutes |
| Variance | 0.07 | Decimal Minutes |


| Number of Bags Observed in 1200 Households | 485 | Bags |
| :--- | ---: | :--- |
| Additional Minutes per 1200 Households | 32.88 | Decimal Minutes |
| Extrapolated over 19,445 Household Population | 532.83 | Decimal Minutes |
| Decimal Minutes Converted to Hours | 8.88 | Hours |
| Weekly Cost @ rate of \$110/Truck Hour | $\$$ | 976.85 |
| Total Additional Cost Yearly | $\mathbf{\$}$ | $\mathbf{5 0 , 7 9 6 . 2 3}$ |

First, all bagged stops with strictly bagged containers were isolated, the sum of the time was divided over the number of total bags allowing for an average of 0.06 DM of hands-on time per unopened bag. The same calculation was repeated with bin-only stops revealing an average of 0.13 DM of hands-on time per bin. The variance was shown to be 0.07 DM . The study of 1200 households saw the collection of 485 bags of recyclable material (this also includes bags from stops with both bins and bags). The expected additional time was multiplied by the 485 bags. Assuming the same number of bags would be observed over the remaining households of Dufferin County, this number was extrapolated to get 532.83 DM per week (8.88 truck hours). At a rate of $\$ 110$ per additional truck hour, this would translate to an additional cost of $\$ 976.85$ per week (\$50,796.23 per year).

### 4.0 QUALITATIVE OBSERVATIONS

Speaking with collection employees, they unsurprisingly prefer not opening the bags. The bags can be cumbersome especially with inclement weather and gloves. It was the general suggestion of the collection employees that they'd prefer residents to only use bins or carts.

There are benefits to the current model of allowing bagged recycling material. In more rural areas with long driveways residents might begrudge retrieving empty bins following collection. Additionally, on certain roads with fast traffic and tight shoulders, bins can be swept away. High winds can also contribute to scattered material, particularly in more rural areas.

Contrarily, disallowing bags could have benefits. Most relevantly, the cost associated with debagging of material would be a nonissue. Additionally, it would reduce a source of plastic waste.

### 4.1 Seasonal Observations

The recycling during the Fall season displayed some results that are likely unique to the time of year. The dates sampled saw rain on 3 of the 4 days with heavy rain on two days. This would surely impact the collection times and weight of the bags. During winter and summer, the weather would pose unique challenges.

It's also important to note the speed of the collection operator would adjust over time with more experience debagging.

### 4.2 Future Studies

To further explore and more accurately conclude the cost implications of bagged recycling, further studies could be conducted. For example, seasonal studies would see different patterns in weather and generation rates. If collection operators were allowed more experience and specialized equipment, it could translate to a reduction in the time debagging. Other case studies could be researched to see the cost associated; particularly in municipalities that have switched from strictly bags to bins or carts. As with all quantitative studies, the larger the sample, generally the more reliable the data. With an exact replication of the methodology of this study an even more accurate conclusion could be drawn.

Additional studies could be conducted to analyze the material. Waste audits comparing bagged versus bin material might show a correlation in contamination rates.

### 5.0 CONCLUSION

The following metrics were gathered from the Dufferin County time and setout study conducted in the Fall of 2019:

## Participation Rates

- 917 of the 1,200 sampled households participated in curbside recycling for a participation rate of $76.42 \%$.
Overall Setout Counts and Types
- A total of 1,574 setouts were observed over the 1,200 homes.
- Setout container types included $64.68 \%$ bins, $30.81 \%$ bags, $3.94 \%$ bundled/loose material and $0.57 \%$ carts.
- $67.50 \%$ of homes put out only bins, $8.62 \%$ only bags, and $23.88 \%$ a mix of bags/bins.


## Rejection Stickers

- No rejection stickers were observed during the study.

Time Results

- Average time per stop was 0.15 decimal minutes (DM) during the bagged sections and 0.34 DM during debagged sections.
- Average time for a single bag was 0.06 DM for bagged and 0.30 DM for debagged.
- Average time for a single bin was 0.13 DM.


## Cost Analysis

- It is estimated that debagging at the curb would result in an additional 45.35 truck hours per week for all of Dufferin County.
- At a rate of $\$ 110$ per additional truck hour this would translate to an additional $\$ 4,988.78 /$ week or approximately $\$ 259,000 /$ year.
- It is estimated that if all bags were switched to equivalent bins, there would be an additional 8.88 truck hours required per week for all of Dufferin County.
- At a rate of $\$ 110$ per additional truck hour this would translate to an additional cost of $\$ 976.85 /$ week or approximately $\$ 50,800 /$ year.


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## Disclaimer

AET Group Inc. makes no warranty and assumes no liability for the information contained in this report outlining the study results. These results reflect measurements made over the one-week study period as described in the methodology. As such, waste collection measurements should be considered snapshots and may not reflect accurately conditions across Dufferin County over time.

| Overall \# | Section \# | Bags | Bins | Bundle/Loose | Cart | Time | Comment | Zone | Date | Bagged/Debagged | Organics Also | Truck Employes | Rural/Urban |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 1 | 0 | 3 | 0 | 0 | 7:12:00 AM |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 2 | 2 |  | O | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 3 | 3 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 4 | 4 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 5 | 5 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 6 | 6 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 7 | 7 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 8 | 8 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 9 | 9 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 10 | 10 | 0 |  | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 11 | 11 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 12 | 12 | 0 | 3 | 0 |  |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 13 | 13 |  | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 14 | 14 |  |  | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 15 | 15 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 16 | 16 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 17 | 17 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 18 | 18 | 3 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 19 | 19 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 20 | 20 | 8 |  | 1 | 0 |  | bundled OCC | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 21 | 21 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes |  | Urban |
| 22 | 22 | 0 | 1 | 0 |  |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 23 | 23 | 0 |  | 0 |  |  |  | Orangeville | October-21-19 | Debagged | Yes | , | Urban |
| 24 | 24 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 25 | 25 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 26 | 26 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 27 | 27 | 0 | 1 |  | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 28 | 28 | 0 | 3 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 29 | 29 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 30 | 30 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 31 | 31 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 32 | 32 | 0 |  | 0 | 0 | 7:39:00 AM |  | Orangeville | October-21-19 | Debagged | Yes | , | Urban |
| 33 | 33 | 2 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 34 | 34 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes |  | Urban |
| 35 | 35 | 1 | 0 | 1 | 0 |  | bundled boxboard | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 36 | 36 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 37 | 37 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 38 | 38 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 39 | 39 | 1 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 40 | 40 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 41 | 41 | 6 | 0 | 1 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 42 | 42 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 43 | 43 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 44 | 44 | 0 | 0 | 0 |  |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 45 | 45 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 46 | 46 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 47 | 47 | 0 |  | 0 | - |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 48 | 48 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 49 | 49 | 0 | 0 |  | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 50 | 50 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 51 | 51 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 52 | 52 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 53 | 53 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 54 | 54 | 2 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 55 | 55 | 0 | 0 |  | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 56 | 56 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 57 | 57 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 58 | 58 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 59 | 59 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 60 | 60 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 61 | 61 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 62 | 62 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 63 | 63 | 0 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 64 | 64 |  | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 65 | 65 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 66 | 66 | 0 | 2 |  | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 67 | 67 | 6 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 68 | 68 | 0 | 3 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 69 | 69 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 70 | 70 | 6 | 1 | 3 | 0 |  | loose piza boxes | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 71 | 71 | 0 | 3 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 72 | 72 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 73 | 73 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 74 | 74 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 75 | 75 | 0 | 1 | 0 | 0 | 7:59:00 AM |  | Orangeville | October-21-19 | Debagged | Yes | 2 | Urban |
| 76 | 1 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 77 | 2 | 1 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 78 | 3 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 79 | 4 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 80 | 5 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 81 | 6 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 82 | 7 | 1 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 83 | 8 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 84 | 9 | 1 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 85 | 10 | 0 | 2 | 0 | 0 | 8:02:00 AM |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 86 | 11 |  | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 87 | 12 | 0 | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 88 | 13 | 0 | 0 | 1 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 89 | 14 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 90 | 15 |  | 0 | O | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 91 | 16 | 0 | 3 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagsed | Yes | 2 | Urban |
| 92 | 17 | 2 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 93 | 18 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 94 | 19 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 95 | 20 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 96 | 21 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 97 | 22 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 98 | 23 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 99 | 24 |  | 2 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 100 | 25 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 101 | 26 |  | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 102 | 27 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 103 | 28 |  | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes |  | Urban |
| 104 | 29 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 105 | 30 | 0 | 1 | O | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 106 | 31 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 107 | 32 33 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | $\frac{\text { Bagged }}{\text { Bagged }}$ | Yes | 2 | Urban |
| 109 | 34 | 1 | 0 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 110 | 35 | 2 |  | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 111 | 36 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 112 | 37 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes |  | Urban |
| 113 | 38 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |
| 114 | 39 | 0 | 1 | 0 | 0 |  |  | Orangeville | October-21-19 | Bagged | Yes | 2 | Urban |











| Overall \# | Section \# | Bags | Bins | Bundle/Loose | Cart | Time | Comment | Zone | Date | Bagged/Debagged | Organics Also | Truck Employees | Rural/Urban |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1141 | 16 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1142 | 17 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1143 | 18 | 0 | 3 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1144 | 19 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1145 | 20 | 0 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1146 | 21 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1147 | 22 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1148 | 23 | 2 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1149 | 24 | 1 | 2 | 4 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1150 | 25 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1151 | 26 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No |  | Urban |
| 1152 | 27 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1153 | 28 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1154 | 29 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1155 | 30 | 0 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No |  | Urban |
| 1156 | 31 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1157 | 32 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1158 | 33 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1159 | 34 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1160 | 35 | 2 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1161 | 36 | 2 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1162 | 37 | 3 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1163 | 38 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1164 | 39 | 3 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1165 | 40 | 1 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1166 | 41 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1167 | 42 | 0 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1168 | 43 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1169 | 44 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1170 | 45 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1171 | 46 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1172 | 47 | 0 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1173 | 48 | 0 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1174 | 49 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1175 | 50 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1176 | 51 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1177 | 52 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1178 | 53 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1179 | 54 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1180 | 55 | 0 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1181 | 56 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1182 | 57 | 1 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1183 | 58 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1184 | 59 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1185 | 60 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1186 | 61 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1187 | 62 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1188 | 63 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1189 | 64 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1190 | 65 | 1 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1191 | 66 | 0 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1192 | 67 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No |  | Urban |
| 1193 | 68 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1194 | 69 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1195 | 70 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No |  | Urban |
| 1196 | 71 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1197 | 72 | 0 | 2 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1198 | 73 | 1 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1199 | 74 | 2 | 0 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |
| 1200 | 75 | 0 | 1 | 0 | 0 |  |  | Shelburne | October-30-19 | Bagged | No | 1 | Urban |

