WMPSC C 7-2019
Appendix 1
February 25, 2019

2015/2016 Seasonal Low-Density Residential Dwelling Curbside Waste Composition Study

Niagara Region Comprehensive Report

Prepared for

The Regional Municipality of Niagara

Prepared by

AET Group Inc.

531 Wellington St. North
Kitchener ON N2H 5L6
T (519) 576-9723
F (519) 570-9589
www.aet98.com

December 22, 2016

Project No. NIA_WAC1415_052

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

Niagara Region (the Region) solicited bids from proponents (proposal number 2014-RFP-50) to conduct a comprehensive low-density residential dwelling waste composition study and prepare a detailed summary report. The Region retained the services of AET Group to conduct the waste composition study involving samples from all twelve local area municipalities (LAMs) across the region, from July 6, 2015 to April 22, 2016 (four seasonal two-week audits). The twelve LAMs include: Fort Erie, Grimsby, Lincoln, Niagara Falls, Niagara-on-the-Lake, Pelham, Port Colborne, St. Catharines, Thorold, Wainfleet, Welland and West Lincoln.

The project objectives were to conduct a series of four seasonal, low-density residential dwelling waste audits within each municipality of the Niagara region. The results collected were used to provide the following information:

- Determine the 2015/2016 program performance measures that include:
  - Capture rate;
  - Diversion (recovery) rate;
  - Participation rate;
  - Residue rate;
  - Set-out rate;
  - Waste generation rate;
- Resource Productivity and Recovery Authority (RPRA, formerly WDO) Datacall's Best Practice performance metric for "Projected kg/hhld Recovered";
- Identify set-out trends that include:
  - Mixed recycling (fibres and containers in one Blue or Grey Box);
  - Total number of non-traditional boxes (non-Blue/Grey Box containers) and transparent bags being set out at each household;
  - Placement of plastic bags/film in boxes;
- Provide qualitative summary of observations and quantify the extent of recycling cross-contamination, specifically including:
  - Frequency, percentage and weight of each recyclable material category being placed in the incorrect recycling container;
  - Households in the study area that set-out loose vs. bundled plastic bags in the Blue/Grey Box stream and identify how many households placed them in their Grey Box correctly vs. their Blue Box;
  - Overall level of cross-contamination by Blue Box and Grey Box streams.
- Compare the 2015/2016 seasonal waste audit results and program performance measures for participants in recycling and organics programs to non-participants in recycling and/or organics programs (i.e. composition of waste in those households that do participate in the recycling and/or organics program vs. those households that do not participate);
- Provide qualitative summary of observations and quantify the differences in the comparison of seasonal waste audit results with the 2010/2011 Niagara region seasonal

waste audit results and provide a detailed analysis, by seasonal waste audit, material stream, Niagara region municipality and region-wide;

- Provide a comprehensive trend analysis of various material streams to determine changes in performance from the 2010/2011 seasonal waste audit results; quantify changes in metrics; provide rationale as to why changes (or no changes) may have occurred, and propose mechanisms to improve performance, including the identification of material streams that could be targeted for improved recycling/capture;
- Complete some comparison (when possible) against pre and post Level of Service (LOS) changes, in addition to the average of the four waste audits in 2010/2011;
- Reference the impact of both LOS changes and improvements/initiatives included in the Region's 2011-2015 Blue Box Recycling Plan;
- Provide commentary on any lessons learned.

All waste composition data should be considered a sample that represents a snapshot in time. There may be variances in results depending on set-out data. In addition, there are other diverted tonnages from other diversion programs in the region that are not included in this waste composition study. These programs include: materials received at drop-off depots (i.e. concrete, asphalt, shingles, yard waste, MHSW, WEEE, recyclables, etc.), curbside yard waste and bulky/white goods collection and Resource Productivity and Recovery Authority-calculated tonnages (i.e. backyard composting, grasscycling and stewardship programs).

Caution must be used when looking at individual municipality data due to the low sample size (ranging from 10-30 households). One household's good or bad habits can skew the results easily on the individual municipality basis. The results compiled for the region as a whole provide a more accurate representation of the waste composition trends in the Niagara region.

The results from the waste composition study are detailed below.

1. Program Performance Measures:

The key program performance measures are outlined in the table below. This also provides an overview of the changes from the 2010-11 audits to the 2015-16 audits.

Performance Measures	2010-11 Niagara Audits (4 Season Average)		2015-16 Niagara Audits (4 Season Average)		% Change 2010-11 vs. 2015-16 Audits
	kg/hh/wk	kg/hh/yr	kg/hh/wk	kg/hh/yr	
Overall Waste Generation:	13.49	701.68	11.91	619.16	-11.73%
Garbage Generation	6.57	341.88	6.14	319.29	-6.54%
Recycling Generation	4.47	232.32	3.76	195.72	-15.80%
Green Bin Organics Generation	2.45	127.49	2.00	104.15	-18.25%
Divertible Material in the Garbage Stream:					
Recyclable Material in the Garbage Stream:	0.91	47.51	0.86	44.46	-6.04%
Green Bin Organic Material in the Garbage Stream:	3.33	173.84	3.06	159.01	-8.17%
Contamination Rates (%):					
Recycling Stream (combined Blue Box and Grey Box)	10.57%		7.69%		-27.23%
Green Bin Organics Stream	1.63%		0.84%		-48.39%
Capture Rate of Divertible Materials:					
Recycling Stream	81.22%		80.18%		-1.28%
Green Bin Organics Stream	41.02%		38.25%		-6.75%
Diversion Rate:	47.48%		45.70%		-3.74%
Participation Rates:					
Recycling Stream (residents place either Blue or Grey Box out for recycling)	72.76%		82.15%		12.90%
Green Bin Organics Stream	41.73%		47.58%		14.01%
Garbage Stream	75.89%		87.47%		15.25%
Set-Out Rate (# items/hh/wk):					
Recycling Stream (combined Blue Box and Grey Box)	1.30		1.45		11.48%
Green Bin Organics Stream	0.46		0.42		-9.36%
Garbage Stream	0.98		0.86		-11.79%
Set-Out Rate (# full container equiv./set-out):					
Recycling Stream (combined Blue Box and Grey Box)	1.67		1.82		9.08%
Green Bin Organics Stream	0.59		0.51		-13.13%
Garbage Stream	1.07		0.99		-7.24%

[1] Participation rates were calculated differently in 2010-2011 versus 2015-16. The calculations in 2010-11 were based on households weekly set-outs. The calculations in 2015-16 classified a household as a participant if they set-out material at least once during the two week study period.
Yearly generation of waste was calculated by multiplying the weekly generation by fifty two weeks.

Explanation of Key Performance Measures:

Diversion:

Of all the waste produced by low-density residential dwellings in the Niagara region, a total of 45.70% is diverted from the landfill through the Blue and Grey Box recycling and Green Bin organics programs in place.

Disposed Divertible Material:

- A total of 63.73% (203 kg/hh/yr) of the garbage stream was comprised of divertible material;
  - 49.80% (159 kg/hh/yr) Green Bin organics and;
  - 13.93% (44 kg/hh/yr) Blue and Grey Box recyclables.
- The most commonly disposed Green Bin organic materials included:
  - Food waste (i.e. food scraps, including: peelings and eggshells, leftover uneaten food, bought and forgot wasted food);
  - Pet waste (i.e. kitty litter) and;
  - Paper tissue/towelling.
- The most commonly disposed Blue and Grey Box recyclable materials included:
  - Boxboard (i.e. cereal boxes, tissue boxes);
  - Corrugated cardboard;
  - Mixed fine paper (i.e. plain white writing paper, mailing envelopes & bills);
  - #1 PET bottles and jars (i.e. plastic water/pop bottles);
  - Flexible films (i.e. retail carry-out bags, milk bags, overwrap for toilet paper);
  - Other rigid plastic packaging (i.e. unmarked plastic containers);
  - Aluminum foil and trays;
  - Steel food and beverage cans (i.e. soup cans, tuna cans) and;
  - Clear glass containers (i.e. glass bottles for food and beverages).

Capture Rates:

- The overall capture rate for Blue and Grey Box recyclable materials was 80.18%.
- Individual material types that had high capture rates included:
  - Newsprint (daily newspaper and sales flyers);
  - Corrugated cardboard;
  - Magazines & catalogues;
  - Glass food & beverage containers;
  - Gable top containers (i.e. milk cartons)
- The overall capture rate for Green Bin organic materials was 38.25%.
- Individual organic material types that had high capture rates included:
  - Yard waste;
  - Unavoidable Food Waste (i.e. food scraps including peelings and egg shells)

Contamination Rates and Cross-Contamination:

- The overall contamination rate of the Blue Box stream was 13.32%.
- A total of 3.69% of the stream consisted of Grey Box cross-contamination (largely newsprint, boxboard, corrugated cardboard and flexible films).
- Blue Box contamination rates for the individual municipalities ranged from a low of 8.45% to a high of 23.93%.
- The overall contamination rate of the Grey Box stream was 4.11%.
- A total of 1.65% of the stream consisted of Blue Box cross-contamination (largely gable top containers).
- Grey Box contamination rates for the individual municipalities ranged from a low of 2.19% to a high of 11.30%.

- The overall contamination rate of the Green Bin organics stream was 0.84%.
- Green Bin contamination rates for the individual municipalities ranged from a low of 0.05% to a high of 3.65%.

2. Trend Analysis Results:

After the Region implemented new Level of Service (LOS) changes in February of 2011, the overall generation and diversion of materials immediately increased.
The new LOS changes included the following:

- Reduction in garbage bag/container set-out limit from 2 items/week to 1 item/week;
- Recycling collection for both Blue Box and Grey Box changed from alternating weekly collection to weekly collection for both Blue Box and Grey Box streams;
- Region-wide weekly collection for Green Bin organics. This was an expansion of services since some municipalities did not have Green Bin collection prior to the LOS changes.

The biggest change seen from the 2010-2011 audits to the 2015-2016 audits is the reduction in waste generation for all waste streams. This means that low-density residential dwellings are producing less garbage, less Blue and Grey Box material and less Green Bin organic material (by weight). This may be attributable to changes in packaging trends, a decrease in overall consumption or disposal of materials.

With lower generation rates, there is an expectation for lower volumes of material. This is not the case for recyclable materials when comparing set-out rates from 2010-2011 to 2015-2016. There is a 9.08% increase in number of full container equivalents/set-out for the recycling stream. This trend could be attributed to the increase in plastic packaging on the market. The plastic packaging has a greater volume with less weight. This requires more recycling boxes to be set-out by low-density residential dwellings. Both garbage and Green Bin organics experienced a decrease in volume of material from 2010-2011 to 2015-2016. The set-out trends are displayed in the table below. The set-out rates show that low-density residential dwellings have adjusted to the one (1) bag/container limit for garbage. The Region provides instruction and support to the contracted hauling company, as well as by-law enforcement to ensure compliance is met throughout the region.

With a lower garbage set-out limit, an increase in contamination levels is expected. Contamination rates for all three diversion programs (Blue Box, Grey Box and Green Bin) have decreased since 2010-2011.

Divertible materials (Blue Box, Grey Box and Green Bin) placed in the garbage stream has decreased from 221 kg/hh/yr in 2010-2011 to 203 kg/hh/yr in 2015-2016. This means that less recyclable and organic materials (by weight) are entering the Region's landfills each year.

The curbside waste diversion rate calculated for low-density residential dwellings has decreased slightly from 2010-2011 to 2015-2016. There was a spike in recycling generation immediately after the LOS changes in February of 2011. Since then, generation has decreased, making it

more difficult to achieve a high diversion rate. Overall, this diversion rate has decreased from 47.48% in 2010-2011 to 45.70% in 2015-2016. It must be noted that this diversion rate is based on a subset of total waste stream. The Region's calculation for waste diversion based on RPRA's Generally Accepted Principles (GAP), which includes additional parameters.

The overall capture rates for the 2015/2016 audits have decreased slightly since 2010/2011, but have remained higher than the pre-LOS changes.

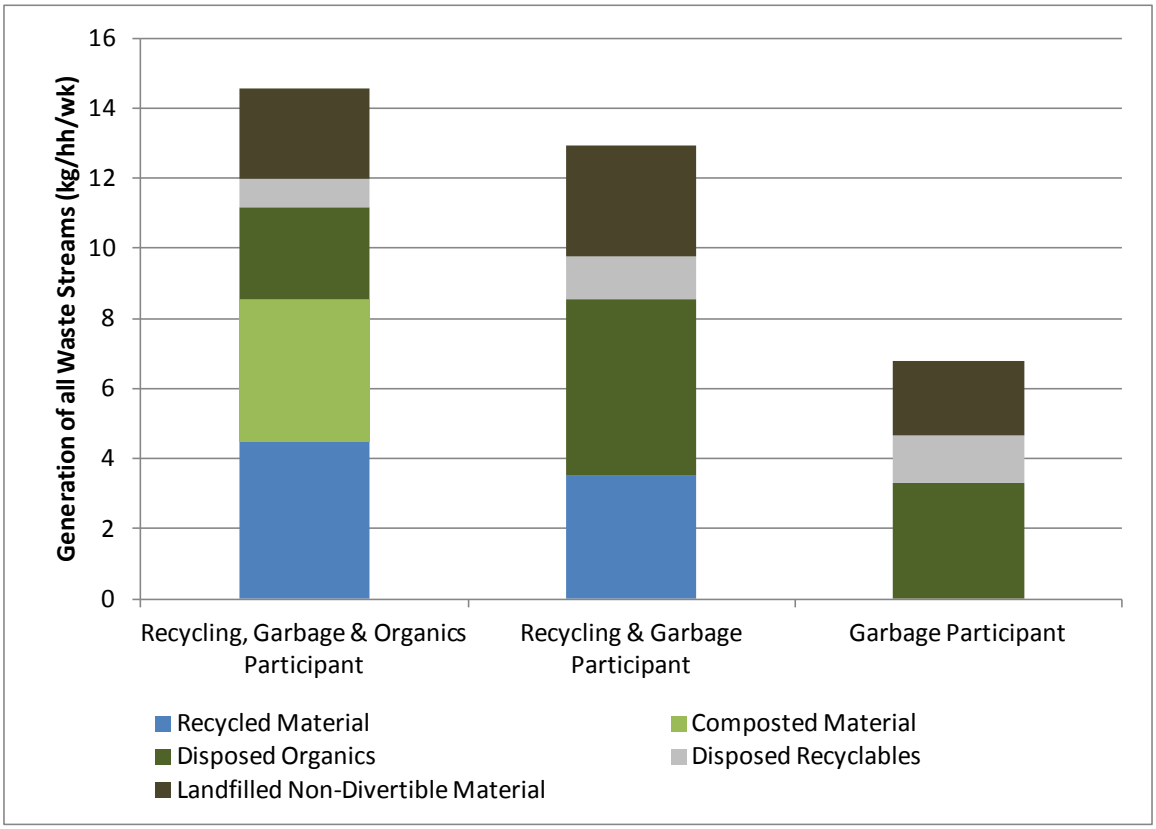
The curbside waste diversion rate for the Region remained fairly constant from 2004 to early 2011, at approximately 40%. However, after the service changes were implemented, this diversion rate climbed to over 50% for both the Spring and Summer 2011 audits. This diversion rate decreased to 45.7% for the 2015/2016 audits. A more thorough examination of changing waste trends can be found in a separate technical memo accompanying this report, as Appendix D. This memo details the keys areas for the Region to achieve a higher diversion rate, including further capture of Green Bin organic material. In addition, the memo provides background on the changing packaging trends (i.e. lightweight flexible packaging, on-the-go packaging styles and portability) increasing convenience for the consumer.

3. Participant Type Comparisons:

In order to assess trends on participants in the diversion programs and non-participants in the diversion programs, participant types were created. The main participant types include:

- 'Recycling, Garbage and Organics Participant' – this participant type represents low-density residential dwellings that set out recycling (Blue or Grey Box), garbage and Green Bin organics;
- 'Recycling & Garbage Participant' – this participant type represents low-density residential dwellings that set out recycling (Blue or Grey Box) and garbage only;
- 'Garbage only Participant' – this participant type represents low-density residential dwellings that set out garbage only.

The results indicate that the quantity of waste produced (all streams equalled 14.57 kg/hh/wk) is the highest for 'Recycling, Garbage and Organics Participants'. However, they produced the least amount of garbage (5.58 kg/hh/wk) compared to the other participant types. The composition of waste (all streams) produced is outlined in the figure below. All annual generation values can be calculated by multiplying the weekly generation value by fifty two weeks.



The focus should be on the total amount of divertible material that has been disposed by each participant type. The following table displays the amount of divertible material that is disposed by each participant type.

	Recycling, Garbage & Organics Participant	Recycling & Garbage Participant	Garbage Participant
	kg/hh/wk	kg/hh/wk	kg/hh/wk
Disposed Green Bin Organics	2.65	5.02	3.28
Disposed Blue and Grey Box Recyclables	0.78	1.22	1.38
Total	**3.43**	**6.24**	**4.67**

4. Qualitative Summary of Observations of 2015-2016 Waste Composition Study results:

Auditors are able to see trends in the waste streams depending on how they have to separate the waste during the audit sorting. The following trends were noted:

- A lot of food waste in the garbage was removed from packaging or bags;
    - In order to capture the food waste, residents would have to take extra steps to remove spent food from its packaging.

- Retail carry-out bags were used to contain garbage;
    - This directly affects the capture rate for flexible films since people are utilizing them as garbage bags.

A degree of contamination in the recycling stream is able to be removed at the Recycling Centre, however, several factors come into play when looking at the transfer of materials and how contamination is able to make it to the end to the end of the line, marketed commodity. During the audit process, auditors scrape empty and separate contents from their packaging and place into individual material categories. The machinery at the Recycling Centre does not have the same degree of separation. This is something to keep in mind when comparing waste composition results to the Region's RPRA calculation for Projected kg/hhld Recovered.

Conclusion

All of the information discussed above is provided in further detail in the following report and attached appendices. The following report summarizes the results of the 2015-2016 low-density residential dwelling curbside waste composition study. This includes an introduction, methodology, detailed audit results, trends and analysis results and observations and lessons learned.

1.0 INTRODUCTION

1.1 Definitions

Avoidable Food Waste:	Food waste that could have been consumed before disposal. This includes: leftover food that was prepared but not eaten (e.g. plate scrapings, half-eaten sandwich, uneaten leftovers) as well as untouched food that expired or went bad before it could be eaten (e.g. food still in packaging, whole produce, uncooked food, whole slices of bread).
Capture Rate:	The capture rate is the percentage of a divertible material collected, out of the total amount of that material generated. It is an excellent indicator of how well a diversion program is working for a particular material.
Contamination Rate:	The percentage of material in a recycling or organics bin that is not accepted in the program. A high contamination rate may lead to the hauler not accepting the material for the diversion program and redirecting the material for disposal.
Diversion Rate:	The diversion rate is the percentage of the total waste generated that is diverted from disposal into the Region's curbside low-density residential recycling and organics streams.
Garbage Stream:	Material that is collected for disposal rather than diversion. It will include divertible material where the diversion programs are not operating at 100% efficiency. This material is sometimes referred to as residual waste.
MHSW:	Municipal Hazardous or Special Waste is material that is potentially harmful to the environment and should be disposed of through special handlers.
Organics Stream:	Material that is diverted from the garbage stream in the Region's curbside low-density residential Green Bin Program.
Participation Rate:	Represents the average proportion of sampled households that had material set out in a particular stream at least once over a seasonal two week study period.
Participant Type:	Participant type refers to the different types of waste set-out combinations. Each household is classified as a designated

participant type after each two week sampling period. This participant type is based on their two week waste set-out profile. There are seven (7) participant types. They include:

- G – Garbage only Participant,
- R – Recycling only Participant,
- O – Organics only Participant,
- RG – Recycling & Garbage Participant,
- RGO – Recycling, Garbage & Organics Participant,
- RO – Recycling & Organics Participant, and
- GO – Garbage & Organics Participant.

Recycling Stream: Material that is diverted from the garbage stream in the Region's curbside low-density residential dwelling Blue & Grey Box recycling program.

Set-out Rate: The average number of items (i.e. Blue/Grey Boxes, Green Bins or garbage bags/bins) set out per household per week or full container equivalents set out per household per week. Unless otherwise stated, this average is calculated over all households in an area, not just those that have material set out. This does not include any households, which items were previously collected by collection contractor or opted out of the survey.

Unavoidable Food Waste: Food that could not be further eaten or prepared (e.g. vegetable and fruit peelings, fats, oils, bones, etc.)

1.2 Background

Niagara Region (the Region) solicited bids from proponents (proposal number 2014-RFP-50) to conduct a comprehensive low-density residential dwelling waste composition study and prepare a detailed summary report. AET Group Inc. (AET) was selected as the successful proponent to carry out this study. The waste composition study was conducted in all twelve LAMs across the Region from July 6, 2015 to April 22, 2016 (four seasonal two-week audits). Results gathered from the study are used to determine participation rates, set-out rates, capture rates, contamination rates, and diversion rates.

The following report details the results of the 2015/2016 waste audits and compares the results to the Region's previous studies. All waste composition data should be considered a sample that represents a snapshot in time. There may be variances in results depending on set-out data. In addition, there are other diverted tonnages from other Regional diversion programs that are not included in this waste composition study. These programs include: materials received at drop-off depots (i.e. concrete, asphalt, shingles, yard waste, MHSW, WEEE, recyclables, etc.), curbside

bulky/white goods and yard waste collection and Resource Productivity and Recovery Authority-calculated tonnages (i.e. backyard composting, grasscycling and stewardship programs).

1.3 Objectives

The waste composition study was intended to accomplish the following objectives when considering the Region's current program:

- Collect accurate low-density residential dwelling waste generation and composition data from each municipality within the region;
- Calculate various program performance measures such as waste generation, diversion, capture, participation, set-out and contamination rates;
- Compare program performance measures for participants in recycling and organics programs to non-participants in recycling and/or organics programs;
- Compare the results of the low-density residential dwelling waste audits with the previous Niagara Region waste audits; and,
- Develop a comprehensive final report, which details all the program performance measures, trend analysis, comparison to previously conducted studies in the region and other comparative analyses.

2.0 METHODOLOGY

2.1 Waste Audit Methodology

Four seasonal waste audits were conducted between July 6, 2015 and April 22, 2016, as follows:

Summer Audit: July 6 – 17, 2015
Fall Audit: October 19 – 30, 2015
Winter Audit: January 18 – 29, 2016
Spring Audit: April 11 – 22, 2016

This report details the results from all four seasons.

2.1.1 Waste Sampling Process

Niagara Region staff provided AET with a list of 170 low-density residential dwellings to be sampled for the waste composition study. Garbage, recycling and organic material was collected each day in two to four different areas across the region. Following the Summer seasonal audit, a total of four (4) households requested to be removed from the study. A fifth household requested to be removed from the study during the Fall seasonal audit.

Each day, the areas sampled were spread over the twelve LAMs, which had been targeted for the study. There were a total of 17 different areas sampled from during the study; three in

Niagara Falls, three in St. Catharines, two in Welland, and one area in Thorold, Fort Erie, Grimsby, Lincoln, Niagara-on-the-Lake, Pelham, Port Colborne, West Lincoln and Wainfleet. Blocks of 10 consecutive households were selected by the Region.

The material from each household was collected and audited separately. Each season, the samples were collected over two consecutive weeks. The number of garbage cans/bags, Green Bins, recycling boxes and the approximate amount of garbage, organics and recyclable material set out for each home measured in terms of full container (cans/bags/bins/boxes) equivalents was recorded. In addition, mixed recycling set-outs were noted, as well as the use of alternate containers. Plastic film in the recycling boxes was noted, if it was present, which bin it was placed in and if it was bagged. Leaf & yard waste and bulky/white good items were weighed at the curbside and left behind for the regular waste hauler to collect (weights of material generated in these streams is not included in the composition analysis within this report).

Some material had been collected by the Region's waste collection contractor prior to the time of AET's arrival, and, as a result, the number of households sampled was adjusted in the calculations to account for this. All material collected by AET was taken to the Humberstone landfill site, located in the City of Welland, at 700 Humberstone Road, to be audited by AET staff.

Figure 2.1 AET Staff Collecting Set-out Data

Figure 2.2 AET Staff Collecting Curbside Samples

Table 2.1 summarizes the sample areas selected by the Region for the audit.

Table 2.1 Summary of Waste Audit Sample Areas

Municipality	2015/2016 Audit (four seasons)
Fort Erie	Urban SFH: 10 hhlds Addresses: 2430, 2434, 2440, 2444, 2448, 2452, 2456, 2460, 2464, 2470 Coral Ave. Avg. House Price: $172-$217k Demographics: Low-Medium Income
Grimsby	Urban SFH: 10 hhlds Addresses: 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 Brierwood Avenue Avg. House Price: $214-$243k Demographics: Medium-High Income
Lincoln	Urban SFH: 10 hhlds Addresses: 4145, 4153, 4159, 4165, 4171, 4177, 4185, 4191, 4195, 4203 Victoria Ave. (Vineland) Avg. House Price: $170-$300k Demographics: Medium Income
Niagara Falls	Urban Townhouses: 10 hhlds Addresses: 7645 Preakness St., units 57,56,54,49,48,45,40,28,27,26 Avg. Age of Homes: 25 years old Avg. House Price: N/A (rentals) Demographics: Medium Income
	Urban SFH: 10 hhlds Addresses: 6995, 6997, 7013, 7015, 7037, 7039, 7057, 7059, 7069, 7071 Briarwood Ave. Avg. Age of Homes: 45 years old Avg. House Price: $116-$135k Demographics: Low Income
	Rural SFH Farms: 10 hhlds Addresses: 13442, 13400, 13368, 13330, 13250, 13230, 13210, 13090, 13040, 12924 Crowland Avenue Avg. Age of Homes: 35 years old Avg. House Price: $190-$358k Demographics: High Income
Niagara-on-the-Lake	Rural SFH & Farms: 10 hhlds Addresses: 323, 343, 351, 357, 363, 395, 401, 407, 413, 419 Queenston Road Avg. Age of Homes: 85 years old Avg. House Price: $176-$576k Demographics: High Income
Pelham	Urban SFH: 10 hhlds Addresses: 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 Blackwood Place, Fonthill Avg. House Price: $283-$379k Demographics: High Income
Port Colborne	Urban SFH: 10 hhlds Addresses: 168, 172, 176, 178, 182, 190, 194, 206, 210 and 214 Neff Street Avg. Age of Homes: 35 years old Avg. House Price: $100-156k Demographics: Low-Medium Income

Municipality	2015/2016 Audit (four seasons)
St. Catharines	Urban SFH: 10 hhlds Addresses: 103, 105, 107, 109, 111, 113, 115, 117, 119, 121 Stoney Brook Cres. Avg. Age of Homes: 25 yrs old Avg. House Price: $165-190k Demographics: Medium-High Income
	Urban SFH: 10 hhlds Addresses: 1, 5, 7, 9, 11, 13, 15, 17, 19, 21 Greenbriar Place Avg. Age of Homes: 25 yrs. old Avg. House Price: $220-$320k Demographics: High Income
	Urban SFH: 10 hhlds Addresses: 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 Oriole Drive Avg. Age of Homes: 60 yrs. old Avg. House Price: $156-157k Demographics: Medium Income
Thorold	Urban SFH: 10 hhlds Addresses: 3, 5, 7, 9, 11, 15, 17, 19, 21, 23 Welland Street, South Avg. Age of Homes: 85 yrs. old Avg. House Price: $129-$182k Demographics: Low-Medium Income
Wainfleet	Rural Farms: 10 hhlds Addresses: 32173, 32363, 32373, 32433, 32449, 32585, 32633, 32761, 32769, 32775 Feeder Road, West Avg. House Price: $150-$340k Demographics: Medium-High Income
Welland	Urban SFH: 10 hhlds Addresses: 2, 4, 8, 16, 20, 28, 38, 42, 44, 48 Clifford Avenue Avg. Age of Homes: 90 yrs. old Avg. House Price: $80-$145k Demographics: Low Income
	Semi-rural SFH: 10 hhlds Addresses: 518, 520, 522, 524, 526, 532, 534, 536, 538, 540 Forks Road Avg. Age of Homes: 35 yrs. old Avg. House Price: $129-$268k Demographics: Low-Medium Income
West Lincoln	Rural SFH with Farms: 10 hhlds Addresses: 5869, 5981, 6211, 6285, 6419, 6547, 6567, 6571, 6601, 6683 Young Street Avg. House Price: $83-$495k Demographics: High Income

2.1.2 Waste Sorting Process

All of the material collected during the sampling period was sorted and weighed. Garbage, organics and recyclables were sorted and weighed separately for each household sampled. At the conclusion of the waste audit, the results were combined to yield an accurate representation of garbage, organics and recyclables for the Niagara region. Samples were sorted into 10 major waste groups, consisting of 97 individual categories. Waste categories were

adapted from Stewardship Ontario's waste audit protocol, and expanded to include a more detailed breakdown of non-packaging and non-printed paper materials. Additional categories were added by the Region, for further analysis. The full list of sort categories can be seen on the audit results sheet, in Appendix A.

Separated material for each waste stream was sorted into bins, based on the 97 categories, and weighed individually. The material weights were measured using a digital BLS Briefcase 40 scale measuring to the nearest 1/100th kilogram and then recorded. After being weighed, non-divertible material was dumped into a large bin, which was located just outside the sorting facility. Recyclable material was separated into two streams; fibres and containers, and placed into separate bins, which were also located outside the sorting facility. Clean organic material was placed in large carts for collection by the Region's organics hauler. Figure 2.3 illustrates AET staff sorting waste samples.

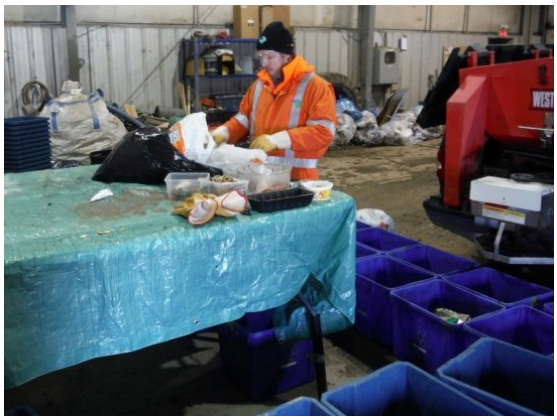


Figure 2.3 AET Staff Sorting Samples

2.2 Limitations

The 170 low-density residential dwellings selected by the Region for the audit represent sample areas from across all twelve LAMs, varying housing types and demographics (17 audit areas of 10 consecutive houses). Although this sample size exceeds Stewardship Ontario's recommended minimum waste audit sample size of 100 households for the region as a whole, caution should be exercised when analyzing the audit data for local area municipalities individually. This is due to the fact that the number of households sampled in each municipality individually may not be representative of that municipality as a whole since most municipalities are represented by only one sample area of 10 households.

Despite the Region's notification to contracted waste/recycling haulers of upcoming audits, in some cases, the contractor collected materials from the designated sample areas prior to AET's arrival. In these cases, the participation and composition data was lost for the affected sample areas. Adjustments were made by AET to omit these lost samples from calculations, thereby not

affecting participation/set-out rates; however, this does leave gaps in the data for some sample areas.

2.3 Quality Assurance / Quality Control

The following Quality Assurance/Quality Control (QA/QC) operations and procedures were followed by AET to ensure accurate and consistent collection and reporting of audit data:

- Development of a unique identifier code for each household to protect the confidentiality of the households sampled.
- Isolation of samples collected into individual piles, in which each bag was flagged with a unique tag, identifying the sample household.
- Use of professionally calibrated scales.
- List of all material categories and descriptions available to staff at the audit table to ensure consistent classifications.
- Regular adjustment to audit bin tare weights to ensure accurate weigh-outs.
- Extensive photo gallery compiled of samples collected and notable materials from each sample.
- Hard copies and electronic copies of all sample collection logs and waste audit logs.
- Internal review of all data entry, analysis and reporting.

3.0 2015/2016 WASTE COMPOSITION AUDIT RESULTS

3.1 Low-Density Residential Dwelling Curbside Collection Results

This section summarizes the combined low-density residential dwelling curbside participation and set-out results for the 17 sample areas audited over the four seasonal 2015/2016 audits. Results are summarized by waste stream, by municipality, and for the region, as a whole. As noted in the limitations section, a high degree of confidence can be placed on the results for the region as a whole (~165 household sample size); however, caution should be exercised when interpreting the results on a municipality by municipality basis, as individual municipalities are only represented by sample sizes of 10-30 households.

3.1.1 Participation Rates

Table 3.1 summarizes the participation rates for audited households during the overall four-season 2015/2016 audit. The participation rate represents the proportion of households in a sample area that had an item set out in the various waste streams at least once during a two week seasonal study period (e.g. if a household did not have recycling set out in week 1, but did have recycling set out in week 2 of a seasonal audit, they were considered a recycling participant for that season). It must be noted that the participation rates were calculated differently for the 2010/2011 audits, where households were classified as participants on a weekly basis (e.g. if a household did not have recycling set out on week 1, but did have recycling set out on week 2, their participation rate was considered 50%). Note that the 'Combined Recycling' results are calculated based on combined data from the Blue and Grey Box streams.

Table 3.1 Summary of Overall Four-Season 2015/2016 Participation Rates

Participation Rates	Combined Recycling	Grey Box Recycling	Blue Box Recycling	Mixed Recycling	Garbage	Green Bin
Fort Erie	87.50%	78.13%	87.50%	0.00%	90.63%	65.63%
Grimsby	85.00%	85.00%	82.50%	0.00%	85.00%	70.00%
Lincoln	80.56%	69.44%	72.22%	2.78%	94.44%	63.89%
Niagara Falls	79.17%	74.17%	76.67%	0.83%	86.67%	40.83%
Niagara-On-The-Lake	77.78%	72.22%	72.22%	2.78%	88.89%	30.56%
Pelham	95.00%	95.00%	92.50%	5.00%	90.00%	77.50%
Port Colborne	75.00%	70.00%	62.50%	2.50%	95.00%	27.50%
St.Catharines	90.52%	86.21%	86.21%	1.72%	90.42%	51.32%
Thorold	90.00%	85.00%	90.00%	2.50%	80.00%	40.00%
Wainfleet	65.00%	27.50%	65.00%	2.50%	77.50%	7.50%
Welland	82.50%	72.50%	82.50%	0.00%	87.50%	52.50%
West Lincoln	67.50%	32.50%	57.50%	5.00%	82.50%	50.00%
Niagara Region	**82.15%**	**72.80%**	**78.40%**	**1.81%**	**87.47%**	**47.58%**

Figure 3.1 below illustrates these results for each of the four primary waste streams (Grey Box, Blue Box, Garbage and Green Bin).

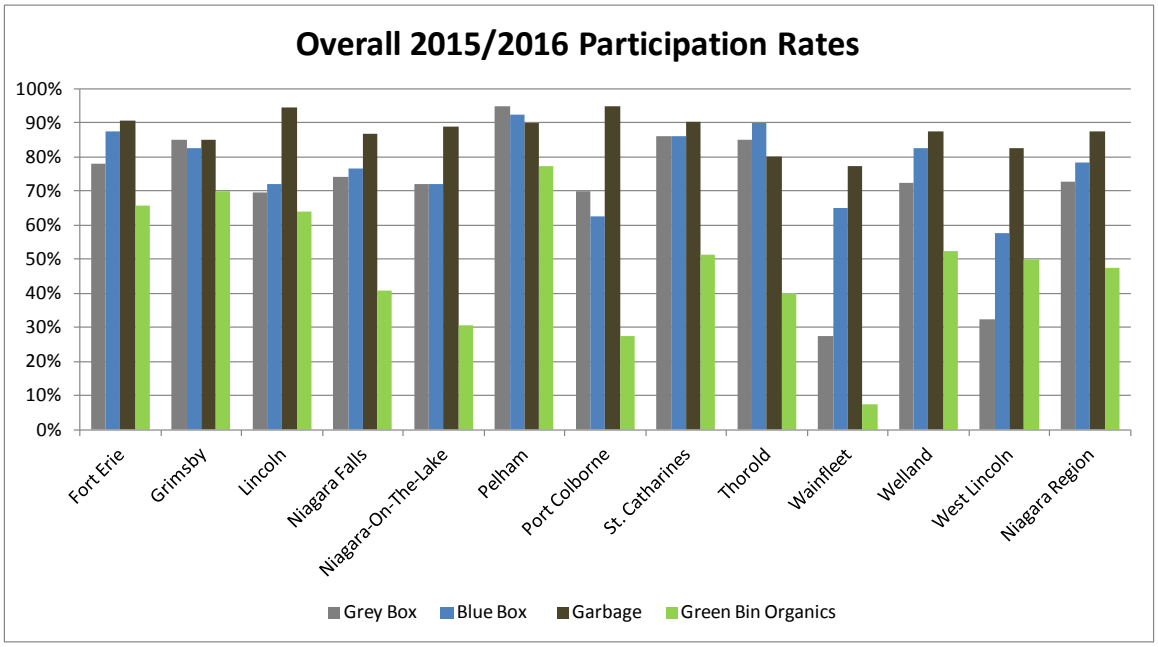


Figure 3.1 Overall Four-Season 2015/2016 Participation Rates

The participation rate across all sample areas was 78.40% for the Blue Box stream and 72.80% for the Grey Box stream, with the Combined Recycling participation rate (participants in either Blue Box or Grey Box) at 82.15%. Looking at individual municipalities' participation rates, there was notable variance. Blue Box participation rates ranged from 57.50% (West Lincoln), 62.5% (Port Colborne), and 65% (Wainfleet) on the low end to 92.5% (Pelham), and 90% (Thorold) on the high end. Grey Box participation rates ranged from 27.5% (Wainfleet) and 32.5% (West Lincoln) on the low end to 95% (Pelham), and 86.21% (St. Catharines) on the high end.

It is suspected that the variance in participation and set-out rates is tied more to the specific type of housing (demographics) of each sample area, rather than the municipality in which they are located. For example, the lower Grey Box participation rates in West Lincoln and Wainfleet are likely due to the number of farms in these sample areas, where residents were more likely to have other uses for the fibre materials. Farms in other municipalities could be expected to have similar findings. Another general observation is that households in higher income urban areas tend to have higher recycling participation rates (e.g. Pelham with house values ranging from $283-$379k). This is not a trend in high income rural areas such as NOTL and West Lincoln. Also noteworthy is the relatively high participation rate in the Thorold sample area, given that it is identified by the Region as a low-medium income area. The houses sampled in Thorold are older houses that are up to 85 years old. Other factors, such as average number of occupants per

household, average age of residents (e.g. retired, young families, etc.), and affordability of purchasing new Blue/Grey Boxes can also be influencing factors in sample areas' results.

The average garbage stream participation rate across the region was 87.47%. The garbage stream participation rate between individual municipalities varies, however, not as much as the recycling streams. Garbage stream participation rates ranged from 77.5% (Wainfleet) to 95% (Port Colborne).

The average organics stream participation rate across the Niagara Region was 47.58%. Looking at individual municipalities' participation rates, there was notable variance. Organics participation ranged from 7.5% (Wainfleet) to 65.00% (Grimsby) and 77.5% (Pelham).

3.1.2 Set-out Rates

Table 3.2 summarizes the set-out rates for audited households during the overall Four-Season 2015/2016 audit period. The set-out rates represent the average weekly number items and full container equivalents set out by households for each waste stream (averaged across all households in sample areas, not just those households that participated). Also summarized in this table is the average number of full container equivalents per household with a set-out (this is averaged across only those households that had a set-out). Full container equivalent refers to the volume of a standard Blue/Grey Box, garbage bag/can or standard Green Bin.

Table 3.2 Summary of Set-out Rates – Overall 4-Season 2015/2016

2015/2016 Audit	Set-out Rates	Combined Blue & Grey Box	Grey Box	Blue Box	Mixed Recycling	Garbage	Green Bin Organics
Fort Erie	avg.# items/hh/wk	1.56	0.80	0.77	0.00	0.81	0.52
	avg. # full container equiv./hh/wk	1.28	0.70	0.58	0.00	0.70	0.33
	avg. # full container equiv./set-out	1.62	1.03	0.81	0.00	0.86	0.65
Grimsby	avg.# items/hh/wk	1.76	0.91	0.85	0.00	0.74	0.59
	avg. # full container equiv./hh/wk	1.42	0.73	0.69	0.00	0.55	0.27
	avg. # full container equiv./set-out	1.94	1.01	0.97	0.00	0.80	0.45
Lincoln	avg.# items/hh/wk	1.24	0.61	0.61	0.01	0.79	0.54
	avg. # full container equiv./hh/wk	1.20	0.58	0.62	0.00	0.65	0.22
	avg. # full container equiv./set-out	1.90	1.16	1.12	0.25	0.82	0.41
Niagara Falls	avg.# items/hh/wk	1.40	0.75	0.65	0.00	0.92	0.39
	avg. # full container equiv./hh/wk	1.34	0.66	0.67	0.00	0.86	0.20
	avg. # full container equiv./set-out	1.99	1.09	1.12	0.75	1.16	0.55
Niagara-On-The-Lake	avg.# items/hh/wk	1.31	0.62	0.67	0.03	0.81	0.28
	avg. # full container equiv./hh/wk	1.06	0.49	0.52	0.06	0.59	0.16
	avg. # full container equiv./set-out	1.73	0.91	0.90	4.00	0.76	0.58
Pelham	avg.# items/hh/wk	1.75	0.90	0.81	0.04	0.78	0.64
	avg. # full container equiv./hh/wk	1.50	0.74	0.72	0.04	0.64	0.25
	avg. # full container equiv./set-out	1.98	1.05	1.03	1.50	0.87	0.44
Port Colborne	avg.# items/hh/wk	1.11	0.54	0.56	0.01	0.84	0.25
	avg. # full container equiv./hh/wk	0.94	0.46	0.47	0.01	0.65	0.07
	avg. # full container equiv./set-out	1.57	0.96	0.91	1.00	0.77	0.29
St. Catharines	avg.# items/hh/wk	1.71	0.87	0.83	0.01	0.94	0.45
	avg. # full container equiv./hh/wk	1.35	0.69	0.66	0.01	0.81	0.25
	avg. # full container equiv./set-out	1.69	0.96	0.92	1.00	1.02	0.57
Thorold	avg.# items/hh/wk	1.66	0.84	0.81	0.01	0.70	0.39
	avg. # full container equiv./hh/wk	1.42	0.71	0.69	0.02	0.60	0.21
	avg. # full container equiv./set-out	1.76	0.96	0.89	1.25	0.86	0.60
Wainfleet	avg.# items/hh/wk	0.84	0.20	0.63	0.01	0.90	0.05
	avg. # full container equiv./hh/wk	0.76	0.15	0.59	0.01	0.87	0.02
	avg. # full container equiv./set-out	1.59	0.92	1.28	1.00	1.42	0.50
Welland	avg.# items/hh/wk	1.58	0.77	0.81	0.00	0.88	0.49
	avg. # full container equiv./hh/wk	1.41	0.68	0.73	0.00	0.74	0.23
	avg. # full container equiv./set-out	2.04	1.10	1.08	0.00	0.94	0.50
West Lincoln	avg.# items/hh/wk	0.91	0.30	0.59	0.03	0.96	0.35
	avg. # full container equiv./hh/wk	0.88	0.23	0.63	0.02	0.93	0.17
	avg. # full container equiv./set-out	1.67	1.05	1.32	0.75	1.28	0.48
Niagara Region	**avg.# items/hh/wk**	**1.45**	**0.71**	**0.73**	**0.01**	**0.86**	**0.42**
	avg. # full container equiv./hh/wk	**1.26**	**0.60**	**0.65**	**0.01**	**0.75**	**0.21**
	avg. # full container equiv./set-out	**1.82**	**1.02**	**1.02**	**0.00**	**0.99**	**0.51**

Figures 3.4-3.7 below illustrate these results for each of the three primary waste streams (recycling, garbage, organics).

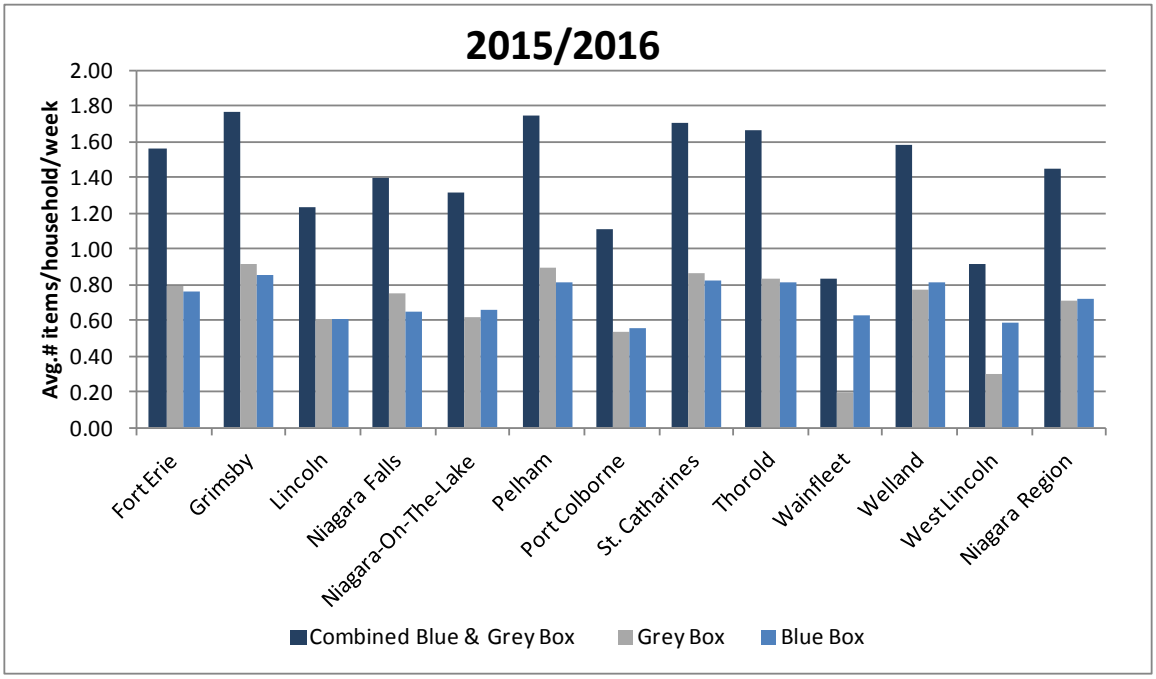


Figure 3.2 Recycling Streams Set-out Avg. # items/household/wk

The average number of items set out per household per week (items/hh/wk) across the region was 0.73 for the Blue Box stream and 0.71 for the Grey Box stream, with the Combined Recycling set-out average (Blue & Grey Box) at 1.45 items/hh/wk. Blue Box set-out rates ranged from 0.56 items/hh/wk (Port Colborne) to 0.85 items/hh/wk (Grimsby). Grey Box set-out rates ranged from 0.20 items/hh/wk (Wainfleet) and 0.30 (West Lincoln) to 0.91 (Grimsby) and 0.90 (Pelham). It should be noted that this is an average across all sample area households, including those without set-outs, but not those that were collected by the hauler prior to the audit team's arrival. As a result of this calculation method, the average number of items set out per household per week is directly tied to the participation rate. As observed with the participation rates, the rural areas tend to have lower set-out rates (particularly Grey Box stream). Anecdotally, rural residents may also be more susceptible to blowing litter issues (large vehicles driving by at higher speeds, exposed open field surroundings), which could influence their tendency to set out less fibre materials at the roadside. In addition, the distance from the household to the curbside in rural areas is usually greater, which makes it more difficult for people to transport their waste to the curbside for collection. Farms that qualify and have registered with the Region have a 4 bag/container limit and might find it easier to set everything out in garbage bags, instead of having to bring their recycling and Green Bins back into the house after it has been collected.

The average number of full container equivalents per household per week generally follows the same pattern. The average number of full container equivalents per household per week (avg. # full container equiv./hh/wk) across the Niagara region was 0.65 for the Blue Box stream and

0.60 for the Grey Box stream, with the combined recycling average (Blue & Grey Box) at 1.26 full container equiv./hh/wk.

Looking specifically at the subset of households that had items set out, Figure 3.3 below illustrates the average number of full container equivalents per set-out.

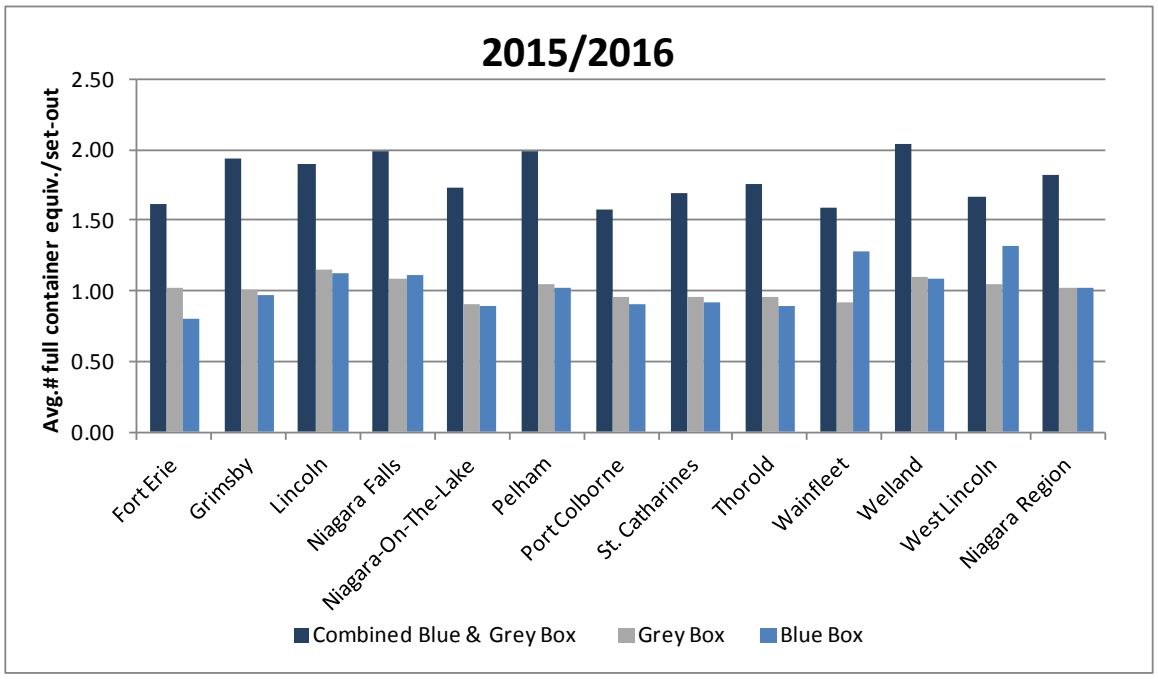


Figure 3.3 Recycling Streams Set-out Avg. # full container equivalents/set-out

The average number of full container equivalents per set-out across the region was 1.02 for both the Blue Box stream and the Grey Box stream, with the combined recycling full container equivalents per set-out average (Blue & Grey Box) at 1.82. The average number of full container equivalents per set-out in the Blue Box stream ranged from 0.81 (Fort Erie) to 1.32 (West Lincoln). The Grey Box full container equivalents per set-out ranged from 0.91 (Niagara-On-The-Lake), and 0.92 (West Lincoln), to 1.16 (Lincoln). Variances in the average # of full container equivalents per set out could be affected by households' storage space available in/outside of the home for accumulating materials. For example, households with more opportunity to store materials (e.g. in a shed/garage or barn) may tend to accumulate materials over a longer period of time until containers are full before setting out. Households with space restrictions may be less likely to want materials accumulating in the home (odours) or outside (animals). Rural households with higher full container equivalents per set out may also accumulate materials over a longer period of time (more than one week) to avoid carrying containers to the roadside more than necessary.

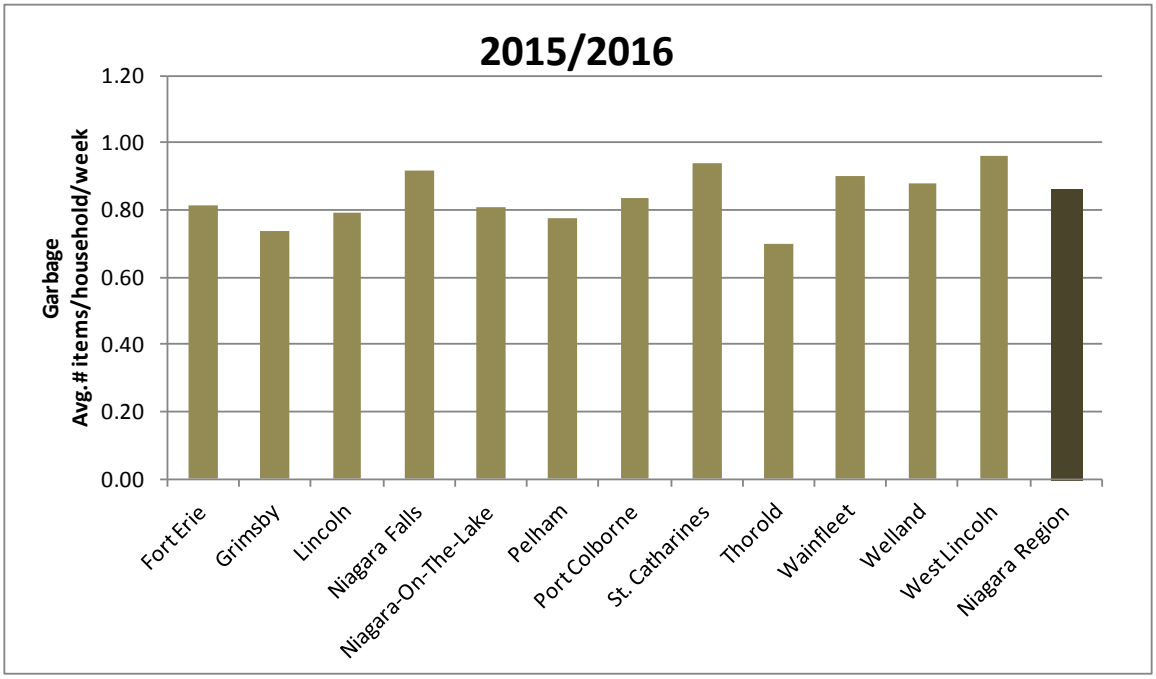


Figure 3.4 Garbage Stream Set-out Avg. # items/household/wk

The average number of garbage items set out per household per week across the region was 0.86. This ranged from a high of 0.96 (West Lincoln) to a low of 0.70 (Thorold). It should be noted that this is an average across all sample area households, including those without set-outs, but not those that were collected by the hauler prior to the audit team's arrival. The same discussions of variability in set-out rates for the recycling streams are also applicable to the garbage stream here.

The average number of full container equivalents per household per week generally follows the same pattern. The average number of full container equivalents per household per week across the region was 0.75.

Looking specifically at the subset of households that had items set out, Figure 3.5 below illustrates the average number of full container equivalents per set-out.

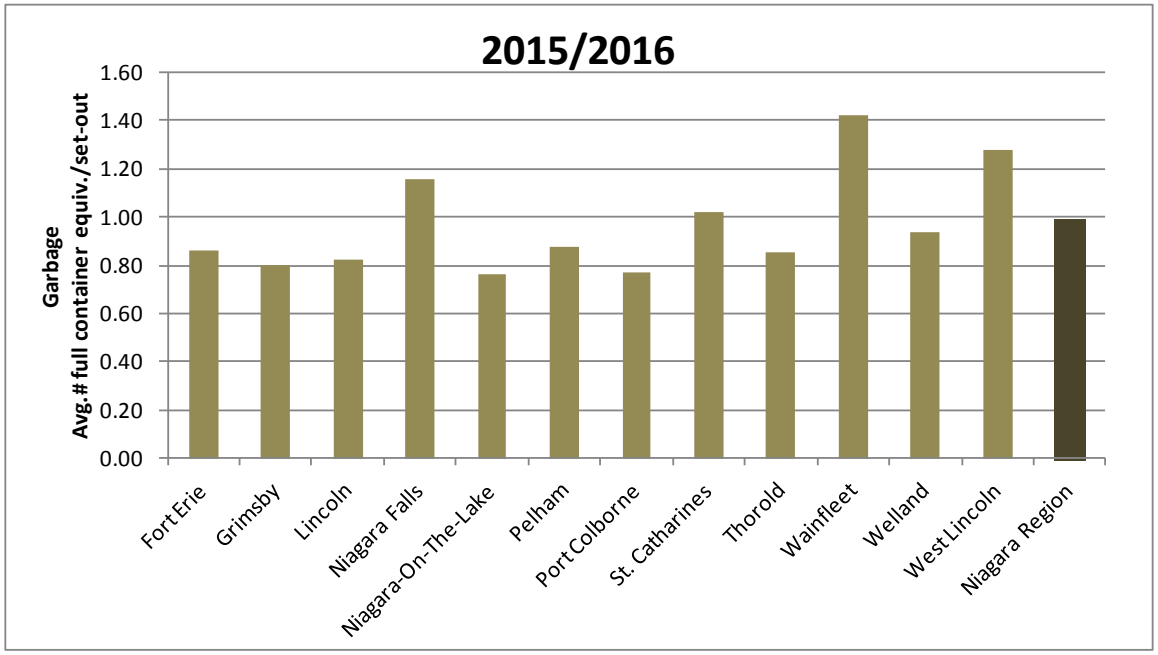


Figure 3.5 Garbage Stream Set-out Avg. # full container equivalents/set-out

The average number of full garbage container equivalents per set-out across the region was 0.99. This ranged from 0.76 (Niagara-On-The-Lake) to 1.42 (Wainfleet).

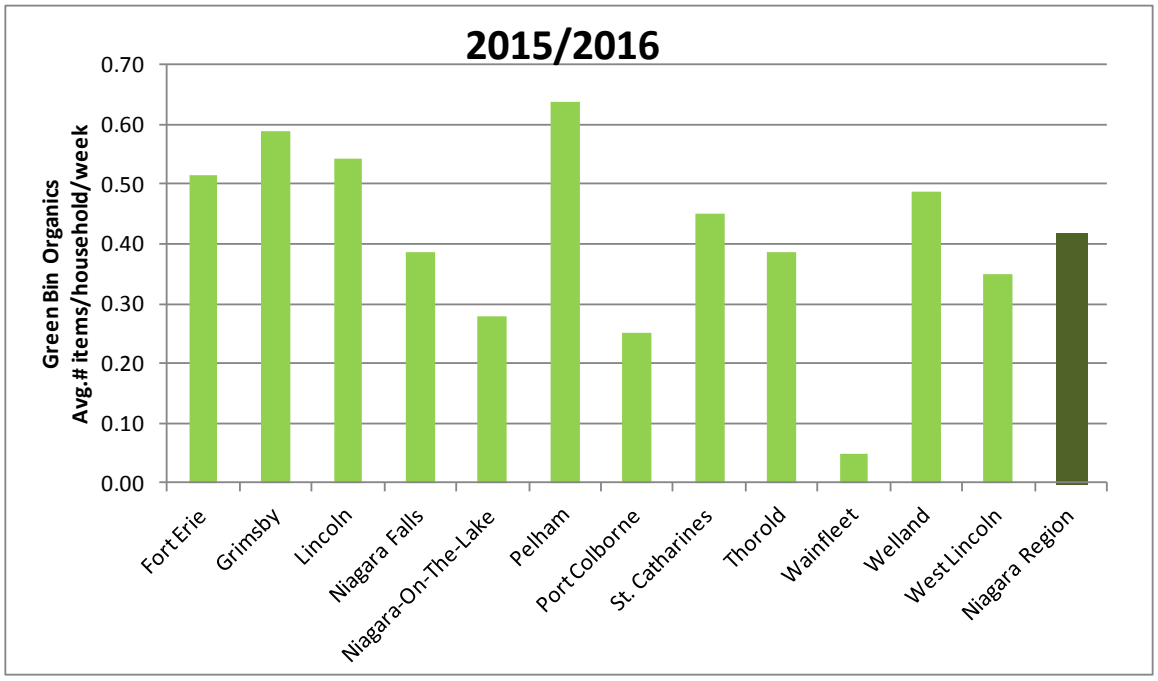


Figure 3.6 Organics Stream Set-out Avg. # items/household/wk

The average number of organics items set out per household per week across the Niagara region was 0.42. This ranged from 0.05 in Wainfleet, to 0.64 in Pelham. It should be noted that this is an average across all sample area households, including those without set-outs, but not those that were collected by the hauler prior to the audit team's arrival.

The average number of full container equivalents per household per week generally follows the same pattern, however notably lower. The average number of full container equivalents per household per week across the region was 0.21.

Looking specifically at the subset of households that had items set out, Figure 3.7 below illustrates the average number of full container equivalents per set-out.

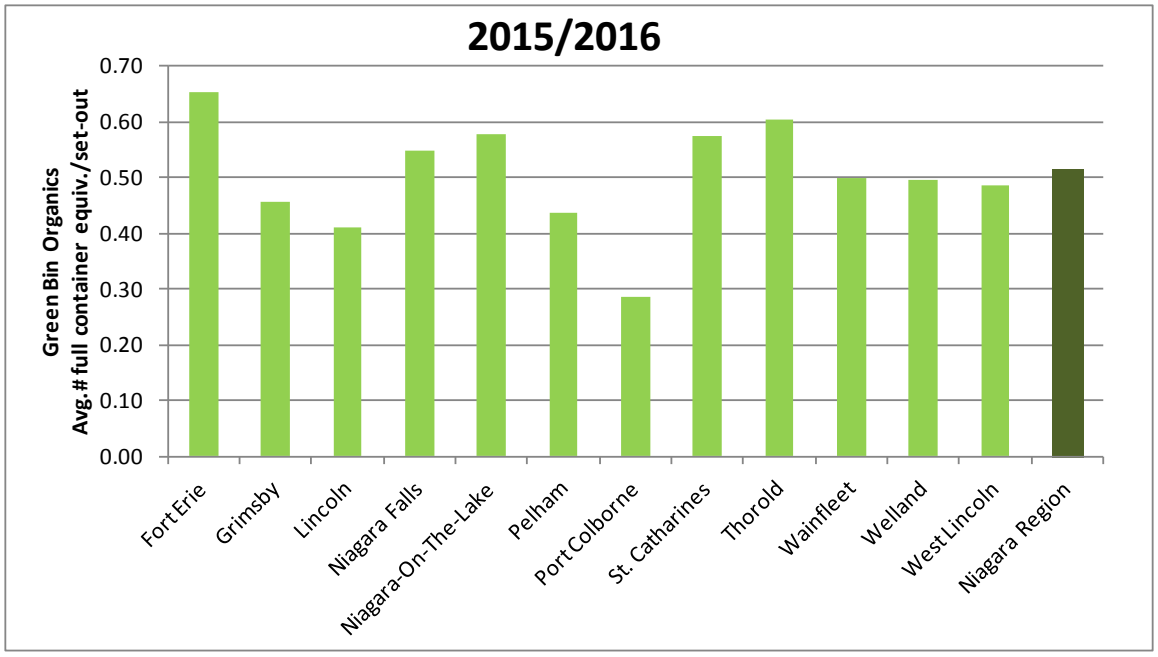


Figure 3.7 Organics Stream Set-out Avg. # full container equivalents/set-out

The average number of full organics container equivalents per set-out across the Niagara region was 0.51. This ranged from 0.29 in Port Colborne to 0.65 in Fort Erie. This shows that capacity is not an issue in the Green Bins. Households participating in the program have ample space in the existing Green Bins to accommodate more materials. This also shows that participating households are less likely to accumulate organics over longer periods in the Green Bin until full before setting out (odour avoidance).

It should also be noted that the municipalities of Niagara Falls, St. Catharines and Welland each had two to three different sample areas audited, representing a mixture of demographics. This translates into their above summarized results being more 'average' or smooth than those municipalities where only one area of a particular demographic was audited.

3.2 Plastic Film

In order to assess Niagara Region's plastic film recycling success, auditors recorded the presence of film in recycling boxes at the curbside. Across all four seasons, a total of 24.22% of Grey and Blue Boxes set out contained plastic film. When looking at the boxes containing film, a total of 37.17% were placed in the Blue Box, 58.56% were placed in the Grey Box and 4.28% were placed in both the Blue and Grey Box. Of the film placed in the Blue Boxes, 22.58% were bagged and the remaining 77.42% were loose. Of the film placed in the Grey Boxes, 68.94% were bagged and the remaining 33.06% were loose. Table 3.3 summarizes the results on plastic film.

Table 3.3 Overview of Plastic Film

Recycling Bin Type	Total Number of Households with a Set-out	Total Number of Bins Containing Films	Percentage (%) of Bagged Films	Percentage (%) of Loose Films
Grey Box	772	235	68.94%	31.06%
Blue Box	838	155	22.58%	77.42%

3.3 Alternative Set-Out Containers

The presence of non-traditional recycling containers was recorded at the curbside during collection. Table 3.4 provides an overview of the number of households that utilized alternate set-out containers. It was observed and noted that a large portion of the alternative set-out containers were transparent bags. Other types of alternative containers include corrugated cardboard boxes, plastic (e.g. Rubbermaid) storage containers and laundry hampers. Across all four seasons, a total of 9.86% of households set-out bagged recyclables.

Table 3.4 Overview of Alternate Set-Out Containers

	# of Houses	# of Households Sampled	% of Alternate Containers
Houses with Alternate Grey Boxes	110	1319	8.34%
Houses with Alternate Blue Boxes	182	1319	13.80%
Houses with Alternate Mixed Boxes	2	1319	0.15%
Houses with Bagged Recyclables	130	1319	9.86%

3.4 Mixed Recycling & Common Cross Contaminating Materials

Recycling containers that were mixed (i.e. co-mingled Grey Box and Blue Box materials) at the curbside were noted separately during curbside collection. The following materials were most commonly found, as a form of cross-contamination:

- Flexible films (grocery and retail carry-out bags, dry cleaning bags, bread bags, flexible frozen food bags, plastic overwrap film for cases of water and paper towels, etc.) are commonly found in both streams. Residents often associate the plastic material with their Blue Box.

- Due to the nature of the material, gable top containers, spiral wound containers and aseptic containers are often placed in the Grey Box at the curbside.
- In addition, #6 Expanded Polystyrene (PS), otherwise known as Styrofoam, is often found inside the Grey Box recycling stream. This is a result of households not removing the material before it is placed at the curbside for collection.

Table 3.5 Top 5 Cross-Contaminating Recyclable Materials

Material	Accepted Recycling Stream	% in Correct Stream	% in Incorrect Stream
Flexible Film Plastic – LDPE & HDPE	Grey	63.91%	36.09%
Gable Top Containers	Blue	69.82%	30.18%
Spiral Wound Containers	Blue	83.76%	16.24%
Aseptic Containers (excluding alcoholic beverages)	Blue	84.94%	15.06%
#6 PS - Expanded Polystyrene	Blue	88.44%	11.56%

3.5 Overall Waste Generation Profile

Figure 3.8 illustrates the overall composition profile of low-density residential dwelling curbside waste being generated in the region, (% of total waste generated, by weight). The figure is a representation of total waste and, therefore, includes contributions from the garbage, organics, and recycling streams. It should be noted that bulky items, as presented here, only include items that were found within the regular garbage stream (e.g. roll of carpet found in garbage can), but do not include large bulky items set out for separate collection at the curb (e.g. large furniture).

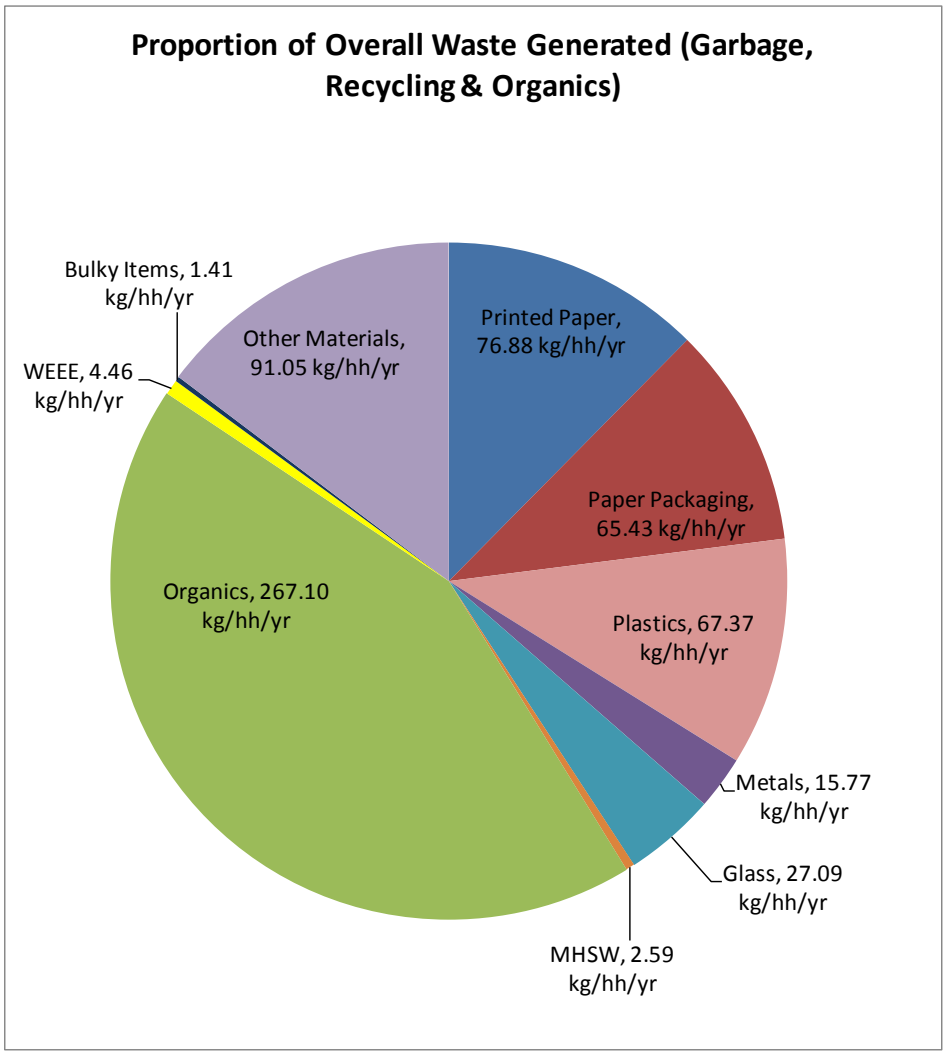


Figure 3.8 2015/2016 – Niagara Region Low-Density Residential Dwelling Curbside Waste Composition Profile (by weight)

Figure 3.9 provides a breakdown of the waste composition profile for each of the 12 municipalities.

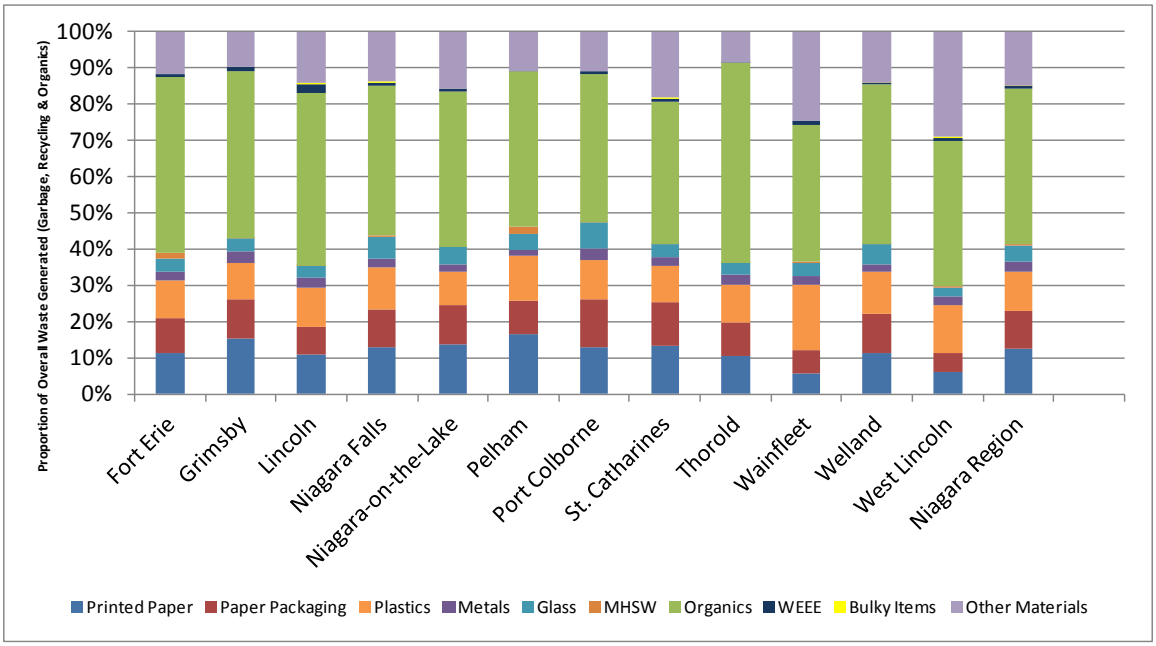


Figure 3.9 Four-Season – Low-Density Residential Dwelling Curbside Waste Composition Profiles (by weight)

Materials in Figure 3.8 and 3.9 have been grouped into 10 primary categories; Printed Paper, Paper Packaging, Plastics, Metals, Glass, MHSW, Organics, WEEE, Bulky Items and Other Materials. Please refer to Appendix A for the full breakdown of the sub-categories.

The largest contribution to the waste stream was Organic Materials, which represented an average 43.14% of the waste being generated by households in the Niagara region. This ranged from 37.88% in Wainfleet, to 55.32% in Thorold. Other Materials and Printed Paper also made up significant percentages of the overall waste generated in the Region, at 14.71% and 12.42% (22.99% when combined with Paper Packaging).

Figure 3.10 below illustrates the overall generation profile of low-density residential dwelling curbside waste being generated in the Niagara region, in terms of total kilograms generated per household per year (kg/hh/yr). The figure is a representation of total waste and, therefore, includes contributions from the garbage, organics, and recycling streams.

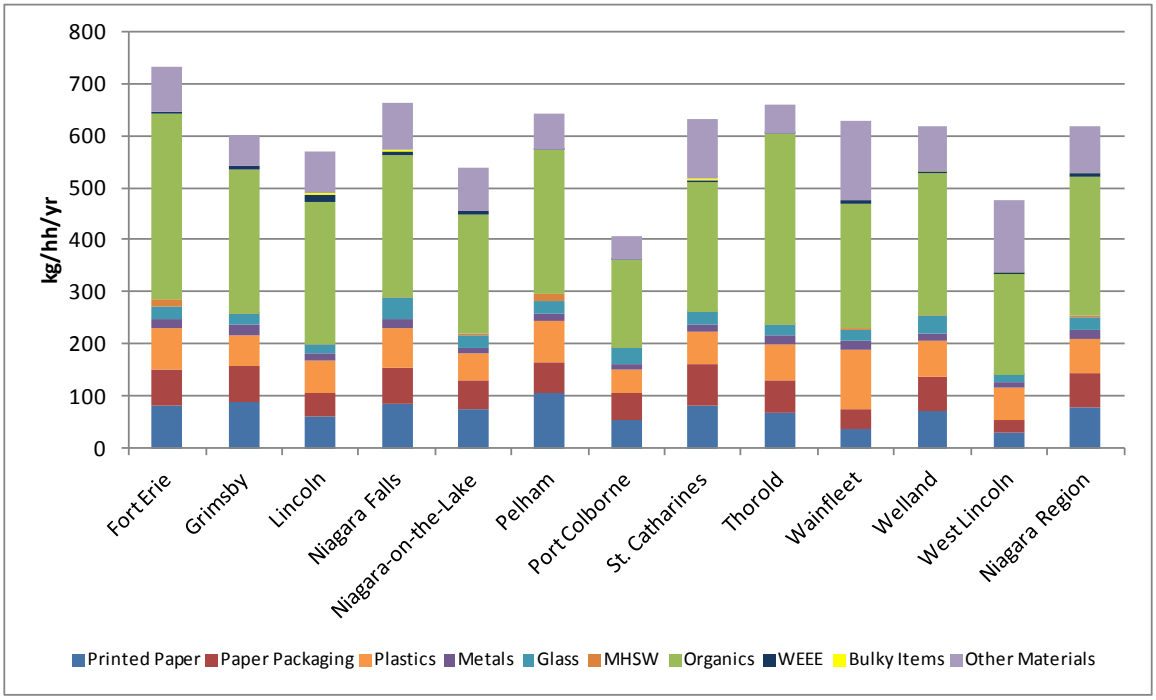


Figure 3.10 4-Season – Low-Density Residential Dwelling Curbside Waste Generation Rates

The overall average household curbside waste generation rate (garbage, recycling & organics streams) for the Niagara region was 619.16 kg/hh/yr. It should be noted that the calculation for determining Niagara region's overall generation rates took into account the relative proportion of households in each municipality (not simply a straight average across all municipalities).

Although the composition of material types was quite similar between municipalities (as shown in Figure 3.10), the overall generation rates were found to be rather varied, ranging from 406.89 kg/hh/yr (Port Colborne) to 732.33 kg/hh/wk (Fort Erie). The complete summary of results by material type and by municipality can be found in Appendix B. As previously noted, individual municipality's results should be analyzed with caution due to the relatively small number of households sampled in each area. The variability in waste generation rates here is more likely linked to the specific housing types audited in each sample area, rather than the municipality in which they are located. The Port Colborne sample area's low overall waste generation rate could be linked to the fact that it is a low-medium income area with relatively smaller houses, possibly resulting in lower overall household consumption and disposal of goods & packaging. Port Colborne had a similar low generation rate in the 2010-11 audit. The lower household consumption could directly correlate to a decrease in household occupants.

3.6 Garbage Stream Results

Figure 3.11 illustrates the composition of the garbage stream for the Niagara region. An average of 319.29 kg/hh/yr of garbage stream waste was generated. Of that, 13.93% was disposed recyclables (largely mixed fine paper, boxboard, flexible films, corrugated cardboard and #1 PET bottles & jars), 49.80% was organics (largely unavoidable food waste, pet waste and tissue/towelling), and 36.27% was non-divertible materials (largely sanitary waste, textiles, construction/renovation waste, plastic laminates and other film packaging and other waste).

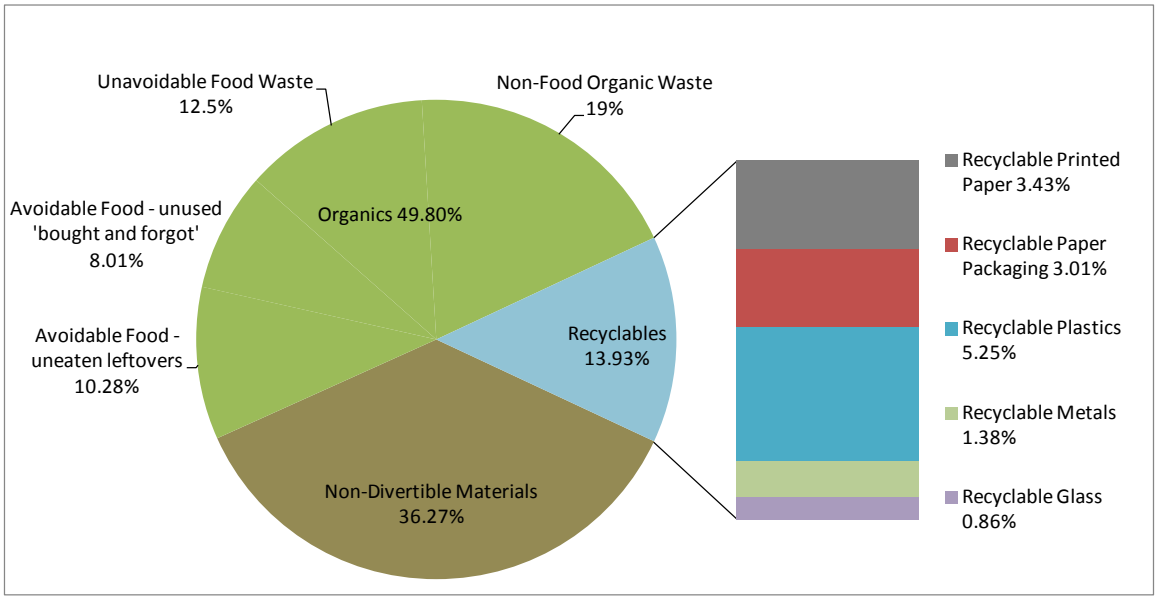


Figure 3.11 Overall 2015/2016 Garbage Stream Composition

Figure 3.12 illustrates the low-density residential dwelling curbside garbage stream composition (% of total garbage stream, by weight), highlighting the materials that could have been captured in the existing recycling and organics programs. Figure 3.13 illustrates the garbage stream generation rates for the same materials, in terms of kg/hh/yr.

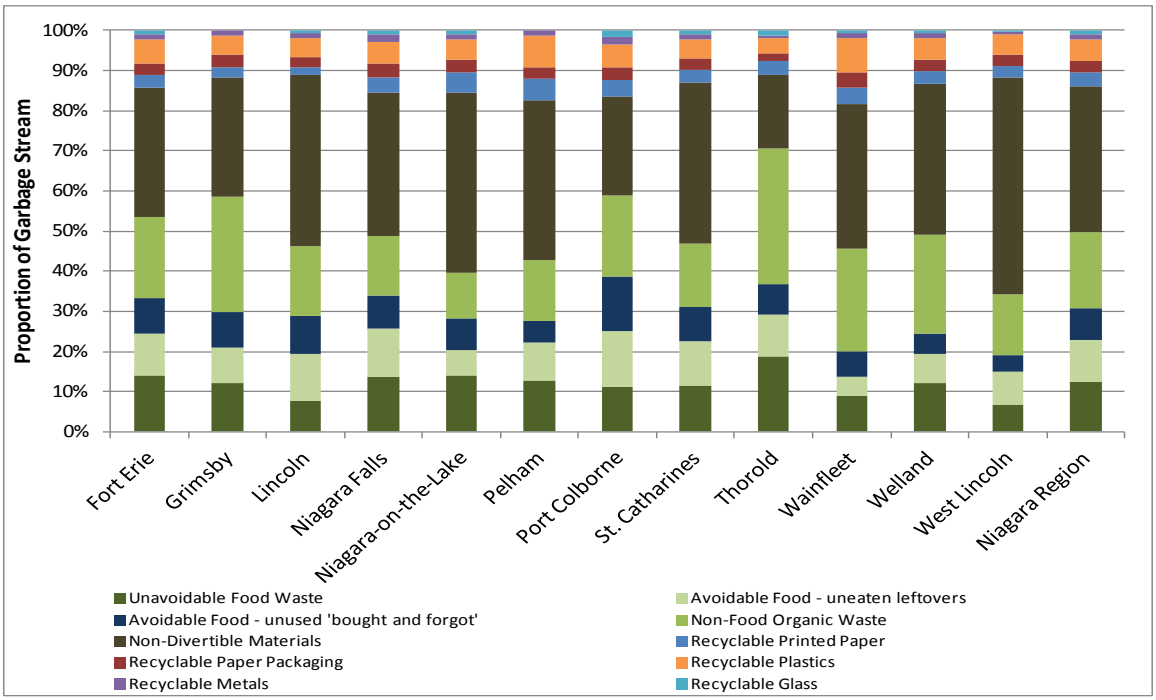


Figure 3.12 Low-Density Residential Dwelling Garbage Stream Composition Profiles (by weight)

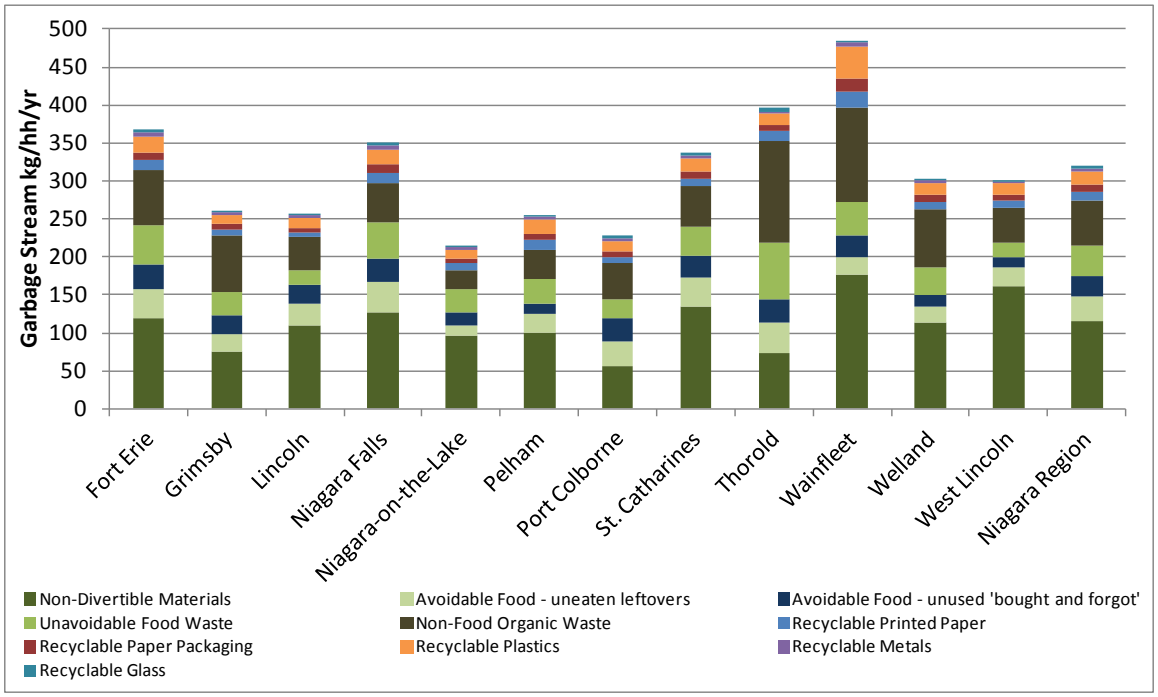


Figure 3.13 Low-Density Residential Dwelling Garbage Stream Generation Rates

The total average garbage stream generation rate across the Niagara region was approximately 319.29 kg/hh/yr, of which currently divertible materials comprised approximately 63.73% (203.47 kg/hh/yr). Organic materials was the largest category of divertible materials at 49.80% (60.68 kg/hh/yr non-food organic waste, 39.92 kg/hh/yr unavoidable food, 32.83 kg/hh/yr avoidable food - uneaten leftovers and 25.58 kg/hh/yr avoidable food – unused 'bought and forgot'), followed by recyclable plastics, at 5.25% (16.75 kg/hh/yr). Recyclable printed paper and recyclable paper packaging accounted for 3.43% (10.94 kg/hh/yr) and 3.01% (9.62 kg/hh/yr) of the garbage stream. Recyclable metals and glass were relatively small components of the garbage stream at 1.38% (4.40 kg/hh/yr) and 0.86% (2.75 kg/hh/yr), respectively.

The proportional material composition of the garbage stream was similar between individual municipalities, however overall garbage generation rate per household per year varies significantly. The annual garbage stream generation rate ranges from 214.46 kg/hh/yr (Niagara-On-The-Lake) to 485.45 kg/hh/yr (Wainfleet). There are several factors which could contribute to the large variances in garbage generation between municipalities. Principally, it is important to recall that only 10 consecutive homes were audited in many of the individual municipalities audited, which cannot be considered a perfect representative sample of all households from within that municipality. The demographics of the specific sample areas selected are suspected to be the main factor for the waste generation profiles, rather than the municipality in which they are situated. Direct comparisons between individual municipalities would require sampling from households of similar demographics in each municipality. In addition, the high garbage generation rate in Wainfleet can be directly correlated to the low participation rates in the recycling and organics streams. This indicates that more households in the Wainfleet sample area aren't participating in the diversion programs as much as other municipalities, therefore creating a heavier garbage stream.

3.7 Blue Box Recycling Stream Results

Figure 3.14 illustrates the composition of the Blue Box recycling stream for Niagara region. An average of 76.09 kg/hh/yr of material was placed in the Blue Box. Of that, 83% was accepted Blue Box recyclables, 3.69% was Grey Box cross-contamination (largely flexible films, boxboard, corrugated cardboard and newsprint), and 13.32% was contamination. The most commonly contaminating materials were polycoat beverage cups, ice cream containers, garbage bags, plastic laminates and other film packaging, durable plastic products (VHS tapes & DVDs, storage containers, plastic cutlery, etc.), food waste (largely food and liquid contained in bottles), other glass (light bulbs, drinking glasses and candle holders), ceramics and other waste.

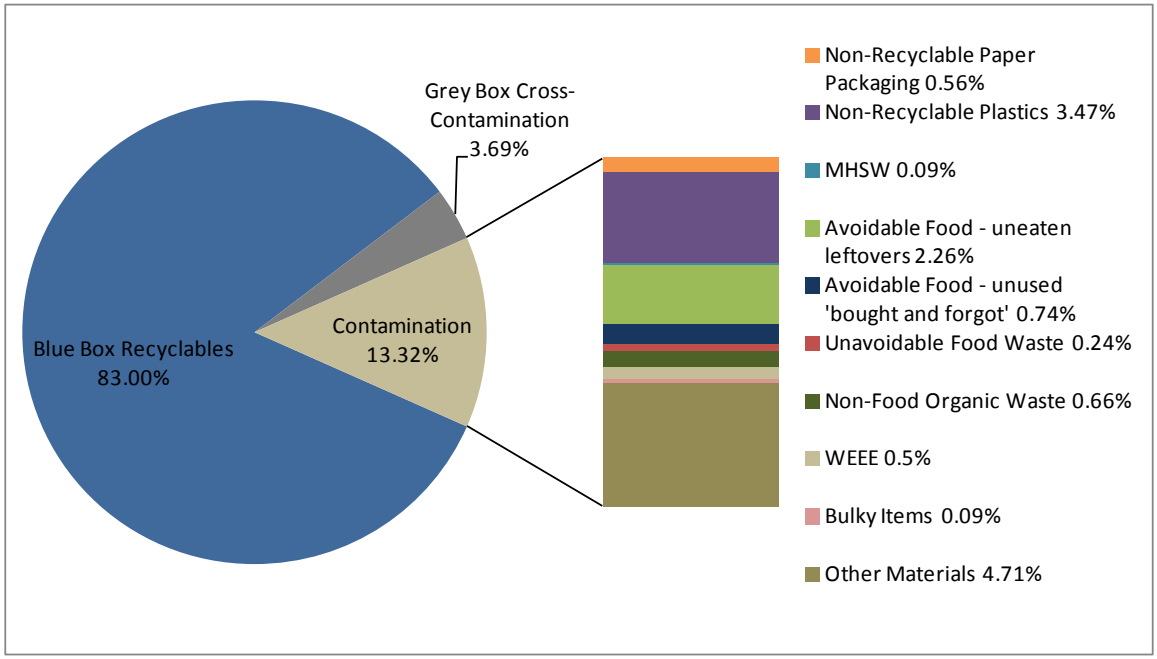


Figure 3.14 Overall 2015/2016 Blue Box Composition

Figure 3.15 illustrates the low-density residential dwelling curbside Blue Box contamination rate (% of total Blue Box, by weight), highlighting the non-recyclable materials that are not accepted in the existing program (contamination). Figure 3.16 illustrates the Blue Box generation rates, in terms of kg/hh/yr.

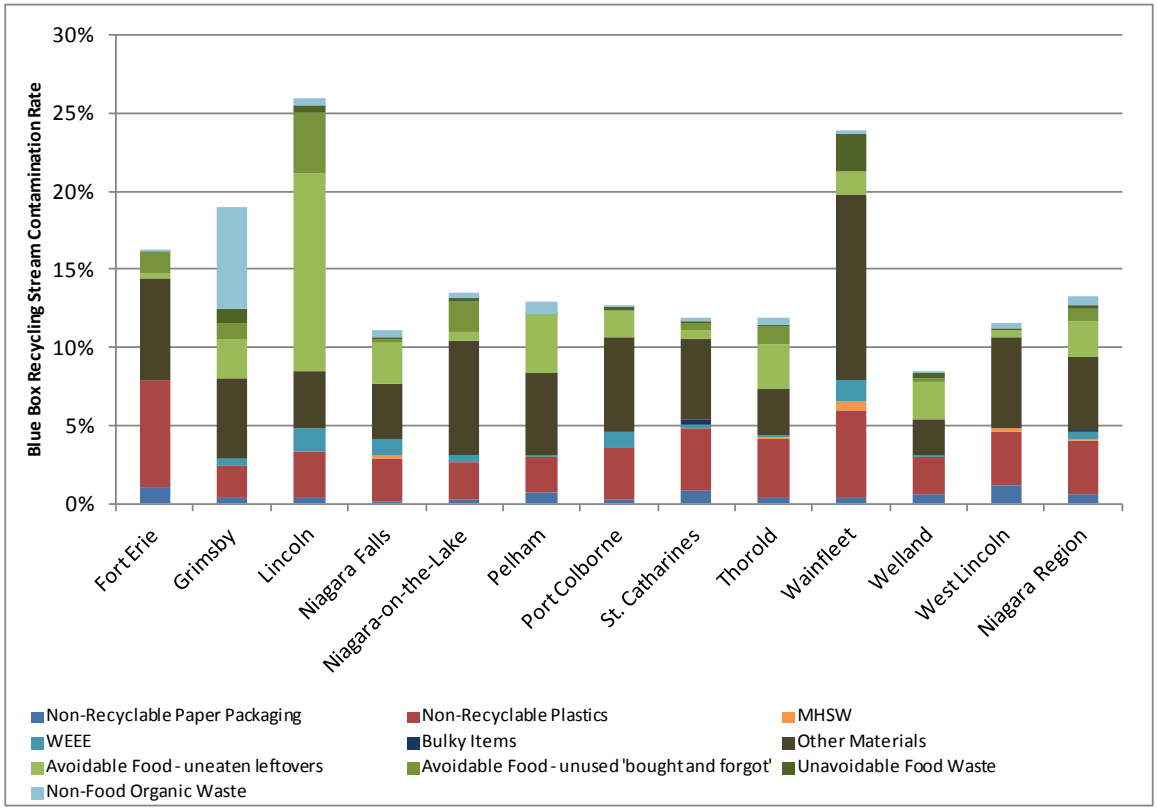


Figure 3.15 Low-Density Residential Dwelling Blue Box Recycling Stream Contamination Rates (by weight)

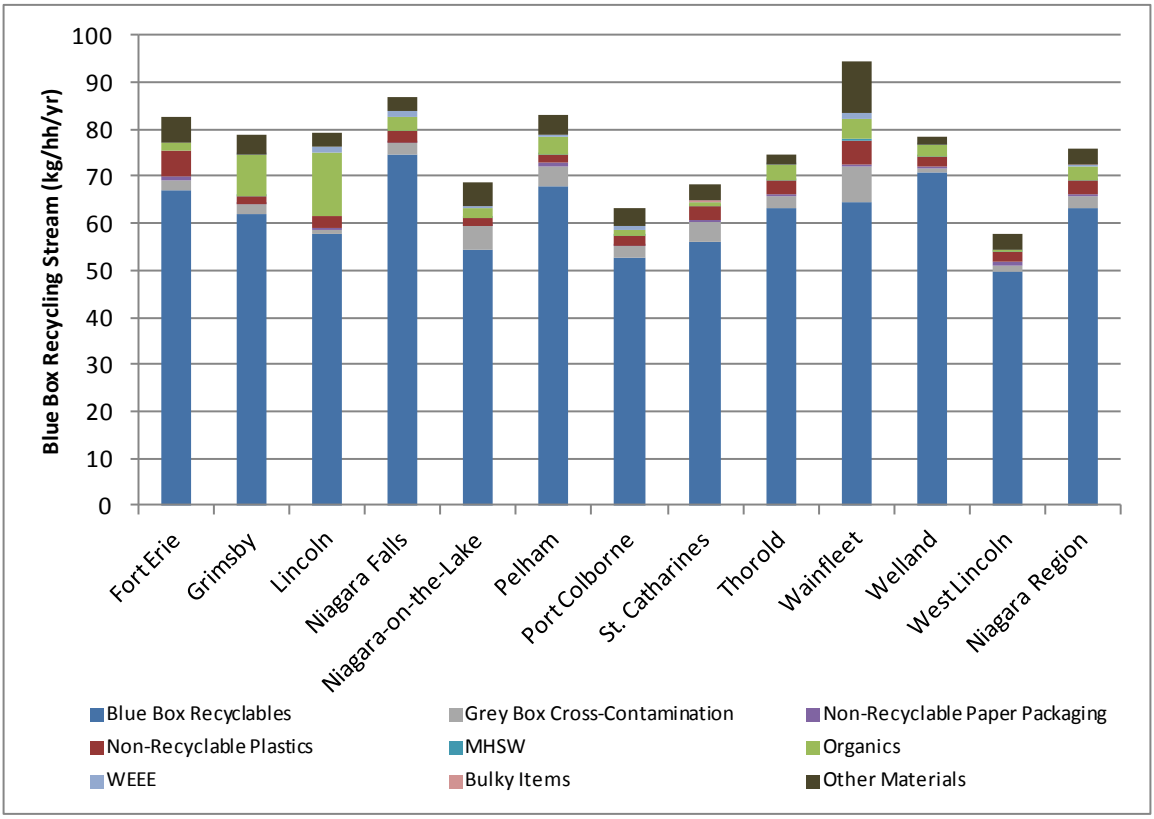


Figure 3.16 Low-Density Residential Dwelling Blue Box Recycling Stream Generation Rates

The total average Blue Box recycling stream generation rate across the Niagara Region was approximately 76.09 kg/hh/yr, of which non-recyclable materials (contamination) comprised approximately 13.32% (10.13 kg/hh/yr). Other materials (largely glassware, light bulbs, scrap metal, ceramics, meat tray liners, cigarette butts, candles) was the largest category of contamination at 4.17% (3.58 kg/hh/yr), followed by organics (largely avoidable food – uneaten leftovers), at 3.9% (2.97 kg/hh/yr) and non-recyclable plastics, at 3.47% (2.64 kg/hh/yr).

As with the garbage stream, the proportional material composition of the Blue Box recycling stream was similar between individual municipalities, however, overall recycling generation rates per household per year varied slightly. The annual Blue Box recycling stream generation rate ranged from 57.88 kg/hh/yr (West Lincoln) to 94.64 kg/hh/yr (Wainfleet). Contamination rates ranged from a low of 8.45% (Welland) to 25.95% (Lincoln). Lincoln had a high amount of food waste in the Blue Box recycling stream. In addition, other contaminating materials included durable plastic products, other electronics, ceramics, other glass and other waste. Since the sample size for Lincoln was 9 households (1 house opted out of the study), the results can be easily swayed by a large amount of contamination coming from one house.

3.8 Grey Box Recycling Stream Results

Figure 3.17 illustrates the composition of the Grey Box recycling stream for Niagara region. An average of 119.63 kg/hh/yr of material was placed in the Grey Box. Of that, 94.24% was accepted Grey Box recyclables, 1.65% was Blue Box cross-contamination (largely gable top containers), and 4.11% was contamination. The most commonly contaminating materials were polycoat beverage cups, plastic laminates and other film packaging, food waste, molded pulp, tissue/towelling and other waste (largely wooden crates for oranges and furnace filters).

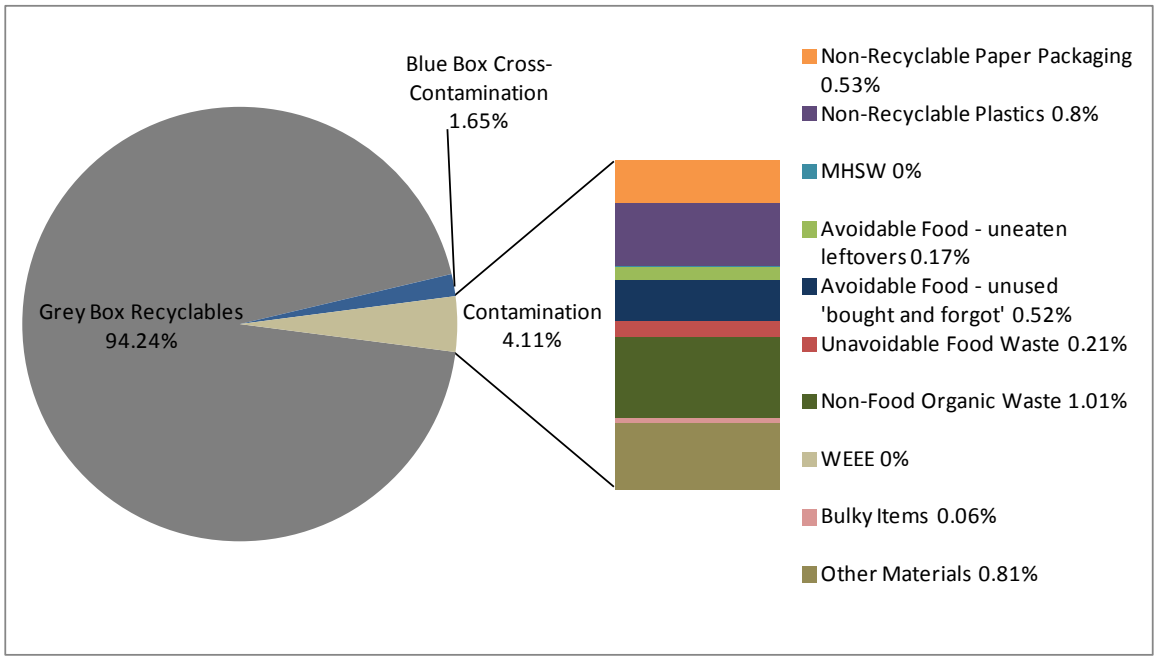


Figure 3.17 Overall 2015/2016 Grey Box Composition

Figure 3.18 illustrates the low-density residential dwelling curbside Grey Box recycling stream contamination rate (% of total recycling stream, by weight), highlighting the materials that are not accepted in the existing program (contamination). Figure 3.19 illustrates the overall recycling stream generation rates, in terms of kg/hh/yr.

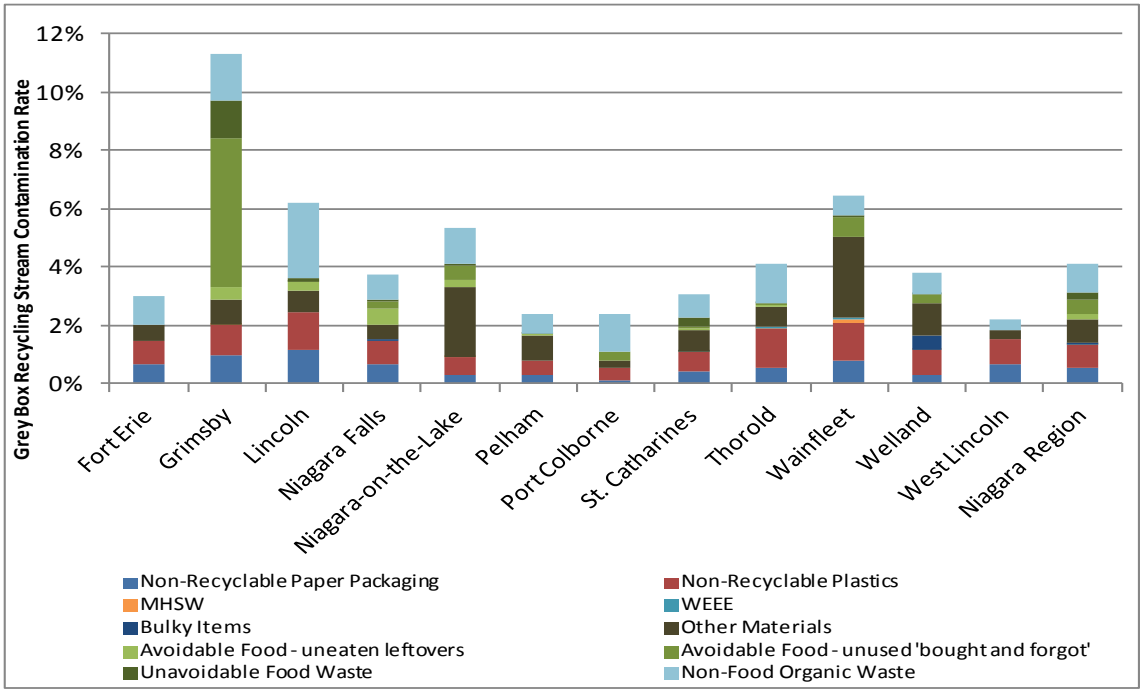


Figure 3.18 Low-Density Residential Dwelling Grey Box Recycling Stream Contamination Rates (by weight)

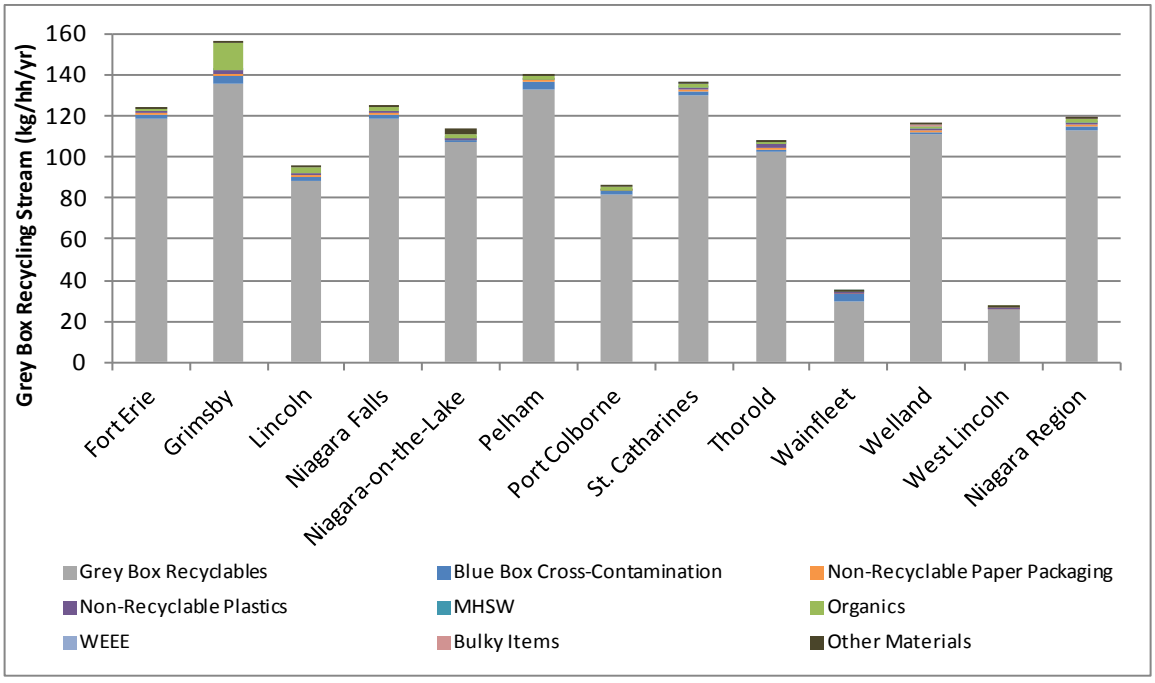


Figure 3.19 Low-Density Residential Dwelling Grey Box Recycling Stream Generation Rates

The total average Grey Box recycling stream generation rate across the Niagara region was approximately 119.63 kg/hh/yr, of which non-recyclable materials (contamination) comprised approximately 4.11% (4.92 kg/hh/yr). Organics was the largest category of contamination at 1.91% (2.29 kg/hh/yr), followed by non-recyclable plastics, at 0.80% (0.95 kg/hh/yr).

The proportional material composition of the recycling stream was similar between individual municipalities, however, overall generation rates per household per year varied notably. The annual Grey Box generation rate ranged from 26.66 kg/hh/yr (West Lincoln) to 156.60 kg/hh/yr (Grimsby). Contamination rates varied from 2.19% (West Lincoln) to 11.30% (Grimsby). The organic material found in the Grey Box recycling stream in Grimsby in particular was comprised of sealed boxes of untouched food products. When collecting the material at the curbside it was difficult to see the contamination because it was contained inside of boxes. The rural areas of Wainfleet and West Lincoln have much lower generation rates for Grey Box fibres.

3.9 Organics Stream Results

Figure 3.20 illustrates the composition of the organics stream for Niagara region. An average of 104.15 kg/hh/yr of material was placed in the Green Bin organics stream. Of that, 70.21% consisted of food waste, 28.95% consisted of non-food organic waste and 0.84% consisted of contamination. The most commonly contaminating materials were flexible films, polycoat beverage cups, and other waste.

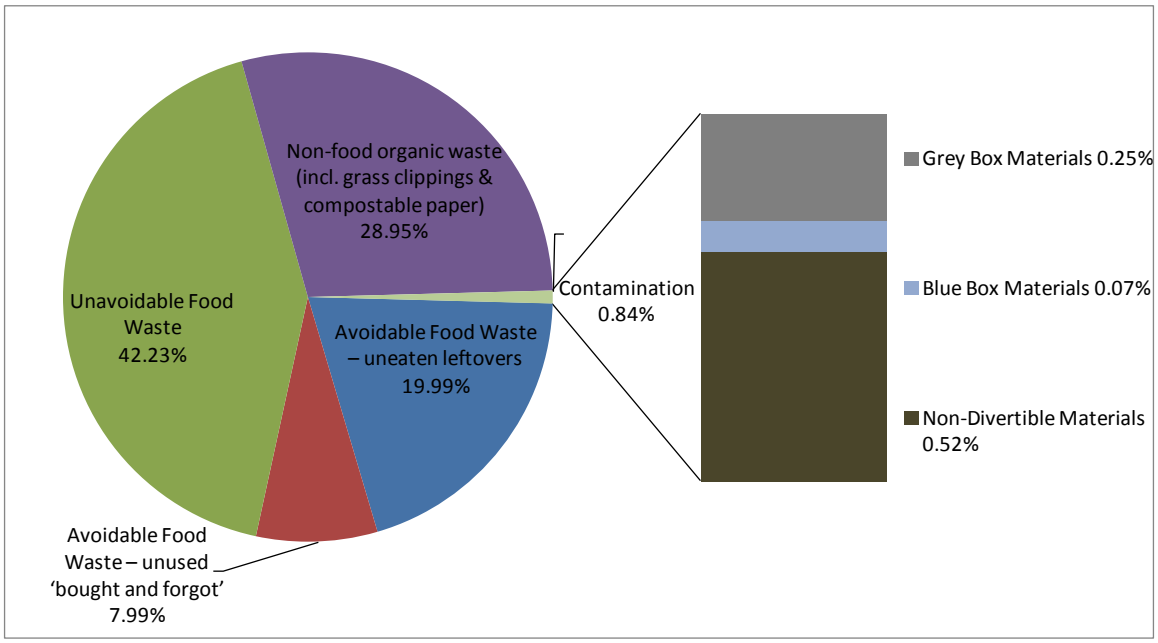


Figure 3.20 Overall 2015/2016 Organics Stream Composition

Figure 3.21 illustrates the low-density residential dwelling curbside organics stream contamination rate (% of total organics stream, by weight), highlighting the materials that are

not accepted in the existing program (contamination). Figure 3.22 illustrates the overall organics stream generation rates, in terms of kg/hh/yr. It must be noted that grass clippings are classified as non-food organic waste here (not contamination). Grass clippings accounted for a total of 0.92% of the Green Bin material.

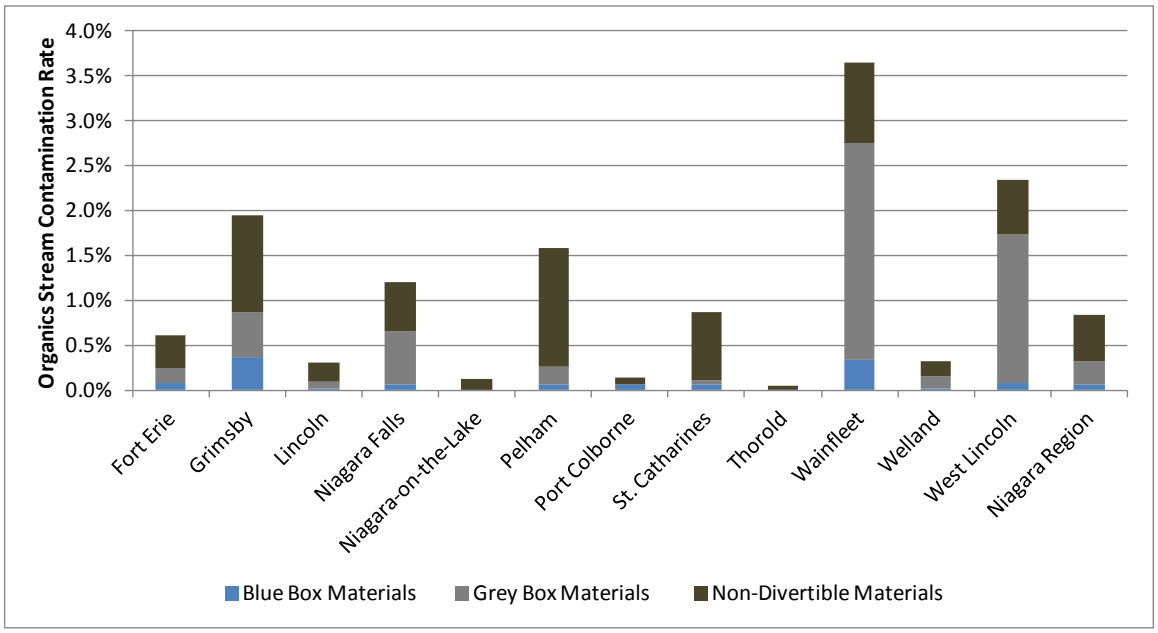


Figure 3.21 Low-Density Residential Dwelling Organics Stream Contamination Rates (by weight)

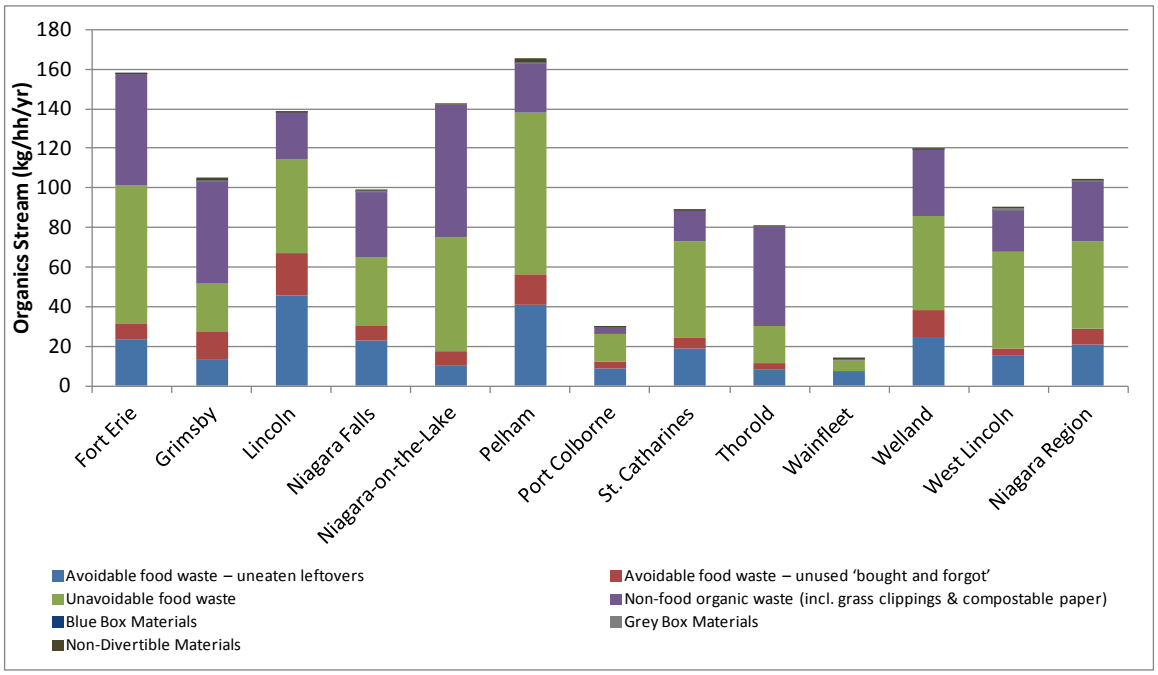


Figure 3.22 Low-Density Residential Dwelling Organics Stream Generation Rates

The total average organics stream generation rate across the Niagara region was approximately 104.15 kg/hh/yr, of which non-accepted materials (contamination) comprised approximately 0.84% (0.88 kg/hh/yr).

As with the garbage and recycling stream, the proportional material composition of the organics stream was similar between individual municipalities' sample areas, however, overall average organics generation rates per household per year varied notably. The average annual organics stream generation rate ranged from a low of 13.70 kg/hh/yr (Wainfleet) to a high of 165.38 kg/hh/yr (Pelham). All areas in region have organics collection services year round, which is a change since the audit conducted in 2010/2011. Contamination rates were generally low and varied from 0.05% in Thorold to 3.65% in Wainfleet.

3.10 Food Waste

Figure 3.23 illustrates the proportion of food waste found in the various waste streams. An average of 175.00 kg/hh/yr of food waste was generated, of which 98.33 kg/hh/yr was placed in the garbage stream, 73.13 kg/hh/yr in the organics stream, and 3.54 kg/hh/yr in the recycling streams.

Of the food waste placed in the garbage stream, large portions of unavoidable and avoidable food waste were present. Most of the food waste found in the garbage was in some type of packaging, whether it be the products original package (e.g. expired yogurt in tub) or a bag (e.g. leftovers/uneaten food in zip-lock bags). Auditors remove all food waste from their containers

and bags while auditing. Other than food scraps, the food waste ending up in the garbage is leftover food that residents take directly out of their refrigerators and cupboards and throw directly into the garbage. The extra effort of removing the food from the packaging is not usually taken.

The food waste being placed in the Green Bin consists largely of unavoidable food scraps. The unused bought and forgot food waste is commonly contained in packaging and disposed of directly into the garbage. Looking in more detail at the individual food types, capture rates for untouched meat and fish, untouched dried food and untouched other food are very low, at 10.36%, 13.99% and 7.71%, respectively. The food waste found in the recycling stream is largely liquid or food left in bottles and jars.

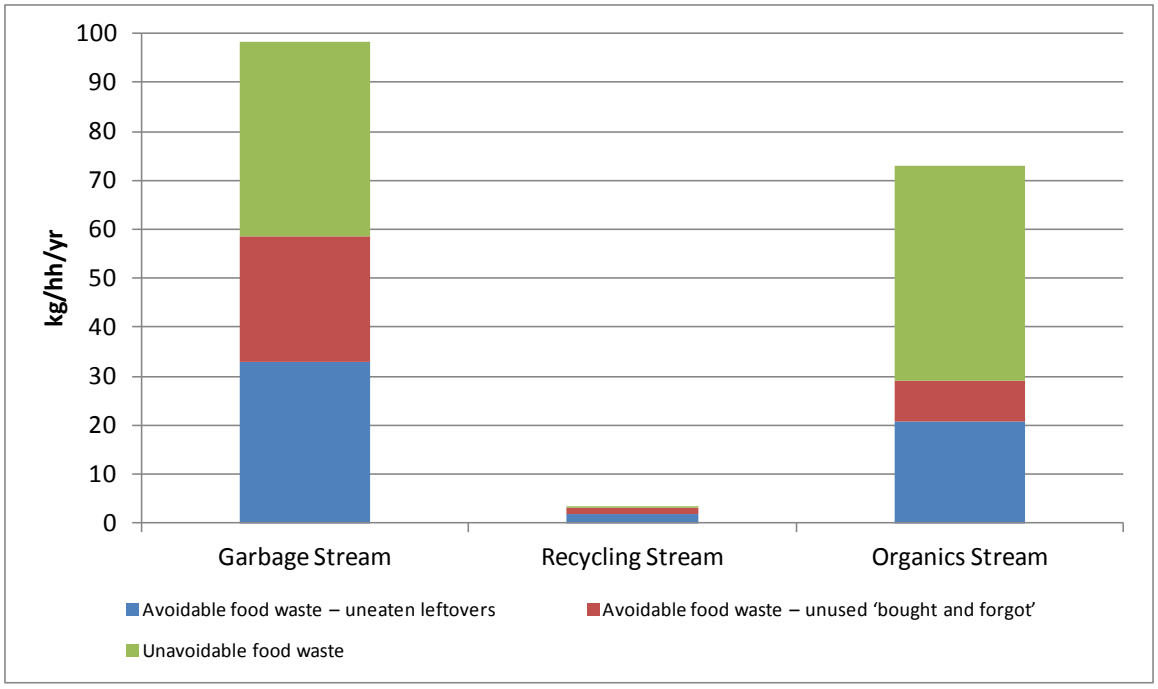


Figure 3.23 Breakdown of Food Waste in Different Waste Streams

Figure 3.24 illustrates the proportion of food waste (avoidable food – uneaten leftovers, avoidable food – unused 'bought and forgot' and unavoidable food waste) in each waste stream. All three types of food waste are present in each waste stream. The Green Bin program consists of 60.15% of unavoidable food waste (food scraps) Of the food waste in the recycling program, 54.39% is represented by avoidable food – uneaten leftovers. As mentioned previously in the report, this consists of liquids and food that have been left in containers. There is a fair divide of the different types of food waste ending up in the garbage stream, however unavoidable food waste was the greatest, at 40.59%, respectively.

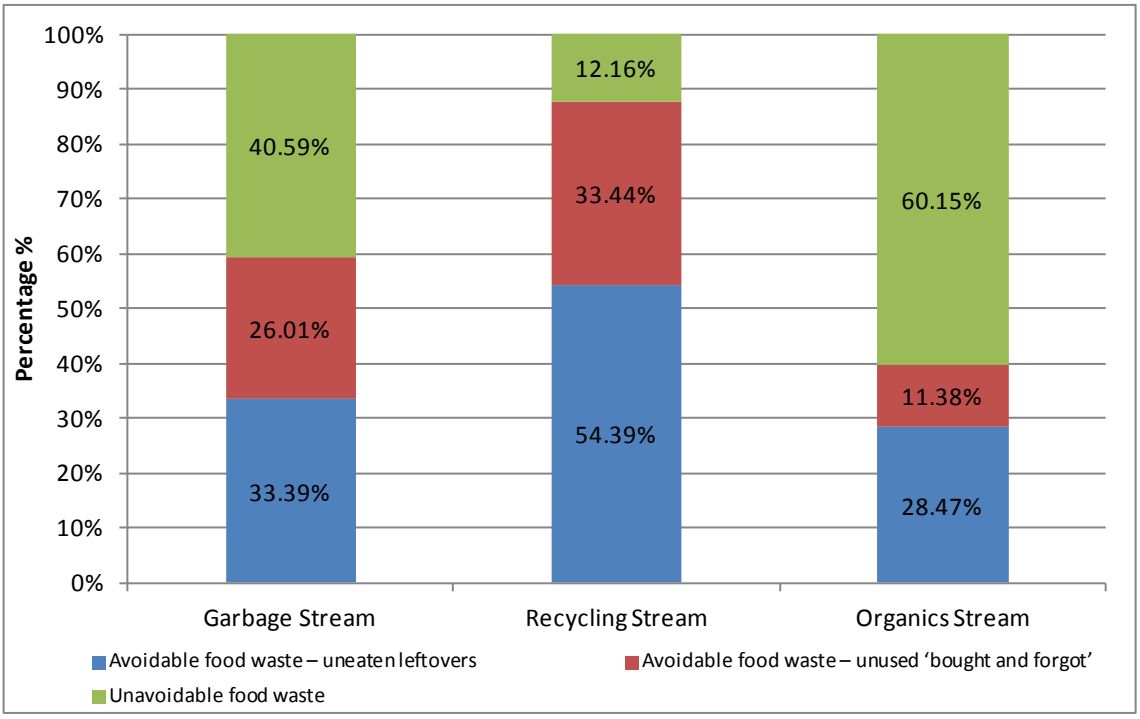


Figure 3.24 Percentage of Different Types of Food Waste in Each Waste Stream

Figure 3.25 illustrates the amount of the various food waste types found in each waste stream. This displays the top generated types of food, which includes unavoidable food scraps, leftover other and bought & forgot fruit & vegetable. For clarification, the 'other' category of food waste includes items that encompass multiple types of food and cannot be reasonably separated. This includes items such as cooked pastas covered in sauce, pizza, sandwiches, stir-fry's, water and drinkable liquids, etc.

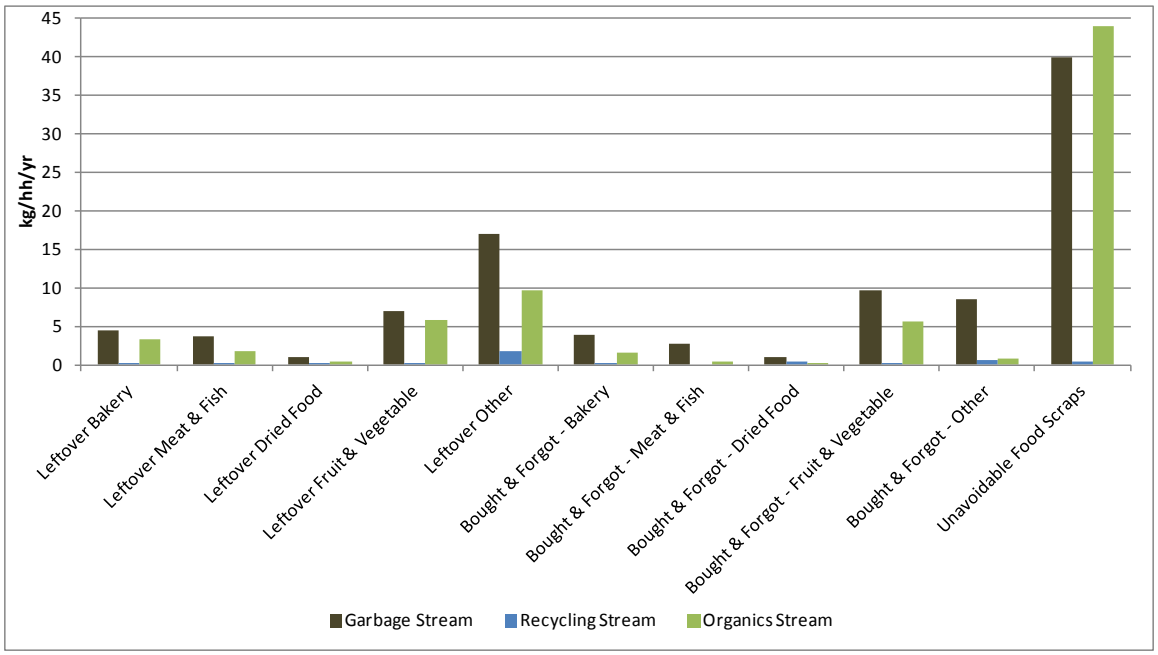


Figure 3.25 Breakdown of Food Waste in Different Streams by Material Type

Figure 3.26 illustrates the capture rates for the individual food waste material types. Unavoidable food waste (food scraps) had the highest capture rate, at 52.16%. Bought and forgot – other had the lowest capture rate, at 7.71%.

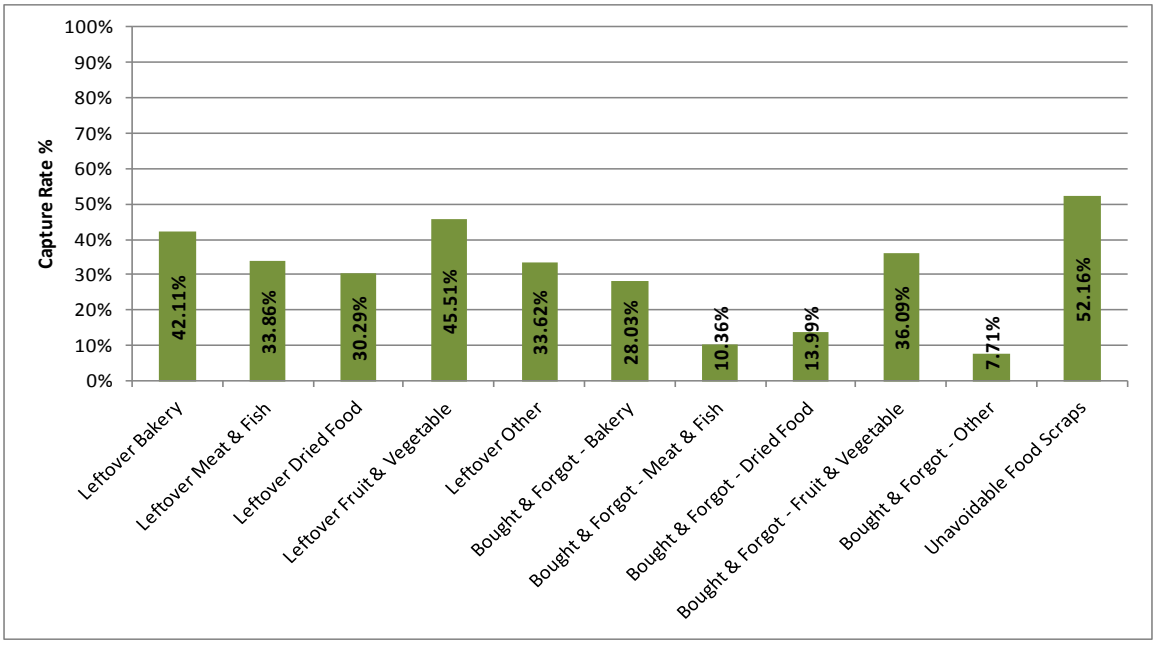


Figure 3.26 Capture Rates for Food Waste Material Types

3.11 Capture Rates for Recyclables

The following section summarizes the capture rates for materials currently accepted in the Region's curbside recycling program (Blue & Grey Box). A chart for each primary recyclable material category (paper, paper packaging, plastic, metal, glass) is presented with a breakdown of capture rates by municipality and for Niagara Region. A detailed breakdown of recyclable capture rates for every material sub-category can be found in Appendix C. The capture rate represents the proportion of a divertible material that was captured in the recycling stream relative to the total amount of that material generated in all streams (garbage, organics, recycling). It should be noted that recyclable materials were considered to be captured if they ended up in either the blue or Grey Box streams (e.g. a newspaper was considered captured if it ended up in the Grey or Blue Box). In addition, recyclable fibre materials that are also compostable (newsprint, corrugated cardboard & boxboard) were also considered captured if they ended up in the Green Bin.

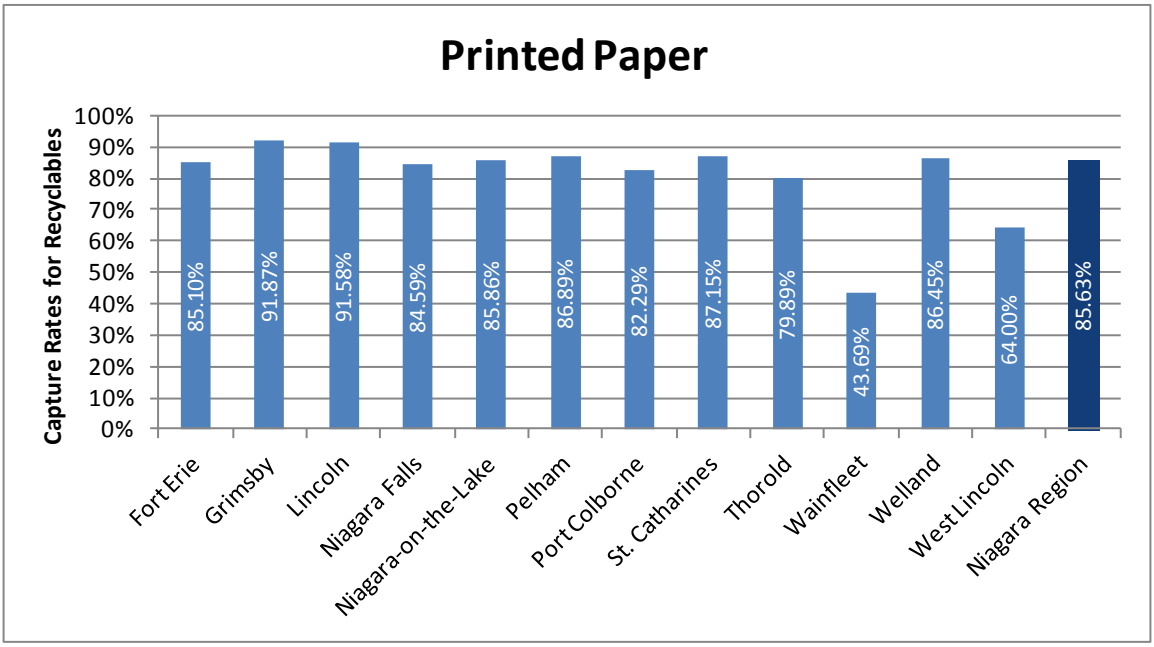


Figure 3.27 Capture Rates for Recyclable Printed Paper Materials

Recyclable printed paper materials include:

- Newspaper
- Books/magazines/directories
- Mixed Fine Paper

Niagara Region's overall recyclable printed paper generation rate was approximately 76.88 kg/hh/yr, of which 65.83 kg/hh/yr was placed in the recycling stream, resulting in a capture rate of 85.63%. The overall generation of printed paper has decreased from 2010/2011 to

2015/2016. The capture rates for the individual municipalities exceeded 80% for nine of the twelve municipalities. The remaining three municipalities (Wainfleet, West Lincoln and Thorold) showed lower capture rates, ranging from 43.69% to 79.89%.

Capture rates for newsprint, magazines/catalogues and telephone books was high (88%+), while capture rates for other printed paper was lower (59%). Other printed paper not captured in the recycling program was often observed to be in the form of receipts, mail and envelopes. It is possible that households place these types of paper in the garbage for security reasons (fear of identity theft). There is also the presence of receipts in grocery bags and take-out food bags. As discussed earlier, rural areas were observed to have generally less paper materials placed for disposal/recycling at the roadside, possibly due to burning in fireplaces or fire pits.

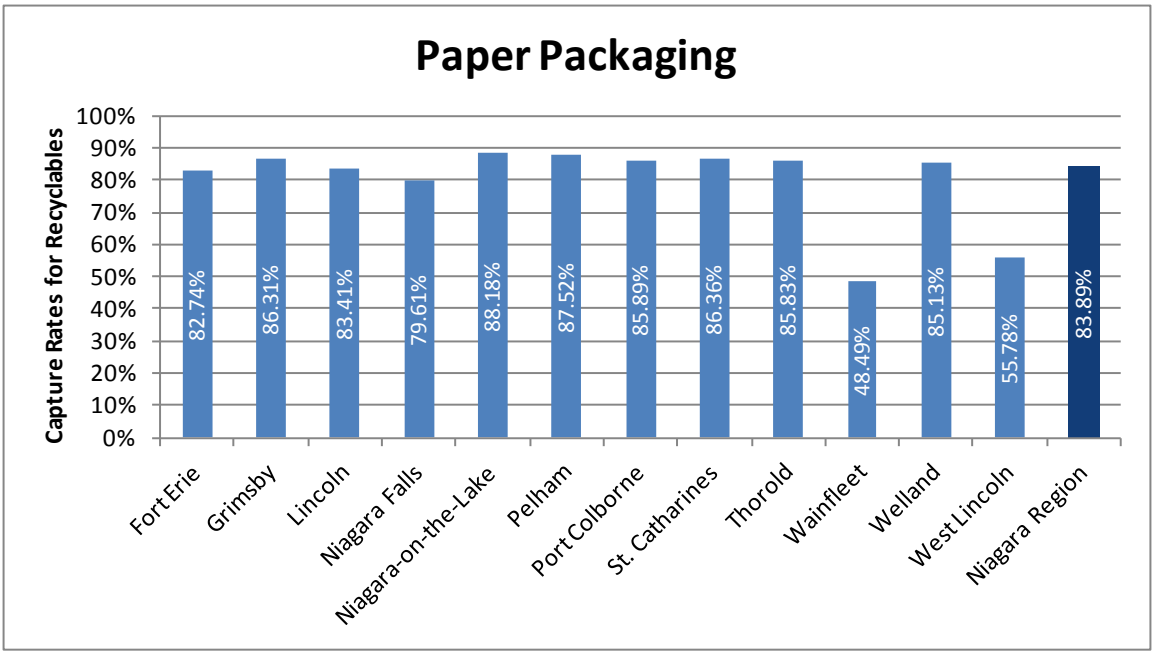


Figure 3.28 Capture Rates for Recyclable Paper Packaging Materials

Recyclable paper packaging materials include:

- Corrugated Cardboard
- Boxboard/Cores
- Composite Cans
- Gable Top Containers
- Aseptic Containers

Niagara Region's overall recyclable paper packaging generation rate was approximately 59.76 kg/hh/yr, of which 50.13 kg/hh/yr was placed in the recycling stream, resulting in a capture rate of 83.89%. Wainfleet, West Lincoln and Niagara Falls had the lowest capture rates at 48.49%, 55.78% and 79.61%, respectively. Niagara-on-the-Lake (88.18%), Pelham (87.52%) and St.

Catharines (86.36%) had the highest recyclable paper packaging capture rates. The capture rate for corrugated cardboard and gable top containers was high, at 91.23% and 85.11%, respectively. Both cores and aseptic containers showed lower capture rates, at 42.89% and 62.38%. As observed in the 2010/2011 audit, boxboard cores (toilet and paper towel rolls) are not being captured to their best potential. Households are not likely to have recycling receptacles in the bathroom where the empty rolls would be disposed.

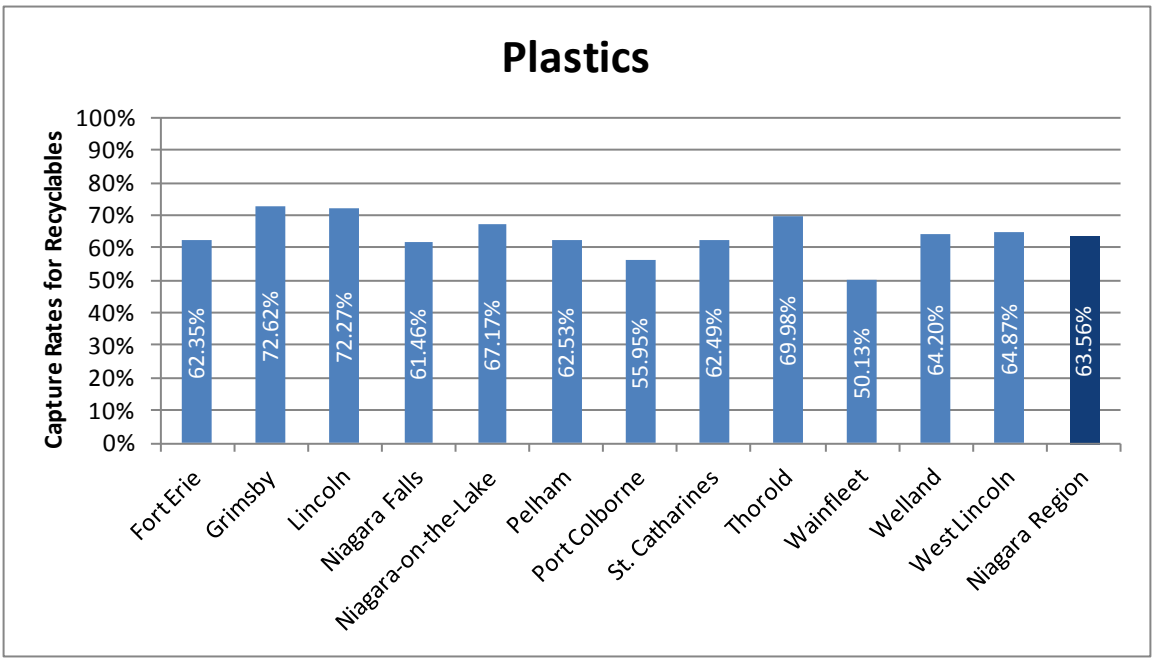


Figure 3.29 Capture Rates for Recyclable Plastic Materials

Recyclable plastic materials include:

- #1 PET Bottles/Jars & Packaging
- #2 HDPE Bottles/Jugs/Pails & Containers
- Wide Mouth Tubs & Lids
- #3 Polyvinyl Chloride (PVC) Plastic Containers
- #2 HDPE and #4 LDPE Flexible Film Plastic
- #5 Polypropylene (PP) Bottles/Jars/Jugs
- #6 Polystyrene (PS) Packaging
- #7 Other Rigid Plastic Containers

Niagara Region's overall recyclable plastics generation rate was approximately 46.51 kg/hh/yr, of which 29.57 kg/hh/yr was placed in the recycling stream, resulting in a capture rate of 63.56%. This ranged from a low of 50.13% in Wainfleet to a high of 72.62% in Grimsby. Capture rates for plastic containers (bottles/jars/jugs/tubs) was generally high, ranging from 73%-99%. The materials with the lowest capture rates included flexible film plastic, at 32.26%, large pails &

lids, at 41.91%, other rigid plastic packaging, at 43.19% and #6 polystyrene (non-expanded and expanded), at 52.17% and 54.21%, respectively.

It should be noted that acceptable bags & film includes only packaging materials (e.g. retail carry-out bags, bread bags, overwrap from cases of bottled water or packs of paper towels, etc.). This category does not include garbage bags or other non-packaging film (e.g. sandwich bags). A contributing factor to the lower capture rate for PE bags and film was observed to be resident's use of retail carry-out bags as small garbage can liners (e.g. in the bathroom or kitchen). PE bags are also often used for cat & dog waste.

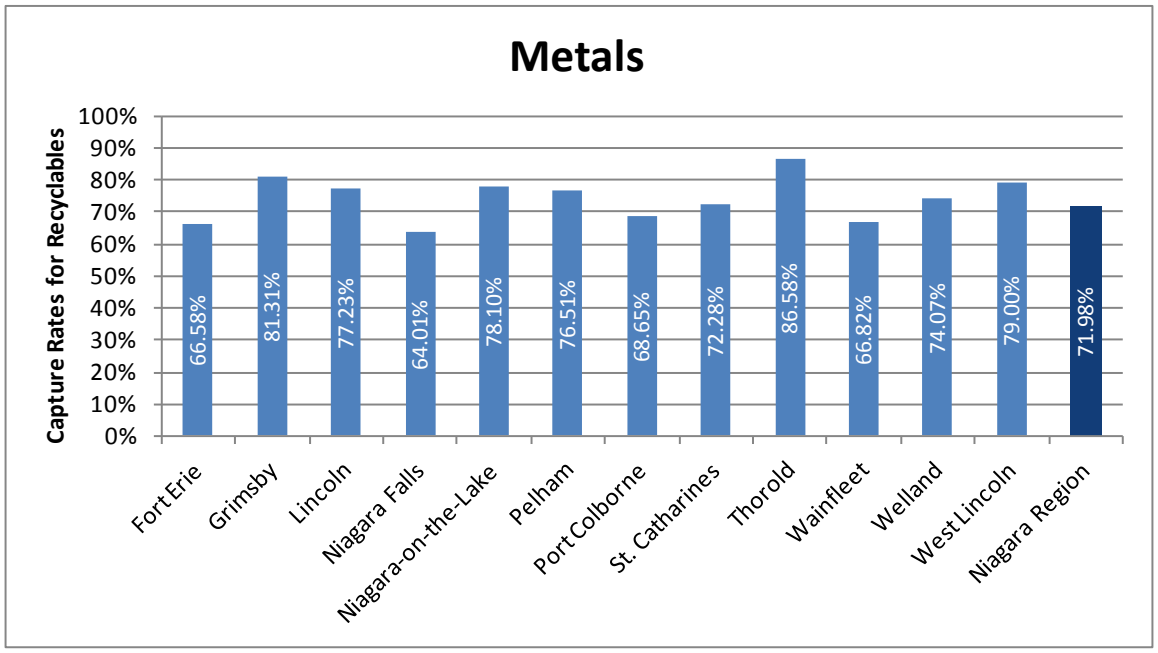


Figure 3.30 Capture Rates for Recyclable Metal Materials

Recyclable metal materials include:

- Aluminum Food & Beverage Cans
- Aluminum Foil & Trays
- Steel Food & Beverage Cans
- Aerosol Cans (empty)
- Steel Paint Cans (empty)

Niagara Region's overall recyclable metals generation rate was approximately 15.77 kg/hh/yr, of which 11.35 kg/hh/yr was placed in the recycling stream, resulting in a capture rate of 71.98%. This ranged from 64.01% in Niagara Falls to 86.58% in Thorold. Steel paint cans, aluminum foil & trays and aluminum aerosols had the lowest capture rates, at 17.75%, 26.43% and 35.58%, respectively. The focus should be put on targeting the capture of aluminum foil as it is more commonly found in the garbage stream. In many cases, the foil & trays observed in the garbage

contained leftover food that people did not separate before discarding. Foil may be a material not commonly recognized as recyclable by residents.

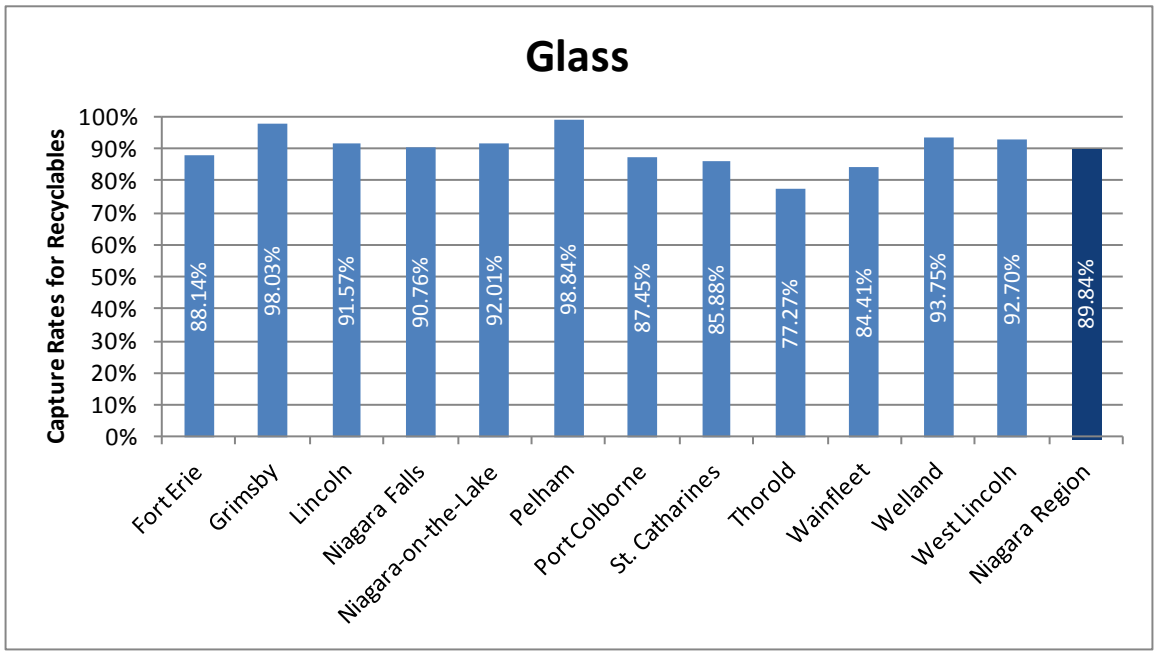


Figure 3.31 Capture Rates for Recyclable Glass Materials

Recyclable glass materials include:

- Clear Food & Beverage Bottles/Jars
- Coloured Food & Beverage Bottles/Jars

Niagara Region's overall recyclable glass generation rate was approximately 27.09 kg/hh/yr, of which 24.34 kg/hh/yr was placed in the recycling stream, resulting in a capture rate of 89.84%. This ranged from 77.27% (Thorold) to 98.84% (Pelham). Glass jars placed in the garbage typically contain food and the homeowner has not taken the extra effort to empty out the jar and place it into the correct stream.

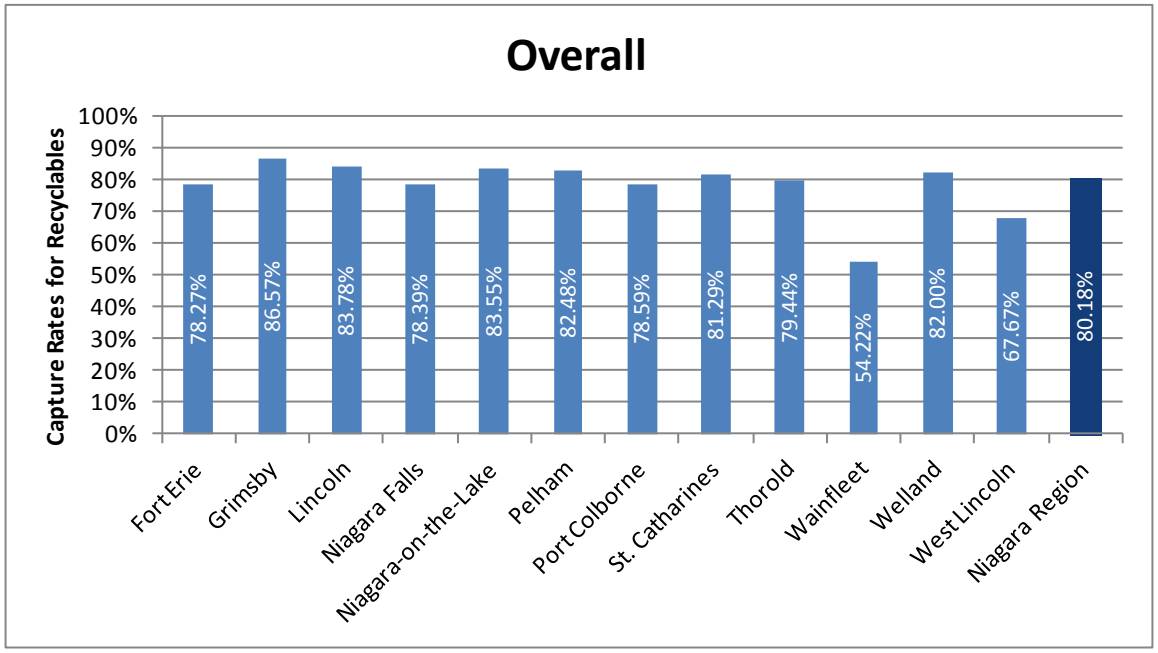


Figure 3.32 Overall Capture Rates for Recycling Stream Materials

Niagara Region's overall recyclable material generation rate (combining all recyclable paper, paper packaging, plastic, metal and glass materials) is approximately 226.02 kg/hh/yr, of which 181.22 kg/hh/yr was placed in the recycling stream, resulting in an overall capture rate of 80.18%. Rural areas including Wainfleet (54.22%) and West Lincoln (67.67%) had the lowest overall capture rates, while Grimsby (86.57%), Lincoln (83.78%) and Niagara-on-the-Lake (83.55%) had the highest overall capture rates. As previously discussed, rural areas' lower overall capture rates may attribute to less paper and paper packaging materials generated, which account for significant weights overall.

3.12 Capture Rates for Organics

The following section summarizes the capture rates for materials currently accepted in the Region's curbside organics program (Green Bin). A detailed breakdown of capture rates for every material category can be found in Appendix C. The capture rate represents the proportion of a divertible material that was captured in the organics stream relative to the total amount of that material generated in all streams (garbage, organics, recycling).

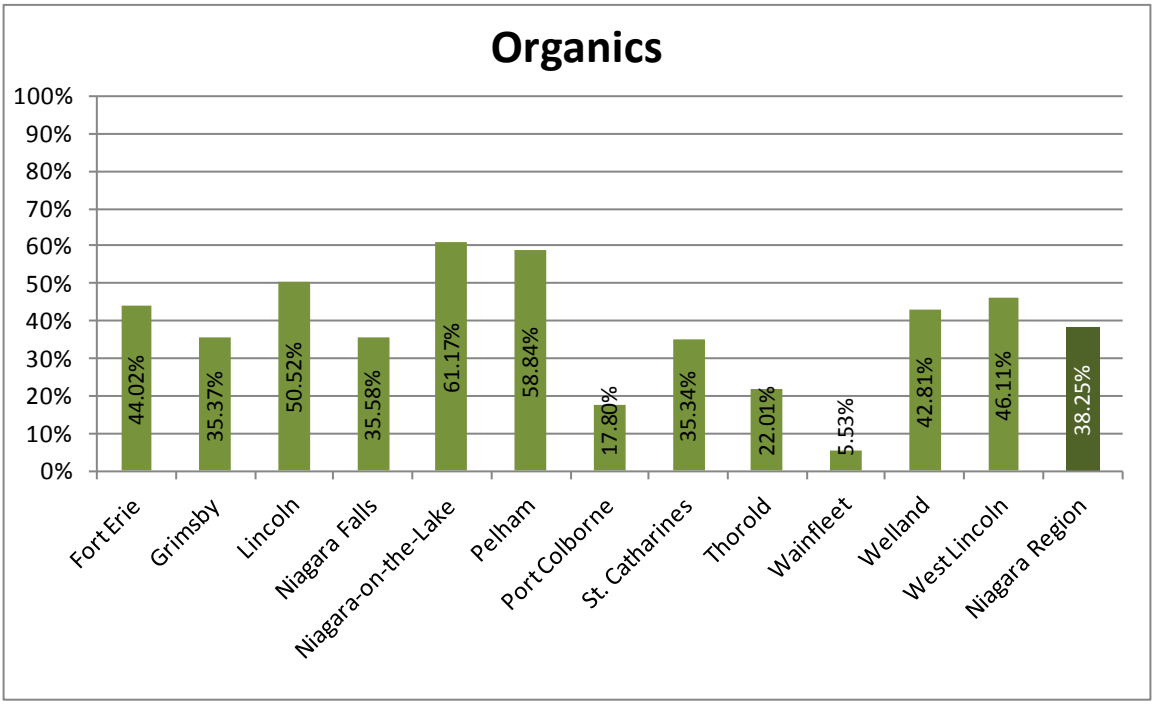


Figure 3.33 Overall Capture Rates for Organics Stream Materials

Accepted organics stream materials include:

- Food Waste (avoidable and unavoidable)
- Pet Waste
- Yard Waste (excluding grass clippings)
- Molded Pulp (e.g. egg cartons)
- Non-laminated Paper Packaging
- Tissue/Towelling
- Compostable Plastic & Paper Bags

Niagara Region's overall organics material generation rate is approximately 266.02 kg/hh/yr, of which 101.76 kg/hh/yr was placed in the organics stream, resulting in an overall capture rate of 38.25%. Wainfleet had the lowest organics capture rate of the municipalities (5.53%) over the four 2015/2016 seasonal audits. This directly correlates to the low participation rate of 7.5% in the Green Bin program for Wainfleet. Niagara-on-the-Lake had the highest capture rate for organics, at 61.17%.

Organics (largely food waste and pet waste) are very heavy and can negatively affect the capture rates for an individual municipality when placed in the incorrect stream. The pet waste placed in the organics stream was commonly from an indoor pet waste collection bin (litter box or cage shavings). Pet waste observed in the garbage stream was most often bagged in non-compostable bags, which would be a barrier for capturing this material in the organics stream.

3.13 Curbside Waste Diversion Rates

Based on the results of the four seasonal 2015/2016 waste composition audits, the average household sampled generated approximately 619.16 kg per year of curbside waste (garbage, Grey/Blue recycling & Green Bin organics stream). Of that amount, 282.98 kg/hh/yr is diverted though the recycling and organics programs, 209.05 kg/hh/yr consisted of landfilled material that could have been diverted under the current diversion programs, and the remaining 127.13 kg/hh/yr consisted of landfilled non-divertible material. This gives an overall diversion rate of 45.70%. It should be noted that contamination found in the recycling and organics streams was considered landfilled waste. In addition, leaf & yard waste and bulky items placed at the curbside was not incorporated into the waste composition results unless it was inside of a garbage can/bag, Blue/Grey box or Green Bin. Table 3.6 outlines the amount of curbside-collected materials diverted by the Region in more detail and by material category. Figure 3.34 illustrates the breakdown of diversion rates by municipality.

Table 3.6 Curbside Collected Waste Diversion for Low-Density Residential Dwellings in Niagara Region

Material Category	Material Diverted (kg/hh/yr)	Landfilled Divertible Materials (kg/hh/yr)	Landfilled Non-Divertible Materials (kg/hh/yr)	Total (kg/hh/yr)	% Diverted
Printed Paper	65.83	11.05	N/A	**76.88**	85.63%
Paper Packaging	50.13	9.63	5.67	**65.43**	76.62%
Plastics	29.57	16.95	20.86	**67.37**	43.88%
Metals	11.35	4.42	N/A	**15.77**	71.98%
Glass	24.34	2.75	N/A	**27.09**	89.84%
MHSW	N/A	N/A	2.59	**2.59**	N/A
Organics	101.76	164.26	1.08	**267.10**	38.10%
WEEE	N/A	N/A	4.46	**4.46**	N/A
Bulky Items	N/A	N/A	1.41	**1.41**	N/A
Other Materials	N/A	N/A	91.05	**91.05**	N/A
Total (kg/hh/yr)	**282.98**	**209.05**	**127.13**	**619.16**	**45.70%**

*Note: Bulky items displayed above only include items that were directly placed into a garbage can/container.

A detailed list of the Other Materials can be found in Appendix A, Material Categories List, however, it is largely comprised of other waste (furnace filters, vacuum bags, candles, wooden fruit baskets, multi-material items, etc.), diapers and sanitary products, construction/renovation materials, textiles, non-recyclable metal and glass, ceramics and coffee pods.

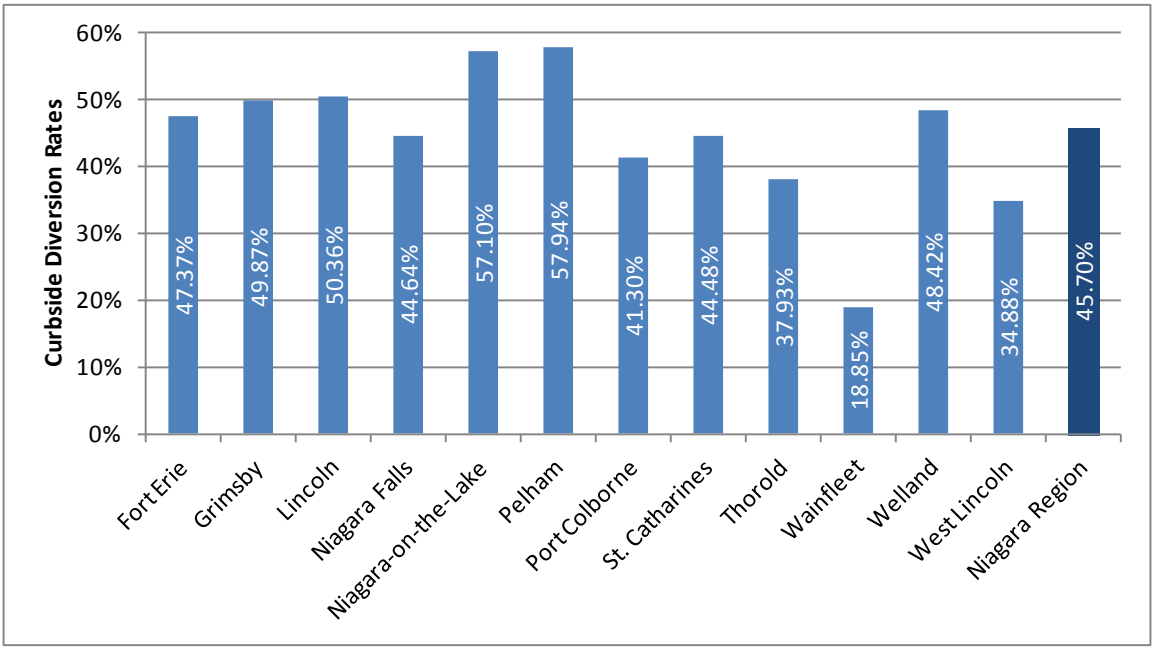


Figure 3.34 Curbside Diversion Rates

Looking at individual municipality's curbside diversion rates, they ranged from 18.85% (Wainfleet) and 34.88% (West Lincoln) on the low end, to 57.94% (Pelham) and 57.10% (Niagara-on-the-Lake) on the high end. Wainfleet and West Lincoln are both rural areas and have a higher bag/container limit due to the fact that they have farms. The overall generation of garbage in Wainfleet was much higher than other municipalities. In addition, there is a higher possibility that some farms might house migrant workers. This may add another obstacle when it comes to participation in the diversion programs. Higher diversion rates may attribute to the higher income level in sample areas, more awareness and understanding of the programs and importance of diversion in general, and perhaps more consumption and disposal of divertible materials overall (e.g. newspapers, magazines, fresh produce, etc.).

Table 3.7 provides an overview of the diversion rates for each sample area in each municipality as well as a maximum possible diversion rate that could have been achieved if all divertible material was captured properly. Overall, Niagara Region could achieve a maximum diversion rate of 79.47%, if 100% of currently divertible materials were captured.

Table 3.7 Overview of Diversion Rates & Maximum Possible Diversion Rates

Sample Area & Municipality	4-Season Diversion Rate	Maximum Possible Diversion Rate
Coral Ave. - Fort Erie	47.37%	81.77%
Brierwood Ave. - Grimsby	49.87%	84.10%
Victoria Ave - Lincoln	50.36%	79.10%
Crowland Ave, Briarwood Ave & Preakness - Niagara Falls	44.64%	79.52%
Queenston Rd - Niagara-on-the-Lake	57.10%	79.74%
Blackwood Place - Pelham	57.94%	82.53%
Neff St. - Port Colborne	41.30%	84.28%
Oriole Dr, Stoney Brook Cres & Greenbriar Place - St. Catharines	44.48%	76.97%
Welland St. S - Thorold	37.93%	87.74%
Feeder Rd - Wainfleet	18.85%	68.78%
Forks Rd & Clifford Ave. - Welland	48.42%	79.71%
Young St. - West Lincoln	34.88%	64.41%
Niagara Region	**45.70%**	**79.47%**

3.14 Audit Results Participants vs. Non-Participants in Diversion Programs

As a result of auditing each household individually, it allowed those households, which participated in the seasonal audits, to be classified as participant types. The number of participant types classified in each season is outlined in Table 3.8. In addition, an average number of participant types are displayed for the overall four-season analysis.

Table 3.8 Participant Types

Participant Type	Summer 2015	Fall 2015	Winter 2016	Spring 2016	4-Season Average
	# of Household Participants	# of Household Participants	# of Household Participants	# of Household Participants	# of Household Participants
Recycling, Garbage & Organics Participant	71	73	70	78	73
Recycling & Garbage Participant	56	55	57	54	56
Garbage Participant	13	20	14	10	14
Recycling Participant	5	2	6	3	4
Recycling & Organics Participant	5	2	3	3	3
Garbage & Organics Participant	2	2	1	3	2
Organics Participant	0	0	0	2	1
Non-Participant	14	11	14	12	13
Total	**166**	**165**	**165**	**165**	**165**

It is important to take into account the overall sample size for the different participant types. Of the households sampled, 44.24% of households participated in the garbage, recycling and organics streams. Discussion on participant types is focused on the following participants:

- Recycling, Garbage & Organics Participant
- Recycling & Garbage Participant
- Garbage Participant

All other participant types have a very low sample size and do not qualify as being a representative sample.

Table 3.9 provides an overview of the overall waste profile for the different participant types. This includes results gathered from all waste streams (Garbage, Blue Box, Grey Box and Green Bin organics). The main focus should be put in the Recycling & Garbage Participants, Recycling, Garbage & Organics Participant and Garbage Participant, as they have a higher number of households that qualified as this participant type. The other participant types are represented by such a small number of households that composition results should not be considered representative for these participant types (Recycling, Recycling & Organics, Garbage & Organics, and Organics).

Table 3.9 Overall Waste Profile (all streams) for Participant Types

	Recycling, Garbage & Organics Participant	Recycling & Garbage Participant	Garbage Participant	Recycling Participant	Recycling & Organics Participant	Garbage & Organics Participant	Organics Participant
	kg/hh/wk	kg/hh/wk	kg/hh/wk	kg/hh/wk	kg/hh/wk	kg/hh/wk	kg/hh/wk
Recycled Material	4.49	3.53	0.00	3.14	3.80	0.00	0.00
Composted Material	4.05	0.00	0.00	0.00	2.99	2.94	3.10
Disposed Organics	2.65	5.02	3.28	0.10	0.13	0.74	0.00
Disposed Recyclables	0.78	1.22	1.38	0.00	0.01	0.48	0.00
Landfilled Non-Divertible Material	2.60	3.15	2.09	0.15	0.33	3.72	0.01
Total	**14.57**	**12.92**	**6.76**	**3.39**	**7.26**	**7.88**	**3.11**
Diversion Rate (%)	58.62%	27.33%	0.00%	92.62%	93.51%	37.35%	99.84%

Figure 3.35 and 3.36 illustrate the overall generation and composition by participant type. The Recycling, Garbage & Organics Participants generated the highest amount of waste, at 14.57 kg/hh/wk. Of this, they diverted a total of 8.54 kg/hh/wk through recycling and composting. This resulted in an overall diversion rate of 58.62%. If all streams were diverted properly (i.e. there was no disposed organics or disposed recyclables), a maximum diversion rate of 82.15% could be achieved.

The Recycling & Garbage Participants generated a total of 12.92 kg/hh/wk, of which 3.53 kg/hh/wk was diverted through the recycling programs. This resulted in an overall diversion rate of 27.33%. If all streams were diverted properly (i.e. there was no disposed organics or disposed recyclables), a maximum diversion rate of 75.60% could be achieved.

The Garbage Only Participants generate a total of 6.76 kg/hh/wk. If these participants chose to participate in the recycling and organics programs, they could achieve a maximum diversion rate of 69.03%.

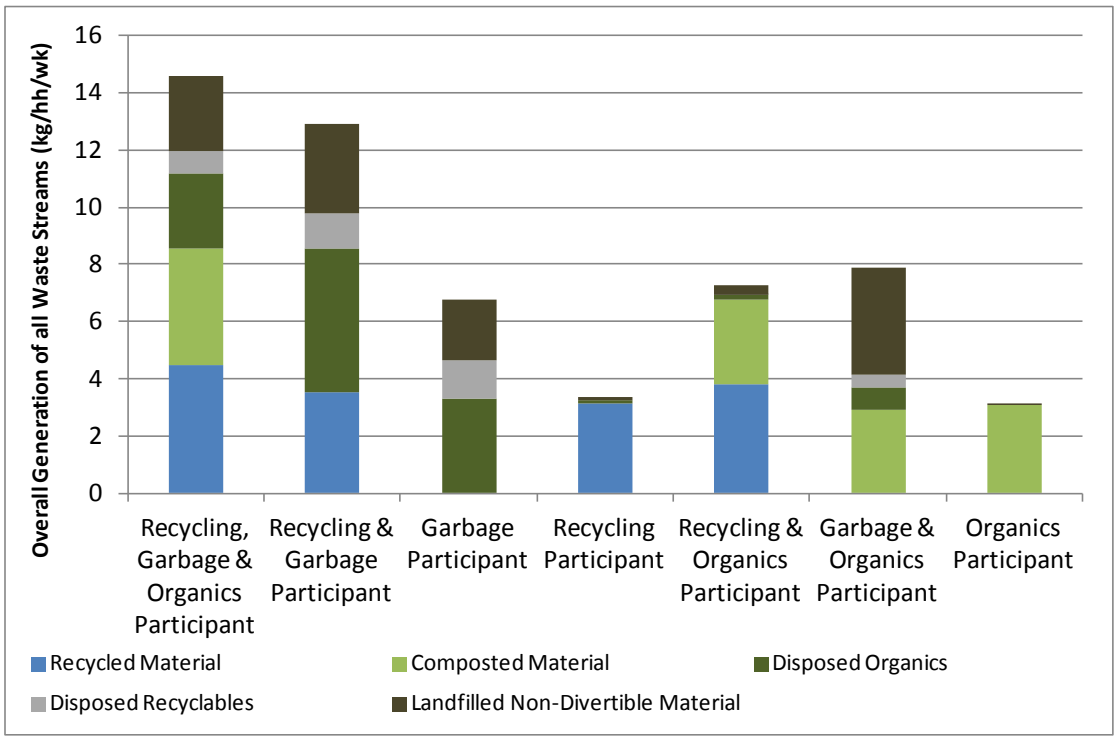


Figure 3.35 Overall Waste Generation Profile (all streams) by Participant Type

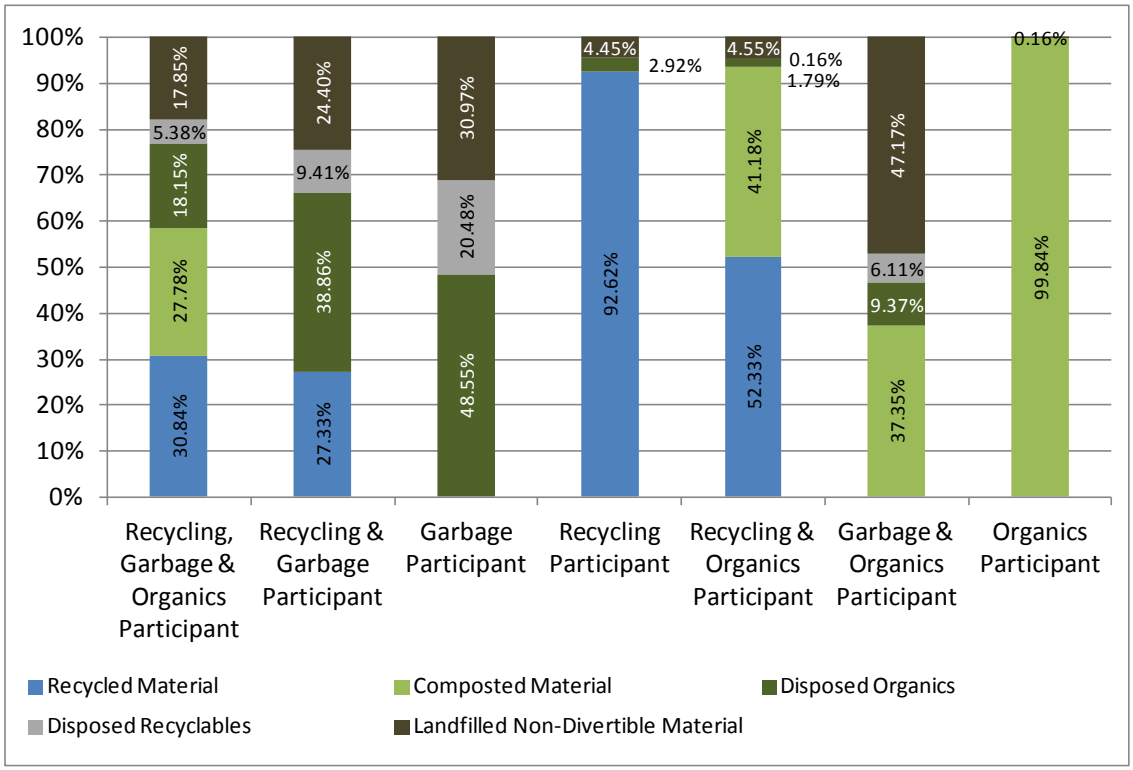


Figure 3.36 Overall Waste Composition (all streams) by Participant Type

Figures 3.37 and 3.38 display the garbage stream composition by participant type. It is important to focus on the composition by kg/hh/wk when comparing the participant types due to the differentiating waste generation rates.

The Recycling, Garbage & Organics Participants had a lower garbage generation rate of 5.58 kg/hh/wk. Of this, organics accounted for a total of 44.77% or 2.50 kg/hh/wk, and recyclable materials accounted for 13.78% or 0.77 kg/hh/wk.

Recycling and Garbage Participants produced the largest amount of garbage, at 9.04 kg/hh/wk. They had the highest amount of organics (54.37% or 4.92 kg/hh/wk) contained within their garbage and a total of 13.45% or 1.22 kg/hh/wk of recycling.

The Garbage Only Participant had an overall garbage generation rate of 6.76 kg/hh/wk. Of this, 48.55% or 3.28 kg/hh/wk was organics, 20.48% or 1.38 kg/hh/wk was recyclables.

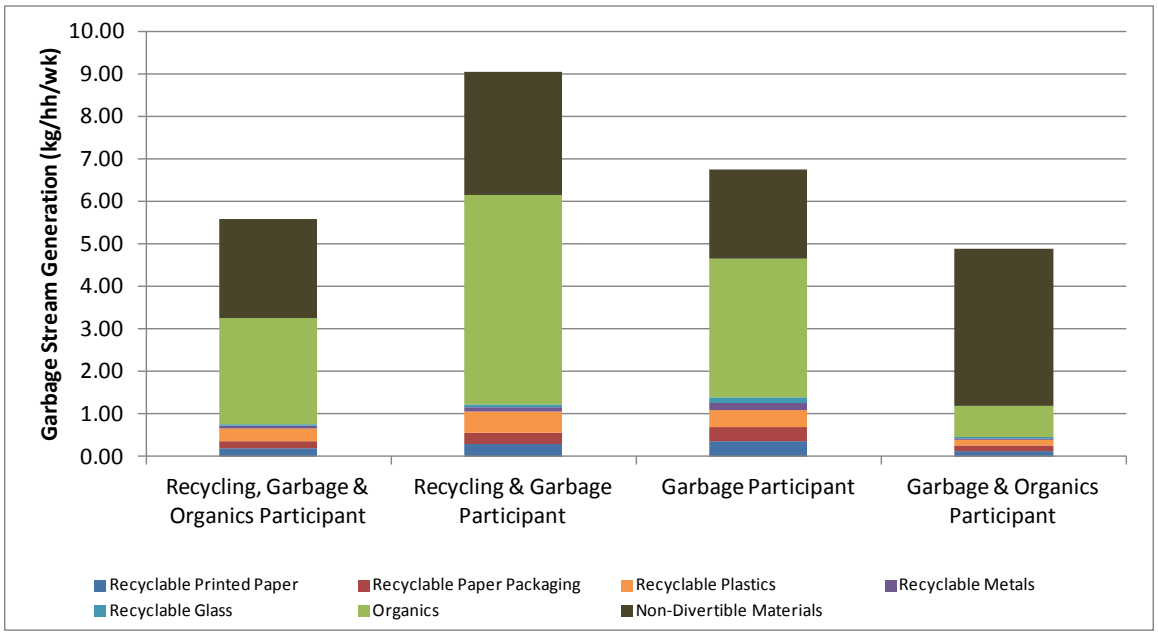


Figure 3.37 Garbage Stream Generation by Participant Type

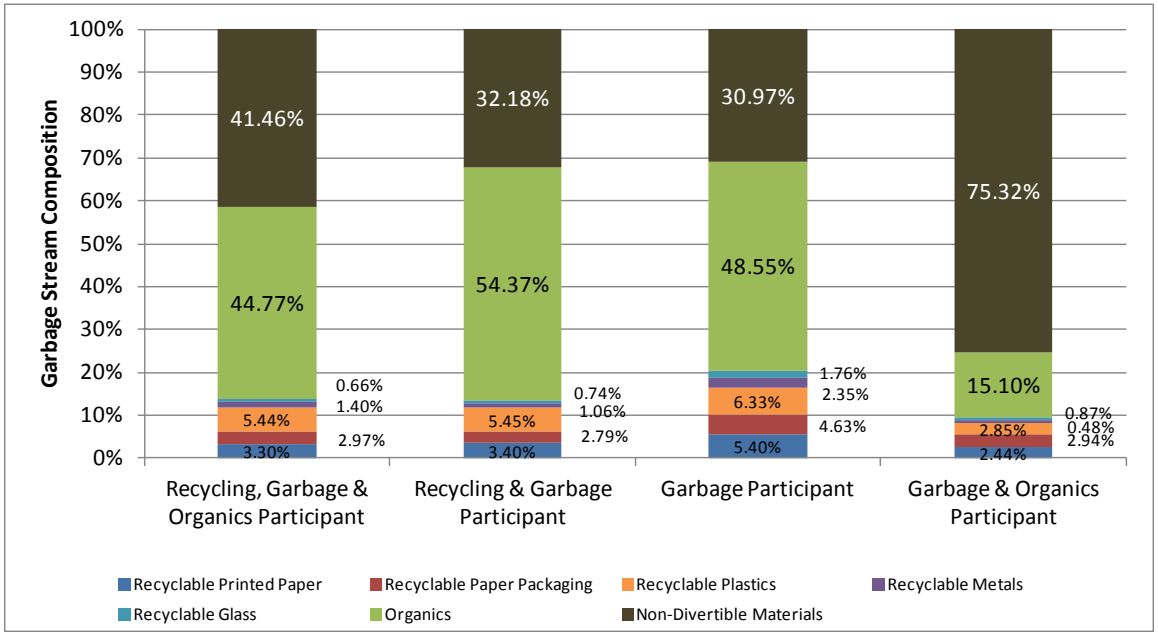


Figure 3.38 Garbage Stream Composition by Participant Type

Figures 3.39 and 3.40 illustrate the recycling stream composition by participant type. The overall generation of recycling was highest for Recycling, Garbage & Organics Participants, at 4.87 kg/hh/wk. All four types of participants had similar contamination rates, ranging from 7.38% (Recycling Only Participant) to 9.68% (Recycling & Organics Participant).

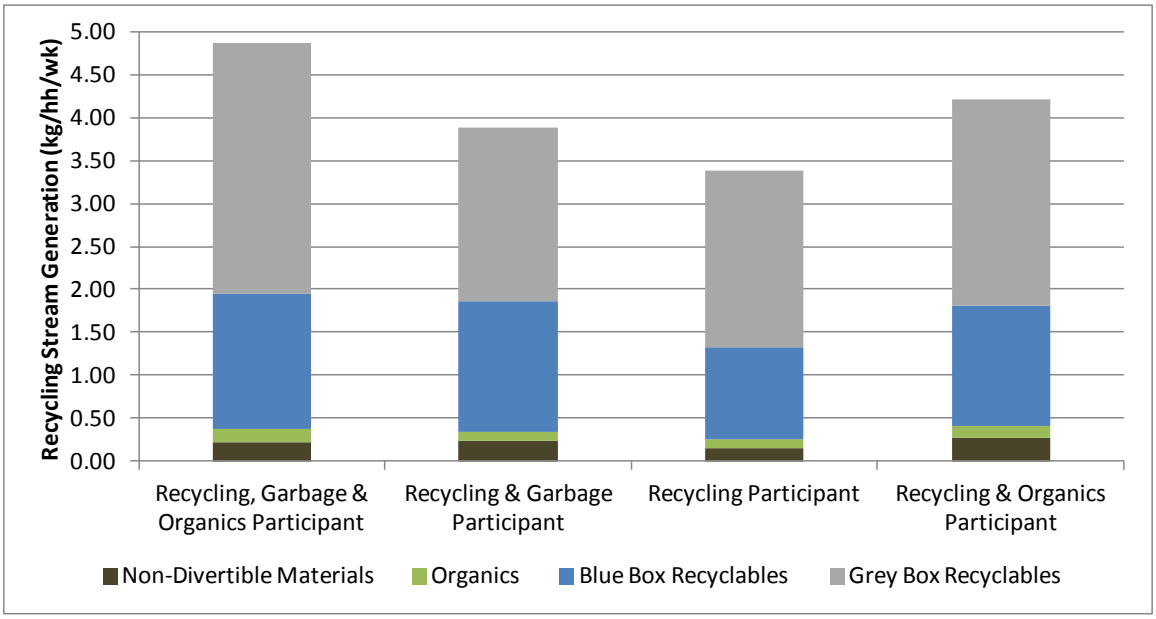


Figure 3.39 Recycling Stream Generation by Participant Type

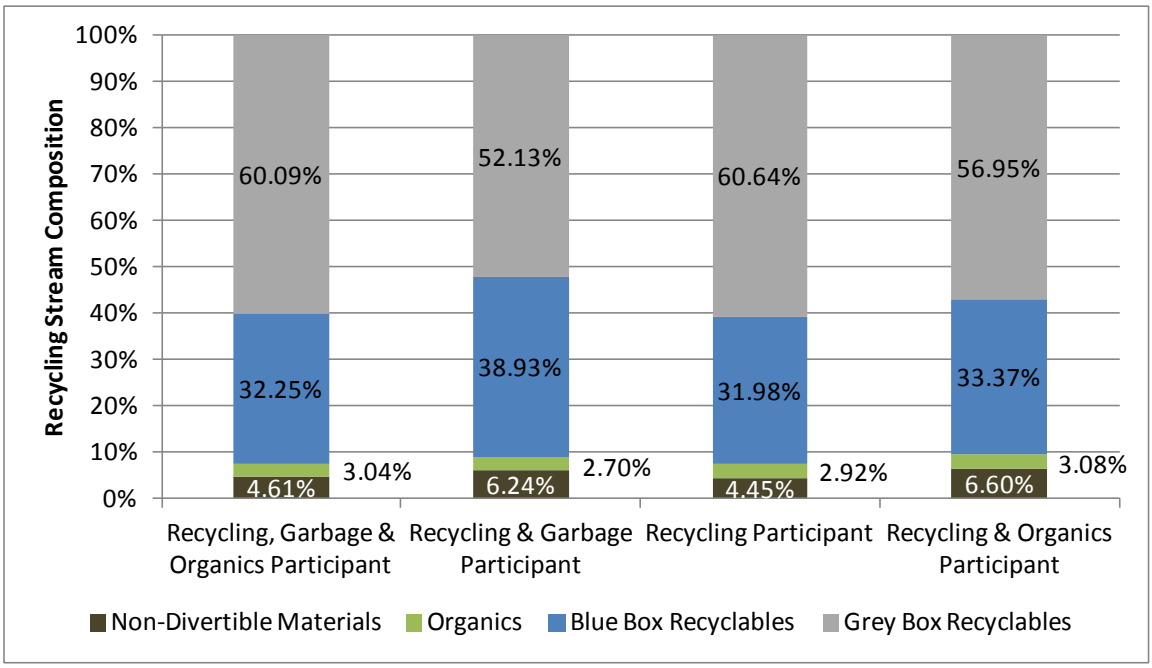


Figure 3.40 Recycling Stream Composition by Participant Type

Figures 3.41 and 3.42 illustrate the organics stream composition by participant type. The overall generation of organics was highest for Recycling, Garbage & Organics Participants, at 4.13 kg/hh/wk. All four types of participants had low contamination rates, ranging from 0.16% (Organics Only Participant) to 2.10% (Recycling & Organics Participant).

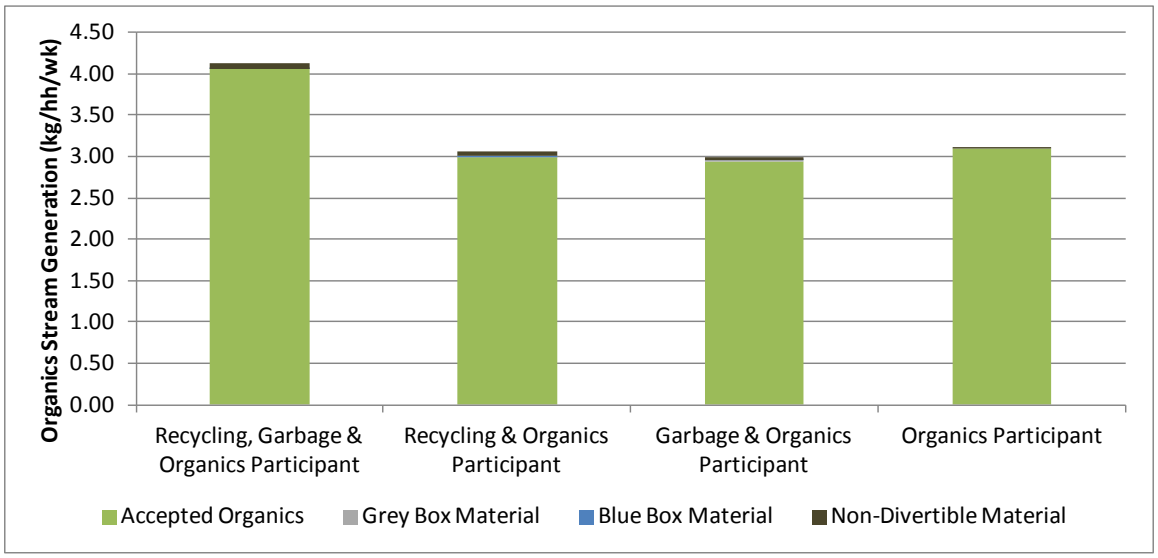


Figure 3.41 Organics Stream Generation by Participant Type

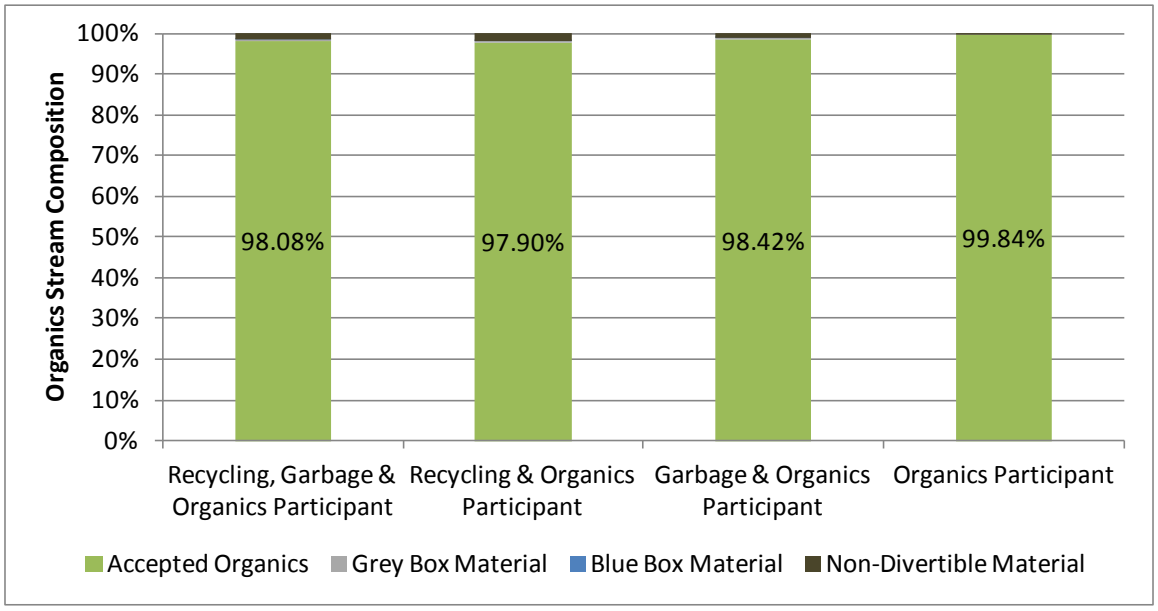


Figure 3.42 Organics Stream Composition by Participant Type

3.15 Rural vs. Urban Waste Composition

There are differences in waste composition among different areas of the Region. In particular, focus was placed on assessing the waste composition of rural versus urban areas. Table 3.10 provides a list of the sample areas and how they were classified.

Table 3.10 Sample Area Rural vs. Urban Classification

Sample Area	Municipality	Land Type
Forks Rd.	Welland	Rural
Feeder Rd. West	Wainfleet	Rural
Crowland Ave.	Niagara Falls	Rural
Queenston Rd.	Niagara-on-the-Lake	Rural
Young St.	West Lincoln	Rural
Clifford Ave.	Welland	Urban
Coral Ave.	Fort Erie	Urban
Neff St.	Port Colborne	Urban
Oriole Dr.	St.Catharines	Urban
Briarwood Ave.	Niagara Falls	Urban
Preakness	Niagara Falls	Urban
Brierwood Ave.	Grimsby	Urban
Blackwood Place	Pelham	Urban
Victoria Ave.	Lincoln	Urban
Stoney Brook Cres.	St.Catharines	Urban
Greenbriar Place	St.Catharines	Urban
Welland St. S.	Thorold	Urban

Figure 3.43 and 3.44 illustrate the proportion of waste set out (all streams by weight) at the curbside for Rural vs. Urban low-density residential dwellings. Rural households set out more garbage than urban households. This factor could directly correlate to rural areas having farms and having a higher garbage set-out limit for their increased size. They also set out less Grey Box material compared to urban households.

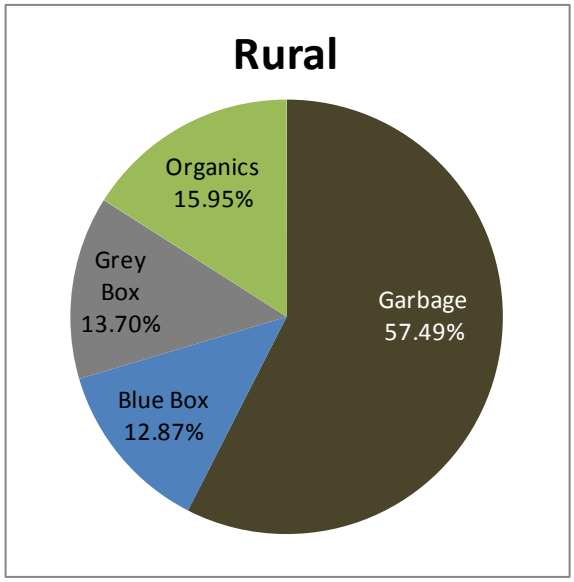


Figure 3.43 Rural Waste Set-Out Profile

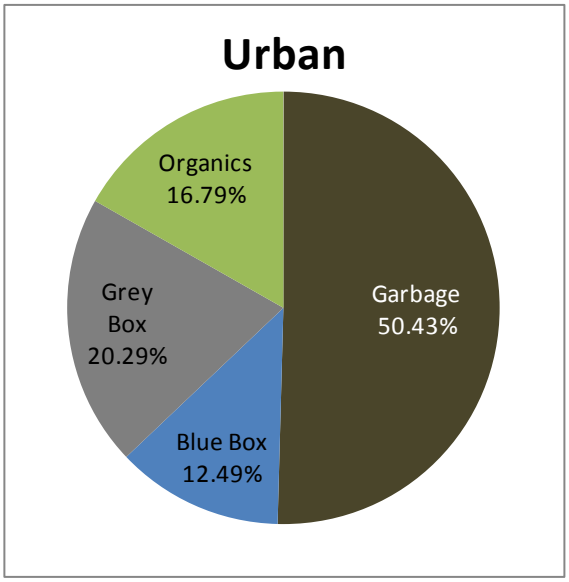


Figure 3.44 Urban Waste Set-Out Profile

Figures 3.45 and 3.46 illustrate the overall proportion of rural and urban low-density residential dwellings waste that was diverted and disposed. The percentages of diverted organics and disposed divertible material are very similar. Rural households generated more non-divertible material than urban households. In addition, urban households recycle more material than rural households.

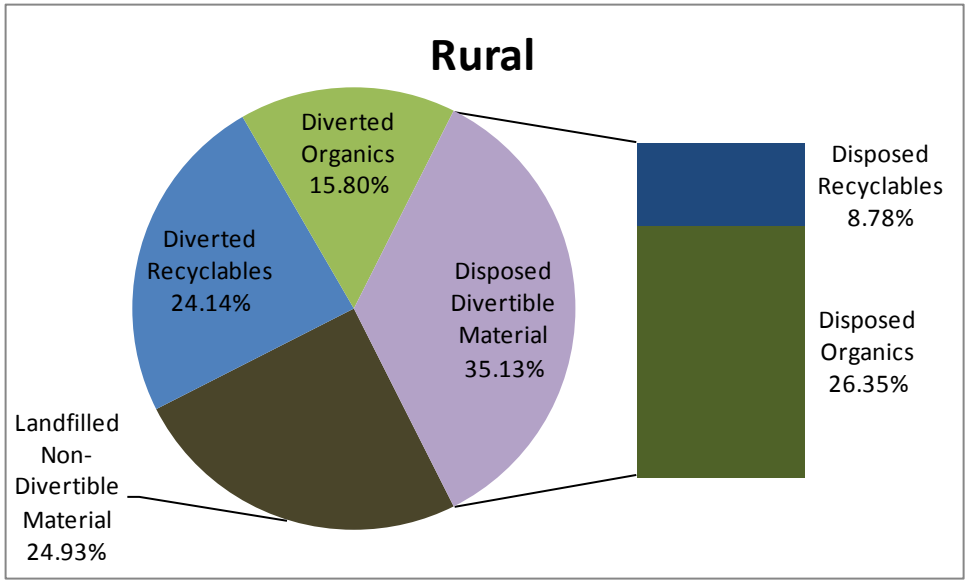


Figure 3.45 Overall Waste Composition of Rural Low-Density Residential Dwellings

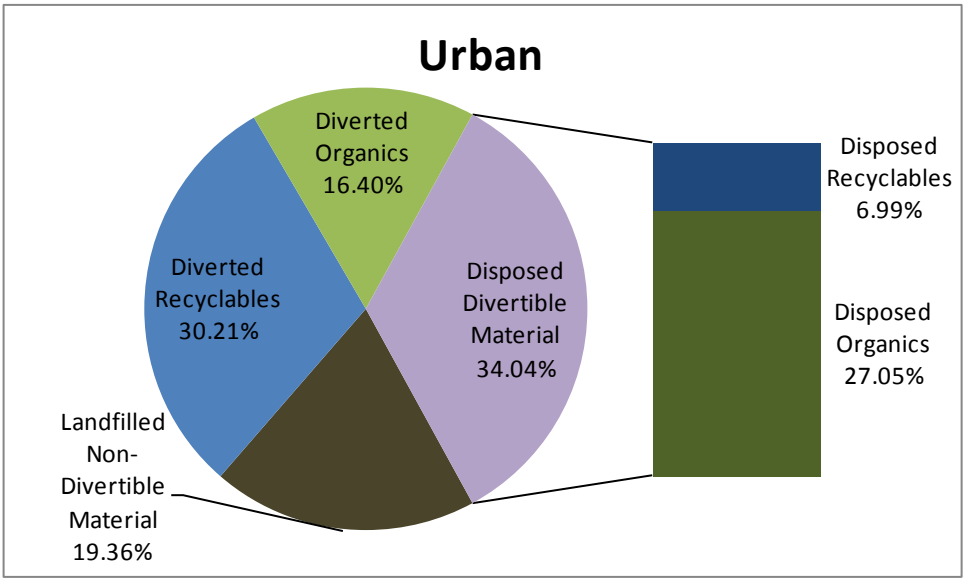


Figure 3.46 Overall Waste Composition of Urban Low-Density Residential Dwellings

Table 3.11 provides an overview of the key performance measures for rural vs. urban low-density residential dwellings in the Niagara region. The overall diversion and capture rates are slightly higher for urban areas. These increases are stronger for the diversion of recyclable materials.

Table 3.11 Performance Measures for Rural vs. Urban Low-Density Residential Dwellings

Performance Measures	Rural	Urban
Diversion Rate	39.94%	46.61%
Capture Rate for Recyclables	73.34%	81.21%
Capture Rate for Organics	37.48%	37.74%

3.16 Resource Productivity and Recovery Authority (RPRA, formerly WDO) Datacall's Best Practice Performance Metric

Resource Productivity and Recovery Authority (RPRA, formerly WDO) datacall requires municipalities to report on the tonnage of recyclable materials that are received and processed by the Blue Box and Grey Box recycling program. A calculation is used by taking the Region's Marketed Tonnes, converted into kilograms, divided by the total number of households. A markup is applied to calculate the projected kg/hh recovered of recyclable material. Based on the waste composition results, the Niagara Region projected kg/hh recovered is 181.83 for low-density residential dwellings, as displayed in Table 3.12. This excludes any sources from high density residential and drop off depots. It must be noted that the total marketed tonnes does not include contamination in the recycling streams. Audit results for low-density residential

dwellings are very precise. Auditor's empty, separate and scrape contents into their specific material categories during the audit process. Auditing ensures that no contamination (i.e. water from a bottle, food from a jar) is included into the recyclable Blue and Grey Box materials.

The Recycling Centre's equipment is not capable of separating contamination to the same degree as the detailed waste auditor's, therefore some of the contamination will end up as part of the marketed tonnage reported by the Region.

Table 3.12 Projected kg/hh Recovered

	2015 Actual from Single Family Waste Composition Results	2016 Projection for Single Family Households
Marketed Tonnes	29,615.59	30,015.40
Households	163,930	165,078
kg/HH Recovered	180.66	181.83

4.0 TRENDS & ANALYSIS

The following sections provide a high level overview of trends observed in Niagara region over time, based on previous audit results. A more detailed discussion of the trends can be found in a supplementary Technical Memo accompanying this report.

4.1 Diversion Performance Changes from 2010/2011 to 2015/2016

Niagara Region's residential waste collection services changed on February 28, 2011. This took place in the middle of the 2010/2011 audits. That particular audit was able to experience the immediate changes after the implementation of the collection service changes. The 2015/2016 audits allow the Region to assess the overall waste profile after the service changes have been in place for a period of five years. Residents have become accustomed to the weekly collection of all waste streams and the 1 bag/container garbage limit. An overview of the service changes is outlined below.

Before Service Change:

- Alternating weekly collection of Blue Box & Grey Box streams (10 of 12 municipalities). Wainfleet and West Lincoln received bi-weekly Blue and Grey Box collection.
- Weekly collection of organics (food & yard waste) streams (10 of 12 municipalities). No Green Bin organics program in Wainfleet or West Lincoln.
- Weekly garbage collection in all 12 municipalities (2 item limit/week). Additional items required tag.

After Service Change:

- Weekly Blue & Grey Box collection all 12 municipalities

- Weekly organics (food & yard waste) collection all 12 municipalities
- Weekly garbage collection in all 12 municipalities (1 item limit/week). Additional items require tag. Farms are able to gain exemption from the 1 item limit/week if they register with the Region. In this case, these addresses are permitted a 4 item limit/week.

Figure 4.1 below illustrates the average curbside diversion rates before vs. after service changes (by primary material category and overall for the Region). The diversion rate refers to the proportion of all waste that was diverted from the garbage stream into the recycling or organics. It should be noted that contamination found in the recycling and organics streams is not counted as diverted material. In addition, the diversion rates for the pre-level of service changes are based off of two seasons of results (Fall 2010 and Winter 2011) where the 5 year post level of service changes are based off of four seasons of results during 2015/2016.

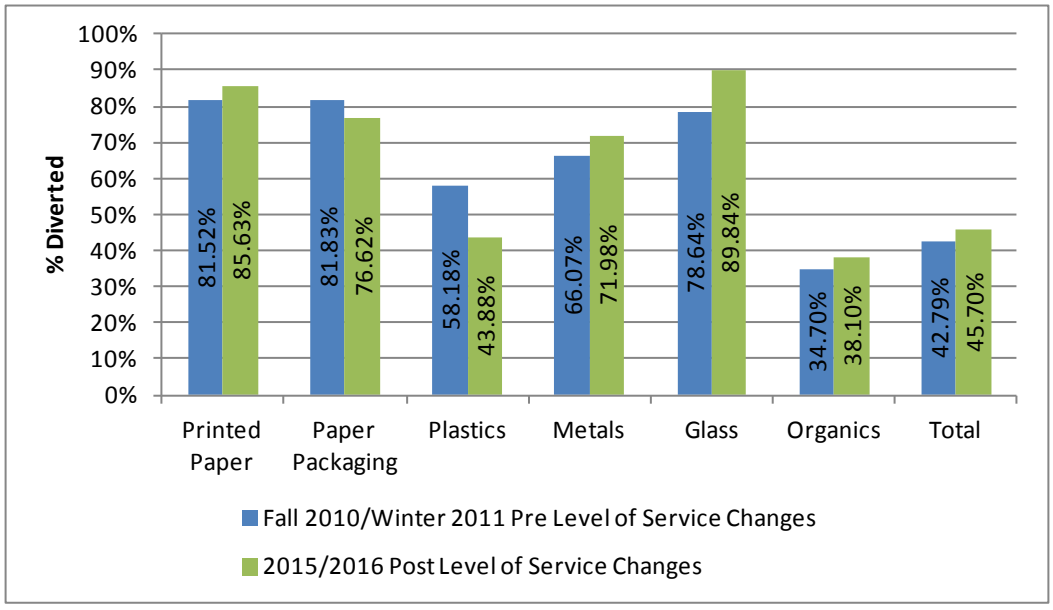


Figure 4.1 Diversion Performance Before LOS Changes vs. 5 Years After February 28, 2011 Service Changes

An overall increase in diversion rates for printed paper, metals, glass and organics was seen, while a decrease in diversion rates for paper packaging and plastics occurred. The overall diversion rate increased from 42.79% to 45.70% after the service level changes have been implemented. It must be noted that the overall generation of all waste streams has decreased since the 2010/2011 audits.

Table 4.1 provides an overview of the key performance measures calculated for the 2010/2011 audits and the 2015/2016 audits. The overall waste (garbage, recycling and organics) generated by low-density residential dwellings in Niagara region has decreased from 13.49 kg/hh/wk to 11.91 kg/hh/wk. This decrease took place across all waste streams. This trend demonstrates the

overall decrease in consumption and disposal of materials (by weight). The amount of divertible materials in the garbage stream has decreased. Due to the decrease in waste generation, the overall diversion rate has decreased slightly from 47.48% in 2010-11 to 45.70% in 2015-16. More importantly, capture rates have remained fairly constant but shown a slight decrease.

Participation rates have increased, however they have been calculated differently for the 2015-16 audits therefore caution should be used when comparing participation rates. The total number of items set out per household per week has increased for recycling and slightly decreased for organics and garbage. Residents across the region are able to set out their recycling each week where the collection services were bi-weekly prior to the level of service changes. Weekly collection of recyclables encourages households to utilize the recycling and organics program services and reduce the amount of garbage being disposed.

The overall full container equivalent has increased for recycling; however the generation weight has decreased. This indicates that the materials being placed in the recycling stream are taking up more volume and weighing less. A prime example of this would be the increase in plastic packaging items such as #1 PET thermoform packaging. This material type is very lightweight and is used to package a variety of product types.

Table 4.1 Performance Measures Comparison Chart for 2010/2011 vs. 2015/2016

Performance Measures	2010-11 Niagara Audits (4 Season Average)	2015-16 Niagara Audits (4 Season Average)	% Change 2010-11 vs. 2015-16 Audits
Overall Waste Generation (kg/hh/wk):	13.49	11.91	-11.73%
Garbage Generation (kg/hh/wk)	6.57	6.14	-6.54%
Recycling Generation (kg/hh/wk)	4.47	3.76	-15.80%
Organics (kg/hh/wk)	2.45	2.00	-18.25%
Divertible Material in the Garbage Stream:			
Recyclable Material in the Garbage Stream (kg/hh/wk):	0.91	0.86	-6.04%
Organic Material in the Garbage Stream (kg/hh/wk):	3.33	3.06	-8.17%
Contamination Rates (%):			
Recycling Stream	10.57%	7.69%	-27.23%
Organics Stream	1.63%	0.84%	-48.39%
Capture Rate of Divertible Materials:			
Recycling Stream	81.22%	80.18%	-1.28%
Organics Stream	41.02%	38.25%	-6.75%
Diversion Rate:	47.48%	45.70%	-3.74%
Participation Rates[1]:			
Recycling Stream	72.76%	82.15%	12.90%
Organics Stream	41.73%	47.58%	14.01%
Garbage Stream	75.89%	87.47%	15.25%
Set-Out Rate (# items/hh/wk):			
Recycling Stream	1.30	1.45	11.48%
Organics Stream	0.46	0.42	-9.36%
Garbage Stream	0.98	0.86	-11.79%
Set-Out Rate (# full container equiv./set-out):			
Recycling Stream	1.67	1.82	9.08%
Organics Stream	0.59	0.51	-13.13%
Garbage Stream	1.07	0.99	-7.24%

A full breakdown of capture rates by individual material category can be found in Appendix C. Direct comparisons could not be made to specific material types as the material categories have changed between the two audits.

4.1.1 Set-out Rates

Table 4.2 compares the average set-out results for the before vs. after February 28, 2011 service changes and the 4-season 2015/2016 study. It must be noted that participation rates were not included as a comparison as they were calculated differently for both studies.

Table 4.2 Comparison of Set-out Rates for Pre-Level of Service Changes, Post Level of Service Changes and 2015/2016 Audits

Season	Combined Recycling		Blue Box		Grey Box		Organics		Garbage	
	Avg.# items/hh/wk	Avg. # full container equiv./hh/wk	Avg.# items/hh/wk	Avg. # full container equiv./hh/wk	Avg.# items/hh/wk	Avg. # full container equiv./hh/wk	Avg.# items/hh/wk	Avg. # full container equiv./hh/wk	Avg.# items/hh/wk	Avg. # full container equiv./hh/wk
Fall 2010/Winter 2011	1.02	1.01	1.02	0.99	0.94	0.96	0.42	0.20	1.07	0.87
Spring/Summer 2011	1.57	1.41	0.83	0.75	0.73	0.65	0.50	0.29	0.89	0.74
4-Season 2010/2011	1.30	1.22	0.89	0.84	0.80	0.75	0.46	0.25	0.98	0.81
4-Season 2015/2016	1.45	1.26	0.73	0.65	0.71	0.60	0.42	0.21	0.86	0.75

(Note that Recycling eligibility was bi-weekly for Wainfleet and weekly alternating streams for other municipalities in Fall 2010/Winter 2011, and weekly in all other seasons).

The average number of recycling items (both Grey and Blue Box) set out per household per week increased from 1.02 to 1.57 in 2010/2011 and decreased slightly in 2015/2016 to 1.45. This equalled an overall increase in recycling set outs from 1.30 items/hh/wk in 2010/2011 to 1.45 items/hh/wk in 2015/2016. The average number of full container equivalents set out per household per week showed similar trends by increasing from 1.01 to 1.41 and back down to 1.26. An immediate increase in the performance measures took place after the service changes were implemented. However, after the first 5 years with the new service changes in place, the numbers have decreased slightly. The weekly collection of all materials changes the way people set out their material. It was noted that during the audit, a couple of residents stated that they only set out their material every other week. This commonly took place in rural areas, where the households were a farther distance from the curbside. This was also demonstrated by households that have elderly residents; this could be a result of a lower waste generation from less residents living in the household and the effort needed to carry four waste bins to the curbside.

The average number of garbage stream items set out per household per week dropped from 1.07 to 0.89 to 0.86, while the average full container equivalent set out per household per week also dropped from 0.87 to 0.74 and then remained constant at 0.75. It should be noted that set-out averages are calculated across all households (not just those that had material set out). In addition, some households (farms max. 4 bags/containers, duplexes max. 2 bags/containers and triplexes max. 3 bags/containers) are permitted to set additional garbage per week. A total of 12 registered farms were included in the study. The farms were located in Wainfleet and West Lincoln. In many cases, these households set out less than the maximum 4 bag/container limit.

4.2 Trends

Several waste composition audit studies have been conducted in the Niagara region in the past. This section compares the most recent audits (Summer 2015, Fall 2015, Winter 2016, Spring 2016) to the previously conducted audits to identify trends in program performance over time. The previously conducted audits were as follows:

Audit Date(s)	Auditor(s)	Households Audited
Fall 2004 & Summer 2005	Jacques Whitford	St. Catharines: 50 hhlds Port Colborne: 50 hhlds Welland: 40 hhlds
Spring, Summer, Fall 2006 & Winter 2007	Stewardship Ontario	Niagara Falls: 30 hhlds St. Catharines: 30 hhlds Niagara-On-The-Lake: 10 hhlds Thorold: 10 hhlds Welland: 20 hhlds
Fall 2007	DFA Infrastructure	West Lincoln: 50 hhlds Wainfleet: 60 hhlds
Fall 2010, Winter, Spring & Summer 2011	AET Group Inc.	Niagara Falls: 30 hhlds St. Catharines: 30 hhlds Niagara-On-The-Lake: 10 hhlds Thorold: 10 hhlds Welland: 20 hhlds West Lincoln: 10 hhlds Wainfleet: 10 hhlds Thorold: 10 hhlds Lincoln: 10 hhlds Grimsby: 10 hhlds Port Colborne: 10 hhlds Fort Erie: 10 hhlds
Summer 2015, Fall, Winter 2016 & Spring	AET Group Inc.	Niagara Falls: 30 hhlds St. Catharines: 30 hhlds Niagara-On-The-Lake: 10 hhlds Thorold: 10 hhlds Welland: 20 hhlds West Lincoln: 10 hhlds Wainfleet: 10 hhlds Thorold: 10 hhlds Lincoln: 10 hhlds Grimsby: 10 hhlds Port Colborne: 10 hhlds Fort Erie: 10 hhlds

As seen in the table above, the number of households and sample areas audited are not consistent over the previous studies. The most recent 2015/2016 series of audits provides the most comprehensive selection of households from across the region, mirroring the households audited in the 2010/2011 audits. Caution should be exercised when comparing results to the Fall 2007 audit results, as the selected households for that audit were limited to Wainfleet and West Lincoln (no organics program in mostly rural areas). Analysis of the results revealed that the Fall 2007 audit was consistently an outlier relative to the other audits; therefore, it will be

presented in the comparative tables below, but not graphically plotted on the charts. It should be noted that previously reported data[1] (with the exception of the 2010/2011 audit data) is unaudited by AET Consultants and assumed to be accurate as presented.

4.2.1 Overall Waste Generation Trends

Table 4.3 and Figure 4.2 summarize the total curbside waste generation trend over time in kilograms/household/year. This represents the combined weight of garbage, recycling and organics stream material set at the curb by low density residential households.

Table 4.3 Comparison of Total Waste Generation Rate Over Time

Audit Period	Quantities Generated in Each Stream			
	Garbage	Recycling	Organics	Total
	kg/hh/yr	kg/hh/yr	kg/hh/yr	kg/hh/yr
Fall 2004	439.6	206.1	45.1	690.8
Summer 2005	385.1	201.4	68.7	655.2
Spring 2006	399.0	216.7	75.9	691.6
Summer 2006	413.2	212.4	83.7	709.2
Fall 2006	336.6	184.5	63.5	584.6
Fall 2007	706.3	194.7	N/A*	900.9
Winter 2007	344.2	161.4	36.2	541.8
Fall 2010	391.2	202.0	112.3	705.5
Winter 2011	361.9	221.0	96.7	679.6
Spring 2011	315.0	233.9	152.9	701.8
Summer 2011	320.9	229.2	140.6	690.6
Summer 2015	339.4	206.1	98.2	643.8
Fall 2015	316.5	168.2	99.1	583.8
Winter 2016	291.8	179.4	86.8	558.0
Spring 2016	335.2	202.6	119.9	657.7

*Audits completed in the Fall of 2007 had no organics collection available in study area. Study area included low-density residential dwellings in West Lincoln and Wainfleet.

[1] Previously reported data obtained from: *Niagara Region Waste Audit Summary Report – Final Report*, DFA Infrastructure International Inc., November 20, 2008.

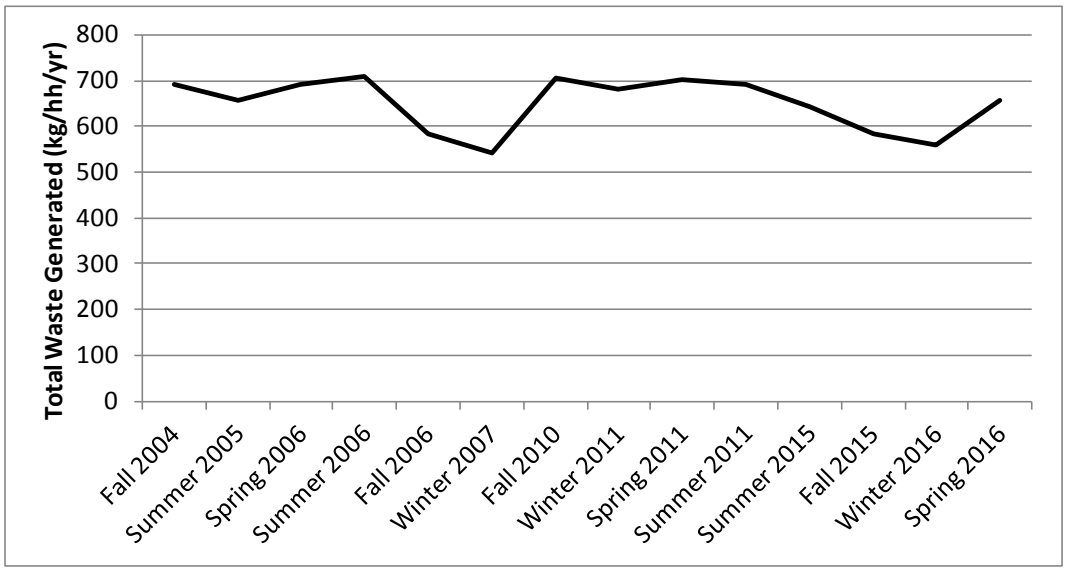


Figure 4.2 Total Waste Generation Rate Over Time

The total waste generation for 2015/2016 has shown a decrease from the audits conducted in 2010/2011. The overall trend of waste generation has decreased from the 2010/2011 audits to the 2015/2016 audits. The fluctuations have gone from a high of 702 kg/hh/yr in the Spring of 2011 to a low of 558 kg/hh/yr in the Winter of 2016. This equates to an overall decrease of 20.5%. The sections below will detail the variances in the composition and distribution of waste across the streams over time.

4.2.2 Garbage Stream Trends

Table 4.4 and Figure 4.3 summarize the total curbside garbage generation trend over time in kilograms/household/year. This represents only the weight of garbage stream material set at the curb by low-density residential dwellings.

Table 4.4 Comparison of Garbage Stream Generation Rate Over Time

Waste Disposed Over Time (Fall 2004 - Spring 2016)	
Waste Audit	**Garbage Disposed (kg/hh/yr)**
Fall 2004	439.57
Summer 2005	385.13
Spring 2006	398.95
Summer 2006	413.18
Fall 2006	336.63
Winter 2007	344.16
Fall 2007	706.26
Fall 2010	407.98
Winter 2011	374.08
Spring 2011	315.02
Summer 2011	320.86
Summer 2015	339.45
Fall 2015	316.52
Winter 2016	291.76
Spring 2016	335.22
Average	**381.65**

In general, the amount of material being generated in the garbage stream appears to experiencing a subtle decline over time. Excluding the Fall 2007 waste audit where only rural households were included and the Green Bin program was not in place yet, the highest garbage stream generation was noticed back in the Fall 2004 audit, at a total of 439.6 kg/hh/yr. The lowest amount of material generated in the garbage stream was noticed during the Winter season of the most recent waste audit in 2016. The Winter 2016 waste audit showed the lowest garbage stream generation, at 291.76 kg/hh/yr. The reason for the decline in garbage stream generation could be due to a number of factors. Residents may have adjusted their habits to participate more in the recycling and organics programs since the garbage set-out limit was decreased in 2011. Packaging trends may have decreased in weight as an overall trend.

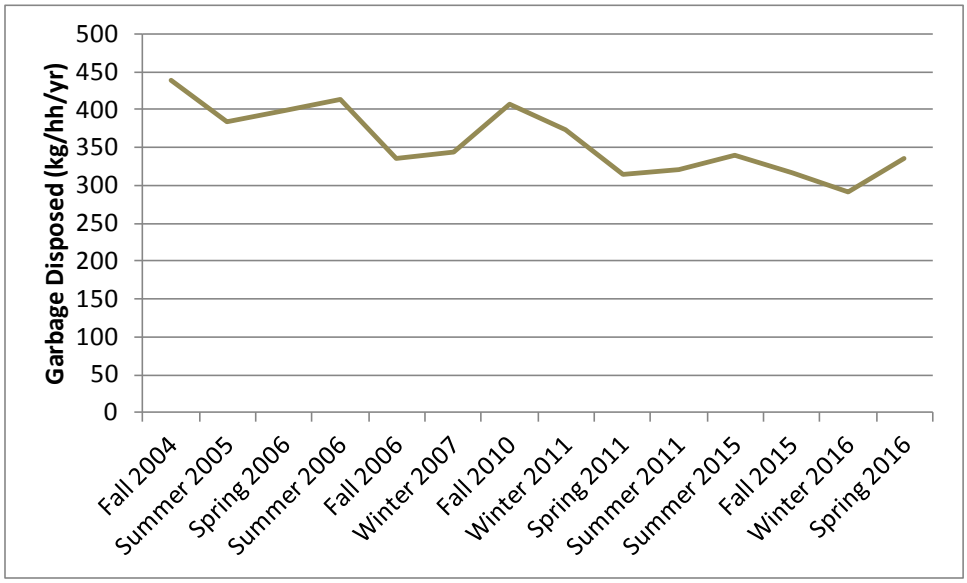


Figure 4.3 Garbage Stream Generation Rate Over Time

4.2.3 Recycling Stream Trends

Table 4.5 and Figure 4.4 summarize the total curbside recycling generation trend over time in kilograms/household/year. This represents the combined weight of recyclable material set out at the curb by low-density residential dwellings in the Grey Box and Blue Box streams.

Table 4.5 Comparison of Recycling Stream Generation Rates Over Time

Audit Period	Total Quantity of Recyclables Set Out (kg/hh/yr)
Fall 2004	206.1
Summer 2005	201.4
Spring 2006	216.7
Summer 2006	212.4
Fall 2006	184.5
Winter 2007	161.4
Fall 2007	194.7
Fall 2010	195.6
Winter 2011	218.2
Spring 2011	233.9
Summer 2011	229.2
Summer 2015	206.1
Fall 2015	168.2
Winter 2016	179.4
Spring 2016	202.6
Average	**200.7**

As shown in Table 4.4, the total amount of recyclables being set out experienced an increase in 2010/2011, however it has shown a decrease in the 2015/2016 audits. The lowest amount of recyclable material being set out in the region was noticed during the Winter 2007 waste audit at 161.4 kg/hh/yr. The Fall 2015 waste audit showed a low generation of 168.2 kg/hh/yr. The highest amounts were noticed after the Region made changes to their curbside collection services at the end of February 2011.

After the spike in recycling generation rates in the Spring and Summer of 2011, the rates declined. The 2015/2016 audits experienced a lower recycling generation rate in the Fall and Winter seasons and a high generation rate in the Spring and Summer seasons. The Spring and Summer seasons cause the consumption of materials, such as refreshments to spike due to the warmer weather. In addition, children are not in school during the Summer, therefore they are consuming and disposing of more goods in their dwellings. In addition, auditors note more cleanouts and purging events taking place in the Spring. As displayed in Figure 4.6, the overall ratio of Blue Box to Grey Box material has changed.

Looking at the total weight of all recycling, the percentage of Blue Box materials have increased over the years. Packaging trends have shown a transition from higher weighted fibre based materials to light-weight plastics. Blue Box materials are accounting for a greater percentage of the recycling stream. This material is much lighter than Grey Box material and would explain the overall reduction in generation.

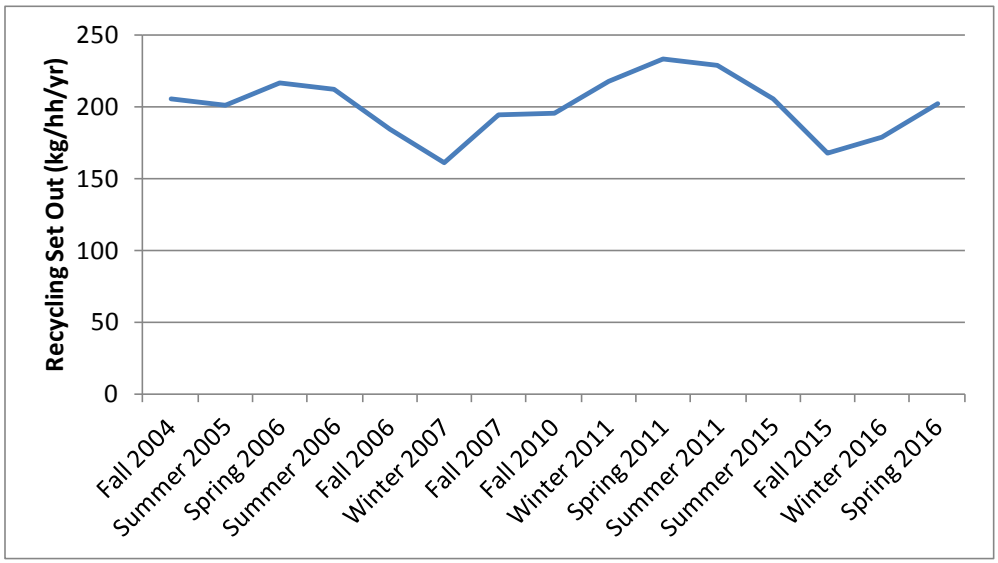


Figure 4.4 Recycling Stream Generation Rate Over Time

Looking closer at the composition of the recycling stream over time; Table 4.6 and Figure 4.5 show the percent of fibres, containers and other materials (contamination from organic material and non-recyclable material), over the period of the Fall 2004 waste audit to the most recent Spring 2016 waste audit. It must be noted that the fibres and containers composition from previous studies (Fall 2004 to Winter 2007) included recyclable and non-recyclable material. For example, the percent of fibres from previous studies would have included recyclable Grey Box material but also non-recyclable paper such as tissue and laminated paper packaging. The AET audits however, (Fall 2010 to Spring 2016) will show only the percent of recyclable fibres and recyclable containers accepted in Niagara's program, with the "other" column representing all non-recyclable material. This will explain why the percent of other materials in Table 4.5 increase significantly after the Winter 2007 audit. Keeping in mind that there were differences in the way composition was calculated across all the waste audits, the proportion the recycling stream comprised of fibres has shown a gradual decrease over the years.

The overall proportion of Grey Box material is decreasing. In contrast, the proportion of Blue Box material has shown a gradual increase over the years. This can be attributable to the increase is plastic packaging production. The overall contamination rates (shown under the 'Other') column have decreased from the 2010/2011 audits. This is a very positive change because it means that households are not purposely placing garbage in the recycling streams to meet the post-LOS garbage limits.

Trends in Blue Box composition are following the same trends mentioned in the 2010/2011 waste composition report. This includes the reduction in packaging weight. The changes in packaging can be attributable to the increase in lighter weight plastic based packaging products.

There is an increased presence of ready-made meals that reduce the amount of food waste (food scraps) being generated and are sold in lightweight packaging (i.e. #1 PET trays/clamshells).

The grocery industry has been continuing the transition to more use of this type of packaging over time. In the earlier audit periods, PET packaging encountered in the Blue Box would have been limited primarily to items such as some egg cartons and berry boxes. Recent audits find this packaging used for many other products, including ready-made salads, peach baskets, baked goods, drink cups, fruit trays, etc. Thermoform packaging is relatively light, therefore may not show up as a significant component by weight of the recycling stream, however, they are high volume items, which take up more space in the Blue Boxes.

Table 4.6 Recycling Stream Composition Over Time

Audit Period	Grey Box		Blue Box		Other	
	kg/hh/yr	% of Total	kg/hh/yr	% of Total	kg/hh/yr	% of Total
Fall 2004	143.5	69.6%	52.8	25.6%	9.8	4.8%
Summer 2005	142.9	70.9%	57.7	28.6%	0.8	0.4%
Spring 2006	158.0	72.9%	57.4	26.5%	1.3	0.6%
Summer 2006	125.2	58.9%	84.4	39.8%	2.7	1.3%
Fall 2006	111.5	60.5%	71.9	39.0%	1.0	0.5%
Fall 2007	138.9	71.4%	54.2	27.8%	1.6	0.8%
Winter 2007	93.5	57.9%	64.7	40.1%	3.2	2.0%
Fall 2010	138.6	68.6%	45.9	22.7%	17.6	8.7%
Winter 2011	140.7	63.7%	55.6	25.2%	24.6	11.1%
Spring 2011	140.2	59.9%	66.8	28.5%	27.0	11.5%
Summer 2011	138.7	60.5%	69.9	30.5%	20.5	9.0%
Summer 2015	115.9	56.4%	70.1	34.1%	19.6	9.5%
Fall 2015	94.7	56.4%	61.0	36.3%	12.1	7.2%
Winter 2016	100.2	56.0%	63.9	35.7%	14.9	8.3%
Spring 2016	121.0	59.9%	66.0	32.7%	15.1	7.5%
Average	**126.9**	**63.1%**	**62.8**	**31.2%**	**11.4**	**5.7%**

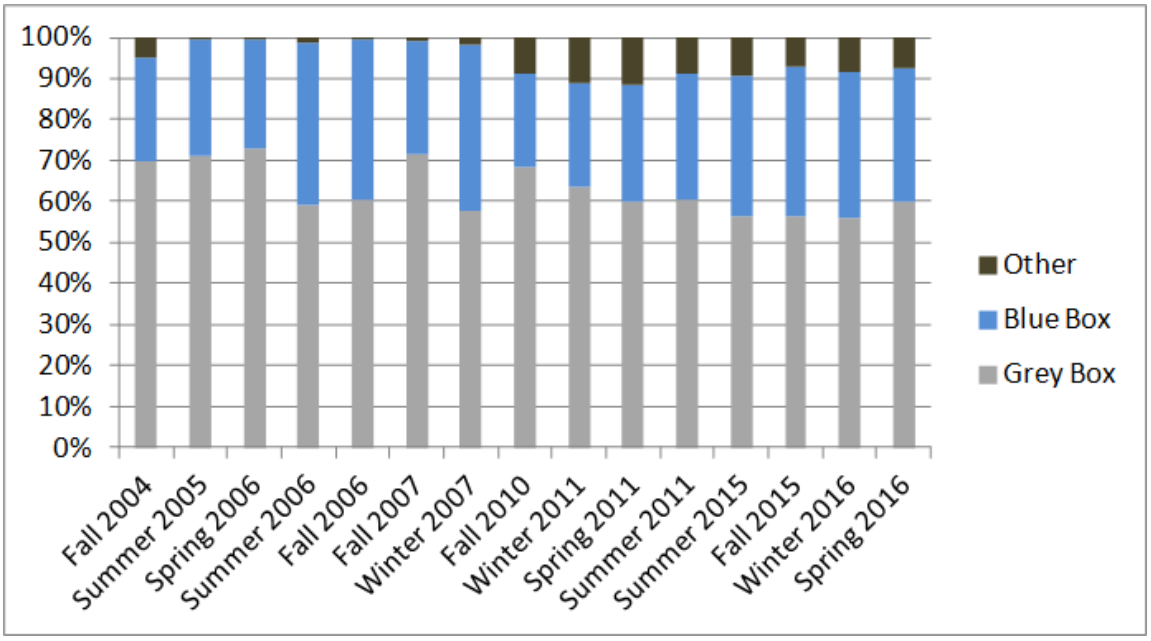


Figure 4.5 Recycling Stream Composition Over Time

4.2.4 Organics Stream Trends

Table 4.7 and Figure 4.6 summarize the total curbside organic material generation trend over time in kilograms/household/year. This represents only material placed in the Green Bin and set out at the curb by low-density residential dwellings. Note that this includes any yard waste placed inside the Green Bins, but not yard waste set out separately at the curb (e.g. bags of leaves, brush).

Table 4.7 Comparison of Organics Stream Generation Rate Over Time

Audit Period	Total Quantity of Organics Set Out (kg/hh/yr)
Fall 2004	45.1
Summer 2005	68.7
Spring 2006	75.9
Summer 2006	83.7
Fall 2006	63.5
Winter 2007	36.2
Fall 2010	112.3
Winter 2011	96.7
Spring 2011	152.9
Summer 2011	140.6
Summer 2015	98.2
Fall 2015	99.1
Winter 2016	86.8
Spring 2016	119.9
Average	**91.4**

The amount of material being generated in the organics stream has shown a decrease during the 2015/2016 audits. The overall generation spiked after the level of service changes in February of 2011 when the Green Bin program was rolled out to include weekly collection of organics throughout the region. The lowest quantity of organic material generated took place in the Winter of 2007. The highest amount of Green Bin material was generated immediately after the level of service changes in the Spring of 2011. The overall generation of organics in 2015/2016 showed a season high of 119.9 kg/hh/yr in the Spring and a low of 86.8 kg/hh/yr in the Winter. These seasonal fluctuations are normal trends as some seasons can pose challenges to participation rates (material freezing in bins in the Winter) and some seasons can be boosted by excess amounts of yard waste and fresh produce (Spring and Summer).

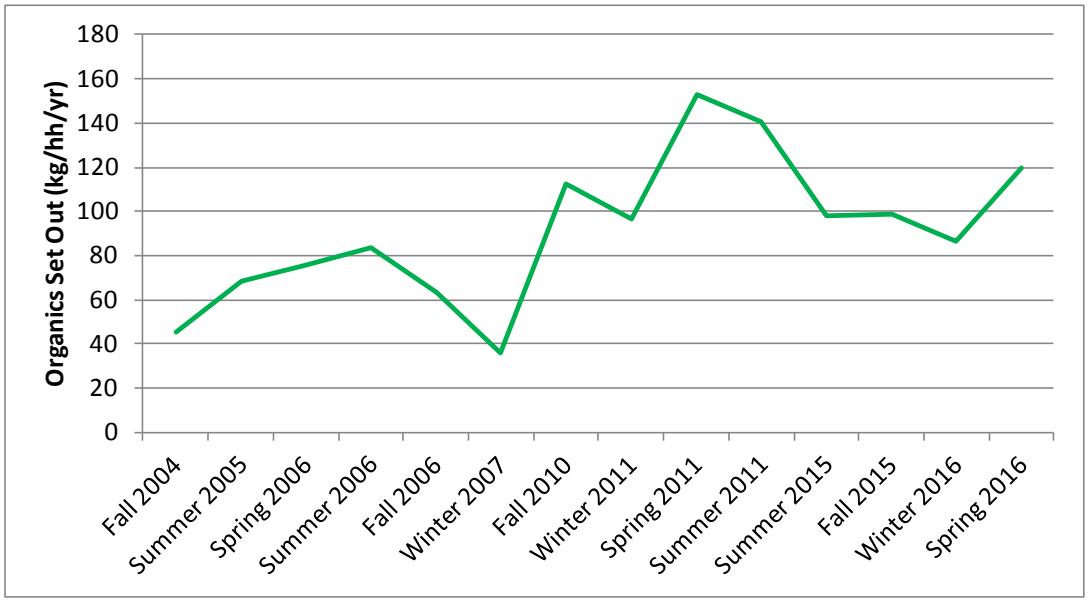


Figure 4.6 Organic Stream Generation Rate Over Time

Looking closer at the composition of the organic stream over time; Table 4.8 and Figure 4.7 show the percent of food waste, yard waste, pet waste and other materials (contamination) over the period of the Fall 2004 waste audit to the most recent Spring 2016 waste audit. Note that the Fall 2007 audit is not included since it focused on rural municipalities where no organics collection occurred.

It is difficult to note any trends over the entire span of the Region's waste audits since it is clear that the level of detail at which the organics stream was audited was not consistent over time. This is clear in Table 4.8 where the contamination from other materials is 0% until the first AET audit in the Fall of 2010. It is unlikely that there was no contamination in the organics stream during past audits, but instead it is more likely an indication of the level of detail at which the organics stream was sorted during these audits. As a result, the following comments regarding trends in the organics stream composition will refer only to the 2010/2011 and 2015/2016 waste audits. It can be said that the trend in contamination of the organics stream from other non-acceptable materials did decline over the course of the 2010/2011 waste audits from 3.6% in the Fall 2010 audit, to 1.0% during the Summer 2011 audit. It experienced a greater decline in 2015/2016.

The effectiveness of a program is not only judged by the capture of materials but the overall contamination in that particular stream. The organics program has minimal contamination. The proportion of pet waste in the organics stream is slightly increasing, demonstrating that households are expanding their Green Bin usage to all types of compostable materials.

Table 4.8 Organics Stream Composition Over Time

Audit Period	Food Waste and Compostable Paper[1]		Yard Waste and Grass Clippings		Pet Waste and Other Acceptable Organics[2]		Other	
	kg/hh/yr	% of Total	kg/hh/yr	% of Total	kg/hh/yr	% of Total	kg/hh/yr	% of Total
Fall 2004	45.1	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Summer 2005	68.7	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Spring 2006	53.8	70.9%	22.1	29.1%	0.0	0.0%	0.0	0.0%
Summer 2006	79.3	94.8%	4.3	5.1%	0.0	0.0%	0.0	0.1%
Fall 2006	54.4	85.6%	9.1	14.4%	0.0	0.0%	0.0	0.0%
Winter 2007	36.2	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Fall 2010	84.6	75.4%	12.27	10.9%	11.34	10.1%	4.05	3.6%
Winter 2011	83.4	86.3%	1.99	2.1%	9.65	10.0%	1.65	1.7%
Spring 2011	96.9	63.3%	36.62	24.0%	18.43	12.1%	0.99	0.6%
Summer 2011	101.2	72.0%	22.77	16.2%	15.28	10.9%	1.35	1.0%
Summer 2015	76.8	78.2%	12.18	12.4%	8.51	8.7%	0.78	0.8%
Fall 2015	78.6	79.3%	8.23	8.3%	11.45	11.6%	0.82	0.8%
Winter 2016	70.7	81.5%	1.94	2.2%	13.18	15.2%	0.95	1.1%
Spring 2016	85.6	71.4%	15.36	12.8%	17.72	14.8%	1.18	1.0%
Average	72.5	79.3%	10.5	11.5%	7.5	8.2%	0.8	0.9%

[1]Includes compostable bags and liners
[2]Includes contributions from fireplace ashes, dryer lint, hair clippings, sawdust and wood shavings

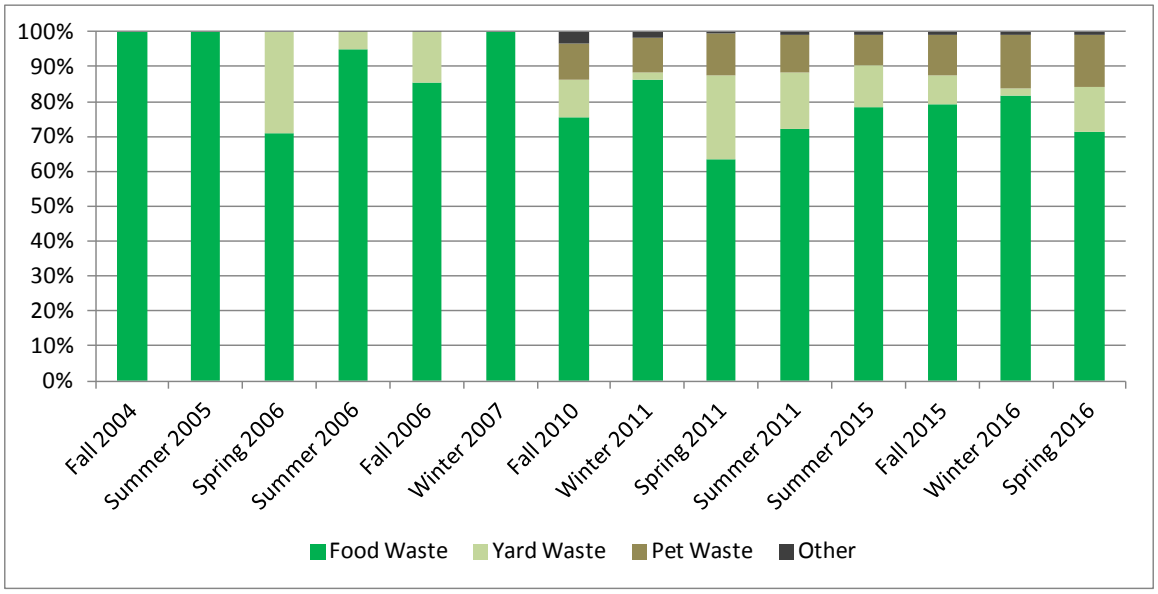


Figure 4.7 Organics Stream Composition Over Time

4.2.5 Capture Rate Trends

The following section summarizes the capture rate trend for the recycling stream and organics stream for the waste audits completed during the period spanning from the Fall 2004 audit to

the Spring 2016 audit. Capture rate calculations from previous audits come directly from previous audit reports. Table 4.9 and Figure 4.8 summarize the capture rate trend over time for the organics and recycling stream. Note that the recyclable capture rate referred to below is a combined recycling stream capture rate that includes Blue Box and Grey Box materials.

Table 4.9 Capture Rate Trend Over Time

Audit	Recyclable Capture Rate (%)	Organics Capture Rate (%)
Fall 2004	72.44%	36.41%
Summer 2005	69.51%	34.17%
Spring 2006	71.07%	29.49%
Summer 2006	69.88%	26.82%
Fall 2006	73.17%	23.75%
Fall 2007	57.29%	N/A[1]
Winter 2007	68.11%	14.38%
Fall 2010	76.87%	37.89%
Winter 2011	76.99%	31.97%
Spring 2011	83.10%	48.92%
Summer 2011	84.06%	44.54%
Summer 2015	79.09%	33.92%
Fall 2015	75.40%	38.65%
Winter 2016	80.61%	36.06%
Spring 2016	79.07%	41.37%
Average	**74.44%**	**34.17%**

[1] Organics collection program not offered in audit study areas

With regards to the recycling stream, the capture rate is shown to be slowly increasing over time. The recyclable capture rate has shown a slight decrease since the level of service changes in February 2011, however the rates remain high. The lowest capture rate was seen in the Fall 2007 audit at 57.29%. Since that time, the capture rate for recyclables accepted in the region has been steadily increasing with a high in the Summer of 2011 of 84.06%. A large increase in the recyclable capture rate also occurred right after the service changes that were implemented in the region at the end of February 2011. Part of the service change being a change from bi-weekly Grey Box and Blue Box collection to weekly Grey and Blue Box collection. It was already noted that the quantity of recyclables being generated increased during this same period, which supports the result that more recyclables were being captured. The most recent audit showed high capture rates but a lower overall generation of recyclables.

Looking at the organics steam, the capture rate is seen to fluctuate a number of times over the period spanning from the Fall 2004 audit to the Summer 2011 audit. After reaching its lowest point of 14.38% during the Winter 2007 audit, the organics capture rate has steadily increased

up to the Summer 2011 audit. A notable increase in organics capture rate can also be seen after the service changes that were implemented at the end of February 2011. However, the capture rates leveled off during the 2015/2016 audits.

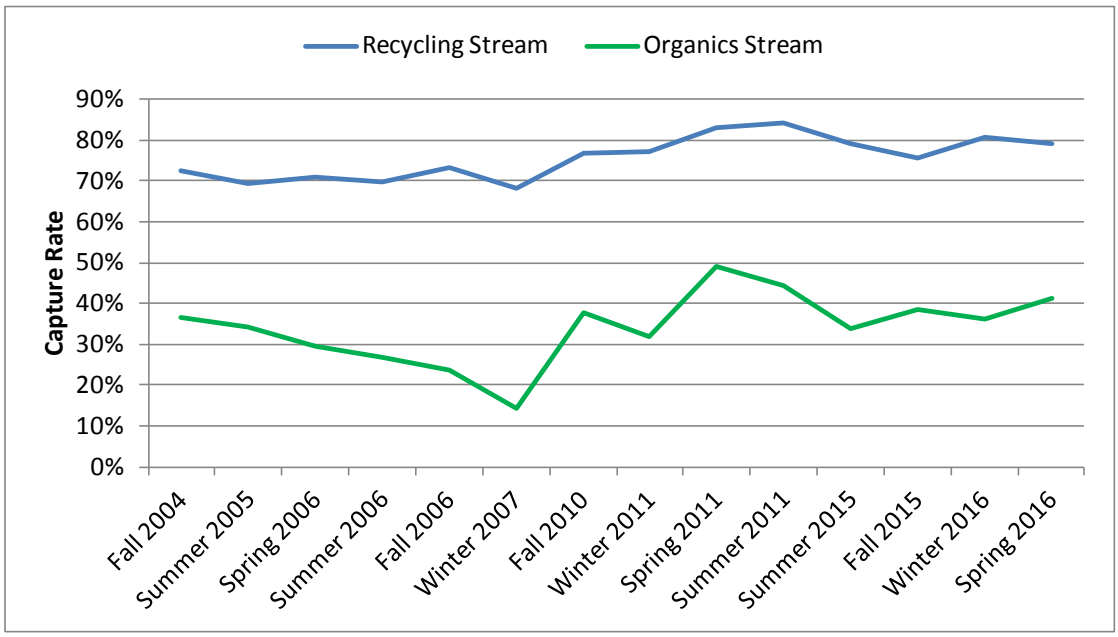


Figure 4.8 Capture Rate Trend Over Time

4.2.6 Curbside Waste Diversion Trends

The diversion rate for the region during each of the previous waste audits was calculated to determine if there were any significant trends to note. For some of the past waste audits conducted in the region it was not possible to calculate diversion rates due to a lack of access to the raw data. This is the main reason why diversion rates for the Fall 2004 and Summer 2005 audits are not reported on. In addition, the diversion rate for the Fall 2007 audit was not included in the trend analysis due to the fact that the audit focused on areas without access to the Green Bin program. Table 4.10 and Figure 4.9 summarize the diversion rates for the remaining waste audits over time.

Table 4.10 Diversion Rate Trend Over Time

Audit Period	Total Generated (kg/hh/yr)	Total Diverted (kg/hh/yr)	Diversion Rate
Spring 2006	662.41	265.36	40.06%
Summer 2006	679.54	278.63	41.00%
Fall 2006	558.83	229.64	41.09%
Winter 2007	510.83	184.03	36.03%
Fall 2010	705.52	291.91	41.38%
Winter 2011	679.55	290.73	42.78%
Spring 2011	701.80	357.70	50.97%
Summer 2011	690.60	347.21	50.28%
Summer 2015	642.01	280.93	43.76%
Fall 2015	582.23	253.61	43.56%
Winter 2016	556.44	249.65	44.87%
Spring 2016	655.90	303.54	46.28%

Note: Raw data was not available to calculate diversion rates for the Fall 2004 and Summer 2005 waste Audits. In addition, the diversion rate for the Fall 2007 audit was omitted since it focused on areas with no Green Bin program in place.

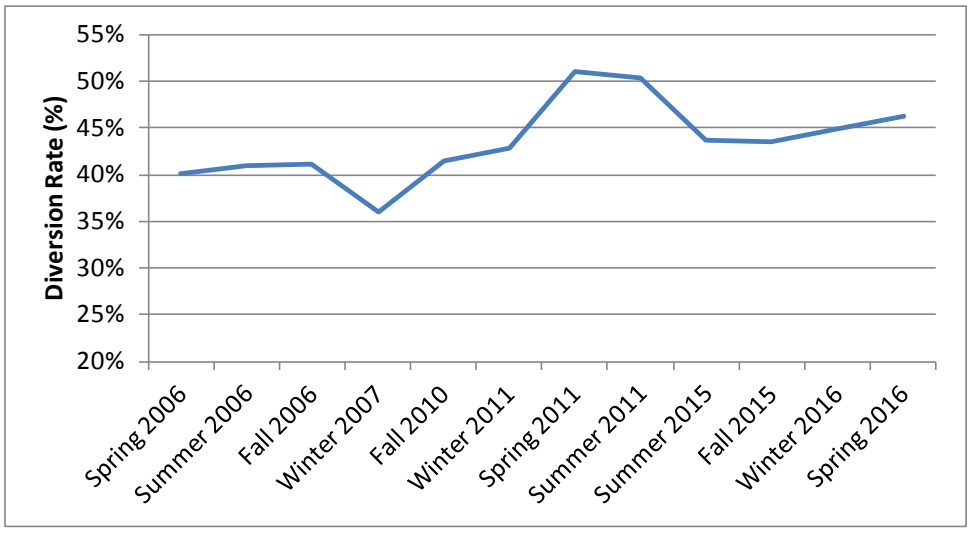


Figure 4.9 Diversion Rate Trend Over Time

Aside from a decrease in the diversion rate during the Winter 2007 audit; the diversion rate remained fairly constant (around 40%) from the Spring 2006 audit to the Winter 2011 audit. Following the Winter 2011 audit, the diversion rate increased significantly from 42.78% in the Winter, to 50.97% in the Spring, an increase of 19.14%. One explanation for the increase would be the services changes the Region implemented at this time that included more areas in the Green Bin collection, as well as Grey and Blue Box collection shifting to a weekly collection. This initial increase levelled off to 44-47% in 2015/2016. Areas that did not have organics collection

prior to the level of service changes may have decided to try using their new Green Bin and ultimately reverted back to their original habits as they were able to meet the new garbage set-out limits. The changing nature of materials has affected the diversion rate over time. There are less printed paper products being generated. Since these products are heavier in nature it boosts the diversion rate. However, the Region still has room to grow with the overall diversion rate.

4.2.7 Overall Participation and Set-out Trends

The following section discusses the trend in participation rates with respect to the garbage, recycling (combined Blue and Grey Box) and organics streams. Also discussed is the trend in set-out behaviour for each of these waste streams. Table 4.11 summarizes the participation rates for all waste streams over the time from the Fall 2004 audit to the Spring 2016 audit.

Table 4.11 Participation Rate Trend Over Time

Audit	Garbage Participation Rate (%)	Recycling Participation Rate (%)	Organics Participation Rate (%)
Fall 2004	81.33%	66.00%	25.33%
Summer 2005	84.33%	70.67%	30.00%
Spring 2006	86.50%	65.50%	24.00%
Summer 2006	80.50%	59.50%	30.00%
Fall 2006	67.50%	57.00%	21.00%
Fall 2007	72.67%	59.33%	N/A[1]
Winter 2007	64.50%	44.00%	16.00%
Fall 2010	73.53%	71.24%	38.00%
Winter 2011	76.26%	71.47%	39.06%
Spring 2011	77.91%	72.15%	44.48%
Summer 2011	75.95%	75.89%	44.94%
Summer 2015[2]	85.54%	82.53%	46.99%
Fall 2015[2]	90.91%	80.00%	46.67%
Winter 2016[2]	86.06%	82.42%	44.85%
Spring 2016[2]	87.35%	83.64%	51.81%
Average	**79.39%**	**69.42%**	**35.94%**

[1] Organics program not available in audit study area

[2] Per Region's request, participation rates were calculated on a two week cycle for the 2015/2016 audits. If a resident set out their material once during the two week period it would be considered 100% participation.

The overall participation rates for garbage, recycling and organics has shown an increase from the 2010/2011 audits. Based on a review of the data from previous year's audits, it appears as though the number of full container equivalents was not always estimated with accuracy to the nearest 1/4, as prescribed by Stewardship Ontario. Audits conducted in 2004/2005 and 2007 estimated the fullness of containers to the nearest tenth of a container. However, the 2010/2011 and 2015/2016 audits did estimate fullness to the nearest 1/4. The result of this difference in methodology is that the estimated fullness in previous year's audits will appear higher than the 2010/2011 audits. The overall focus should be placed on the results from 2010/2011 and 2015/2016 as the same methodology was used when recording set-out data at the curbside.

Figure 4.10 shows the trend in garbage stream participation over time. The participation rates calculated for 2015/2016 were assessed on a two week cycle. They cannot be directly compared to previous participation rates. However, it can be seen that the participation rates for garbage are ranging from 85% to 90%. Residents are utilizing the weekly garbage collection.

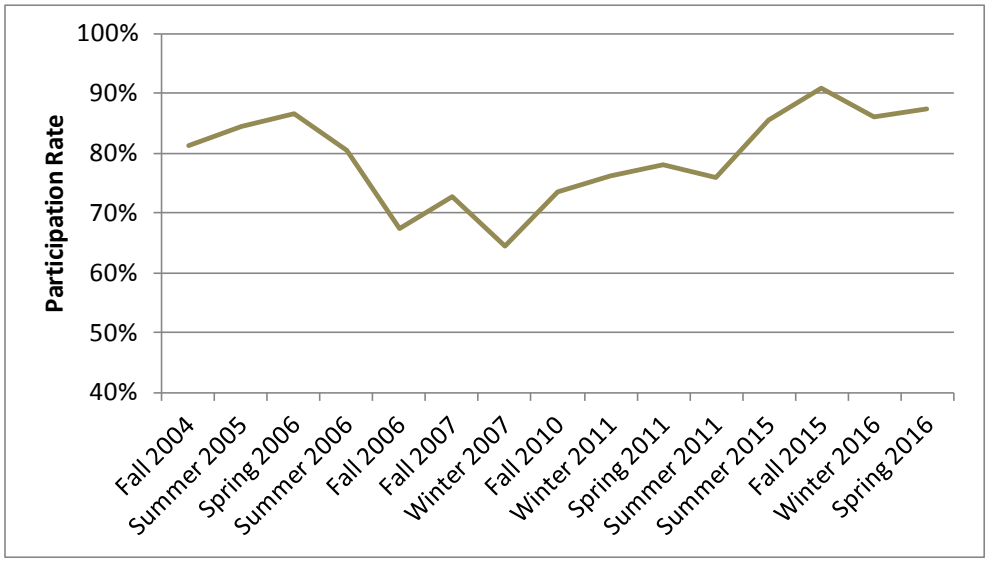


Figure 4.10 Garbage Stream Participation Rate Trend

Table 4.12 and Figure 4.11 summarize the trend in garbage stream set-outs over time. This is summarized in terms of number of items per set-out, per week (average across only households with a set-out), and also in number of full container equivalents per set-out, per week. Both the number of garbage items and number of full garbage container equivalents set out by low-density residential dwellings have decreased over time and is now remaining very constant. This indicates that households in general are setting out fewer garbage items now than in previous years, coinciding with the increases in capture and diversion rates. This is largely caused by the change in garbage set-out limits. Residents are complying with the set-out limits in most cases. Auditors were instructed to reject over the limit garbage set-outs when residents did not

purchase additional garbage tags. It was noted that auditors only had to reject material a couple of times each season in 2015/2016.

Table 4.12 Garbage Stream Set-out Trend Over Time

Audit Period	No. of Containers Per Set-Out Per Week	No. of Equivalent Full Containers Per Set-out Per Week
Fall 2004	1.63	N/A[1]
Summer 2005	1.50	N/A[1]
Spring 2006	1.55	1.77
Summer 2006	1.58	1.78
Fall 2006	1.47	1.47
Fall 2007	1.77	1.30
Winter 2007	1.59	1.59
Fall 2010	1.44	1.15
Winter 2011	1.42	1.18
Spring 2011	1.11	0.96
Summer 2011	1.20	0.97
Summer 2015	1.12	0.97
Fall 2015	1.14	1.00
Winter 2016	1.16	0.99
Spring 2016	1.15	1.00

[1] No. of equivalent full containers data was not collected as part of Fall 2004 & Summer 2005 waste audits.

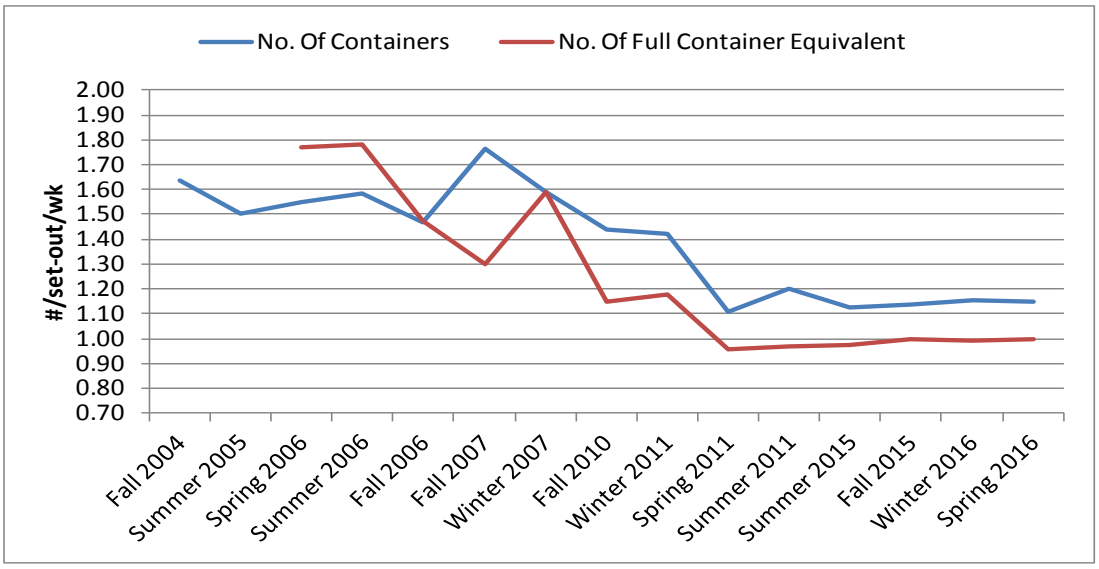


Figure 4.11 Garbage Stream Set-out Trend Over Time

Figure 4.12 shows the trend in recycling stream participation over time. Similar to the garbage stream, the participation rates were calculated on a two week cycle for the 2015/2016 audits. Overall, the participation in the recycling stream is high. The new level of service changes with weekly recycling collection allow residents to participate in the recycling programs more often. It provides more flexibility to divert their recyclable materials. The Region also has a comprehensive social marketing and outreach strategy, which encourages increased participation rates that will increase capture of recyclables. It educates residents on waste management practices, to improve the quality of materials received at the Recycling Centre, reduce the processing residue rate, improve collection and processing efficiencies. It will also decrease operational issues at the Recycling Centre due to contaminating materials.

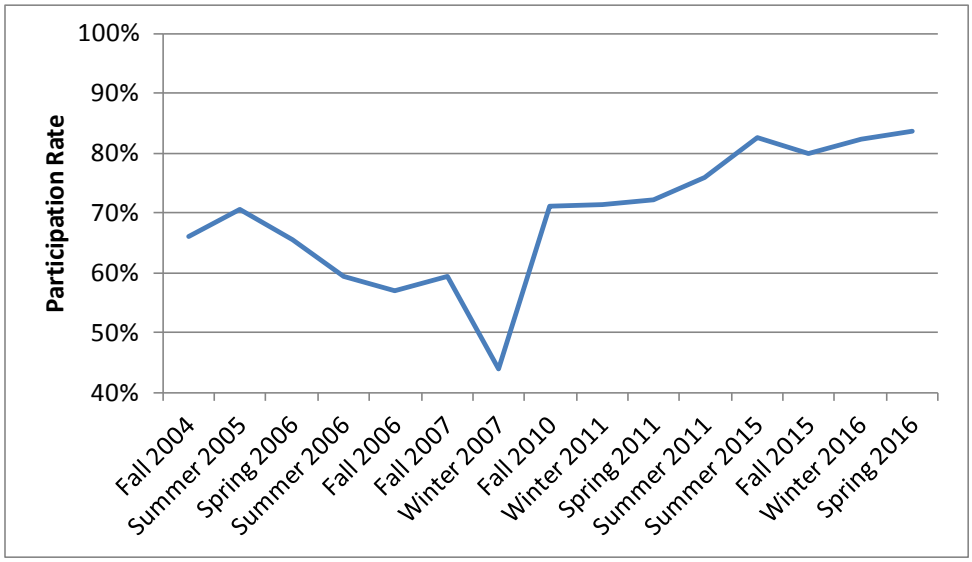


Figure 4.12 Recycling Stream Participation Rate Trend Over Time

Table 4.13 and Figure 4.13 summarize the trend in recycling stream set-outs over time. This is summarized in terms of number of items per set-out, per week; and also in number of full container equivalents per set-out, per week. Both the number of recycling items and number of full recycling container equivalents set out by low-density residential dwellings stayed relatively constant from the period of time between the Fall 2004 audit and the Winter 2011 audit, aside from small seasonal fluctuations. After the service changes that took place in February of 2011, the number of items set out per week exceeded 2. This trend has remained constant with the most recent audits conducted in 2015/2016.

Table 4.13 Recycling Stream Set-out Trend Over Time

Audit Period	No. of Containers Per Set-Out Per Week	No. of Equivalent Full Containers Per Set-out Per Week
Fall 2004	1.33	N/A[1]
Summer 2005	1.23	N/A[1]
Spring 2006	1.37	1.35
Summer 2006	1.47	1.45
Fall 2006	1.47	1.48
Fall 2007	1.57	1.27
Winter 2007	1.54	1.44
Fall 2010	1.36	1.35
Winter 2011	1.49	1.48
Spring 2011	2.07	2.02
Summer 2011	2.15	1.81
Summer 2015	2.17	1.98
Fall 2015	2.03	1.72
Winter 2016	2.05	1.74
Spring 2016	2.15	1.86

[1] No. of equivalent full containers data was not collected as part of Fall 2004 & Summer 2005 waste audits.

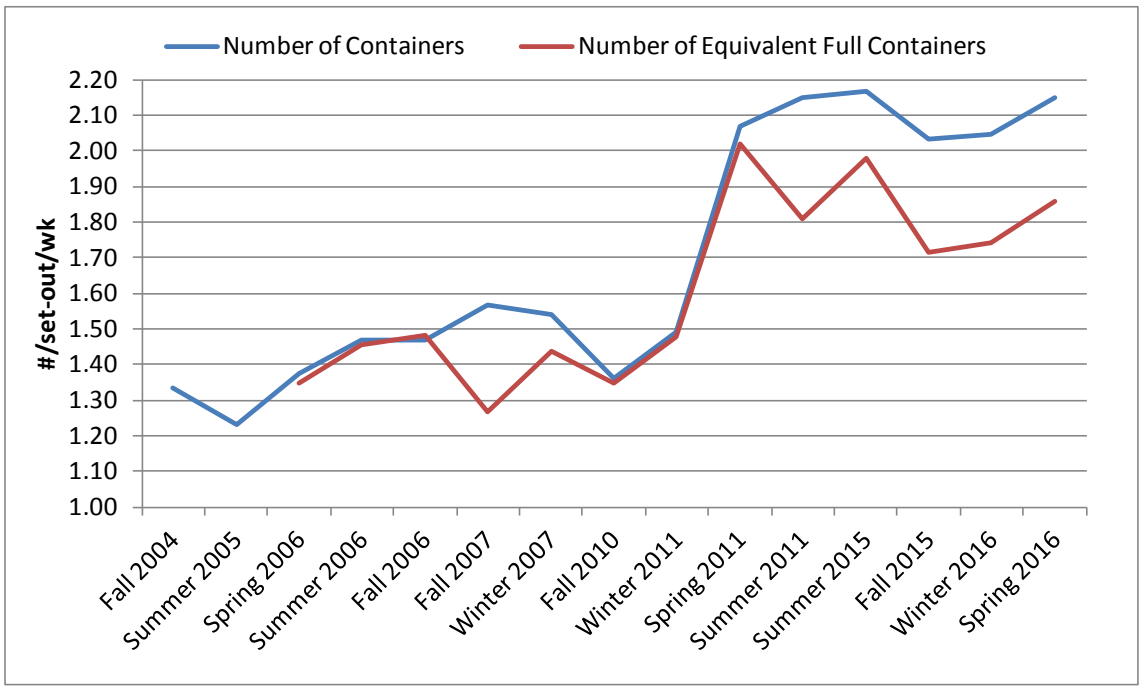


Figure 4.13 Recycling Stream Set-out Trend Over Time

Figure 4.14 shows the trend in organics stream participation over time. The participation rates for 2015/2016 were calculated on a two week cycle. This designates a household as a participant if they set-out a Green Bin on either week of the 2 week study period. The overall trend in Green Bin organics participation is increasing. This does not include leaf & yard waste that is set out separately from the Green Bin for curbside collection.

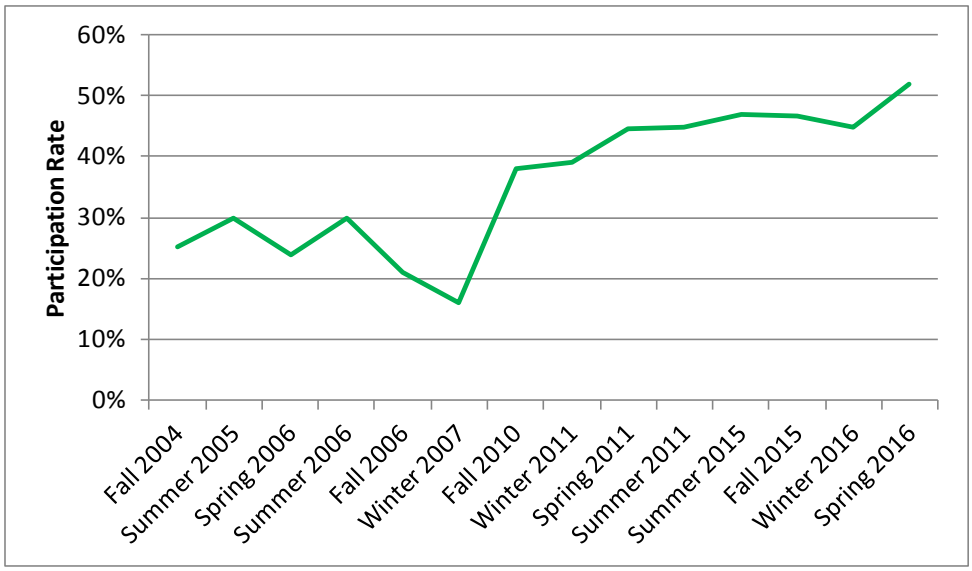


Figure 4.14 Green Bin Organics Stream Participation Rate Trend

Table 4.14 and Figure 4.15 summarize the trend in Green Bin organics stream set-outs over time. This is summarized in terms of number of items set out per household sampled per week, and also in number of full container equivalents (FCE) set out, per household sampled, per week. Both the number of organic stream items and number of full container equivalents set out by low-density residential dwellings stayed relatively constant over the period of time between the Fall 2004 audit and the Summer 2011 audit, with very little fluctuation. A spike in organics container fullness was experienced during the Spring of 2011, however the trend lowered back down to remain constant after that time. Before the Spring 2011 audit, the FCE average for organics was 0.51 containers. The Spring 2011 audit results showed the spike for FCE, at 0.70 containers. For the remaining audits conducted after the Spring 2011 audit, the FCE average was 0.53 containers. This shows a small overall average increase from 0.51 (pre-LOS) to 0.53 (five year post-LOS). On average, participants in the organics program are setting out one Green Bin each week that is half full. This means that there is more space available in the Green Bins for households to divert more organic material, if needed.

Table 4.14 Organics Stream Set-out Trend Over Time

Audit Period	No. of Containers Per Set-Out Per Week	No. of Equivalent Full Containers Per Set-out Per Week
Fall 2004	1.10	N/A[1]
Summer 2005	1.07	N/A[1]
Spring 2006	1.08	0.49
Summer 2006	1.04	0.64
Fall 2006	1.04	0.47
Winter 2007	1.00	0.40
Fall 2010	1.11	0.54
Winter 2011	1.04	0.50
Spring 2011	1.13	0.70
Summer 2011	1.11	0.59
Summer 2015	1.07	0.53
Fall 2015	1.03	0.51
Winter 2016	1.01	0.46
Spring 2016	1.07	0.55

[1] No. of equivalent full containers data was not collected as part of Fall 2004 & Summer 2005 waste audits.

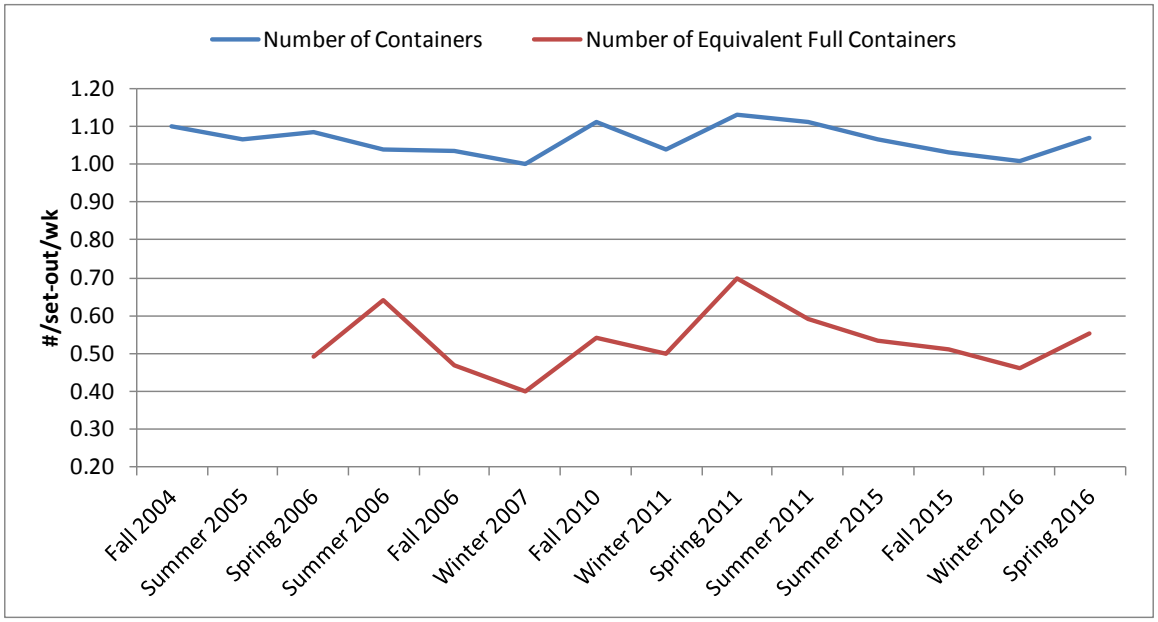


Figure 4.15 Organics Stream Set-out Trend Over Time

4.3 Opportunities

Looking specifically at Niagara Region's most recent audit results, the following summarizes the materials which are currently in the garbage stream and have potential opportunity for improved recovery/capture rates.

Top 5 currently divertible materials in the garbage stream by weight (kilograms/household/yr):

1. Food Waste: 98.33 kg/hh/yr
2. Pet Waste: 33.91 kg/hh/yr
3. Tissue/Towelling: 19.15 kg/hh/yr
4. Flexible Film Plastic – LDPE & HDPE: 7.42 kg/hh/yr
5. Yard Waste: 5.35 kg/hh/yr

By weight, 4 of the top 5 currently divertible materials in the garbage stream are compostable organics. Food waste is by far the largest component here, contributing approximately 98.33 kg/hh/yr to the garbage stream. The largest proportions of food waste included unavoidable food waste and leftover food waste. As noted in the 2010/2011 audit report, there is a lot more contained/packaged food waste found in the garbage. It is less likely for residents to make the extra effort to remove food from its packaging.

When looking at the different participant types, the households who participate in all three diversion programs dispose of the highest percentage of unavoidable food waste, avoidable food waste (leftover other) and avoidable food waste (untouched other) in the garbage. This means that the households that already participate in all three diversion programs have to target these specific food types to capture the maximum potential. This includes items such as food scraps, bones, eggshells, leftover stir fry and pasta dishes, leftover and uneaten sandwiches and burgers, yogurt, sour cream, condiments and liquid (water, pop, juice). This might suggest that people may be less likely to use the Green Bin if it means inconveniencing themselves to empty out food waste from containers/bottles/jars, etc.

Pet waste is the second highest component of divertible waste in the garbage stream. Most pet waste found in the garbage was bagged in non-compostable plastic bags. This is likely a barrier for placing this type of material in the Green Bin. It is recommended that the Region continue to encourage residents to utilize kraft paper bags, newsprint or compostable bags to collect and dispose of their pet waste into the Green Bin.

Tissue/towelling is another common, potentially divertible material in the garbage stream. This material was observed to often originate from bathroom garbage bags, where residents are unlikely to have a separate collection bin for compostable material. The only recyclable material appearing in the top 5 is Flexible Film Plastic (e.g. retail carry-out bags, bread bags, etc.). The quantity of recyclable plastic bags has remained very constant from the 2010/2011 audits. The overall generation of all material has decreased but the amount of flexible plastic

bags in the garbage stream has remained constant. More retailers are charging a fee for retail carry-out bags. Since this change has occurred, the bags have been manufactured to be stronger and therefore slightly heavier. Many of the bags found in the garbage were observed be used for garbage bags (e.g. small bathroom, kitchen garbage can liner or pet waste bag), however, many were also empty or near empty, which could have been captured in the recycling stream.

Top 5 currently divertible materials with the lowest capture rates:

Blue Box

1. Steel Paint Cans 17.75%
2. Aluminum Foil & Foil Trays 26.43%
3. Aluminum Aerosols 35.58%
4. Large HDPE & PP Pails & Lids 41.91%
5. Other Rigid Plastic Packaging 43.19%

Grey Box

1. Flexible Film Plastic – LDPE & HDPE 32.26%
2. Cores 42.89%
3. Other Printed Paper (Obligated) 59.10%
4. Other Printed Paper (Non-Obligated) 59.45%
5. Boxboard 77.48%

Green Bin

1. Non-laminated Paper/Packaging 12.45%
2. Tissue/Towelling 21.51%
3. Pet Waste 27.17%
4. Molded Pulp Packaging 29.08%
5. Food Waste 41.79%

   Lowest capture rates for specific types of food waste include:

   - Avoidable Food Waste (untouched other) – 7.71%
   - Avoidable Food Waste (untouched meat & fish) – 10.36%
   - Avoidable Food Waste (untouched dried food) – 13.99%

The top 5 divertible Blue Box materials with the lowest capture rates are not large contributors to the waste stream, however, should still be targeted for capture. These materials can be targeted through the recycling promotional information pamphlet sent to households throughout the region each year. Other rigid plastic packaging is commonly unmarked plastic containers or packaging. This material can be targeted by encouraging residents to recycle plastic packaging including unmarked plastics, plant pots and trays and pails. This material was not accepted in the Region's Blue Box recycling program in 2010/2011 but it is now accepted to be processed at the Region's Recycling Centre.

The top 5 divertible Grey Box materials with the lowest capture rates include flexible films, which are commonly used to bag waste. However, there is a lot of room for improvement in capturing flexible films as many bags and overwrap are disposed of in the garbage stream. Cores are commonly found in bathroom garbage bags. While this material does not contribute a

significant weight, it is commonly found in many households' garbage. Other printed paper (otherwise known as mixed fine paper) is disposed of in grocery bags, kraft paper take-out bags, shopping bags and loose bills and notes that residents throw out for privacy reasons.

Organic material has the greatest potential for improvement when it comes to the overall capture. The types of non-laminated paper/packaging commonly found includes traditional popcorn bags, paper plates. The paper plates are typically used at parties or gatherings where a lot of materials are thrown into the garbage. Promotional material can be altered to accentuate items such as popcorn bags, paper plates and molded pulp drink trays and egg cartons. Tissue/towelling, pet waste and food waste are the largest contributors to the overall disposed waste in the Niagara region.

4.4 Impacts of LOS Changes and Improvements/Initiatives included in the Region's 2011-2015 Blue Box Recycling Plan

Following the LOS changes that took place on February 28, 2011, the collection frequency for Blue Box and Grey Box recyclables changed to weekly collection of both streams and garbage limits reduced from a 2 bag/container limit to 1 bag/container for residential households in the region. Prior to the LOS changes and following the LOS changes, the Region conducted studies that included focus groups, a public open house and telephone surveys to assess the public views on potential service changes. The collection results indicate that residents in the Niagara region have adjusted to the new waste set-out criteria and are following the new guidelines. Auditors did have to reject over the limit set-outs on the rare occasion but it is not a common practice.

The 2011-2015 Blue Box Recycling Plan outlined diversion targets and how the Region plans to achieve these targets. The Region has improved the collection procedures to expand to organics collection region-wide and a weekly service for all recyclables. The Region aimed to add permanent facilities for reuse centres and Household Hazardous Waste (HHW) drop-off depots. While AET was conducting the audit at the Humberstone Landfill in Welland, the Region was building a permanent household hazardous waste drop-off depot. This is an example of the Region's commitment to achieving diversion targets and ensuring the proper disposal of hazardous materials. One of the diversion targets that had not yet been implemented included "providing incentives to improve participation in diversion through waste collection every other week with a two container limit."[2] The final initiative included improvements to the public education/awareness campaigns as well as enforcement activities. The Region has launched social marketing campaigns to target recyclable materials ("The Odd Couple" plastic bag recycling campaign) in addition to their regular waste guide that is sent out in the mail each year. In addition, by-law enforcement officers are available to obtain compliance and educate residents that are not adhering to the solid waste management by-law.

[2] 2011-2015 Niagara Region Blue Box Program Plan

Short term opportunities were also outlined in the 2011-2015 Niagara Region Blue Box Program Plan. This included the Region providing, free of charge, Blue and Grey Boxes to new homeowners and replacements to residents with broken containers. Weekly collection of both recycling streams has given residents additional capacity for recyclables. Blue and Grey Boxes also have a larger capacity. This will ensure that overflow of recyclables are not disposed of in the garbage stream. Residents are also given the option to bag their recyclables for curbside collection.

Medium and long term opportunities outlined in the 2011-2015 Niagara Region Blue Box Program Plan included continual review of collection contract and the collection fleet requirements. The changing composition and quality of inbound Blue Box material has a direct effect on the processes at the Recycling Centre and the value of the marketable tonnage.

The Region completes an annual RPRA (formerly WDO) datacall, which is outlined in Section 3.16 of this report. This compiles data including tonnage, operational/capital costs, details about the Blue Box diversion program and policy details. The datacall allows the Region to establish targets and projections.

The 2011-2015 Niagara Region Blue Box Program Plan provides an overview on key performance measures. All of these parameters (including participation rates, set-out rates, generation rates, capture rates and diversion rates) are outlined in Table 4.1. Following the LOS changes, the Region experienced a spike in generation of divertible material. The 2015/2016 audits reveal that generation of all materials, including Blue Box and Grey Box materials, has decreased. There has been a decrease in overall weight of material. Capture rates have remained constant and set-out rates reveal that households are placing fuller bins of recycling at the curbside for collection.

5.0 OBSERVATIONS & LESSONS LEARNED

5.1 Observations

The following observations were made during the 2015/2016 audits. These factors outline the pros and cons of the region's current waste collection program. It was noted by auditors that there were small inconsistencies in the rejection of non-accepted materials by the waste and recycling collection contractor. For example, collection contractor staff have been spotted rejecting entire Blue/Grey Boxes at the curbside, as well as removing contaminating materials, collecting accepted materials and placing the contamination back into the households' boxes. Both of the practices mentioned above are not necessarily incorrect. This all depends on the material being collected and the degree of contamination.

In addition, AET's audit supervisors were approached on a couple of occasions by residents looking for clarification on where they should dispose of an item. The Region has an excellent search engine on their website where residents can type in materials and it identifies what stream it should be placed in; however many residents do not know about this service or do not have access to a computer. This would be represented in the aging population that is not as educated on advancements in technology.

Another observation would be certain households consistently setting out over the bag limit garbage. This was observed primarily on rural roads. This is an indication that the collection contractor regularly collects the over the limit garbage set-out. AET's auditors had lists that indicated which households were permitted higher set-out limits (i.e. farms, duplexes and triplexes). In many cases, households in an area with surrounding farms may have a falsified understanding that they are permitted to set-out more garbage due to their neighbors with farms having a higher set-out limit.

The observations noted about the collection contractor are not necessarily a flaw in the system. The focus must be on the collection procedures across the entire region being consistent.

5.2 Lessons Learned

One of the objectives was to assess the composition of the waste streams based on participant types. However, auditing material on an individual household level creates challenges in the entire audit process when it comes to the collection of materials, physically sorting and weighing the materials and analyzing the data. The scales being used to measure the weight of materials during the audit are very precise, however when materials are found in small quantities (i.e. a receipt or a coffee cup lid) they don't always register a weight on the scale. Audit supervisors use their judgement to either record this weight as 0.01 kg or record it as 0 kg. A standard discretion was agreed upon by both audit supervisors in the field and the project manager. Auditing larger samples that have been accumulated from several households will provide more accurate measurements.

A positive outcome from the current methodology is that it has allowed AET to designate participant types. It has allowed the Region to establish additional patterns and trends from the current sampled households. This information would not be apparent in the minimum standard audits. Caution must be used to only gather data from the participant types that have a significant sample size. In the case of the 2015/2016 audits, Recycling, Garbage & Organic Participants and Recycling & Garbage Participants had sample sizes exceeding 50 households. Garbage only Participants only had 14 participants. The remaining participant types not mentioned above do not qualify as representative data due to their low sample size.

Future consideration should be given for a different audit methodology. Two alternate methodologies to consider for future studies are listed below:

1. Pre-audit Surveying and Aggregated Waste Samples

If the ultimate goal is to be able to assess the composition of the waste streams, based on participant types, surveying can be completed for several weeks prior to the audit period to determine participant types for all sample areas. This way, participant types are pre-determined prior to the audit for each household. When collection commences, auditors can collect materials that have been aggregated from certain participant types.

2. Selective Sampling of Participant Types at the Curbside

This methodology would allow samples to be gathered for targeted participant types only. This method would involve different households being audited than previous studies. The auditors would drive along with the regular collection contractor and collect material at households that qualify as the participant type they are looking for. For example, you would start on a street and collect the first ten households that participate in all three diversion programs. This sample would be aggregated and classified as your Recycling, Garbage & Organics Participant from Street A. Similarly, auditors would collect material for the first 10 households that are classified as Recycling & Garbage Participants. This methodology is completely different and in turn would provide different composition data that would focus on the participant types. It would not be comparable to previous studies completed throughout the region.

Report Prepared By:

Kerri Blair, B.Sc., Dip.EMA, EP (Waste)
Environmental Consultant

Report Reviewed By:

Ben Dunbar, BES, Dip.EMA, EP (Waste)
Manager of Waste Operations

Disclaimer

AET Group makes no warranty and assumes no liability for the information contained in this report outlining the waste composition study results. These results reflect measurements made over the sample periods as described in the methodology. As such, waste generation measurements should be considered snapshots and may not reflect accurate conditions across individual Municipalities or the region over time. Data provided by the Region from previously conducted studies (excluding the 2010/2011 audits) is not audited by AET.

APPENDIX A

MATERIAL CATEGORIES LIST

2015/16 Waste Composition Study - Material Categories		
Material Category	**Stream**	**Description / Examples**
PRINTED PAPER		
Newsprint - Daily and weekly	**Grey & Green**	Daily and weekly newspapers published by the Canadian Newspaper Association (CNA) and the Ontario Community Newspapers Association (OCNA); Globe and Mail, Toronto Star, Hamilton Spectator, community newspapers. Consult Stewardship Ontario and The Continuous Improvement Fund's list of OCNA/CNA publications. No inserts, flyers and magazines from newspapers.
Other Newsprint - Other	**Grey & Green**	Non OCNA/CNA publications (e.g. TV guides, Auto Trader, Real Estate News) plus inserts and flyers from OCNA/CNA newspapers. Consult Stewardship Ontario and The Continuous Improvement Fund's list of OCNA/CNA publications. Includes glossy flyers and advertising distributed with newspapers.
Magazines and Catalogues	**Grey**	Glossy magazines, catalogues, calendars, annual reports and product manuals (must be bound, i.e. stapled or glued).
Directories / Telephone books	**Grey**	Telephone books and other directories such as the Yellow Pages
Other Printed Paper (Obligated)	**Grey**	Mixed fine paper, bills and statements, ad mail, etc. Includes non-newsprint flyers and advertising, promotional calendars
Other Printed Paper (Non-Obligated)	**Grey**	Writing paper, office paper , soft or hard covered books, paper envelopes (blank), gift cards, purchased calendars, gift wrap, construction paper, photographs
PAPER PACKAGING		
Gable Top Containers	**Blue**	Polycoat containers with a gable shaped top, milk and milk substitutes like soy, almond and rice milk, juices, some foods, sugar, molasses etc.
Aseptic Containers (excluding alcoholic beverages)	**Blue**	Polycoat fibre and foil containers (e.g. Tetra Pak) for soy, almond and rice milk, juice boxes, water, soup, sauces etc.
Aseptic Containers - alcoholic beverages	**Blue**	Polycoat fibre and foil containers (e.g. Tetra Pak) for wine and other spirits
Polycoat Beverage Cups	**Garbage**	Hot beverage/food containers, with polycoat on inside only, including coffee cups, soup cups/bowls, chili cups etc. Cold beverage/food containers with polycoat on both sides including fountain drinks, take-out ice cream cups.
Spiral Wound Containers	**Blue**	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.
Ice Cream Containers and Other Bleached Long Polycoat Fibre	**Garbage**	Polycoated paper ice cream containers, typically with a lid, excluding boxboard folded ice cream boxes. Food containers with white fibre and a rolled or folded rim, includes Michelina's frozen food, KFC tubs.
Paper Laminate Packaging	**Garbage**	Paper with aluminum foil, paper with plastic, multi-layered paper - Includes microwave popcorn bags, some cookie bags, dog food bags, paper granola bar wrappers, laminated paper carry out bags, etc.
Corrugated Cardboard	**Grey & Green**	Includes micro-flute corrugated containers, pizza boxes, waxed corrugated containers, electronic product boxes such as television and computer boxes, boxes used to direct mail for residential consumers. 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.
Boxboard	**Grey & Green**	Boxboard, paperboard, cereal box, shoe box, non-glossy frozen food boxes
Cores	**Grey & Green**	Cores from toilet paper/ toweling/gift wrap, etc.
PLASTICS		
#1 PET Bottles and Jars (excluding alcoholic beverages)	**Blue**	#1 plastic bottles and jars including pop, juice, cooking oil, honey, dish soap, etc.
#1 PET Bottles and Jars ≥ 5 L (excluding alcoholic beverages)	**Blue**	#1 plastic bottles and jars including pop, juice, cooking oil, honey, dish soap, etc.
#1 PET Bottles (alcoholic beverages)	**Blue**	#1 plastic bottles used to contain alcoholic beverages
#1 PET Thermoform - Clear	**Blue**	#1 clamshells, #1 egg cartons, #1 trays, #1 blister packaging, etc.
#1 PET Thermoform - Coloured	**Blue**	#1 coloured PET microwaveable trays, etc.
#2 HDPE Bottles and Jugs (excluding alcoholic beverages)	**Blue**	#2 plastic bottles and jugs, juice, milk, laundry soap, shampoo, windshield washer fluid, etc.
#2 HDPE Bottles and Jugs ≥ 5 L (excluding alcoholic beverage)	**Blue**	#2 plastic bottles and jugs equal to or greater than 5 L
#2 HDPE Bottles (alcoholic beverage containers)	**Blue**	#2 plastic bottles used to contain alcoholic beverages
#2 Other HDPE Containers	**Blue**	Other #2 containers such as margarine and yogurt containers made from HDPE
Flexible Film Plastic – LDPE & HDPE	**Grey**	HDPE & LDPE film, dry cleaning bags, bread bags, non-aluminum lined, stretchy frozen food bags, milk bags, toilet paper and paper towel over-wrap, lawn seed bags, grocery and retail carry-out bags, frozen plastic pizza liners/wraps, produce bags.
LDPE/HDPE Film - Products (non-packaging)	**Garbage**	zip lock sandwich and freezer bags, plastic food wrap (i.e. Saran Wrap) and non-stretchy plastic film.
#5 PP Bottles	**Blue**	# 5 plastic bottles includes nutritional supplement drinks, shampoos, etc.
#5 Other PP Containers	**Blue**	# 5 containers such as margarine and yogurt containers and other containers made from PP, including tubs and lids with resin codes #5 PP
#6 PS - Expanded Polystyrene	**Blue**	# 6 Foam take-out containers such as drink cups, large, white packaging foam, meat trays, etc.
#6 PS - Non-expanded Polystyrene	**Blue**	#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.
Plastic Laminates and Other Film Packaging	**Garbage**	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.
Other Rigid Plastic Packaging	**Blue**	Other rigid containers (#3, #4 & #7), non-PET blister packaging, unmarked/coded packaging, plant pots and trays, pails etc.
Large HDPE & PP Pails & Lids	**Blue**	Equal to or greater than 5 litres and less than 25 litres
Other Plastics - (non-packaging/durable)	**Garbage**	Rubbermaid tubs, toys etc.
METALS		
Aluminum- food and beverage Containers (excluding alcoholic beverage containers)	**Blue**	Single-serve juice/soft drink cans, pet food cans, food cans (e.g., sardine cans)
Aluminum (alcoholic beverage containers)	**Blue**	Aluminum cans and bottles used to contain alcoholic beverages
Aluminum Foil & Foil Trays	**Blue**	Aluminum foil wrap, pie plates, baking trays, etc.
Aluminum Aerosols	**Blue**	Empty Aluminum aerosol containers, hair products, etc.
Steel Food and Beverage Cans	**Blue**	Apple juice, soup beans, peaches cans, etc.
Steel Paint Cans	**Blue**	Empty Steel Paint Cans
Steel Aerosol Container	**Blue**	Empty spray paint cans, cooking oil, whipped cream, etc.

GLASS		
Clear Glass - food and beverage (excluding alcoholic beverage containers)	**Blue**	Food containers such as pickle jars, salsa jars and diary tubs, cosmetic containers for creams, beverage bottles
Clear Glass - alcoholic beverage containers	**Blue**	Wine bottles, spirit bottles, single-serve cooler bottles, beer bottles
Coloured Glass - food and beverage (excluding alcoholic beverage containers)	**Blue**	Olive oil bottles, balsamic vinegar
Coloured Glass - alcoholic beverage containers	**Blue**	Wine bottles, spirit bottles, single-serve cooler bottles, beer bottles
MUNICIPAL HAZARDOUS OR SPECIAL WASTE		
Pressurized Containers	**Garbage**	All pressurized cylinders used for compresses gases including propane, helium, welding/brazing gases, etc.
Batteries (Consumer-Type Portable)	**Garbage**	All batteries (primary and secondary)
Paint & Stain	**Garbage**	Cans / tubs still containing product, oil and latex paint, wood stain, varnish, etc.
Motor Oil	**Garbage**	Oil filters and jugs or cans still containing oil
Other MHSW liquids	**Garbage**	Solvents, antifreeze, acids, pool chemicals, weed killer, gasoline, brake fluid, glues, adhesives, cleaners, nail polish remover, etc. Look for signal words such as "Poison", "Danger", "Warning", "Caution", and "Precautionary Statements".
Other MHSW	**Garbage**	Sharps, drug products, medicine, medical waste, fluorescent tubes, ionized smoke detectors, etc. Look for signal words such as "Poison", "Danger", "Warning" and "Caution" statements".
Home Health Care Waste	**Garbage**	Casts, catheters, dialysis waste (tubing, filters, disposable towels and sheets), disposable pads, gloves and masks, colostomy bags, gastric and nasal tubes, IV bags, soiled dressings, sponges.
ORGANICS		
Avoidable Food Waste (leftover bakery)	**Green**	Food that was prepared but not eaten (e.g. plate scrapings, half-eaten sandwich, uneaten leftovers).
Avoidable Food Waste (leftover meat & fish)	**Green**	
Avoidable Food Waste (leftover dried food)	**Green**	
Avoidable Food Waste (leftover fruit & vegetable)	**Green**	
Avoidable Food Waste (leftover other)	**Green**	
Avoidable Food Waste (untouched bakery)	**Green**	Food that expired or went bad before it could be eaten (e.g. food still in packaging, whole produce, uncooked food, whole slices of bread).
Avoidable Food Waste (untouched meat & fish)	**Green**	
Avoidable Food Waste (untouched dried food)	**Green**	
Avoidable Food Waste (untouched fruit & vegetable)	**Green**	
Avoidable Food Waste (untouched other)	**Green**	
Unavoidable Food Waste	**Green**	Food that could not be further eaten or prepared (e.g. vegetable and fruit peelings, fats, oils, bones, etc.)
Yard Waste	**Green**	Brush, branches, wood chips, leaves, soil, plant material, excluding grass clippings
Grass Clippings	**Garbage**	Grass clippings only
Pet Waste	**Green**	Animal feces, bedding, kitty litter
Molded Pulp Packaging	**Green**	Egg cartons, drink trays, other trays, molded pulp flower pots/trays, etc.
Non-laminated Paper/Packaging	**Green**	Chinette paper plates, microwave popcorn bags
Tissue/Towelling	**Green**	Napkins, Tissues, and Paper Towels
Compostable Plastic Bags	**Green**	Certified Plastic Compostable Bags
Compostable Paper Bags	**Green**	Certified Paper Compostable Bags
WEEE (Waste Electrical and Electronic Equipment)		
TVs	**Garbage**	Televisions (Tube, Projection, Plasma, LCD, LED)
Computer Monitors	**Garbage**	Computer Monitors (CRT, Flat panel/LCD)
Computer Components	**Garbage**	Computer towers and internal/external components (power supplies, hard drives, disk drives, motherboards, keyboards, mouse, cables, etc.)
Laptops	**Garbage**	Laptop computers or notebooks.
Computer Peripheral Devices	**Garbage**	Printers, scanners, fax machines.
Audio/Video Equipment	**Garbage**	DVD, Radio, VCR, Stereo Components (amplifiers, cassette decks, tuners, turntables, CD players, speakers), etc.
Telecom Equipment	**Garbage**	Phones, pagers, Blackberry, mobile phones, etc.
Small Home Appliances	**Garbage**	Blenders, coffee machine, room humidifier, etc.
Other Electronics	**Garbage**	Electronic games, toys, clocks, gadgets, anything with a plug or battery.
BULKY ITEMS		
Mattresses	**Garbage**	Mattresses and box springs, futons, foam mattresses
Wood Furniture or Fixtures	**Garbage**	Chairs, sofas, cabinets, tables, garden furniture, etc. made up of mostly wood
Plastic Furniture or Fixtures	**Garbage**	Chairs, sofas, cabinets, tables, garden furniture, etc. made up mostly of plastic
Carpeting	**Garbage**	Carpeting, underlay, mats
Other Large Bulky Items	**Garbage**	Other large items not classified elsewhere
White Good Appliances	**Garbage**	Stoves, refrigerators, washers, dryers, freezers, etc.
OTHER MATERIALS		
Diapers and Sanitary Products	**Garbage**	Diapers, sanitary napkins, hygiene products, etc.
Textiles	**Garbage**	Clothing, shoes, mats, drapes, sheets, etc. Plastic rice sacks go in Other Rigid Plastic Packaging
Construction & Renovation	**Garbage**	Lumber, wood cut off, drywall, ceramic tiles, plaster, etc.
Tires and Other Rubber	**Garbage**	Rubber tires and tubes, other rubber items such as hoses
Ceramics	**Garbage**	Ceramic plates, cups, plant pots, etc.
Other Aluminum (non-packaging)	**Garbage**	Aluminum siding, etc.
Other Steel (non-packaging)	**Garbage**	Non-packaging steel products including baking trays, frying pans etc.
Other Glass (non-Blue Box)	**Garbage**	Dishes, ceramics, window glass
Coffee Pods	**Garbage**	Full and Empty Coffee Pods
Other Waste	**Garbage**	All other materials not classified elsewhere (i.e. wooden fruit basket, vacuum bags, wax candles, furnace filters, juice pouches, bubble wrap, woven plastic feed bags, toys, etc.) Includes also includes wet-strength boxboard, fast food, frozen food boxes, ice cream boxes, cartons such as fry/onion ring boxes and laminated paper plates.

APPENDIX B

SUMMARY OF AUDIT RESULTS

Niagara Region - Waste Sort Results for Single-Family 2015/16

Municipality:		Fort Erie	Fort Erie	Fort Erie	Fort Erie	Grimsby	Grimsby	Grimsby	Grimsby	Lincoln	Lincoln	Lincoln	Lincoln
Waste Stream:		Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics
# of Single-Family Households		14,494	14,494	14,494	14,494	9,217	9,217	9,217	9,217	8,315	8,315	8,315	8,315
Notes:													
Material Category	Stream	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr
1. PRINTED PAPER													
Newsprint - Daily and weekly	Grey & Green	0.61	0.00	15.24	0.22	0.33	0.00	32.94	0.01	0.30	0.07	13.72	0.26
Other Newsprint - Other	Grey & Green	0.67	0.00	33.21	0.33	0.07	0.00	31.82	0.06	0.27	0.01	24.81	0.00
Magazines and Catalogues	Grey	0.98	0.00	2.43	0.00	2.46	0.00	10.40	0.00	0.52	0.00	6.77	0.00
Directories / Telephone books	Grey	0.00	0.00	1.16	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.32	0.00
Other Printed Paper (Obligated)	Grey	4.49	0.00	3.21	0.21	3.01	0.08	4.34	0.08	1.92	0.10	2.82	0.00
Other Printed Paper (Non-Obligated)	Grey	5.41	0.08	14.84	0.02	1.36	0.12	2.54	0.04	2.18	0.01	7.58	0.00
Total Paper		**12.16**	**0.08**	**70.09**	**0.77**	**7.22**	**0.21**	**82.69**	**0.19**	**5.19**	**0.20**	**56.02**	**0.26**
2. PAPER PACKAGING													
Gable Top Containers	Blue	0.66	0.55	1.42	0.00	0.23	1.56	0.62	0.00	0.22	1.38	0.69	0.00
Aseptic Containers (excluding alcoholic beverages)	Blue	0.72	0.33	0.21	0.00	0.10	0.12	0.05	0.00	0.48	0.57	0.17	0.00
Aseptic Containers - alcoholic beverages	Blue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Polycoat Beverage Cups	Garbage	2.53	0.71	0.22	0.05	1.72	0.03	0.69	0.65	1.42	0.14	0.70	0.09
Spiral Wound Containers	Blue	0.20	0.92	0.08	0.00	0.08	0.24	0.09	0.00	0.35	0.38	0.08	0.00
Ice Cream Containers and Other Bleached Long Polycoat Fibre	Garbage	0.69	0.11	0.25	0.00	1.00	0.18	0.03	0.00	0.45	0.05	0.19	0.00
Paper Laminate Packaging	Garbage	2.57	0.05	0.35	0.24	1.44	0.12	0.79	0.07	1.93	0.09	0.22	0.01
Corrugated Cardboard	Grey & Green	2.15	0.06	22.46	0.09	2.61	0.10	27.45	0.46	1.70	0.22	12.75	0.26
Boxboard	Grey & Green	5.91	0.37	23.64	0.00	4.72	0.40	20.37	0.48	3.26	0.23	14.86	0.00
Cores	Grey & Green	0.94	0.00	0.62	0.04	0.55	0.00	0.25	0.07	0.42	0.01	0.68	0.00
Total Paper Packaging		**16.38**	**3.08**	**49.26**	**0.43**	**12.45**	**2.74**	**50.35**	**1.73**	**10.22**	**3.07**	**30.33**	**0.35**
3. PLASTICS													
#1 PET Bottles and Jars (excluding alcoholic beverages)	Blue	1.73	13.51	0.00	0.00	0.99	7.68	0.21	0.03	1.00	9.93	0.08	0.00
#1 PET Bottles and Jars ≥ 5 L (excluding alcoholic beverages)	Blue	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00
#1 PET Bottles (alcoholic beverages)	Blue	0.07	0.13	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.09	0.00	0.00
#1 PET Thermoform - Clear	Blue	0.84	2.36	0.00	0.00	0.16	3.06	0.07	0.00	0.27	2.43	0.02	0.00
#1 PET Thermoform - Coloured	Blue	0.13	0.25	0.00	0.00	0.08	0.54	0.03	0.00	0.06	0.38	0.01	0.00
#2 HDPE Bottles and Jugs (excluding alcoholic beverages)	Blue	1.33	7.13	0.00	0.00	0.18	3.93	0.06	0.00	0.77	4.37	0.00	0.00
#2 HDPE Bottles and Jugs ≥ 5 L (excluding alcoholic beverage)	Blue	0.07	0.23	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.32	0.00	0.00
#2 HDPE Bottles (alcoholic beverage containers)	Blue	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00
#2 Other HDPE Containers	Blue	0.16	0.69	0.00	0.00	0.01	0.10	0.00	0.00	0.02	0.36	0.01	0.00
Flexible Film Plastic – LDPE & HDPE	Grey	8.94	1.63	1.81	0.03	6.80	1.09	4.99	0.41	7.09	0.46	4.15	0.11
LDPE/HDPE Film - Products (non-packaging)	Garbage	4.13	0.35	0.16	0.05	4.53	0.26	0.20	0.03	3.86	0.90	0.61	0.07
#5 PP Bottles	Blue	0.16	0.33	0.03	0.00	0.18	0.27	0.01	0.00	0.08	0.40	0.00	0.00
#5 Other PP Containers	Blue	1.91	3.75	0.00	0.00	0.40	3.09	0.12	0.20	0.54	3.45	0.01	0.00
#6 PS - Expanded Polystyrene	Blue	1.44	0.99	0.02	0.05	0.31	1.14	0.20	0.00	0.35	0.69	0.03	0.00
#6 PS - Non-expanded Polystyrene	Blue	1.51	0.65	0.06	0.04	0.53	0.87	0.08	0.00	0.58	1.68	0.14	0.00
Plastic Laminates and Other Film Packaging	Garbage	6.99	1.06	0.82	0.08	4.77	0.62	1.37	0.22	5.66	0.46	0.46	0.01
Other Rigid Plastic Packaging	Blue	2.64	1.31	0.08	0.01	1.88	2.51	0.31	0.03	1.49	1.01	0.22	0.01
Large HDPE & PP Pails & Lids	Blue	0.05	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	1.94	0.00	0.00
Other Plastics - (non-packaging/durable)	Garbage	3.72	4.25	0.01	0.00	2.76	0.71	0.04	0.01	3.97	1.05	0.15	0.01
Total Plastics		**35.83**	**38.62**	**2.98**	**0.26**	**23.62**	**27.90**	**7.68**	**0.92**	**25.73**	**29.92**	**5.89**	**0.20**
4. METALS													
Aluminum- food and beverage Containers (excluding alcoholic beverage containers)	Blue	0.44	3.24	0.02	0.00	0.79	8.24	0.18	0.11	0.69	5.75	0.04	0.00
Aluminum (alcoholic beverage containers)	Blue	0.07	0.81	0.03	0.00	0.03	0.36	0.00	0.00	0.20	0.09	0.00	0.00
Aluminum Foil & Foil Trays	Blue	1.64	0.38	0.00	0.03	1.10	0.71	0.14	0.01	0.72	0.49	0.02	0.01
Aluminum Aerosols	Blue	0.26	0.11	0.00	0.00	0.14	0.09	0.00	0.00	0.06	0.07	0.00	0.00
Steel Food and Beverage Cans	Blue	2.18	5.94	0.02	0.00	0.47	4.13	0.20	0.03	1.11	4.92	0.00	0.00
Steel Paint Cans	Blue	0.61	0.00	0.00	0.00	0.41	0.00	0.06	0.00	0.46	0.00	0.00	0.00
Steel Aerosol Container	Blue	0.52	0.91	0.00	0.00	0.27	0.49	0.00	0.00	0.14	0.06	0.00	0.00
Total Metals		**5.72**	**11.39**	**0.06**	**0.03**	**3.21**	**14.01**	**0.58**	**0.14**	**3.37**	**11.38**	**0.07**	**0.01**
5. GLASS													
Clear Glass - food and beverage (excluding alcoholic beverage containers)	Blue	1.98	12.44	0.00	0.00	0.37	19.00	0.73	0.00	1.55	9.01	0.09	0.00
Clear Glass - alcoholic beverage containers	Blue	0.37	3.24	0.00	0.00	0.00	1.05	0.00	0.00	0.00	1.99	0.00	0.00
Coloured Glass - food and beverage (excluding alcoholic beverage containers)	Blue	0.24	0.00	0.00	0.00	0.07	0.70	0.00	0.00	0.00	2.06	0.00	0.00
Coloured Glass - alcoholic beverage containers	Blue	0.43	6.79	0.00	0.00	0.00	0.23	0.00	0.00	0.00	3.73	0.00	0.00
Total Glass		**3.02**	**22.47**	**0.00**	**0.00**	**0.44**	**20.98**	**0.73**	**0.00**	**1.55**	**16.78**	**0.09**	**0.00**
6. MUNICIPAL HAZARDOUS OR SPECIAL WASTE													
Pressurized Containers	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batteries (Consumer-Type Portable)	Garbage	0.60	0.00	0.00	0.00	0.24	0.05	0.02	0.00	0.24	0.00	0.00	0.00
Paint & Stain	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor Oil	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other MHSW liquids	Garbage	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other MHSW	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Home Health Care Waste	Garbage	12.48	0.00	0.00	0.02	0.45	0.00	0.01	0.00	0.14	0.00	0.00	0.01
Total MHSW		**13.10**	**0.00**	**0.00**	**0.02**	**0.70**	**0.05**	**0.03**	**0.00**	**0.38**	**0.00**	**0.00**	**0.01**
7. ORGANICS													
Avoidable Food Waste (leftover bakery)	Green	5.71	0.00	0.00	4.42	3.26	0.00	0.10	0.85	2.12	0.00	0.04	7.05

Municipality:		Niagara Falls	Niagara Falls	Niagara Falls	Niagara Falls	Niagara-on-the-Lake	Niagara-on-the-Lake	Niagara-on-the-Lake	Niagara-on-the-Lake	Pelham	Pelham	Pelham	Pelham
Waste Stream:		Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics
# of Single-Family Households		30,120	30,120	30,120	30,120	7,423	7,423	7,423	7,423	6,171	6,171	6,171	6,171
Notes:													
Material Category	Stream	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr
1. PRINTED PAPER													
Newsprint - Daily and weekly	Grey & Green	2.04	0.08	22.24	0.02	0.72	0.12	13.49	0.00	0.30	0.12	21.21	0.30
Other Newsprint - Other	Grey & Green	2.78	0.31	31.15	0.10	2.61	0.33	23.22	0.00	1.02	0.18	26.62	0.20
Magazines and Catalogues	Grey	0.65	0.00	6.47	0.00	2.26	1.71	7.78	0.00	0.62	0.04	18.66	0.00
Directories / Telephone books	Grey	0.26	0.10	2.31	0.00	0.00	0.00	2.28	0.00	0.00	0.00	2.61	0.00
Other Printed Paper (Obligated)	Grey	3.80	0.04	5.66	0.17	3.47	0.00	7.62	0.00	7.05	0.64	8.05	0.01
Other Printed Paper (Non-Obligated)	Grey	3.58	0.01	4.44	0.00	1.34	0.00	6.58	0.00	4.69	0.69	11.48	0.01
Total Paper		**13.11**	**0.54**	**72.27**	**0.28**	**10.39**	**2.16**	**60.97**	**0.00**	**13.68**	**1.66**	**88.64**	**0.51**
2. PAPER PACKAGING													
Gable Top Containers	Blue	0.81	1.32	1.19	0.00	0.22	1.46	0.29	0.00	0.21	2.01	0.73	0.00
Aseptic Containers (excluding alcoholic beverages)	Blue	0.33	0.42	0.08	0.00	0.16	0.70	0.03	0.00	0.53	0.82	0.29	0.00
Aseptic Containers - alcoholic beverages	Blue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Polycoat Beverage Cups	Garbage	1.71	0.04	0.57	0.00	0.20	0.02	0.04	0.00	0.92	0.20	0.27	0.00
Spiral Wound Containers	Blue	0.24	0.34	0.04	0.00	0.20	0.36	0.00	0.00	0.14	0.32	0.00	0.00
Ice Cream Containers and Other Bleached Long Polycoat Fibre	Garbage	0.52	0.12	0.06	0.00	0.17	0.04	0.19	0.00	0.49	0.20	0.03	0.00
Paper Laminate Packaging	Garbage	5.45	0.02	0.17	0.05	1.03	0.09	0.07	0.14	2.44	0.17	0.10	0.09
Corrugated Cardboard	Grey & Green	3.49	0.08	26.06	0.24	1.57	0.86	32.00	0.03	2.10	0.72	22.86	0.27
Boxboard	Grey & Green	6.45	0.24	17.53	0.11	3.81	0.42	12.71	0.00	3.30	1.14	19.25	0.10
Cores	Grey & Green	1.03	0.01	0.52	0.05	0.63	0.02	0.25	0.00	0.72	0.04	0.58	0.01
Total Paper Packaging		**20.04**	**2.58**	**46.23**	**0.46**	**7.99**	**3.97**	**45.58**	**0.17**	**10.86**	**5.61**	**44.14**	**0.47**
3. PLASTICS													
#1 PET Bottles and Jars (excluding alcoholic beverages)	Blue	2.58	11.87	0.07	0.00	1.10	6.36	0.06	0.00	5.46	9.86	0.61	0.00
#1 PET Bottles and Jars ≥ 5 L (excluding alcoholic beverages)	Blue	0.24	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00
#1 PET Bottles (alcoholic beverages)	Blue	0.07	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.09	0.00
#1 PET Thermoform - Clear	Blue	0.77	3.30	0.05	0.00	0.26	2.54	0.00	0.00	0.81	4.47	0.25	0.00
#1 PET Thermoform - Coloured	Blue	0.16	0.31	0.01	0.00	0.07	0.35	0.00	0.00	0.40	0.56	0.00	0.00
#2 HDPE Bottles and Jugs (excluding alcoholic beverages)	Blue	0.83	4.20	0.03	0.00	0.85	3.29	0.10	0.00	0.49	4.23	0.00	0.00
#2 HDPE Bottles and Jugs ≥ 5 L (excluding alcoholic beverage)	Blue	0.07	0.34	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00
#2 HDPE Bottles (alcoholic beverage containers)	Blue	0.00	0.05	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.09	0.00
#2 Other HDPE Containers	Blue	0.09	0.22	0.00	0.00	0.01	0.21	0.00	0.00	0.01	0.53	0.00	0.00
Flexible Film Plastic – LDPE & HDPE	Grey	8.27	1.50	2.20	0.42	6.20	1.72	1.18	0.00	8.10	0.66	1.54	0.31
LDPE/HDPE Film - Products (non-packaging)	Garbage	5.30	0.36	0.41	0.03	2.07	0.28	0.21	0.03	4.58	0.14	0.18	0.03
#5 PP Bottles	Blue	0.17	0.25	0.03	0.00	0.14	0.14	0.00	0.00	0.42	1.72	0.03	0.00
#5 Other PP Containers	Blue	1.03	2.14	0.09	0.00	0.56	3.47	0.05	0.00	0.77	3.34	0.10	0.00
#6 PS - Expanded Polystyrene	Blue	1.22	1.31	0.15	0.02	0.73	0.90	0.02	0.00	0.96	2.00	0.08	0.00
#6 PS - Non-expanded Polystyrene	Blue	1.00	0.65	0.04	0.01	0.14	0.63	0.00	0.00	0.57	0.79	0.10	0.01
Plastic Laminates and Other Film Packaging	Garbage	6.22	0.85	0.62	0.10	4.47	0.53	0.52	0.00	7.09	0.57	0.47	0.08
Other Rigid Plastic Packaging	Blue	2.15	1.42	0.10	0.02	1.39	1.71	0.29	0.00	2.37	1.71	0.16	0.02
Large HDPE & PP Pails & Lids	Blue	0.04	0.04	0.00	0.00	0.00	0.25	0.00	0.00	0.02	0.73	0.00	0.00
Other Plastics - (non-packaging/durable)	Garbage	10.82	1.09	0.04	0.02	6.55	0.88	0.00	0.00	8.89	1.24	0.04	0.03
Total Plastics		**41.03**	**30.06**	**3.85**	**0.61**	**24.55**	**23.44**	**2.43**	**0.03**	**40.93**	**33.46**	**3.76**	**0.49**
4. METALS													
Aluminum- food and beverage Containers (excluding alcoholic beverage containers)	Blue	1.18	2.96	0.01	0.00	0.40	2.73	0.01	0.00	0.09	4.28	0.05	0.00
Aluminum (alcoholic beverage containers)	Blue	0.32	0.29	0.00	0.00	0.06	0.04	0.02	0.00	0.00	0.46	0.06	0.00
Aluminum Foil & Foil Trays	Blue	1.46	0.24	0.01	0.01	0.90	0.37	0.01	0.00	1.70	0.61	0.00	0.01
Aluminum Aerosols	Blue	0.08	0.06	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.03	0.00	0.00
Steel Food and Beverage Cans	Blue	1.76	6.95	0.02	0.00	0.63	5.53	0.00	0.00	0.38	3.24	0.01	0.07
Steel Paint Cans	Blue	0.55	0.26	0.02	0.00	0.46	0.00	0.00	0.00	0.41	0.00	0.00	0.00
Steel Aerosol Container	Blue	0.89	0.31	0.00	0.00	0.07	0.34	0.00	0.00	0.18	0.60	0.00	0.00
Total Metals		**6.24**	**11.08**	**0.05**	**0.01**	**2.54**	**9.02**	**0.04**	**0.00**	**2.79**	**9.21**	**0.11**	**0.07**
5. GLASS													
Clear Glass - food and beverage (excluding alcoholic beverage containers)	Blue	1.50	16.02	0.09	0.00	1.46	9.47	0.00	0.00	0.31	13.84	0.16	0.00
Clear Glass - alcoholic beverage containers	Blue	0.97	8.99	0.00	0.00	0.32	5.82	0.00	0.00	0.00	6.58	0.26	0.00
Coloured Glass - food and beverage (excluding alcoholic beverage containers)	Blue	0.21	2.63	0.00	0.00	0.00	5.64	0.00	0.00	0.00	2.39	0.00	0.00
Coloured Glass - alcoholic beverage containers	Blue	0.92	7.67	0.00	0.00	0.19	1.68	0.00	0.00	0.00	2.04	0.77	0.00
Total Glass		**3.61**	**35.31**	**0.09**	**0.00**	**1.96**	**22.62**	**0.00**	**0.00**	**0.31**	**24.84**	**1.18**	**0.00**
6. MUNICIPAL HAZARDOUS OR SPECIAL WASTE													
Pressurized Containers	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batteries (Consumer-Type Portable)	Garbage	0.32	0.00	0.00	0.00	0.24	0.00	0.03	0.00	9.44	0.01	0.00	0.00
Paint & Stain	Garbage	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor Oil	Garbage	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other MHSW liquids	Garbage	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other MHSW	Garbage	0.15	0.00	0.00	0.00	0.07	0.00	0.00	0.00	4.01	0.00	0.00	0.00
Home Health Care Waste	Garbage	0.57	0.22	0.00	0.00	0.42	0.01	0.00	0.00	0.26	0.00	0.00	0.00
Total MHSW		**1.61**	**0.23**	**0.00**	**0.00**	**0.91**	**0.01**	**0.03**	**0.00**	**13.72**	**0.01**	**0.00**	**0.00**
7. ORGANICS													
Avoidable Food Waste (leftover bakery)	Green	5.29	0.01	0.07	1.87	3.59	0.00	0.00	2.21	4.84	0.00	0.00	4.62

Municipality:		Port Colborne	Port Colborne	Port Colborne	Port Colborne	St. Catharines	St. Catharines	St. Catharines	St. Catharines	Thorold	Thorold	Thorold
Waste Stream:		Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling
# of Single-Family Households		9,409	9,409	9,409	9,409	43,645	43,645	43,645	43,645	7,560	7,560	7,560
Notes:												
Material Category	Stream	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr
1. PRINTED PAPER												
Newsprint - Daily and weekly	Grey & Green	0.70	0.10	7.89	0.00	0.28	0.33	20.67	0.12	0.28	0.29	14.70
Other Newsprint - Other	Grey & Green	1.90	0.81	22.17	0.00	1.01	0.63	29.31	0.12	0.25	0.33	27.58
Magazines and Catalogues	Grey	2.21	0.00	5.90	0.00	0.74	0.07	9.45	0.00	0.31	0.00	5.64
Directories / Telephone books	Grey	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00
Other Printed Paper (Obligated)	Grey	3.44	0.12	3.20	0.00	4.02	0.10	6.54	0.00	3.23	0.04	2.98
Other Printed Paper (Non-Obligated)	Grey	1.05	0.00	3.07	0.00	4.66	0.01	4.90	0.00	9.74	0.01	2.95
Total Paper		**9.31**	**1.03**	**42.22**	**0.00**	**10.70**	**1.13**	**71.21**	**0.25**	**13.80**	**0.67**	**53.85**
2. PAPER PACKAGING												
Gable Top Containers	Blue	0.64	1.98	0.22	0.00	0.23	2.16	0.59	0.00	0.19	1.16	0.11
Aseptic Containers (excluding alcoholic beverages)	Blue	0.11	0.12	0.03	0.00	0.39	0.72	0.06	0.00	0.38	0.48	0.11
Aseptic Containers - alcoholic beverages	Blue	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00
Polycoat Beverage Cups	Garbage	0.76	0.05	0.01	0.00	0.87	0.20	0.15	0.34	0.21	0.15	0.40
Spiral Wound Containers	Blue	0.23	0.61	0.03	0.00	0.25	0.48	0.19	0.00	0.19	0.30	0.06
Ice Cream Containers and Other Bleached Long Polycoat Fibre	Garbage	0.33	0.08	0.00	0.00	0.39	0.25	0.10	0.00	0.13	0.10	0.01
Paper Laminate Packaging	Garbage	1.53	0.01	0.06	0.00	1.98	0.11	0.36	0.03	2.28	0.03	0.21
Corrugated Cardboard	Grey & Green	1.44	0.53	25.69	0.00	3.24	0.40	38.09	0.19	1.94	0.08	27.47
Boxboard	Grey & Green	3.99	0.51	13.05	0.00	4.85	0.83	17.23	0.23	4.32	0.98	16.81
Cores	Grey & Green	0.66	0.00	0.21	0.00	0.83	0.03	0.84	0.06	1.03	0.02	1.12
Total Paper Packaging		**9.69**	**3.90**	**39.31**	**0.00**	**13.03**	**5.20**	**57.61**	**0.86**	**10.65**	**3.28**	**46.29**
3. PLASTICS												
#1 PET Bottles and Jars (excluding alcoholic beverages)	Blue	1.79	6.49	0.07	0.00	2.19	7.85	0.09	0.02	0.49	10.34	0.06
#1 PET Bottles and Jars ≥ 5 L (excluding alcoholic beverages)	Blue	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.01	0.00	0.00
#1 PET Bottles (alcoholic beverages)	Blue	0.03	0.08	0.00	0.00	0.01	0.16	0.00	0.00	0.03	0.00	0.00
#1 PET Thermoform - Clear	Blue	0.68	1.71	0.08	0.00	0.67	2.98	0.05	0.00	0.40	4.37	0.14
#1 PET Thermoform - Coloured	Blue	0.23	0.29	0.01	0.00	0.08	0.37	0.02	0.00	0.07	0.29	0.00
#2 HDPE Bottles and Jugs (excluding alcoholic beverages)	Blue	0.72	2.92	0.00	0.00	1.00	2.88	0.24	0.00	0.51	5.75	0.00
#2 HDPE Bottles and Jugs ≥ 5 L (excluding alcoholic beverage)	Blue	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.32	0.00
#2 HDPE Bottles (alcoholic beverage containers)	Blue	0.00	0.06	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
#2 Other HDPE Containers	Blue	0.02	0.31	0.00	0.00	0.06	0.16	0.03	0.00	0.06	0.36	0.00
Flexible Film Plastic – LDPE & HDPE	Grey	4.71	0.42	0.85	0.00	6.77	1.59	2.25	0.04	8.59	0.65	3.46
LDPE/HDPE Film - Products (non-packaging)	Garbage	2.67	0.32	0.04	0.02	4.02	0.30	0.35	0.03	4.88	0.07	0.18
#5 PP Bottles	Blue	0.18	0.14	0.00	0.00	0.29	0.26	0.00	0.00	0.23	0.29	0.07
#5 Other PP Containers	Blue	1.42	1.29	0.00	0.00	0.94	3.51	0.02	0.00	1.16	3.91	0.02
#6 PS - Expanded Polystyrene	Blue	1.00	0.50	0.21	0.00	0.92	1.02	0.19	0.00	0.80	1.25	0.10
#6 PS - Non-expanded Polystyrene	Blue	1.06	0.59	0.05	0.00	0.68	0.93	0.04	0.00	0.42	0.83	0.19
Plastic Laminates and Other Film Packaging	Garbage	4.36	0.31	0.36	0.00	6.50	0.48	0.51	0.02	6.27	0.59	0.82
Other Rigid Plastic Packaging	Blue	1.71	0.98	0.04	0.00	2.34	1.55	0.20	0.00	2.31	1.25	0.10
Large HDPE & PP Pails & Lids	Blue	0.00	0.12	0.00	0.00	0.05	0.16	0.00	0.00	0.00	1.42	0.00
Other Plastics - (non-packaging/durable)	Garbage	4.13	1.46	0.01	0.00	5.00	1.93	0.02	0.00	4.71	2.20	0.42
Total Plastics		**24.71**	**17.99**	**1.72**	**0.02**	**31.53**	**26.36**	**4.01**	**0.12**	**30.92**	**33.87**	**5.54**
4. METALS												
Aluminum- food and beverage Containers (excluding alcoholic beverage containers)	Blue	0.94	4.05	0.05	0.00	0.69	3.13	0.03	0.00	0.20	4.03	0.04
Aluminum (alcoholic beverage containers)	Blue	0.15	0.31	0.04	0.00	0.27	0.60	0.00	0.00	0.02	0.29	0.00
Aluminum Foil & Foil Trays	Blue	0.85	0.08	0.00	0.02	1.40	0.49	0.01	0.02	1.00	0.50	0.03
Aluminum Aerosols	Blue	0.00	0.11	0.00	0.00	0.13	0.04	0.00	0.00	0.11	0.00	0.00
Steel Food and Beverage Cans	Blue	1.31	3.65	0.00	0.00	1.02	6.91	0.42	0.00	0.55	9.28	0.01
Steel Paint Cans	Blue	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.41	0.00	0.00
Steel Aerosol Container	Blue	0.75	0.49	0.00	0.00	0.59	0.33	0.05	0.00	0.09	1.13	0.00
Total Metals		**3.99**	**8.70**	**0.08**	**0.02**	**4.59**	**11.50**	**0.51**	**0.02**	**2.37**	**15.23**	**0.08**
5. GLASS												
Clear Glass - food and beverage (excluding alcoholic beverage containers)	Blue	0.72	6.43	0.00	0.00	2.85	11.38	0.02	0.00	2.71	12.06	0.05
Clear Glass - alcoholic beverage containers	Blue	2.00	7.14	0.31	0.00	0.05	2.61	0.00	0.00	1.70	0.61	0.00
Coloured Glass - food and beverage (excluding alcoholic beverage containers)	Blue	0.62	1.70	0.00	0.00	0.17	1.34	0.00	0.00	0.29	1.70	0.00
Coloured Glass - alcoholic beverage containers	Blue	0.40	10.51	0.00	0.00	0.10	3.94	0.00	0.00	0.00	1.53	0.00
Total Glass		**3.74**	**25.78**	**0.31**	**0.00**	**3.17**	**19.27**	**0.02**	**0.00**	**4.69**	**15.90**	**0.05**
6. MUNICIPAL HAZARDOUS OR SPECIAL WASTE												
Pressurized Containers	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batteries (Consumer-Type Portable)	Garbage	0.52	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.18	0.00	0.01
Paint & Stain	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motor Oil	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other MHSW liquids	Garbage	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.07	0.00
Other MHSW	Garbage	0.04	0.00	0.00	0.00	0.05	0.01	0.00	0.00	0.01	0.00	0.00
Home Health Care Waste	Garbage	0.07	0.01	0.00	0.00	0.13	0.01	0.00	0.00	0.23	0.00	0.01
Total MHSW		**0.66**	**0.01**	**0.00**	**0.00**	**0.61**	**0.01**	**0.00**	**0.01**	**0.70**	**0.07**	**0.03**
7. ORGANICS												
Avoidable Food Waste (leftover bakery)	Green	3.80	0.00	0.00	0.47	5.13	0.00	0.00	4.62	4.63	0.00	0.00

Niagara Region - Waste Sort Results for Single-Family 2015/16

Municipality:		Fort Erie	Fort Erie	Fort Erie	Fort Erie	Grimsby	Grimsby	Grimsby	Grimsby	Lincoln	Lincoln	Lincoln	Lincoln	Niagara Falls	Niagara Falls	Niagara Falls	Niagara Falls	Niagara-on-the-Lake	Niagara-on-the-Lake	Niagara-on-the-Lake	Niagara-on-the-Lake	Pelham	Pelham	Pelham	Pelham	Port Colborne	Port Colborne	Port Colborne	Port Colborne	St. Catharines	St. Catharines	St. Catharines	St. Catharines	Thorold	Thorold	Thorold
Waste Stream:		Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling
# of Single-Family Households		14,494	14,494	14,494	14,494	9,217	9,217	9,217	9,217	8,315	8,315	8,315	8,315	30,120	30,120	30,120	30,120	7,423	7,423	7,423	7,423	6,171	6,171	6,171	6,171	9,409	9,409	9,409	9,409	43,645	43,645	43,645	43,645	7,560	7,560	7,560
Notes:																																				
Material Category	Stream	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr
Avoidable Food Waste (leftover meat & fish)	Green	8.73	0.00	0.00	1.11	1.50	0.09	0.00	0.69	2.91	0.00	0.00	5.18	3.60	0.00	0.00	2.05	1.15	0.00	0.00	1.29	5.07	0.00	0.00	2.94	3.38	0.00	0.00	0.46	3.80	0.00	0.00	2.01	2.48	0.00	0.00
Avoidable Food Waste (leftover dried food)	Green	0.37	0.00	0.00	0.14	0.89	0.00	0.13	0.04	2.54	0.00	0.07	0.75	1.23	0.02	0.12	0.84	0.32	0.00	0.00	0.00	1.22	0.00	0.01	1.43	0.94	0.00	0.00	0.00	0.52	0.00	0.01	0.32	1.52	0.00	0.00
Avoidable Food Waste (leftover fruit & vegetable)	Green	9.76	0.00	0.00	12.18	4.13	0.04	0.31	1.34	7.31	0.00	0.00	11.14	8.55	0.00	0.00	6.42	3.88	0.00	0.00	1.44	5.57	0.00	0.00	7.40	6.99	0.00	0.00	3.53	7.77	0.00	0.00	5.51	6.67	0.00	0.00
Avoidable Food Waste (leftover other)	Green	13.77	0.24	0.00	5.70	12.86	1.87	0.10	10.87	15.09	10.00	0.17	21.59	23.25	2.26	0.46	11.96	4.72	0.40	0.27	5.12	7.69	3.14	0.03	24.37	16.38	1.09	0.00	4.36	20.25	0.41	0.05	6.31	25.64	2.13	0.11
Avoidable Food Waste (untouched bakery)	Green	6.74	0.00	0.00	0.07	6.04	0.07	0.64	4.00	2.93	0.00	0.00	2.63	4.69	0.00	0.05	2.22	2.23	0.00	0.00	0.00	1.68	0.00	0.00	1.77	5.08	0.00	0.00	1.61	2.60	0.00	0.00	1.03	4.38	0.00	0.00
Avoidable Food Waste (untouched meat & fish)	Green	3.62	0.00	0.00	0.00	2.98	0.00	0.00	0.08	1.03	0.00	0.00	1.22	2.63	0.00	0.00	0.70	2.59	0.00	0.00	0.00	1.73	0.00	0.00	0.98	3.32	0.00	0.00	0.00	2.86	0.00	0.00	0.28	4.20	0.00	0.00
Avoidable Food Waste (untouched dried food)	Green	0.51	0.00	0.00	0.23	0.83	0.00	7.05	3.18	0.29	0.00	0.00	0.00	0.52	0.00	0.00	0.11	2.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	1.74	0.00	0.05	0.00	0.39	0.00	0.00
Avoidable Food Waste (untouched fruit & vegetable)	Green	12.46	0.00	0.00	7.59	7.20	0.00	0.35	4.21	9.71	0.43	0.00	16.30	12.37	0.20	0.05	2.89	6.92	0.00	0.00	6.17	4.60	0.00	0.00	12.04	13.97	0.00	0.00	1.61	9.29	0.00	0.00	3.57	14.60	0.00	0.00
Avoidable Food Waste (untouched other)	Green	9.51	1.14	0.00	0.18	6.51	0.75	0.01	2.19	10.04	2.63	0.01	1.38	8.93	0.06	0.24	1.27	2.77	1.34	0.56	1.19	4.93	0.00	0.00	0.88	8.23	0.00	0.22	0.20	11.88	0.35	0.02	0.26	7.42	0.85	0.03
Unavoidable Food Waste	Green	51.28	0.06	0.00	69.82	31.24	0.73	1.95	24.08	19.77	0.43	0.14	47.57	48.56	0.03	0.04	35.02	29.78	0.10	0.12	57.42	32.14	0.03	0.01	81.83	25.74	0.12	0.00	14.25	38.95	0.05	0.43	48.96	74.32	0.05	0.03
Yard Waste	Green	3.47	0.00	0.00	5.61	5.55	0.14	0.01	24.28	4.88	0.01	0.01	0.98	8.53	0.08	0.00	6.91	2.66	0.00	0.03	0.06	0.94	0.00	0.00	9.67	0.85	0.00	0.00	0.29	8.64	0.00	0.00	4.06	2.96	0.00	0.00
Grass Clippings	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.12	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pet Waste	Green	53.25	0.00	0.00	35.24	52.10	4.35	0.12	14.16	29.57	0.00	0.00	17.63	18.24	0.00	0.02	16.34	6.72	0.03	0.00	51.30	22.05	0.00	0.00	4.33	26.45	0.00	0.06	0.00	25.67	0.00	0.00	1.63	85.95	0.05	0.00
Molded Pulp Packaging	Green	2.41	0.00	1.10	2.35	0.38	0.18	0.77	0.39	0.86	0.10	2.09	0.76	0.92	0.23	0.63	0.76	0.60	0.01	0.72	5.03	0.20	0.12	0.49	0.41	0.94	0.03	0.85	0.16	0.91	0.15	0.78	0.78	1.66	0.23	0.64
Non-laminated Paper/Packaging	Green	0.41	0.00	0.03	0.07	0.66	0.00	0.02	0.01	0.06	0.04	0.00	0.04	0.36	0.00	0.18	0.19	0.42	0.03	0.02	0.17	0.53	0.00	0.01	0.27	0.63	0.00	0.03	0.01	0.67	0.00	0.01	0.06	2.73	0.00	0.07
Tissue/Towelling	Green	14.37	0.01	0.06	9.51	15.61	0.41	1.59	4.10	9.01	0.09	0.36	1.37	23.42	0.11	0.24	7.00	13.64	0.17	0.60	5.87	15.13	0.55	0.43	6.96	17.54	0.03	0.17	2.33	17.06	0.03	0.33	6.84	40.08	0.05	0.78
Compostable Plastic Bags	Green	0.06	0.00	0.00	2.32	0.05	0.00	0.00	0.48	0.00	0.09	0.00	1.48	0.19	0.00	0.00	0.75	0.14	0.00	0.00	2.91	0.00	0.00	0.05	2.00	0.00	0.00	0.01	0.44	0.00	0.00	0.00	1.29	0.00	0.00	0.00
Compostable Paper Bags	Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.17	0.00	0.00	0.00
Total Organic Materials		**196.42**	**1.45**	**1.19**	**156.52**	**151.78**	**8.63**	**13.15**	**102.08**	**118.11**	**13.82**	**2.88**	**137.66**	**171.67**	**2.99**	**2.11**	**97.43**	**84.74**	**2.07**	**2.32**	**141.77**	**108.34**	**3.84**	**1.04**	**161.88**	**134.59**	**1.27**	**1.35**	**29.71**	**157.76**	**1.00**	**1.69**	**87.69**	**279.62**	**3.35**	**1.66**
8. WEEE (Waste Electrical and Electronic Equipment)																																				
TVs	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Computer Monitors	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Computer Components	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Laptops	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Computer Peripheral Devices	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Audio/Video Equipment	Garbage	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.12	0.04	0.00	0.00	0.05	0.00	0.00
Telecom Equipment	Garbage	0.79	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.01	0.04	0.00	0.00	1.18	0.45	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.07
Small Home Appliances	Garbage	0.69	0.00	0.00	0.00	6.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	0.88	0.00	0.00	0.17	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.79	0.00	0.00	0.00	0.40	0.00	0.00
Other Electronics	Garbage	3.58	0.00	0.00	0.00	0.20	0.30	0.00	0.00	12.90	1.11	0.00	0.00	2.52	0.03	0.00	0.00	3.31	0.29	0.00	0.00	0.86	0.00	0.00	0.00	0.01	0.25	0.00	0.00	1.94	0.13	0.01	0.00	0.88	0.06	0.00
Total WEEE		**5.06**	**0.00**	**0.00**	**0.00**	**6.86**	**0.30**	**0.00**	**0.00**	**12.97**	**1.11**	**0.00**	**0.00**	**5.05**	**0.93**	**0.00**	**0.00**	**3.74**	**0.29**	**0.00**	**0.00**	**1.25**	**0.04**	**0.00**	**0.00**	**2.14**	**0.70**	**0.00**	**0.00**	**2.88**	**0.18**	**0.01**	**0.00**	**1.42**	**0.06**	**0.07**
9. BULKY ITEMS																																				
Mattresses	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wood Furniture or Fixtures	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plastic Furniture or Fixtures	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carpeting	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.90	0.00	0.00	0.00	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71	0.25	0.00	0.00	0.00	0.00	0.00
Other Large Bulky Items	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00
White Good Appliances	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Bulky Items		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.90**	**0.00**	**0.00**	**0.00**	**1.92**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.56**	**0.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
10. OTHER MATERIALS																																				
Diapers and Sanitary Products	Garbage	25.18	0.00	0.00	0.00	6.55	0.08	0.00	0.00	35.69	0.00	0.00	0.01	32.18	0.00	0.00	0.00	6.18	0.00	0.00	0.00	7.52	0.38	0.03	0.00	8.79	0.00	0.00	0.00	42.88	0.35	0.02	0.05	3.21	0.00	0.00
Textiles	Garbage	9.03	0.00	0.00	0.01	5.07	0.01	0.00	0.00	6.60	0.00	0.33	0.07	8.91	0.10	0.01	0.12	16.06	0.11	0.07	0.00	9.94	0.17	0.01	0.00	5.45	0.00	0.02	0.00	14.45	0.30	0.08	0.00	13.79	0.00	0.05
Construction & Renovation	Garbage	4.09	0.00	0.00	0.00	7.10	0.00	0.00	0.12	2.41	0.01	0.00	0.00	9.78	0.02	0.04	0.00	9.04	1.35	0.09	0.00	6.51	0.00	0.00	0.00	0.33	0.00	0.00	0.00	29.93	0.00	0.00	0.00	3.48	0.00	0.00
Tires and Other Rubber	Garbage	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.00	0.00	1.41	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.22	0.10	0.00	0.00	0.06	0.00	0.00
Ceramics	Garbage	1.21	3.36	0.00	0.00	4.19	0.98	0.00	0.00	0.98	0.24	0.00	0.00	1.16	0.14	0.04	0.00	3.63	0.20	0.00	0.00	5.23	0.20	0.00	0.00	0.19	0.00	0.00	0.00	0.98	0.61	0.00	0.00	1.02	0.69	0.00
Other Aluminum (non-packaging)	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00
Other Steel (non-packaging)	Garbage	0.88	0.01	0.00	0.00	1.02	0.07	0.00	0.00	0.94	1.03	0.00	0.00	2.15	0.54	0.02	0.00	6.42	0.24	0.00	0.00	2.19	1.90	0.01	0.00	2.25	2.71	0.00	0.00	0.91	0.65	0.54	0.00	2.67	0.83	0.00
Other Glass (non-Blue Box)	Garbage	1.43	1.65	0.00	0.00	1.03	2.08	0.01	0.00	1.27	0.49	0.00	0.00	0.91	0.56	0.06	0.01	4.82	1.65	0.00	0.00	1.31	0.40	0.06	0.00	1.31	0.55	0.05	0.00	0.85	0.61	0.01	0.00	2.52	0.39	0.11
Coffee Pods	Garbage	1.17	0.00	0.00	0.02	4.56	0.46	0.87	0.00	1.99	0.02	0.00	0.00	3.41	0.02	0.00	0.13	4.98	0.00	0.00	0.00	1.59	0.03	0.00	0.09	3.35	0.00	0.00	0.00	1.20	0.14	0.00	0.06	2.96	0.02	0.00
Other Waste	Garbage	36.16	0.37	0.70	0.12	22.91	0.36	0.52	0.03	26.48	1.13	0.41	0.04	28.46	1.60	0.51	0.10	26.47	1.48	2.53	0.00	25.56	1.31	1.13	1.86	18.24	0.57	0.14	0.00	18.64	0.72	0.38	0.13	22.17	0.33	0.53
Total Other Materials		**79.69**	**5.38**	**0.70**	**0.15**	**52.42**	**4.04**	**1.40**	**0.15**	**76.41**	**2.95**	**0.74**	**0.12**	**86.97**	**3.01**	**0.68**	**0.36**	**77.64**	**5.03**	**2.69**	**0.00**	**61.25**	**4.39**	**1.24**	**1.95**	**39.93**	**3.83**	**0.21**	**0.00**	**110.06**	**3.47**	**1.02**	**0.24**	**51.95**	**2.27**	**0.69**
Total Accepted Blue Box Material		**22.37**	**66.99**	**1.98**	**0.13**	**8.81**	**62.13**	**3.15**	**0.39**	**11.11**	**57.55**	**1.61**	**0.01**	**21.66**	**74.73**	**2.04**	**0.06**	**10.34**	**54.19**	**0.88**	**0.00**	**16.26**	**68.06**	**3.85**	**0.10**	**17.55**	**52.69**	**1.14**	**0.02**	**17.87**	**56.21**	**2.25**	**0.05**	**14.30**	**63.43**	**1.07**
Total Accepted Grey Box Material		**30.11**	**2.14**	**118.62**	**0.25**	**21.90**	**1.79**	**135.76**	**0.53**	**17.66**	**1.11**	**88.46**	**0.11**	**32.35**	**2.37**	**118.59**	**0.59**	**22.61**	**5.17**	**107.11**	**0.00**	**27.90**	**4.21**	**132.87**	**0.32**	**20.11**	**2.48**	**82.03**	**0.00**	**26.39**	**3.98**	**129.62**	**0.05**	**29.68**	**2.39**	**102.70**
Total Green Bin Organic Material		**196.42**	**1.45**	**1.19**	**157.21**	**151.78**	**8.63**	**13.15**	**96.04**	**118.11**	**13.82**	**2.88**	**138.18**	**171.30**	**2.99**	**2.11**	**97.96**	**84.74**	**2.07**	**2.32**	**140.45**	**108.34**	**3.84**	**1.04**	**162.77**	**134.59**	**1.27**	**1.35**	**29.71**	**157.76**	**1.00**	**1.69**	**88.41**	**279.62**	**3.35**	**1.66**
Total Non-Divertible Material		**118.48**	**11.90**	**2.51**	**0.59**	**76.20**	**6.30**	**4.54**	**8.25**	**108.95**	**6.74**	**3.07**	**0.31**	**125.95**	**6.64**	**2.55**	**0.55**	**96.78**	**7.17**	**3.76**	**1.52**	**100.62**	**6.95**	**2.34**	**2.19**	**56.50**	**6.75**	**0.69**	**0.02**	**134.86**	**7.18**	**2.52**	**0.67**	**72.53**	**5.51**	**2.82**
Grand Total		**367.38**	**82.48**	**124.29**	**158.18**	**258.69**	**78.86**	**156.60**	**105.21**	**255.83**	**79.21**	**96.02**	**138.62**	**351.26**	**86.73**	**125.29**	**99.15**	**214.46**	**68.61**	**114.06**	**141.97**	**253.12**	**83.06**	**140.10**	**165.38**	**228.75**	**63.19**	**85.20**	**29.74**	**336.89**	**68.37**	**136.08**	**89.18**	**396.13**	**74.69**	**108.25**

Niagara Region - Waste Sort Results for Single-Family 2015/16

Municipality:		Thorold	Wainfleet	Wainfleet	Wainfleet	Wainfleet	Welland	Welland	Welland	Welland	West Lincoln	West Lincoln	West Lincoln	West Lincoln	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	GRAND TOTAL Niagara Region	GRAND TOTAL Niagara Region
Waste Stream:		Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Garbage	Blue Box Recycling	Blue Box Recycling	Grey Box Recycling	Grey Box Recycling	Organics	Organics		
# of Single-Family Households		7,560	3,194	3,194	3,194	3,194	19,525	19,525	19,525	19,525	4,857	4,857	4,857	4,857	163,930		163,930		163,930		163,930			
Notes:																								
Material Category	Stream	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)
1. PRINTED PAPER																								
Newsprint - Daily and weekly	Grey & Green	0.00	3.13	0.00	3.21	0.00	1.80	0.00	18.49	0.00	1.16	0.00	2.02	0.00	0.94	0.30%	0.14	0.18%	18.35	15.34%	0.08	0.08%	19.51	3.15%
Other Newsprint - Other	Grey & Green	0.31	2.77	0.00	6.22	0.00	1.34	0.01	22.55	0.10	1.07	0.00	9.02	0.00	1.38	0.43%	0.31	0.40%	27.18	22.72%	0.12	0.11%	28.99	4.68%
Magazines and Catalogues	Grey	0.00	1.31	0.00	2.05	0.00	0.43	0.00	6.63	0.00	3.20	0.08	5.79	0.00	1.00	0.31%	0.10	0.13%	7.50	6.27%	0.00	0.00%	8.60	1.39%
Directories / Telephone books	Grey	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01%	0.02	0.02%	0.87	0.73%	0.00	0.00%	0.94	0.15%
Other Printed Paper (Obligated)	Grey	0.00	3.61	0.01	3.20	0.00	3.00	0.03	7.55	0.00	2.90	0.00	1.35	1.40	3.71	1.16%	0.08	0.10%	5.42	4.53%	0.10	0.09%	9.31	1.50%
Other Printed Paper (Non-Obligated)	Grey	0.00	9.18	0.00	0.63	0.00	2.85	0.05	4.87	0.02	0.84	0.07	0.60	0.08	3.85	1.21%	0.05	0.07%	5.61	4.69%	0.01	0.01%	9.53	1.54%
Total Paper		**0.31**	**20.01**	**0.01**	**15.52**	**0.00**	**9.42**	**0.09**	**60.07**	**0.13**	**9.17**	**0.14**	**18.77**	**1.48**	**10.94**	**3.43%**	**0.69**	**0.91%**	**64.94**	**54.29%**	**0.30**	**0.29%**	**76.88**	**12.42%**
2. PAPER PACKAGING																								
Gable Top Containers	Blue	0.00	0.59	0.88	0.48	0.00	0.21	1.76	0.36	0.00	0.30	1.46	0.31	0.00	0.40	0.13%	1.60	2.11%	0.69	0.58%	0.00	0.00%	2.70	0.44%
Aseptic Containers (excluding alcoholic beverages)	Blue	0.00	0.82	0.07	0.19	0.00	0.06	0.44	0.01	0.00	0.40	0.20	0.00	0.00	0.34	0.11%	0.48	0.64%	0.09	0.07%	0.00	0.00%	0.91	0.15%
Aseptic Containers - alcoholic beverages	Blue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00%	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.01	0.00%
Polycoat Beverage Cups	Garbage	0.00	1.07	0.12	0.14	0.00	1.68	0.33	0.20	0.00	3.00	0.53	0.00	0.00	1.35	0.42%	0.21	0.28%	0.29	0.25%	0.14	0.13%	1.99	0.32%
Spiral Wound Containers	Blue	0.00	0.44	0.50	0.31	0.00	0.14	0.65	0.09	0.00	0.21	1.21	0.00	0.00	0.22	0.07%	0.50	0.66%	0.10	0.08%	0.00	0.00%	0.82	0.13%
Ice Cream Containers and Other Bleached Long Polycoat Fibre	Garbage	0.00	0.51	0.00	0.07	0.00	0.32	0.08	0.05	0.00	0.27	0.07	0.00	0.00	0.45	0.14%	0.14	0.18%	0.09	0.07%	0.00	0.00%	0.68	0.11%
Paper Laminate Packaging	Garbage	0.04	1.96	0.25	0.08	0.00	2.37	0.07	0.09	0.02	1.35	0.10	0.18	0.00	2.63	0.82%	0.08	0.10%	0.25	0.21%	0.06	0.05%	3.01	0.49%
Corrugated Cardboard	Grey & Green	0.00	5.94	1.36	8.90	0.00	2.87	0.02	32.30	0.39	1.65	0.09	1.04	0.06	2.76	0.86%	0.27	0.36%	28.21	23.58%	0.20	0.19%	31.44	5.08%
Boxboard	Grey & Green	0.00	9.53	0.36	3.95	0.00	4.69	0.17	15.46	0.13	4.62	0.78	4.68	0.00	5.04	1.58%	0.52	0.68%	16.68	13.94%	0.13	0.12%	22.36	3.61%
Cores	Grey & Green	0.00	0.81	0.01	0.07	0.00	1.21	0.04	0.64	0.00	0.70	0.03	0.08	0.00	0.87	0.27%	0.02	0.02%	0.60	0.50%	0.03	0.03%	1.52	0.25%
Total Paper Packaging		**0.04**	**21.66**	**3.55**	**14.17**	**0.00**	**13.53**	**3.57**	**49.20**	**0.55**	**12.51**	**4.47**	**6.30**	**0.06**	**14.04**	**4.40%**	**3.84**	**5.04%**	**47.00**	**39.28%**	**0.56**	**0.54%**	**65.43**	**10.57%**
3. PLASTICS																								
#1 PET Bottles and Jars (excluding alcoholic beverages)	Blue	0.00	2.04	15.70	1.89	0.00	1.26	12.71	0.10	0.00	0.84	11.67	0.05	0.01	1.91	0.60%	10.08	13.24%	0.14	0.11%	0.01	0.01%	12.13	1.96%
#1 PET Bottles and Jars ≥ 5 L (excluding alcoholic beverages)	Blue	0.00	0.00	3.48	0.00	0.00	0.05	0.43	0.00	0.00	0.00	0.29	0.00	0.00	0.05	0.02%	0.22	0.29%	0.00	0.00%	0.00	0.00%	0.27	0.04%
#1 PET Bottles (alcoholic beverages)	Blue	0.00	0.05	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01%	0.12	0.15%	0.00	0.00%	0.00	0.00%	0.15	0.02%
#1 PET Thermoform - Clear	Blue	0.00	0.24	1.98	0.03	0.00	0.51	2.58	0.00	0.00	0.19	2.63	0.01	0.00	0.59	0.18%	2.91	3.82%	0.05	0.04%	0.00	0.00%	3.55	0.57%
#1 PET Thermoform - Coloured	Blue	0.00	0.22	0.13	0.00	0.00	0.39	0.39	0.02	0.00	0.02	0.14	0.00	0.00	0.15	0.05%	0.35	0.45%	0.01	0.01%	0.00	0.00%	0.51	0.08%
#2 HDPE Bottles and Jugs (excluding alcoholic beverages)	Blue	0.00	1.05	4.67	0.12	0.00	0.54	4.38	0.00	0.00	0.79	4.49	0.00	0.00	0.82	0.26%	4.10	5.39%	0.08	0.07%	0.00	0.00%	4.99	0.81%
#2 HDPE Bottles and Jugs ≥ 5 L (excluding alcoholic beverage)	Blue	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.14	0.03	0.00	0.00	0.02	0.01%	0.18	0.23%	0.00	0.00%	0.00	0.00%	0.20	0.03%
#2 HDPE Bottles (alcoholic beverage containers)	Blue	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.07	0.09%	0.00	0.00%	0.00	0.00%	0.07	0.01%
#2 Other HDPE Containers	Blue	0.00	0.05	0.37	0.00	0.00	0.10	0.16	0.00	0.00	0.03	0.29	0.00	0.00	0.07	0.02%	0.27	0.35%	0.01	0.01%	0.00	0.00%	0.34	0.05%
Flexible Film Plastic – LDPE & HDPE	Grey	0.00	8.31	5.92	1.28	0.33	7.61	0.73	2.31	0.13	8.27	0.47	1.03	0.03	7.42	2.32%	1.30	1.71%	2.31	1.93%	0.15	0.15%	11.18	1.81%
LDPE/HDPE Film - Products (non-packaging)	Garbage	0.00	5.66	0.40	0.01	0.00	3.72	0.42	0.06	0.00	3.65	0.25	0.05	0.05	4.16	1.30%	0.34	0.45%	0.26	0.22%	0.03	0.03%	4.79	0.77%
#5 PP Bottles	Blue	0.00	0.23	0.64	0.00	0.00	0.12	0.58	0.00	0.02	0.13	0.36	0.00	0.00	0.20	0.06%	0.37	0.48%	0.01	0.01%	0.00	0.00%	0.59	0.10%
#5 Other PP Containers	Blue	0.00	1.03	2.06	0.01	0.01	1.48	2.13	0.09	0.00	1.27	3.03	0.00	0.04	1.08	0.34%	2.93	3.85%	0.05	0.04%	0.01	0.01%	4.07	0.66%
#6 PS - Expanded Polystyrene	Blue	0.00	1.09	1.01	0.02	0.01	1.19	1.03	0.19	0.00	1.12	0.16	0.03	0.01	0.99	0.31%	1.05	1.38%	0.14	0.11%	0.01	0.01%	2.18	0.35%
#6 PS - Non-expanded Polystyrene	Blue	0.00	0.66	0.21	0.04	0.00	0.73	0.94	0.03	0.00	0.86	0.36	0.00	0.00	0.79	0.25%	0.82	1.07%	0.05	0.04%	0.01	0.01%	1.66	0.27%
Plastic Laminates and Other Film Packaging	Garbage	0.00	11.37	0.81	0.29	0.10	8.32	0.50	0.43	0.06	4.81	0.36	0.18	0.12	6.41	2.01%	0.61	0.80%	0.59	0.49%	0.06	0.06%	7.66	1.24%
Other Rigid Plastic Packaging	Blue	0.00	3.33	2.00	0.07	0.02	2.06	1.14	0.18	0.00	1.39	2.22	0.08	0.00	2.14	0.67%	1.48	1.94%	0.16	0.13%	0.01	0.01%	3.78	0.61%
Large HDPE & PP Pails & Lids	Blue	0.00	23.06	0.35	0.00	0.00	0.06	0.33	0.00	0.00	0.00	0.61	0.00	0.00	0.48	0.15%	0.35	0.46%	0.00	0.00%	0.00	0.00%	0.83	0.13%
Other Plastics - (non-packaging/durable)	Garbage	0.00	6.84	4.10	0.18	0.00	9.13	0.97	0.48	0.00	9.67	1.36	0.00	0.00	6.60	2.07%	1.69	2.22%	0.11	0.09%	0.01	0.01%	8.40	1.36%
Total Plastics		**0.00**	**65.25**	**43.82**	**3.93**	**0.47**	**37.25**	**29.70**	**3.90**	**0.21**	**33.18**	**28.72**	**1.42**	**0.26**	**33.92**	**10.62%**	**29.20**	**38.38%**	**3.96**	**3.31%**	**0.29**	**0.28%**	**67.37**	**10.88%**
4. METALS																								
Aluminum- food and beverage Containers (excluding alcoholic beverage containers)	Blue	0.00	0.36	1.79	0.04	0.00	0.48	3.72	0.10	0.00	0.16	1.78	0.00	0.00	0.67	0.21%	3.65	4.80%	0.04	0.04%	0.01	0.01%	4.37	0.71%
Aluminum (alcoholic beverage containers)	Blue	0.00	0.17	0.45	0.00	0.00	0.04	0.19	0.01	0.00	0.01	0.17	0.00	0.00	0.17	0.05%	0.40	0.52%	0.01	0.01%	0.00	0.00%	0.57	0.09%
Aluminum Foil & Foil Trays	Blue	0.00	1.11	0.14	0.05	0.01	0.93	0.74	0.00	0.00	0.61	0.00	0.00	0.01	1.23	0.39%	0.43	0.57%	0.02	0.01%	0.01	0.01%	1.69	0.27%
Aluminum Aerosols	Blue	0.00	0.15	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.01	0.00	0.00	0.00	0.11	0.03%	0.06	0.08%	0.00	0.00%	0.00	0.00%	0.17	0.03%
Steel Food and Beverage Cans	Blue	0.00	1.61	7.75	0.55	0.00	1.05	5.00	0.06	0.00	1.20	5.80	0.00	0.00	1.20	0.38%	6.05	7.95%	0.15	0.12%	0.00	0.00%	7.41	1.20%
Steel Paint Cans	Blue	0.00	1.35	0.14	0.00	0.00	0.11	0.05	0.00	0.00	0.00	0.96	0.00	0.00	0.43	0.13%	0.09	0.11%	0.01	0.01%	0.00	0.00%	0.52	0.08%
Steel Aerosol Container	Blue	0.00	0.73	0.14	0.00	0.00	0.94	0.48	0.00	0.00	0.38	0.29	0.00	0.00	0.58	0.18%	0.44	0.58%	0.01	0.01%	0.00	0.00%	1.04	0.17%
Total Metals		**0.00**	**5.48**	**10.42**	**0.63**	**0.01**	**3.65**	**10.27**	**0.17**	**0.00**	**2.38**	**9.00**	**0.00**	**0.01**	**4.40**	**1.38%**	**11.12**	**14.61%**	**0.23**	**0.20%**	**0.02**	**0.02%**	**15.77**	**2.55%**
5. GLASS																								
Clear Glass - food and beverage (excluding alcoholic beverage containers)	Blue	0.00	1.44	12.14	0.00	0.00	1.96	13.33	0.07	0.00	0.48	9.80	0.00	0.00	1.83	0.57%	12.59	16.54%	0.08	0.07%	0.00	0.00%	14.50	2.34%
Clear Glass - alcoholic beverage containers	Blue	0.00	0.25	1.76	0.00	0.00	0.09	1.28	0.00	0.00	0.27	0.97	0.00	0.00	0.45	0.14%	3.96	5.20%	0.03	0.02%	0.00	0.00%	4.44	0.72%
Coloured Glass - food and beverage (excluding alcoholic beverage containers)	Blue	0.00	0.18	3.07	0.00	0.00	0.00	15.42	0.00	0.00	0.00	0.25	0.00	0.00	0.16	0.05%	3.41	4.48%	0.00	0.00%	0.00	0.00%	3.57	0.58%
Coloured Glass - alcoholic beverage containers	Blue	0.00	1.80	2.91	0.00	0.00	0.00	0.50	0.20	0.00	0.16	0.53	0.00	0.00	0.31	0.10%	4.22	5.55%	0.05	0.04%	0.00	0.00%	4.58	0.74%
Total Glass		**0.00**	**3.67**	**19.88**	**0.00**	**0.00**	**2.05**	**30.53**	**0.28**	**0.00**	**0.91**	**11.55**	**0.00**	**0.00**	**2.75**	**0.86%**	**24.17**	**31.77%**	**0.16**	**0.14%**	**0.00**	**0.00%**	**27.09**	**4.38%**
6. MUNICIPAL HAZARDOUS OR SPECIAL WASTE																								
Pressurized Containers	Garbage	0.00	0.25	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.01	0.00%
Batteries (Consumer-Type Portable)	Garbage	0.00	0.25	0.37	0.00	0.00	0.21	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.69	0.22%	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.70	0.11%
Paint & Stain	Garbage	0.00	0.16	0.09	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.03%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.11	0.02%
Motor Oil	Garbage	0.00	0.20	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.05	0.01%
Other MHSW liquids	Garbage	0.00	0.00	0.00	0.00	0.00	0.27	0.02	0.00	0.00	0.00	0.15	0.00	0.00	0.06	0.02%	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.07	0.01%
Other MHSW	Garbage	0.00	0.43	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.23	0.07%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.23	0.04%
Home Health Care Waste	Garbage	0.00	0.15	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.17	0.00	0.00	0.00	1.37	0.43%	0.04	0.06%	0.00	0.00%	0.00	0.00%	1.42	0.23%
Total MHSW		**0.00**	**1.43**	**0.46**	**0.04**	**0.00**	**1.35**	**0.02**	**0.00**	**0.00**	**0.74**	**0.15**	**0.00**	**0.00**	**2.51**	**0.01**	**0.07**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**2.59**	**0.00**
7. ORGANICS																								
Avoidable Food Waste (leftover bakery)	Green	0.30	3.46	0.14	0.00	7.67	3.22	0.00	0.00	2.82	2.19	0.00	0.00	2.29	4.43	1.39%	0.01	0.01%	0.02	0.02%	3.24	3.11%	7.69	1.24%

Niagara Region - Waste Sort Results for Single-Family 2015/16

Municipality:		Thorold	Wainfleet	Wainfleet	Wainfleet	Wainfleet	Welland	Welland	Welland	Welland	West Lincoln	West Lincoln	West Lincoln	West Lincoln	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	TOTAL Niagara Region	GRAND TOTAL Niagara Region	GRAND TOTAL Niagara Region
Waste Stream:		Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Blue Box Recycling	Grey Box Recycling	Organics	Garbage	Garbage	Blue Box Recycling	Blue Box Recycling	Grey Box Recycling	Grey Box Recycling	Organics	Organics		
# of Single-Family Households		7,560	3,194	3,194	3,194	3,194	19,525	19,525	19,525	19,525	4,857	4,857	4,857	4,857	163,930		163,930		163,930		163,930			
Notes:																								
Material Category	Stream	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)	Weight kg/hh/yr	Percentage (% by weight)
Avoidable Food Waste (leftover meat & fish)	Green	0.38	3.06	0.00	0.00	0.00	1.78	0.00	0.00	2.33	2.83	0.00	0.00	1.22	3.58	1.12%	0.01	0.01%	0.00	0.00%	1.84	1.76%	5.43	0.88%
Avoidable Food Waste (leftover dried food)	Green	0.15	0.09	0.00	0.00	0.00	1.00	0.00	0.00	0.46	0.66	0.00	0.00	0.00	0.90	0.28%	0.00	0.00%	0.04	0.03%	0.41	0.39%	1.35	0.22%
Avoidable Food Waste (leftover fruit & vegetable)	Green	0.44	4.82	0.07	0.00	0.00	4.48	0.07	0.00	6.07	2.31	0.00	0.00	4.42	6.90	2.16%	0.01	0.01%	0.02	0.02%	5.79	5.55%	12.71	2.05%
Avoidable Food Waste (leftover other)	Green	6.91	11.53	1.18	0.00	0.00	10.93	1.78	0.00	12.72	16.99	0.24	0.00	7.66	17.02	5.33%	1.70	2.23%	0.13	0.11%	9.55	9.17%	28.40	4.59%
Avoidable Food Waste (untouched bakery)	Green	0.16	5.82	0.00	0.00	0.00	2.37	0.00	0.00	2.31	2.85	0.00	0.00	0.10	3.78	1.18%	0.00	0.01%	0.04	0.04%	1.49	1.43%	5.32	0.86%
Avoidable Food Waste (untouched meat & fish)	Green	0.00	4.08	0.00	0.00	0.00	2.36	0.00	0.00	0.08	0.86	0.00	0.00	0.00	2.74	0.86%	0.00	0.00%	0.00	0.00%	0.32	0.30%	3.05	0.49%
Avoidable Food Waste (untouched dried food)	Green	0.00	2.39	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.93	0.29%	0.00	0.00%	0.41	0.34%	0.22	0.21%	1.56	0.25%
Avoidable Food Waste (untouched fruit & vegetable)	Green	3.11	3.89	0.00	0.10	0.01	6.10	0.00	0.35	10.63	5.97	0.00	0.00	3.19	9.69	3.03%	0.06	0.08%	0.07	0.06%	5.54	5.32%	15.36	2.48%
Avoidable Food Waste (untouched other)	Green	0.05	14.02	0.00	0.14	0.00	3.77	0.20	0.01	1.19	2.51	0.00	0.00	0.00	8.44	2.64%	0.50	0.66%	0.09	0.08%	0.76	0.72%	9.79	1.58%
Unavoidable Food Waste	Green	19.08	43.30	2.24	0.02	5.13	37.13	0.25	0.03	47.48	20.25	0.08	0.00	48.68	39.92	12.50%	0.18	0.24%	0.25	0.21%	43.99	42.23%	84.33	13.62%
Yard Waste	Green	36.59	3.44	0.00	0.10	0.00	1.14	0.00	0.09	14.44	2.42	0.00	0.00	0.04	5.35	1.68%	0.02	0.03%	0.02	0.01%	8.05	7.73%	13.44	2.17%
Grass Clippings	Garbage	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.00	4.18	0.00	0.00	0.00	0.00	0.13	0.04%	0.00	0.00%	0.00	0.00%	0.96	0.92%	1.08	0.18%
Pet Waste	Green	11.37	103.32	0.04	0.00	0.00	44.25	0.00	0.00	8.28	23.19	0.00	0.00	17.36	33.91	10.62%	0.25	0.33%	0.01	0.01%	12.75	12.24%	46.92	7.58%
Molded Pulp Packaging	Green	0.14	0.72	0.13	0.05	0.00	4.88	0.04	0.56	0.78	0.92	0.16	0.06	0.21	1.48	0.46%	0.13	0.17%	0.77	0.64%	0.97	0.93%	3.34	0.54%
Non-laminated Paper/Packaging	Green	0.16	0.23	0.01	0.01	0.00	0.98	0.00	0.04	0.12	0.28	0.00	0.00	0.05	0.65	0.20%	0.01	0.01%	0.05	0.04%	0.10	0.10%	0.81	0.13%
Tissue/Towelling	Green	0.97	16.69	0.09	0.08	0.39	23.38	0.02	0.16	2.86	18.38	0.02	0.05	2.33	19.15	6.00%	0.09	0.12%	0.36	0.30%	5.37	5.16%	24.97	4.03%
Compostable Plastic Bags	Green	0.55	0.00	0.00	0.00	0.00	0.75	0.00	0.00	1.61	0.06	0.00	0.00	0.99	0.14	0.04%	0.00	0.01%	0.00	0.00%	1.27	1.22%	1.41	0.23%
Compostable Paper Bags	Green	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.11	0.11%	0.12	0.02%
Total Organic Materials		**80.35**	**220.87**	**3.89**	**0.50**	**13.20**	**149.51**	**2.36**	**1.24**	**118.41**	**102.85**	**0.49**	**0.10**	**88.53**	**159.13**	**0.50**	**2.97**	**0.04**	**2.29**	**0.02**	**102.72**	**0.99**	**267.10**	**0.43**
8. WEEE (Waste Electrical and Electronic Equipment)																								
TVs	Garbage	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Computer Monitors	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Computer Components	Garbage	0.00	0.25	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.03	0.01%
Laptops	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Computer Peripheral Devices	Garbage	0.00	1.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01%	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.04	0.01%
Audio/Video Equipment	Garbage	0.00	0.36	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.23	0.07%	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.24	0.04%
Telecom Equipment	Garbage	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.06%	0.03	0.04%	0.00	0.00%	0.00	0.00%	0.22	0.04%
Small Home Appliances	Garbage	0.00	0.00	1.11	0.00	0.00	0.45	0.00	0.00	0.00	0.08	0.00	0.00	0.00	1.08	0.34%	0.18	0.24%	0.00	0.00%	0.00	0.00%	1.26	0.20%
Other Electronics	Garbage	0.00	1.86	0.25	0.01	0.00	1.89	0.04	0.00	0.00	1.93	0.00	0.00	0.00	2.50	0.78%	0.15	0.20%	0.00	0.00%	0.00	0.00%	2.66	0.43%
Total WEEE		**0.00**	**4.34**	**1.36**	**0.01**	**0.00**	**2.64**	**0.04**	**0.00**	**0.00**	**2.79**	**0.00**	**0.00**	**0.00**	**4.07**	**1.27%**	**0.38**	**0.50%**	**0.01**	**0.00%**	**0.00**	**0.00%**	**4.46**	**0.72%**
9. BULKY ITEMS																								
Mattresses	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Wood Furniture or Fixtures	Garbage	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.01	0.00%	0.00	0.00%	0.07	0.06%	0.00	0.00%	0.08	0.01%
Plastic Furniture or Fixtures	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Carpeting	Garbage	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	1.70	0.00	0.00	0.00	1.04	0.33%	0.07	0.09%	0.00	0.00%	0.00	0.00%	1.10	0.18%
Other Large Bulky Items	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.07%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.22	0.04%
White Good Appliances	Garbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%
Total Bulky Items		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.81**	**0.00**	**0.59**	**0.00**	**1.70**	**0.00**	**0.00**	**0.00**	**1.28**	**0.40%**	**0.07**	**0.09%**	**0.07**	**0.06%**	**0.00**	**0.00%**	**1.41**	**0.23%**
10. OTHER MATERIALS																								
Diapers and Sanitary Products	Garbage	0.00	27.96	0.00	0.00	0.00	19.53	0.00	0.00	0.00	45.56	0.00	0.00	0.00	27.17	8.51%	0.11	0.15%	0.01	0.01%	0.01	0.01%	27.30	4.41%
Textiles	Garbage	0.00	28.15	0.25	0.02	0.00	12.28	0.04	0.20	0.00	16.37	0.00	0.00	0.00	11.45	3.59%	0.12	0.16%	0.07	0.06%	0.03	0.02%	11.67	1.88%
Construction & Renovation	Garbage	0.00	12.82	0.02	0.00	0.00	13.02	0.05	0.00	0.00	6.79	0.00	0.00	0.00	13.48	4.22%	0.07	0.09%	0.01	0.01%	0.01	0.01%	13.57	2.19%
Tires and Other Rubber	Garbage	0.00	0.04	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.26	0.08%	0.03	0.04%	0.00	0.00%	0.00	0.00%	0.28	0.05%
Ceramics	Garbage	0.00	1.63	0.44	0.51	0.00	2.45	0.70	0.05	0.00	0.33	0.00	0.00	0.00	1.62	0.51%	0.69	0.91%	0.02	0.02%	0.00	0.00%	2.33	0.38%
Other Aluminum (non-packaging)	Garbage	0.00	0.00	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00%	0.01	0.01%	0.00	0.00%	0.00	0.00%	0.01	0.00%
Other Steel (non-packaging)	Garbage	0.00	3.67	0.16	0.01	0.00	2.90	0.08	0.12	0.00	3.27	0.00	0.00	0.00	1.96	0.61%	0.62	0.81%	0.16	0.13%	0.00	0.00%	2.74	0.44%
Other Glass (non-Blue Box)	Garbage	0.00	3.58	7.70	0.01	0.00	2.94	0.33	0.13	0.00	1.11	2.01	0.00	0.00	1.55	0.49%	0.94	1.24%	0.04	0.03%	0.00	0.00%	2.53	0.41%
Coffee Pods	Garbage	0.00	1.46	0.00	0.00	0.00	2.56	0.01	0.00	0.00	0.31	0.00	0.00	0.00	2.36	0.74%	0.07	0.09%	0.05	0.04%	0.05	0.04%	2.53	0.41%
Other Waste	Garbage	0.00	63.43	2.57	0.41	0.03	26.19	0.62	0.81	0.12	60.22	1.35	0.07	0.38	26.39	8.26%	0.92	1.21%	0.60	0.50%	0.16	0.16%	28.08	4.53%
Total Other Materials		**0.00**	**142.72**	**11.25**	**1.00**	**0.03**	**82.56**	**1.83**	**1.32**	**0.12**	**134.04**	**3.35**	**0.07**	**0.38**	**86.25**	**27.01%**	**3.58**	**4.71%**	**0.96**	**0.81%**	**0.26**	**0.25%**	**91.05**	**14.71%**
Total Accepted Blue Box Material		**0.00**	**44.07**	**64.35**	**3.78**	**0.05**	**14.58**	**70.73**	**1.52**	**0.03**	**10.98**	**49.69**	**0.47**	**0.07**	**17.44**	**5.46%**	**63.15**	**83.00%**	**1.98**	**1.65%**	**0.07**	**0.07%**	**82.64**	**13.35%**
Total Accepted Grey Box Material		**0.00**	**44.61**	**7.65**	**29.71**	**0.33**	**25.79**	**1.05**	**110.77**	**0.15**	**24.41**	**1.52**	**25.61**	**1.50**	**27.02**	**8.46%**	**2.81**	**3.69%**	**112.73**	**94.24%**	**0.26**	**0.25%**	**143.38**	**23.16%**
Total Green Bin Organic Material		**80.65**	**220.87**	**3.89**	**0.50**	**13.20**	**149.03**	**2.36**	**1.24**	**114.86**	**102.85**	**0.49**	**0.10**	**88.59**	**159.01**	**49.80%**	**2.97**	**3.90%**	**2.29**	**1.91%**	**102.32**	**98.24%**	**266.02**	**42.96%**
Total Non-Divertible Material		**0.04**	**175.90**	**18.75**	**1.80**	**0.12**	**113.37**	**4.27**	**3.22**	**4.38**	**162.02**	**6.17**	**0.48**	**0.55**	**115.82**	**36.27%**	**7.16**	**9.42%**	**2.63**	**2.20%**	**1.50**	**1.44%**	**127.13**	**20.53%**
Grand Total		**80.69**	**485.45**	**94.64**	**35.79**	**13.70**	**302.77**	**78.41**	**116.76**	**119.42**	**300.25**	**57.88**	**26.66**	**90.71**	**319.29**	**100.00%**	**76.09**	**100.00%**	**119.63**	**100.00%**	**104.15**	**100.00%**	**619.16**	**100.00%**

APPENDIX C

CAPTURE RATES

Niagara Region - 2015/2016 Single Family Residential Curbside Study Capture Rates

Season:		Summer	Summer	Summer	Fall	Fall	Fall	Winter	Winter	Winter	Spring	Spring	Spring	4-Season Average	4-Season Average	4-Season Average
Sample Area:		Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region	Niagara Region
Material Category	Stream	Generated per Household per year (kg/hh/yr)	Captured per Household per year (kg/hh/yr)	Capture Rate (%)	Generated per Household per year (kg/hh/yr)	Captured per Household per year (kg/hh/yr)	Capture Rate (%)	Generated per Household per year (kg/hh/yr)	Captured per Household per year (kg/hh/yr)	Capture Rate (%)	Generated per Household per year (kg/hh/yr)	Captured per Household per year (kg/hh/yr)	Capture Rate (%)	Generated per Household per year (kg/hh/yr)	Captured per Household per year (kg/hh/yr)	Capture Rate (%)
1. PRINTED PAPER																
Newsprint - Daily and weekly	Grey & Green	19.14	17.69	92.43%	17.47	16.36	93.69%	17.36	16.78	96.62%	19.61	17.95	91.54%	19.51	18.56	95.16%
Other Newsprint - Other	Grey & Green	26.61	25.28	95.01%	27.46	25.27	92.04%	22.22	20.93	94.22%	32.27	30.15	93.42%	28.99	27.61	95.25%
Magazines and Catalogues	Grey	8.58	7.84	91.42%	6.95	5.97	85.96%	9.28	8.03	86.49%	9.93	8.45	85.08%	8.60	7.60	88.32%
Directories / Telephone books	Grey	1.53	1.45	94.67%	0.81	0.71	88.00%	0.59	0.58	97.87%	0.82	0.82	100.00%	0.94	0.89	94.91%
Other Printed Paper (Obligated)	Grey	9.18	5.50	59.96%	8.27	3.77	45.60%	8.68	5.26	60.61%	10.27	6.65	64.76%	9.31	5.50	59.10%
Other Printed Paper (Non-Obligated)	Grey	10.20	4.45	43.64%	5.43	2.92	53.87%	6.89	4.39	63.69%	13.50	8.62	63.87%	9.53	5.67	59.45%
Total Paper		**75.23**	**62.21**	**82.70%**	**66.37**	**55.01**	**82.88%**	**65.03**	**55.97**	**86.07%**	**86.40**	**72.64**	**84.08%**	**76.88**	**65.83**	**85.63%**
2. PAPER PACKAGING																
Gable Top Containers	Blue	2.84	2.51	88.53%	2.63	2.06	78.24%	2.58	2.26	87.89%	2.37	1.97	83.13%	2.70	2.30	85.11%
Aseptic Containers (excluding alcoholic beverages)	Blue	0.60	0.29	48.95%	0.79	0.52	65.51%	1.04	0.72	69.35%	1.10	0.62	55.93%	0.91	0.57	62.38%
Aseptic Containers - alcoholic beverages	Blue	0.02	0.01	42.86%	0.01	0.01	100.00%	0.00	0.00	100.00%	0.00	0.00	N/A	0.01	0.01	61.94%
Spiral Wound Containers	Blue	1.05	0.77	73.50%	0.63	0.37	58.48%	0.83	0.67	81.04%	0.76	0.57	74.63%	0.82	0.60	73.27%
Corrugated Cardboard	Grey & Green	36.48	32.85	90.04%	24.55	20.81	84.79%	26.23	23.75	90.54%	28.85	26.31	91.20%	31.44	28.68	91.23%
Boxboard	Grey & Green	21.37	15.69	73.44%	20.40	14.28	70.01%	21.22	16.37	77.13%	21.88	16.04	73.27%	22.36	17.32	77.48%
Cores	Grey & Green	1.72	0.75	43.65%	1.35	0.55	40.34%	1.27	0.50	39.17%	1.42	0.48	33.95%	1.52	0.65	42.89%
Total Paper Packaging		**64.07**	**52.88**	**82.53%**	**50.36**	**38.60**	**76.64%**	**53.18**	**44.28**	**83.26%**	**56.38**	**45.98**	**81.55%**	**59.76**	**50.13**	**83.89%**
3. PLASTICS																
#1 PET Bottles and Jars (excluding alcoholic beverages)	Blue	14.32	12.52	87.45%	11.41	9.50	83.25%	11.71	9.46	80.76%	12.60	10.93	86.75%	12.13	10.21	84.18%
#1 PET Bottles and Jars ≥ 5 L (excluding alcoholic beverages)	Blue	0.40	0.37	93.31%	0.45	0.35	77.85%	0.27	0.27	100.00%	0.60	0.52	86.47%	0.27	0.22	81.25%
#1 PET Bottles (alcoholic beverages)	Blue	0.16	0.16	99.04%	0.18	0.12	65.66%	0.13	0.10	81.53%	0.12	0.10	83.92%	0.15	0.12	81.80%
#1 PET Thermoform - Clear	Blue	4.11	3.51	85.62%	2.76	2.34	84.70%	3.40	3.00	88.01%	3.80	3.07	80.74%	3.55	2.96	83.38%
#1 PET Thermoform - Coloured	Blue	0.51	0.35	69.44%	0.44	0.27	61.88%	0.62	0.45	72.83%	0.48	0.31	64.99%	0.51	0.36	69.81%
#2 HDPE Bottles and Jugs (excluding alcoholic beverages)	Blue	5.26	4.60	87.52%	4.68	3.85	82.24%	4.42	3.57	80.83%	5.57	4.81	86.42%	4.99	4.18	83.68%
#2 HDPE Bottles and Jugs ≥ 5 L (excluding alcoholic beverage)	Blue	0.34	0.31	90.45%	0.16	0.16	100.00%	0.19	0.19	100.00%	0.09	0.02	21.33%	0.20	0.18	87.82%
#2 HDPE Bottles (alcoholic beverage containers)	Blue	0.10	0.10	100.00%	0.00	0.00	100.00%	0.14	0.14	100.00%	0.03	0.02	87.43%	0.07	0.07	99.64%
#2 Other HDPE Containers	Blue	0.48	0.34	70.39%	0.30	0.24	81.10%	0.31	0.29	92.37%	0.25	0.24	95.52%	0.34	0.27	80.55%
Flexible Film Plastic – LDPE & HDPE	Grey	12.17	3.81	31.31%	10.00	2.84	28.41%	9.66	2.94	30.49%	13.43	5.00	37.20%	11.18	3.61	32.26%
#5 PP Bottles	Blue	0.61	0.42	68.81%	0.56	0.26	47.38%	0.70	0.50	71.75%	0.66	0.53	80.62%	0.59	0.38	64.73%
#5 Other PP Containers	Blue	4.01	2.91	72.52%	4.35	3.06	70.21%	3.62	2.70	74.68%	3.80	2.85	75.06%	4.07	2.98	73.16%
#6 PS - Expanded Polystyrene	Blue	1.99	0.92	46.37%	1.84	0.97	52.44%	2.50	1.45	58.08%	2.28	1.34	58.80%	2.18	1.18	54.21%
#6 PS - Non-expanded Polystyrene	Blue	1.74	0.97	55.80%	1.35	0.56	41.48%	1.55	0.79	51.25%	1.70	0.99	58.46%	1.66	0.87	52.17%
Other Rigid Plastic Packaging	Blue	4.45	1.95	43.76%	2.72	1.32	48.60%	4.41	1.91	43.24%	3.66	1.52	41.66%	3.78	1.63	43.19%
Large HDPE & PP Pails & Lids	Blue	1.00	0.96	96.70%	6.09	0.32	5.18%	0.27	0.25	92.37%	0.14	0.14	96.65%	0.83	0.35	41.91%
Total Plastics		**51.63**	**34.21**	**66.26%**	**47.30**	**26.16**	**55.31%**	**43.90**	**28.02**	**63.83%**	**49.20**	**32.40**	**65.85%**	**46.51**	**29.57**	**63.56%**
4. METALS																
Aluminum- food and beverage Containers (excluding alcoholic beverage containers)	Blue	4.76	3.97	83.41%	4.13	3.54	85.62%	4.04	3.58	88.59%	4.27	3.59	83.97%	4.37	3.69	84.48%
Aluminum (alcoholic beverage containers)	Blue	0.77	0.60	77.96%	0.33	0.14	42.61%	0.29	0.27	93.94%	0.66	0.44	67.25%	0.57	0.40	70.59%
Aluminum Foil & Foil Trays	Blue	1.51	0.42	27.73%	1.57	0.37	23.49%	1.50	0.32	21.03%	1.86	0.60	32.35%	1.69	0.45	26.43%
Aluminum Aerosols	Blue	0.25	0.12	48.43%	0.10	0.01	12.11%	0.08	0.03	33.40%	0.16	0.06	33.84%	0.17	0.06	35.58%
Steel Food and Beverage Cans	Blue	5.98	4.81	80.34%	7.30	6.41	87.77%	8.28	6.94	83.82%	7.62	6.36	83.42%	7.41	6.20	83.69%
Steel Paint Cans	Blue	1.03	0.01	1.36%	0.63	0.30	47.51%	0.01	0.01	100.00%	0.59	0.18	31.14%	0.52	0.09	17.75%
Steel Aerosol Container	Blue	0.98	0.47	47.96%	1.12	0.48	42.28%	0.85	0.34	39.89%	1.05	0.47	45.18%	1.04	0.46	43.86%
Total Metals		**15.28**	**10.39**	**68.04%**	**15.20**	**11.25**	**73.98%**	**15.06**	**11.49**	**76.28%**	**16.21**	**11.70**	**72.19%**	**15.77**	**11.35**	**71.98%**
5. GLASS																
Clear Glass - food and beverage (excluding alcoholic beverage containers)	Blue	16.18	14.59	90.19%	12.89	11.24	87.19%	13.60	12.19	89.61%	14.50	12.68	87.47%	14.50	12.67	87.37%
Clear Glass - alcoholic beverage containers	Blue	5.00	4.53	90.58%	3.75	3.75	100.00%	4.29	4.09	95.26%	4.67	3.39	72.70%	4.44	3.98	89.76%
Coloured Glass - food and beverage (excluding alcoholic beverage containers)	Blue	2.32	2.08	89.35%	4.51	4.39	97.32%	3.84	3.75	97.70%	4.25	4.12	96.83%	3.57	3.41	95.50%
Coloured Glass - alcoholic beverage containers	Blue	4.69	4.50	95.83%	4.46	4.06	91.06%	3.83	3.63	94.86%	4.19	3.53	84.23%	4.58	4.27	93.31%
Total Glass		**28.20**	**25.69**	**91.13%**	**25.62**	**23.45**	**91.52%**	**25.56**	**23.66**	**92.56%**	**27.61**	**23.72**	**85.92%**	**27.09**	**24.34**	**89.84%**
7. ORGANICS																
Avoidable Food Waste (leftover bakery)	Green	5.60	1.96	34.95%	9.86	5.28	53.55%	6.04	1.85	30.68%	8.17	3.67	44.88%	7.69	3.24	42.11%
Avoidable Food Waste (leftover meat & fish)	Green	4.91	1.98	40.22%	6.40	1.99	31.06%	3.33	1.07	31.97%	5.55	1.96	35.29%	5.43	1.84	33.86%
Avoidable Food Waste (leftover dried food)	Green	1.47	0.56	37.81%	2.01	0.59	29.51%	0.84	0.01	1.13%	1.22	0.49	39.84%	1.35	0.41	30.29%
Avoidable Food Waste (leftover fruit & vegetable)	Green	13.39	5.72	42.68%	14.24	7.58	53.20%	6.40	1.91	29.87%	12.43	5.57	44.78%	12.71	5.79	45.51%
Avoidable Food Waste (leftover other)	Green	24.63	5.74	23.30%	29.69	11.68	39.35%	23.77	8.89	37.41%	34.39	13.07	38.00%	28.40	9.55	33.62%
Avoidable Food Waste (untouched bakery)	Green	7.12	2.34	32.86%	6.03	1.46	24.27%	4.27	1.15	26.97%	3.86	0.97	25.07%	5.32	1.49	28.03%
Avoidable Food Waste (untouched meat & fish)	Green	2.65	0.36	13.59%	3.77	0.19	5.09%	3.37	0.29	8.56%	2.17	0.43	19.96%	3.05	0.32	10.36%
Avoidable Food Waste (untouched dried food)	Green	1.67	0.08	4.59%	0.76	0.05	5.95%	3.55	0.77	21.68%	0.21	0.00	0.00%	1.56	0.22	13.99%
Avoidable Food Waste (untouched fruit & vegetable)	Green	16.87	5.88	34.84%	14.88	5.00	33.60%	13.99	5.02	35.87%	13.65	6.22	45.61%	15.36	5.54	36.09%
Avoidable Food Waste (untouched other)	Green	10.27	0.68	6.57%	10.33	0.77	7.47%	8.71	1.00	11.50%	7.68	0.64	8.28%	9.79	0.76	7.71%
Unavoidable Food Waste	Green	89.57	42.51	47.46%	71.42	36.20	50.69%	81.76	42.34	51.79%	81.96	45.05	54.97%	84.33	43.99	52.16%
Yard Waste	Green	15.05	9.91	65.87%	15.28	8.21	53.73%	3.45	1.94	56.20%	19.03	13.50	70.98%	13.44	8.05	59.91%
Pet Waste	Green	51.33	8.49	16.54%	35.72	11.42	31.96%	51.56	13.14	25.50%	60.59	17.67	29.16%	46.92	12.75	27.17%
Molded Pulp Packaging	Green	3.52	1.48	42.04%	4.96	1.12	22.68%	1.55	0.33	21.56%	2.49	0.58	23.19%	3.34	0.97	29.08%
Non-laminated Paper/Packaging	Green	1.17	0.09	7.77%	0.23	0.02	8.52%	1.19	0.19	15.67%	0.68	0.12	18.04%	0.81	0.10	12.45%
Tissue/Towelling	Green	27.26	5.16	18.92%	25.25	4.57	18.10%	21.50	4.34	20.17%	24.79	4.74	19.13%	24.97	5.37	21.51%
Compostable Plastic Bags	Green	1.53	1.36	89.01%	1.82	1.40	77.26%	0.90	0.88	98.07%	1.10	1.08	98.41%	1.41	1.27	89.53%
Compostable Paper Bags	Green	0.04	0.04	100.00%	0.18	0.17	94.74%	0.06	0.06	92.66%	0.13	0.13	100.00%	0.12	0.11	96.50%
Total Organic Materials		**278.05**	**94.31**	**33.92%**	**252.83**	**97.71**	**38.65%**	**236.25**	**85.19**	**36.06%**	**280.08**	**115.88**	**41.37%**	**266.02**	**101.76**	**38.25%**
Total Accepted Blue Box Material		**87.44**	**70.08**	**80.14%**	**82.19**	**60.97**	**74.19%**	**79.31**	**63.88**	**80.55%**	**83.82**	**65.98**	**78.71%**	**82.64**	**65.12**	**78.81%**
Total Accepted Grey Box Material		**146.96**	**115.31**	**78.47%**	**122.67**	**93.49**	**76.21%**	**123.42**	**99.53**	**80.65%**	**151.97**	**120.46**	**79.26%**	**143.38**	**116.10**	**80.97%**
Total Green Bin Organic Material		**278.05**	**94.31**	**33.92%**	**252.83**	**97.71**	**38.65%**	**236.25**	**85.19**	**36.06%**	**280.08**	**115.88**	**41.37%**	**266.02**	**101.76**	**38.25%**
Combined Recycling Capture Rate		**234.40**	**185.39**	**79.09%**	**204.86**	**154.47**	**75.40%**	**202.72**	**163.41**	**80.61%**	**235.80**	**186.44**	**79.07%**	**226.02**	**181.22**	**80.18%**
Overall Capture Rate for all Divertible Materials		**512.46**	**279.70**	**54.58%**	**457.69**	**252.18**	**55.10%**	**438.98**	**248.60**	**56.63%**	**515.87**	**302.32**	**58.60%**	**492.04**	**282.98**	**57.51%**

APPENDIX D

TECHNICAL MEMO ON NIAGARA WASTE AUDIT AND TRENDS ANALYSIS FROM 2010/11 TO 2015/16

Reclay StewardEdge
Product Stewardship Solutions

TO: Ben Dunbar, AET Group Inc.
FROM: Neil Menezes, Reclay StewardEdge Inc.
DATE: January 3, 2017
RE: Niagara Waste Audit and Trends Analysis from 2010/11 to 2015/16

Reclay StewardEdge (RSE) has undertaken comprehensive research and analysis to understand the Packaging Trends that may impact Niagara Region's strategy to reach diversion target of 65 percent by 2020. Additionally, this analysis will take into consideration the impact of the Waste Free Ontario Act (2016) through two scenarios: 100 percent producer control and 100 percent producer funded with municipal control.

Market Trends Analysis

General Trends

The mix and generation of materials as a result of our "on-the-go" lifestyle is changing, and these changes are becoming more noticeable in waste and recyclable streams managed by municipalities. For example, some producers are opting for smaller packaging sizes and greater use of flexible, light-weight packaging. Flexible packaging is seen to satisfy multiple needs of the on-the-go lifestyle, namely because of the portability, the ability to easily open and reseal the container, and the packaging durability. Notably, products sold with this type of packaging generally contain less packaging for the same volume of product, which is positive step towards packaging efficiency.[i] Flexible packaging has expanded across a number of product chains, including: snacks, processed meats and poultry, chocolate confectionary, and pet food.[ii] Flexible packaging however, is not readily recyclable as it consists of multiple layers of various materials that are inseparable (e.g. foil and plastic layers, multiple plastic polymers, etc.). Furthermore, as a consequence of its thin design flexible packaging is a difficult material to manage at a Material Recovery Facility. (MRF) It can comingle with other materials, creating further challenges for equipment and increasing instances of contamination.

On-the-go lifestyles also promote two other prominent trends, namely pre-prepared meals and single-serve packaging. Additionally, the relative growth in pre-prepared meal options, as well as single-serve portions, will inherently result in more, often flexible plastic, packaging. With continued expansion of convenience, single-serve, and on-the-go food options, flexible packaging is expected to remain the dominant packaging type, maintaining 29 percent globally.[iii] Moreover, as a consequence of the growing reliability on convenience and foods with on-the-go properties (bottled water and juice), PET containers are expected to experience significant growth 2014-2019 at 4.7 percent.[iv] Building on the growing consumer needs for convenience, there is additional development forecasted for the food and beverage packaging industries with growth expected at 4 percent and 4.4 percent respectively by 2019.[v]

Eco-responsible and sustainable packaging continue to gain momentum as a result of changes in legislation, growing consumer awareness and ultimately the bottom line. Changes in legislation have been directed at reducing the amount of packaging put on the market, this however has resulted in the 'lightweighting' of multiple materials, most notably plastic PET. Lightweighting will continue to gain momentum as multiple manufacturers have identified ways to lightweight materials while maintaining the integrity and durability of the packaging. For example, the Dow Chemical Company has created a new line of high performing resins for packaging that are both sustainable with significant lightweight capabilities.[vi]

Resulting from growing consumer awareness and concern, some brands are shifting to more environmentally friendly packaging options. This movement is shaped by two key brand initiatives: alternative and more sustainable sources for packaging material, and considering the ability to repurpose or reuse packaging.[vii] Additionally, "brown" is said to be the new "green" with a shift toward compostable packaging, where natural browns are preferred over bleached paper, and the use of plant based plastics (Bioplastics) which are perceived as an environmentally responsible alternative. As

a consequence of this understanding, consumers believe that all Bioplastics are the same and can be recycled or in some cases composted. However, while some plant based plastics, which are chemically identical to the oil based plastic can be actively recycled, other plant based plastics, like Polylactic Acid (PLA) are not and are a cause of concern at the MRF. Alternatively, some Bioplastics are sold to consumers indicating the plastic is compostable or biodegradable. While this may be true in some instances, Bioplastics often do not fully break down in most municipal composting systems, creating additional contamination and quality issues for the Municipal Organics Processing Facility.

Provincial Data

An analysis was conducted using Stewardship Ontario data to compare trends between 2012 (2010 data) and 2016 (2014). There are a number of notable changes between 2010 and 2014; noteworthy decreases include telephone books (-75%), newsprint CNA/OCNA (-36%), paint cans (-42%) and coloured glass (-27%). The declining trend was expected across newsprint and telephone books, as electronic sources continue to gain momentum and phase out paper products. The decline in steel paint cans was expected to a lesser extent, largely as a result of designated program for the collection of paint and steel paint containers. There were three notable material increases, namely plastic film (18%), boxboard (10%), and other plastics (9%). Both plastics categories are aligned with global plastic growth trends, especially related to flexible plastics (plastic film). This is largely as a consequence of producers and manufacturers continuing to put emphasis on the reduction of material inputs resulting in both light-weighted packaging and a proliferation of products now packaged in flexible 'pouch' packaging versus traditional containers, for example pet food and lubricating oil, which are not recyclable.

Niagara Data

Using the 2010-2011 and 2015-2016 data, the analysis included a review of the material composition between the two data sets as well as an assessment of the overall total generation and recovery rate changes. In the 2010-2011 audit, Niagara was achieving a 47.5% diversion, which had dropped slightly to 45.7% in 2015-2016. This decline in overall diversion is due to three key factors: declining generation of materials with high recovery rates, increasing generation of materials with typically low recovery rates, and low diversion of acceptable organic waste. The current diversion rate of 45.7% in Niagara is based on an 80% diversion of acceptable recyclable materials but only a 37% diversion of acceptable organic materials. Although the audits represent two limited sets of sample data, this provides a general reflection of the successes and challenges of the Recycling and Organics programs in the region. At a high level it is evident that both streams are contributing to the challenges associated with reaching the 65 percent target diversion rate by 2020. However, it should also be noted that the diversion rate goal is also based on other efforts, including drop-off depot tonnage for other waste streams which have not been assessed as part of the curbside audit.

Total waste generation is on a downward trend, declining by 11%, including the declines in the following material types: newspaper – dailies and weeklies (-42%) and newspaper – other (-24%), boxboard (-10%), books & mixed fine paper (-26%), and shredded paper (-13%). This declining trend is particularly notable as these material types represented 20% of the total waste stream[1] in the 2010-2011 audit to approximately 18% in the 2015-2016 audit. These materials also represent some of the materials with the highest recovery rates: newspaper - newspaper – dailies and weeklies (95%) and newspaper – other (95%), boxboard (75%), books & mixed fine paper (59%), and shredded paper (59%).

The most significant change resulting from the aforementioned analysis is a combination between a decline in waste generation for material types that have traditionally represented a relatively large portion of the waste stream, with high recovery, namely newspapers. While boxboard generation appears to be declining, it represents 4% of the waste stream with an unchanged recovery rate of 75%. It should be noted however, that the decline in boxboard generation in the Niagara region reflects the opposite of provincial trends; Niagara's boxboard generation declined 10% while the provincial generation increased 10%. The downward trend of the aforementioned material types will impact the

[1] Total waste stream is defined as the combination of all waste streams; garbage, recycling and organics stream.

Region's ability to achieve the target recycling goals as a result of putting more pressure on all other material types that traditionally have not had significant recovery rates.

There were a number of notable waste generation increases identified, namely: laminated/other plastic bags & film (96%); LDPE (#4) and PP (#5) other bottles, jars and jugs (68%); PET bottles (11%) and glass (9%). This is especially notable as these materials, with the exception of glass, have experienced similar growth in the provincial stream, and are expected to grow further in global trends. While there has been a generation increase of these materials, two of the growing materials types achieved a significantly low recovery rate, specifically laminated/other plastic bags & film (14%) and LDPE (#4) and PP (#5) other bottles, jars and jugs (58%). While currently these material types only make up approximately 1% of the waste stream, both global and provincial trends have identified these plastics for significant growth in the coming years. As a result of the changes in waste generation, composition, and recovery, Niagara will need to determine if efforts should be concentrated toward improving recovery of materials that represent a relatively significant percentage of the waste stream, perhaps despite the reduced material value.

Considerations and Recommendations

To increase overall diversion, the Region should consider the following factors of consideration and recommendations associated with recycling and organics collection.

There are two primary factors contributing to the low diversion rate, namely the Organics program and the changing composition, generation, and recovery of certain recyclable material types. With consideration to the Organics program, the Region should focus on improving the recovery of the *right* materials. Specifically, there continues to be significant quantities of divertible organic material in the garbage (food and pet waste).[2] This can be attributed to a variety of factors, including but not limited to the 'yuck' factor, resulting in residents who choose not to properly divert these materials because they find it unpleasant.

If greater Organics diversion is not achieved, the Region will not be able to reach its overall diversion target of 65 percent by 2020. Improving the Organics program will require focus, above the current social marketing and education campaigns. The Region should ensure that its current practice of leaving behind untagged garbage containers over the limit, or highly contaminated Organics bins with an explanatory note that both encourages residential participation while providing a reminder about proper disposal and recycling practices in the Region is continued. This practice will ensure more of the *right* items are included in the Organics stream, rather than being disposed of in the garbage stream. It is important to note that in the 2015 waste audit, 50% of the waste found within the garbage stream consisted of organic materials. This was virtually the same finding as the 2010 audit (51%).While the Region currently employs a fee for additional garbage container collection as a deterrent, the Region may also wish to focus on alternative collection mechanisms to discourage residents from putting Organics in garbage stream, such as a move to bi-weekly garbage collection.

With consideration to the changing trends related to recycling composition, generation and recovery, the Region should focus on material types not achieving a high recovery rate as comparable material types (e.g.: boxboard recovery rate at 75% compared to corrugated cardboard at 91%, etc.), and/or materials with growing generation trends with low recovery rates. While both books & mixed fine paper, and shredded paper are on the decline in the region, both these materials continue to make up 3% of the waste stream respectively. While these materials should be prioritized, an overall shift in focus should take place on materials that are growing in generation and expected further growth.

With consideration of all analytical factors, including the market trends analysis, Stewardship Ontario data, and Niagara Region's waste audits, RSE has the following recommendations:

- ✓ Focus on Organics diversion and ensure residents are putting more of the right materials in the right place (yard and pet waste in Organics versus garbage).

[2] Yard waste and grass clippings were excluded from the analysis.

- ✓ Reconsider bi-weekly garbage collection. If the Region does wish to consider moving to bi-weekly garbage collection, it is recommended the Region implement a small scale pilot in representative communities to test the effectiveness before a large scale roll-out. The objective will be to increase the capture of Organics available for collection at the home and to reduce the amount of Organics in the garbage stream.
- ✓ Consider additional research to determine which areas/neighborhoods of the Region with certain demographics have the most challenge with the Organics program.
    - This will guide any future Promotion and Education initiatives to target the root of the matter, namely whether participation is limited because of lack of education and awareness, or the 'yuck' factor.
- ✓ Consider creating Guide or Promotion and Education initiatives to focus on non-traditional materials that are not achieving optimal recovery performance:
    - Boxboard
    - Hard-cover books not accepted while paperback can be recycled
    - Shredded paper should be collected in clear bags to avoid contamination to ensure material recovery.

Waste Free Ontario Act (2016)

The Act was proclaimed on November 30, 2016, ensuring that Extended Producer Responsibility (EPR) policy will be continued and strengthened in Ontario. In addition, the Ministry of Environment and Climate Change (MOECC) released their Final Draft for the Strategy for a Waste Free Ontario Building the Circular Economy, in December 2016. However, even with the Proclamation of the Act and revised Strategy Document, there is still uncertainty around the role municipalities will play under the new act. As this is unknown at the time of the writing of this memo, the assessment considers two potential scenarios relating to EPR policies for Printed Paper and Packaging: 100 percent producer control and 100 percent producer funded with municipal control.

The 100 percent producer control is similar to the current model in British Columbia. While the legislative intent was to create full EPR, the outcome was less than ideal for municipalities. Municipalities were presented with the first right of refusal. Specifically, to either accept the terms and conditions and pricing offered and turn the collection and sorting service to Multi-Material British Columbia (MMBC), or to refuse the offer and continue providing recycling service. This inevitably created a monopoly for residential processing. Municipalities are not seeing full responsibility, but rather fixed terms with multiple terms and conditions as required by MMBC. Other regulated programs in British Columbia for other products such as electronics, tires, paint are managed under programs that are 100 producer controlled and financed systems.

Conversely, 100 percent producer funding with municipal control is more similar to the model in Ontario if the funding was raised from the current 50 percent to 100 percent. The legislation has the intent of ending the current Stewardship Ontario monopoly by introducing a competitive compliance scheme. However, there are few details on how coordination between multiple schemes would be facilitated. The existing infrastructure however, will be shared, thereby ensuring that all Blue Box materials will remain together. While this model would facilitate options for both producers and municipalities, it is unclear whether the legislation will include a mechanism, or expand on the Authority's role, to ensure service providers and municipalities collaborate. An example of this approach exists in Quebec where the current Blue Box program allows for municipal control of the program, with 100 percent steward funding of reported costs with some built in deductions.

While the Act has passed, the specific details will be in regulations that have not been Tabled at this time. Consequently, it is unclear which type of scenario would be realized in Ontario. What is evident however, is that the Minister and the legislation are clear about creating a truly Extended Producer Responsibility program that does not foster or facilitate the existing inefficiencies and challenges associated with diversion programs and producer stewardship.

[i] Mintel Group. (2013). *Consumer Trends and Flexible Packaging: How packaging can help drive trends* . London: Mintel Group, 5.
[ii] Ibid, 9.
[iii] Packaging Machinery Manufacturers Institute. (2015). *Global Packaging Trends - Global Growth Markets for Packaging.* Reston: The Association for Packaging and Processing Technologies, 6.
[iv] Ibid
[v] harma, D., & Sinha, A. A. (2016, February 17). *Out of the Box: Trends in Global Packaging.* Retrieved from The Smart Cube: http://www.thesmartcube.com/insights/trends/item/out-of-the-box-trends-in-global-packaging?category_id=27
[vi] Ibid
[vii] Mintel Group. (2016). *Global Packaging Trends.* London: Mintel Group, 3.