



City of Spruce Grove

Final Report: Residential Waste Audit

November 2022

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S-Cubed Environmental

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Executive Summary

The City of Spruce Grove engaged S-Cubed Environmental to carry out a curbside residential waste audit in the summer and fall of 2022 to collect quantitative data on the performance of its residential garbage, organics, and recycling collection program, and to compare data collected with similar waste audits conducted in 2016 and 2019.

This waste audit examined the waste from a sample of 100 households during audit periods in June and November. The garbage cart, organics cart and recycling bag streams were studied. The audit categories for all streams were: paper, plastics, metal, glass, organics, beverage containers, electronics, textiles, household hazardous waste (HHW), and landfill, with numerous sub-categories for each.

This 2022 residential waste audit showed a 47% curbside diversion rate, which is a slight decline from the 2019 and 2016 waste audits, 48% and 51% respectively. The difference between the audits is within the margin of error.

Sixty percent of materials in the garbage stream consisted of compostable, recyclable, and reusable materials that could be diverted from the garbage through current Spruce Grove diversion programs.

The biggest waste diversion opportunity is to increase the quantity of compostable materials diverted from the garbage cart into the organics cart. During the waste audit, 44% of the garbage stream consisted of compostable materials (by weight).

The Single-Use Item Reduction Bylaw has achieved great success in reducing the generation of the targeted items: plastic checkout bags, plastic straws, and polystyrene food service ware. The number of single-use items counted during the 2022 waste audit was approximately half that counted in the 2019 audit.

The City has an opportunity to build on previous successful Community-Based Social Marketing pilot projects to increase participation in the organics cart program and other diversion programs. There are opportunities to expand educational materials and approaches to foster increased diversion of materials to the organics cart, recycling bag, Eco Centre and for reuse.

There are links between waste diversion and the City's climate action goals. Waste reduction and diversion reduce GHG emissions and there are calculator tools available to enable the City to calculate GHG emissions reductions associated with its waste diversion programs.

The new provincial EPR regulatory framework should lead to cost savings for the City as the physical and financial burden of collecting, sorting, processing and recycling materials is shifted to the producers of the products, and away from local governments and taxpayers.

1 Background

The City of Spruce Grove (the City) engaged S-Cubed Environmental to carry out a curbside residential waste audit in the summer and fall of 2022 to collect quantitative data on the performance of its current residential garbage, organics, and recycling collection program. The City operates a comprehensive waste collection program with a focus on waste reduction and diversion. In addition to curbside collection they operate an Eco Centre and several seasonal waste diversion events, including Large Item Pick Up, Free-cycle, Shred-4-Free and E-roundup.

The City provides curbside garbage, organics and recycling collection to approximately 11,630 single-family households. Garbage and recycling are collected weekly. Organics is collected weekly from mid-April through mid-November and monthly from December through March. Recycling is manually collected in bags, while garbage and organics are collected using an automated cart system.

The City is committed to providing educational and promotional tools to support residents to successfully divert materials from the waste stream. Due to recycling market challenges, there have been some changes to the list of items that can be recycled through the blue bag program. Several plastic types are no longer accepted in the blue bag.

The main goals of this residential waste audit were to:

- understand whether recycling and organics diversion rates have been impacted by the changes to the list of items that can be recycled through the blue bag program;
- determine if there has been a reduction in garbage generation rates following enhanced communication strategies and diversion programs – in comparison with waste audit data from 2016 and 2019; and,
- develop a better understanding of the weight and number of single-use items in the garbage, recycling and organics streams.

In this report, **waste** refers to the combined streams of garbage, recycling, and organics. A glossary of terms used in this report is located in Appendix A.

2 Residential Waste Audit Methodology

This curbside residential waste audit examined the waste from a sample of 100 households. The sample consisted of the same 100 households from different neighbourhoods, which were sampled both in the summer (June 22nd to June 24th) and fall (November 2nd to November 4th) 2022. The specific households were chosen randomly, and included several neighbourhoods representing a range of City demographics. The same addresses were sampled in the 2022 waste audit as were sampled in the 2019 waste audit.

S-Cubed personnel started each day at 7:00 am by visually assessing and recording waste data at the curbside pick-up locations. A daily sampling log sheet with the house addresses to be sampled was used to track waste details (i.e., date, time, number and fullness of the garbage and

organics carts, number of recycling bags, presence of visual contamination in the organics carts and recycling bags, presence of loose cardboard).

GFL Environmental then collected the waste samples from the various neighbourhoods. Samples were brought to the old Public Works building. Garbage and recycling streams were emptied inside the building and the organics samples were emptied onto a concrete pad outside the building.



Image 1 – Sorting area set-up

At the sorting site, digital photographs of waste samples were taken before sorting. Samples from each of the garbage, recycling and organics streams were hand-sorted by a team of three to five people into bins, carts and buckets lined with black garbage bags labelled with the subcategories described in Appendix B. Materials were weighed using a floor scale accurate to five grams. Notes about unexpected and unusual materials were documented. Data were recorded in a spreadsheet for data analysis.

3 Residential Waste Audit Categories

The audit categories for all streams were paper, plastics, metal, glass, organics, beverage containers, electronics, textiles, household hazardous waste (HHW), and landfill. Appendix B contains a detailed list of categories and sub-categories, including examples of items found in each subcategory. Residential Waste Audit results are found in Appendix C.

For each of the garbage, recycling and organics streams, the S-Cubed team separated and counted single-use items found within the stream, including the following: plastic grocery bags, straws, cutlery, lids, takeout plastic cups, and takeout containers (sub-sorted into polystyrene, paper and plastic clamshells), hot and cold paper to-go cups. The results of this single-use item analysis are presented in Section 4.6.

The term **contamination** refers to material found in the sample that does not belong in the respective program. For example, a black plastic garbage bag in the organics cart is considered contamination, as the organics cart should only contain compostable items. If a glass jar was found in a recycling bag, it was considered contamination because glass is only accepted for recycling at the Eco Centre.

4 Comparison of Summer and Fall Waste Audits – Results & Discussion

4.1 Set-Out Rate and Cart Observations

This section describes observations made during the visual inspection of the curbside waste pick-up location at each sample home. The set-out rate is the percentage of sample participants that placed a garbage cart, organics cart or recycling bag out for collection on a particular day.

Garbage Cart

The set-out rate for garbage carts for the overall waste audit was 81%. During the summer audit period, there was a 84% set-out rate, while during the fall audit period, the set-out rate was slightly lower at 78%. It was snowy during the fall audit period, and set-out rates for all streams were lower – potentially due to the inclement weather. Table 1 summarizes the average set-out rate for garbage and most frequent garbage cart fullness level during the 2022 audit.

Table 1 – Overall Garbage Cart Set-Out Rate and Cart Fullness Assessment – 2022 Study

Parameter Assessed During Visual Inspection	Percent of Homes
Homes with garbage cart at the curb	81%
Most frequent cart fullness level	100%

Recycling Bag

The set-out rate for recycling bags for the overall residential waste audit was 40%. During the summer audit period, the set-out rate for recycling bags was 45%. During the fall audit period, this dropped to 34%. It was snowy during the fall audit period, and set-out rates for all streams were lower – potentially due to the snowy weather.

Table 2 summarizes recycling bag set-out rate data for the overall residential waste audit.

Table 2 – Overall Recycling Bag Set-Out Rate – 2022 Study

Parameter Assessed During Visual Inspection	Percent of Homes
Recycling Bag(s) or cardboard at the curb	40%
One Recycling Bag	26%
Multiple Recycling Bags	10%
Only cardboard at the curb	4%

Organics Cart

The set-out rate for the organics cart for the overall residential waste audit was 47% (Table 3). During the summer audit period, the set-out rate for the organics cart was 57%. During the fall audit period, this dropped to 37% -- again, likely due to the snowy conditions. During both the summer and fall waste audit periods, there was weekly collection of the organics cart.

Table 3 – Overall Organics Cart Set-Out Rate and Cart Fullness Assessment – 2022 Study

Parameter Assessed During Visual Inspection	Percent of Homes
Households with organics cart at the curb	47%
Most frequent cart fullness level	50%

4.2 Garbage Cart Stream

Eighty-one percent of households set garbage at the curb during the two seasons of the residential waste audit. On average throughout the two waste audit periods, households disposed of 12.3 kilograms of garbage per week.

There was a slightly higher garbage generation rate during the summer audit period (12.4 kilograms per household), in comparison with the fall audit (12.1 kilograms per household).

Figure 1 shows a comparison of the composition of the garbage cart stream between the summer and fall waste audit periods. The quantity of recyclable materials and materials that could have been diverted / disposed of at the Eco Centre was similar between the two seasons of the waste audit. A notable difference between the two audit periods was that there was a greater proportion of compostable material in the garbage cart stream during the fall audit (48.6%), in comparison with the summer audit period (40.3%).

On average across both audit periods, 60% of the garbage cart stream consisted of compostable, recyclable and reusable materials that could be diverted from the garbage through current Spruce Grove diversion programs. On average, 40% of the materials in the garbage cart stream could not currently be diverted from the landfill through existing waste diversion programs. However, there remain opportunities for Spruce Grove to consider creating more waste diversion opportunities for particular materials, as further detailed in Section 6.

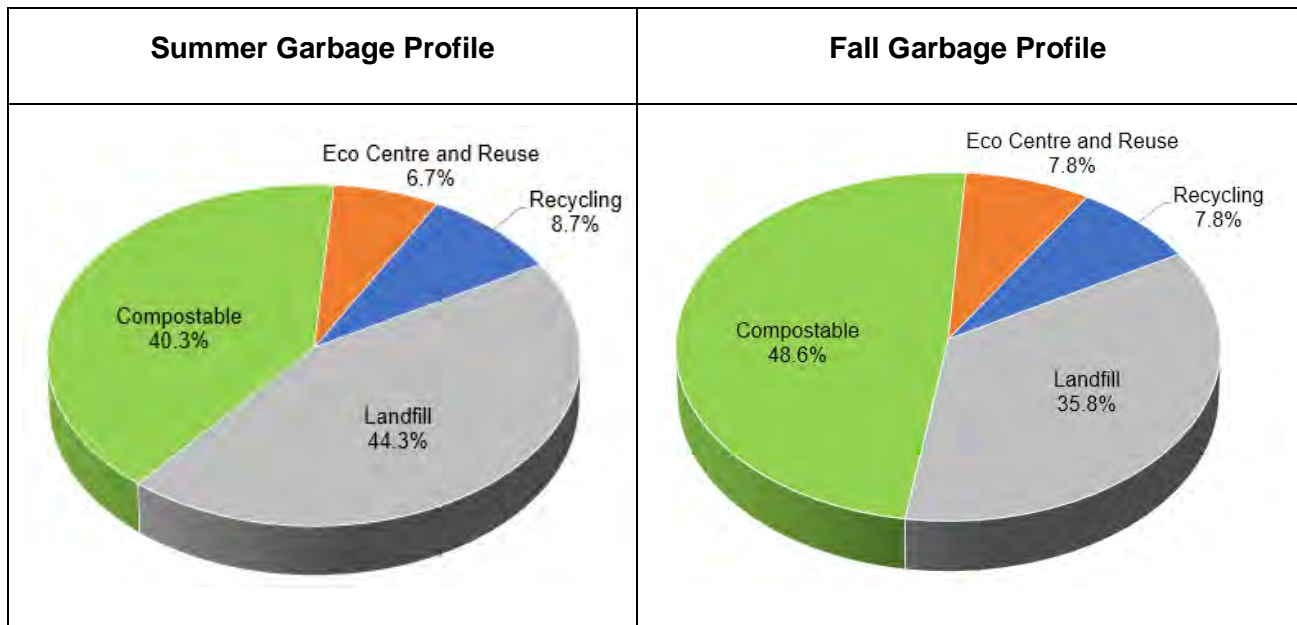


Figure 1 – Composition of the Spruce Grove Residential Garbage Stream in Summer and Fall 2022

On average over the entire waste audit, 44% of the garbage stream consisted of compostable items (by weight). Compostable materials in the garbage consisted primarily of edible food waste, inedible food waste, animal waste, compostable paper and food in packaging. It was notable that there was a low quantity (2%) of yard and garden material in the garbage stream across the entire waste audit.

On average over the entire waste audit, 8.3% of materials in the garbage stream could have been placed in the recycling bag. Materials in this category consisted of mixed paper, rigid plastic, refundable beverage containers and smaller amounts of cardboard and metal food cans.

On average over the entire waste audit, 7.3% of materials in the garbage stream could have been diverted to the Eco Centre or donated for reuse. The main materials in this category consisted of electronics, textiles (such as clothing and shoes), glass food jars, and reusable items.

Household hazardous waste items (excluding electronics) that should be dropped off at Eco Centre made up 0.5% of the garbage cart stream. Although this is not a large portion of the garbage stream, it is important that hazardous materials be disposed of properly. When placed in the garbage cart, household hazardous materials such as propane tanks and household chemicals can potentially injure collections staff and can release toxic chemicals into the environment.

Materials for which there is currently no diversion program in Spruce Grove (40%) consisted mainly of 'other waste' (including items such as coffee pods, packaging with the product inside, furniture table legs, a dog bed, tree trunk, inflatable mattress, furnace filters, arts and crafts, and fines (small pieces of glass, organic material, cigarette butts, and paper that are difficult to pick up)), non-recyclable plastic (flexible and/or stretchy plastic, food wrappers, candy wrappers), hygiene/diapers/pet pads, non-recyclable paper (hot/cold to-go cups, plastic-lined paper fast-food

containers), construction and demolition waste (vinyl siding, painted wood, treated wood, and ceramic tile), and non-recyclable glass and ceramics.

The detailed composition of the residential garbage cart stream sampled in summer and fall of 2022 is found in Table 4.

Table 4 – Detailed Composition of the Spruce Grove Residential Garbage in Summer and Fall 2022

Audit Sub-Categories	Summer 2022		Fall 2022	
	Kg	%	Kg	%
Compostable	499.49	40.3%	589.45	48.6%
Inedible food waste	152.65	12.3%	128.29	10.6%
Edible Food Waste	143.85	11.6%	186.99	15.4%
Animal Waste	91.96	7.4%	121.22	10.0%
Compostable Paper	65.23	5.3%	49.07	4.0%
Food In Packaging	33.74	2.7%	33.30	2.7%
Other Organic Material	7.56	0.6%	2.03	0.2%
Shredded Paper	2.81	0.2%		0.0%
Yard & Garden	1.71	0.1%	46.60	3.8%
Pumpkins		0.0%	21.96	1.8%
Recyclable	107.88	8.7%	94.49	7.8%
Mixed paper	59.43	4.8%	54.46	4.5%
Rigid Plastic	22.74	1.8%	16.64	1.4%
Refundables	12.31	1.0%	5.10	0.4%
Cardboard	7.53	0.6%	6.97	0.6%
Metal Containers	5.89	0.5%	11.34	0.9%
Eco Centre and Reuse	83.36	6.7%	94.51	7.8%
Clothing & Footwear	22.66	1.8%	17.53	1.4%
Electronics	22.50	1.8%	28.03	2.3%
Glass Food Jars	20.69	1.7%	16.21	1.3%
Donatable items	8.20	0.7%	17.95	1.5%
Household Textiles	4.27	0.3%	2.98	0.2%
HHW	4.15	0.3%	8.96	0.7%
Batteries	0.82	0.1%	1.05	0.1%
Polystyrene Packaging	0.07	0.0%	1.82	0.2%
Landfill	549.81	44.3%	433.28	35.8%
Other Waste	207.96	16.8%	140.66	11.6%
Hygiene/Diapers/Pet Pads	104.55	8.4%	71.17	5.9%
NR Plastic	104.38	8.4%	106.95	8.8%
NR Paper	25.35	2.0%	12.15	1.0%
Aggregates /Soil / Clay	20.28	1.6%	1.00	0.1%
NR Glass & Ceramics	18.08	1.5%	21.92	1.8%
NR Metal	17.65	1.4%	12.25	1.0%
C&D Waste	17.09	1.4%	28.42	2.3%

Audit Sub-Categories	Summer 2022		Fall 2022	
	Kg	%	Kg	%
Other Textiles	12.04	1.0%	9.21	0.8%
Garbage Bags	11.50	0.9%	18.41	1.5%
Flexible Plastic	10.94	0.9%	11.16	0.9%
Grand Total	1240.53	100.0%	1211.73	100.0%

GARBAGE AUDIT IMAGES | The following images show examples of items found in the garbage cart stream during the fall audit. The summer report located in Appendix F shows examples of items found during the summer audit.

Organic Material That Could Have Been Diverted

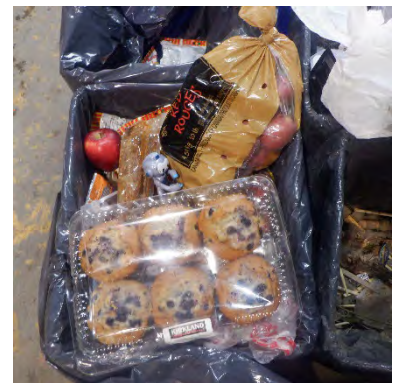
On average across the entire waste audit, 44% of the material found in the garbage could have been composted or eaten instead of sent to a landfill.



Edible food



Food in packaging



Food in packaging



Inedible food waste



Compostable paper



Yard waste

Materials That Could Have Been Recycled in Recycling Bag

On average, about 8% of the material found in the garbage could have been placed in the recycling bag.



Rigid Plastic



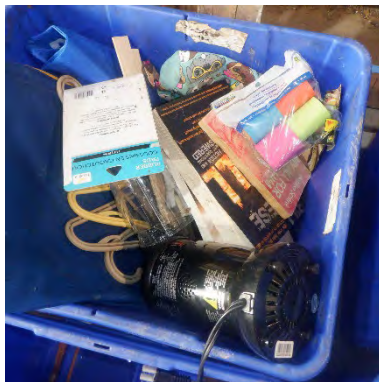
Mixed paper



Metal containers

Materials That Could Have Been Taken to Eco Centre or to a Thrift Store

On average, about 7% of the material found in the garbage could have been diverted to the Eco Centre or donated for reuse.



Hangers, books, working Magic Bullet blender, and party supplies.



Electronics – if not working, should be taken to Eco Centre for electronics recycling.

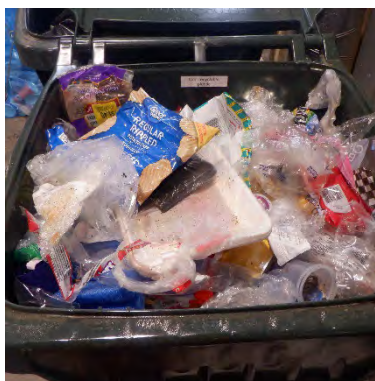


Clothing and footwear

Landfill



Construction waste



Non-recyclable plastic



Plastic takeout cups



Other waste – photo album



Hot to-go cups



Styrofoam takeout containers



Self-contained cat litter box (containing litter and feces).



Non-recyclable paper



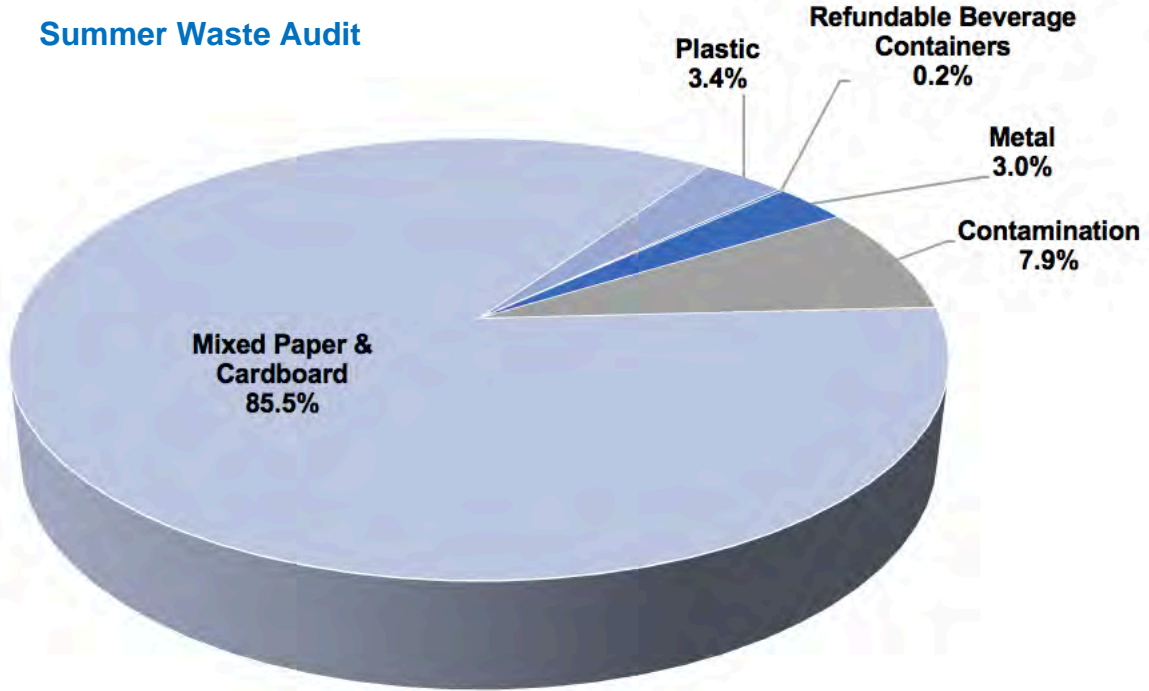
Non-recyclable glass and ceramics

4.3 Recycling Bag Stream

On average, 40% of households set recycling bags and/or cardboard at the curb during the two-season residential waste audit. The recycling bag generation rate was 1.6 kilograms of recycling per household per week. Once contaminants were removed from the recycling bag stream, the generation rate fell to an average of 1.5 kilograms of recyclables per household per week. The recycling bag generation rate during the summer audit with no contamination removed was 1.6% and the rate for the fall was 1.7%.

Figure 2 shows the proportion of the various categories of materials in the recycling stream for both the summer and fall waste audit periods. On average across the entire waste audit, the recyclable material in the recycling stream consisted predominantly of mixed paper and cardboard (89%), with cardboard comprising 47% and mixed paper 42%. On average, the recycling bag stream contained 2.8% rigid plastic, 2.3% metal containers and 0.8% refundable beverage containers.

Summer Waste Audit



Fall Waste Audit

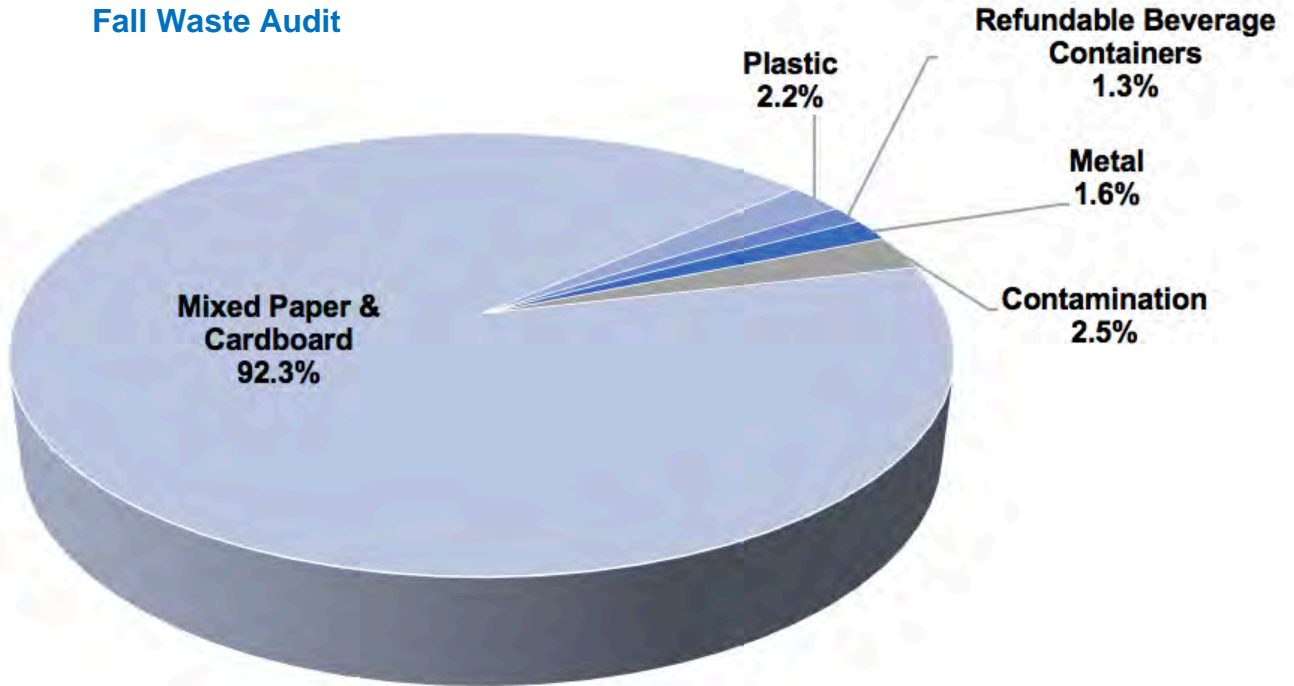


Figure 2 – Composition of the Spruce Grove Residential Recycling Bag Stream in Summer and Fall 2022.

Figure 2 aggregates items that do not belong in the recycling bag as contamination. There was a decline in the proportion of contamination in the recycling bag between the summer and fall waste audits. There was 7.9% contamination in the recycling bag in the summer audit and 2.5% contamination in the fall audit, giving an average contamination rate of 5.1%.

The majority of the contamination in the recycling bag stream consisted of contaminated recycling (excess food residue in plastic containers), non-recyclable plastic, glass food containers, non-recyclable paper, and flexible plastic.

The detailed composition of the residential recycling bag stream sampled in summer and fall of 2022 is in Table 5.

Table 5 – Detailed Composition of the Spruce Grove Residential Recycling Bag Stream in Summer and Fall of 2022.

Audit Sub-Categories	Summer 2022		Fall 2022	
	Kg	%	Kg	%
Recyclable	146.45	92.1%	163.33	97.5%
Mixed paper	74.87	47.1%	62.31	37.2%
Cardboard	61.13	38.4%	92.31	55.1%
Rigid Plastic	5.40	3.4%	3.73	2.2%
Metal Containers	4.75	3.0%	2.76	1.6%
Refundables	0.31	0.2%	2.23	1.3%
Contamination	12.58	7.9%	4.20	2.5%
Contaminated Recycling	3.76	2.4%	1.21	0.7%
NR Plastic	2.80	1.8%	1.27	0.8%
Glass Food Jars	2.09	1.3%	0.16	0.1%
Flexible Plastic	1.12	0.7%	0.26	0.2%
NR Paper	0.95	0.6%	0.85	0.5%
Donatable items	0.86	0.5%	-	-
Other Waste	0.25	0.2%	0.35	0.2%
NR Glass & Ceramics	0.21	0.1%	-	-
Yard & Garden	0.18	0.1%	-	-
Edible Food Waste	0.15	0.1%	-	-
Compostable Paper	0.14	0.1%	-	-
Batteries	0.10	0.1%	0.03	0.0%
NR Metal	-	-	0.09	0.1%
Grand Total	159.03	100.0%	167.53	100.0%

RECYCLING AUDIT CATEGORIES | The following images show examples of items found in the recycling bags sampled during the fall audit. The summer report located in Appendix F shows examples of items found during the summer audit.

Recyclable Material

Mixed paper and cardboard were the top two items recycled by weight.



Mixed paper



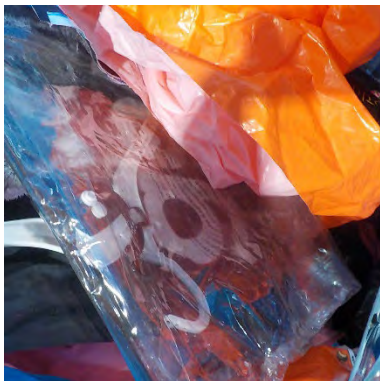
Cardboard



Rigid plastic

Contamination

On average across the entire residential waste audit, the recycling stream had 5.1% contamination.



Non-recyclable plastic



Contaminated recycling



Plastic packaging



Glass food container



Non-recyclable paper



Non-recyclable coffee cups

4.4 Organics Cart Stream

On average, 47% of households set out an organics cart at the curb during the two-season residential waste audit. During the summer audit period, 57% of households sampled set out an organics cart and during the fall audit period, 37% of households sampled set out an organics cart.

The average generation rate was 9.1 kilograms of organics per household per week. Once contaminants were removed from the organics cart stream, the generation rate fell to an average of 9.0 kilograms of organics per household per week. The June audit period had an organics generation rate (after contaminants were removed) of 11.4 kilograms per household, while during the November audit period the organics generation rate was lower at 6.6 kilograms per household. There was a snowstorm during the fall audit, which likely contributed to a lower set-out rate during this period, and an associated reduction in the overall quantity of organic material set out during the fall audit.

The contamination rate was low for both audit seasons – during the summer audit, the contamination rate was 1.3% and during the fall audit it was 0.2%.

Figure 3 shows the proportion of the various categories of materials in the organics cart for both the summer and fall waste audits. During both audits, yard and garden material / grass clippings made up the vast majority of the material being placed in the organics cart. During the summer audit, grass clippings and yard and garden material made up 88% of the organics cart stream, while during the fall, these items made up 82% of the stream. The biggest difference in the organics cart stream between June and November was that the June stream was comprised of 75% grass clippings, while during the November audit there were no grass clippings, but 82% yard and garden material consisting mainly of leaves, as well as 8.4% pumpkins.

On average between the two study periods, compostable paper made up 2.6% of the stream, inedible food waste made up 5.2% of the stream, and edible food waste 1.8%. During the winter and early spring seasons, we would expect food waste and compostable paper to make up a larger proportion of the organics cart stream, and for the total weight of the organics stream to be much lower, when people are doing minimal yard work involving vegetation management. The organics generation rate tends to be highly variable by season in locations where households generate large quantities of yard and garden material.

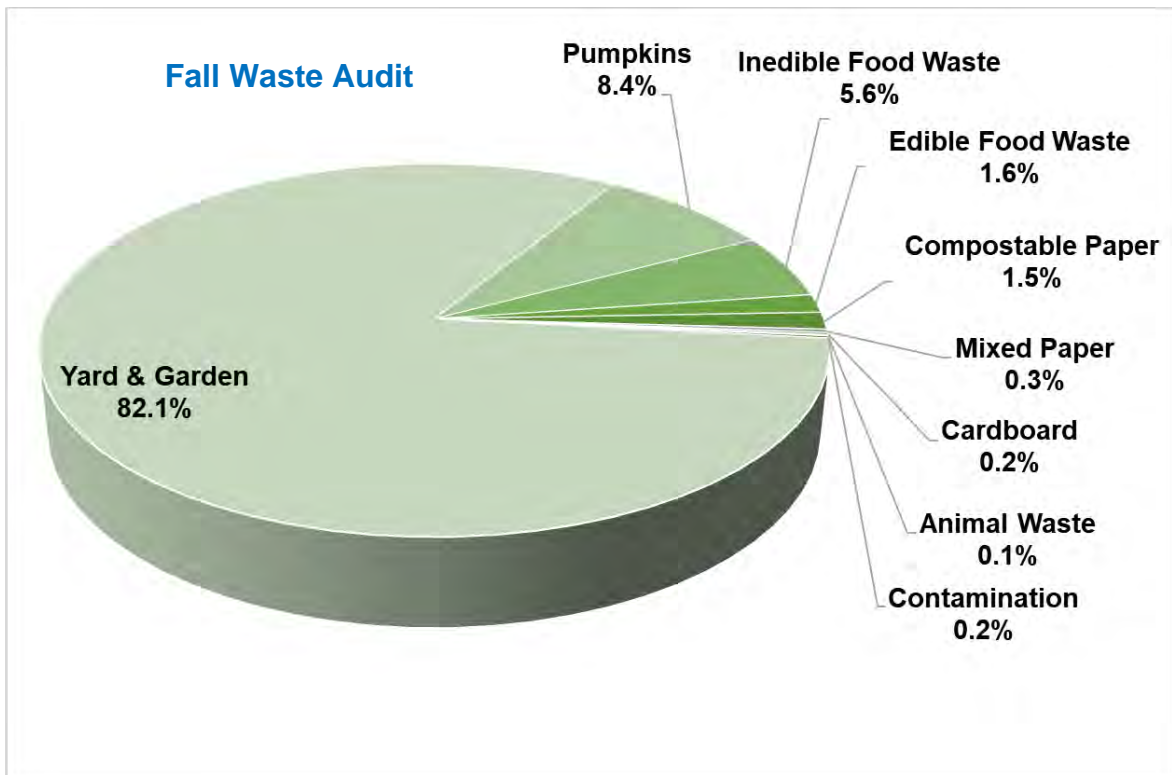
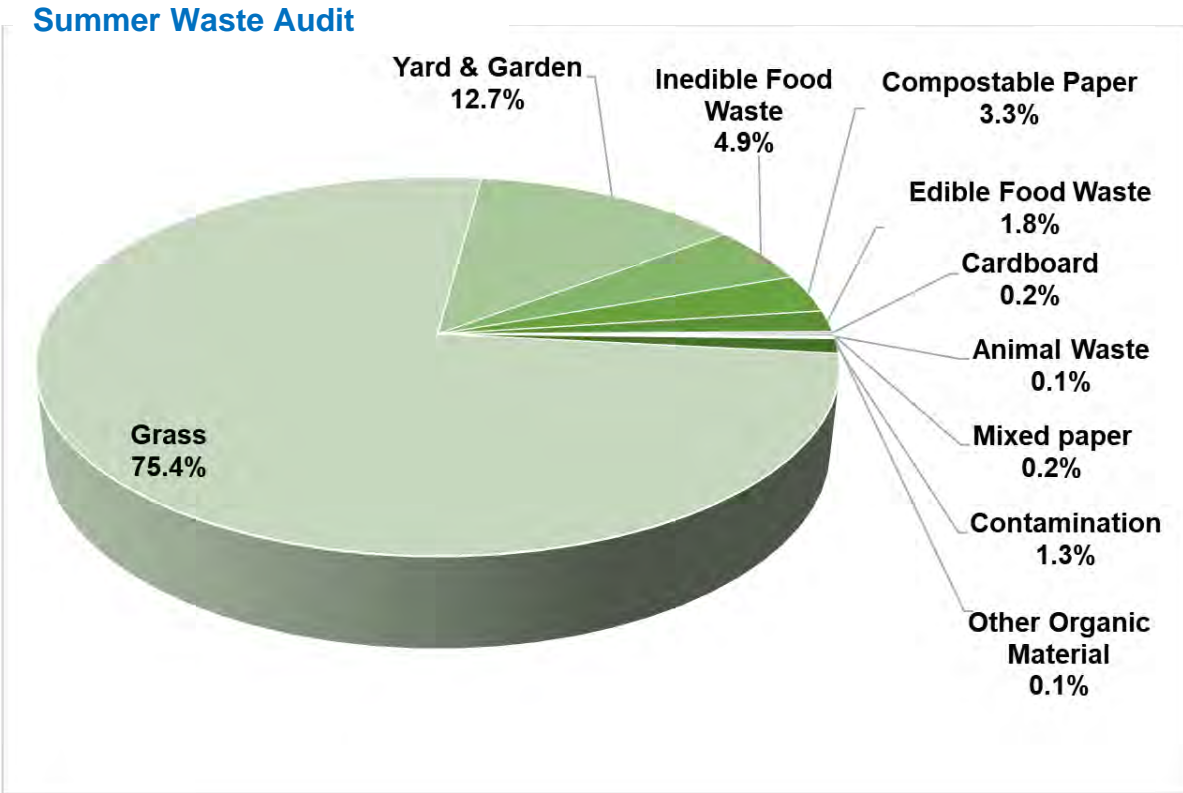


Figure 3 – Composition of the Spruce Grove Residential Organics Carts in Summer and Fall 2022

Table 6 shows the detailed composition of the Organics Cart stream sampled in summer and fall 2022.

Table 6 – Detailed Composition of Spruce Grove Residential Organics Carts in Summer and Fall 2022

Audit Sub-Categories	Summer 2022		Fall 2022	
	Kg	%	Kg	%
Compostable	1138.69	98.7%	658.36	99.8%
Grass	869.73	75.4%	-	-
Yard & Garden	146.38	12.7%	541.81	82.1%
Inedible Food Waste	56.61	4.9%	37.09	5.6%
Compostable Paper	37.8	3.3%	9.80	1.5%
Edible Food Waste	21.19	1.8%	10.61	1.6%
Cardboard	2.39	0.2%	1.16	0.2%
Mixed paper	2.04	0.2%	2.00	0.3%
Animal Waste	1.36	0.12%	0.65	0.1%
Other Organic Material	1.19	0.1%	-	-
Pumpkins	-	-	55.26	8.4%
Contamination	14.68	1.3%	1.23	0.2%
Other Waste	10.12	0.9%	1.22	0.2%
NR Plastic	2.75	0.2%	0.00	0.0%
NR Paper	1.05	0.1%	0.02	0.0%
C&D Waste	0.51	0.04%	-	-
Refundables	0.25	0.02%	-	-
Grand Total	1153.32	100.0%	659.59	100.0%

ORGANIC AUDIT CATEGORIES | The following images show examples of items found in the organics carts sampled during the fall. The summer report located in Appendix F shows examples of items found during the summer audit.

Organic Material

On average across the entire waste audit, 86% of the organic material was yard and garden material followed by smaller amounts of inedible and edible food waste.



Leaves



Plants



Pumpkins (yard waste)



Inedible food waste



Edible food waste



Compostable paper

Contamination

The organics carts had 1.3% contamination in the summer and 0.2% contamination in the fall.



Soil and sod



Trunk of tree too large to compost



Animal waste in plastic bags



Garbage bag



Wax-lined and shiny paper takeout containers



Aluminum foil and mixed paper

4.5 Total Waste Generation Rates and Curbside Diversion Rates

Figure 4 shows the average proportion of garbage, organics and recycling (by weight) generated by Spruce Grove residents during the waste audit conducted in the summer and fall of 2022. This graph does not reflect adjustments for the weight of contaminants in the recycling and organics streams, nor the quantity of organics or recyclable materials found in the garbage stream. Across

the entire waste audit, organics comprised 40% of the material generated, recycling comprised 7%, and garbage comprised 53% of the total material generated.

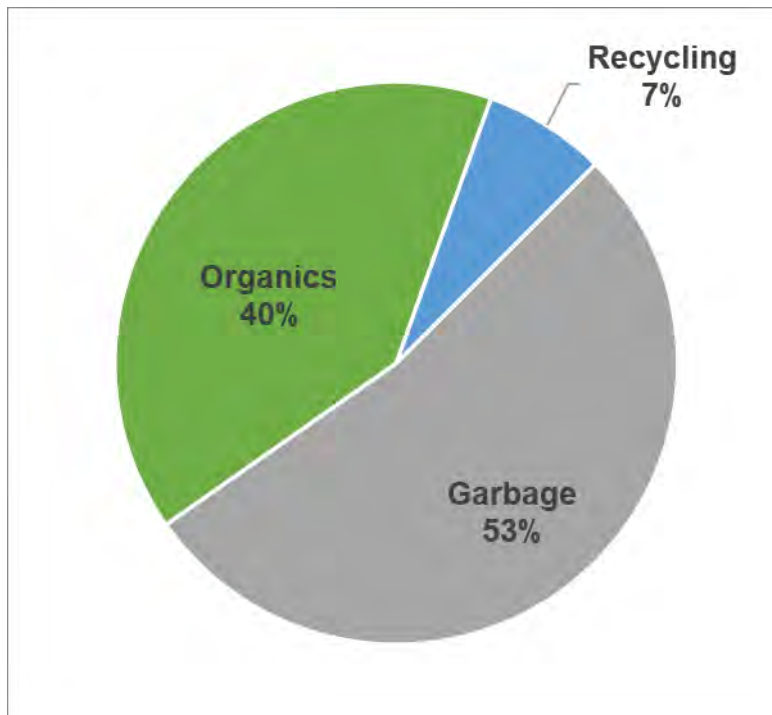


Figure 4 – Average proportion of garbage, organics, and recycling (by weight) generated by Spruce Grove residents during the 2022 residential waste audit.

Given that the waste audit occurred in June and November, the quantity of yard and garden material present in the organics carts was higher than we would expect it to be outside of the gardening season. As a result, we would expect the organics fraction of the total waste stream to be lower in late fall, winter and early spring when people are managing less vegetation in their yards and gardens. This waste generation rate should be considered a snapshot collected during the seasons when people are most active in their yards and gardens.

Comparing the summer and fall sampling periods of the waste audit, in the summer, the proportion of the total waste stream that consisted of organics set out at the curb was 45%, while in the fall it dropped to 32%. This difference was mainly due to a larger quantity of grass clippings and yard and garden material in the organics stream during the summer. These proportions do not reflect the quantity of organic material present in the garbage stream.

Figure 5 compares the quantity of garbage, organics, and recycling (by weight) set out by the 100 households sampled during the summer and fall periods of the residential waste audit. This graph does not reflect adjustments for the weight of contaminants in the recycling and organics streams. As the graph shows, significantly more organics were set out in the summer than the fall. There were comparable quantities of garbage and recycling set out during the summer and fall audit periods.

Garbage, Organics, and Recycling Generation in 100-Household Sample by Season

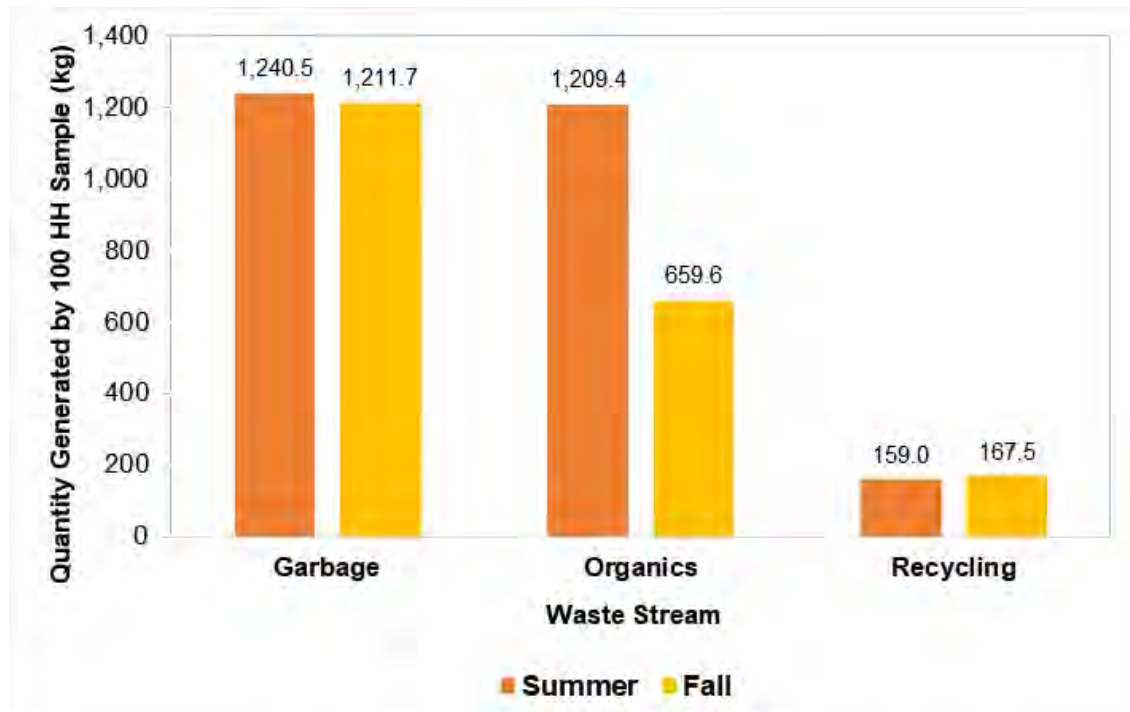


Figure 5 – Quantity of garbage, organics and recycling generated by the 100 households sampled in summer and fall 2022.

Table 7 summarizes the average set-out rates for garbage, recycling, and organics on both a household basis and a normalized population (per capita) basis over both seasons of the residential waste audit. For the recycling and organics streams, data are shown both for the quantity of materials set out at the curbside and the adjusted quantity once contaminants were removed.

Table 7 – Mean household weekly set-out and per capita generation rates for garbage, recycling, and organics in the 2022 Spruce Grove residential waste audit.

Material Stream	Mean Household Set-Out Rate (kg/hh/week)	Mean Household Set-Out Rate - Without Contaminants (kg/hh/week)	Per Capita Generation Rate (kg/capita/week) ¹
Garbage Cart	12.3	n/a	4.7
Recycling Bag	1.6	1.5	0.6 ²
Organics Cart	9.1	9.0	3.5 ²

1. Assumption: Average household size of 2.6 ([Statistics Canada 2021 Census profile](#)).
 2. With contaminants removed.

It is important to note that the by-stream generation rates would change if more compostable and recyclable materials were diverted from the garbage cart stream into the respective organics cart and recycling bag streams.

The curbside diversion rate was 47% for households sampled in the 2022 residential waste audit. The summer audit diversion rate was 51% and the fall audit diversion rate was 41%. This curbside diversion rate was calculated without removing contaminants from the organics and recycling streams.

4.6 Single-Use Items

In January 2022, Spruce Grove implemented a Single-Use Items Reduction Bylaw focusing on plastic checkout bags, plastic straws, and polystyrene food service ware. As a result, monitoring the prevalence of single-use items in the waste stream was a priority for the 2022 residential waste audit.

For each of the garbage, recycling and organics streams, single-use plastic and paper items were sorted, counted and weighed to measure the quantities present in all three streams. During the summer waste audit period, there were 1,337 single-use items counted, with a weight of 13.6 kilograms. During the fall waste audit period, there were 944 single-use items counted, with a weight of 11.6 kilograms.

The proportion of the waste stream that was composed of single-use items remained very similar across the two waste audit periods. Approximately 0.5 percent of the total combined garbage, recycling and organics streams, by weight, consisted of single-use items, which amounted to a total of 25.2 kilograms throughout the entire waste audit. Ninety-eight percent of the single-use items were found in the garbage stream. There was a total count of 2,281 single-use items. Table 8 describes the prevalence of single-use items in each stream by count and weight.

Table 8 – Quantity and weight of single-use items in the Spruce Grove residential garbage, recycling and organics streams during the 2022 residential waste audit.

Material Stream	Single-Use Item Count	Single-Use Item Weight (kg)
Garbage Cart	2,233	24.5
Recycling Bag	24	0.35
Organics Cart	24	0.39
Total	2,281	25.2

The proportion of various types of single-use items in the combined garbage, recycling and organics streams was very similar between the summer and fall audit periods, and so these data

are presented as an average for the entire waste audit (Figure 6). Detailed single-use item count data for the combined, summer and fall audit periods are found in Appendix D.

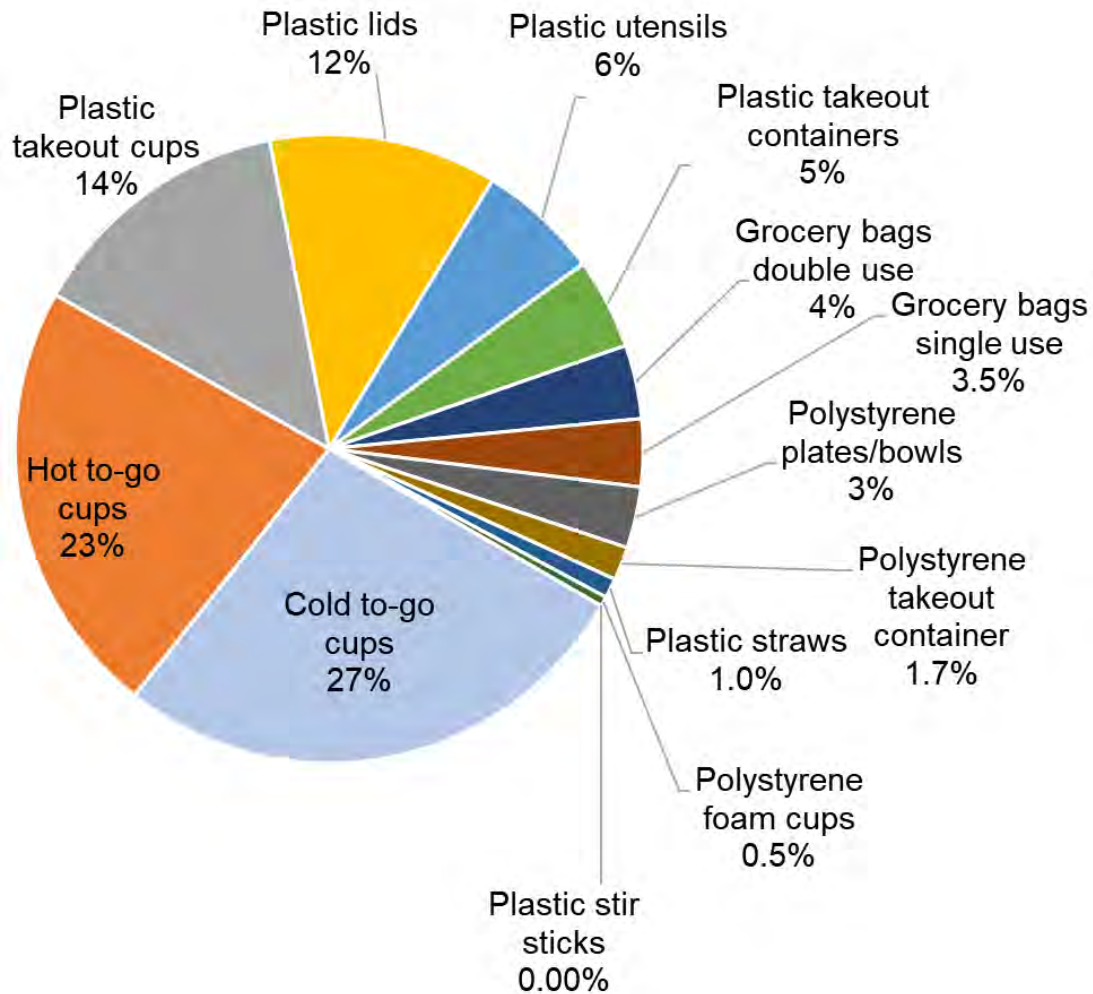


Figure 6 – Proportion of single-use items (by count) in the residential combined garbage, recycling and organics streams in Spruce Grove in the 2022 residential waste audit.

The single-use items that were most commonly counted were cold and hot to-go cups, together comprising 50% of the single-use items counted. This was followed by plastic take-out cups and plastic lids. It is notable that there were very small quantities of the three items that the Single-Use Items Reduction Bylaw was created to address. Of the single-use items present in the waste stream, plastic checkout bags that had only been used once comprised 3.5% of the single-use items and grocery bags that had been used at least twice (for example, to contain residential garbage) made up 4% of the single-use items counted. Plastic straws comprised 1% of single-use items and polystyrene food service ware made up 1.7% of single-use items.

Figure 7 shows how the prevalence of items targeted by the Single-Use Item Reduction Bylaw has declined dramatically between the 2019 and 2022 waste audits. In 2022, there was a total count of 2,281 single-use items (25.2 kg), while in the 2019 audit there had been 4,102 single-

use items (40.6 kg). Thus, after the introduction of the Single-Use Items Reduction Bylaw, the number of single-use items has been reduced by approximately half.

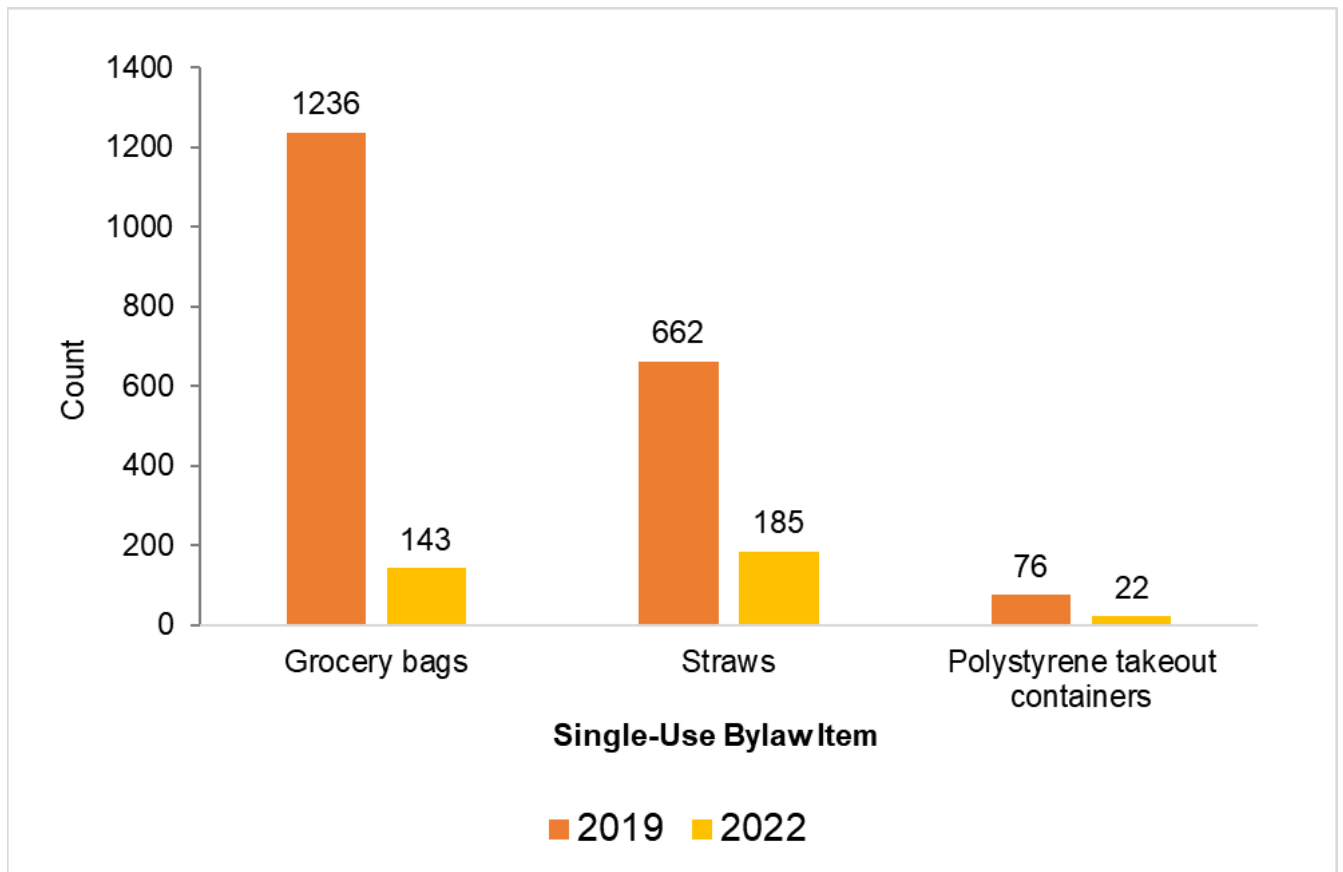


Figure 7 – Prevalence of items addressed in Single-Use Item Bylaw in 2019 and 2022 waste audits.

Extrapolating from the single-use item data collected during the residential waste audit, Table 9 provides an estimate of the quantity (by weight) of single-use items that would be disposed of by each household on an annual basis. We estimate that each household in Spruce Grove generates 5.89 kilograms of single-use items on an annual basis.¹

¹ Kilograms per household per year (kg/hh/yr) was calculated by determining the proportion of single-use items by weight in each of the garbage, recycling and organics streams from the audit, and multiplying these proportions by the annual tonnages for each stream. Annual curbside waste data was used from November 2021 to October 2022.

Table 9 – Estimate of the quantity of single-use items disposed Of annually by Spruce Grove households.

Single Use Item		kg/hh/yr
NR Paper	Cold to-go cups	1.72
	Hot to-go cups	1.19
NR Plastic	Plastic takeout cups	0.82
	Plastic lids	0.68
	Plastic utensils	0.32
	Plastic takeout containers	0.29
	Grocery bags single-use	0.26
	Polystyrene plates/bowls	0.20
	Grocery bags double-use	0.18
	Polystyrene takeout container	0.13
	Plastic straws	0.06
	Polystyrene foam cups	0.03
	Plastic stir sticks	0.003
Total		5.89

5 Comparative Analysis among the 2016, 2019 and 2022 Waste Audits

5.1 Set-out Rates

The set-out rate is the number of sample participants that placed a garbage cart, organics cart or recycling bag out for collection on a particular day. Figure 8 shows the set-out rates for garbage, organics, and recycling during the waste audits in 2016, 2019 and 2022.

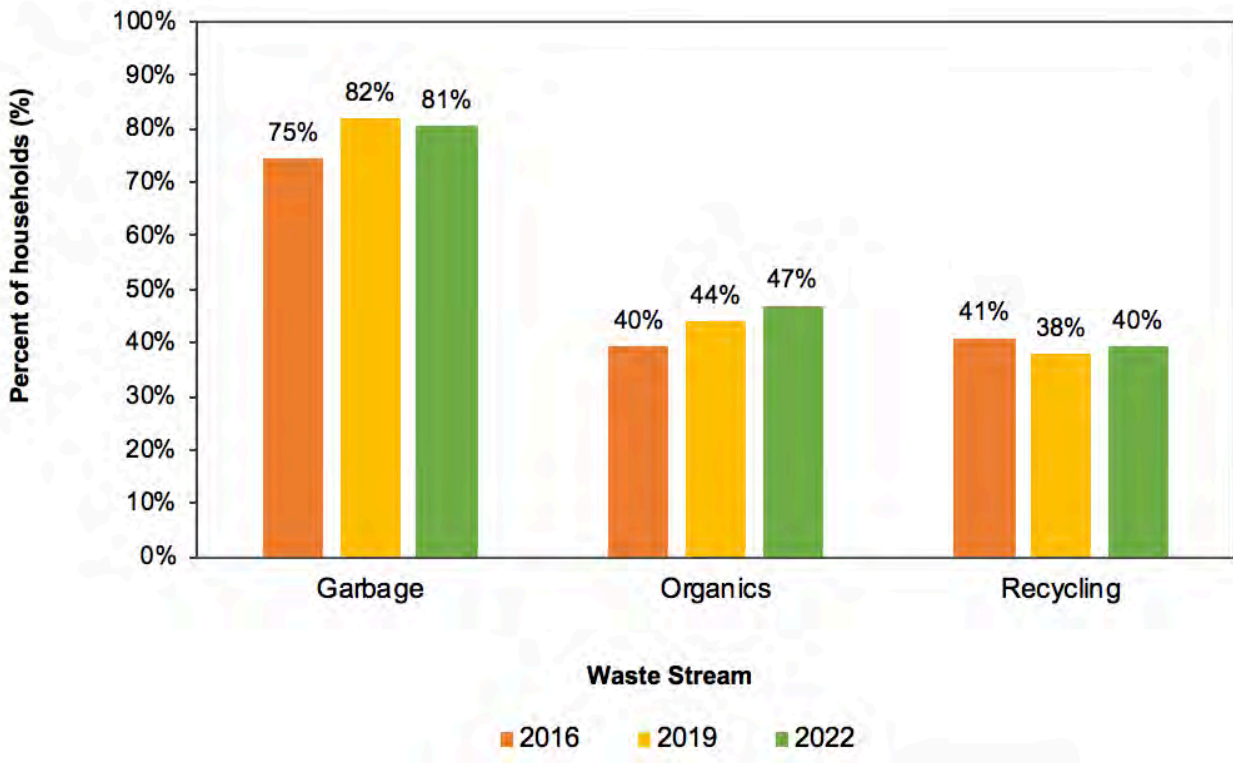


Figure 8 – Number of households setting out garbage carts, organics carts and recycling during the 2016, 2019 and 2022 Spruce Grove waste audits.

The most notable trend in set-out rates across the three waste audits is that there has been a steady increase in the number of households setting out an organics cart for collection, rising from 40% in 2016 to 47% in 2022. This may be partly due to the City’s Community-Based Social Marketing efforts in selected neighbourhoods, which have provided one-on-one communication with residents to encourage and support use of the organics cart.

Despite the increasing proportion of residents setting out an organics cart, there continues to be a far greater proportion of residents who set out a garbage cart (75% to 82%) than an organics cart.

The proportion of households setting out recycling has remained relatively constant across the three audit years, varying between 38% and 41%.

It is important to note that during the fall portion of the 2022 waste audit, there was a snowstorm, and set-out rates for all streams were lower than during the summer period of the waste audit – most significantly for the organics and recycling streams. This weather event may have masked a potentially higher increase in participation in the organics and recycling programs in 2022, in comparison with 2016 and 2019, as people opted to wait for better weather to put out their organics and recycling streams during the fall audit period.

5.2 Waste Generation and Diversion Rates

Figure 9 shows the proportional generation rates for garbage, organics and recycling and curbside diversion rates for the Spruce Grove residential waste audits completed in 2016, 2019 and 2022. Between 2016 and 2022, there has been a slow, but steady increase in the proportion of garbage generated by Spruce Grove residents, increasing from 49% to 53% of the total waste stream. The organics generation rate has remained relatively constant, between 38 and 40% of the total waste stream. There has been a decline in the quantity of recycling being generated. The biggest decline was between 2016 and 2019, when the recycling generation rate fell from 13% to 8% of the total waste stream. At the time of the 2016 waste audit, flexible plastic was accepted as a recyclable item in the blue bag program. Between the 2016 and 2019 audits, this was removed as acceptable items in the recycling stream, due to changes in recycling markets.

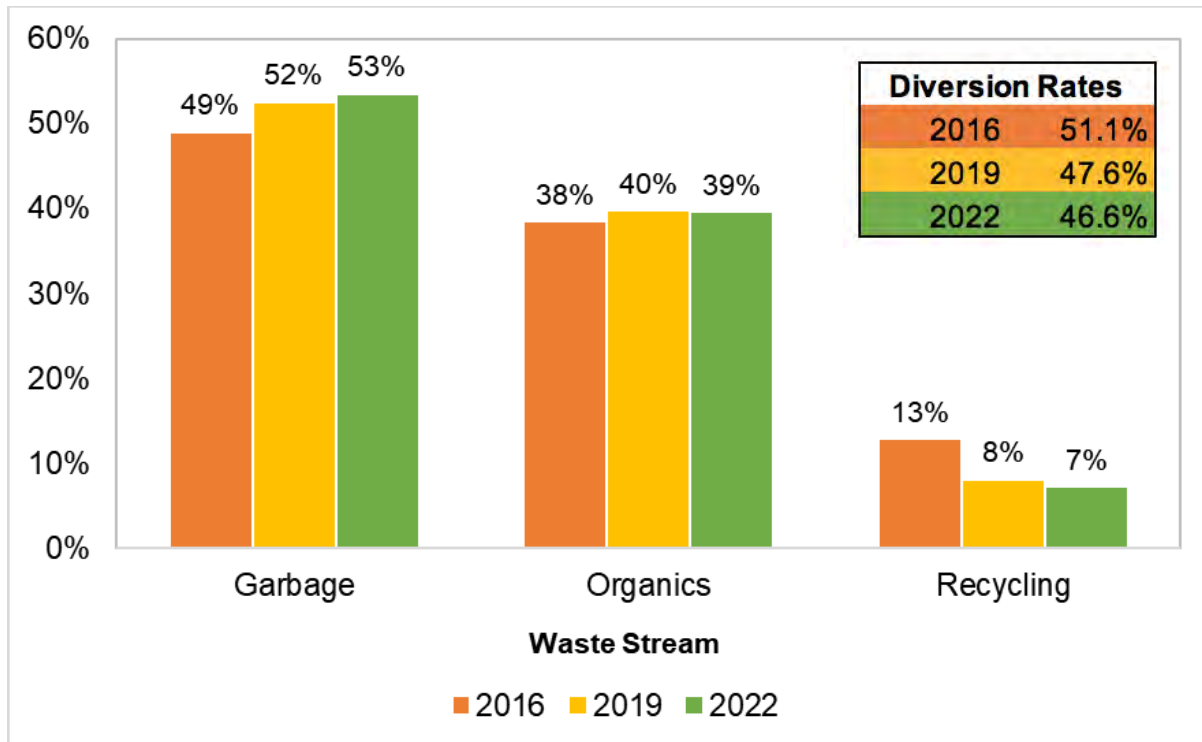


Figure 9 – Proportional generation rates for garbage, organics, and recycling during the 2016, 2019 and 2022 Spruce Grove residential waste audits and curbside diversion rates.

The residential curbside diversion rate for Spruce Grove during the 2022 waste audit was 46.6%. The waste diversion rate has declined since 2016.

Table 10 summarizes the average weight of the garbage, organics, and recycling streams generated by households during the 2016, 2019 and 2022 waste audits, which follows the same trends as Figure 9. The average generation rate for garbage has increased from 9.9 kilograms per household per week in 2016 to 12.3 kilograms per household per week in 2022. The quantity of material in the organics carts increased between 2016 and 2019, and then has fallen slightly between 2019 and 2022 to 9.3 kilograms per household per week. There has been a steady decrease in the quantity of recyclable materials placed at the curb, from 2.6 kilograms per household in 2016 to 1.6 kilograms per household in 2022.

Table 10 – Weekly household generation rates for garbage, organics and recycling during Spruce Grove residential waste audits in 2016, 2019 and 2022.

Material Stream	Generation rate for each audit year (kilograms / household / week)		
	2016	2019	2022
Garbage	9.9	13.1	12.3
Organics	7.7	9.9	9.3
Recycling	2.6	2.0	1.6
Total Waste	25.3	31.5	26.1

5.3 Contamination Rates for the Organics and Recycling Streams

Figure 10 presents the contamination rates for the organics and recycling streams over the various waste audits. The contamination rate for the organics stream has remained low and relatively constant across waste audit years, between 0.9% and 1.3%. There has been a significant decline in the contamination rate for the recycling stream, dropping steadily from 18% in 2016 to 5% in 2022. A contributing factor to the decline in the recycling stream contamination levels may be due to the decrease in the number of categories of plastic that are accepted and the City’s education efforts.

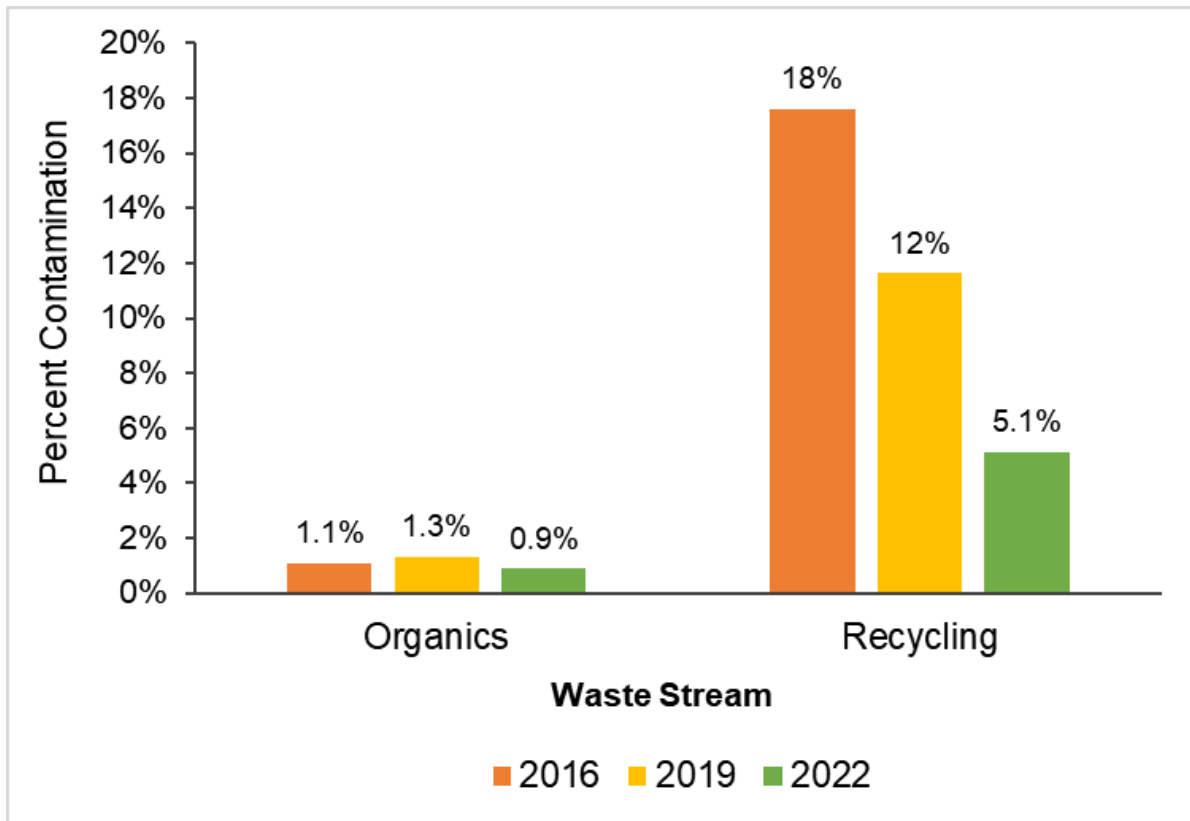


Figure 10 – Contamination rates for the organics and recycling streams during the Spruce Grove residential waste audits in 2016, 2019 and 2022.

5.4 Capture Rates for Various Materials

As shown in Figure 9, Spruce Grove’s curbside residential diversion rate has declined since 2019 to 46.6% in the 2022 waste audit. When exploring opportunities to increase the waste diversion rate, it can be helpful to examine the capture rates for different materials. A capture rate for a specific material is the proportion of that material that is being diverted for either recycling or composting.

Figure 11 shows the capture rates for the recycling bag stream and three separate components of the organics cart stream across the waste audits carried out in 2016, 2019 and 2022.

The capture rate for the recycling bag stream has declined over time from 75% in 2016 to 62% in 2022. This signifies that a declining proportion of materials accepted in the blue bag for recycling are being diverted for recycling. There has also been a steady decline in the quantity of materials diverted to the blue bag recycling program across the audit years, from 2.6 kg per household in 2016 to 2 kg per household in 2019 and 1.6 kg per household in 2022 (Table 10). This decline is most likely due to the decline in the quantity of material types accepted for recycling through the blue bag program. Over this time period, there have also been manufacturing changes to packaging, as some brand owners switch from aluminum, steel, paper, or glass packaging to plastic, which results in less or lighter material that can be recycled.

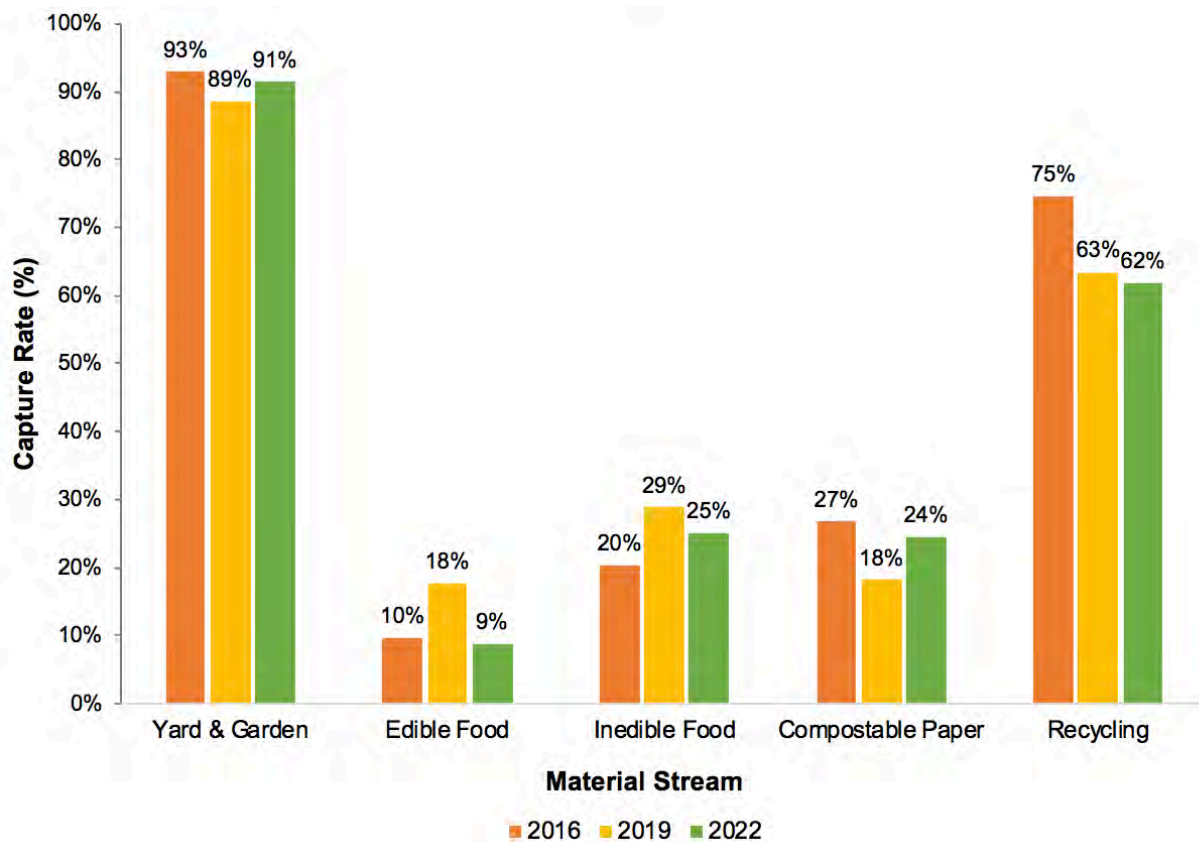


Figure 11 – Capture rate for various material streams during the Spruce Grove residential waste audits in 2016, 2019 and 2022.

For the organics stream, it is notable that a very high proportion of grass clippings and yard and garden materials are consistently being diverted by Spruce Grove residents – between 89% and 93% across the waste audits. In contrast, very low proportions of food waste and compostable paper are being diverted to the organics cart.

During the waste auditing process, edible food is defined as food that could have been eaten by people, instead of being placed in the waste stream. Some examples are an unopened can of soup, a piece of pizza or a loaf of bread. Inedible food consists of food scraps that are not eaten

by people, but can be diverted to the organics cart. Some examples include fruit and vegetable peels, egg shells, meat trimmings and coffee grounds.

Data from the waste audits conducted over the past few years suggest that supporting residents to prevent food waste and divert more food scraps and compostable paper from the garbage cart to the organics cart are some of the 'lowest hanging fruit' (pun intended!).

Section 6 presents some potential educational and policy approaches that Spruce Grove may wish to consider to foster greater diversion of these materials.

6 Opportunities to Increase Residential Waste Diversion

The City of Spruce Grove currently has a curbside waste diversion rate of 47%. Sixty percent of materials in the garbage stream could be diverted from the garbage through current Spruce Grove diversion programs.

Between 2017 and 2019, the City conducted Community-Based Social Marketing programs in some Spruce Grove neighbourhoods to support residents to divert more food scraps and food-soiled paper into the organics stream. However, there are a number of neighbourhoods where this direct educational engagement with residents has not taken place. There remain opportunities for the City to increase diversion of organic and recyclable materials and to optimize the performance of the residential curbside collection program. Such initiatives can further both increased waste diversion and meeting climate change action goals, such as those being developed as part of the City's Climate Change Implementation Plan.

Opportunities detailed in this section include using education to increase successful participation in curbside diversion programs, and fostering diversion of items that can be reused or recycled, but are not accepted in the organics cart or recycling bag.

The main broad tactics that are most successfully used by communities to increase waste diversion are the following:

- implement extensive public education and communication;
- make waste diversion convenient and easy;
- provide financial incentives to reward waste diversion; and,
- ban recyclable and/or reusable materials from the waste stream.

We understand that the City of Spruce Grove wishes to focus on the first three tactics at this time, with an emphasis on public education and communication.

6.1 Divert More Compostable Items to Organics Cart

The largest opportunity to increase the residential curbside diversion rate is to increase the quantity of organic material placed in the organics carts. The 2022 waste audit showed that 44% of the garbage stream consisted of items that could have been eaten or composted (by weight).

There are numerous benefits to diverting organics from the garbage to the organics streams. There are greenhouse gas emissions avoided when organics are sent for composting rather than disposed of in a landfill – thus contributing to the City’s climate action goals. In addition, when organics are placed in the landfill, the nutrient value in the organics is a lost resource.

Compostable materials in the garbage consisted primarily of edible food waste, inedible food waste, animal waste, compostable paper, and food in packaging.

Below are some educational approaches that the City may wish to consider to foster increased diversion of compostable items into the organics cart.

6.1.1 Continue Community-Based Social Marketing Program to Foster Organics Diversion

Between 2017 and 2019, the City carried out Community-Based Social Marketing (CBSM) pilot projects in three neighbourhoods to foster the diversion of food waste into organics carts. The neighbourhoods that were targeted with these CBSM pilot projects were Hilldowns, Harvest Ridge and Greenbury. Data collected as part of the Greenbury pilot project indicated that CBSM efforts resulted in a significant increase in the diversion of food waste and food-soiled paper into the organics cart². The success of the CBSM pilot projects are reflected in the increase in the residential waste diversion rate between 2016 and 2019 and in particular the increased diversion of organics.

There is an opportunity for the City to continue and expand its CBSM program to target neighbourhoods that have not yet been reached with CBSM educational efforts, and to return to engage with households in neighbourhoods that were targeted early in the pilot project. Given the success of previous CBSM pilot projects, it would be an opportune moment for the City to consider expanding this direct community engagement approach throughout the City.

There are numerous observations and learnings presented in the report by Czan (2019) that would be helpful to consider when planning new CBSM efforts.

A survey was conducted in the fall of 2017 in which Spruce Grove residents were asked if the door-to-door engagements and other promotional activities about organics diversion were having an impact on their behavior to divert organics to the green cart. The results from the analyzed

² Czan, M. 2019. Food waste diversion – Community-Based Social Marketing in Greenbury, Spruce Grove 2019.

data could be relevant today, as the City considers next steps to foster increased diversion of organic materials. The main outcomes from the survey of residents were:

- residents identified that a lack of information/knowledge was a barrier to using the kitchen catcher to divert organics (See Section 6.1.2 for further suggestions on how to address this);
- inconvenience is also a barrier. Kitchen catchers reduce the barrier to participating in organics diversion. Also, easily accessible information about what and how to compost and recycle is important. Information needs to be available to the resident at the time that they are recycling, and where they are recycling, or composting;
- people with kitchen catchers were very likely to use them to take organics to green carts (the kitchen catcher makes organics diversion more convenient); and,
- if someone had a kitchen catcher, that person was likely to be using their organics cart.

6.1.2 Create & Distribute Image-Based Educational Materials


There are opportunities for the City to adjust and expand its educational materials to foster greater clarity and understanding around what items should be placed in the organics cart. Image-based educational materials (print and online) are used by many communities to depict what items belong in the organics and recycling streams. The use of images rather than just text is more eye-catching, captures people's attention more easily and can overcome language and/or literacy barriers.

The City could consider creating image-based posters of 'What Goes in the Organics Cart' and 'What Can I Recycle & Reuse' (Section 6.4.1). Figure 12 and Figure 13 show examples of two image-based posters depicting what belongs in the organics stream in the City of Calgary and Hamlet of Tulita. As another example, the City of St. Albert has a ['What Goes Where?'](#) poster that depicts accepted materials using drawings.

It can be valuable to place the image-based posters of what can and cannot be placed in the organics cart and recycling bag on the City's website, and make the posters available for easy download and printing by residents. Printed versions of the posters can be distributed as part of CBSM efforts. It would be valuable for the City to consider distributing printed versions of both the 'What Goes in the Organics Cart' and 'What Can I Recycle & Reuse' to all households, so they are available to all residents at the time they are recycling and composting, at home when they are undertaking these diversion activities.



Green Cart
Food and yard waste



Green Cart
Food and yard waste

Yes. Put these compostables into your green cart.
Remember to include the food from meal preparation, cleaning out the fridge and plate scrapings too.



Plate scrapings



Meat, fish and bones




Fruits and vegetables
Remove any stickers.



Bread and noodles



Eggshells and dairy products



Coffee filters and tea bags



Food soiled paper
• Paper plates • Paper towel
• Napkins • Used tissues



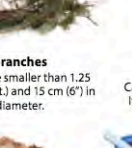
Cooking oil, sauces and grease
Tip: Use a paper towel to soak up any fats, oils or grease and put it in your green cart too.



Grass clippings
Use paper yard waste bags to prevent grass from sticking to your cart.



Branches
Should be smaller than 1.25 metres (4 ft.) and 15 cm (6") in diameter.



Sod and soil
Carts have a 60 kg weight limit. If you can easily roll your cart, that's ok.



Plants and weeds



Leaves



Pet waste and kitty litter (all varieties)
Put in a certified compostable bag or paper bag and tie/roll closed.

No. Keep these items OUT of your green cart.
By keeping these items out of your green cart, you're doing your part to ensure we can produce the highest quality compost possible that will be used at local farms, gardens and in our community.




No plastic or biodegradable bags
If using a bag to line your kitchen pail, only use **certified compostable bags**.



No food in packaging
Separate food scraps from container before composting.



No plant pots or bedding trays
Separate plants and soil from container before composting.



No foam or plastic packaging



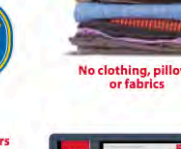
No painted or treated wood



No diapers or wipes
(even if they say compostable)



No plastic plates or cutlery
(even if they say compostable)



No fruit or vegetable stickers



No clothing, pillows or fabrics

If in doubt, check it out.
Go to calgary.ca/whatgoeswhere to find out where it can be composted, recycled or safely disposed.



4 Your guide to cart collection | Green | Blue | Black

Your guide to cart collection | Green | Blue | Black 5

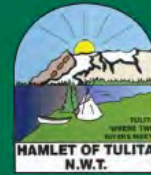
Figure 12 – What goes in the Green Cart poster – City of Calgary³.

³ City of Calgary. 2022. [What goes in the Green Cart](http://calgary.ca/whatgoeswhere).

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Tulita Composts



YES These items go in your compost collection bin:

Fruit and vegetable scraps



Paper that has food on it

(Coffee filters and grounds, tea bags, napkins, paper towel, tissue, brown paper, paper plates)



Yard, garden and plant material



Meat, small bones, fat and fish



Bread, pasta and rice



Eggshells and dairy products



Certified compostable bags and dishware



NO These items cannot be composted:

- ✗ Plastic or biodegradable bags
- ✗ Diapers or wipes
- ✗ Fruit or vegetable stickers
- ✗ Plastic or foam packaging
- ✗ Painted or treated wood
- ✗ Waxed paper

**Feeding the Land,
Not the Landfill**



Is it compostable?
Look for the logo! It's on the packaging or product itself. These logos guarantee the item is compostable.



This project is supported by funding from the GNWT Waste Reduction and Recycling Initiative

Questions?
Call the Hamlet Office at (867) 588-4471

6.1.3 Create an Educational Campaign on ‘What Goes Where?’ Focused on Organic Materials With Low Diversion Rates

Numerous municipalities across Canada have produced creative educational campaigns focused on improving the diversion of organic materials with low diversion rates and addressing problem contaminants in the organics stream. This is an educational opportunity for Spruce Grove, and if desired, could be accomplished at a very low cost. Examples of items that Spruce Grove may want to target are food scraps (inedible food) of all types and compostable paper.

Metro Vancouver has a set of “Food scraps aren’t garbage” [creative imagery and campaign materials](#) (web, print and videos) focused on food scraps recycling and other recycling topics that they share for free with other municipalities (Figure 14). They allow other municipalities to remove the Metro Vancouver logo and attach their own logo, provided credit is given for the concept and creative to Metro Vancouver on the imagery. These themes have been used by Spruce Grove in the past messaging in 2018.



Figure 14 – Metro Vancouver ‘Food scraps and food-soiled paper aren’t garbage’ imagery.⁴

The City of St. Albert has created educational campaigns focused on ‘[What Goes Where?](#)’ for their organics carts and recycling bags. They targeted common contaminants that they were finding in their organics and recycling streams. These educational messages were shared on social media, on their website and through other communication channels.

⁴ Metro Vancouver. 2022. [Campaign materials](#).

6.1.4 Engage Directly With Residents at Community Events

The City may wish to consider opportunities to engage directly with residents at community events where Spruce Grove residents are already gathering to share information about the City's diversion programs, promote use of the organics cart and recycling bag and answer residents' questions. The City has previous experience doing such community engagement, including as part of the Community-Based Social Marketing work that was carried out in 2019.

The City could consider creating a 'What Goes Where?' composting and recycling educational booth and a 'What Goes Where?' trivia game about the City's waste diversion programs (see Figure 15). It is helpful to be creative and use humour, and to set up the booth throughout the year at places where people are already gathering – sport tournaments, arts events, public gatherings, etc.

As an example, the City of Moncton, New Brunswick created a fun and creative educational display where they set up basketball hoops over recycling and compost bins and people (both adults and children) had to try to shoot the material into the bin through the hoops. They partnered with a local basketball team and a sneaker recycler for this event.

Facilitating such an interactive display creates an ideal opportunity to check-in with residents about their experience participating in waste diversion programs, answer people's waste diversion questions in-person and to gain insight on the barriers and challenges people are facing to participating in diversion programs.



Spin the Wheel of Waste
Diversion trivia game.



Compost program educational display and Recycle Right Relay game at an educational booth at the Yellowknife Farmers' Market.

Figure 15 – Example of a compost and recycling program educational display, trivia game and relay race used to directly engage with community members and to foster waste diversion.

6.2 Promote ‘Love Food, Hate Waste’ – Avoidance of Edible Food Waste

Of the organic materials placed in the Garbage Cart, on average 10% consisted of edible food waste – food that didn’t need to enter the waste stream, as it could have been eaten by people. During both the summer and fall study periods, this represented the largest component of organic materials that could be diverted or prevented from entering the garbage cart.

The City could consider creating an educational campaign to encourage residents to prevent avoidable food waste, leveraging a [2020 community survey](#) on this topic.

Preventing avoidable food waste would reduce the overall size of the waste stream to be managed, thus reducing City costs. Reducing edible food waste also saves residents directly as it reduces food purchasing costs, as more food is consumed instead of discarded. The National Zero Waste Council conducted research on household food waste in Canada in 2022 and found that 63% of the food Canadians throw away could have been eaten, and that the average Canadian household threw out 140 kilograms of avoidable food waste per year (Figure 16 and Figure 17) – at a cost of more than \$1,300 per year.⁵

The National Zero Waste Council provides many tips and resources on its [‘Love Food, Hate Waste’](#) website. The City references this ‘Love Food, Hate Waste’ campaign on its website. The City could consider expanding its promotion and sharing of the ‘Love Food, Hate Waste’ educational resources, which can be used free of charge by municipalities.



Figure 16 – Infographics on avoidable food waste from the ‘Love Food Hate Waste’ campaign.

⁵ National Zero Waste Council. 2022. [Food Waste in the Home](#).



Figure 17 – ‘What is wasted in Canadian households?’ poster from the ‘Love Food Hate Waste’ campaign⁶.

6.3 Promote Grasscycling

Grasscycling is the natural recycling of grass by leaving grass clippings on the lawn after mowing, rather than placing them in the organics cart. It is the most convenient, cost-effective and environmentally responsible way to manage grass clippings.

Currently the City states that ‘Grasscycling is a good way to reduce the amount of grass you collect’ on its website. The City may wish to consider adding a ‘Grasscycling’ page to its website and creating an educational campaign to more actively encourage residents to grasscycle. There are significant financial savings that can be achieved by a municipality if many residents grasscycle, as this practice greatly reduces the quantity of material that must be collected, transported and tipped at the compost facility.

Many municipalities in Canada actively promote grasscycling and share tips and educational resources on how to grasscycle, so there are many existing resources that can be reviewed for ideas. A few examples are the [City of Edmonton](#), [City of St. Albert](#), [City of Calgary](#) and [City of Lethbridge](#).

⁶ National Zero Waste Council. 2022. [Food Waste in the Home](#).

In 2016, the City of Edmonton’s grasscycling educational campaign featured the City’s mayor and an Edmonton Oilers defenceman mowing the grass at City Hall without grass catcher bags to promote grasscycling (**Figure 18**)!



Figure 18 – Edmonton Mayor, Don Iveson, and Edmonton Oilers defenceman, Andrew Ference, grasscycling at Edmonton City Hall in 2016. Source: *Edmonton Journal*⁷.

Promoting grasscycling can also be considered a form of climate change adaptation, and would align with the City’s work to prepare for future climate conditions through the Climate Change Implementation Plan. Grass clippings have a high water and nitrogen content. They quickly decompose, returning nutrients to the soil, and improving soil moisture retention. This reduces the amount of fertilizer and water needed to maintain a healthy lawn – which is particularly important during dry summers. As a result, grasscycling also helps residents to improve their climate resiliency, with increasing drought a likelihood in the Spruce Grove area in a changing climate.

6.4 Promote Diversion of More Items for Recycling and Reuse

The data from the 2022 waste audit showed that the quantity of recyclable material being placed in the blue bag has declined between 2016 and 2022. During the 2022 waste audit, 8.3% of materials in the garbage stream could have been placed in the recycling bag, and 7.3% of materials could have been diverted to the Eco Centre or donated for reuse.

The City may wish to consider increasing its educational and promotional efforts to foster increased diversion of materials for recycling and reuse. There would also be valuable in the City engaging with residents (such as through a survey) to understand what the current barriers are

⁷ Filipski, G. 2016. [Examining the benefits of Edmonton’s grasscycling push](#). Edmonton Journal.

to diverting materials for reuse. This knowledge could inform future efforts to reduce these barriers, and thus foster further reuse.

6.4.1 Consider Creating Image-Based ‘What Goes Where?’ Posters for Recyclable and Reusable Materials

Section 6.1.2 described how imagery can be a valuable tool when communicating with residents about what items should be placed in the organics cart. The same concept applies for helping residents to know how to successfully divert recyclable and reusable items.

The City may wish to consider creating image-based ‘What Goes Where?’ posters for recyclable and reusable materials, and then actively disseminating these educational posters in the same manners discussed in Section 6.1.2. As an example, the City of Calgary has created an image-based poster depicting items that can go in that community’s recycling stream (Figure 19).



Figure 19 – City of Calgary pictorial poster for what can go in the recycling stream⁸.

⁸ City of Calgary. 2022. [Blue Cart recycling poster](https://www.calgary.ca/whatgoeswhere).

The City of Edmonton has created a [2-page image-based poster](#) that indicates how to properly dispose of a wide variety of items. The poster includes instructions on how to access further information on where to donate items in good condition (Figure 20). The City hosts a 1-page 'Reuse Directory' on its website, where it indicates the locations of non-profit organization that accept items for reuse.




Figure 20 – Portion of City of Edmonton ‘What Goes Where?’ poster encouraging the donation of items in good condition to the Reuse Centre or local non-profit organizations.

6.5 Consider Expanding Education to Include “Why?” and “What Happens Next?”

One motivator for people to participate in waste diversion programs is to understand why they are being asked to separate items into the organics cart and recycling bag, and what happens to these items once they’ve placed them in the appropriate collection container.

The City of Spruce Grove’s ‘Trim Your Trash’ App is a great location to consider including more details on the ‘why?’ and ‘what happens next?’ of waste diversion. Educational messaging in such applications can also be used to encourage residents to prioritize waste prevention, and reuse over recycling, which the City is already doing for some items in the ‘Trim Your Trash’ application. Figure 21 and Figure 22 show two examples from the Town of Banff ‘What Goes Where?’ tool, where information is provided on plastics recycling myth-busting, and tips on how to avoid edible food waste.




Special Instructions

i Please rinse and clean. Must be marked with the recycling symbol #1-7

Best Option

Plastic and Metal Containers

 Put this item in a blue plastics and metals bin.

[Residential Bin Locations Map](#)

Plastics recycling: myth busting 101!

We know there's a lot of information out there about plastics recycling so we wanted to be totally transparent about where your materials go and what happens to them!

Hard plastics #1-7 recycled in Banff go to a state-of-the-art container sortation plant near Vancouver where the materials get sorted into their respective streams:

- PET Bottles & Jars
- HDPE Colour
- Tubs & Lids
- HDPE Natural
- Bulky Rigid

Once the materials are processed into plastics pellets, they are sold to markets to make the following new plastics products.

- Packaging Products
- Carpets
- Piping Products
- Garden Products
- Clothing
- Various other plastic products


In lieu of 'cradle-to-grave' end-of-life cycle for plastic products, Banff's plastic goes to a company that aims for a seamless, continuous Circular Economy.

By recycling in Banff, you reduce landfill waste and help protect the park for future generations to enjoy!

Figure 21 – Town of Banff ‘What Goes Where?’ educational messaging on the ‘Why?’ and ‘What happens next?’ for plastic containers.

←
Food Scraps

Type an item



Best Option

Food Scraps

Food scraps and food-soiled paper go in the food bin.

NO plastic bags. Use a certified compostable bag, paper bag, newspaper or dispose of food scraps loose.

[Residential Food Waste Bin Locations Map \(PDF\)](#)

Food isn't garbage! The best approach is to stop food waste from happening in the first place. Visit <https://lovefoodhatewaste.ca/> for tips on how to prevent food waste in your home!

For food scraps like peels, bones, coffee grinds and more... compost is the answer. These food scraps are sent to a farm in Alberta where they are turned into compost which is used as a soil amendment on the land. When you compost your food scraps, you help reduce landfill waste, reduce GHG emissions, and create a circular food economy!

Figure 22 – Town of Banff ‘What Goes Where?’ educational messaging on the ‘Why?’ and ‘What happens next?’ for food scraps.

6.6 Opportunities to Continue Leadership in Single-Use Item Reduction

As described in Section 4.6, the City's Single-Use Items Reduction Bylaw has achieved great success in reducing the generation of the targeted items: plastic checkout bags, plastic straws, and polystyrene food service ware.

Since the introduction of the City's bylaw to reduce single-use items, the federal government has announced legislation that will target some (but not all) of the items already covered under Spruce Grove's municipal bylaw, as well as some additional single-use items.

There remain opportunities for Spruce Grove to foster further reduction in single-use items, in conjunction with the new federal legislation. Some benefits of reducing single-use items include reducing resource use on disposable items, having a smaller quantity of materials that need to be collected and managed by the City, reducing the confusion for residents regarding what to do with items for which it is often not clear whether they can be recycled or composted, and reducing the quantity of non-recyclable and non-compostable items in the waste stream.

6.6.1 Upcoming Federal Prohibition of Some Single-Use Items

In June 2022, the Government of Canada announced [Single-use Plastics Prohibition Regulations \(SUPPR\)](#). The goal of these Regulations is to ban or restrict the use of certain single-use plastics where there is evidence that they are found in the environment, are often not recycled, and have readily available and viable alternatives.

These Regulations prohibit the manufacture, import and sale of single-use plastic checkout bags, cutlery, foodservice ware made from or containing problematic plastics that are hard to recycle, ring carriers, stir sticks, and straws (with some exceptions). The majority of items addressed under these Regulations will no longer be allowed to be manufactured and imported for sale into Canada as of December 20, 2022 and will no longer be allowed to be sold in Canada as of December 20, 2023. The two exceptions are ring carriers and flexible straws packaged with beverage containers, which have a more extended prohibition timeline.

We would expect these federal Regulations to address approximately 16% of the items that were counted as part of this residential waste audit: grocery bags (7.5%), plastic utensils (6%), polystyrene takeout containers (1.7%) and plastic straws (1%). The City's Single-Use Items Reduction Bylaw has already significantly reduced the quantity of plastic checkout bags, plastic straws, and polystyrene food service ware in the waste stream. The new federal legislation should further reduce these items from the waste stream, given that it will be in effect for all of Canada.

The Regulations will also lead to the phase-out of single-use plastic foodservice ware that cannot be recycled – including single-use foodservice ware that includes polystyrene, polyvinyl chloride, oxo-degradable plastic or black plastic made with carbon black. Plastic takeout containers made up five percent of the single-use items counted. Businesses currently using single-use plastic foodservice ware covered by the federal prohibition will need to transition to another type of recyclable or compostable single-use foodservice ware or reusable foodservice ware.

Spruce Grove may consider providing businesses with suggestions for selecting compostable foodservice ware containers. During the audit, we notice many different types of products that look compostable but are not. Containers that say they are recyclable are not accepted in the composting program as they have a plastic liner like hot and cold paper cups. These items, even if clean, are not accepted in the blue bag program either. Franchise businesses have greater limitations on the takeout packaging used and hopefully changes will occur through the franchisee corporate social responsibility mandates.

6.6.2 Opportunity to Foster Further Reduction of Single-Use Items Rather Than Replacing Them

The federal Regulations to prohibit some single-use plastics will likely prompt many businesses and organizations to transition to another type of single-use item – such as single-use foodservice ware made from recyclable plastic or item that is compostable. The City may wish to consider tools it could use to further reduce the prevalence of single-use items, rather than just replacing one single-use item with another. There are also many common single-use items that the federal Regulations do not address, such as hot and cold paper to-go cups and plastic disposable cups. During the 2022 waste audit, hot and cold to-go cups made up 50% of the single-use items counted in the waste stream.

Some common policy tools used to reduce single-use items include:

- requiring minimum charges for the use of single-use items to provide a financial disincentive – often the fee must be visible to the customer, and the business is able to keep the surcharge;
- prohibiting the use of single-use items in dine-in settings;
- requiring that single-use items only be provided on-request; and,
- banning single-use items for situations in which there are viable and practical reusable options.

Some examples of jurisdictions using policy approaches to reduce single-use items, rather than just replace them, are summarized in Table 11. We have focused on policy tools being used for items that are not otherwise covered in the new federal Regulations.

Table 11 – Examples of municipalities using policy approaches to reduce single-use items.

Jurisdiction	Examples of Policy Tools
<p>City of Edmonton Charter Bylaw 20117 (will go into effect on July 1, 2023)</p>	<ul style="list-style-type: none"> • single-use cups: restaurants must serve dine-in drink orders in reusable cups and accept reusable customer cups for dine-in and takeout orders; and, • accessories such as utensils, straws, pre-packaged condiments and napkins must be available only by request or self-serve.

Jurisdiction	Examples of Policy Tools
<p>Town of Banff</p> <p>Proposed Single-Use Items Bylaw</p>	<ul style="list-style-type: none"> businesses must provide reusable products for dine-in services; customers must request accessory items like utensils, straws, and pre-packaged condiments; businesses must have a written policy to accept reusable cups and containers; businesses must charge a minimum fee of \$0.50 on disposable cups; and, any remaining disposable food ware must be recyclable or compostable within Banff’s recycling and composting programs.
<p>City of Vancouver</p> <p>Single-Use Item Reduction Strategy (various bylaws between 2020 and 2022)</p>	<ul style="list-style-type: none"> single-use cups: \$0.25 fee must be charged; single-use utensils: by-request only; and, foam cups and foam take-out containers: by request only.
<p>City of Victoria</p> <p>Consultation paper and draft bylaw</p>	<ul style="list-style-type: none"> single-use straws, utensils, stir sticks, and condiment packages made of any material be distributed only by request; businesses use only reusable products for dine-in services, with exemptions for businesses that cannot accommodate sanitization procedures for reusable products; and, \$0.25 fee on single-use takeout cup or container.
<p>City of Berkeley, California</p> <p>Single-Use Foodware Rules</p>	<ul style="list-style-type: none"> The City of Berkeley, California is known as a worldwide leader in achieving reductions in the use of single-use items. Businesses that allow customers to eat on-site must use reusable foodware and must provide colour-coded bins for composting, recycling, and garbage. Businesses offering takeout must use BPI-certified compostable foodware, and provide disposable accessory items (e.g., straws, napkins, utensils) only upon request. No single-use plastic is allowed. \$0.25 must be charged for disposable cups. Disposable accessory items (e.g., straws, stirrers, napkins, utensils, condiment cups/packets, cup sleeves, tops, lids, etc.) are to be provided only by request and must be BPI-certified compostable. City of Berkeley offers on-site technical assistance to support the transition to reusable foodware.

6.6.3 Opportunity to Foster Reusable Instead of Disposable Items

There are opportunities for municipalities to set policies and support initiatives that focus on reuse of durable items, rather than the single-use and disposal of items. In a number of municipalities and regions across Canada, cup and container-sharing platforms have been developing. Some examples include ‘[Banff Isn’t Disposable](#)’ in Banff (Figure 23), [Reusables](#) in Vancouver and on Vancouver Island and [Friendlier](#) in Guelph, Ontario. Municipal policies that provide structural, financial and educational incentives to reduce single-use items can contribute to the independent establishment of cup and container-sharing programs.

For example, after the federal Regulations are fully implemented, all or almost all plastic takeout containers should be recyclable. The City may wish to focus education on how the new Regulations impact Spruce Grove residents and that recyclable plastic containers must be rinsed prior to being placed in the recycling bag.



Banff Isn't Disposable

A pilot reusable container program in Banff National Park

HOW does the program work?



- **CHOOSE** the reusable option at any participating business
- **PAY** a \$5 deposit per container
- **DIVERT** waste and extra spending from single-use items
- **RETURN** the container to any of the participating businesses and get your full deposit back
- **CLEANED** by businesses and redistribute as needed. Rinse your containers to help businesses out :)

Figure 23 – Banff Isn’t Disposable program design⁹.

⁹ Banff Isn’t Disposable. <https://banffisntdisposable.com/>

6.7 Opportunity to Link Waste Reduction and Diversion Achievements and Goals to the Climate Change Implementation Plan

The City is in the process of preparing a Climate Change Implementation Plan. There are many ways in which waste reduction and diversion reduce greenhouse gas (GHG) emissions.

For example, when organics such as food scraps and yard and garden materials are disposed of in a landfill, they generate methane, which is a potent GHG. Emissions from Canadian landfills make up 24% of Canada's national methane emissions¹⁰. In 2013, Environment Canada estimated that for every one tonne of food waste diverted through composting reduced GHG emissions by one tonne of carbon dioxide equivalent.¹¹

In 2022, Environment and Climate Change Canada published an updated [Greenhouse Gas Calculator for Organic Waste Management](#)¹² which enables municipalities to calculate and compare GHG emissions of baseline and alternative scenarios for their particular circumstances. Environment and Climate Change Canada also has a more general [Greenhouse Gases Calculator for Waste Management](#)¹³ which can be used to measure the GHG savings for recycling a wide variety of items.

The GHG emissions savings associated with recycling items that can be placed in the recycling bag can often be surprising. For example, in certain scenarios the emissions reductions associated with recycling one tonne of aluminum can be 10 tonnes of GHG emissions reductions. Producing virgin aluminum requires a huge amount of energy, and therefore recycling this material has large GHG emissions benefits.

To date, Spruce Grove has taken a sector- and location-based approach to quantifying GHG emissions, as is common in many municipalities. A growing number of jurisdictions around the world are also starting to measure and track consumption-based emissions (Scope 3 emissions), which are related to the products and materials that are used and consumed by residents. It is estimated that 45% of global GHG emissions are consumption-based.¹⁴

Fostering a circular economy through strategies such as encouraging the creation and use of durable products, reducing single-use items, encouraging repair and reuse of items, reducing the waste of edible food, promoting regenerative food production and minimizing the materials being sent to landfill reduce these consumption-based emissions.

¹⁰ Environment and Climate Change Canada. 2022. [Waste and greenhouse gases: Canada's actions.](#)

¹¹ Environment Canada. 2013. [Technical document on municipal solid waste organics processing.](#)

¹² Environment and Climate Change Canada. 2022. [Greenhouse gas calculator for organic waste management.](#)

¹³ Environment Canada. 2013. [Greenhouse gases calculator for waste management.](#)

¹⁴ Ellen MacArthur Foundation. 2021. [Completing the picture: How the circular economy tackles climate change.](#)

6.8 Follow Implementation of the New Provincial EPR Legislation

On October 3, 2022, the Government of Alberta passed an [Extended Producer Responsibility Regulation](#). The purpose of this EPR regulatory framework is to shift the physical and financial burden of collecting, sorting, processing and recycling materials to the producer of the products, and away from local governments and taxpayers. The materials that will be included in this first stage of EPR in Alberta include paper products, plastics, metal, glass, hazardous and special products from the residential sector.

This new EPR framework is expected to increase environmental stewardship for a variety of recyclable materials and to support a circular economy that creates economies of scale and markets for recycled materials. There should be cost savings to the City as the responsibility for collecting, sorting, and recycling materials is transferred from the City to the producers of items.

Given how recently this legislation was passed, there are many details to be determined regarding how new EPR programs will work for municipalities. The new EPR framework will be fully implemented by 2025.

Over the coming years, it will be valuable for City of Spruce Grove staff to participate in meetings and training opportunities on EPR that target the municipal sector. These will likely be provided both through the provincial government and the [Recycling Council of Alberta](#). Participation in these conversations that lead to the establishment of EPR programs will enable Spruce Grove staff and decision-makers to remain up-to-date with the opportunities that EPR will bring and to be in the best position to adjust and tailor current Spruce Grove waste diversion programs accordingly.

The City may wish to engage the broader community in learning about EPR and the changes it will bring to recycling in Alberta. The City could consider holding information sessions once more information becomes available, sending a survey to residents to seek feedback and engaging with businesses as appropriate. Such engagement can re-ignite and foster further interest in waste diversion. It also creates an opportunity to continue educating the public about topics such as common items that can be placed in the organics cart and recycling bag.

7 Conclusions in Brief

Diversion Rate

- This 2022 residential waste audit showed a curbside diversion rate of 47%. The residential waste diversion rate has declined since the 2016 and 2019 waste audits.
- The removal of some items such as flexible plastic from the list of items accepted in the blue bag may have partially contributed to this decline.

Organics Cart

- The biggest waste diversion opportunity in the Spruce Grove residential sector is to increase the quantity of compostable materials diverted from the garbage cart and into the organics cart.
- During the 2022 waste audit, 44% of the garbage stream consisted of compostable materials – primarily food waste, food-soiled paper, and animal waste.

Recycling

- During the 2022 waste audit, 8% of materials in the garbage could have been placed in the recycling bag, and 7% could have been diverted to the Eco Centre or donated for reuse.

Single-Use Items

- The Single-Use Item Reduction Bylaw has achieved great success in reducing the generation of the targeted items: plastic checkout bags, plastic straws, and polystyrene food service ware.
- The number of single-use items counted during the 2022 waste audit was approximately half that counted in the 2019 audit.

Community-Based Social Marketing & Educational Tools to Increase Diversion

- The City has an opportunity to build on previous successful Community-Based Social Marketing pilot projects to increase participation in the organics cart program.
- There are opportunities to expand educational materials and approaches to foster increased diversion of materials to the organics cart, recycling bag, Eco Centre and for reuse.
- The City may wish to consider engaging directly with residents through a survey to directly enquire about the main barriers residents are facing that keep them from diverting materials to the green cart, recycling bag and for reuse – and then use the results to support education and CBSM efforts.

Waste Diversion is Part of Climate Action

- There are many ways in which waste reduction and diversion reduce GHG emissions and there are calculator tools available to enable the City to calculate GHG emissions reductions associated with its waste diversion programs.

Extended Producer Responsibility (EPR)

- The new provincial EPR regulatory framework should lead to cost savings for the City as the physical and financial burden of collecting, sorting, processing and recycling materials to the producer of the products, and away from local governments and taxpayers.
- There are many details on how the EPR framework will work that are still being determined; the City may wish to encourage staff to participate in meetings and training opportunities on EPR that target the municipal sector.

Appendix A: Glossary

Contamination – items that are in recycling (Recycling Bag), or organics (Organics Cart) program that should not be in those programs.

Diversion rate – proportion of recyclable, compostable and reusable items prevented from going to a landfill relative to the total waste stream.

Eco Centre – a location for residents to divert recyclable items, including those that are not accepted in a blue bag program, and to safely dispose of hazardous items such as HHW.

Garbage – material that is sent to a landfill and collected in a Garbage Cart.

HH – Households

HHW – Household Hazardous Waste

Organics Cart – cart used to collect organic material for composting.

Organics – the material accepted in the Organics Cart program that is compostable and can be processed at the AltRoot Compost Pad to produce compost.

NR – non-recyclable. The material that is not physically able to be recycled in a Recycling Bag or without a current market.

Recycling Bag – used to collect recyclable material that is sent to a processor for recycling.

Residential Waste Audit or Waste Audit – an examination of the proportion of various materials in a given waste stream.

Waste – The combined streams of garbage, recycling, and organics.

Appendix B: Waste Audit Categories and Single-Use Plastic Items

	Sub-Category	Description and Examples
Paper		
	Mixed Paper	Boxboard, envelopes, paper, paper bags, egg cartons, white paper, newsprint, magazines, tissue paper
	Cardboard	Corrugated cardboard
Plastic		
	Rigid	Rigid plastics i.e., laundry detergent bottles, condiment bottles, large yogurt or sour cream containers, windshield washer fluid jug
	Styrofoam packaging	Styrofoam computer or appliance packaging
Metal		
	Metal Containers	Steel cans and pie plate foil containers (must be easily cleaned-otherwise Other Waste)
Glass		
	Glass Food Containers	Food jars
Organics		
	Edible Food Waste	Sandwich, slices of pizza, fruit
	Inedible Food Waste	Banana peel, bones, vegetable peels
	Compostable paper	Food-soiled napkins, paper plates no waxy liner, fast food packaging, tissues (i.e., fast-food bags, flour bags, parchment paper); greasy pizza boxes; NO SHINY paper.
	Food in Packaging	Food that could be composted if it was removed from its packaging; captures items that can't be opened in 2 seconds. Wasted food items in their original packaging.
	Yard & Garden	Grass clippings, leaves, branches.
	Pumpkins	A seasonal item; ornamental apples could also be added to this list.
	Animal Waste	All types of pet waste and bedding
	Other Organic Waste	Stir sticks, chop sticks, toothpicks, popsicle sticks, animal hair, PC compostable coffee pods (wider and shorter), wooden cutlery, Poly Lactic Acid (PLA) containing items. BPI-certified compostable paper cups and packaging;
Beverage Containers		
	Refundables	Aluminum, tetra pak, pouches, glass, plastic
Electronics		
	Electronics	IT accessories, toothbrush, headphones, audio, visual, kitchen and power tools, batteries, and other power cord items.
Household Hazardous Waste		
	HHW	ARMA containers, fluorescent bulbs, paint, used engine oil and filters, propane tanks, household chemicals; aerosol cans.
Textiles		
	Clothing and Footwear	Clothing and footwear (wearable/donatable)
	Household	Drapes, pillows (useable/donatable)
	Other	Rags, work gloves, coveralls, non-donatable textiles

continued

Landfill Sub-Category		Description and Example
Other Waste		Playdough, glue, cig butts, elastics, rubber gloves, hand lotion tubes, lint, dryer lint, cotton swabs, vacuum bag, broken water sprinkler as due to mixed materials, masks, gloves, wipes, foil & aluminum containers with food residue, paint brushes and rollers, sawdust, drywall residue, incandescent light bulb, toothpaste and product, candles, fines (small residue-broken glass, sand, pieces of paper).
Reuse		Items that could be donated; gift bags
Non-Recyclable Paper		Cigarette foils, waxed paper ice cream containers, soup tetra containers, flour & dog food bags as they have a liner, waxy paper, Pringles chip containers, padded envelopes, gift bags with tassels or place in reuse bin; laminated paper, paper that is glittery/shimmery. French fry containers, subway wrappers, anything shiny surface is in this section. DQ ice cream container.
	Count	Hot to-go cups
	Count	Cold to-go cups
	Count	Paper takeout containers (clamshell, fries, Tim Horton's boxes, DQ paper cups)
Non-Recyclable Plastic		Plant pots, single-use yogurt, sauce cups, lids, wrappers, chip bags, toys, cd cases, crunchy plastic, bacon packaging; food wrap, cookie trays and covers, PET #1 raspberry clamshell (note different from a TO container sandwich clamshell), stretch wrap, plant pots, black plastic containers, and plastic pumps.
	Count	Plastic straws
	Count	Plastic cutlery
	Count	Plastic lids coffee cup/ fountain / slushy
	Count	Plastic disposable cups (cold to-go cups i.e., takeout, solo, smoothie)
	Count	Styrofoam takeout container (cups, clamshells from a deli)
	Count	Clamshell takeout containers (i.e., deli containers, fast food places, PET)
	Count	Grocery bags single-use (i.e., loose)
	Count	Grocery bags double-use (i.e., held garbage)
Non-Recyclable Glass/ Ceramics		Windowpanes, fish tanks, coffee mugs and plates, perfume bottles, mirror
Non-Recyclable Metal		This is for scrap metal, hangers, metal fry pans
Garbage Bags		Liners
C&D waste		Treated and painted wood, drywall, lumber, insulation, underlay
Contaminated Recycling		Excess food residue in or on item (reserved for recycling stream)
Hygiene/ Diapers/Pet Pads		
Aggregate, Soil, Clay		Includes non-compostable organic waste – sod, soil, clay and aggregate like rocks or concrete pieces.
Animal Waste		All types of pet waste and bedding (reserved for organics stream when not in a BPI compostable bag)

Appendix C: Annual Waste Audit Results 2022

	Garbage		Recycling		Organics		Total	
	kg	%	kg	%	kg	%	kg	%
Landfill or Contamination	961.8	39.2%	13.1	4.0%	15.7	0.0	990.6	21.6%
Other Waste	348.6	14.2%	0.6	0.2%	11.3	0.6%	360.5	7.9%
Contaminated Recycling	--	0.0%	5.0	1.5%	--	0.0%	5.0	0.1%
Flexible Plastic	22.1	0.9%	1.4	0.4%	--	0.0%	23.5	0.5%
NR Glass & Ceramics	40.0	1.6%	0.2	0.1%	--	0.0%	40.2	0.9%
NR Metal	29.9	1.2%	0.1	0.0%	--	0.0%	30.0	0.7%
NR Paper	37.5	1.5%	1.8	0.5%	1.1	0.1%	40.4	0.9%
NR Plastic	211.3	8.6%	4.1	1.2%	2.75	0.15%	218.2	4.8%
Garbage Bags	29.9	1.2%	--	0.0%	--	0.0%	29.9	0.7%
Hygiene/Diapers/Pet Pads	175.7	7.2%	--	0.0%	--	0.0%	175.7	3.8%
C&D Waste	45.5	1.9%	--	0.0%	0.5	0.0%	46.0	1.0%
Aggregates /Soil / Clay	21.3	0.9%	--	0.0%	--	0.0%	21.3	0.5%
Paper	128.4	5.2%	290.6	89.0%	7.6	0.4%	426.6	9.3%
Mixed paper	113.9	4.6%	137.2	42.0%	4.0	0.2%	255.1	5.6%
Cardboard	14.5	0.6%	153.4	47.0%	3.5	0.2%	171.5	3.7%
Plastic	41.3	1.7%	9.1	2.8%	--	0.0%	50.4	1.1%
Rigid Plastic	39.4	1.6%	9.1	2.8%	--	0.0%	48.5	1.1%
Polystyrene Packaging	1.9	0.1%	--	0.0%	--	0.0%	1.9	0.0%
Organic	1088.9	44.4%	0.5	0.1%	1789.4	98.7%	2878.8	62.7%
Edible Food Waste	330.8	13.5%	0.1	0.0%	31.8	1.8%	362.8	7.9%
Inedible food waste	280.9	11.5%	--	0.0%	93.7	5.2%	374.6	8.2%
Compostable Paper	114.3	4.7%	0.1	0.0%	47.6	2.6%	162.0	3.5%
Yard & Garden	48.3	2.0%	0.2	0.1%	688.2	38.0%	736.7	16.0%
Food In Packaging	67.0	2.7%	--	0.0%	--	0.0%	67.0	1.5%
Pumpkins	22.0	0.9%	--	0.0%	55.3	3.0%	77.2	1.7%
Animal Waste	213.2	8.7%	--	0.0%	2.0	0.1%	215.2	4.7%
Shredded Paper	2.8	0.1%	--	0.0%	--	0.0%	2.8	0.1%
Grass	--	0.0%	--	0.0%	869.7	48.0%	869.7	18.9%
Other Organic Material	9.6	0.4%	--	0.0%	1.2	0.1%	10.8	0.2%
Beverage Containers	17.4	0.7%	2.5	0.8%	0.3	0.0%	20.2	0.4%
Refundables	17.4	0.7%	2.5	0.8%	0.3	0.0%	20.2	0.4%
Metal	17.2	0.7%	7.5	2.3%	--	0.0%	24.7	0.5%
Metal Containers	17.2	0.7%	7.5	2.3%	--	0.0%	24.7	0.5%
Glass	36.9	1.5%	2.3	0.7%	--	0.0%	39.1	0.9%
Glass Food Jars	36.9	1.5%	2.3	0.7%	--	0.0%	39.1	0.9%
Electronics	52.4	2.1%	0.1	0.0%	--	0.0%	52.5	1.1%
Batteries	1.9	0.1%	0.1	0.0%	--	0.0%	2.0	0.0%
Electronics	50.5	2.1%	--	0.0%	--	0.0%	50.5	1.1%

	Garbage		Recycling		Organics		Total	
	kg	%	kg	%	kg	%	kg	%
Textiles	68.7	2.8%	--	0.0%	--	0.0%	68.7	1.5%
Household Textiles	7.3	0.3%	--	0.0%	--	0.0%	7.3	0.2%
Other Textiles	21.2	0.9%	--	0.0%	--	0.0%	21.2	0.5%
Clothing & Footwear	40.2	1.6%	--	0.0%	--	0.0%	40.2	0.9%
HHW	13.1	0.5%	--	0.0%	--	0.0%	13.1	0.3%
HHW	13.1	0.5%	--	0.0%	--	0.0%	13.1	0.3%
Reusable	26.2	1.1%	0.9	0.3%	--	0.0%	27.0	0.6%
Donatable items	26.2	1.1%	0.9	0.3%	--	0.0%	27.0	0.6%
Grand Total	2452.3	100%	326.6	100%	1812.9	100%	4591.7	100.0%

Appendix D: Single-Use Item from 2022 Audit

Annual Single-Use Items Count and Weight (both summer and fall audits)

Category & Sub-Categories	Garbage		Recycling		Organics		Total	
	Count	kg	Count	kg	Count	kg	Count	kg
NR Paper								
Cold to-go cups	271	6.6	7	0.15	4	0.09	206.5	4.06
Hot to-go cups	237	5.27	7	0.13	11	0.24	231	4.27
NR Plastic								
Plastic lids	645	2.91	1	0.005	5	0.03	651	2.94
Plastic utensils	305	1.57	2	0.006			307	1.57
Plastic takeout cups	257	3.59			2	0.04	259	3.63
Plastic straws	178	0.23	5	0.03	2	0.002	185	0.25
Polystyrene plates/bowls	98	0.79					98	0.79
Grocery bags single use	74	0.86	1	0.01			75	0.87
Grocery bags double use	68	0.95					68	0.95
Plastic takeout containers	41	1.18					41	1.18
Polystyrene Foam Cups	33	0.13					33	0.13
Polystyrene takeout container	21	0.405	1	0.03			22	0.43
Plastic stir sticks	5	0.006					5	0.006
Grand Total	2,233	24.47	24	.35	24	.394	2281	25.22

Fall Single-Use Item Count and Weight

Category & Sub-Categories	Garbage		Recycling		Organics		Total	
	Count	kg	Count	kg	Count	kg	Count	kg
NR Paper								
Cold to-go cups	140	3.36	2	0.03	1	0.02	143	3.4
Hot to-go cups	124	2.33	1	0.03			125	2.36
NR Plastic								
Plastic lids	237	1.34			1	0.002	238	1.34
Plastic utensils	116	0.63	1	0.005			117	0.64
Plastic takeout cups	104	1.63					104	1.63
Plastic straws	45	0.08	3	0.03	1	0.001	49	0.11
Polystyrene plates/bowls	48	0.39					48	0.39
Grocery bags single use	47	0.52					47	0.52
Grocery bags double use	27	0.37					27	0.37
Plastic takeout containers	5	0.57					5	0.57
Polystyrene Foam Cups	27	0.06					27	0.06
Polystyrene takeout container	13	0.27					13	0.27
Plastic stir sticks	1	0.005					1	0.005
Grand Total	934	11.53	7	0.09	3	0.02	944	11.63

Summer Single-Use Item Count and Weight

Category & Sub-Categories	Garbage		Recycling		Organics		Total Item count	Total kg
	Count	kg	Count	kg	Count	kg		
NR Paper								
Cold to-go cups	131	3.24	5	0.13	3	0.08	139	3.44
Hot to-go cups	113	2.95	6	0.1	11	0.24	130	3.28
NR Plastic								
Plastic lids	408	1.57	1	0.005	4	0.025	413	1.6
Plastic utensils	189	0.94	1	0.001			190	0.94
Plastic takeout cups	153	1.97			2	0.04	155	2.01
Plastic straws	133	0.15	2	0.002	1	0.001	136	0.15
Polystyrene plates/bowls	50	0.4					50	0.4
Grocery bags single use	27	0.34	1	0.01			28	0.35
Grocery bags double use	41	0.59					41	0.59
Plastic takeout containers	36	0.61					36	0.61
Polystyrene Foam Cups	6	0.07					6	0.07
Polystyrene takeout container	8	0.14	1	0.03			9	0.17
Plastic stir sticks	4	0.001					4	0.001
Grand Total	1299	12.94	17	0.27	21	0.38	1337	13.59

Note: NR = Non-Recyclable

Appendix E: Fall Waste Audit Results 2022

	Garbage		Recycling		Organics		Total	
	kg	%	kg	%	kg	%	kg	%
Landfill or Contamination	424.1	35.0%	4.0	2.4%	1.2	0.0	429.3	21.1%
Other Waste	140.7	11.6%	0.3	0.2%	1.2	0.2%	142.2	7.0%
Contaminated Recycling	--	0.0%	1.2	0.7%	--	0.0%	1.2	0.1%
Flexible Plastic	11.2	0.9%	0.3	0.2%	--	0.0%	11.4	0.6%
NR Glass & Ceramics	21.9	1.8%	--	0.0%	--	0.0%	21.9	1.1%
NR Metal	12.2	1.0%	0.1	0.1%	--	0.0%	12.3	0.6%
NR Paper	12.1	1.0%	0.9	0.5%	0.0	0.0%	13.0	0.6%
NR Plastic	107.0	8.8%	1.3	0.8%	0.00	0.00%	108.2	5.3%
Garbage Bags	18.4	1.5%	--	0.0%	--	0.0%	18.4	0.9%
Hygiene/Diapers/Pet Pads	71.2	5.9%	--	0.0%	--	0.0%	71.2	3.5%
C&D Waste	28.4	2.3%	--	0.0%	--	0.0%	28.4	1.4%
Aggregates /Soil / Clay	1.0	0.1%	--	0.0%	--	0.0%	1.0	0.0%
Paper	61.4	5.1%	154.6	92.3%	3.2	0.5%	219.2	10.8%
Mixed paper	54.5	4.5%	62.3	37.2%	2.0	0.3%	118.8	5.8%
Cardboard	7.0	0.6%	92.3	55.1%	1.2	0.2%	100.4	4.9%
Plastic	18.5	1.5%	3.7	2.2%	--	0.0%	22.2	1.1%
Rigid Plastic	16.6	1.4%	3.7	2.2%	--	0.0%	20.4	1.0%
Polystyrene Packaging	1.8	0.2%	--	0.0%	--	0.0%	1.8	0.1%
Organic	589.4	48.6%	--	0.0%	655.2	99.3%	1244.6	61.0%
Edible Food Waste	187.0	15.4%	--	0.0%	10.6	1.6%	197.6	9.7%
Inedible food waste	128.3	10.6%	--	0.0%	37.1	5.6%	165.4	8.1%
Compostable Paper	49.1	4.0%	--	0.0%	9.8	1.5%	58.9	2.9%
Yard & Garden	46.6	3.8%	--	0.0%	541.8	82.1%	588.4	28.9%
Food In Packaging	33.3	2.7%	--	0.0%	--	0.0%	33.3	1.6%
Pumpkins	22.0	1.8%	--	0.0%	55.3	8.4%	77.2	3.8%
Animal Waste	121.2	10.0%	--	0.0%	0.7	0.1%	121.9	6.0%
Other Organic Material	2.0	0.2%	--	0.0%	--	0.0%	2.0	0.1%
Beverage Containers	5.1	0.4%	2.2	1.3%	--	0.0%	7.3	0.4%
Refundables	5.1	0.4%	2.2	1.3%	--	0.0%	7.3	0.4%
Metal	11.3	0.9%	2.8	1.6%	--	0.0%	14.1	0.7%
Metal Containers	11.3	0.9%	2.8	1.6%	--	0.0%	14.1	0.7%
Glass	16.2	1.3%	0.2	0.1%	--	0.0%	16.4	0.8%
Glass Food Jars	16.2	1.3%	0.2	0.1%	--	0.0%	16.4	0.8%
Electronics	29.1	2.4%	0.0	0.0%	--	0.0%	29.1	1.4%
Batteries	1.1	0.1%	0.0	0.0%	--	0.0%	1.1	0.1%
Electronics	28.0	2.3%	--	0.0%	--	0.0%	28.0	1.4%
Textiles	29.7	2.5%	--	0.0%	--	0.0%	29.7	1.5%
Household Textiles	3.0	0.2%	--	0.0%	--	0.0%	3.0	0.1%
Other Textiles	9.2	0.8%	--	0.0%	--	0.0%	9.2	0.5%
Clothing & Footwear	17.5	1.4%	--	0.0%	--	0.0%	17.5	0.9%

	Garbage		Recycling		Organics		Total	
	kg	%	kg	%	kg	%	kg	%
HHW	9.0	0.7%	--	0.0%	--	0.0%	9.0	0.4%
HHW	9.0	0.7%	--	0.0%	--	0.0%	9.0	0.4%
Reusable	18.0	1.5%	--	0.0%	--	0.0%	18.0	0.9%
Donatable items	18.0	1.5%	--	0.0%	--	0.0%	18.0	0.9%
Grand Total	1211.7	100%	167.5	100%	659.6	100%	2038.8	100%

Appendix F: Summer Waste Audit Report 2022



City of Spruce Grove

Technical Report: Residential Waste Audit

July 2022

Submitted by: Stacey Schaub-Szabo M.Sc. P.Biol
S-Cubed Environmental

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1 Background

The City of Spruce Grove (the City) operates a comprehensive waste collection program with a strong focus on waste reduction and diversion. The City offers a three-stream residential collection service: garbage, organics and recycling. In addition, it operates an Eco Centre and several seasonal waste diversion events, including Large Item Pick Up, Free-cycle, Shred-4-Free and E-roundup.

The City is committed to providing educational and promotional tools to support residents to successfully divert materials from the waste stream. Due to recycling market challenges, there have been changes to the list of items that can be recycled through the blue bag program. A number of plastic types and glass are no longer accepted in the blue bag.

The City engaged S-Cubed Environmental to conduct a residential waste audit in June 2022. The main goals of this waste audit were to:

- understand whether recycling and organics diversion rates have been impacted by the changes to the list of items that can be recycled through the blue bag program;
- determine if there has been a reduction in garbage generation rates following enhanced communication strategies and diversion programs – in comparison with waste audit data from 2016 and 2019; and,
- develop a better understanding of the weight and number of single-use items in the garbage, recycling and organics streams and if there was a decrease from 2019 due to the Single-Use Items Reduction Bylaw January 2022.

In this report, **waste** refers to the combined streams of garbage, recycling, and organics. A glossary of terms used in this report is located in Appendix A.

2 Waste Audit Categories

The audit categories for all streams were the following: paper, plastics, metal, glass, organics, refundable beverage containers, electronics, textiles, household hazardous waste, and landfill. Appendix B contains a detailed description of categories and sub-categories, including examples of items found in each subcategory.

For each of the garbage, recycling and organics streams, the S-Cubed team separated and counted single-use items found within the stream, including the following: plastic grocery bags, straws, cutlery, lids, takeout plastic cups, and polystyrene takeout containers. The results of this single-use item analysis are presented in Section 6.

The term contamination refers to material found in the sample that does not belong in the respective stream. For example, a black plastic garbage bag is considered contamination if it is

found in the organics program, and electronics are considered contamination when found in the blue cart.

3 Waste Audit Methodology

The summer residential waste audit was conducted from June 22th to June 24th, 2022. The audit included samples from the garbage, recycling and organics streams. A sample of 100 houses was selected, which included several neighbourhoods representing a range of City demographics.

S-Cubed personnel started each day at 7:00 am by visually assessing and recording waste data at the curbside pick-up locations for the sample homes. A daily sampling log sheet with the house addresses to be sampled was used to track waste details (i.e., date, time, number and fullness of the garbage and organics carts, number of recycling bags, presence of visual contamination in the organics carts, presence of loose cardboard, etc.).

GFL Environmental then collected the waste samples from the various neighbourhoods. Samples were brought to the old Public Works building. Garbage and recycling streams were emptied inside the building and, the organics samples were emptied onto a concrete pad outside the building.



Image 1 – Sorting area set up

At the sorting site, digital photographs of waste samples were taken before sorting. Samples from each of the garbage, recycling and organics streams were hand-sorted by a team of three to five people into bins, carts and buckets lined with black garbage bags labelled with the subcategories described in Appendix B. Materials were weighed using a floor scale accurate to five grams. Notes about unexpected and unusual materials were documented. Data were recorded in a spreadsheet for data analysis.

4 Results and Discussion

4.1 Set Out Rate

During the waste audit period, 83 percent of households sampled set out garbage at the curb. This is relatively similar to garbage set out rates from 2016 and 2019. Of the households sampled, 45 percent set out recycling at the curb, which is slightly higher than the two previous audits. Sixty percent of households sampled set out their organics cart at the curb, which is slightly higher than

previous audits. Section 5 presents a more detailed comparison of set-out rates measured in this waste audit relative to the previous two audits.

In addition to recording the set-out rate, we also categorized and recorded the fullness of the garbage and organics carts, and counted the number of blue bags set out. The most frequent fullness for the organic cart was 50 percent and the most frequent fullness for the garbage cart was 100 percent. Twenty-nine households set out one blue bag, twelve households set out two or more blue bags at the curb, and four households had set out only cardboard at the curb.

4.2 Garbage Stream Audit Results

During the audit period, 83 percent of the 100-household sample set out black garbage carts. The total weight of the garbage examined was 1,241 kilograms. This represents an average of 12.4 kilograms per household.

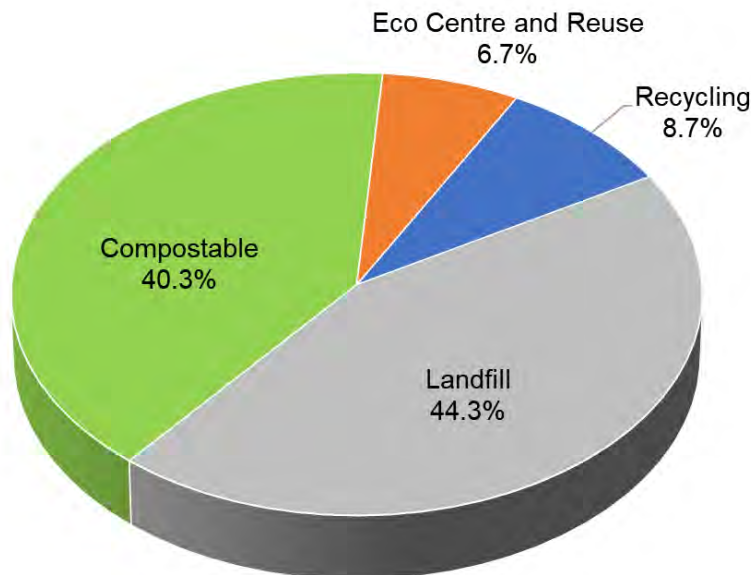


Figure 1 shows the proportion of materials in the garbage stream that cannot otherwise be diverted and must be sent to landfill (44%), along with the portion of compostable (40%) and recyclable materials (16%) present in the garbage stream.

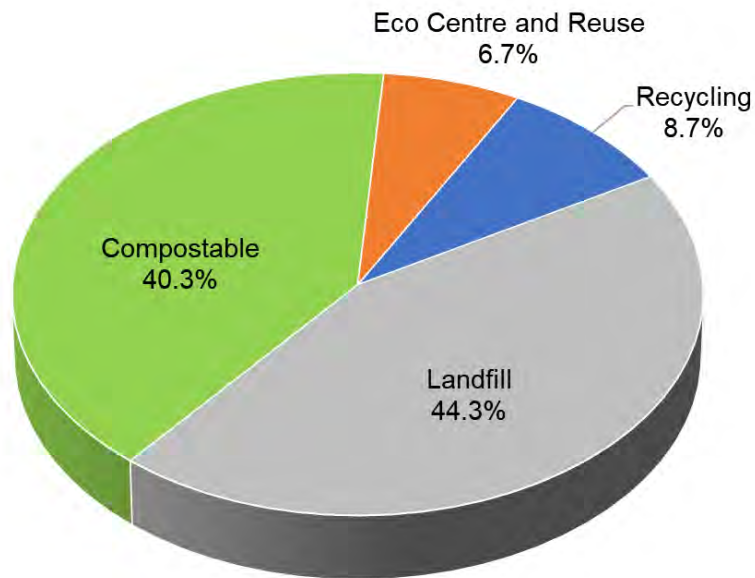


Figure 1 – Composition of Residential Garbage Stream in June 2022

More than a third of the garbage stream consisted of compostable items. Compostable materials in the garbage consisted primarily of inedible and edible food waste, followed by animal waste and compostable paper.

Almost nine percent of the material in the garbage could have been recycled in the blue bag program. Materials in this category consisted mainly of mixed paper followed by smaller quantities of rigid plastic and refundable beverage containers. Approximately seven percent of material in the garbage could have been recycled or reused if the items were dropped off at the Eco Centre or other donation locations. The main materials in this category were clothing and footwear, electronics, and glass jars. Table 1 provides a detailed description of the proportion of various materials found in the garbage stream.

Table 1 – Detailed Composition of the Garbage Stream in the Black Garbage Cart

Audit Sub-Categories	KG	%
Compostable	499.5	40.3%
Inedible Food Waste	152.6	12.3%
Edible Food Waste	143.8	11.6%
Animal Waste	92.0	7.4%
Compostable Paper	65.2	5.3%
Food In Packaging	33.7	2.7%
Other Organic Material	7.6	0.6%
Shredded Paper	2.8	0.2%
Yard & Garden	1.7	0.1%
Blue Bag Recycling	107.9	8.7%
Mixed Paper	59.4	4.8%

Audit Sub-Categories	KG	%
Rigid Plastic	22.7	1.8%
Refundable Beverage Containers	12.3	1.0%
Cardboard	7.5	0.6%
Metal Containers	5.89	0.5%
Eco Centre and Reuse	83.3	6.7%
Clothing & Footwear	22.7	1.8%
Electronics	22.5	1.8%
Glass Food Jars	20.7	1.7%
Donatable Items	8.2	0.7%
Household Textiles	4.3	0.3%
HHW	4.1	0.3%
Batteries	0.8	0.07%
Polystyrene Packaging	0.08	0.01%
Landfill	549.9	44.3%
Other Waste	208.0	16.8%
Hygiene/Diapers/Pet Pads	104.6	8.4%
Non-Recyclable (NR) Plastic	104.4	8.4%
NR Paper	25.4	2.0%
Aggregates /Soil / Clay	20.3	1.6%
NR Glass & Ceramics	18.1	1.5%
NR Metal	17.7	1.4%
C&D Waste	17.1	1.4%
Other Textiles	12.0	1.0%
Garbage Bags	11.5	0.9%
Flexible Plastic	10.9	0.9%
Grand Total	1240.5	100%

Below are the images of the garbage samples delivered to the sort location.



Wednesday



Thursday



Friday

GARBAGE AUDIT IMAGES | The following images are from the garbage stream and show materials that could be diverted from the landfill.

Organic Material

Approximately 40% of the material found in the garbage could be composted instead of sent to a landfill.



Edible food



Compostable paper



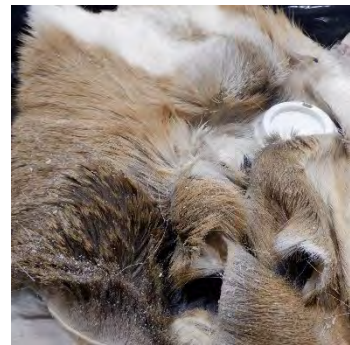
Food in packaging



Other organic waste-compostable PC coffee pods, stir sticks.



Inedible food waste



Animal pelts

Materials That Could Have Been Recycled in the Blue Bag

Approximately nine percent of the items in the garbage stream could have been recycled in the blue bag. We observed a number of containers in the garbage stream containing food debris – if cleaned, these containers could have been recycled.



Rigid plastic



Mixed paper



Metal food containers



Beverage containers

Materials That Could Have Been Taken to the Eco Centre or Other Donation Centre



Electronics



Glass jars



Craft supplies



Packaging Styrofoam

Landfill



Garden hose



Polystyrene takeout containers



Non-recyclable plastic food wrappers



Plastic lids



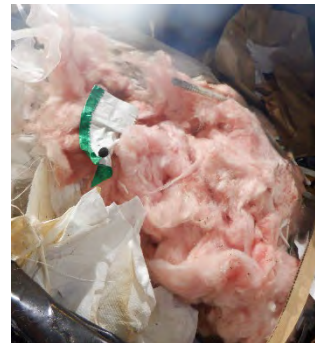
Foam core



Other waste



Flexible plastic



C&D waste

4.3 Recycling Stream Audit Results

During the study period, 45 percent of the 100-household sample set out recycling. The total weight of the recyclables examined was 161 kilograms. This represents an average of 1.6 kilograms per household. The contamination rate was 8 percent. Figure 2 shows the proportion of the various categories of materials in the recycling stream. This figure aggregates the items that do not belong in the blue recycling bag as contamination.

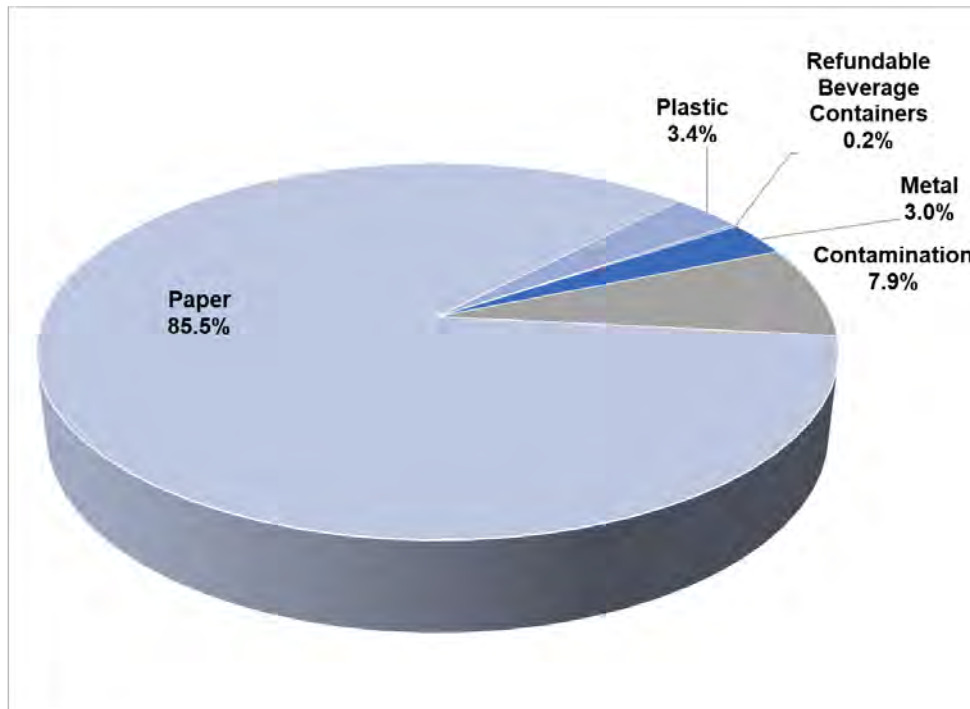


Figure 2 – Composition of the Blue Recycling Bag Stream

Table 2 provides a detailed composition of the blue bag recycling stream rounded to the tenth decimal. The recyclable materials in the recycling stream consisted of mostly paper which comprised of mixed paper and cardboard with smaller amounts of rigid plastic and metal containers.

There was eight percent contamination in the recycling stream. The majority of the contamination consisted of contaminated (dirty) recycling, non-recyclable plastics, glass food jars and garbage bags. Some examples of what we observed as contamination included food wrappers, loose film plastic, heavy food residue inside cans and plastic containers, and a furnace filter.

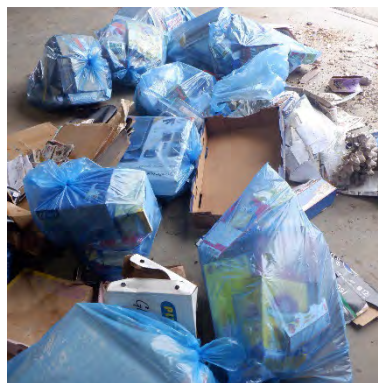
Table 2 – Detailed Composition of the Blue Bag Recycling Stream

Audit Sub-Categories	KG	%
Recycling	146.5	92.1%
Mixed paper	74.9	47.1%
Cardboard	61.1	38.4%
Rigid Plastic	5.4	3.4%
Metal Containers	4.75	3.0%
Refundables	0.3	0.2%
Contamination	12.6	7.9%
Contaminated Recycling	3.8	2.4%
NR Plastic	2.8	1.8%
Glass Food Jars	2.1	1.3%
Flexible Plastic	1.1	0.7%
NR Paper	0.9	0.6%
Donatable items	0.9	0.5%
Other Waste	0.2	0.2%
NR Glass & Ceramics	0.2	0.1%
Yard & Garden	0.2	0.1%
Edible Food Waste	0.1	0.09%
Compostable Paper	0.1	0.08%
Batteries	0.10	0.06%
Grand Total	159.0	100%

Below are images of the recycling samples delivered to the sort location.



Wednesday



Thursday



Friday

RECYCLING AUDIT CATEGORIES | The following images are from the recycling stream.

Recyclable Material

The majority of the recyclable material was mixed paper and cardboard with much smaller amounts of recyclable plastic and metal.



Mixed paper



Metal containers



Rigid plastic containers



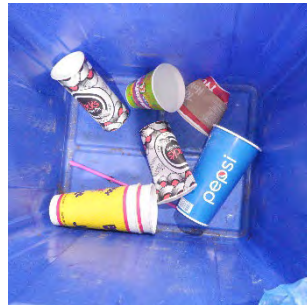
Cardboard

Contamination

The recycling stream had about 8% contamination and included materials such as the following.



Donatable plastic items



Fountain and coffee cups



Non-recyclable paper
– coil-bound book



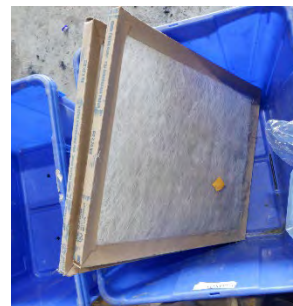
Flexible plastic



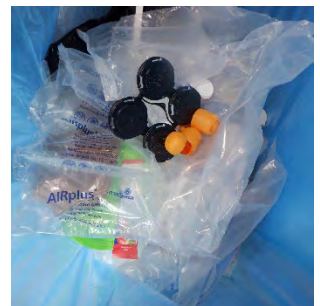
Compostable paper



Batteries



Furnace filter



Loose film and non-
recyclable plastic

4.4 Organics Stream Audit Results

During the study period, 60 percent of the 100-household sample set out a green organics cart. The total weight of the organics examined was 1153 kilograms. This represents an average of 11.5 kilograms per household. The contamination rate was 1.3 percent. Figure 3 shows the proportion of the various categories of materials in the organics stream. During the June audit, the vast majority of the organics stream was comprised of grass clippings, with smaller quantities of yard and garden materials, inedible food waste and compostable paper. This figure aggregates the items that do not belong in the green organics cart as contamination. Some examples of what we observed as contamination included a garbage bag, film plastic and metal.

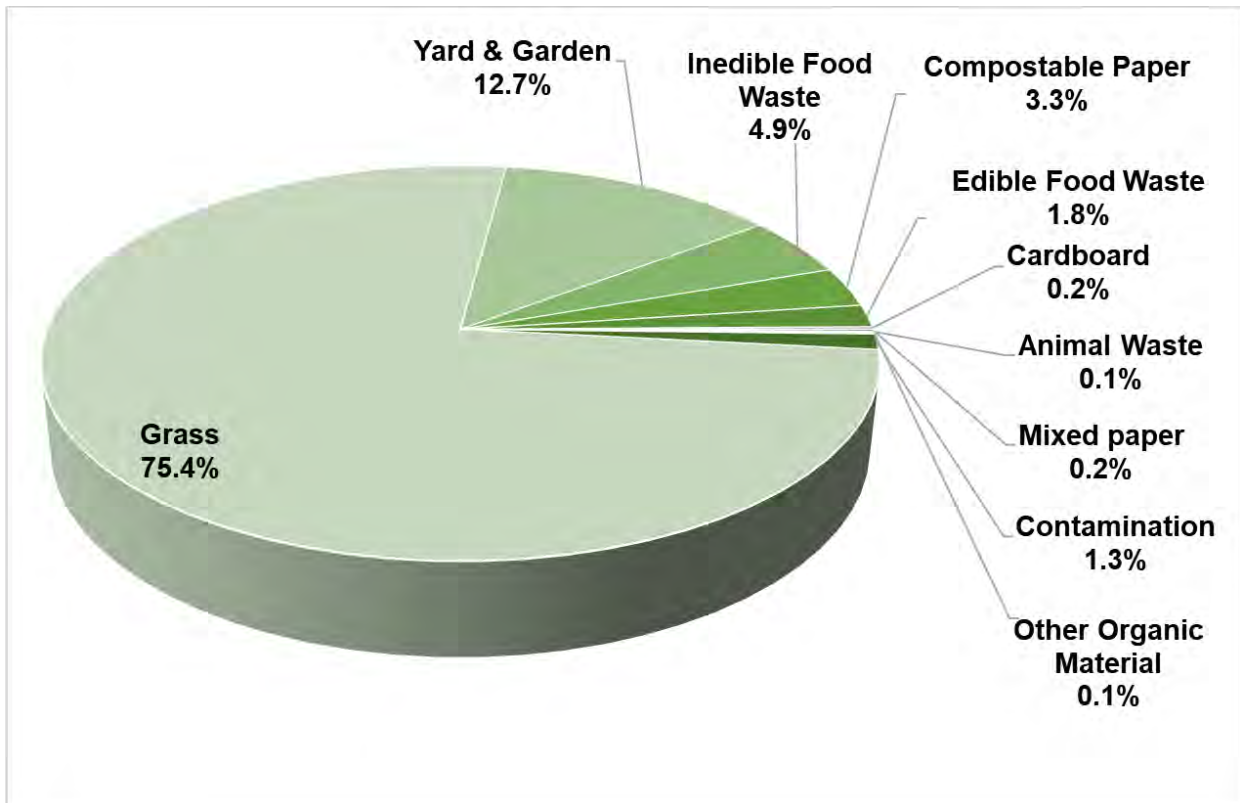


Figure 3 – Composition of the Organics Stream

Table 3 provides a detailed composition of the organics stream rounded to the tenth decimal. A comparative analysis of results from this audit with those from past waste audits is found in Section 5.

Table 3 – Detailed Composition of the Green Cart Organics Stream

Audit Sub-Categories	KG	%
Compostable	1138.6	98.7%
Grass	869.73	75.4%
Yard & Garden	146.4	12.7%
Inedible food waste	56.6	4.9%
Compostable Paper	37.8	3.3%
Edible Food Waste	21.2	1.8%
Cardboard	2.385	0.2%
Mixed paper	2.035	0.2%
Animal Waste	1.355	0.1%
Other Organic Material	1.185	0.1%
Contamination	14.7	1.3%
Other Waste	10.1	0.9%
NR Plastic	2.8	0.2%
NR Paper	1.1	0.09%
C&D Waste	0.51	0.04%
Refundables	0.25	0.02%
Grand Total	1153.3	100%

Below are images of the organic samples delivered to the sort location.



Wednesday



Thursday



Friday

ORGANIC AUDIT CATEGORIES | The following images are from the organics stream.

Organic Material

Over 80 percent of the organics stream was grass clippings / yard and garden material, with smaller quantities of compostable paper, inedible food waste and edible food.



Grass



Edible food



Branches



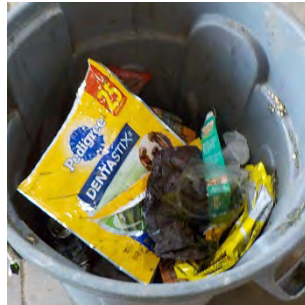
Compostable paper

Contamination

The organics stream had 1.2 percent contamination and included materials such as:



Garbage bag



Plastic film and wrappers



Metal can



Lids and metal part

5 Comparative Analysis of Summer Waste Audits

An objective in conducting this June 2022 waste audit was to determine if there has been a reduction in garbage generation rates following enhanced communication strategies and diversion programs – in comparison with waste audit data from 2016 and 2019. This included a comparison of the single-use items before and after the Bylaw was implemented. The City was also interested in understanding whether recycling diversion rates have been impacted by the reduction of the list of items that can be recycled through the blue bag program and if organics diversion rates have improved.

This section compares data from the current summer waste audit with those conducted during the summers of 2016 and 2019.

5.1 Set-Out Rates

Figure 4 shows how the set-out rate for garbage, organics and recycling compares across the three summer waste audits. There was a small gradual increase in the set-out rate for the green organics cart from 2016 to 2022 and a slight increase in the set-out rate for recycling in 2022 in

comparison with the 2016 and 2019 audits. There was no clear pattern of change in the set-out rate for garbage.

The overall summer curbside diversion rate increased between 2016 and 2019 and then fell in 2022. The removal of some items such as flexible plastic and glass jars from the list of items accepted in the blue bag may be the reason for this decline.

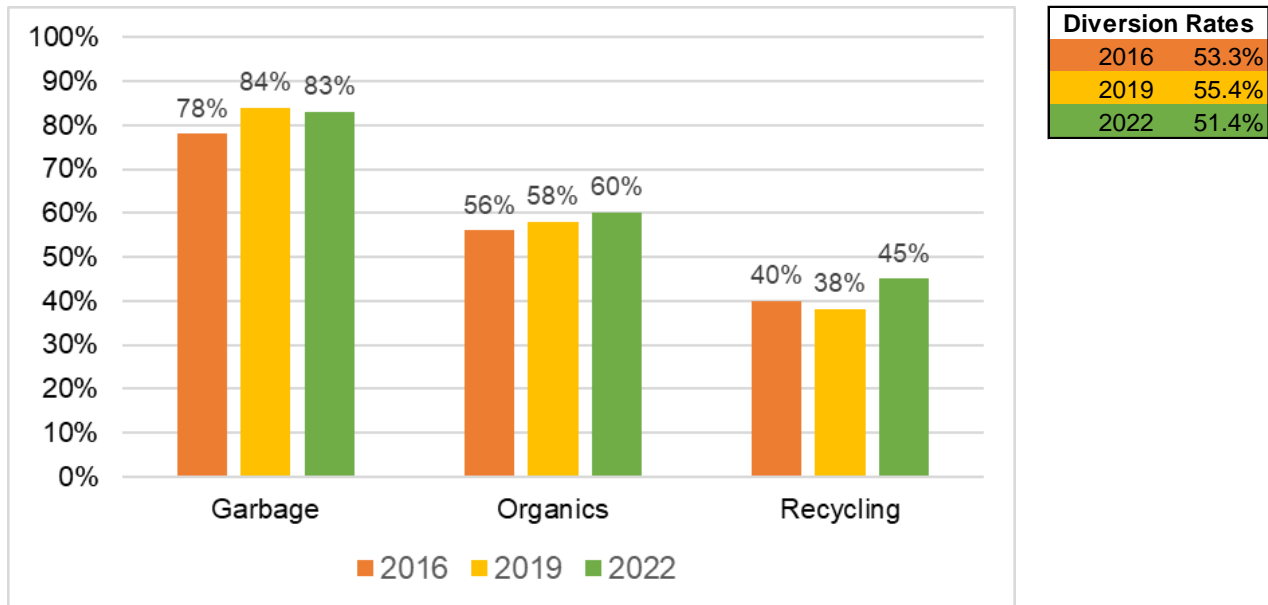


Figure 4 - Comparison of set-out rates for the garbage, organics and recycling streams and diversion rates during the 2016, 2019 and 2022 summer audits.

5.2 Waste Generation Rates and Contamination Levels

Table 4 compares the per household generation rates for garbage, organics and recycling and the contamination rates for organics and recycling across the three audit years focusing on the spring event.

Table 4 – Household waste generation rates and contamination levels across audit events

	Kilograms per household			Contamination rate		
	2016	2019	2022	2016	2019	2022
Garbage	11.8	14.0	12.4	/		
Organics	10.7	15.3	12.1	1.1%	0.6%	1.2%
Recycling	2.8	2.2	1.6	17.3%	12.2%	7.9%
Total Waste	25.3	31.5	26.1			

There has been a steady decline in the quantity of materials diverted to the blue bag recycling program across the audit years, from 2.8 kg per household in 2016 to 1.6 kg per household in 2022. This decline in quantity of material recycled through the blue bag program is most likely due to the decline in the quantity of material types accepted for recycling through the blue bag

program over the same time period. For example, flexible plastic has not been collected in the blue bag program since the 2016 audit period.

It is interesting to note that during the same time period there has also been a steady decline in the contamination rate within the blue bag recycling stream, from 17% in 2016 to 8.3% in 2022. Part of the reason for this decline in contamination may be due to a shorter, simpler list of items that are accepted in the blue bag program. However, this decline in contamination also very likely reflects the City's focus on public education to help residents understand changes to the accepted list of blue bag recycling items and public education focused on reducing contamination from frequently mis-sorted items.

There were no clear trends in the quantity of material collected in the organics and garbage streams. The quantity of organics and garbage collected per household rose between the 2016 and 2019 audits, and the 2022 audit results were between the 2016 and 2019 results.

The contamination rate for the organics stream has remained low across all three summer audit periods – ranging from 0.6% in 2019 to 1.2% in 2022. These slight differences may just reflect variation in the quantity of grass clippings and yard waste collected during the various audits. The grass clippings and yard waste are heavy, and an increase in the quantity of these materials (such as observed in 2019) tends to reduce the rate of contamination, even if some contaminants are still present. As much as the organics contamination rate is low, it is still valuable to take note of any trends in the type of contaminants present.

Figure 5 presents the proportion of the total waste stream that was composed of garbage, organics and recycling across the three summer audit events.

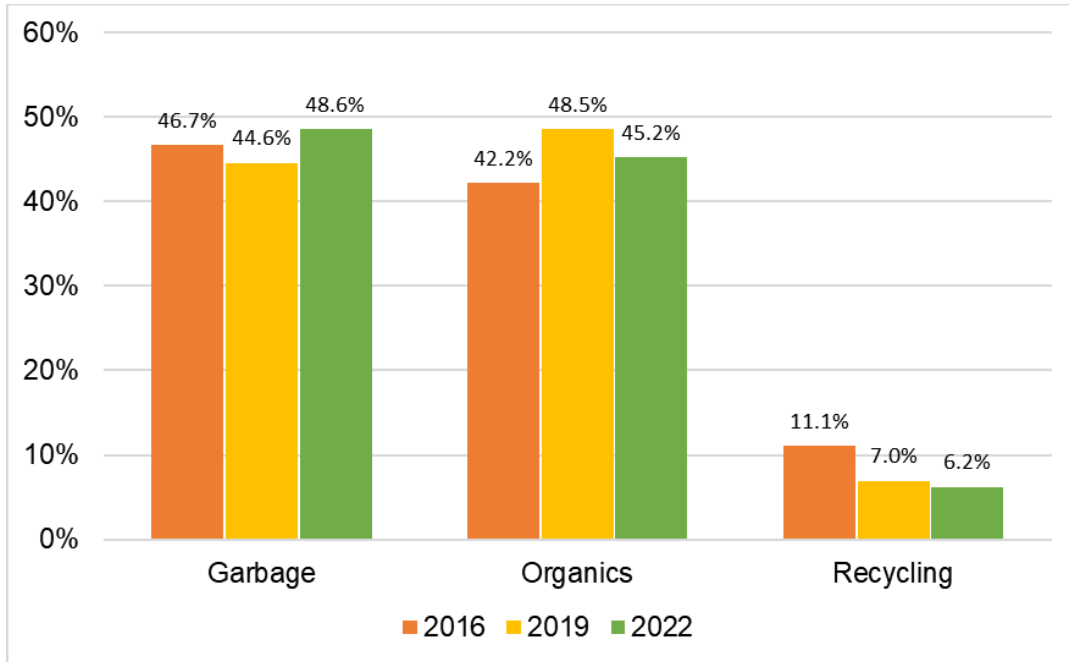


Figure 5 – Comparison of waste generated among the three audits represented as a percentage of the total waste stream for that year.

Similar to the per household waste generation data, the clearest trend is that the proportion of materials being diverted through blue bag recycling has declined across the audit years. Since 2016, there has been a slight increase in material diverted through the green organics cart.

5.3 Material Capture Rates

Resident participation in diversion programs can be evaluated by examining the capture rate for categories of materials that can be diverted through current recycling and organics programs. Figure 6 shows the capture rates for compostable paper, food waste and blue bag recyclable items across the three audit periods.

A clear opportunity remains to increase the diversion of food waste into the green organics cart. In 2018 the City carried out a door-to-door campaign and other public engagement to encourage residents to divert food waste to the green cart. This may explain why the 2019 capture rate for food waste was significantly higher than in 2016. Between 2019 and 2022, there has been a slight decline in the capture rate for food waste. The capture rate for materials that can be diverted through the blue bag recycling program has remained at greater than 50% across all audit events, with a slight decline between 2019 and 2022.

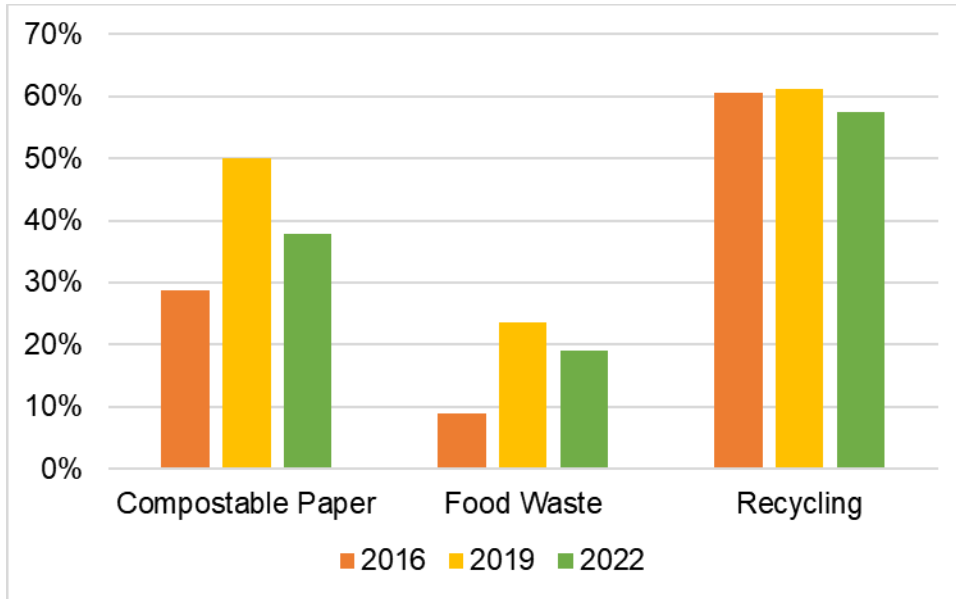


Figure 6 – Capture Rates for Compostable Paper, Food Waste and Blue Bag Recycling Among Summer Audit Events

6 Single-use Trends

One of the objectives of this waste audit was to develop a better understanding of the weight and number of single-use items in the garbage, recycling, and organics streams. For each of these streams, single-use plastic and paper items were sorted, counted, and weighed to measure the quantities present. Almost all of the single-use items were found in the garbage stream. Approximately 0.52% percent of the total combined waste streams consisted of single-use items, which amounted to 13.58 kilograms. There was a total count of 1337 single-use items. In 2019 the total count of single-use items was 2375.

Figure 7 depicts the proportion of various single-use item categories in the combined waste streams. The single-use items that were most commonly counted were disposable hot and cold paper cups and disposable plastic cups. In 2019, the top item was plastic grocery bags then the same order of items in 2022. Detailed single-use item count data is found in Appendix D.

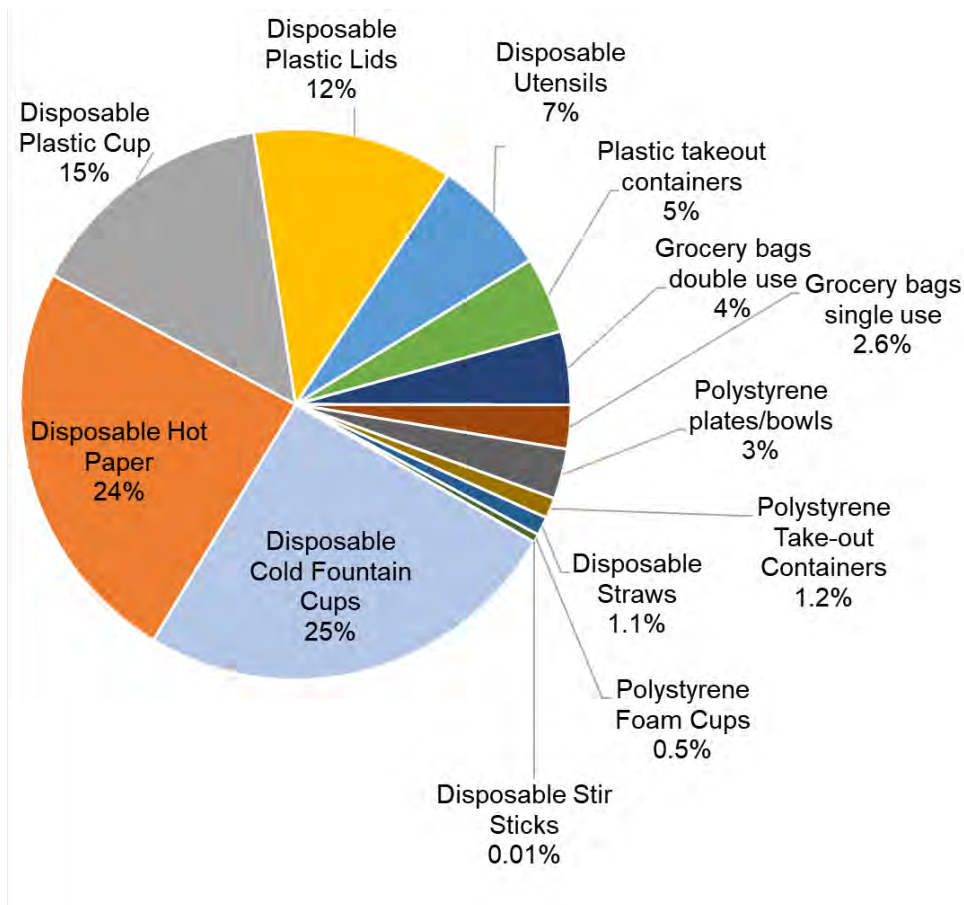


Figure 7 – The percentage of single-use items found in the waste stream by weight

In January, Spruce Grove implemented a single-use plastics reduction bylaw focusing on plastic checkout bags, plastic straws, and polystyrene food service ware. Figure 8 shows the count of these three items between the two summer audits as well as the count for the other items. Polystyrene plates / bowls is not part of the figure as those were placed in the non-recyclable plastic category in 2019.

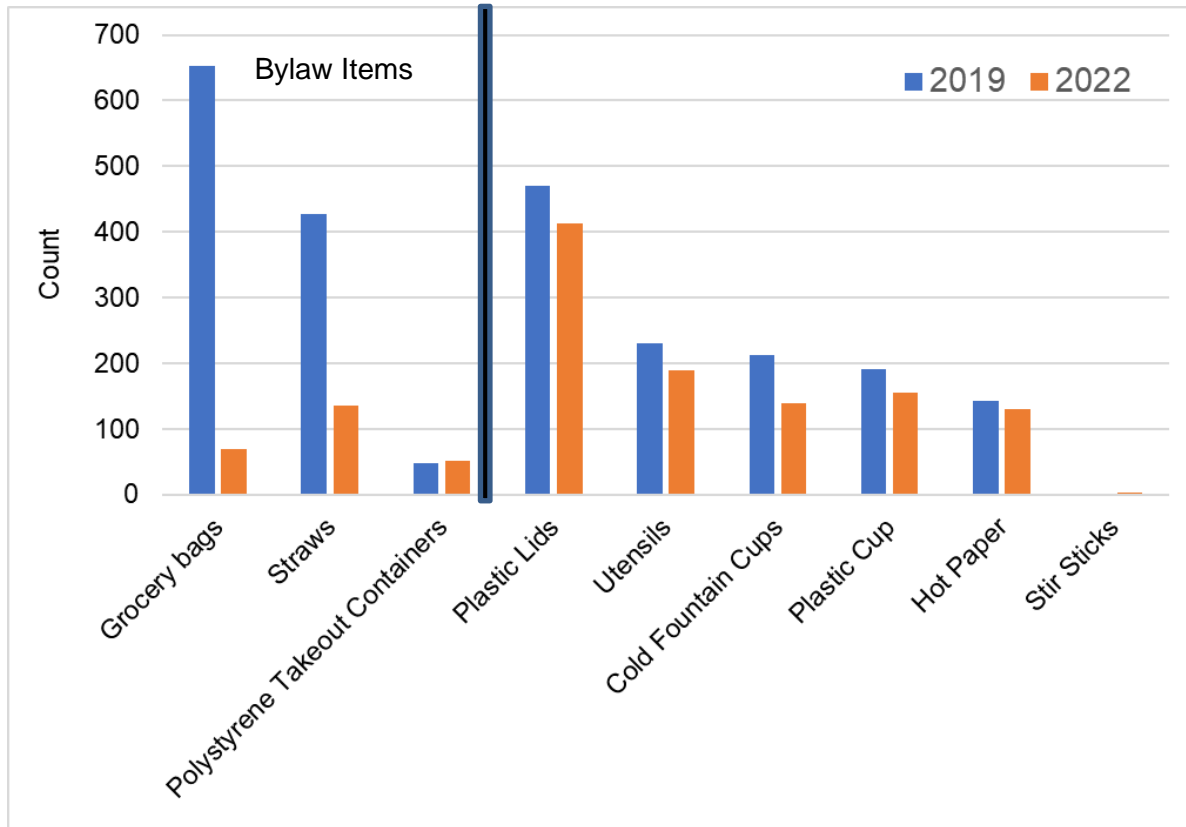


Figure 8 – The count of single-use items found in the 2019 audit compared to the 2022 audit

In June, the [federal government announced regulations](#) indicating that the manufacture and import of six single-use plastic items will be banned starting in December 2022. These six items are: checkout bags, cutlery, foodservice ware made from or containing problematic plastics that are hard to recycle; ring carriers; stir sticks; and, straws (with some exceptions). The sale of these items will be prohibited as of December 2023.

7 Conclusions

Diversion Rate

Curbside residential diversion in Spruce Grove increased between 2016 and 2019 and then fell slightly in 2022 to 51%. The removal of some items such as flexible plastic from the list of items accepted in the blue bag may have contributed to this decline.

Organics

The audit found that approximately 40% of the material in the garbage could be composted instead of sent to landfill. However, the City's efforts to educate residents about how to divert compostable paper are making an impact in the diversion of this material category. The capture rate for compostable paper has increased from less than 30% in 2016 to almost 60% in 2022. The contamination rate for the organics stream has remained low across all three summer audit periods – ranging from 0.6% in 2019 to 1.2% in 2022.

Blue Bag

The capture rate for materials that can be diverted through the blue bag recycling program has remained at greater than 50% across all audit events, with a slight decline between 2019 and 2022. However, there has been a steady decline in the quantity of materials diverted to the blue bag recycling program across the audit years, from 2.8 kg per household in 2016 to 1.6 kg per household in 2022. This decline in the quantity of material recycled through the blue bag program is most likely due to the decline in the quantity of material types accepted for recycling through the blue bag program over the same time period. There are also manufacturing changes with brand owners who are substituting packaging to plastic from aluminum, steel and glass resulting in less or lighter material that can be recycled, and companies selling smaller sized products require less boxboard and cardboard packaging.

There has been a steady decline in the contamination rate within the blue bag recycling stream across the audit periods, from a contamination rate of 17% in 2016 to 8.3% in 2022. This reduction in contamination is likely due to a combination of the City's public education efforts and the shorter, simpler list of items that are accepted in the blue bag program.

Single-Use

There was a significant decline in the prevalence of single-use items in the waste stream in 2022 compared with 2019. The largest declines were observed for grocery bags and straws, which were addressed as part of the recent Single-Use Items Reduction Bylaw. In 2022, 0.5 percent of the total combined waste streams consisted of single-use items, which amounted to 13.6 kilograms, in comparison with 20.9 kilograms in 2019. In 2022, there was a total count of 1337 single-use items, with the most commonly counted items consisting of disposable hot and cold paper cups, disposable plastic cups and disposable plastic lids. In 2019, the single-use item count was 2375. Thus, after the introduction of the Single-Use Items Reduction Bylaw, the number of single-use items has been reduced by approximately half in 2022, as compared to the 2019 audit.

In summary, the June 2022 waste audit showed that the most significant opportunity to increase residential waste diversion is to increase the diversion of inedible food waste, edible food, and animal waste to the green organics cart.

We also noted that the following common items belong in the garbage and not the green organics cart where they were observed:

- single-use condiment packets, straws, and plastic to-go cups;
- dryer sheets, baby wipes, and disinfectant wipes;
- treated wood; and,
- plastic packaging on or containing food – packaging must be removed before placing the food in the organics cart.

Recycling contamination rates would improve if the following items were not placed in the blue bag:

- food containers with food residue – they should be rinsed first;
- glass food jars – they should be taken to the Eco Centre;
- plastic bags and plastic food packaging – they should be placed in the garbage; and,
- reusable items – these should be donated to others or placed in the garbage.

Appendix A Glossary

Blue Bag Recycling— recyclable material that is sent to a processor for recycling

Capture rate - is the amount of material diverted compared to the amount of the same material sent to the landfill. Capture rate is expressed as a percentage.

Compost – a humus-like substance that is produced from the decomposition of organic materials that takes place at a composting facility.

Contamination – items that are in a recycling or organics program that should not be in those programs.

Diversion rate – proportion of recyclable, compostable and reusable items prevented from going to a landfill relative to the total waste stream.

Garbage – material that is sent to a landfill.

Green Organics Cart – cart used to collect organic material for composting.

HH – Households

HHW – Household Hazardous Waste

Organics – material that is biodegradable and can be processed at a composting facility to produce compost.

Eco Centre – a location for residents to divert recyclable items, including those that are not accepted in a blue bag program, and to safely dispose of hazardous items such as HHW.

N.R. – Non-recyclable

Waste Composition or Waste Audit – an examination of the proportion of various materials in a given waste stream.

Appendix B Audit Categories

	Sub-Category	Description and Examples
Paper		
	Mixed Paper	Boxboard, envelopes, paper, paper bags, egg cartons, white paper, newsprint, magazines, tissue paper
	Cardboard	Corrugated cardboard
Plastic		
	Rigid	Rigid plastics i.e., laundry detergent bottles, condiment bottles, large yogurt or sour cream containers, windshield washer fluid jug
	Styrofoam packaging	Styrofoam computer or appliance packaging
Metal		
	Metal Containers	Steel cans and pie plate foil containers (must be easily cleaned-otherwise Other Waste)
Glass		
	Glass Food Containers	Food jars
Organics		
	Edible Food Waste	Sandwich, slices of pizza, fruit
	Inedible Food Waste	Banana peel, bones, vegetable peels
	Compostable paper	Food-soiled napkins, paper plates no waxy liner, fast food packaging, tissues (i.e., fast-food bags, flour bags, parchment paper); greasy pizza boxes; NO SHINY paper.
	Food in Packaging	Food that could be composted if it was removed from its packaging; captures items that can't be opened in 2 seconds. Wasted food items in their original packaging.
	Yard & Garden	Grass clippings, leaves, branches.
	Pumpkins	A seasonal item; ornamental apples could also be added to this list.
	Animal Waste	All types of pet waste and bedding
	Other Organic Waste	Stir sticks, chop sticks, toothpicks, popsicle sticks, animal hair, PC compostable coffee pods (wider and shorter), wooden cutlery, Poly Lactic Acid (PLA) containing items. BPI-certified compostable paper cups and packaging;
Beverage Containers		
	Refundables	Aluminum, tetra pak, pouches, glass, plastic
Electronics		
	Electronics	IT accessories, toothbrush, headphones, audio, visual, kitchen and power tools, batteries, and other power cord items.
Household Hazardous Waste		
	HHW	ARMA containers, fluorescent bulbs, paint, used engine oil and filters, propane tanks, household chemicals; aerosol cans.
Textiles		
	Clothing and Footwear	Clothing and footwear (wearable/donatable)
	Household	Drapes, pillows (useable/donatable)
	Other	Rags, work gloves, coveralls, non-donatable textiles

continued

Landfill Sub-Category		Description and Example
Other Waste		Playdough, glue, cig butts, elastics, rubber gloves, hand lotion tubes, lint, dryer lint, cotton swabs, vacuum bag, broken water sprinkler as due to mixed materials, masks, gloves, wipes, foil & aluminum containers with food residue, paint brushes and rollers, sawdust, drywall residue, incandescent light bulb, toothpaste and product, candles, fines (small residue-broken glass, sand, pieces of paper).
Reuse		Items that could be donated; gift bags
Non-Recyclable Paper		Cigarette foils, waxed paper ice cream containers, soup tetra containers, flour & dog food bags as they have a liner, waxy paper, Pringles chip containers, padded envelopes, gift bags with tassels or place in reuse bin; laminated paper, paper that is glittery/shimmery. French fry containers, subway wrappers, anything shiny surface is in this section. DQ ice cream container.
	Count	Hot to-go cups
	Count	Cold to-go cups
	Count	Paper takeout containers (clamshell, fries, Tim Horton's boxes, DQ paper cups)
Non-Recyclable Plastic		Plant pots, single-use yogurt, sauce cups, lids, wrappers, chip bags, toys, cd cases, crunchy plastic, bacon packaging; food wrap, cookie trays and covers, PET #1 raspberry clamshell (note different from a TO container sandwich clamshell), stretch wrap, plant pots, black plastic containers, and plastic pumps.
	Count	Plastic straws
	Count	Plastic cutlery
	Count	Plastic lids coffee cup/ fountain / slushy
	Count	Plastic disposable cups (cold to-go cups i.e., takeout, solo, smoothie)
	Count	Styrofoam takeout container (cups, clamshells from a deli)
	Count	Clamshell takeout containers (i.e., deli containers, fast food places, PET)
	Count	Grocery bags single-use (i.e., loose)
	Count	Grocery bags double-use (i.e., held garbage)
Non-Recyclable Glass/ Ceramics		Windowpanes, fish tanks, coffee mugs and plates, perfume bottles, mirror
Non-Recyclable Metal		This is for scrap metal, hangers, metal fry pans
Garbage Bags		Liners
C&D waste		Treated and painted wood, drywall, lumber, insulation, underlay
Contaminated Recycling		Excess food residue in or on item (reserved for recycling stream)
Hygiene/ Diapers/Pet Pads		
Aggregate, Soil, Clay		Includes non-compostable organic waste – sod, soil, clay and aggregate like rocks or concrete pieces.
Animal Waste		All types of pet waste and bedding (reserved for organics stream when not in a BPI compostable bag)

Appendix C Summer 2022 Waste Audit Results

	Garbage		Recycling		Organics		Total kg	Total %
	kg	%	kg	%	kg	%		
Landfill or Contamination	537.8	43.4%	9.1	5.7%	14.4	0.0	561.3	22.0%
Other Waste	208.0	16.8%	0.2	0.2%	10.1	0.9%	218.3	8.6%
Contaminated Recycling	--	0.0%	3.8	2.4%	--	0.0%	3.8	0.1%
Flexible Plastic	10.9	0.9%	1.1	0.7%	--	0.0%	12.1	0.5%
NR Glass & Ceramics	18.1	1.5%	0.2	0.1%	--	0.0%	18.3	0.7%
NR Metal	17.7	1.4%	--	0.0%	--	0.0%	17.7	0.7%
NR Paper	25.4	2.0%	0.9	0.6%	1.1	0.1%	27.3	1.1%
NR Plastic	104.4	8.4%	2.8	1.8%	2.75	0.24%	109.9	4.3%
Garbage Bags	11.5	0.9%	--	0.0%	--	0.0%	11.5	0.5%
Hygiene/Diapers/Pet Pads	104.6	8.4%	--	0.0%	--	0.0%	104.6	4.1%
C&D Waste	17.1	1.4%	--	0.0%	0.5	0.0%	17.6	0.7%
Aggregates /Soil / Clay	20.3	1.6%	--	0.0%	--	0.0%	20.3	0.8%
Recycling Bags	--	0.0%	--	0.0%	--	0.0%	--	0.0%
Paper	67.0	5.4%	136.0	85.5%	4.4	0.4%	207.4	8.1%
Mixed paper	59.4	4.8%	74.9	47.1%	2.0	0.2%	136.3	5.3%
Cardboard	7.5	0.6%	61.1	38.4%	2.4	0.2%	71.0	2.8%
Plastic	22.8	1.8%	5.4	3.4%	--	0.0%	28.2	1.1%
Rigid Plastic	22.7	1.8%	5.4	3.4%	--	0.0%	28.1	1.1%
Polystyrene Packaging	0.1	0.0%	--	0.0%	--	0.0%	0.1	0.0%
Organic	499.5	40.3%	0.5	0.3%	1134.2	98.3%	1634.2	64.0%
Edible Food Waste	143.8	11.6%	0.1	0.1%	21.2	1.8%	165.2	6.5%
Inedible food waste	152.6	12.3%	--	0.0%	56.6	4.9%	209.3	8.2%
Compostable Paper	65.2	5.3%	0.1	0.1%	37.8	3.3%	103.1	4.0%
Yard & Garden	1.7	0.1%	0.2	0.1%	146.4	12.7%	148.3	5.8%
Food In Packaging	33.7	2.7%	--	0.0%	--	0.0%	33.7	1.3%
Animal Waste	92.0	7.4%	--	0.0%	1.4	0.1%	93.3	3.7%
Shredded Paper	2.8	0.2%	--	0.0%	--	0.0%	2.8	0.1%
Grass	--	0.0%	--	0.0%	869.7	75.4%	869.7	34.1%
Other Organic Material	7.6	0.6%	--	0.0%	1.2	0.1%	8.7	0.3%
Beverage Containers	12.3	1.0%	0.3	0.2%	0.3	0.0%	12.9	0.5%
Refundables	12.3	1.0%	0.3	0.2%	0.3	0.0%	12.9	0.5%
Metal	5.9	0.5%	4.8	3.0%	--	0.0%	10.6	0.4%
Metal Containers	5.9	0.5%	4.8	3.0%	--	0.0%	10.6	0.4%
Glass	20.7	1.7%	2.1	1.3%	--	0.0%	22.8	0.9%
Glass Food Jars	20.7	1.7%	2.1	1.3%	--	0.0%	22.8	0.9%
Electronics	23.3	1.9%	0.1	0.1%	--	0.0%	23.4	0.9%
Batteries	0.8	0.1%	0.1	0.1%	--	0.0%	0.9	0.0%
Electronics	22.5	1.8%	--	0.0%	--	0.0%	22.5	0.9%
Textiles	39.0	3.1%	--	0.0%	--	0.0%	39.0	1.5%
Household Textiles	4.3	0.3%	--	0.0%	--	0.0%	4.3	0.2%
Other Textiles	12.0	1.0%	--	0.0%	--	0.0%	12.0	0.5%
Clothing & Footwear	22.7	1.8%	--	0.0%	--	0.0%	22.7	0.9%
HHW	4.1	0.3%	--	0.0%	--	0.0%	4.1	0.2%
HHW	4.1	0.3%	--	0.0%	--	0.0%	4.1	0.2%
Reusable	8.2	0.7%	0.9	0.5%	--	0.0%	9.1	0.4%
Donatable items	8.2	0.7%	0.9	0.5%	--	0.0%	9.1	0.4%
Grand Total	1240.5	100%	159.0	100%	1153.3	100%	2552.9	100.0%

Appendix D Summer 2022 Single-Use Audit Results

Single-use Item Type	Garbage		Recycling		Organics		Total kg	Number
	kg	Number	kg	Number	kg	Number		
Disposable Cold Fountain Cups	3.24	131	0.13	5	0.08	3	3.44	139
Disposable Hot Paper	2.95	113	0.10	6	0.24	11	3.28	130
Disposable Plastic Cup	1.97	153			0.04	2	2.01	155
Disposable Plastic Lids	1.57	408	0.01	1	0.03	4	1.60	413
Disposable Stir Sticks	0.00	4					0.00	4
Disposable Straws	0.15	133	0.00	2	0.00	1	0.15	136
Disposable Utensils	0.94	189	0.00	1			0.94	190
Grocery Bags Double Use	0.59	41					0.59	41
Grocery Bags Single Use	0.34	27	0.01	1			0.35	28
Plastic Takeout Containers	0.61	36					0.61	36
Polystyrene Foam Cups	0.07	6					0.07	6
Polystyrene Plates/Bowls	0.40	50					0.40	50
Polystyrene Take-out Containers	0.14	8	0.025	1			0.17	9
Grand Total	12.94	1299	.27	17	.38	21	13.59	1337