



METRO VANCOUVER

Full-Scale Waste Composition Study Report



May 2022 – 21-2946



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Attention: Terry Fulton, Senior Project Engineer – Solid Waste Services, Metro Vancouver

Metro Vancouver Waste Composition Study – Full-Scale Facility Audit (2021)

Dillon Consulting Limited (Dillon) is pleased to submit this final report to Metro Vancouver for the Metro Vancouver Waste Composition Study – Full-Scale Facility Audit (Project A, 2021) completed at the North Shore Recycling and Waste Centre, Metro Vancouver Waste-to-Energy Facility and the Vancouver South Transfer Station. As outlined in the work plan, this report presents the waste composition study results, including Single-Use Item (SUI) and Personal Protective Equipment (PPE) disposal results, an analysis by sector and a comparison of the 2021/2022 waste composition data with Waste Composition Monitoring Program reports from previous years. The audit data containing composition for all categories is included as **Appendix A**.

Sincerely,

DILLON CONSULTING LIMITED

A handwritten signature in black ink, appearing to read "HG", with a long horizontal flourish extending to the right.

Heidi Gerlach, EP, Associate
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MNN:bg

Our file: 21-2946

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- A All Waste Composition by Sector
- B All Counts by Sector
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Executive Summary

Dillon was retained by Metro Vancouver to conduct the 2021 Full-Scale Waste Composition Study. Sampling was completed at three facilities in the Metro Vancouver Region over four weeks in December 2021 and January 2022. We note the sampling period immediately followed significant flooding events in the Abbotsford region, affecting inbound volumes at all Metro Vancouver waste facilities.

Waste was collected, sampled, and sorted from the sectors listed below. Materials from litter cans and street sweeping were not included in this study.

- Single-Family (SF) residential waste;
- Multi-family (MF) residential waste;
- Commercial/Institutional (CI) waste; and
- Small Loads (SL) waste.

The number of samples analyzed from each sector was based on the variability of each sector, in order to generate reproducible data. Samples were collected at the following facilities: North Shore Recycling and Waste Centre, Metro Vancouver Waste-to-Energy Facility and Vancouver South Transfer Station.

Table 1 presents the waste composition by sector and the combined waste composition for all sectors.

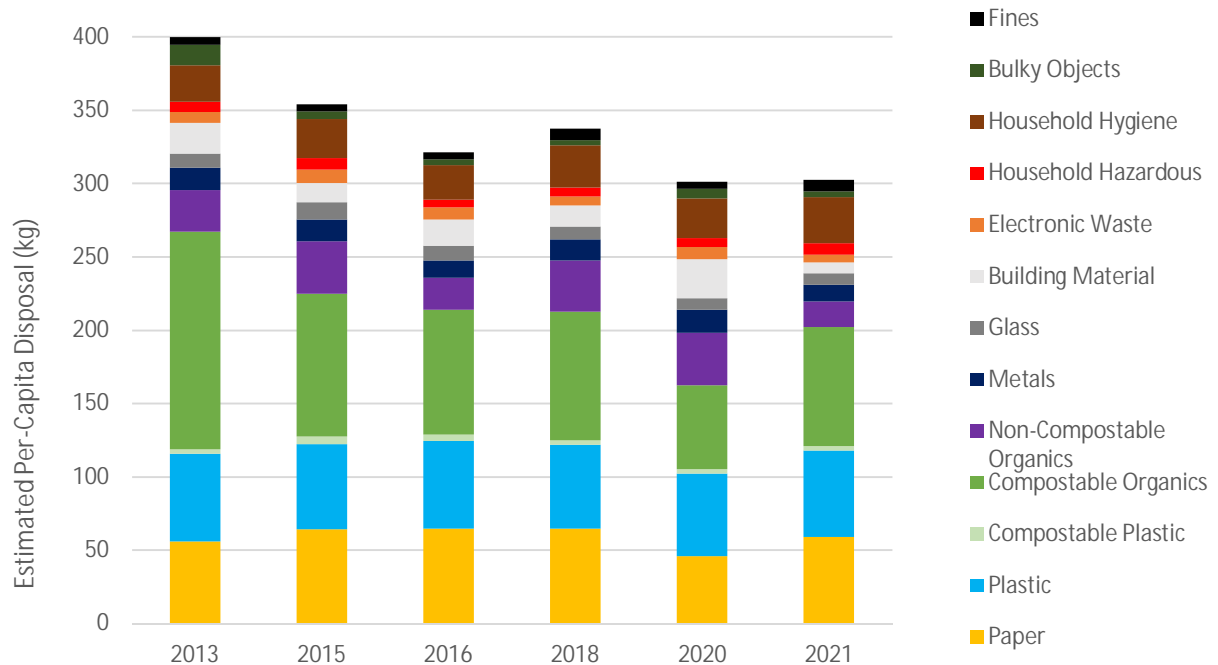
Table 1: Waste Composition Summary

Primary Category	Combined Composition	By Sector			
		SF (N=14)	MF (N=17)	CI (N=34)	SL (N=35)
Disposed Tonnes	863,306	156,742	233,290	348,005	125,269
Paper	19%	19%	21%	22%	8%
Plastic	19%	21%	18%	21%	12%
Compostable Plastic	<1%	<1%	<1%	<1%	<1%
Compostable Organics	29%	25%	30%	33%	19%
Non-Compostable Organics	9%	7%	5%	6%	28%
Metals	3%	4%	2%	3%	5%
Glass	2%	2%	3%	1%	2%
Building Material	5%	<1%	<1%	4%	21%
Electronic Waste	1%	1%	1%	1%	1%
Household Hazardous	2%	1%	3%	2%	2%
Household Hygiene	9%	16%	14%	6%	1%
Bulky Objects	1%	<1%	1%	<1%	2%
Fines	2%	3%	2%	2%	1%
Grand Total	100%	100%	100%	100%	100%

Figure 1 presents the combined waste composition for all full-scale, multi-sector waste composition studies completed since 2013. Waste disposal habits have been impacted by the global COVID-19 pandemic which began impacting the lives of all Metro Vancouver residents in March 2020. Both the 2020 and 2021 waste composition studies were completed during the COVID-19 pandemic, with the 2020 waste composition study having been completed in September 2020 and the 2021 waste composition study having been completed in December 2021 – January 2022.

Overall, the historical waste composition results in this section demonstrate that waste composition in 2020 was an outlier, and that 2021 waste composition and generation tended to be more similar to 2018 data than 2020 data. Overall, waste composition in 2018 and 2021 was very similar. Slightly more plastic and compostable organics was disposed in 2021 than in 2018.

Figure 1: Waste Composition and Disposal for All Sectors Combined (2013 – 2021)



Since 2020, each material category has been assigned a functional category that includes material with a similar end fate or management paradigm. Figure 2 presents a comparison of the 2020 and 2021 functional categories for overall waste (all sectors combined). The composition by functional category between 2020 and 2021 appears to be relatively different, especially in terms of the amount of green bin and C&D materials.

Figure 2: Functional Category Composition for All Sectors Combined (2020 – 2021)

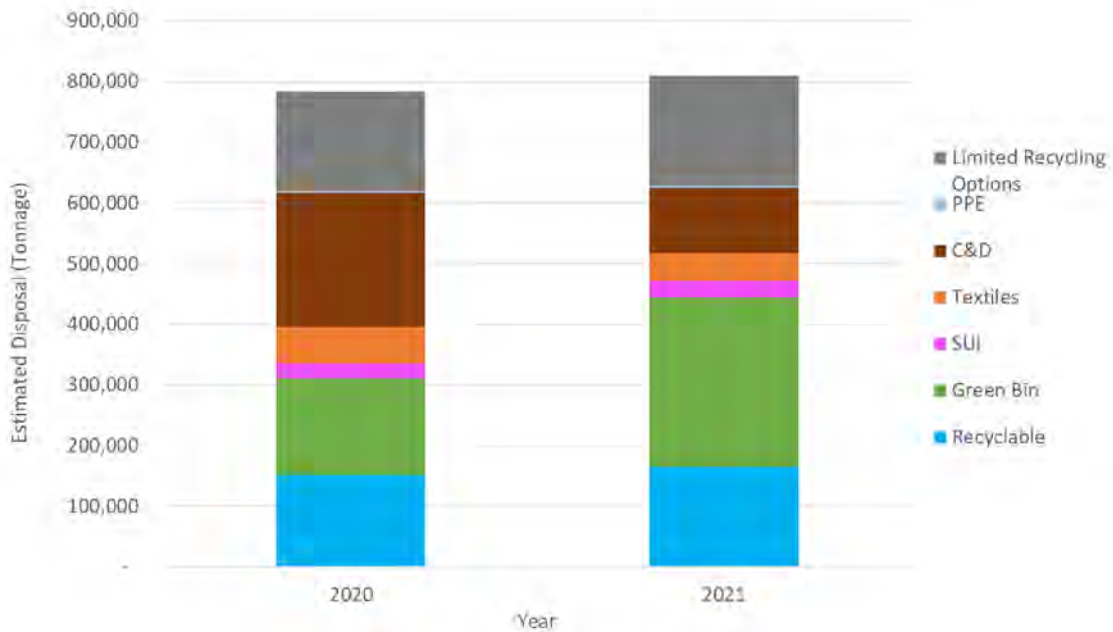
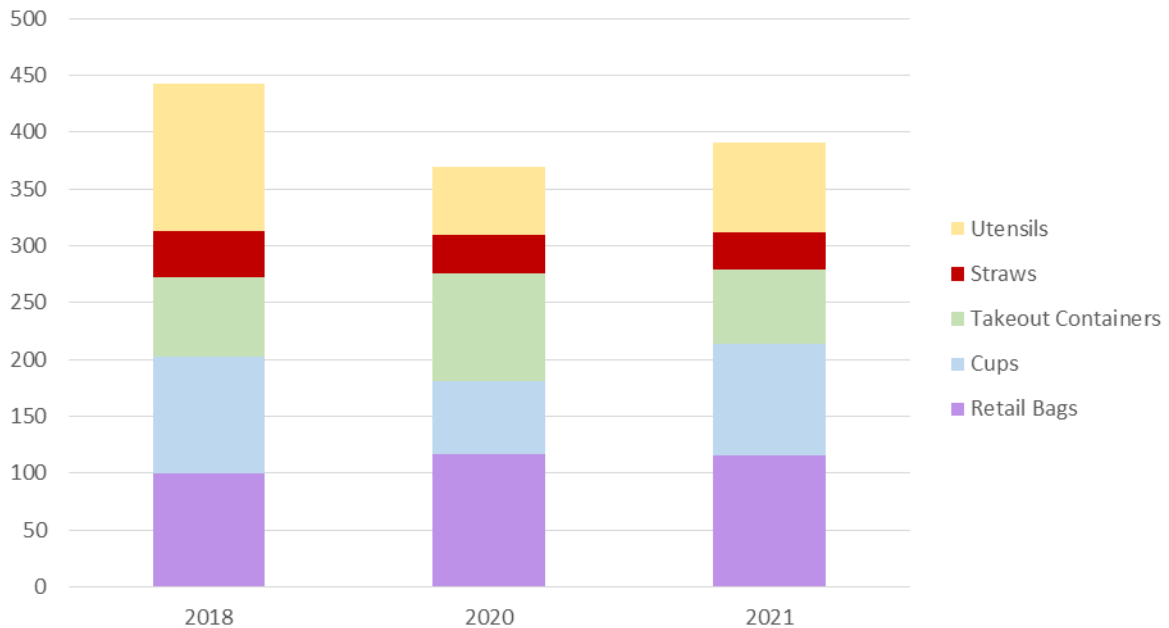


Figure 3 presents the per-capita disposal for single-use items in 2018, 2020 and 2021. While the breakdown by sector is very different between 2020 and 2021, the overall disposal on a per-capita basis was similar in 2020 and 2021.

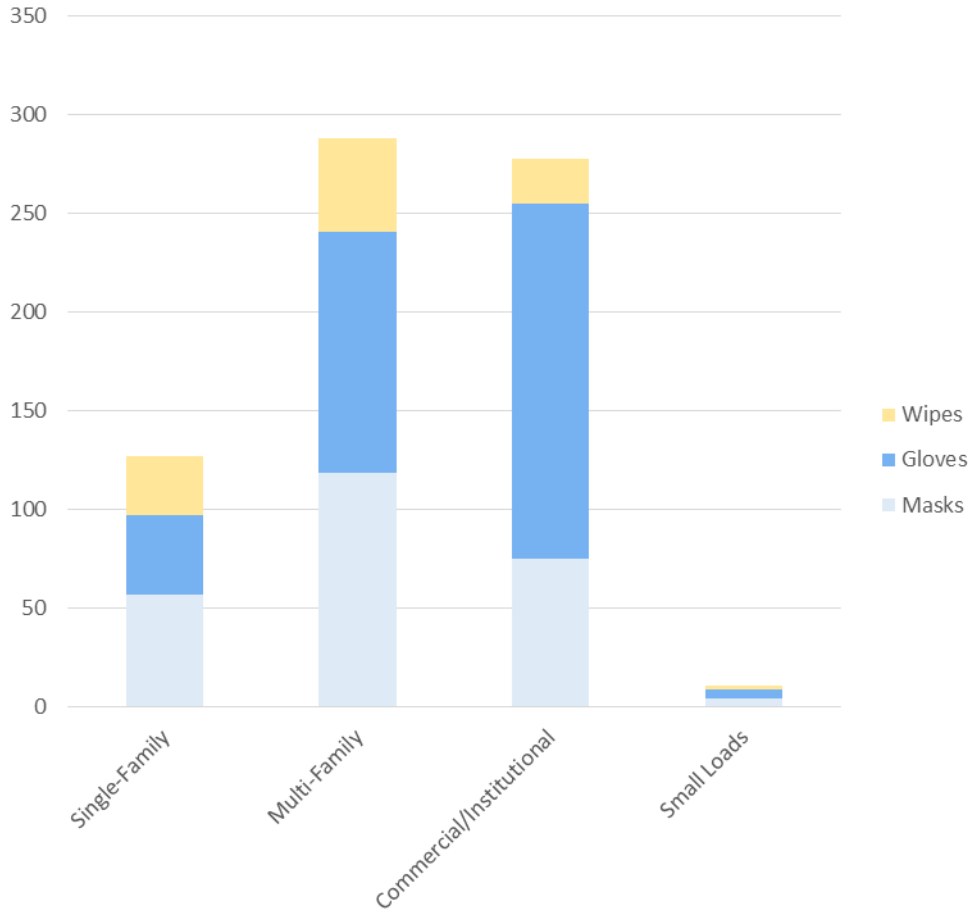
Figure 3: Single-Use Items Disposal – Per-Capita Comparison for 2018, 2020 and 2021



In the 2020 and 2021 waste composition studies, the quantity of PPE disposed was measured and all PPE items found were both weighed and counted. Figure 4 presents the quantity of PPE disposed by sector

and combined for all sectors. The largest quantity of PPE was disposed by the MF sector, followed by the CI sector, then the SF sector.

Figure 4: Estimated Number of PPE Items Disposed in 2021



1.0 Introduction

1.1 Background

Metro Vancouver provides essential services and planning for British Columbia's lower mainland region, including solid waste management for approximately 2.7 million people across 21 municipalities, one Electoral Area, and one Treaty First Nation. Solid waste management in the region is facilitated by a Waste-to-Energy Facility and five Recycling and Waste Centres; the United Boulevard Recycling and Waste Centre will replace the current Coquitlam Recycling and Waste Centre in 2022. These facilities, in conjunction with the City of Vancouver's Vancouver South Transfer Station and the Vancouver Landfill, comprise the public-sector system which provides waste diversion and disposal services to residents and businesses in the region.

As Metro Vancouver is responsible for the long-term planning for waste generation and disposal by residents and businesses within the region, the Corporation is guided by solid waste management plans – most recently from 2011. Currently, Metro Vancouver is in the process of updating the region's Solid Waste Management Plan which will explore options to improve waste reduction, diversion, and recycling. This may include identifying types of wastes – such as SUI and PPE items – to prioritize in future initiatives. Waste composition studies are conducted to collect data and provide analysis to inform the update of the region's Solid Waste Management Plan.

1.2 Scope of Work

Dillon completed waste sampling and sorting in accordance with the methodology set out in *Recommended Waste Characterization Methodology for Direct Waste Analysis Studies in Canada* (CCME, 1999) and previous Metro Vancouver waste composition studies. Sampling was completed at three facilities in the Metro Vancouver Region over four (non-consecutive) weeks in December 2021 and January 2022. The sampling was originally scheduled for November 22, 2021 – December 17, 2021, however, Metro Vancouver waste management facilities experienced unexpected impacts in November due to extreme weather events in British Columbia, and the sampling start date was postponed by one week. This resulted in the last week of sampling being completed in January 2022.

Waste was collected, sampled, and sorted from the following sectors:

- Single-Family (SF) residential waste;
- Multi-family (MF) residential waste;
- Commercial/Institutional (CI) waste; and
- Small Loads (SL) waste.

Materials from litter cans and street sweeping were not included in this study.

Samples were collected at the following facilities:

- North Shore Recycling and Waste Centre;
- Metro Vancouver Waste-to-Energy Facility; and
- Vancouver South Transfer Station.

The number of samples analyzed from each sector, the facilities that materials were sampled from, and the dates for sampling at each facility are presented in Table 2. The number of samples to be analyzed from each sector was based on the variability of each sector, in order to generate reproducible data. Therefore, less samples were analyzed from sectors that have low variability between samples (SF and MF) and more samples were analyzed from sectors that have high variability between samples (CI and SL).

Table 2: Number of Samples Completed by Sector and Facility

Sector	North Shore Recycling and Waste Centre	Metro Vancouver Waste-to-Energy Facility	Vancouver South Transfer Station	Grand Total
Sorting Dates	November 29 – December 10, 2021	December 13 – 17, 2021	January 10 – 14, 2022	
SF	6	3	5	14
MF	6	5	6	17
CI	12	13	9	34
SL	19	-	16	35
Grand Total	43	21	36	100

Overall, 100 samples with a total weight of 9,067 kg were sorted. The average sample weight was 90 kg. The target sample size was 100 kg for SF, MF, and CI sectors and the average sample size for these sectors was 99.3 kg. The average sample size for the SL sector was 74.6 kg. Garbage was sorted into 13 primary categories and a total of 171 subcategories. Category descriptions are presented in Appendix C.

2.0 Methodology

2.1 Sample Collection

Samples were selected by the field supervisor based on the sample's sector and municipality of origin to adequately represent regional waste generation. The field supervisor worked with facility staff to randomly select samples from the identified sectors. The origins of in-bound waste loads were determined by communicating with the receiving waste facility's scale house or the waste haulers of the load. Following confirmation of the sector and municipality of origin, the field supervisor contacted waste facility personnel if the load was to be selected for sampling. Once contacted, facility staff used a loader to retrieve a sample from the load from the tipping floor and transport it to a sample collection and sorting area, designated by the facility's manager. For each load selected, staff retrieved either one loader bucket of the material, weighing approximately 300-500 kg, or its entirety if the selected load was insufficient to fill a loader bucket. Field staff then collected a sample of the retrieved material, weighing approximately 100 kg whenever possible as entire in-bound loads could be less than 100 kg. Field staff collected the sample in a spatially uniform manner across and around the retrieved material to obtain a representative sample. The collected sample was then weighed and labeled prior to sorting.

2.2 Data Analysis and Statistical Evaluation

Data was compiled electronically throughout the course of the project. Data collected during field work, including scale tickets, was compiled on-site and reviewed daily to ensure accuracy. Sample logs and checklists were employed to ensure that a sufficient distribution of samples was collected to provide proper statistical evaluation. Data was regularly subjected to quality assurance and quality control methods during fieldwork and analysis, ensuring the differences between pre-sorting and post-sorting sample weights were within acceptable margins of accuracy (i.e., majority of samples fell within 3% difference). The overall composition for each sector was calculated by combining weights of all sorted materials. The composition for all sectors combined was calculated by weighting the sector compositions using the overall Metro Vancouver disposal for each sector. For SUI and PPE disposal analysis, averages were calculated by sector and total weights and counts taken at the end of each week of field work. Standard deviations and 90% confidence intervals were calculated for primary categories and functional material categories (further described in Section 3.3) by waste sector. Given the variance in total sample weights between samples, waste composition percentages were used to determine the statistical parameters to normalize the data set.

2.3 Single-Use Items and PPE

To determine the densities of single-use items (SUI) and personal-protective equipment (PPE), following the sorting of a sample, each item category of SUI and PPE was weighed, counted, and then collected for that week of sampling. A weekly total weight was measured by weighing the SUI and PPE items which

had been collected throughout the week. Similarly, a weekly total count was calculated by combining the count data for SUI and PPE sorted from samples throughout the week. The densities for each SUI and PPE category was calculated from dividing the weight for each category by its respective count, with weights and counts averaged either by sample or weekly total.

The quantity of SUI and PPE waste generated per capita (kg/capita) was calculated using the collected sample data and extrapolated by using regional disposal tonnages and population data. The collected data was also combined to provide a regional total for SUI and PPE waste disposal. The number of SUI and PPE waste disposed per capita (unit/capita) was calculated from the counts, unit weights, and waste generation per capita for each SUI and PPE item category.

3.0 Results

3.1 Waste Composition Results

The following sections present the waste composition results reported as weighted average percentages by primary material category. All percentages calculated in the section refer to the percentage of material in comparison to the total amount of sampled materials. Weighted average percentages were calculated by combining all sample data for each sector (SF, MF, CI, and SL). Each set of results had a 90% confidence interval calculated which determines the level of consistency between samples. Select photographs from the field auditing can be found in Appendix D.

3.1.1 Single-Family (SF) Waste Composition

Figure 5 shows the weighted average of the primary material composition for SF waste. The largest composition by weight was compostable organics (25%), followed by plastic (21%), paper (19%), and household hygiene (16%). Compostable organics were made up of mainly food waste (23%), of which 13% of food was avoidable and 10% of food was unavoidable. The largest components that made up plastic included plastic film (8%), followed by rigid containers (non-beverage) (4%) and textiles (4%). The largest subcategories of paper were comprised of other paper (12%) such as napkins, paper plates, and food-soiled paper. Other large components found in the paper included cardboard (2%), boxboard (2%), and fine paper (2%). Household hygiene mostly comprised of diapers (15%).

Figure 5: Single-Family Waste Composition

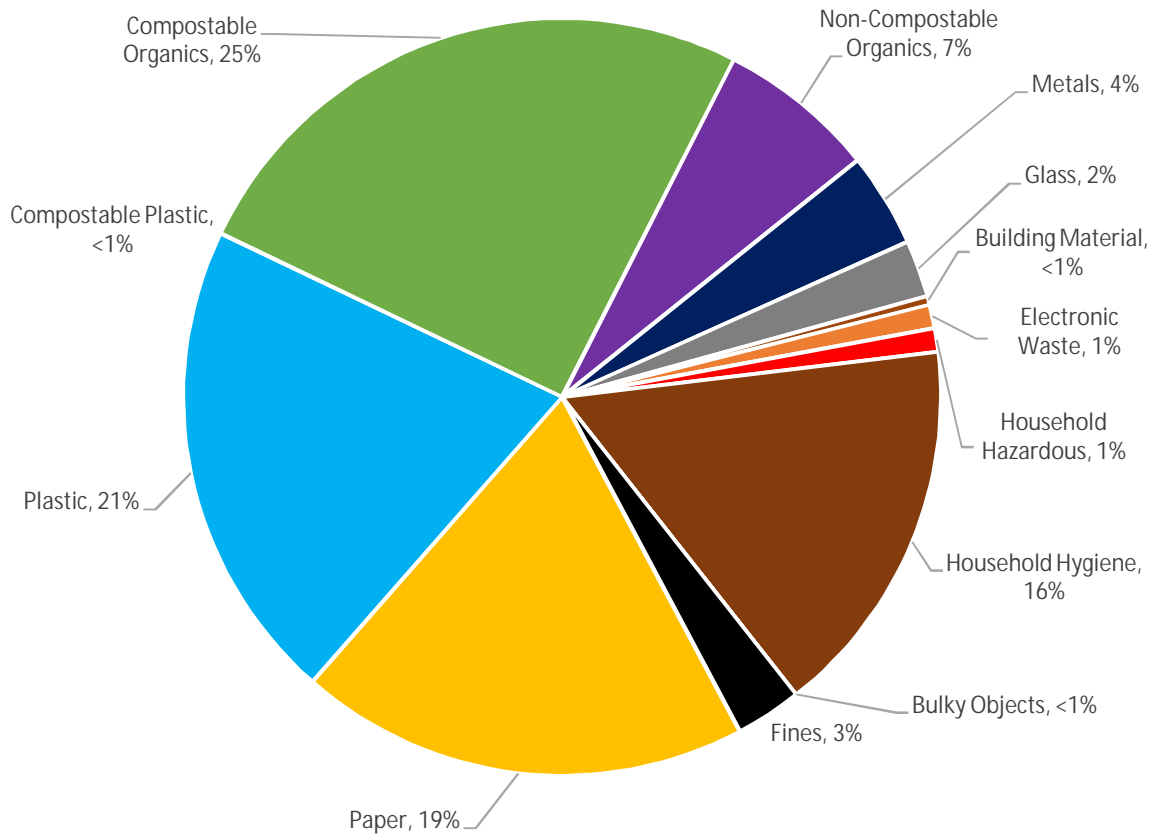


Table 3 presents the waste composition results for SF garbage and the 90% confidence intervals. The calculated confidence intervals for the primary materials categories were low (<4%) which indicates that there was low variability in the composition of samples. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 3: Single-Family Waste Composition

Primary Category	Composition (n=14)	90% Confidence Interval ¹
Paper	19%	±2%
Plastic	21%	±3%
Compostable Plastic	<1%	-
Compostable Organics	25%	±3%
Non-Compostable Organics	7%	±2%
Metals	4%	±3%
Glass	2%	±1%
Building Material	<1%	-
Electronic Waste	1%	±1%
Household Hazardous	1%	±1%
Household Hygiene	16%	±4%
Bulky Objects	<1%	-
Fines	3%	±1%

Notes:

¹Confidence intervals are shown where the confidence interval was greater than 1%.**3.1.2****Multi-Family (MF) Waste Composition**

Figure 6 shows the weighted average of the primary material composition for MF waste. The largest composition by weight was compostable organics (30%), followed by paper (21%), plastic (18%), and household hygiene (14%). Compostable organics were made up of mainly food waste (29%), of which 19% of food was avoidable and 10% of food was unavoidable. The largest components that made up paper included other paper (14%) such as napkins, paper plates, and food-soiled paper. Other significant components found in the paper include cardboard (2%), boxboard (2%), and fine paper (2%). The largest subcategories of plastic were comprised of plastic film (7%), rigid non-beverage plastic containers (5%), synthetic textiles (3%), and other plastics (3%) such as plastic single-use items. Household hygiene primarily consisted of diapers (12%).

Figure 6: Multi-Family Waste Composition

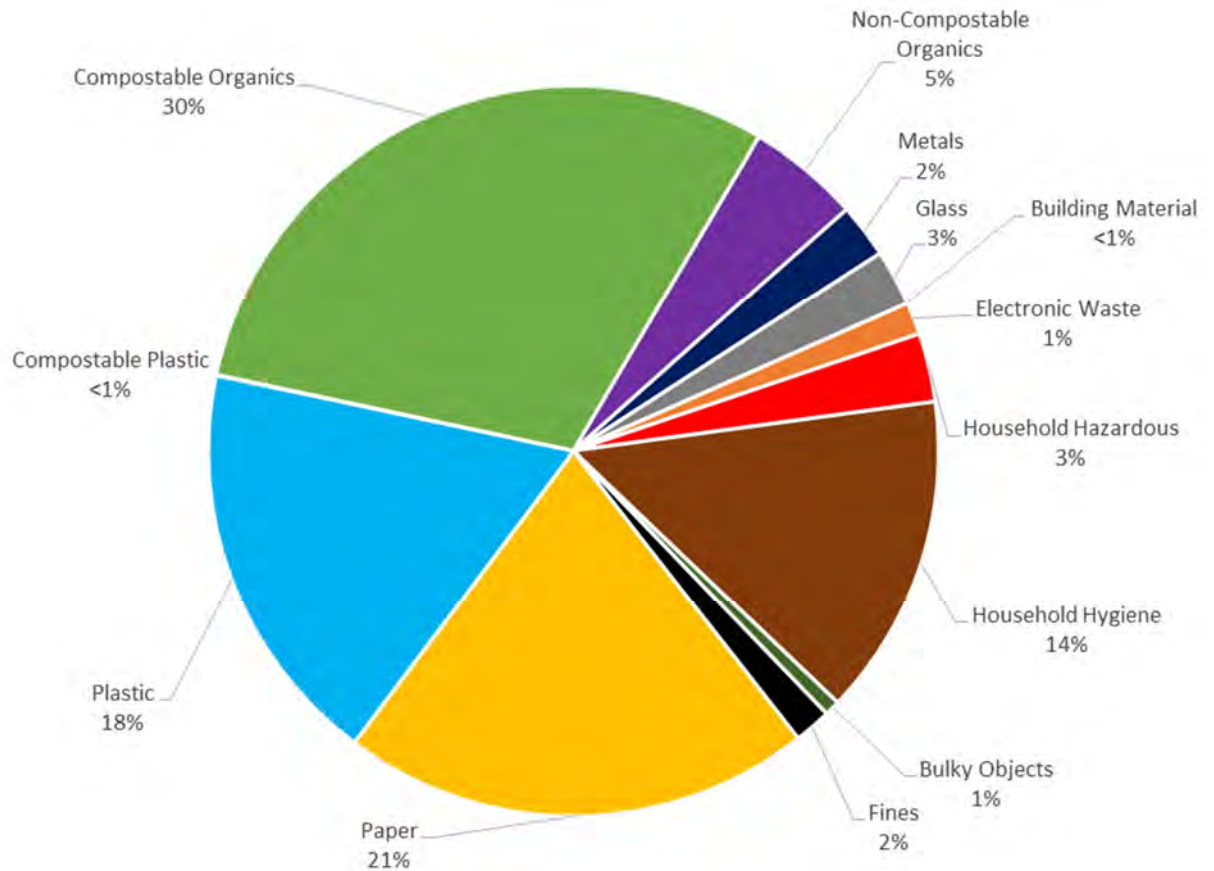


Table 4 presents the waste composition results for MF waste composition and the 90% confidence intervals. The calculated confidence intervals for the primary material categories were low (<4%), which indicates that there was low variability in the composition of samples. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 4: Multi-Family Waste Composition

Primary Category	Composition (n=17)	90% Confidence Interval ¹
Paper	21%	±2%
Plastic	18%	±2%
Compostable Plastic	<1%	-
Compostable Organics	30%	±4%
Non-Compostable Organics	5%	±2%
Metals	2%	±1%
Glass	3%	±1%
Building Material	<1%	-
Electronic Waste	1%	±2%
Household Hazardous	3%	±3%
Household Hygiene	14%	±2%
Bulky Objects	1%	±1%
Fines	2%	-

Notes:

¹Confidence intervals are shown where the confidence interval was greater than 1%.

3.1.3 Commercial/Institutional (CI) Waste Composition

Figure 7 shows the weighted average of the primary material composition for Commercial/Institutional garbage. The largest composition by weight was compostable organics (33%), followed by paper (22%), and plastic (21%). Compostable organics were made up of mainly food waste (28%), of which 18% of food was avoidable and 10% of food was unavoidable such as kitchen scraps. The largest components that made up paper include other paper (12%) such as napkins, paper plates, and food-soiled paper. Other large components found in the paper include cardboard (4%), boxboard (2%), and fine paper (2%) including office paper and envelopes. The largest subcategories of plastics were comprised of plastic film (10%), rigid non-beverage plastic containers (4%), and textiles (3%).

Figure 7: Commercial/Institutional Waste Composition

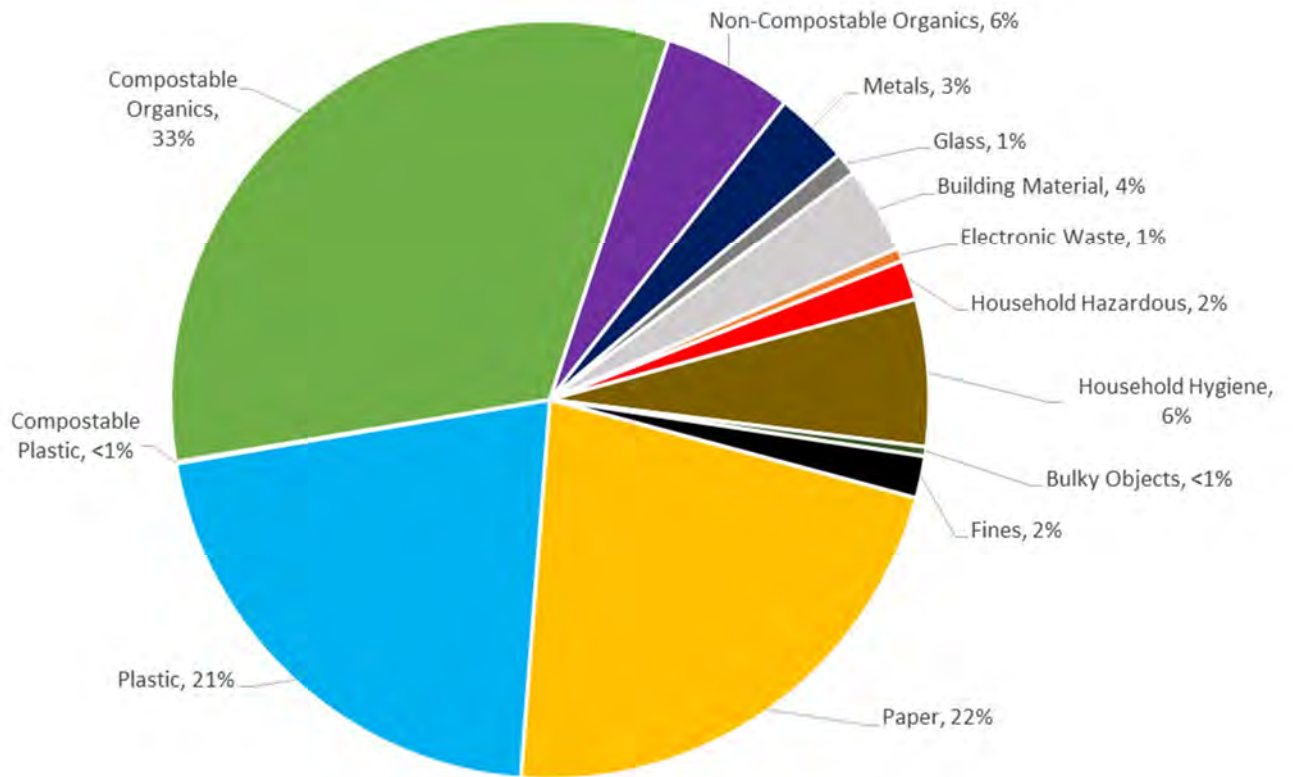


Table 5 presents the waste composition results for CI waste composition and the 90% confidence intervals. The calculated confidence intervals for the primary material categories were low (<6%), which indicates that there was low variability in the composition of samples. However, there was higher variability in the composition of samples in the CI sector compared to the SF and MF sectors. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 5: Commercial/Institutional Waste Composition

Primary Category	Composition (n=34)	90% Confidence Interval ¹
Paper	22%	±3%
Plastic	21%	±5%
Compostable Plastic	<1%	-
Compostable Organics	33%	±6%
Non-Compostable Organics	6%	±2%
Metals	3%	±1%
Glass	1%	±1%
Building Material	4%	±3%
Electronic Waste	1%	-
Household Hazardous	2%	±1%
Household Hygiene	6%	±3%
Bulky Objects	<1%	±1%
Fines	2%	-

Notes:

¹Confidence intervals are shown where the confidence interval was greater than 1%.

3.1.4 Small Load (SL) Waste Composition

Figure 8 shows the weighted average of the primary material composition for SL waste. The largest composition by weight was non-compostable organics (28%), followed by building material (21%) and compostable organic (19%). Non-compostable organics were made up of mainly treated or painted wood (24%) and small amounts of natural fiber textiles (3%). The largest components that made up building material included other inorganics (9%) which comprised concrete, insulation materials, and roofing shingles. Other components of building materials included carpet waste (5%) and masonry (3%). Compostable organics were made up of clean wood (8%), yard and garden waste (6%), and avoidable food items (3%).

Figure 8: Small Load Waste Composition

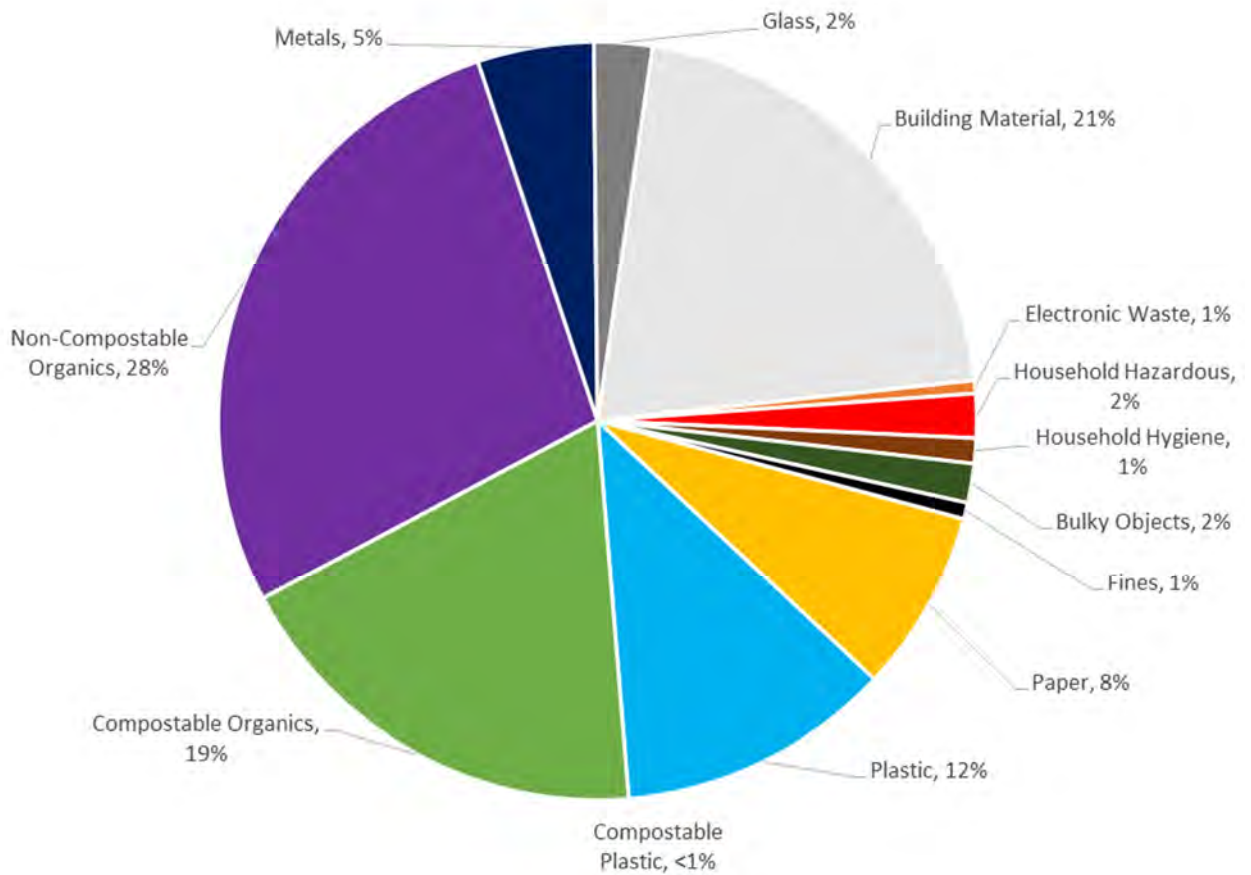


Table 6 presents the waste composition results for SL garbage and the 90% confidence intervals. The calculated confidence intervals for the primary material categories were considerably higher than in other sectors, with the highest at 9% for non-compostable organic materials (Table 6). This indicates that there was higher variability in the composition of samples in the SL sector as compared to other sectors. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 6: Small Load Waste Composition

Primary Category	Composition (n=35)	90% Confidence Interval ²
Paper	8%	±3%
Plastic	12%	±3%
Compostable Plastic	<1%	-
Compostable Organics	19%	±8%
Non-Compostable Organics	28%	±9%
Metals	5%	±3%
Glass	2%	±1%
Building Material	21%	±8%
Electronic Waste	1%	-
Household Hazardous	2%	±1%
Household Hygiene	1%	±1%
Bulky Objects	2%	±1%
Fines	1%	-

Notes:

¹Percentages are rounded to the nearest whole number and may not add up to 100%.

²Confidence intervals are shown where the confidence interval was greater than 1%.

3.1.5

Combined Waste Composition Results

Figure 9 shows the weighted average of the primary material composition for all combined sectors of garbage. The largest combined composition by weight was compostable organics (29%), followed by paper (19%) and plastic (19%). Compostable organics were made up of food waste (24%), of which 15% of food was avoidable and 9% of food was unavoidable. The largest components that made up paper include other paper (11%) such as napkins, paper plates, and food soiled paper. Other components found in paper include cardboard (3%), boxboard (2%) and fine paper (2%) such as office paper and envelopes. The largest subcategories of plastics included plastic film (8%), rigid non beverage plastic containers (4%), synthetic textiles (3%) and other plastics (3%). Other plastics includes single-use items such as straws and utensils.

Figure 9: Combined Waste Composition – Garbage

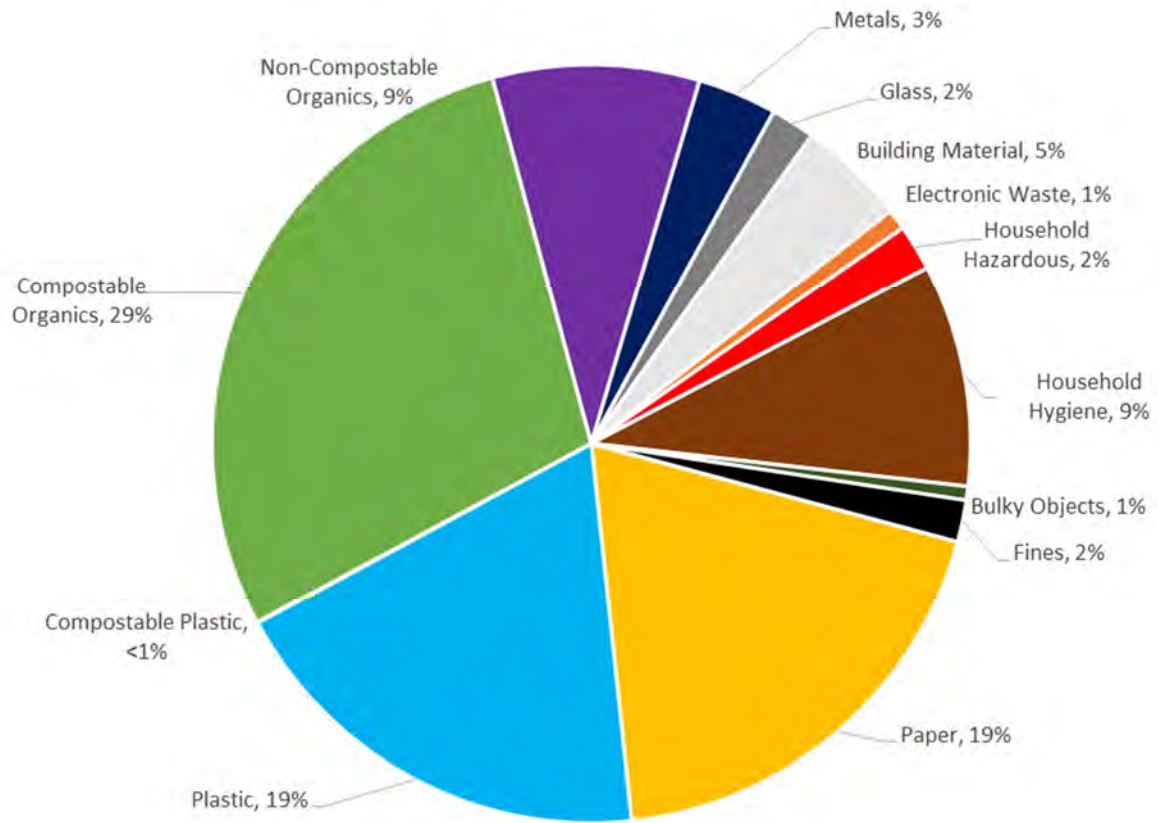


Table 7 presents the waste composition results for combined waste composition and the 90% confidence intervals. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 7: Combined Waste Composition

Primary Category	Composition (n=100)	90% Confidence Interval ^{1,2}
Paper	19%	±2%
Plastic	19%	±2%
Compostable Plastic	<1%	-
Compostable Organics	29%	±4%
Non-Compostable Organics	9%	±4%
Metals	3%	±1%
Glass	2%	±1%
Building Material	5%	±3%
Electronic Waste	1%	-
Household Hazardous	2%	±1%
Household Hygiene	9%	±2%
Bulky Objects	1%	-
Fines	2%	-

Notes:

¹Confidence Interval was calculated based on equal weighting of the 100 samples.

²Confidence intervals are shown where the confidence interval was greater than 1%.

3.2 Waste Disposal

This section presents the regional disposal for all primary categories. Data is presented by sector and combined. Per-capita disposal estimates are including for SF and MF sectors.

3.2.1 Residential Waste (kg/capita)

Residential waste disposal is presented in Table 8. These disposal estimates were calculated using the percent composition data collected during auditing and extrapolating using regional disposal and population data. Overall, the SF disposal rate was calculated to be 95.0 kg/capita and the MF disposal rate was calculated to be 206.0 kg/capita. The combined residential disposal rate was calculated to be 141.0 kg/capita. Notably, the SF generation rate *only* includes material which is collected through municipal curbside garbage collection programs, and does not include material which is dropped off by residents directly at waste management facilities (which is accounted for in SL waste).

Table 8: Residential Waste Disposal (kg/capita)

	Single-Family			Multi-Family			Overall Residential (kg/capita)		
Disposed Tonnage	156,742			233,290			390,032		
Population	1,634,477			1,132,476			2,766,953		
Primary Category	% Composition	Disposal by Primary Category (kg/capita)	90% Confidence Interval (kg/capita) ¹	% Composition	Disposal by Primary Category (kg/capita)	90% Confidence Interval (kg/capita) ¹	% Composition	Disposal by Primary Category (kg/capita)	90% Confidence Interval (kg/capita) ^{1,2}
Paper	19%	18.4	±0.3	21%	42.9	±0.8	20%	28.4	±0.4
Plastic	21%	19.8	±0.5	18%	37.2	±0.6	19%	26.9	±0.4
Compostable Plastic	<1%	0.0	-	<1%	0.1	-	<1%	0.0	-
Compostable Organics	25%	24.3	±0.8	30%	62.1	±2	28%	39.8	±1
Non-Compostable Organics	7%	6.5	±0.1	5%	10.2	±0.2	6%	8.0	±0.1
Metals	4%	3.9	±0.1	2%	5.0	-	3%	4.3	-
Glass	2%	2.3	-	3%	5.2	-	2%	3.5	-
Building Material	<1%	0.4	-	<1%	0.0	-	<1%	0.2	-
Electronic Waste	1%	1.0	-	1%	3.0	-	1%	1.8	-
Household Hazardous	1%	1.0	-	3%	6.3	±0.2	2%	3.1	-
Household Hygiene	16%	15.6	±0.6	14%	29.4	±0.7	15%	21.3	±0.5
Bulky Objects	<1%	0.0	-	1%	1.4	-	<1%	0.6	-
Fines	3%	2.7	-	2%	3.4	-	2%	3.0	-
Total	-	95.9	-	-	206.0	-	-	141.0	-

Notes:

¹Confidence intervals are shown where the confidence interval was greater than 0.1 kg per capita.

²Confidence Interval was calculated based on equal weighting of the single-family and multi-family samples

3.2.2 All Waste Disposal (Tonnage by Sector)

Waste disposal for all sectors is presented in Table 9. These disposal estimates were calculated using the percent composition data collected during auditing and extrapolating using regional disposal data.

Table 9: Estimated Waste Disposal for Primary Material Categories

	Single-Family			Multi-Family			Commercial/Institutional			Small Load			Combined Waste Composition				
Disposed Tonnage	156,742			233,290			348,005			125,269			863,306				
Population	1,634,477			1,132,476			-			-			2,766,953				
Primary Category	% Composition	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes) ¹	% Composition	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes) ¹	% Composition	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes) ¹	% Composition	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes) ¹	% Composition	Tonnage Disposed by Primary Category (tonnes)	90% Confidence Interval (tonnes) ¹	Per-Capita Disposal (kg per capita)	90% Confidence Interval (kg per capita) ^{2,3}
Paper	19%	30,153	±500	21%	48,527	±1000	22%	76,759	±3000	8%	9,782	±300	19%	165,221	±3000	60	±1
Plastic	21%	32,359	±900	18%	42,143	±700	21%	73,363	±4000	12%	14,675	±400	19%	162,540	±3000	59	±1
Compostable Plastic	<1%	26	-	<1%	68	-	<1%	254	-	<1%	2	-	<1%	351	-	<1	-
Compostable Organics	25%	39,784	±1000	30%	70,333	±3000	33%	113,802	±7000	19%	23,212	±2000	29%	247,132	±9000	89	±3
Non-Compostable Organics	7%	10,557	±200	5%	11,597	±200	6%	19,325	±400	28%	34,658	±3000	9%	76,138	±3000	28	±1
Metals	4%	6,329	±200	2%	5,635	±30	3%	10,973	±100	5%	6,209	±200	3%	29,146	±400	11	-
Glass	2%	3,794	±40	3%	5,853	±40	1%	3,425	±30	2%	3,112	±40	2%	16,184	±100	6	-
Building Material	<1%	609	-	<1%	-	-	4%	12,905	±400	21%	26,275	±2000	5%	39,789	±1000	14	±0.5
Electronic Waste	1%	1,561	±8	1%	3,349	±50	1%	1,948	-	1%	693	-	1%	7,550	-	3	-
Household Hazardous	1%	1,601	±10	3%	7,078	±200	2%	5,928	±80	2%	2,354	±20	2%	16,962	±100	6	-
Household Hygiene	16%	25,523	±1000	14%	33,288	±800	6%	21,755	±700	1%	1,344	±10	9%	81,910	±1000	30	±0.5
Bulky Objects	<1%	-	-	1%	1,606	±20	<1%	1,382	±8	2%	2,090	±20	1%	5,077	-	2	-
Fines	3%	4,445	±40	2%	3,811	-	2%	6,188	-	1%	863	-	2%	15,307	-	6	-

Notes:

¹Confidence intervals are shown where the confidence interval was greater than 1%.

²Confidence intervals are shown where the confidence interval was greater than 0.1 kg per capita.

³Confidence Interval was calculated based on equal weighting of the 100 samples.

3.2.3 Historical Comparison

The following figures (Figure 10 to Figure 13) show the historical comparisons in each of the sample sectors from 2013 to 2021 by estimated disposal tonnage. Figure 14 shows the combined historical comparison for all sample sectors. Findings are discussed in Section 3.2.3.1.

Figure 10: Single-Family Historical Comparison 2013 – 2021

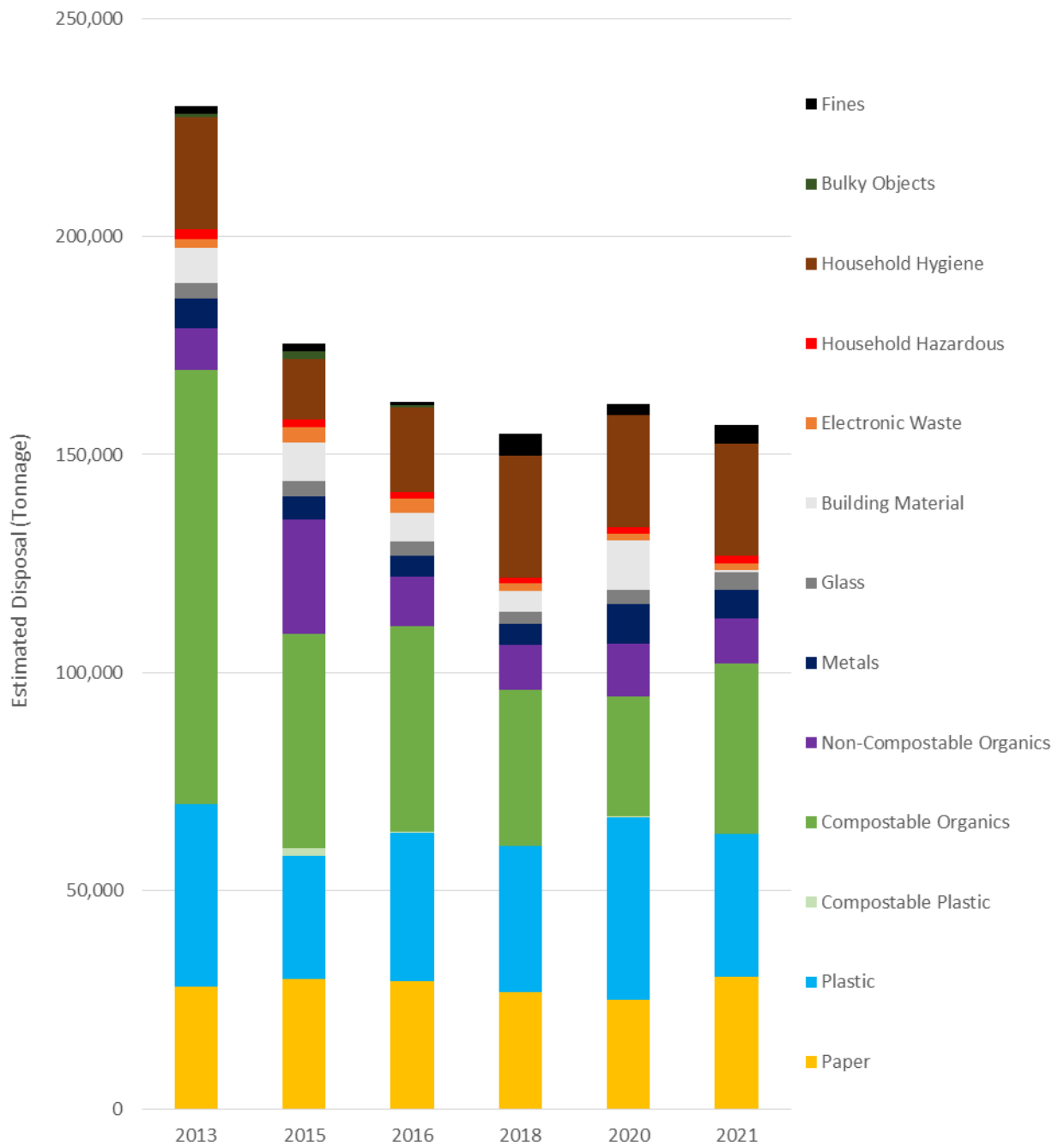


Figure 11: Multi-Family Historical Comparison 2013 - 2021

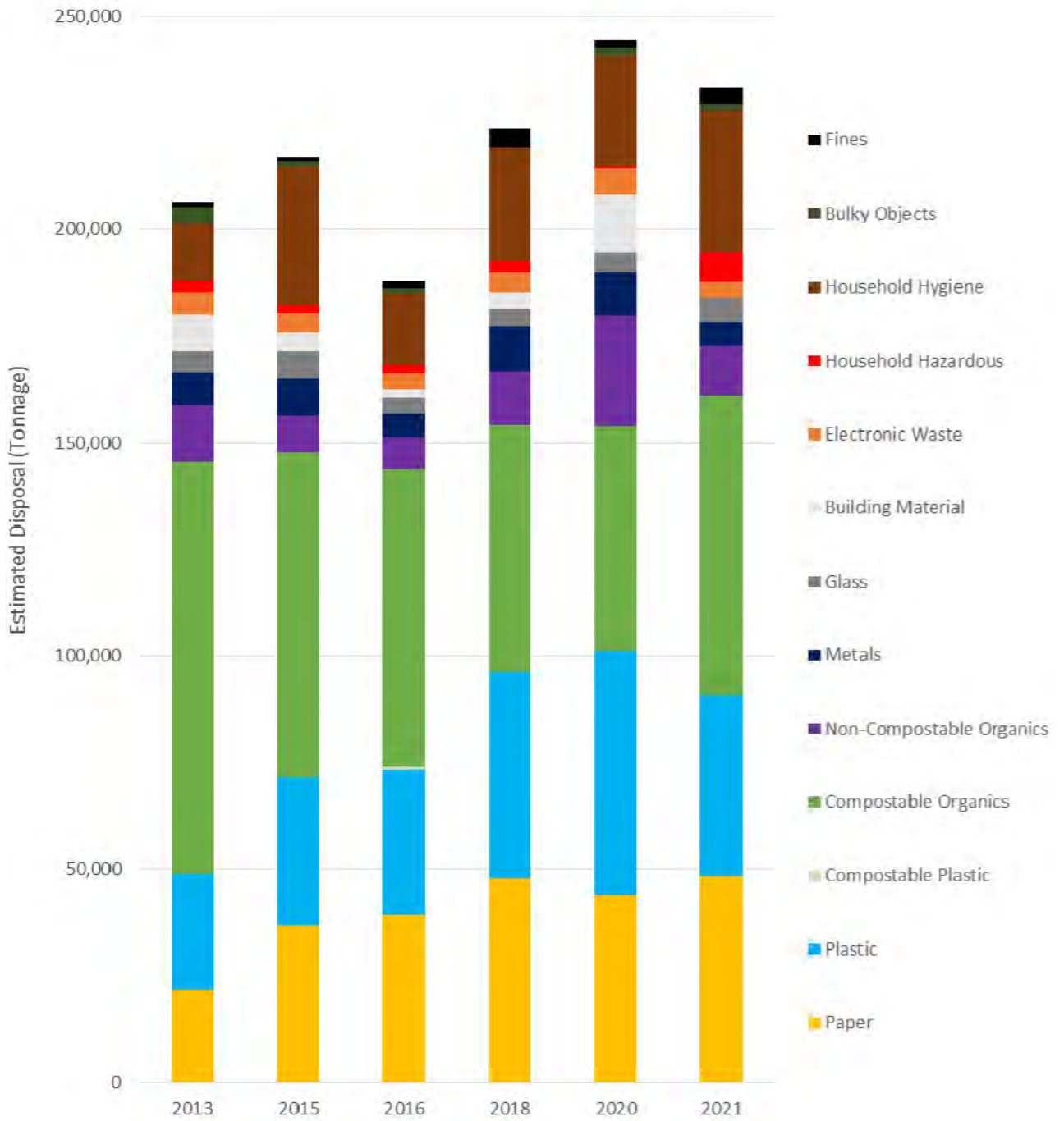


Figure 12: Commercial/Institutional Historic Comparison 2013 - 2021

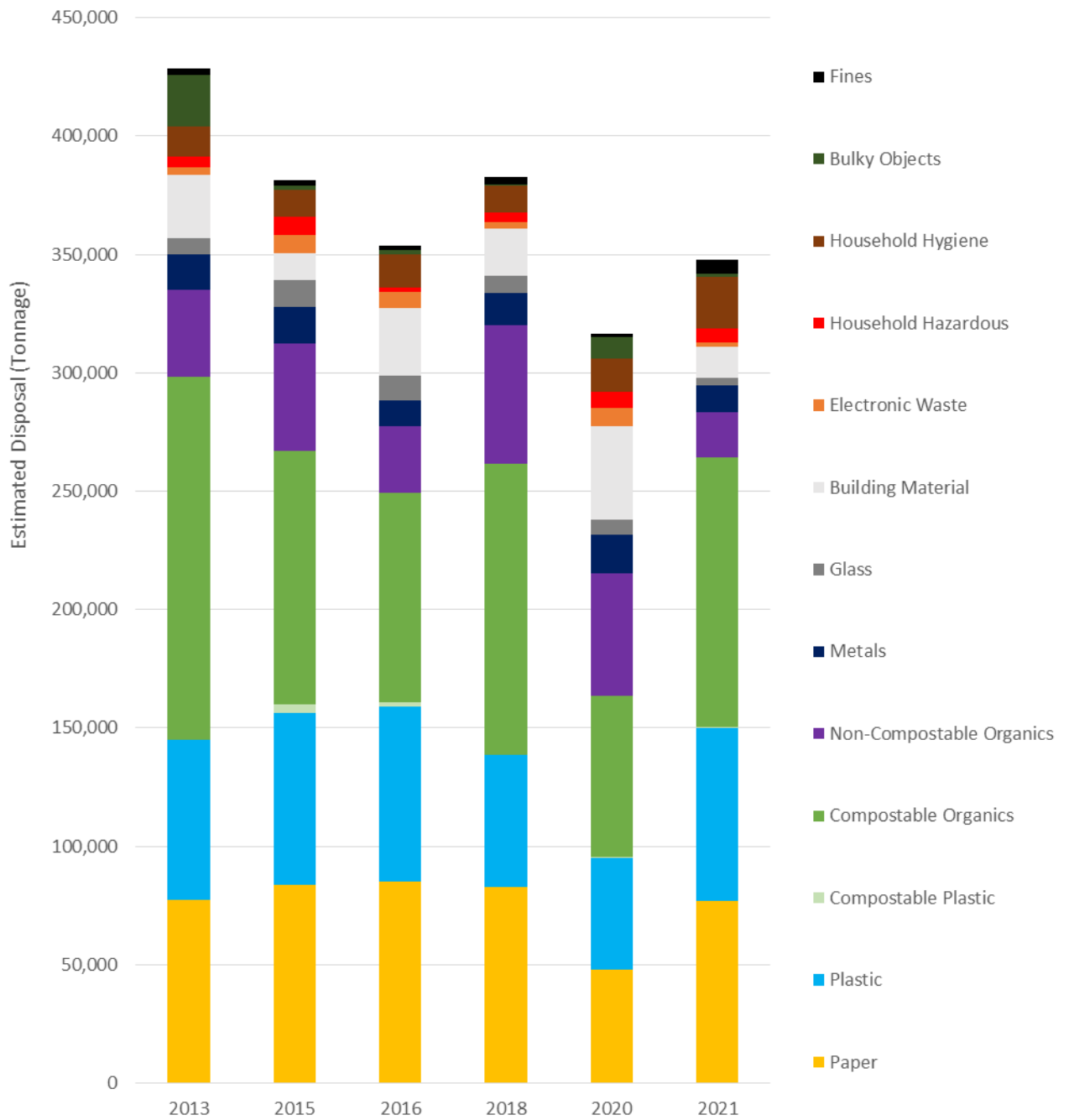


Figure 13: Small Loads Historical Comparison 2013 - 2021

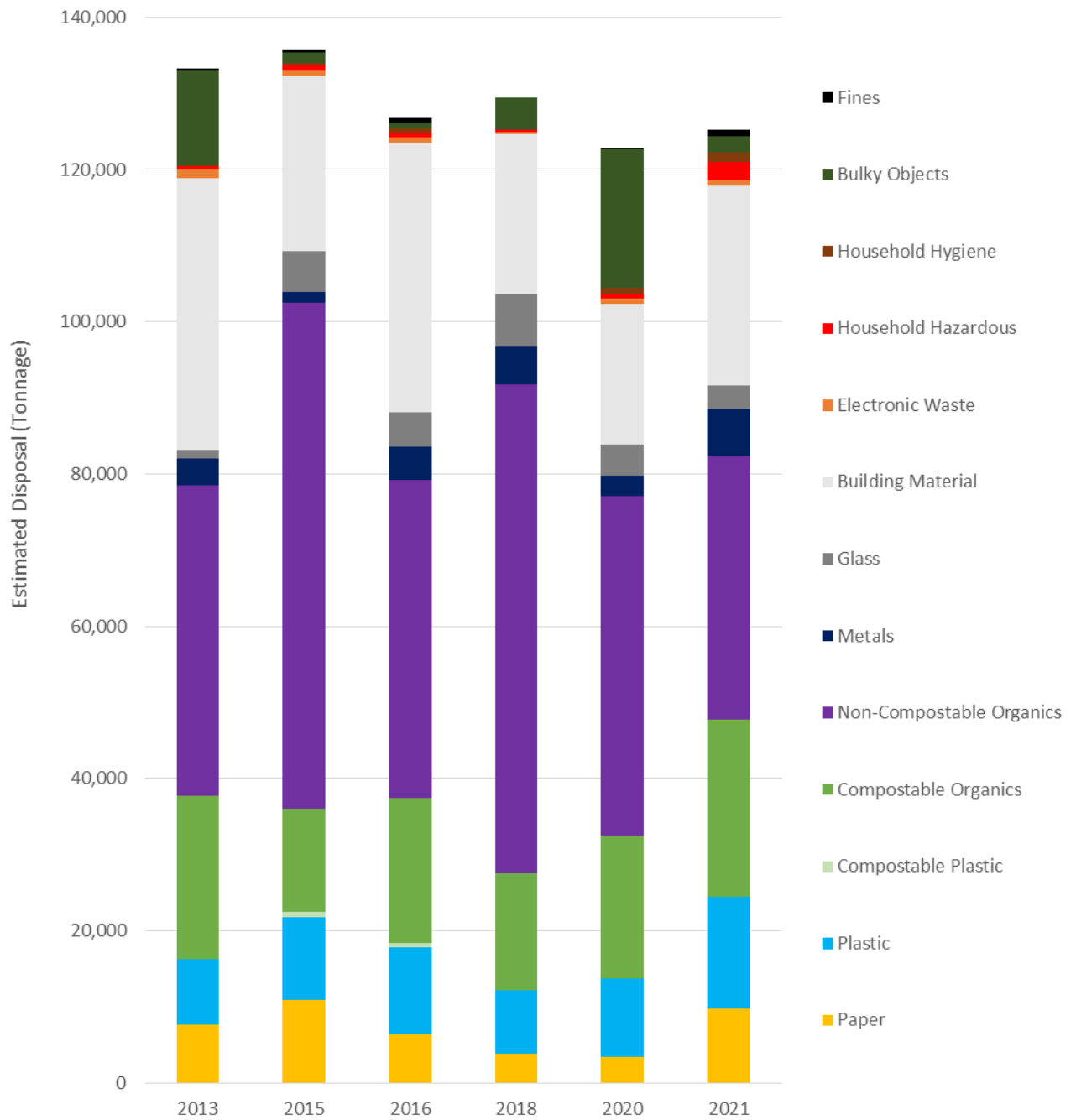
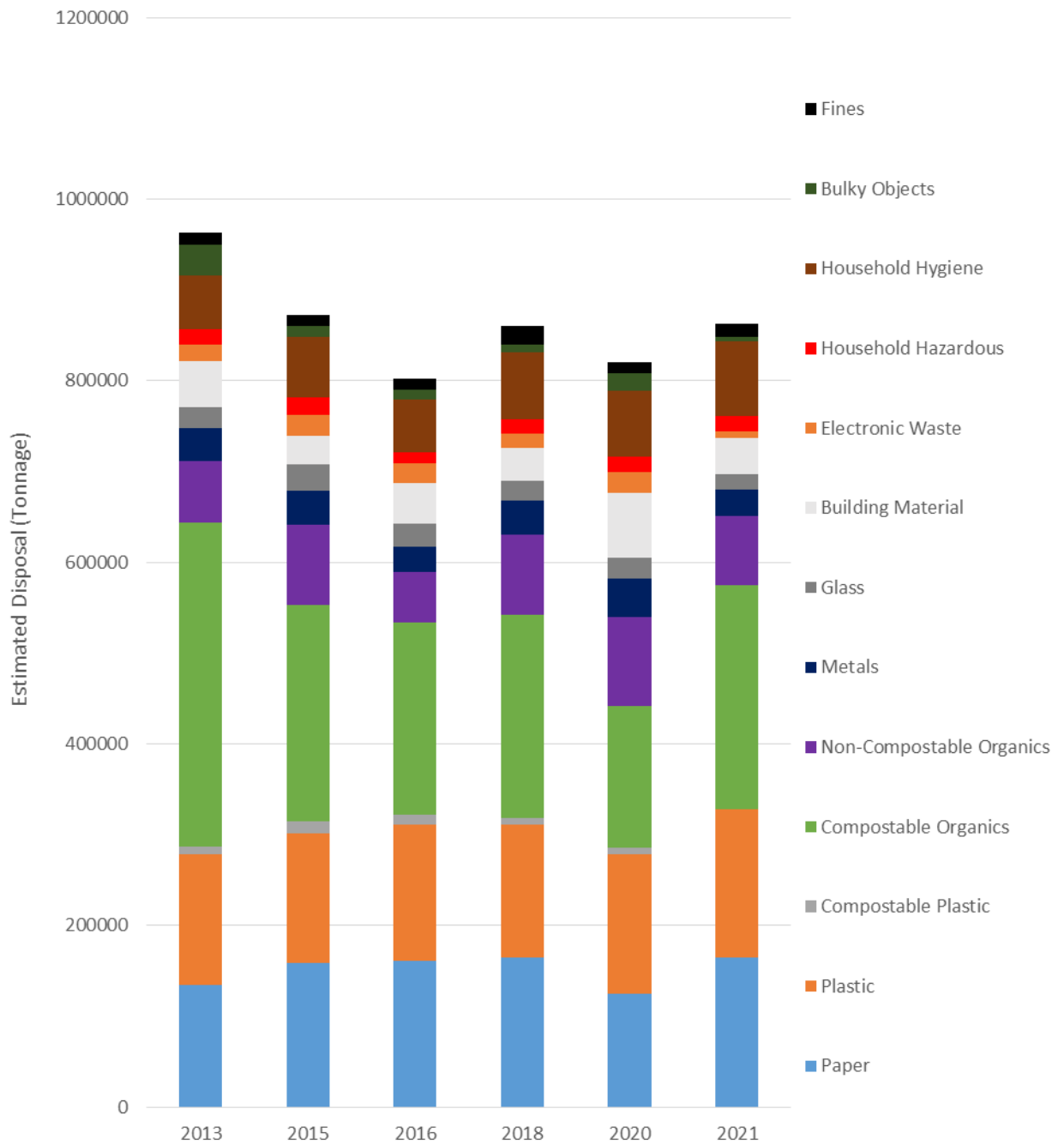


Figure 14: Combined All Sectors Historical Comparison 2013 - 2021



3.2.3.1

Discussion of Historical Comparison

The figures in this section compare waste composition from 2013 to 2021. Waste disposal habits have been impacted by the global COVID-19 pandemic which began impacting the lives of all Metro Vancouver residents in March 2020.

Two of the waste composition studies discussed in the historical comparison were completed during the pandemic:

- The 2020 waste composition study was completed in September 2020; and
- The 2021 waste composition study was completed in December 2021 – January 2022.

Notable events in the pandemic timeline which may have impacted waste disposal in Metro Vancouver include:

- Throughout 2020 and 2021, many types of businesses had modified or limited services and limited capacity (for customers and/or employees).
- All dine-in establishments closed on March 20, 2020 but reopened (with limited capacity) on May 19, 2020 (limited capacity).
- A mandatory mask policy was introduced for all indoor public spaces on November 19, 2020, which was *after* the 2020 waste composition study. This policy was briefly lifted in the summer of 2021, but had been reinstated prior to the beginning of the 2021 waste composition study.
- The peak of the COVID-19 Omicron wave in BC was in early January 2022, during the final week of the 2021 waste composition study.

Overall, the historical waste composition results in this section demonstrate that waste composition in 2020 was an outlier, and that 2021 waste composition and generation tended to be more similar to 2018 data than 2020 data. Notable 2020 results that demonstrate this trend include:

- In the SF and MF sectors, less compostable organics were disposed and more plastic was disposed in 2020 than in the years before and after. The quantity of building materials disposed by these sectors in 2020 was more than double that which was disposed in the years before and after.
- In the CI sector, less paper, plastic, and compostable organics were disposed in 2020 than in the years before and after. The quantity of building materials disposed by the CI sector in 2020 was approximately double that which was disposed in the years before and after.
- In the SL sector, the quantity of bulky objects disposed in 2020 was approximately quadruple that which was disposed in the years before and after.
- Overall, less paper, less plastic, and less compostable organics and more building materials were disposed in 2020 than in the years before and after.

Some notable observations about 2021 results which do not consider 2020's outlying results include:

- In the SF sector, the overall 2021 waste composition results were very similar to 2018 waste composition results. Slightly more compostable organics was disposed in 2021 than in 2018.
- In the MF sector, the overall 2021 waste composition results were very similar to 2018 waste composition results, however:
 - Slightly more compostable organics were disposed in 2021 than in 2018;
 - Slightly less plastic was disposed in 2021 than in 2018; and
 - More household hygiene was disposed in 2021 than in 2018.
- In the CI sector, somewhat more plastics and significantly less non-compostable organics were disposed in 2021 than in 2018. In 2018, non-compostable organics mostly comprised finished wood.
- In the SL sector:
 - More paper, plastics, and compostable organics were disposed in 2021 than in 2018;
 - Significantly less non-compostable organics were disposed in 2021 than in 2018. In 2018, non-compostable organics mostly comprised finished wood; and
 - More building materials were disposed in 2021 than in 2018.
- Overall, waste composition in 2018 and 2021 was very similar. Slightly more plastic and compostable organics was disposed in 2021 than in 2018.

3.3 Functional Categories Composition

Since 2020, each material category has been assigned a functional category that includes material with a similar end fate or management paradigm. The following sections show the composition of the different functional categories for each waste stream and combined adjusted values. Note that not all material categories were assigned a function category and some materials may be present in more than one functional category.

3.3.1 Functional Categories Composition by Sector

The largest functional category by weight percentage in the single-family, multi-family, and commercial/institutional sectors was green bin materials which comprised mainly food waste. The largest functional category by weight percentage in the small loads' sector is construction & demolition waste. Table 10 shows the functional categories composition of the 2021 waste composition in detail from most prevalent to least prevalent.

Table 10: Functional Categories Composition

Functional Category	Definition	Combined (Weight %)	SF (Weight %)	MF (Weight %)	CI (Weight %)	SL (Weight %)
Green Bin	Items accepted in most residential green bin programs	33%	34%	39%	37%	12%
Limited Recycling Options	Other items (excluding those above) that typically have few or no readily available options for recycling	22%	29%	24%	20%	13%
Recyclable	Items accepted in most residential recycling programs or covered by extended producer responsibility programs in BC ¹	20%	20%	21%	21%	14%
Construction and Demolition	Items typically generated by construction, demolition, or renovation activities	13%	5%	2%	10%	51%
Textiles	Clothing, household textiles, and accessories	6%	7%	6%	4%	5%
Single-Use Items	Single-Use food and beverage packaging	3%	4%	4%	3%	1%
Personal Protective Equipment	Personal protective equipment commonly used in response to the COVID-19 pandemic	1%	1%	1%	1%	<1%

Notes:

¹Additional challenges exist for recycling items in the commercial/institutional sector because this sector is not covered by EPR programs in BC. For example, packaging and printed paper is only covered by an EPR program when generated by residential sources.

3.3.2 Historical Comparison for Functional Categories

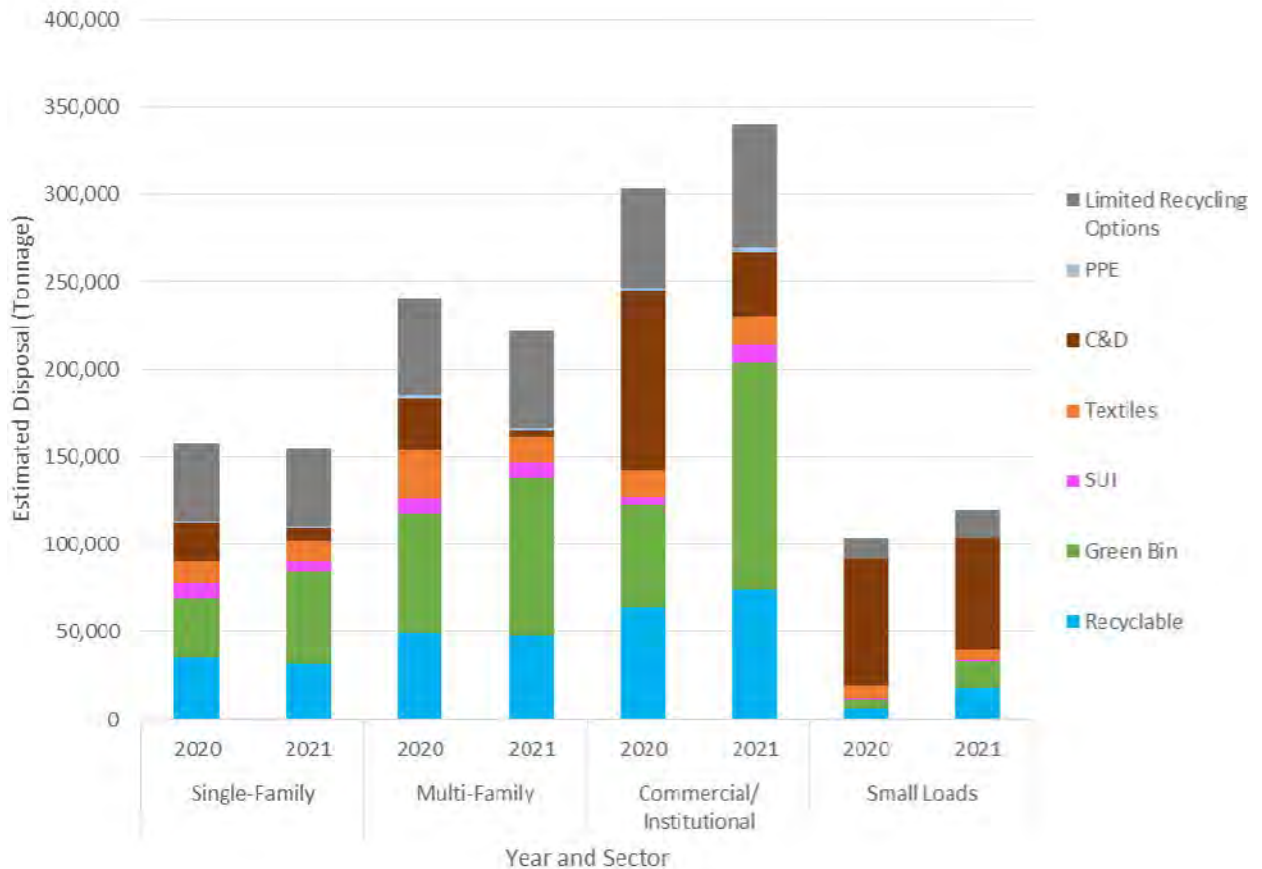
Figure 15 presents a side-by-side comparison of the 2020 and 2021 functional categories for each sector. As discussed extensively in Section 3.2.3.1, 2020 waste composition was an outlier when compared to the years before and after because of changed disposal habits due to the COVID-19 pandemic. However, functional category composition analysis was completed for the first time in 2020, therefore there is no older data on functional categories.

Notable results include:

- In all sectors, more green bin materials were disposed in 2021 than in 2020; and

- In all sectors, less construction and demolition (C&D) materials were disposed in 2021 than in 2020.

Figure 15: Functional Categories by Sector (2020 – 2021)¹



Notes:

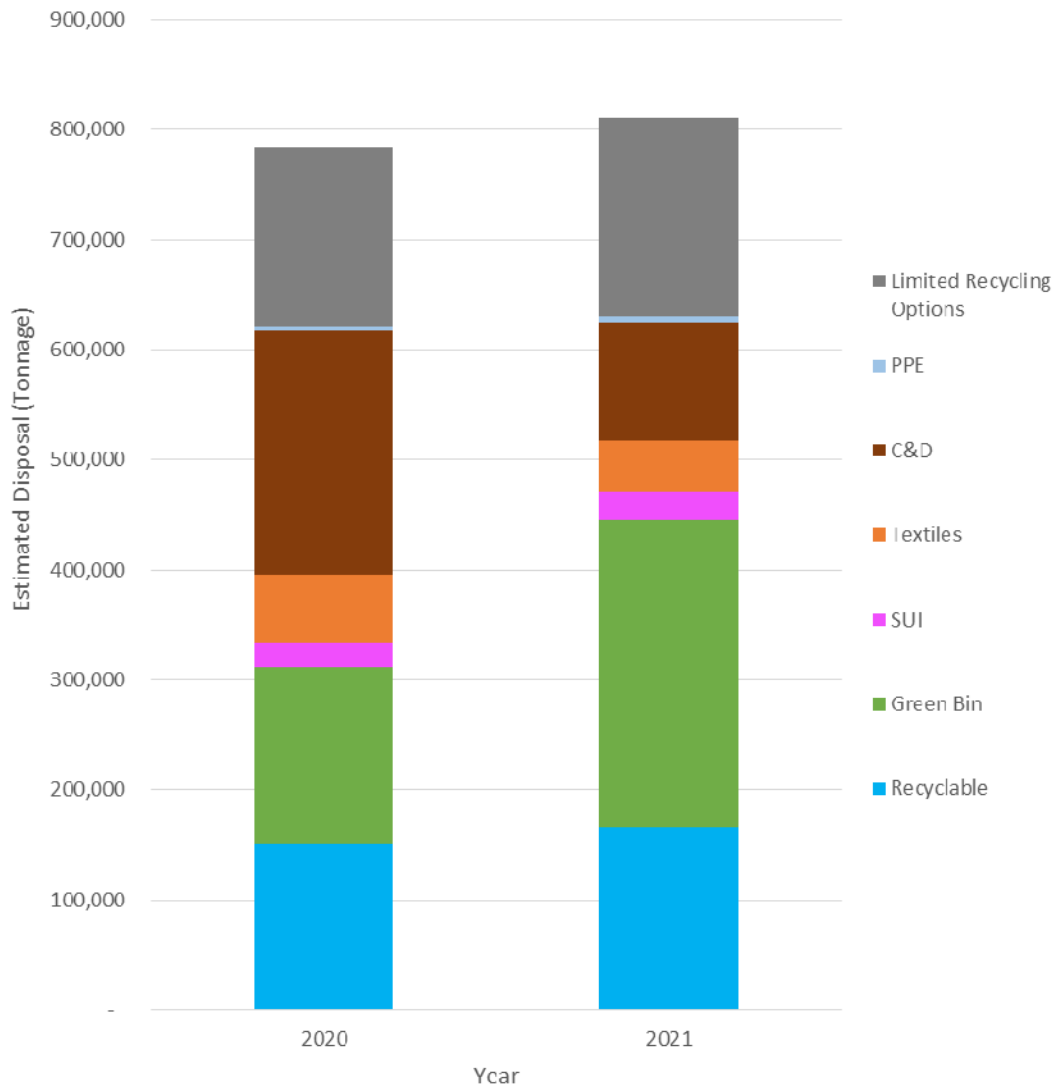
¹In the 2020 waste composition study data analysis, several categories were miscategorised into incorrect functional categories. The 2020 functional values used for comparison purposes in this report were corrected.

Figure 19 presents a side-by-side comparison of the 2020 and 2021 functional categories for overall waste (all sectors combined).

The composition by functional category between 2020 and 2021 appears to be relatively different, especially in terms of the amount green bin and C&D materials. Notably, 2020 was an anomalous year and residents’ behaviours may have changed vastly during the COVID-19 pandemic. This may have been reflected in the waste composition. For example, residents may have been eating more at home in 2020 (which might have resulted in less food waste) or performing more home renovation projects (which might have resulted in more C&D waste).

The Historical Comparison section of this report (Section 3.2.3) reviews primary category composition from 2013 to 2021. This analysis shows that 2020 was an outlier in the years between 2013 and 2021, where more building material was disposed and less compostable organics were disposed.

Figure 16: Historical Functional Categories 2020 – 2021



3.4 Single-Use Item Disposal

Figure 17 presents the 2021 estimated disposal tonnage of SUIs for each sector. Figure 18 presents the 2021 estimated disposal counts of SUIs for each sector. Figures were calculated by extrapolating from the quantity of SUIs found during the waste composition study to overall annual disposal tonnages.

Figure 17: SUI Disposal Tonnage by Sector and Category

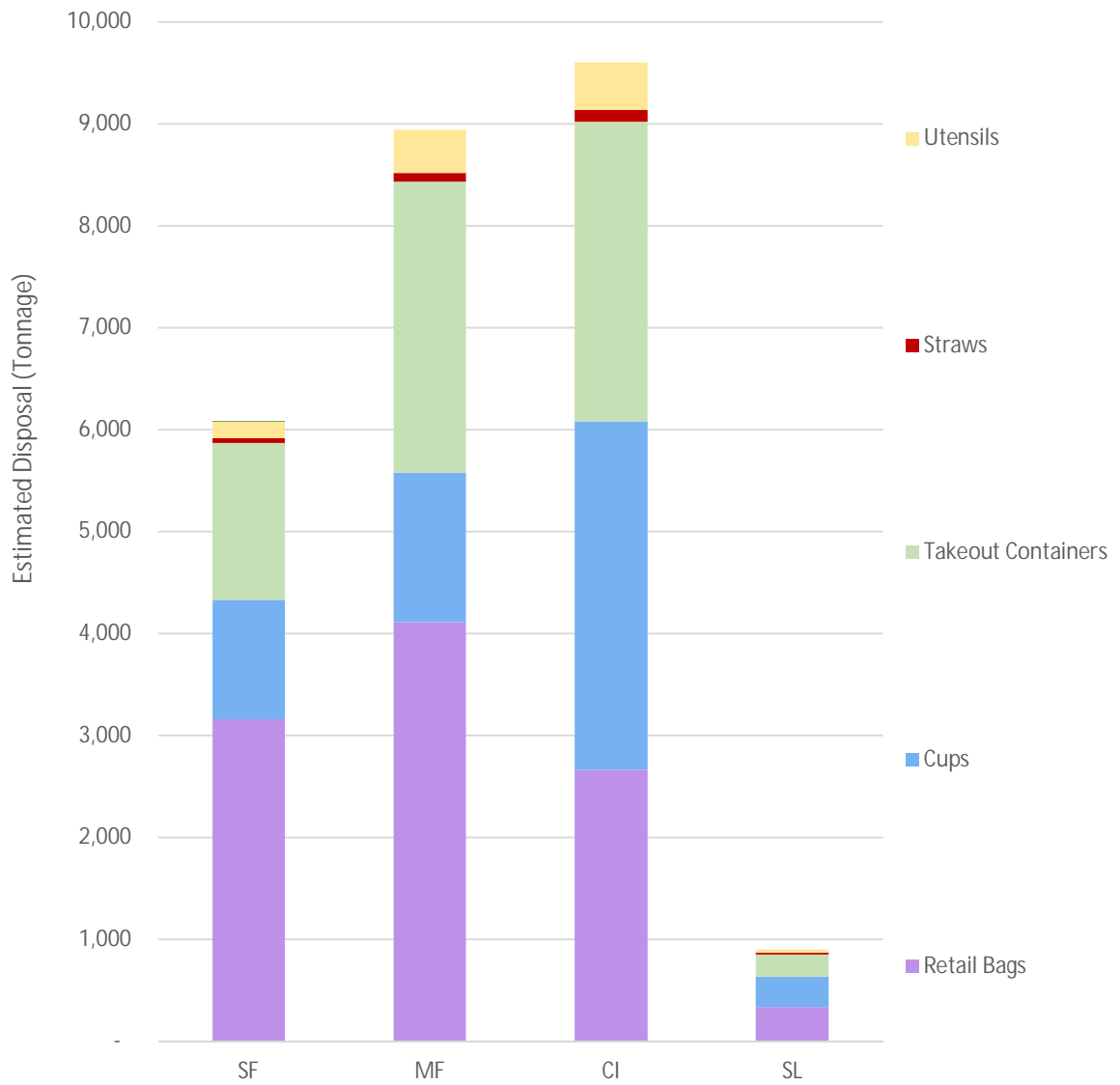
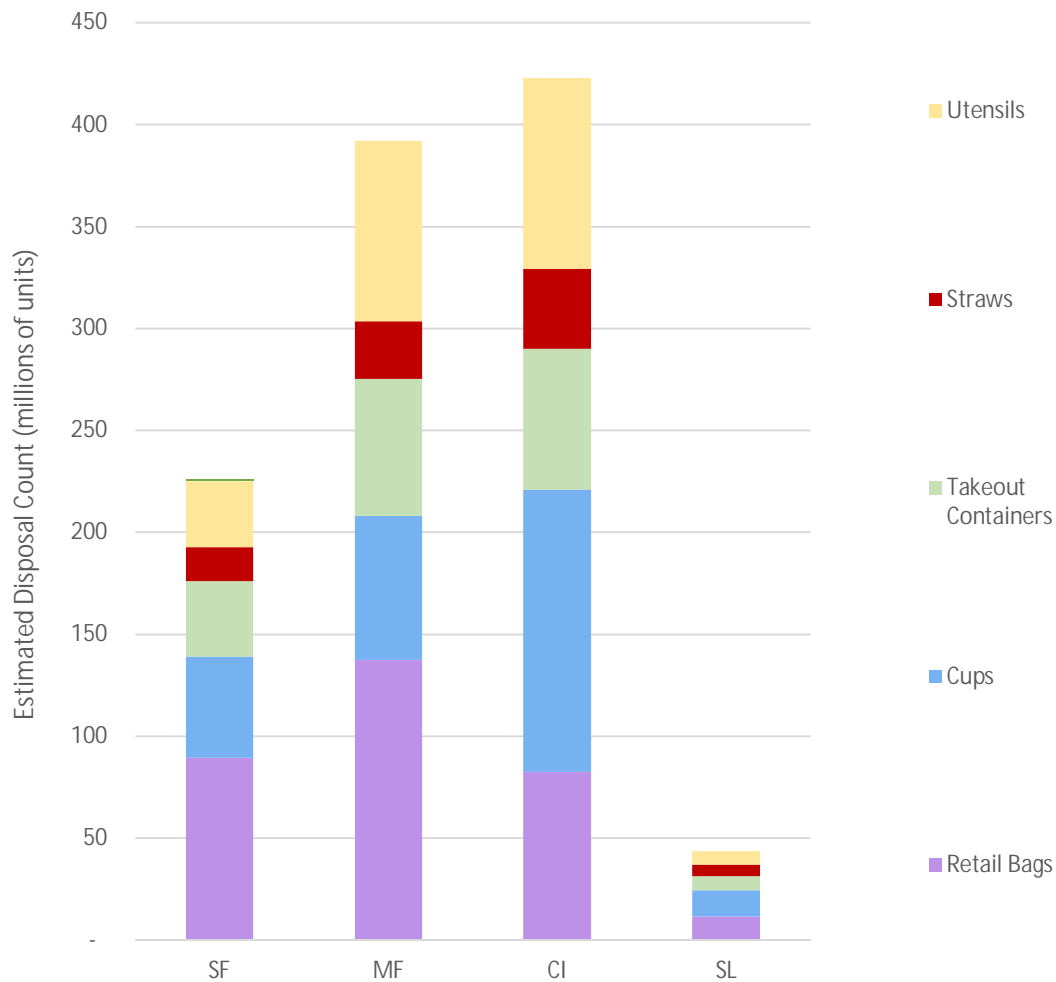


Figure 18: SUI Disposal Counts by Sector and Category



SUIs were most common in MF and CI waste. The largest component of SUIs varied by sector, with retail bags being most prevalent in SF and MF sectors, and cups being most prevalent in the CI sector.

Table 11 presents the estimated tonnage of SUI categories disposed in each sector. Additionally, data is presented in terms of disposal per capita.

To calculate the tonnages presented in Table 11, the following methodology was used:

- The tonnages of retail bags, cups, and takeout containers were calculated based on the total weight of these categories found in the audit.
- The tonnages of straws and utensils were calculated based on the count of these categories found in the audit, and the per-unit weight of these items found. This method was used because these items are very low density and their weight is often smaller than the lowest reading of the scale, so their weight does not get correctly measured.

Table 11: Estimated Disposal of Single-Use Items¹

SUI Category	Disposed Tonnage ²					Disposed kg/capita (Combined)
	Single-Family	Multi-Family	Commercial/Institutional	Small Loads	Combined	
Retail Bags	3,159	4,111	2,657	334	10,261	3.71
020 - Paper bags	1,170	2,137	1,509	216	5,032	1.82
024 - Re-Used Plastic Bags	1,154	1,205	741	63	3,162	1.14
025 - Empty Plastic Bags	836	755	371	53	2,015	0.73
066 - Plastic Bags Labeled Compostable	-	14	37	2	53	0.02
Cups	1,170	1,463	3,419	293	6,346	2.29
013 - Plastic-Lined Paper Hot Cups	609	892	2,075	154	3,729	1.35
014 - Plastic-Lined Paper Cold Cups	360	211	397	31	999	0.36
015 - Plastic-Lined Paper Cups Labeled Compostable	-	-	132	-	132	0.05
039 - Rigid Plastic Cups	185	354	789	22	1,349	0.49
050 - Foam Cups	5	7	21	87	120	0.04
063 - Rigid Plastic Cups Labeled Compostable	11	-	5	-	16	0.01
Takeout Containers	1,539	2,859	2,943	219	7,559	2.73
017 - Unlined Paper Takeout Containers	355	524	778	22	1,678	0.61
018 - Plastic-Lined Paper Takeout Containers	455	1,416	863	151	2,885	1.04
019 - Plastic-Lined Paper Takeout Containers	275	613	889	24	1,801	0.65
051 - Foam Takeout Containers	348	177	169	10	704	0.25
057 - Rigid Plastic takeout Containers	95	75	32	12	214	0.08
064 - Plastic Takeout Containers Labeled Compostable	11	54	175	-	240	0.09
065 - Other Foodware Labeled Compostable	-	-	37	-	37	0.01
Straws	50	83	116	16	265	0.10
016 - Paper Straws	24	38	54	3	119	0.04
059 - Plastic Straws	26	45	62	13	146	0.05
Utensils	160	426	465	32	1,083	0.39
060 - Plastic Utensils	91	182	275	13	561	0.20
084 - Wood Utensils	69	244	190	19	522	0.19
Total of all SUIs Disposed	6,078	8,941	9,601	894	25,514	9.22

Notes:

¹Due to the relatively low weight of SUIs when compared to other materials, the calculated confidence intervals were very low and the results appeared to have unrealistically low variability. Thus, confidence intervals for SUIs are not presented.

²Figures were calculated by extrapolating from the quantity of SUIs found during the waste composition study to overall annual disposal tonnages.

Figure 19 presents the SUI disposal in 2018, 2020, and 2021 by estimated total units. These items were counted during auditing, and these counts were extrapolated to the region by applying regional disposal tonnages.

In general, SUI disposal in 2018 and 2021 was similar, and 2020 disposal was an outlier. This is likely due to the COVID-19 pandemic. Notably, the SF sector had much higher SUI disposal in 2020 than in other years, and the CI sector had much lower SUI disposal in 2020 than in other years.

Figure 19: Estimated SUI Disposal in 2018, 2020, and 2021

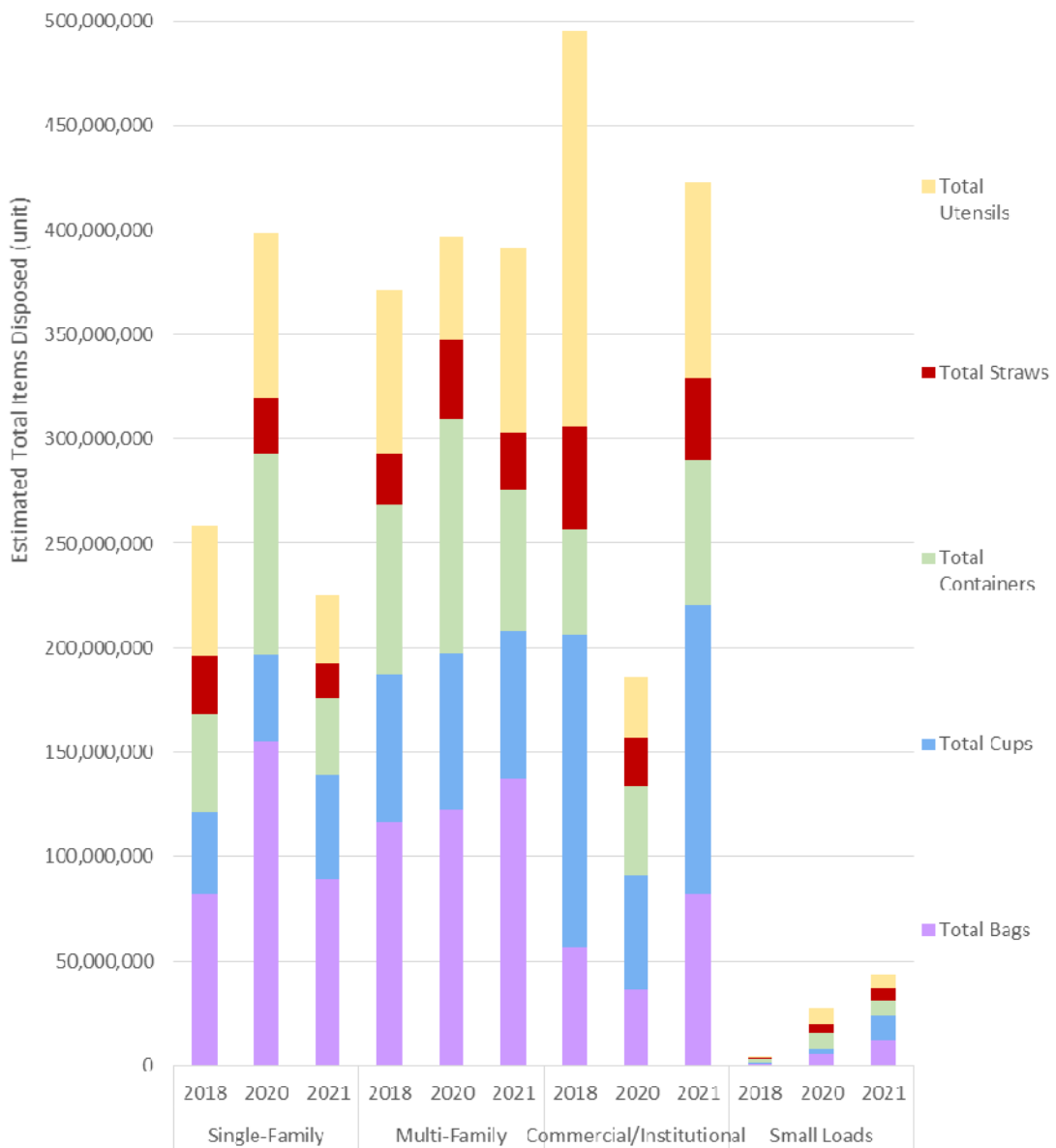


Table 12 presents the per-capita disposal for single-use items in 2018, 2020, and 2021. While the breakdown by sector is very different between 2020 and 2021 (Figure 19), the overall disposal on a per-capita basis was similar in 2020 and 2021.

Table 12: Single-Use Items Disposal – Per-Capita Comparison for 2018, 2020, and 2021

SUI Category	2018 (unit/capita)	2020 (unit/capita)	2021 (unit/capita)
Retail Bags	100	117	116
Cups	102	64	98
Takeout Containers	70	95	65
Straws	40	34	33
Utensils	130	49	80
Total	443	359	391

3.5 Personal Protective Equipment Disposal

In the 2020 and 2021 waste composition studies, the quantity of PPE disposed was measured. PPE items found were both weighed and counted. The PPE data collected during the waste composition study was extrapolated using regional disposal and population data.

Table 13 presents the quantity of PPE disposed by sector and combined for all sectors. The largest quantity of PPE was disposed by the CI sector, followed by the MF sector, then the SF sector.

Table 13: Estimated Disposal of PPE Categories

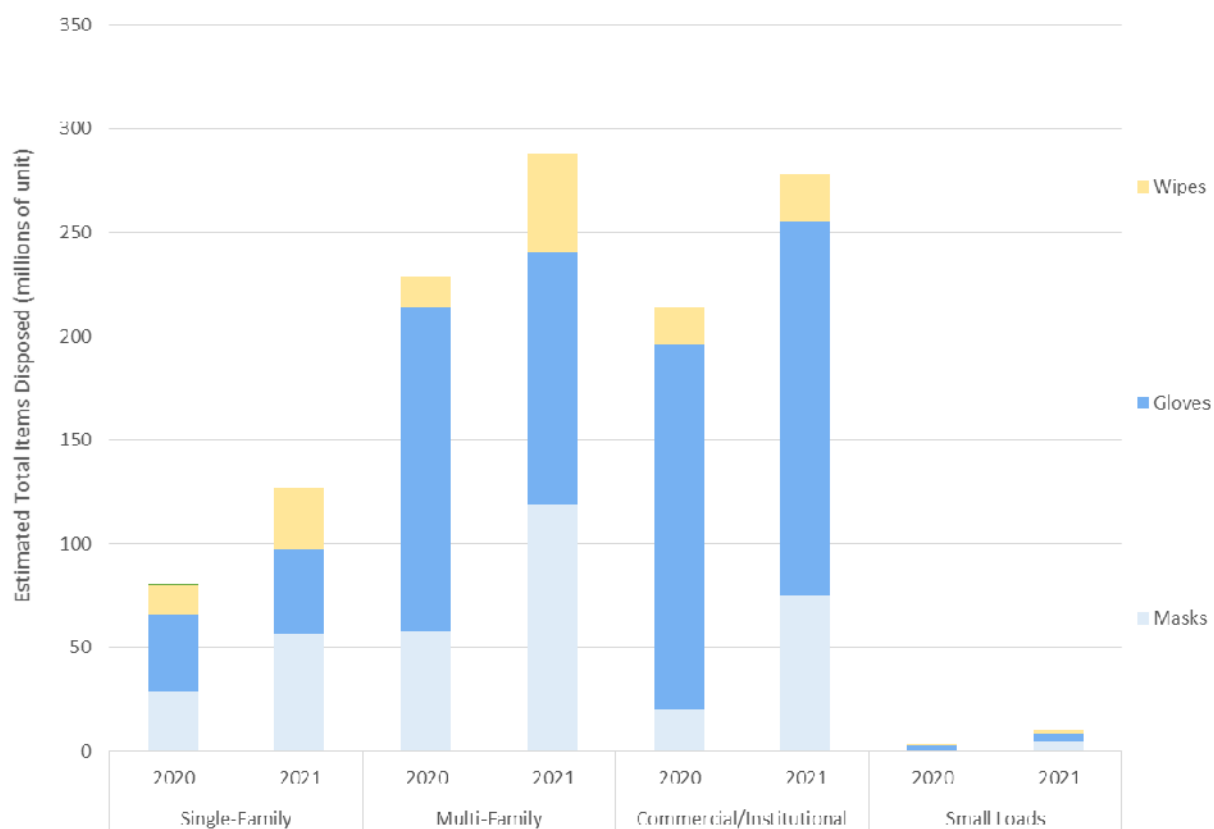
PPE Category	SF (Tonnage)	MF (Tonnage)	CI (Tonnage)	SL (Tonnage)	Combined (Tonnage)
Masks	350	610	540	29	1,500
Gloves	350	800	1,800	65	3,000
Wipes	160	270	180	10	620
Total	860	1,688	2,520	100	5,120

Table 14 presents the approximate number of PPE items disposed. Additionally, the number of units disposed per capita is presented.

Table 14: Estimated Number of PPE Items Disposed

PPE Category	SF Count (millions of units)	MF Count (millions of units)	CI Count (millions of units)	SL Count (millions of units)	Combined (millions of units)	Combined (units/capita)
Masks	57	120	75	4	260	94
Gloves	41	120	180	4	350	126
Wipes	29	48	23	2	100	36
Total	130	290	280	11	710	257

Figure 20 presents the 2021 estimated disposal tonnage of PPE for each sector. More PPE was disposed in 2021 than in 2020. Notably, the auditing for the 2020 waste composition study took place in September 2020, which was before the BC government introduced mask mandates.

Figure 20: Estimated PPE Disposal in 2020 and 2021¹

¹ Two samples were removed from this analysis as they contained extremely high quantities of PPE when compared to other samples.

Limitations and Sources of Error

Limitations and potential sources of error for the study include:

- Weights measured by the electronic scale can be inaccurate. These inaccuracies could be the result of operator errors during weighing (e.g. by not placing the scale on a level-surface or neglecting to keep the scale tared) or due to wear-and-tear on the scale. This was controlled by having field staff monitor and maintain proper scale use, and retaining spare scales.
- Sample weights may change after being weighed in due to small materials being lost during sorting or transportation, and by changing moisture content from excessive rain or sunshine.
- Discrepancies between the weigh-in mass of the sample and the weigh-out mass, calculated by summing the net weights for each sorted item category can occur. This type of discrepancy may be the result of errors in recording the field data, either during weigh-in or when sorted categories are weighed. Such errors were monitored for by QA/QC procedures for error checking during data collection, as a result the errors were minor.
- Larger bulky or otherwise oddly shaped items may not have been effectively retrievable by the facility's loader or the field staff for sample collection. Such items were noted if detected.
- Sorting accuracy was limited in certain cases due to notable health and safety hazards to field staff as a result of the waste contents or how the contents were contained.
- Personal wipes, sorted from samples as a PPE category, in certain cases may not be distinguishable from other tissues and sanitary wipes and therefore may not have been accurately weighed or counted.
- Waste loads hauled from the multi-family sector were often collected alongside other sectors leading to potentially mixed loads being collected and represented as multi-family samples. This type of error was minimized by communication between the waste hauler, facility staff, and the field sorting team to accurately retrieve a multi-family sample from a potentially mixed load.

Closure and Professional Statement

This report was prepared exclusively for the purposes, project and location outlined in this report. The report is based on the composition of the inbound material over a specific period of time as indicated in the report. Although a reasonable analysis was conducted by Dillon, Dillon's analysis was by no means exhaustive. Rather, Dillon's report represents a reasonable review of the audit results as a "snapshot" in time. These results only reflect the conditions of the period of time in which they were collected. The audit results for the assessments that took place December 2021 to January 2022 are those reflected in this report.

Dillon prepared this report for the sole benefit of the Metro Vancouver. The material in the report reflects Dillon's best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decision based on it, are the responsibilities of such third parties.

Appendix A

All Waste Composition by Sector

Category	SF	MF	CI	SL	Combined (n=100)
01 - Paper	19.2%	20.8%	22.1%	7.8%	19.1%
001 - Junk Mail, Flyers, Unaddressed Mail	0.8%	0.9%	0.9%	0.1%	0.8%
002 - Other Fine Office Paper or Envelopes	1.0%	0.7%	1.6%	0.3%	1.1%
003 - Newsprint	0.3%	0.4%	0.2%	0.1%	0.2%
004 - Clean Recyclable OCC	0.8%	1.1%	2.3%	1.1%	1.5%
005 - Waxed OCC	0.2%	0.2%	1.1%	0.0%	0.6%
006 - Other Soiled OCC	1.3%	0.6%	0.8%	0.5%	0.8%
007 - Cereal Boxes and Other Box Packaging	1.8%	1.6%	2.5%	2.0%	2.0%
008 - Telephone Books	0.0%	0.0%	0.0%	0.0%	0.0%
009 - Magazines	0.2%	0.1%	0.3%	0.1%	0.2%
010 - Books	0.2%	1.2%	0.0%	0.5%	0.4%
011 - Dairy or Dairy Substitute	0.2%	0.2%	0.2%	0.0%	0.2%
012 - Non-Dairy/Deposit	0.2%	0.1%	0.2%	0.0%	0.1%
013 - Plastic-Lined Paper Hot Cups	0.4%	0.4%	0.6%	0.1%	0.4%
014 - Plastic-Lined Paper Cold Cups	0.2%	0.1%	0.1%	0.0%	0.1%
015 - Plastic-Lined Paper Cups Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
016 - Paper Straws	0.1%	0.0%	0.1%	0.0%	0.1%
017 - Unlined Paper Takeout Containers	0.2%	0.2%	0.2%	0.0%	0.2%
018 - Plastic-Lined Paper Takeout Containers	0.3%	0.6%	0.2%	0.1%	0.3%
019 - Plastic-Lined Paper Takeout Containers	0.2%	0.3%	0.3%	0.0%	0.2%
020 - Paper bags	0.7%	0.9%	0.4%	0.2%	0.6%
021 - Other Recyclable Paper	1.0%	1.0%	1.1%	0.3%	0.9%
022 - Other Compostable Paper	8.1%	8.4%	7.5%	1.0%	6.9%
023 - Non-compostable, non-recyclable paper	1.1%	2.0%	1.5%	1.3%	1.5%
02 - Plastic	20.6%	18.1%	21.1%	11.7%	18.8%
024 - Re-Used Plastic Bags	0.7%	0.5%	0.2%	0.0%	0.4%
025 - Empty Plastic Bags	0.5%	0.3%	0.1%	0.0%	0.2%
026 - Consumables Packaging Bags and Film	1.4%	1.6%	1.6%	0.5%	1.4%
027 - Garbage Bags Sandwich/Freezer Bags	1.2%	1.4%	1.6%	0.5%	1.3%
028 - Other Flexible Plastic Packaging	2.5%	2.5%	1.4%	0.2%	1.7%
029 - Freezer Bags	0.3%	0.3%	0.1%	0.0%	0.2%
030 - Deposit Beverage Pouches	0.0%	0.0%	0.0%	0.0%	0.0%
031 - Other Plastic Film	1.2%	0.8%	5.5%	1.3%	2.8%
032 - Clothing and accessories	1.6%	0.7%	0.8%	0.1%	0.8%
033 - Household	2.4%	1.2%	1.0%	1.9%	1.5%
034 - Reusable bags	0.1%	0.1%	0.1%	0.0%	0.1%
035 - Other	0.3%	0.4%	0.8%	0.3%	0.5%
036 - Dairy or Dairy Substitute	0.1%	0.1%	0.2%	0.0%	0.1%
037 - Deposit Containers – Water	0.1%	0.1%	0.1%	0.0%	0.1%
038 - Deposit Containers – Other	0.2%	0.2%	0.1%	0.0%	0.1%
039 - Rigid Plastic Cups	0.1%	0.2%	0.2%	0.0%	0.2%
040 - Other	0.0%	0.0%	0.0%	0.0%	0.0%
041 - # 1 PETE – Bottles and Jars	0.3%	0.2%	0.2%	0.1%	0.2%
042 - #1 PETE – Other Packaging	0.6%	0.8%	0.6%	0.7%	0.6%
043 - #2 HDPE – Bottles and Jugs	0.2%	0.4%	0.2%	0.1%	0.2%
044 - #2 HDPE – Tubs and Lids	0.2%	0.1%	0.4%	0.2%	0.3%
045 - #3 PVC	0.0%	0.0%	0.0%	0.0%	0.0%
046 - #4 LDPE	0.0%	0.2%	0.1%	0.1%	0.1%
047 - #5 PP	1.1%	1.6%	0.9%	0.3%	1.0%
048 - #6 PS – Non-Foam	0.2%	0.2%	0.2%	0.0%	0.2%
049 - #6 PS – Packing Foam	0.1%	0.2%	0.2%	0.2%	0.2%
050 - Foam Cups	0.0%	0.0%	0.0%	0.1%	0.0%
051 - Foam Takeout Containers	0.2%	0.1%	0.0%	0.0%	0.1%
052 - #6 PS – Foam foodware	0.5%	0.5%	0.6%	0.0%	0.5%
053 - #6 PS – Other PS Foam	0.0%	0.0%	0.1%	0.0%	0.0%
054 - Other Foam	0.4%	0.0%	0.0%	0.1%	0.1%
055 - #7 Mixed Resin Plastic	0.0%	0.1%	0.0%	0.0%	0.0%
056 - Uncoded Packaging/Containers	0.3%	0.4%	0.5%	0.1%	0.4%
057 - Rigid Plastic takeout Containers	0.1%	0.0%	0.0%	0.0%	0.0%
058 - Durable Plastic Products	3.4%	2.7%	2.7%	4.7%	3.1%
059 - Plastic Straws	0.0%	0.0%	0.0%	0.0%	0.0%
060 - Plastic Utensils	0.1%	0.1%	0.1%	0.0%	0.1%
061 - Coffee Pods	0.3%	0.3%	0.1%	0.1%	0.2%
062 - Other/Mixed Plastics	0.1%	0.1%	0.1%	0.0%	0.1%
03 - Compostable Plastic	0.0%	0.0%	0.1%	0.0%	0.0%
063 - Rigid Plastic Cups Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
064 - Plastic Takeout Containers Labeled Compostable	0.0%	0.0%	0.1%	0.0%	0.0%

Category	SF	MF	CI	SL	Combined (n=100)
065 - Other Foodware Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
066 - Plastic Bags Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
067 - Bags and Liners	0.0%	0.0%	0.0%	0.0%	0.0%
068 - Packaging , Bottles	0.0%	0.0%	0.0%	0.0%	0.0%
04 - Compostable Organics	25.4%	30.1%	32.7%	18.5%	28.6%
069 - Small Yard Waste	1.4%	1.0%	0.6%	5.7%	1.6%
070 - Large Yard Waste	0.0%	0.0%	0.3%	0.7%	0.2%
071 - Unavoidable Food Waste	10.4%	10.2%	10.1%	1.1%	8.9%
072 - Plate Scrapings, Unfinished Meals	4.1%	7.8%	6.5%	0.4%	5.5%
073 - Whole Fruits and Vegetables	1.9%	2.7%	4.2%	0.5%	2.8%
074 - Whole Meats, Fish	0.5%	0.8%	2.9%	0.3%	1.5%
075 - Full/Unused Ready-Made	1.3%	2.0%	0.8%	0.6%	1.2%
076 - Baked Goods	1.5%	1.7%	1.3%	0.4%	1.3%
077 - Dairy	0.4%	0.3%	0.4%	0.2%	0.3%
078 - Liquids (drinks, oil in package)	1.5%	1.3%	1.0%	0.2%	1.1%
079 - Candy and snacks	1.0%	0.6%	0.2%	0.0%	0.4%
080 - Condiments and sauces	0.5%	1.2%	0.5%	0.6%	0.7%
081 - Pet food	0.1%	0.0%	0.0%	0.0%	0.0%
082 - Wood Pallets	0.0%	0.0%	0.1%	0.0%	0.0%
083 - Unfinished Wood Furniture	0.0%	0.2%	0.3%	0.0%	0.1%
084 - Wood Utensils	0.0%	0.1%	0.2%	0.0%	0.1%
085 - Other Wood	0.6%	0.1%	3.2%	7.8%	2.6%
086 - Manure, Slaughterhouse, Animals	0.2%	0.0%	0.0%	0.0%	0.0%
05 - Non-Compostable Organics	6.7%	5.0%	5.6%	27.7%	8.8%
087 - Pressure Treated Wood	0.9%	0.1%	1.2%	7.0%	1.7%
088 - Finished Wood	0.5%	0.3%	2.2%	6.4%	2.0%
089 - Finished Wood Furniture	2.2%	0.8%	0.2%	10.4%	2.2%
090 - Natural Fiber Clothing	0.9%	2.1%	0.9%	0.6%	1.2%
091 - Household	1.3%	1.0%	0.7%	1.4%	1.0%
092 - Reusable bags	0.0%	0.0%	0.0%	0.0%	0.0%
093 - Other	0.0%	0.1%	0.0%	0.7%	0.1%
094 - Tires	0.0%	0.0%	0.0%	0.0%	0.0%
095 - Other Rubber	0.2%	0.0%	0.0%	0.6%	0.1%
096 - Leather	0.1%	0.0%	0.0%	0.0%	0.0%
097 - Composite Organic Materials (shoes)	0.5%	0.4%	0.3%	0.4%	0.4%
098 - Other	0.0%	0.1%	0.0%	0.1%	0.1%
06 - Metals	4.0%	2.4%	3.2%	5.0%	3.4%
099 - Food Containers	0.2%	0.0%	0.2%	0.1%	0.2%
100 - Spiral-Wound Containers	0.1%	0.0%	0.1%	0.0%	0.1%
101 - Other Ferrous	0.0%	0.0%	0.3%	0.1%	0.1%
102 - Food Containers	0.2%	0.3%	0.2%	0.0%	0.2%
103 - Alcoholic	0.0%	0.2%	0.1%	0.0%	0.1%
104 - Non-Alcoholic	0.1%	0.2%	0.2%	0.0%	0.2%
105 - Food Containers	0.1%	0.3%	0.0%	0.0%	0.1%
106 - Foil Trays, Wrap	0.6%	0.4%	0.2%	0.1%	0.3%
107 - Other Non-Ferrous	0.0%	0.1%	0.1%	2.1%	0.3%
108 - Household	2.6%	0.9%	1.4%	2.2%	1.6%
109 - Machine Parts	0.0%	0.0%	0.0%	0.0%	0.0%
110 - Construction/Industrial	0.0%	0.1%	0.6%	0.3%	0.3%
07 - Glass	2.4%	2.5%	1.0%	2.5%	1.9%
111 - Beer	0.0%	0.1%	0.0%	0.0%	0.0%
112 - Other Alcohol	0.3%	0.4%	0.2%	0.0%	0.2%
113 - Non-Alcoholic & Non-Dairy	0.1%	0.3%	0.1%	0.0%	0.1%
114 - Dairy or Dairy Substitute	0.0%	0.0%	0.0%	0.0%	0.0%
115 - Food Containers	0.4%	0.7%	0.3%	0.2%	0.4%
116 - Other Glass and Ceramics	1.6%	1.1%	0.3%	2.3%	1.0%
117 - Light bulbs (Non-hazardous)	0.1%	0.0%	0.0%	0.0%	0.0%
08 - Building Material	0.4%	0.0%	3.7%	21.0%	4.6%
118 - Gypsum/Drywall	0.0%	0.0%	0.4%	1.9%	0.5%
119 - Masonry	0.0%	0.0%	0.0%	3.3%	0.5%
120 - Rock, Sand, Dirt	0.1%	0.0%	0.0%	1.8%	0.3%
121 - Rigid Asphalt	0.0%	0.0%	0.0%	0.2%	0.0%
122 - Carpet	0.0%	0.0%	1.8%	3.8%	1.3%
123 - Underlay	0.1%	0.0%	1.1%	1.4%	0.7%
124 - Other Inorganics	0.1%	0.0%	0.3%	8.7%	1.4%
09 - Electronic Waste	1.0%	1.4%	0.6%	0.6%	0.9%
125 - Desktop Computers	0.0%	0.8%	0.0%	0.0%	0.2%
126 - Notebook Computers	0.0%	0.0%	0.0%	0.0%	0.0%

Category	SF	MF	CI	SL	Combined (n=100)
127 - Computer Peripherals	0.1%	0.0%	0.0%	0.0%	0.0%
128 - Computer Monitors	0.0%	0.0%	0.0%	0.0%	0.0%
129 - Printers, Scanners	0.0%	0.0%	0.0%	0.0%	0.0%
130 - Televisions	0.0%	0.0%	0.0%	0.0%	0.0%
131 - Other Audio/Video	0.0%	0.1%	0.1%	0.1%	0.1%
132 - Mobile Phones & Accessories	0.0%	0.0%	0.0%	0.0%	0.0%
133 - Other	0.0%	0.0%	0.0%	0.0%	0.0%
134 - Small Appliances & Floor Care Appliances	0.2%	0.3%	0.1%	0.0%	0.2%
135 - Electronic Toys	0.0%	0.0%	0.0%	0.0%	0.0%
136 - Smoke Detectors	0.0%	0.0%	0.0%	0.0%	0.0%
137 - Other Electronics	0.6%	0.2%	0.4%	0.4%	0.4%
10 - Household Hazardous	1.0%	3.0%	1.7%	1.9%	2.0%
138 - Lead Acid	0.0%	0.0%	0.0%	0.0%	0.0%
139 - Household Batteries (Non Lithium-Ion)	0.2%	0.0%	0.0%	0.0%	0.1%
140 - Lithium Ion Batteries	0.0%	0.0%	0.0%	0.0%	0.0%
141 - Sharps	0.0%	0.0%	0.0%	0.0%	0.0%
142 - Animal Carcass	0.1%	0.0%	0.0%	0.1%	0.0%
143 - Other	0.5%	2.5%	1.1%	0.1%	1.2%
144 - Stains/Preservatives	0.0%	0.0%	0.0%	0.1%	0.0%
145 - Latex Paint	0.0%	0.0%	0.2%	0.5%	0.1%
146 - Oil-Based Paint	0.0%	0.0%	0.0%	0.4%	0.1%
147 - Paint Aerosols	0.0%	0.0%	0.0%	0.1%	0.0%
148 - Solvents	0.0%	0.0%	0.0%	0.0%	0.0%
149 - Cleaners, Soaps etc.	0.1%	0.2%	0.0%	0.2%	0.1%
150 - Pesticides/Herbicides/Preservatives	0.0%	0.0%	0.0%	0.3%	0.0%
151 - Motor Oil	0.0%	0.0%	0.0%	0.0%	0.0%
152 - Oil Filters	0.0%	0.1%	0.0%	0.0%	0.0%
153 - Antifreeze	0.0%	0.0%	0.0%	0.0%	0.0%
154 - Pharmaceuticals	0.0%	0.1%	0.0%	0.1%	0.0%
155 - Other Petroleum Based Products	0.0%	0.0%	0.0%	0.0%	0.0%
156 - Other	0.0%	0.0%	0.2%	0.1%	0.1%
157 - Thermostats and Switches	0.0%	0.0%	0.0%	0.0%	0.0%
158 - CFLs	0.0%	0.0%	0.0%	0.0%	0.0%
159 - Other HHW or Containers	0.1%	0.1%	0.0%	0.1%	0.1%
11 - Household Hygiene	16.3%	14.3%	6.3%	1.1%	9.5%
160 - Diapers	7.9%	5.0%	3.4%	0.3%	4.2%
161 - Pet Waste	5.7%	5.9%	1.1%	0.2%	3.1%
162 - Other (sanitary products, condoms)	1.2%	1.5%	0.7%	0.2%	0.9%
163 - Masks	0.2%	0.3%	0.2%	0.0%	0.2%
164 - Gloves	0.2%	0.3%	0.6%	0.1%	0.4%
165 - Wipes	0.1%	0.1%	0.2%	0.0%	0.1%
166 - Personal Care	1.0%	1.1%	0.2%	0.3%	0.6%
12 - Bulky Objects	0.0%	0.7%	0.4%	1.7%	0.6%
167 - Large Appliances	0.0%	0.0%	0.0%	0.0%	0.0%
168 - Mattresses, Box Springs	0.0%	0.0%	0.0%	0.0%	0.0%
169 - Other Upholstered Furniture	0.0%	0.0%	0.0%	0.3%	0.0%
170 - Other Furniture	0.0%	0.7%	0.4%	1.4%	0.5%
13 - Fines	2.8%	1.6%	1.8%	0.7%	1.8%
171 - Fines	2.8%	1.6%	1.8%	0.7%	1.8%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix B

All Counts by Sector

Category	Regional Disposal Count (millions of units)				
	SF	MF	CI	SL	Total
Retail Bags	92	141	95	12	340
020 - Paper bags	19	38	28	5	89
024 - Re-Used Plastic Bags	45	54	29	3	131
025 - Empty Plastic Bags	25	46	32	4	107
034 - Reusable bags (washable / non-washable)	1.3 / 0.74	1.9 / 0.14	2.8 / 0.23	0.53 / 0.24	6.5 / 1.35
066 - Plastic Bags Labeled Compostable ¹	<1	1	3	<1	5
092 - Reusable bags	<1	<1	<1	<1	<1
Cups	50	71	149	13	283
013 - Plastic-Lined Paper Hot Cups	31	39	103	6	179
014 - Plastic-Lined Paper Cold Cups	12	9	18	6	45
015 - Plastic-Lined Paper Cups Labeled Compostable	<1	2	6	<1	7
039 - Rigid Plastic Cups	6	21	21	1	49
050 - Foam Cups	<1	<1	1	<1	1
063 - Rigid Plastic Cups Labeled Compostable ¹	<1	<1	1	<1	1
Takeout Containers	37	68	78	7	190
017 - Unlined Paper Takeout Containers	6	10	13	0	30
018 - Plastic-Lined Paper Takeout Containers	15	27	24	5	70
019 - Plastic-Lined Paper Takeout Containers	10	21	28	1	59
051 - Foam Takeout Containers	5	8	7	1	21
057 - Rigid Plastic takeout Containers	2	2	2	<1	6
064 - Plastic Takeout Containers Labeled Compostable ¹	<1	<1	4	<1	4
065 - Other Foodware Labeled Compostable ¹	<1	<1	0	<1	0
Straws	17	28	42	6	93
016 - Paper Straws	7	11	17	1	36
059 - Plastic Straws	10	17	25	5	57
Utensils	32	89	100	7	228
060 - Plastic Utensils	17	33	54	2	106
084 - Wood Utensils	16	56	46	4	122
PPE	127	288	278	10	710
163 - Masks	57	120	75	4	260
164 - Gloves	41	120	180	4	350
165 - Wipes	29	48	23	2	100

Notes:

¹Compostable SUIs were not counted during the 2021 waste composition study. Tonnages and counts found during the 2020 waste composition study were used to calculate a number of items per tonne, and these values were applied to the estimated disposal tonnages found in the 2021 waste composition study analysis.

Appendix C

Category Descriptions

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?	Description
Paper	Fine, Office, Envelopes	01	Junk Mail, Flyers, Unaddressed Mail	Recyclable		
Paper	Fine, Office, Envelopes	02	Other Fine Office Paper or Envelopes	Recyclable		
Paper	Newsprint	03	Newsprint	Recyclable		
Paper	OCC	04	Clean Recyclable OCC	Recyclable		
Paper	OCC	05	Waxed OCC	Limited Recycling Options		Non-recyclable, compostable
Paper	OCC	06	Other Soiled OCC	Green Bin		Contaminated with food/blood/grease, dirty pizza boxes
Paper	Boxboard	07	Cereal Boxes and Other Box Packaging	Recyclable		
Paper	Bound Paper Products	08	Telephone Books	Recyclable		
Paper	Bound Paper Products	09	Magazines	Recyclable		
Paper	Bound Paper Products	10	Books	Recyclable		
Paper	Beverage Containers – Gabletop/Drink Box/Aseptic	11	Dairy or Dairy Substitute	Recyclable		
Paper	Beverage Containers – Gabletop/Drink Box/Aseptic	12	Non-Dairy/Deposit	Recyclable		
Paper	Other Paper	13	Plastic-Lined Paper Hot Cups	SUI	Y	Coffee, tea, drinks, etc., not including compostable
Paper	Other Paper	14	Plastic-Lined Paper Cold Cups	SUI	Y	Fountain drinks, Slurpees, etc.
Paper	Other Paper	15	Plastic-Lined Paper Cups Labeled Compostable	SUI	Y	Hot or cold beverage containers labeled compostable
Paper	Other Paper	16	Paper Straws	SUI	Y	Paper Straws
Paper	Other Paper	17	Unlined Paper Takeout Containers	SUI	Y	Fibre based to-go containers e.g. Unbranded pulp clamshells
Paper	Other Paper	18	Plastic-Lined Paper Takeout Containers	SUI	Y	Fold-flat fibre based to-go containers – coated e.g. Fast food containers
Paper	Other Paper	19	Plastic-Lined Paper Takeout Containers	SUI	Y	Fibre-based bowl containers – coated e.g. Soup or curry containers
Paper	Other Paper	20	Paper bags	SUI	Y	Grocery bags, retail carryout
Paper	Other Paper	21	Other Recyclable Paper	Recyclable		Kraft paper, moulded pulp. Recyclable polycoat containers
Paper	Other Paper	22	Other Compostable Paper	Green Bin		Paper plates, tissue paper, toweling, etc.
Paper	Other Paper	23	Non-compostable, Non-recyclable Paper	Limited Recycling Options		Tar paper, laminated paper, coated paper, etc.
Plastic	Film	24	Re-Used Plastic Bags	SUI	Y	Retail & grocery – Reused as kitchen catchers
Plastic	Film	25	Empty Plastic Bags	SUI	Y	Retail & grocery – Empty that have not been reused as garbage bags
Plastic	Film	26	Consumables Packaging Bags and Film	Recyclable		Dry cleaning bags, bread bags, frozen food bags, milk mags, toilet paper and toweling over-wrap, lawn seed, soil, peat moss, fertilizer, multi-layer plastic films; meat, poultry and fish wrap; vacuum sealed bacon; luncheon meat and cheese; cereal liners; chip bags and other snack food bags; candy wraps; pasta bags; boil in a bag; plastic based food pouches; bubble wrap; cling wrap; etc.
Plastic	Film	27	Garbage Bags Sandwich/Freezer Bags	Limited Recycling Options		HDPE & LDPE garbage bags, kitchen catchers, blue or clear bags for recyclables

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?	Description
Plastic	Film	28	OFPP	Limited Recycling Options		Other flexible plastic packaging (e.g. chip bags, coffee bags, candy bar wrappers, and other crinkly wrappers)
Plastic	Film	29	Freezer Bags	Limited Recycling Options		HDPE & LDPE sandwich, freezer bags, Ziplocs and other food use bags
Plastic	Film	30	Deposit Beverage Pouches	Recyclable		
Plastic	Film	31	Other Plastic Film			Pallet/distribution wrap and lumber wrap (nonwoven), tarps, other plastic film
Plastic	Textiles (Synthetic)	32	Clothing and accessories	Textiles		Includes all clothing and accessories (e.g. purses) primarily made of synthetic materials
Plastic	Textiles (Synthetic)	33	Household	Textiles		Includes all linens, towels, curtains, tablecloths, pet clothes, etc. made of synthetic materials
Plastic	Textiles (Synthetic)	34	Reusable bags	Textiles	Y**	Reusable retail carryout bags made of synthetic materials **Counted washable vs non-washable**
Plastic	Textiles (Synthetic)	35	Other	Textiles		All other textiles (e.g. stuffed toys and animals, masks, pet collars and leashes made of synthetic materials)
Plastic	Rigid Beverage Containers	36	Dairy or Dairy Substitute	Recyclable		
Plastic	Rigid Beverage Containers	37	Deposit Containers – Water	Recyclable		Water bottles
Plastic	Rigid Beverage Containers	38	Deposit Containers – Other	Recyclable		All other deposit beverage bottles: juice, pop, alcohol
Plastic	Rigid Beverage Containers	39	Rigid Plastic Cups	SUI	Y	Plastic beverage cups for iced coffee, tea, drinks, etc.
Plastic	Rigid Beverage Containers	40	Other	Recyclable		Non-deposit juice, water, or pop containers
Plastic	Rigid (non-beverage)	41	# 1 PETE – Bottles and Jars	Recyclable		Other bottles and jars: #1, cooking oil, peanut butter, dish soap, mouthwash, etc. (excluding bottles that contained HHW)
Plastic	Rigid (non-beverage)	42	#1 PETE – Other Packaging	Recyclable		Other packaging: #1, bakery, clamshells, trays, ovenable trays, egg cartons
Plastic	Rigid (non-beverage)	43	#2 HDPE – Bottles and Jugs	Recyclable		Other Bottles and Jugs: #2, laundry soap, shampoo, windshield washer fluid, etc. (excluding bottles that contained HHW)
Plastic	Rigid (non-beverage)	44	#2 HDPE – Tubs and Lids	Recyclable		Wide mouth tubs and lids, dairy tubs, pails, lawn, garden, pool supplies, kitty litter, etc.
Plastic	Rigid (non-beverage)	45	#3 PVC	Recyclable		Bottles and Jars: #3 bottles and jars, lotions, soaps, bug repellents, shampoos, etc.
Plastic	Rigid (non-beverage)	46	#4 LDPE	Recyclable		Wide mouth tubs and lids, dairy tubs, etc.
Plastic	Rigid (non-beverage)	47	#5 PP	Recyclable		Wide mouth tubs and lids, dairy tubs, pails, lawn, garden, pool supplies, kitty litter, etc.
Plastic	Rigid (non-beverage)	48	#6 PS – Non-Foam	Recyclable		#6 PS (non-foam), trays, clamshells, lids, pill and vitamin bottles, seedling trays, etc.
Plastic	Rigid (non-beverage)	49	#6 PS – Packing Foam	Recyclable		#6 PS (foam) EPS used to protect boxed products such as TVs, electronics etc.
Plastic	Rigid (non-beverage)	50	Foam Cups	SUI	Y	#6 Expanded polystyrene Cups
Plastic	Rigid (non-beverage)	51	Foam Takeout Containers	SUI	Y	#6 Expanded polystyrene Takeout containers

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?	Description
Plastic	Rigid (non-beverage)	52	#6 PS – Foam foodware	Recyclable		Meat trays, egg cartons
Plastic	Rigid (non-beverage)	53	#6 PS – Other PS Foam	Recyclable		Packaging peanuts, seedling trays, other EPS
Plastic	Rigid (non-beverage)	54	Other Foam	Limited Recycling Options		Non EPS Foam
Plastic	Rigid (non-beverage)	55	#7 Mixed Resin Plastic	Recyclable		Food containers, mustard, ketchup and some juices
Plastic	Rigid (non-beverage)	56	Uncoded Packaging/Containers	Recyclable		Blister packaging, tubes for pharmaceutical & health care/cosmetic products, plant pots, unmarked/coded packaging, etc.
Plastic	Rigid (non-beverage)	57	Rigid Plastic takeout Containers	SUI	Y	Clamshells, plastic non-foam, non-compostable containers used for takeout (most likely #1 PETE but possibly others)
Plastic	Other	58	Durable Plastic Products	Limited Recycling Options		Non-packaging such as VCR tapes, CDs, toys, games, plant pots, Tupperware, furniture, siding, plumbing pipes, etc
Plastic	Other	59	Plastic Straws	SUI	Y	
Plastic	Other	60	Plastic Utensils	SUI	Y	
Plastic	Other	61	Coffee Pods			
Plastic	Other	62	Other/Mixed Plastics	Limited Recycling Options		
Compostable Plastic	Foodware	63	Rigid Plastic Cups Labeled Compostable	SUI	Y	
Compostable Plastic	Foodware	64	"Plastic Takeout Containers Labeled Compostable"	SUI	Y	
Compostable Plastic	Foodware	65	Other Foodware Labeled Compostable	SUI	Y	Compostable cutlery, straws or other
Compostable Plastic	Film	66	Plastic Bags Labeled Compostable	SUI	Y	Compostable grocery or other retail carryout
Compostable Plastic	Film	67	Bags and Liners	Limited Recycling Options		Compostable kitchen catcher bags, tote liners, overwrap, etc.
Compostable Plastic	Other Compostable Products and Packaging	68	Packaging , Bottles	Limited Recycling Options		Bags, pop bottles, water bottles, or other compostable packaging
Compostable Organics	Yard & Garden	69	Small Yard Waste	Green Bin		Small yard waste (leaves, branches, brush, grass clippings, wood chips, plant material, potting soil, peat, etc.)
Compostable Organics		70	Large Yard Waste	Green Bin		Other large yard wastes (branches, etc. over 15 cm dia. or 1 m long)
Compostable Organics	Food Waste - Unavoidable	71	Unavoidable Food Waste	Green Bin		Unavoidable food waste arising from food/drink preparation (bones, egg shells, tea bags, peels, oil, fats)
Compostable Organics	Food Waste - Avoidable	72	Plate Scrapings, Unfinished Meals	Green Bin		
Compostable Organics	Food Waste – Avoidable	73	Whole Fruits and Vegetables	Green Bin		
Compostable Organics	Food Waste – Avoidable	74	Whole Meats, Fish	Green Bin		
Compostable Organics	Food Waste – Avoidable	75	Full/Unused Ready-Made	Green Bin		Packaged items, canned foods
Compostable Organics	Food Waste – Avoidable	76	Baked Goods	Green Bin		
Compostable Organics	Food Waste – Avoidable	77	Dairy	Green Bin		Yogurt, cheese, butter
Compostable Organics	Food Waste – Avoidable	78	Liquids (drinks, oil in package)	Green Bin		

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?	Description
Compostable Organics	Food Waste – Avoidable	79	Candy and snacks	Green Bin		Chips, candy, nuts
Compostable Organics	Food Waste – Avoidable	80	Condiments and sauces	Green Bin		Condiments, pasta sauce, salsa in container
Compostable Organics	Food Waste – Avoidable	81	Pet food	Green Bin		
Compostable Organics	Clean Wood	82	Wood Pallets	C&D		Unpainted, untreated
Compostable Organics	Clean Wood	83	Unfinished Wood Furniture	C&D	Y	No composites
Compostable Organics	Clean Wood	84	Wood Utensils	SUI		Chopsticks, stir sticks, other wood utensils
Compostable Organics	Clean Wood	85	Other Wood	C&D		Mixed/dimensional lumber, rotting wood - unpainted, untreated
Compostable Organics	Other Compostable Organics	86	Manure, Slaughterhouse, Animals			Manure, animals prepared for food
Non-compostable organics	Treated or Painted Wood	87	Pressure Treated Wood	C&D		Treated lumber, shingles, decking etc.
Non-compostable organics	Treated or Painted Wood	88	Finished Wood	C&D		Flooring, paneling, siding, glued particle board, plywood, OSB - painted, stained or finished
Non-compostable organics	Treated or Painted Wood	89	Finished Wood Furniture	C&D		Not multi-material
Non-compostable organics	Textiles	90	Natural Fiber Clothing	Textiles		Includes all clothing, lingerie, socks, costumes, snowsuits, swimwear, bags, purses, backpacks, gloves, mittens, hats, scarves, wallets etc. primarily made of natural materials
Non-compostable organics	Textiles	91	Household	Textiles	Y	Includes all linens, towels, curtains, tablecloths, pet clothes etc. made of natural materials
Non-compostable organics	Textiles	92	Reusable bags	Textiles		Reusable retail carryout bags made of natural materials
Non-compostable organics	Textiles	93	Other	Textiles		All other textiles (e.g stuffed toys and animals, masks, pet collars and leashes made of natural materials)
Non-compostable organics	Rubber	94	Tires	Recyclable		
Non-compostable organics	Rubber	95	Other Rubber	Recyclable		Gloves
Non-compostable organics	Leather / Multiple/Composite Organic Materials	96	Leather	Limited Recycling Options		Jackets, purses, belts
Non-compostable organics	Other	97	Composite Organic Materials (shoes)	Textiles		Includes all footwear, sport shoes, insoles etc.
Non-compostable organics	Other	98	Other	Textiles		Wax and other non-compostable materials
Metals	Ferrous	99	Food Containers	Recyclable		
Metals	Ferrous	100	Spiral-Wound Containers	Recyclable		Frozen juice containers, coffee cans, chip and nut containers
Metals	Ferrous	101	Other Ferrous	Recyclable		
Metals	Bimetallic	102	Food Containers	Recyclable		
Metals	Non-Ferrous (copper, aluminum, brass)	103	Alcoholic	Recyclable		
Metals	Non-Ferrous (copper, aluminum, brass)	104	Non-Alcoholic	Recyclable		

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?	Description
Metals	Non-Ferrous (copper, aluminum, brass)	105	Food Containers	Recyclable		
Metals	Non-Ferrous (copper, aluminum, brass)	106	Foil Trays, Wrap	Recyclable		
Metals	Non-Ferrous (copper, aluminum, brass)	107	Other Non-Ferrous	Recyclable		
Metals	Non-Consumable Mixed Metals	108	Household	Recyclable		Kitchen & bathroom fixtures, coat hangers, other metal fixtures, closet doors, filing cabinets, furnishings, etc.
Metals	Non-Consumable Mixed Metals	109	Machine Parts	Recyclable		Auto parts, electric motors, bicycles and parts, lawn mowers, etc.
Metals	Non-Consumable Mixed Metals	110	Construction/Industrial	Recyclable		Nails, screws, handheld tools, drywall trim, flashing, baseboard heaters, industrial doors, panels, etc.
Glass	Beverage Containers	111	Beer	Recyclable		
Glass	Beverage Containers	112	Other Alcohol	Recyclable		
Glass	Beverage Containers	113	Non-Alcoholic & Non-Dairy	Recyclable		
Glass	Beverage Containers	114	Dairy or Dairy Substitute	Recyclable		
Glass	Food Containers	115	Food Containers	Recyclable		
Glass	Other Glass and Ceramics	116	Other Glass and Ceramics	Limited Recycling Options		Dishware, mirrors, incandescent light bulbs, fibreglass insulation, plant pots, coffee cups
Glass	Other Glass and Ceramics	117	Light bulbs (Non-hazardous)	Recyclable		Incandescent and halogen light bulbs
Building Material	Gypsum / Drywall	118	Gypsum/Drywall	C&D		
Building Material	Masonry	119	Masonry	C&D		
Building Material	Rock, Sand, Dirt	120	Rock, Sand, Dirt	C&D		
Building Material	Rigid Asphalt	121	Rigid Asphalt	C&D		
Building Material	Carpet Waste	122	Carpet	C&D		
Building Material	Carpet Waste	123	Underlay	C&D		
Building Material	Other Inorganics	124	Other Inorganics	C&D		Insulation, Linoleum, Laminate, Stucco etc.
Electronic Waste	Computers and Peripherals	125	Desktop Computers	Recyclable		
Electronic Waste	Computers and Peripherals	126	Notebook Computers	Recyclable		
Electronic Waste	Computers and Peripherals	127	Computer Peripherals	Recyclable		Including key board, mouse, cables, modems, routers and external hardware other than below
Electronic Waste	Computers and Peripherals	128	Computer Monitors	Recyclable		
Electronic Waste	Computers and Peripherals	129	Printers, Scanners	Recyclable		
Electronic Waste	Televisions & AV Equipment	130	Televisions	Recyclable		
Electronic Waste	Televisions & AV Equipment	131	Other Audio/Video	Recyclable		
Electronic Waste	Telephones & Telecommunications Equipment	132	Mobile Phones & Accessories	Recyclable		
Electronic Waste	Telephones & Telecommunications Equipment	133	Other	Recyclable		Land line phones and accessories, fax machines

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?	Description
Electronic Waste	Small Appliances & Floor Care Appliances	134	Small Appliances & Floor Care Appliances	Recyclable		Microwaves, toasters, vacuum cleaners, coffee makers, corded and cordless, etc.
Electronic Waste	Electronic Toys	135	Electronic Toys	Recyclable		
Electronic Waste	Smoke Detectors	136	Smoke Detectors	Recyclable		
Electronic Waste	Other Electronics	137	Other Electronics	Recyclable		
Household Hazardous	Batteries	138	Lead Acid	Recyclable		Car, truck, boat, wheel chair, golf cart batteries over 2 kg under BCBCP Stewardship Program
Household Hazardous	Batteries	139	Household Batteries (Non Lithium-Ion)	Recyclable		Small, Rechargeable and Non Rechargeable Batteries (Ni-Cd, Ni-MH, and Pb under 5 kg)
Household Hazardous	Batteries	140	Lithium Ion Batteries	Recyclable		Small, lithium rechargeable (Li-ion) and single use lithium metal batteries under 5 kg
Household Hazardous	Medical/Biological	141	Sharps			Needles
Household Hazardous	Medical/Biological	142	Animal Carcass			
Household Hazardous	Medical/Biological	143	Other			Bandages, IV bags, etc.
Household Hazardous	HHW	144	Stains/Preservatives	Recyclable		
Household Hazardous	HHW	145	Latex Paint	Recyclable		
Household Hazardous	HHW	146	Oil-Based Paint	Recyclable		
Household Hazardous	HHW	147	Paint Aerosols	Recyclable		
Household Hazardous	HHW	148	Solvents	Recyclable		
Household Hazardous	HHW	149	Cleaners, Soaps etc.	Recyclable		
Household Hazardous	HHW	150	Pesticides/Herbicides/Preservatives	Recyclable		With PCP Reg. #
Household Hazardous	HHW	151	Motor Oil	Recyclable		
Household Hazardous	HHW	152	Oil Filters	Recyclable		
Household Hazardous	HHW	153	Antifreeze	Recyclable		
Household Hazardous	HHW	154	Pharmaceuticals	Recyclable		
Household Hazardous	HHW	155	Other Petroleum Based Products	Recyclable		
Household Hazardous	HHW	156	Other	Recyclable		
Household Hazardous	Mercury Containing Items	157	Thermostats and Switches	Recyclable		
Household Hazardous	Mercury Containing Items	158	CFLs	Recyclable		
Household Hazardous	Other HHW	159	Other HHW or Containers			
Household Hazardous	Biological	160	Diapers	Limited Recycling Options		
Household Hygiene	Biological	161	Pet Waste	Limited Recycling Options		Animal feces, bedding, cat litter
Household Hygiene	Biological	162	Other (sanitary products, condoms)	Limited Recycling Options		Sanitary napkins, tampons, condoms

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?	Description
Household Hygiene	Public Health	163	Masks	PPE	Y	Surgical or face coverings
Household Hygiene	Public Health	164	Gloves	PPE	Y	Nitrile or latex gloves
Household Hygiene	Public Health	165	Wipes	PPE	Y	Single-use disinfectant wipes
Household Hygiene	Liquid Product	166	Personal Care	Limited Recycling Options		Full shampoo bottles, beauty products, creams, etc.
Bulky Objects	White Goods	167	Large Appliances	Recyclable		
Bulky Objects	Furniture	168	Mattresses, Box Springs	Recyclable		
Bulky Objects	Furniture	169	Other Upholstered Furniture			
Bulky Objects	Furniture	170	Other Furniture			Multi-material furniture (e.g. plastic, metal, small amount wood)
Fines	Fines	171	Fines	Limited Recycling Options		Items too small to classify efficiently (e.g. bread tabs, twist ties, typically <1")

Appendix D

Selected Site Photos



Photo 1: Sample SH-SF-02 after Sampling



Photo 2: Sorting Area at North Shore Transfer Station

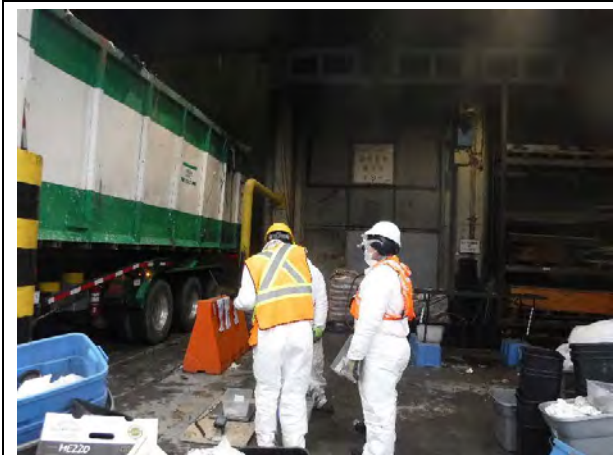


Photo 3: Sample collection and sorting area at Burnaby WTE Facility



Photo 4: Sample collection and sorting area at Vancouver Transfer Station



Photo 5: Source of Sample VA-SF-01 (Single Family)



Photo 6: Source of Sample SH-MF-05 (Multi-Family)



Photo 7: Source of BU-CI-13
(Commercial/Institutional)



Photo 8: Source of SH-SL-18 (Small Loads)



Photo 9: Sample after sorting

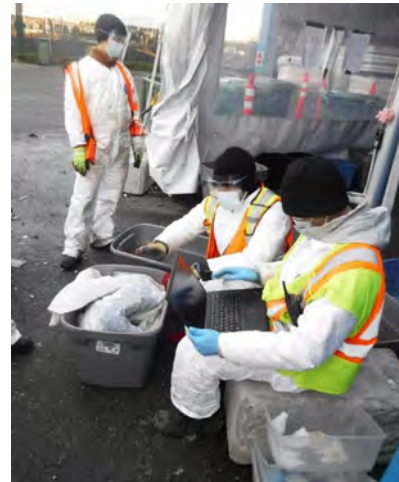


Photo 10: Weighing out each category after sample sorting



Photo 11: Plastic-lined Paper Cold Cups
(Category 14)



Photo 12: Clean Recyclable OCC (Category 04)



Photo 13: Boxboard (Category 07)



Photo 14: Consumer Plastics Packaging (Category 26)



Photo 15: Foam Takeout Containers (Category 51)



Photo 16: Gloves (Category 164)



Photo 17: Other Electronics (Category 137)



Photo 18: Small Yard Waste (Category 69)



Photo 19: Foil Trays, Wraps (Category 106)



Photo 20: Weekly collection of PPE sorted

Appendix E

Functional Categories Listing

Functional Category	Sorting Category
Green Bin	006 - Other Soiled OCC
	022 - Other Compostable Paper
	069 - Small Yard Waste
	070 - Large Yard Waste
	071 - Unavoidable Food Waste
	072 - Plate Scrapings, Unfinished Meals
	073 - Whole Fruits and Vegetables
	074 - Whole Meats, Fish
	075 - Full/Unused Ready-Made
	076 - Baked Goods
	077 - Dairy
	078 - Liquids (drinks, oil in package)
	079 - Candy and snacks
	080 - Condiments and sauces
Limited Recycling Options	081 - Pet food
	005 - Waxed OCC
	023 - Non-compostable, non-recyclable paper
	027 - Garbage Bags Sandwich/Freezer Bags
	029 - Freezer Bags
	031 - Other Plastic Film
	054 - Other Foam
	058 - Durable Plastic Products
	062 - Other/Mixed Plastics
	067 - Bags and Liners
	068 - Packaging , Bottles
	095 - Other Rubber
	097 - Composite Organic Materials (shoes)
	098 - Other
	116 - Other Glass and Ceramics
	160 - Diapers
	161 - Pet Waste
162 - Other (sanitary products, condoms)	
166 - Personal Care	
171 - Fines	
Recyclable	001 - Junk Mail, Flyers, Unaddressed Mail
	002 - Other Fine Office Paper or Envelopes
	003 - Newsprint
	004 - Clean Recyclable OCC
	007 - Cereal Boxes and Other Box Packaging

Functional Category	Sorting Category
	008 - Telephone Books
	009 - Magazines
	011 - Dairy or Dairy Substitute
	012 - Non-Dairy/Deposit
	021 - Other Recyclable Paper
	026 - Consumables Packaging Bags and Film
	028 - OFPP
	030 - Deposit Beverage Pouches
	036 - Dairy or Dairy Substitute
	037 - Deposit Containers – Water
	038 - Deposit Containers – Other
	040 - Other
	041 - # 1 PETE – Bottles and Jars
	042 - #1 PETE – Other Packaging
	043 - #2 HDPE – Bottles and Jugs
	044 - #2 HDPE – Tubs and Lids
	045 - #3 PVC
	046 - #4 LDPE
	047 - #5 PP
	048 - #6 PS – Non-Foam
	049 - #6 PS – Packing Foam
	052 - #6 PS – Foam Foodware
	053 - #6 PS – Other PS Foam
	055 - #7 Mixed Resin Plastic
	056 - Uncoded Packaging/Containers
	094 - Tires
	099 - Food Containers
	100 - Spiral-Wound Containers
	101 - Other Ferrous
	102 - Food Containers
	103 - Alcoholic
	104 - Non-Alcoholic
	105 - Food Containers
	106 - Foil Trays, Wrap
	107 - Other Non-Ferrous
	108 - Household
	109 - Machine Parts
	110 - Construction/Industrial
	111 - Beer

Functional Category	Sorting Category
	112 - Other Alcohol
	113 - Non-Alcoholic & Non-Dairy
	114 - Dairy or Dairy Substitute
	115 - Food Containers
	117 - Light bulbs (Non-hazardous)
	125 - Desktop Computers
	126 - Notebook Computers
	127 - Computer Peripherals
	128 - Computer Monitors
	129 - Printers, Scanners
	130 - Televisions
	131 - Other Audio/Video
	132 - Mobile Phones & Accessories
	133 - Other
	134 - Small Appliances & Floor Care Appliances
	135 - Electronic Toys
	136 - Smoke Detectors
	137 - Other Electronics
	138 - Lead Acid
	139 - Household Batteries (Non Lithium-Ion)
	140 - Lithium Ion Batteries
	144 - Stains/Preservatives
	145 - Latex Paint
	146 - Oil-Based Paint
	147 - Paint Aerosols
	148 - Solvents
	149 - Cleaners, Soaps etc.
	150 - Pesticides/Herbicides/Preservatives
	151 - Motor Oil
	152 - Oil Filters
	153 - Antifreeze
	154 - Pharmaceuticals
	155 - Other Petroleum Based Products
	157 - Thermostats and Switches
	158 - CFLs
	167 - Large Appliances
	168 - Mattresses, Box Springs
Textiles	032 - Clothing and accessories
	033 - Household

Functional Category	Sorting Category
	034 - Reusable bags
	035 - Other
	090 - Natural Fiber Clothing
	091 - Household
	092 - Reusable bags
	093 - Other
	096 - Leather
Single-Use Items	013 - Plastic-Lined Paper Hot Cups
	014 - Plastic-Lined Paper Cold Cups
	015 - Plastic-Lined Paper Cups Labeled Compostable
	016 - Paper Straws
	017 - Unlined Paper Takeout Containers
	018 - Plastic-Lined Paper Takeout Containers
	019 - Plastic-Lined Paper Takeout Containers
	020 - Paper bags
	024 - Re-Used Plastic Bags
	025 - Empty Plastic Bags
	039 - Rigid Plastic Cups
	050 - Foam Cups
	051 - Foam Takeout Containers
	057 - Rigid Plastic takeout Containers
	059 - Plastic Straws
	060 - Plastic Utensils
	063 - Rigid Plastic Cups Labeled Compostable
064 - Plastic Takeout Containers Labeled Compostable	
065 - Other Foodware Labeled Compostable	
066 - Plastic Bags Labeled Compostable	
084 - Wood Utensils	
PPE	163 - Masks
	164 - Gloves
	165 - Wipes