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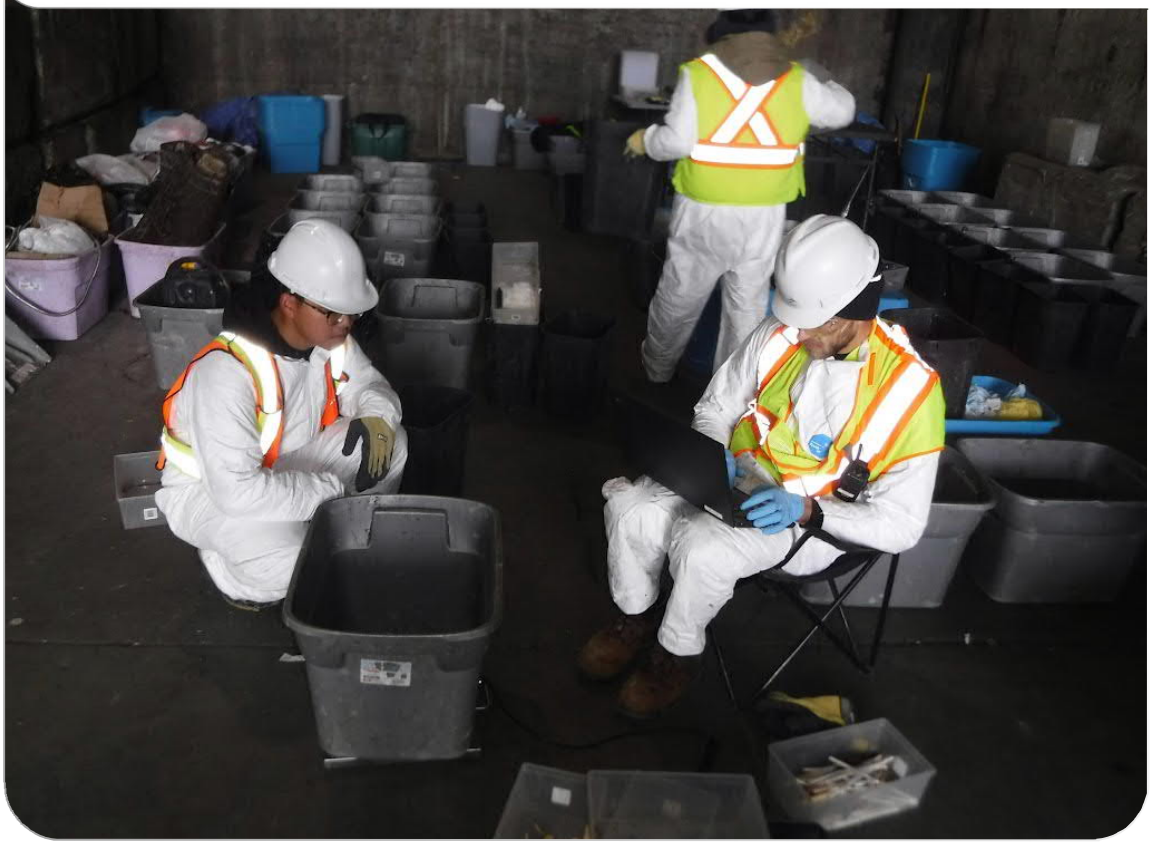
DILLON CONSULTING

Prepared for:
Metro Vancouver
Prepared by:
Dillon Consulting Limited

METRO VANCOUVER

2023 Full-Scale Waste Composition Study



June 2024 – 23-6987

June 28, 2024

Metro Vancouver
4730 Kingsway
Burnaby, BC
V5H 0C6

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

Metro Vancouver Waste Composition Study – Full-Scale Facility Audit (2023)

Dear Terry,

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, 2023) completed at the North Surrey Recycling and Waste Centre, United Boulevard Recycling and Waste Centre, and North Shore Recycling and Waste Centre from October 30 to November 27, 2023. 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 2023 waste composition data with Waste Composition Monitoring Program reports from previous years. The audit data containing composition for all categories is attached to this report as Appendix C.

Sincerely,

DILLON CONSULTING LIMITED

Heidi Gerlach, EP, Associate
Project Manager

KH:clm

Our file: 23-6987

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Executive Summary

Dillon Consulting Limited (Dillon) was retained by Metro Vancouver to conduct the 2023 Full-Scale Waste Composition Study. Sampling was completed at three facilities in the Metro Vancouver region over four weeks in October and November 2023.

Waste was collected, sampled, and sorted from the sectors listed below. Materials from litter cans, municipal abandoned waste collection, 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 provide waste composition data that is representative of each sector. Samples were collected at the following facilities:

- North Surrey Recycling and Waste Centre;
- United Boulevard Recycling and Waste Centre; and
- North Shore Recycling and Waste Centre.

Executive Summary Table 1 summarizes the waste composition by sector and the combined waste composition for all sectors.

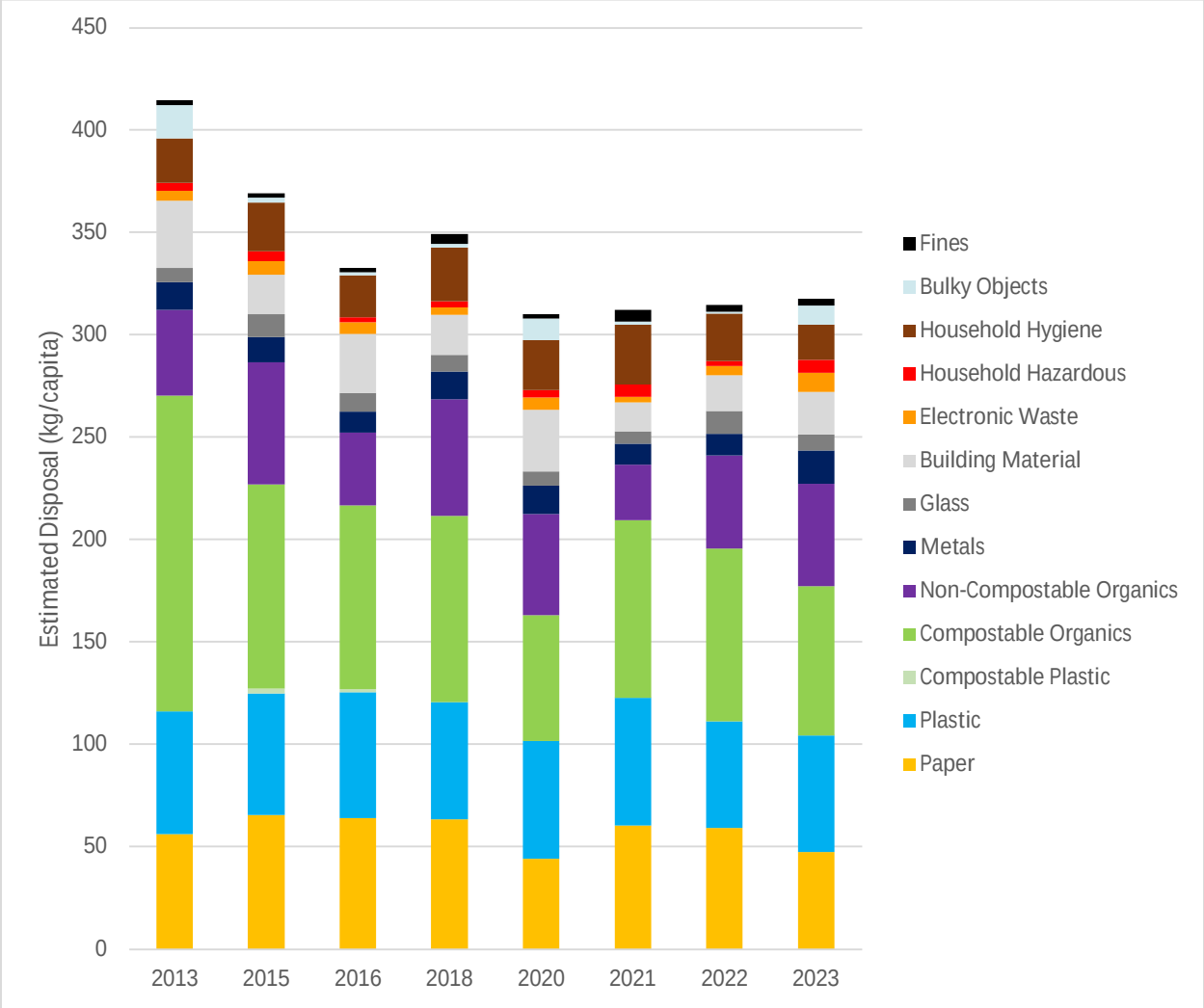
Executive Summary Table 1: Waste Composition Summary

Primary Category	Combined Composition[1]	By Sector[1]			
		SF (n=18)	MF (n=20)	CI (n=37)	SL (n=25)
Disposed Tonnes	906,598	142,912	250,962	305,096	117,597
Paper	14%	16%	19%	15%	6%
Plastic	18%	20%	19%	17%	15%
Compostable Plastic	<1%	<1%	<1%	<1%	<1%
Compostable Organics	23%	24%	28%	20%	19%
Non-Compostable Organics	15%	9%	7%	22%	21%
Metals	5%	4%	6%	5%	5%
Glass	3%	2%	3%	2%	3%
Building Material	7%	2%	2%	8%	16%
Electronic Waste	3%	3%	3%	3%	4%
Household Hazardous	2%	2%	2%	2%	2%
Household Hygiene	6%	14%	9%	1%	2%
Bulky Objects	3%	1%	1%	4%	6%
Fines	1%	2%	1%	1%	1%

[1]All percentages presented were rounded to the nearest whole number. Percentages may not add up to 100%.

Executive Summary Figure 1 presents the overall waste composition (all sectors combined) for all full-scale, multi-sector waste composition studies completed since 2013. Studies between 2013 and 2023 had similar methodologies and consistent primary categories. Descriptions of each waste category can be found in Appendix A Category Description.

Executive Summary Figure 1: Waste Composition and Disposal for All Sectors Combined (2013 – 2023)

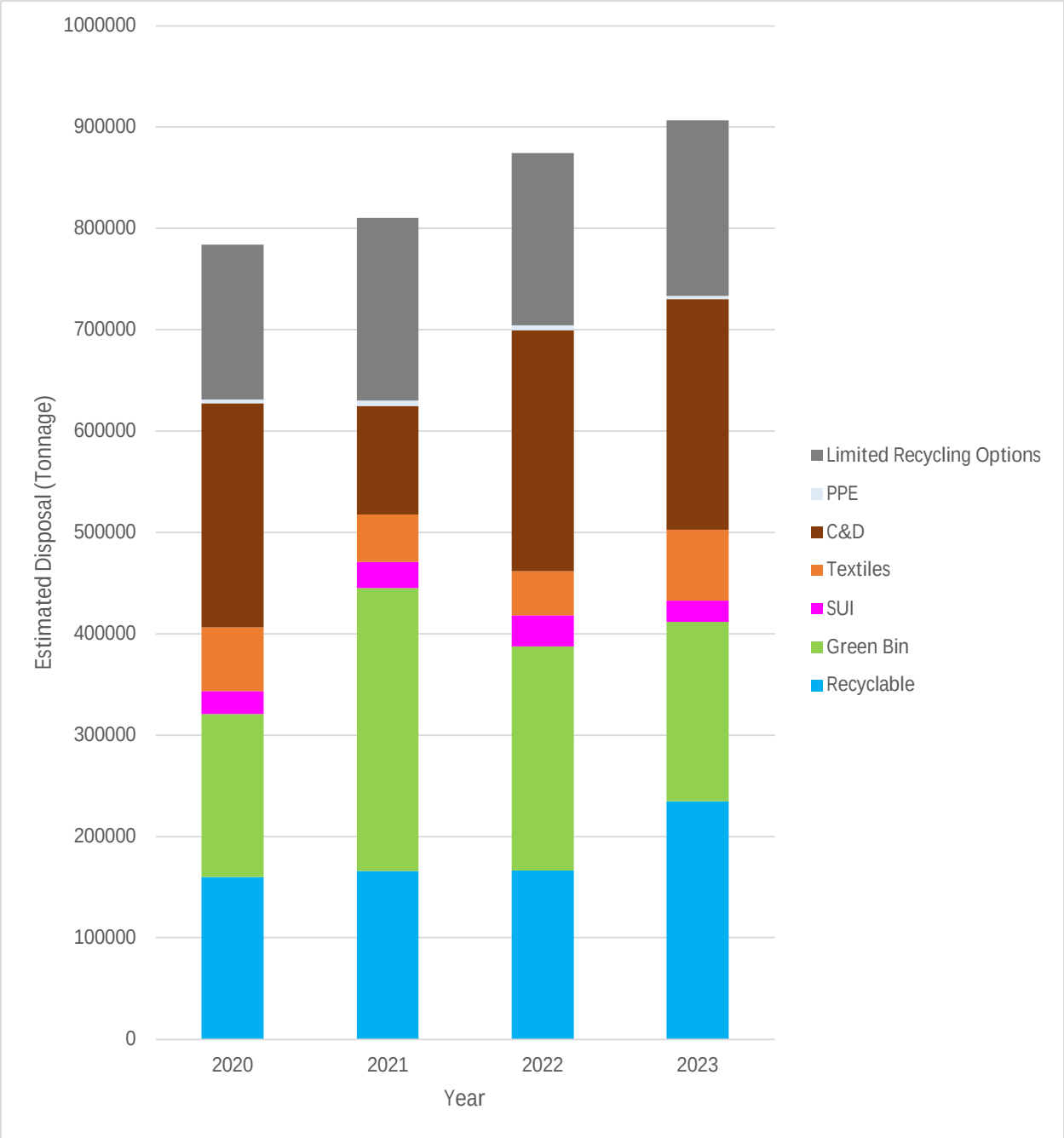


Overall, estimated disposal per capita has remained relatively stable from 2020 to 2023. Notably, the quantity of metals and electronic waste increased, and the quantity of paper and compostable organics decreased from 2022 to 2023.

Since 2020, each material category has been assigned a functional category that describes the waste management model of the material or end-fate. Executive Summary Figure 2 presents a comparison of the 2020 through 2023 functional categories for overall waste. Descriptions of each functional category

can be found in Appendix B Functional Category Listing. Functional categories for each tertiary category were chosen and approved by Metro Vancouver.

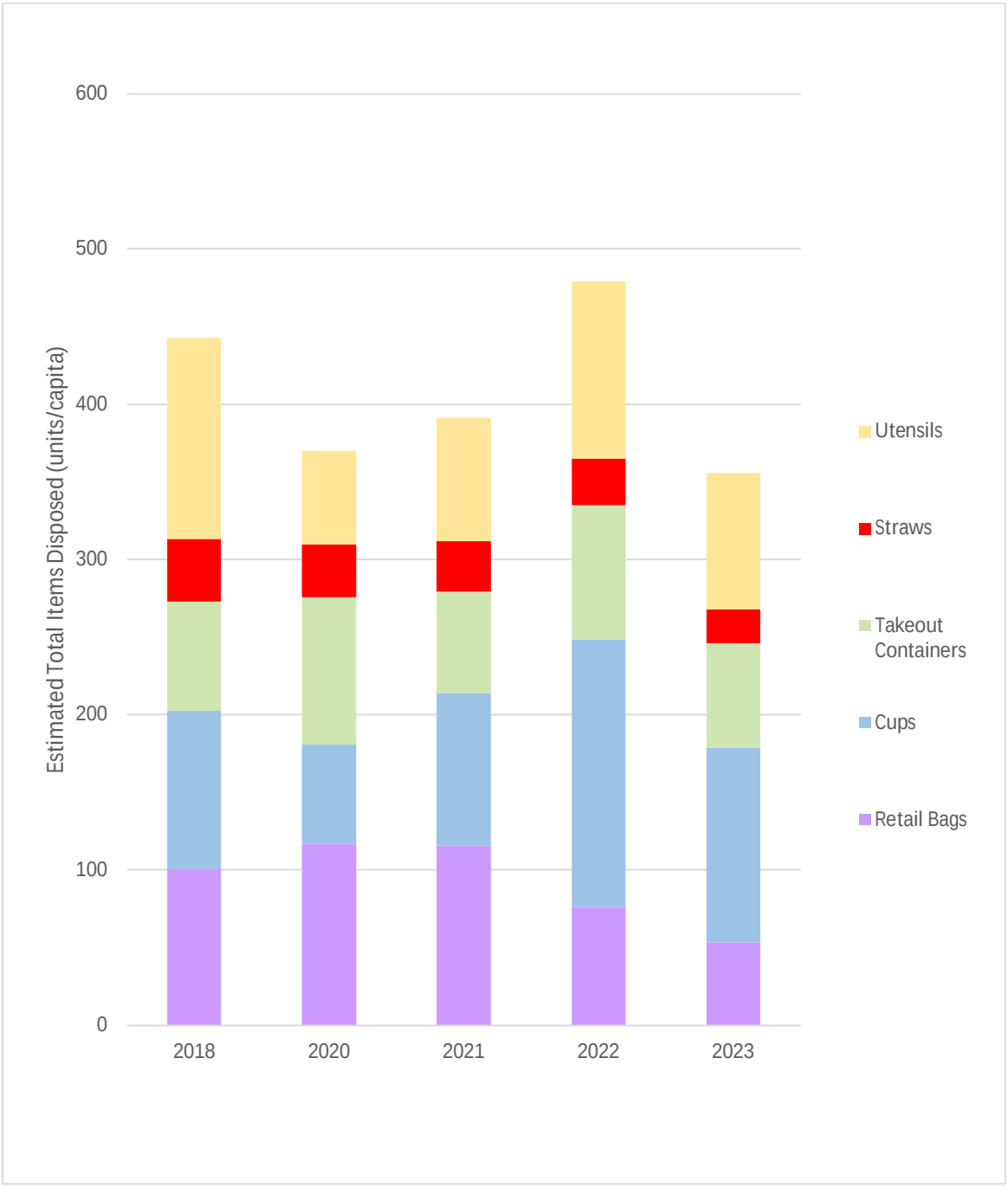
Executive Summary Figure 2: Functional Category Composition for All Sectors Combined (2020 – 2023)



In comparison to 2021 and 2022, the amount of green bin waste in the garbage decreased, while recyclable and textile waste appear to have increased significantly. Recyclable materials were the second largest functional group by weight percentage for all four sectors.

Executive Summary Figure 3 presents the overall per capita disposal of SUI units by year.

Executive Summary Figure 3: Single-Use Items Disposal for All Sectors Combined (2020 – 2023)



Overall, single-use items disposed are decreasing in all categories, and most noticeably in retail bags. Changes in the number of takeout containers and utensils disposed is less noticeable.

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 2.8 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 six Recycling and Waste Centres, in conjunction with the Vancouver South Transfer Station and the Vancouver Landfill managed by the City of Vancouver. These facilities comprise the public-sector system, which provides waste diversion and disposal services to residents and businesses in the region.

In 2022, approximately 906,500 tonnes of garbage across four waste sectors were disposed at regional facilities. This study aims to better understand the waste composition of garbage entering facilities that comprise the public-sector solid waste management system in Metro Vancouver.

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 a solid waste management plan, approved in 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 waste to prioritize in future initiatives. Waste composition studies are conducted to collect data, complete analysis, and provide results to inform future programs and policies.

1.2 Scope of Work

Dillon Consulting Limited (Dillon) was retained to complete Metro Vancouver's Full-Scale Facility Waste Composition Study for 2023. Dillon completed waste sampling and sorting in accordance with the standard methodologies used in previous Metro Vancouver waste composition studies. Sampling was completed at three facilities in the Metro Vancouver region over four consecutive weeks, from October 30 to November 27, 2023.

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, street sweeping, and abandoned waste collection were not included in this study.

Samples were collected at the following facilities:

- North Surrey Recycling and Waste Centre;
- United Boulevard Recycling and Waste Centre; and
- North Shore Recycling and Waste Centre.

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 1. The number of samples to be analyzed from each sector was based on the variability of waste material in each sector, in order to collect data representative of the sector. Therefore, fewer 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 1: Number of Samples Completed by Sector and Facility

Sector	North Surrey Recycling and Waste Centre	United Boulevard Recycling and Waste Centre	North Shore Recycling and Waste Centre	Grand Total
Sorting Dates	October 30 – November 3, 2023	November 6 – November 17, 2023	November 20 – November 27, 2023	
SF	7	7	4	18
MF	5	10	5	20
CI	11	17	9	37
SL	7	9	9	25
Grand Total	30	43	27	100

Overall, 100 samples with a total weight of 10,118 kg were sorted. The average sample weight was 96 kg. The target sample size was 100 kg for the SF, MF, and CI sectors and the average sample size for these sectors was 111 kg. The average sample size for the SL sector was 94 kg.

Garbage was sorted into 13 primary categories and a total of 175 subcategories. Category descriptions are presented in Appendix A.

2.0 Methodology

2.1 Sample Collection

Samples were selected at each facility by Dillon's field supervisor based on the sample's sector to adequately represent regional waste generation. The field supervisor worked with facility staff to randomly select samples from the identified sectors. The municipality of origin of inbound waste loads was noted by communicating with the receiving waste facility's scale house or the waste haulers of the load. Following confirmation of the sector, the field supervisor contacted waste facility personnel to determine if the load was to be selected for sampling. At each facility, facility staff would use a loader to retrieve a sample from the tipping floor and transport it to a sample collection and sorting area, designated by the facility's manager. For each load selected, haulers would unload a quarter of their total inbound load, or facility staff would retrieve either one loader bucket of the material, weighing approximately 300 to 500 kg, or its entirety if the selected load was insufficient to fill a loader bucket. Dillon field staff then collected a sample of the retrieved material weighing approximately 100 kg, whenever possible, as entire inbound loads could be less than 100 kg if comprised of low-density materials. For inbound loads with low-density materials, 640 L of waste was collected as a sample. Field staff collected the sample in a 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

The 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 confirm that a sufficient distribution of samples was collected for statistical evaluation. Data was regularly subjected to quality assurance and quality control methods during fieldwork and analysis, confirming the differences between pre-sorting and post-sorting sample weights were within acceptable margins of accuracy (i.e., the majority of samples fell within a 3% difference). The overall composition for each sector was calculated by combining the weights of all sorted materials after outliers were removed. The data collected was scanned to identify any outliers. 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, unit weights for each SUI and PPE category referenced 2018 unit weights; this is consistent with the methodology used in 2022. Standard deviations and 90% confidence intervals were calculated for primary categories and functional material categories (further described in Section 3.3) by waste sector. The list of functional material categories is provided in Appendix B. Given the variance in total sample weights between samples, waste composition percentages were used to determine the statistical parameters to normalize the data set.

In this study, estimated disposal rates were compared against historic data. Upon review, 2022 disposal rates for the multi-family sector were calculated using former population and disposal tonnages. This slight discrepancy did not affect overall waste composition for 2022 and no significant alteration was noted in historical generation trends when compared to 2023 data.

2.3 Single-Use Items and PPE

Following the sorting of a sample, each item category of SUI and PPE was weighed and counted. In addition, the SUI and PPE items were collected throughout the fourth week of sampling and weighed to obtain a single-week total weight. Similarly, a single-week total count was calculated by combining the count data for SUI and PPE sorted from samples during the fourth week of the study. Though SUI and PPE materials were individually weighed, data analysis was conducted using 2018 unit weights for each SUI and PPE item category. 2018 unit weights were used to maintain the comparability of results with previous waste composition studies.

The waste generated per capita (kg/capita) for SUI and PPE was calculated using the collected sample data and extrapolated using regional disposal tonnages and population data. The collected data was also combined to provide a regional total for SUI and PPE. The number of SUI and PPE waste disposed per capita (unit/capita) was calculated from the counts, waste generation per capita, and 2018 unit weights 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. The largest primary category components for each set of results (>10%) are highlighted in the tables presented in this section. Waste composition results for all categories by sector are included in Appendix C. Select photographs from the field audit are included in Appendix D.

3.1.1 Single-Family (SF) Waste Composition

Figure 1 presents the weighted average waste composition of garbage by primary category for the SF sector. The largest components by weight were compostable organics (24%), followed by plastic (20%), paper (16%), and household hygiene (14%). Compostable organics mainly comprised unavoidable food waste (11% of total composition), which refers to waste produced from food preparation, such as eggshells, bones, and tea bags. The largest components of plastic were household plastic (3%) and film (3%). The largest components found in the paper category were other compostable paper (7%) such as paper plates, tissue, and food-soiled paper. Diapers were the largest component within the household hygiene category of waste, comprising 6% of the overall SFD sample.

Figure 1: Single-Family Waste Composition – Garbage

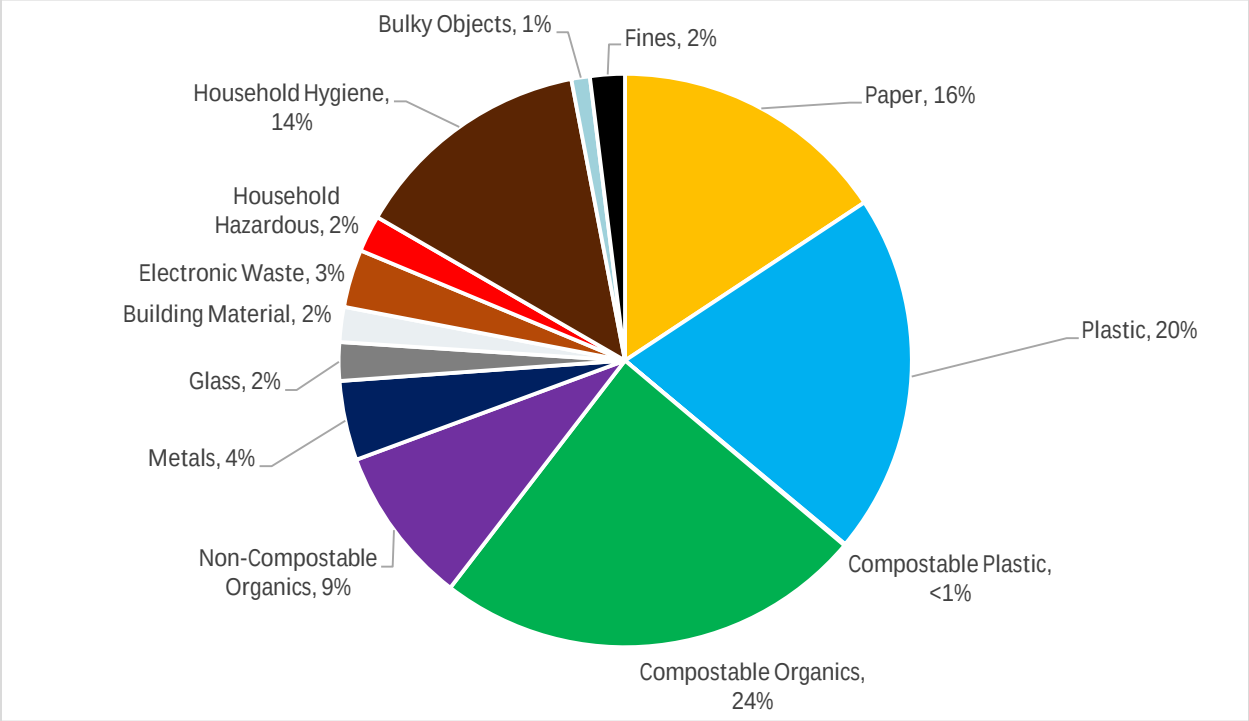


Table 2 summarizes the SF garbage waste composition results and the 90% confidence intervals. The calculated confidence intervals for the primary material categories were ≤4%, indicating low variability between SF samples. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 2: Single-Family Waste Composition – Garbage

Primary Category	Average[1] (n=18)	90% Confidence Interval
Paper	16%	±2%
Plastic	20%	±3%
Compostable Plastic	<1%	-
Compostable Organics	24%	±4%
Non-Compostable Organics	9%	±2%
Metals	4%	±1%
Glass	2%	±1%
Building Material	2%	±1%
Electronic Waste	3%	±1%
Household Hazardous	2%	±1%
Household Hygiene	14%	±4%
Bulky Objects	1%	±1%
Fines	2%	-

[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.1.2 Multi-Family (MF) Waste Composition

Figure 2 presents the weighted average waste composition of garbage by primary category for the MF sector. The largest components by weight were compostable organics (28%) followed by paper and plastic (19% each). Unavoidable food waste (13%) constituted the largest component of compostable organics. For paper, the largest component was other compostable paper (7%). The largest components found in the plastic category were household plastic (3%) and film (3%).

Figure 2: Multi-Family Waste Composition – Garbage

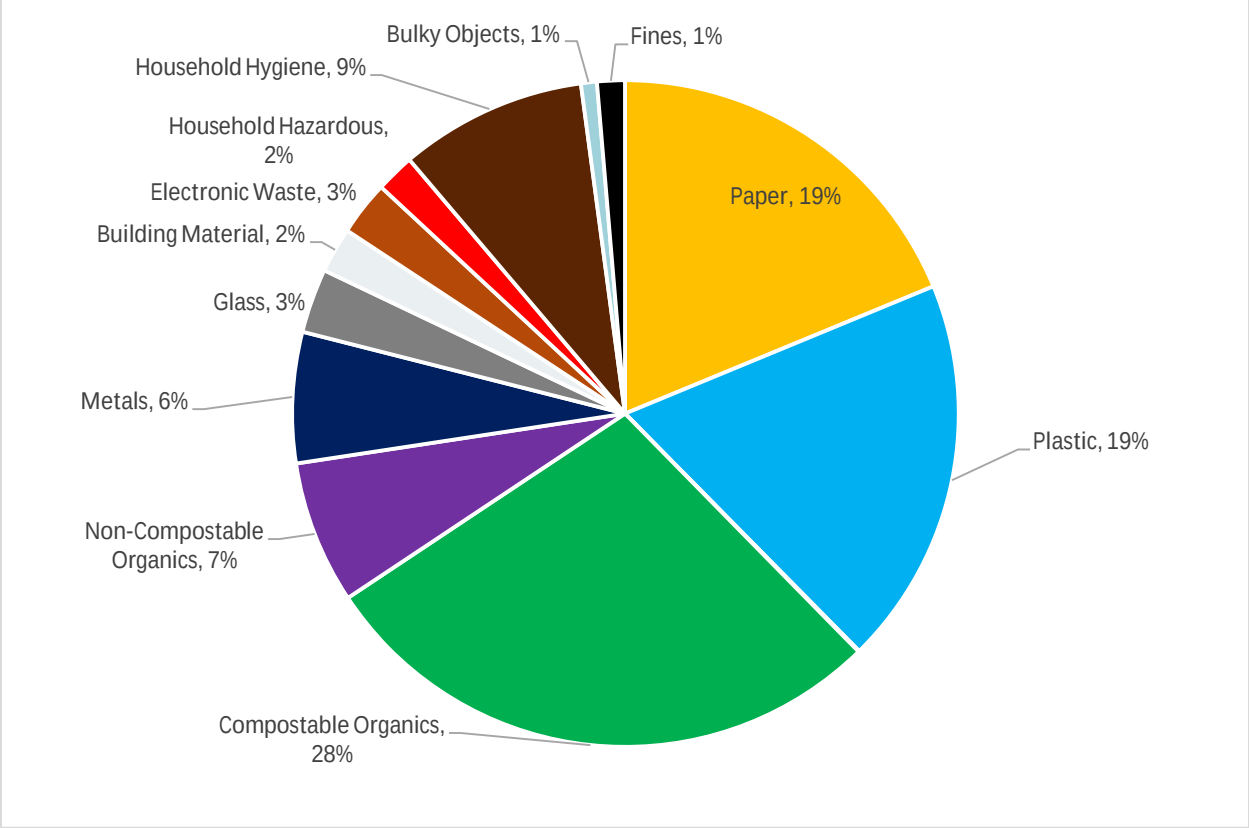


Table 3 summarizes the MF garbage waste composition results and the 90% confidence intervals. The calculated confidence intervals for the primary material categories were low (≤4%), indicating low variability between MF samples. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 3: Multi-Family Waste Composition – Garbage

Primary Category	Average[1] (n=20)	90% Confidence Interval
Paper	19%	±2%
Plastic	19%	±2%
Compostable Plastic	0%	-
Compostable Organics	28%	±4%
Non-Compostable Organics	7%	±2%
Metals	6%	±2%
Glass	3%	±1%
Building Material	2%	±1%
Electronic Waste	3%	±1%
Household Hazardous	2%	±1%
Household Hygiene	9%	±3%
Bulky Objects	1%	±1%
Fines	1%	-

[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.1.3 Commercial/Institutional (CI) Waste Composition

Figure 3 presents the weighted average waste composition of garbage by primary category for the CI sector. The largest components by weight were non-compostable organics (22%), followed by compostable organics (20%), plastic (18%), and paper (15%). Non-compostable organics were mainly comprised of finished wood (7%) and finished wood furniture (5%). Compostable organics consisted mostly of other wood (6%) and wood pallets (3%). The largest components found in the plastic category were other flexible packaging (3%). Paper consisted mostly of non-compostable, non-recyclable paper, and clean recyclable old corrugated cardboard (OCC) (3% each).

Figure 3: Commercial/Institutional Waste Composition – Garbage

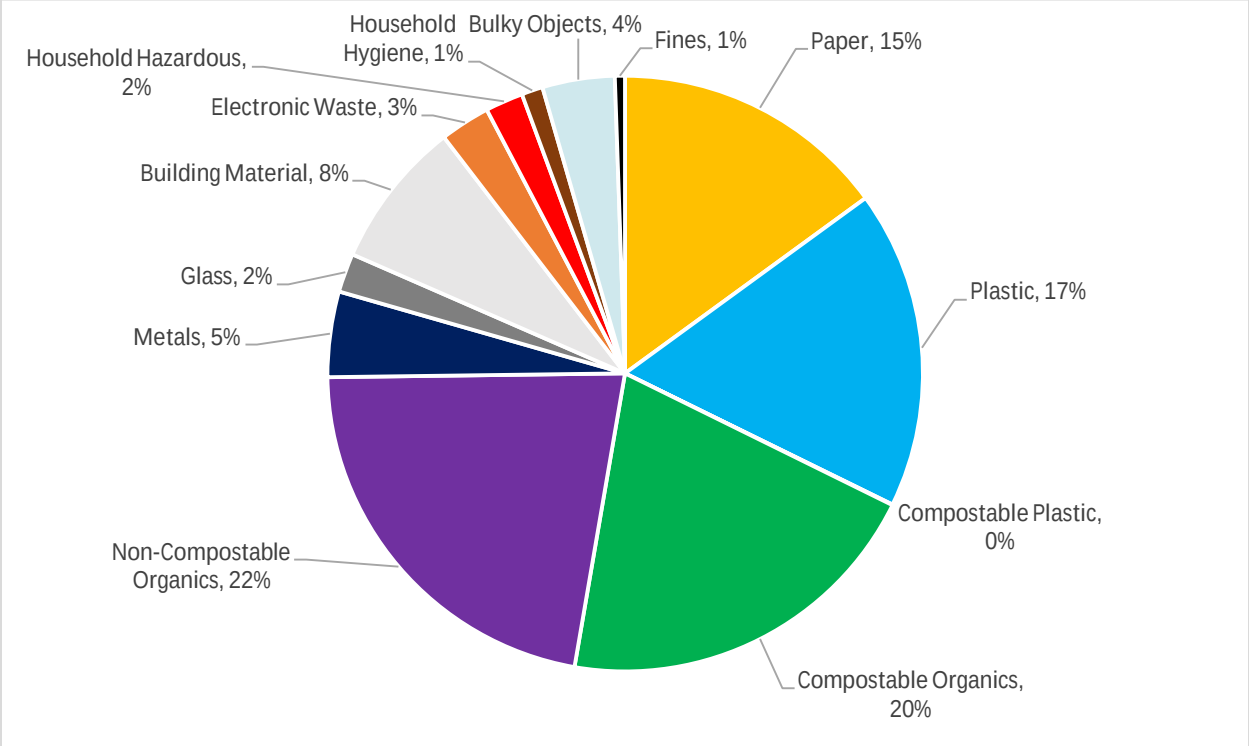


Table 4 summarizes the CI garbage waste composition results and the 90% confidence intervals. Although the calculated confidence intervals for the primary material categories were low (≤6%), indicating fairly low variability between CI samples. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 4: Commercial/Institutional Waste Composition – Garbage

Primary Category	Average[1] (n=37)	90% Confidence Interval
Paper	15%	±5%
Plastic	17%	±4%
Compostable Plastic	<1%	-
Compostable Organics	20%	±6%
Non-Compostable Organics	22%	±5%
Metals	5%	±2%
Glass	2%	±1%
Building Material	8%	±5%
Electronic Waste	3%	±2%
Household Hazardous	2%	±1%
Household Hygiene	1%	±1%
Bulky Objects	4%	±3%
Fines	1%	-

[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.1.4 Small Load (SL) Waste Composition

Figure 4 presents the weighted average waste composition of garbage by primary category for the SL sector. The largest components by weight were non-compostable organics (21%), followed by compostable organics (19%), building materials (16%), and plastic (15%). Non-compostable organics mainly comprised finished pressure finished wood (7%) and finished wood furniture (5%). A large component of compostable organics was other wood, making up 5% of compostable organics in this study. Building material consisted mostly of masonry (7%). Plastics consisted mostly of durable plastic products (4%), household, and other flexible plastic packaging (multi-layered and other flexible resin) (2% each).

Figure 4: Small Load Waste Composition – Garbage

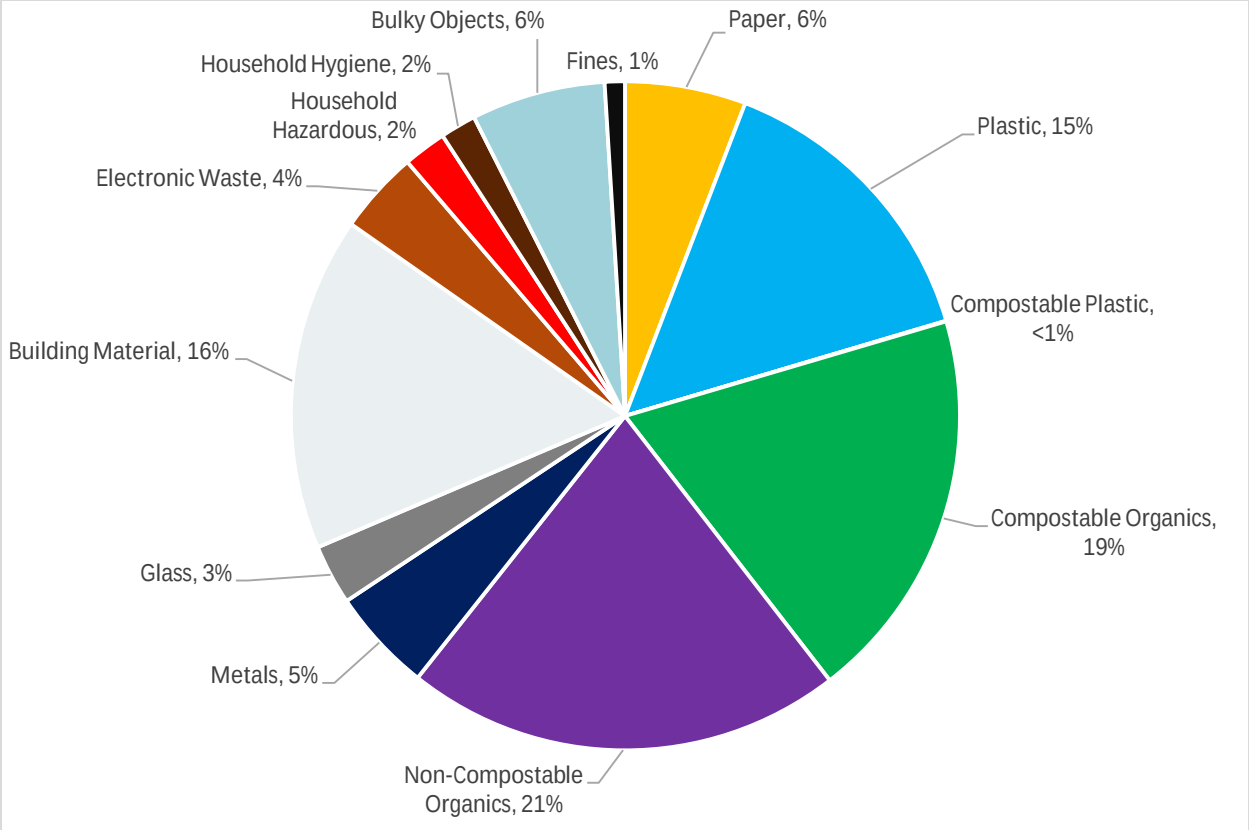


Table 5 summarizes the SL garbage waste composition results and the 90% confidence intervals. The calculated confidence intervals for the primary material categories were higher than in other sectors, with the highest at 8%. This indicates higher variation between SL samples due to waste loads in this sector consisting of varied composition and total weight. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 5: Small Load Waste Composition – Garbage

Primary Category	Average[1] (n=25)	90% Confidence Interval
Paper	6%	±2%
Plastic	15%	±6%
Compostable Plastic	<1%	-
Compostable Organics	19%	±7%
Non-Compostable Organics	21%	±6%
Metals	5%	±2%
Glass	3%	±1%
Building Material	16%	±8%
Electronic Waste	4%	±3%
Household Hazardous	2%	±1%
Household Hygiene	2%	±1%
Bulky Objects	6%	±4%
Fines	1%	±1%

[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.1.5 Combined Waste Composition Results

Figure 5 presents the weighted average waste composition of garbage by primary category for all combined sectors. The largest components by weight were compostable organics (23%), followed by plastic (18%), non-compostable organics (15%), and paper (14%). Compostable organics consisted of both avoidable and unavoidable food waste (12% in total); 7% of compostable organics was unavoidable food waste and 5% constituted avoidable food waste like unfinished meals, whole meat, and full ready-made meals. Plastics are comprised mostly of other flexible plastic packaging and household plastic (3% each). Non-compostable organics consisted mostly of finished wood (5%) and pressure-treated wood (4%). The largest component found in the paper category was other compostable paper (3%).

Figure 5: Combined Waste Composition – Garbage

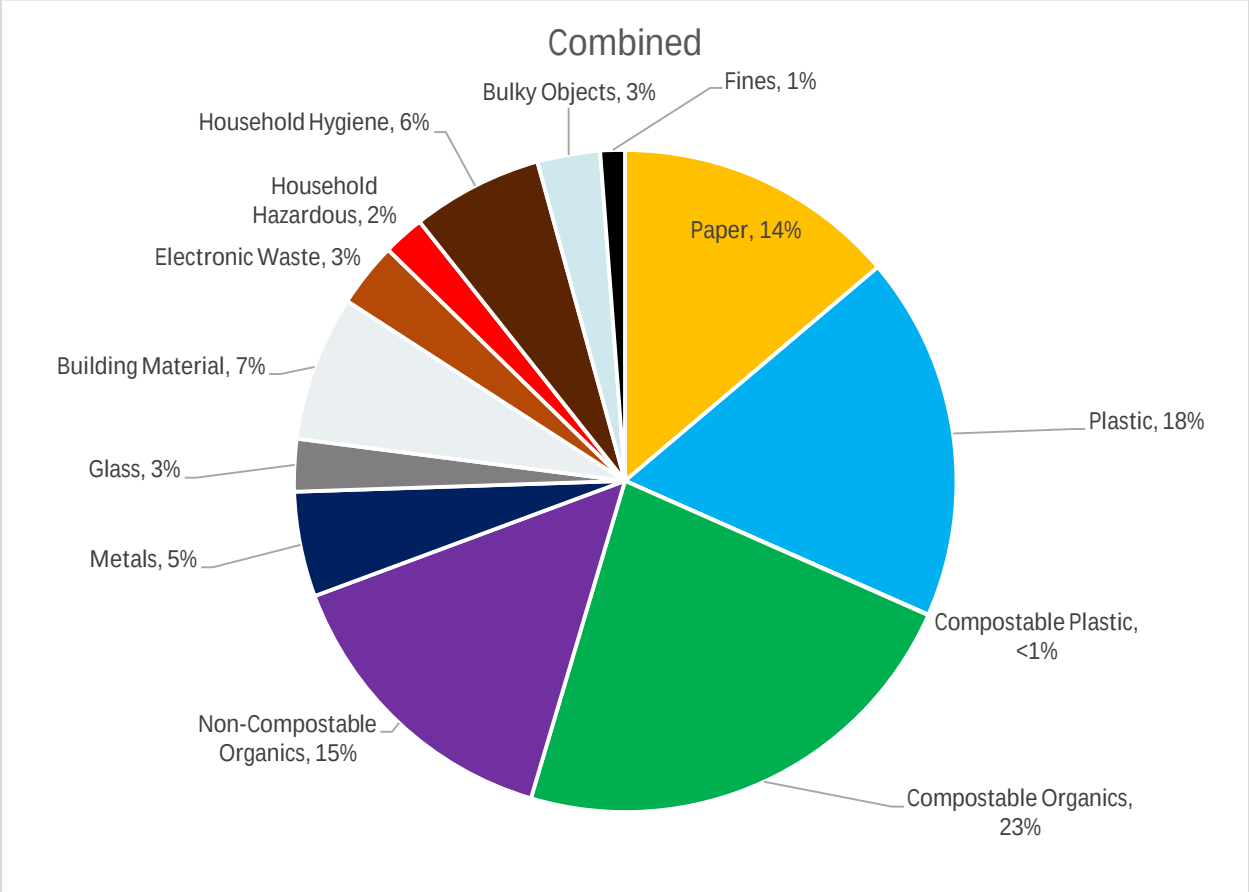


Table 6 summarizes the combined sector garbage waste composition results and the 90% confidence intervals. The calculated confidence intervals for the primary material categories (≤3%) reflected the expected variation for a given primary category. Materials which comprise more than 10% of the waste stream are highlighted in blue.

Table 6: Combined Waste Composition – Garbage

Primary Category	Average[1] (n=100)	90% Confidence Interval
Paper	14%	±2%
Plastic	18%	±2%
Compostable Plastic	<1%	-
Compostable Organics	23%	±3%
Non-Compostable Organics	15%	±3%
Metals	5%	±1%
Glass	3%	±1%
Building Material	7%	±3%
Electronic Waste	3%	±1%
Household Hazardous	2%	±1%
Household Hygiene	6%	±1%
Bulky Objects	3%	±1%
Fines	1%	-

[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.2 Waste Disposal

This section presents the regional disposal for all primary categories. Data is presented by sector, total residential (SF and MF sectors), and all sectors combined. Per-capita disposal estimates are included for the SF and MF sectors. At the time of the study, 2023 disposal tonnages were unavailable so 2022 disposed tonnages were used for calculations in this study.

3.2.1 Residential Waste (kg/capita)

Table 7 summarizes the residential waste disposal rates by material. These estimated disposal rates were calculated using the percent composition data collected during auditing and extrapolating using regional disposal and population data. Compostable organics was the most disposed material by weight for both SF and MF at 21.2kg/capita and 57.7kg/capita, respectively. Plastics and paper were the second and third most disposed categories by weight for both SF and MF. MF disposal rates for the top three waste categories are more than doubled compared to SF.

Table 7: Residential Waste Disposal (kg/capita)

	Single-Family			Multi-Family			Overall Residential	
Disposed Tonnage	142,912			250,962			393,874	
Population	1,636,112			1,218,263			2,854,375	
Primary Category	% Composition[1]	Disposal by Primary Category (kg/capita)	90% Confidence Interval (kg/capita)	% Composition[1]	Disposal by Primary Category (kg/capita)	90% Confidence Interval (kg/capita)	% Composition[1]	Disposal by Primary Category (kg/capita)
Paper	16%	13.7	±0.2	19%	38.7	±1	18%	24.4
Plastic	20%	17.8	±0.5	19%	38.8	±0.7	19%	26.8
Compostable Plastic	<1%	0.1	-	<1%	0.1	-	<1	0.1
Compostable Organics	24%	21.2	±0.9	28%	57.7	±2.4	27%	36.8
Non-Compostable Organics	9%	7.8	±0.2	7%	14.3	±0.2	8%	10.6
Metals	4%	3.9	±0.1	6%	13.1	±0.3	6%	7.8
Glass	2%	1.9	-	3%	6.4	±0.1	3%	3.8
Building Material	2%	1.7	-	2%	4.5	±0.1	2%	2.9
Electronic Waste	3%	2.9	-	3%	5.4	±0.1	3%	4.0
Household Hazardous	2%	1.8	-	2%	3.8	-	2%	2.7
Household Hygiene	14%	11.9	±0.5	9%	18.7	±0.5	11%	14.8
Bulky Objects	1%	0.9	-	1%	1.6	-	1%	1.2
Fines	2%	1.7	-	1%	2.8	-	2%	2.2
Total	-	87.3	±0.2	-	206.0	-	-	138.0

[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.2.2 All Waste Disposal (Tonnage by Sector)

Table 8 summarizes the waste disposal for all sectors. These estimated disposed tonnages were calculated using the percent composition data collected during auditing and extrapolating using regional disposal data.

Table 8: Estimated Waste Disposal by Primary Category

	Single-Family			Multi-Family			Commercial/Institutional			Small Load			Combined Waste Composition	
Disposed Tonnage	142,912			250,962			395,096			117,597			906,568	
Population	1,636,112			1,218,263			-			-			2,854,375	
Primary Category	% Composition[1]	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes)	% Composition[1]	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes)	% Composition[1]	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes)	% Composition[1]	Disposal by Primary Category (tonnes)	90% Confidence Interval (tonnes)	% Composition[1]	Disposal by Primary Category (tonnes)
Paper	16%	22,451	±356.9	19%	47,122	±1175	15%	59141	±2790.7	6%	6,859	±161.7	14%	133,180
Plastic	20%	29,099	±777	19%	47,313	±912	17%	68312	±3022.2	15%	17,162	±953.3	18%	162,415
Compostable Plastic	<1%	125	±0.2	<1%	98	-	0%	112	±0	<1%	6	-	<1%	478
Compostable Organics	24%	34,726	±1519.6	28%	70,259	±2919.7	20%	80790	±4977.7	19%	22,453	±1630.4	23%	202,593
Non-Compostable Organics	9%	12,769	±252.6	7%	17,403	±267	22%	87165	±4585.4	21%	24,869	±1425.6	15%	140,851
Metals	4%	6,399	±91.5	6%	15,969	±306.5	5%	18389	±359.3	5%	5,858	±139	5%	46,474
Glass	2%	3,073	±31.9	3%	7,797	±78.2	2%	8305	±102.6	3%	3,446	±45.2	3%	22,228
Building Material	2%	2,820	±38.6	2%	5,515	±75.4	8%	31779	±1474.9	16%	18,987	±1467.1	7%	58,653
Electronic Waste	3%	4,675	±52.1	3%	6,633	±80	3%	10695	±210.5	4%	4,698	±126.6	3%	36,917
Household Hazardous	2%	2,956	±19.1	2%	4,668	±35.1	2%	8091	±80.7	2%	2,433	±31.1	2%	18,069
Household Hygiene	14%	19,524	±799.3	9%	22,803	±602.9	1%	4525	±23.6	2%	2,037	±26.9	6%	48,800
Bulky Objects	1%	1,492	±17.4	1%	1,994	±19.6	4%	15525	±425.3	6%	7,632	±312.3	3%	26,339
Fines	2%	2,802	±13.6	1%	3,388	±11.7	1%	2267	±4.6	1%	1,157	±5.8	1%	9,571
Total	-	142,912	-	-	250,962	-	-	395,096		-	117,597	-	-	906,568

[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.2.3 Historical Comparison

The following figures (Figure 6 to Figure 9) show the historical comparisons in each of the sample sectors from 2013 to 2023 by estimated disposal tonnage. Sampling for full-scale waste composition studies typically occurs in the fall. Figure 10 shows the combined historical comparison for all sample sectors. Upon review, the 2022 disposal rates for the multi-family sector were calculated based on previous population figures and disposal amounts. This minor inconsistency did not impact the overall waste composition for 2022, and there was no notable change in historical generation trends when compared to the 2023 data. Findings are discussed in Section 3.2.3.1.

Figure 6: Single-Family Historical Comparison 2013 – 2023

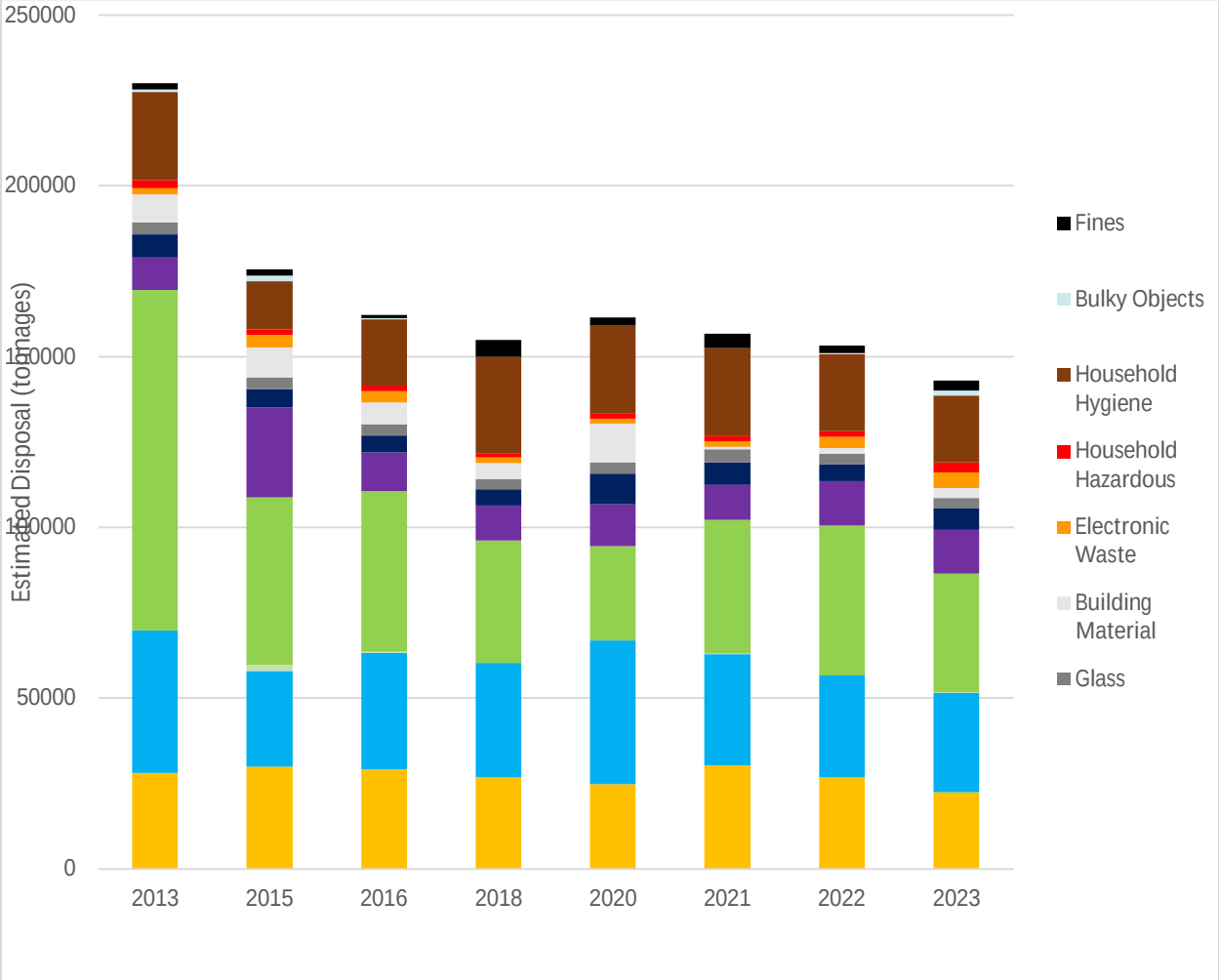


Figure 7: Multi-Family Historical Comparison 2013 – 2023

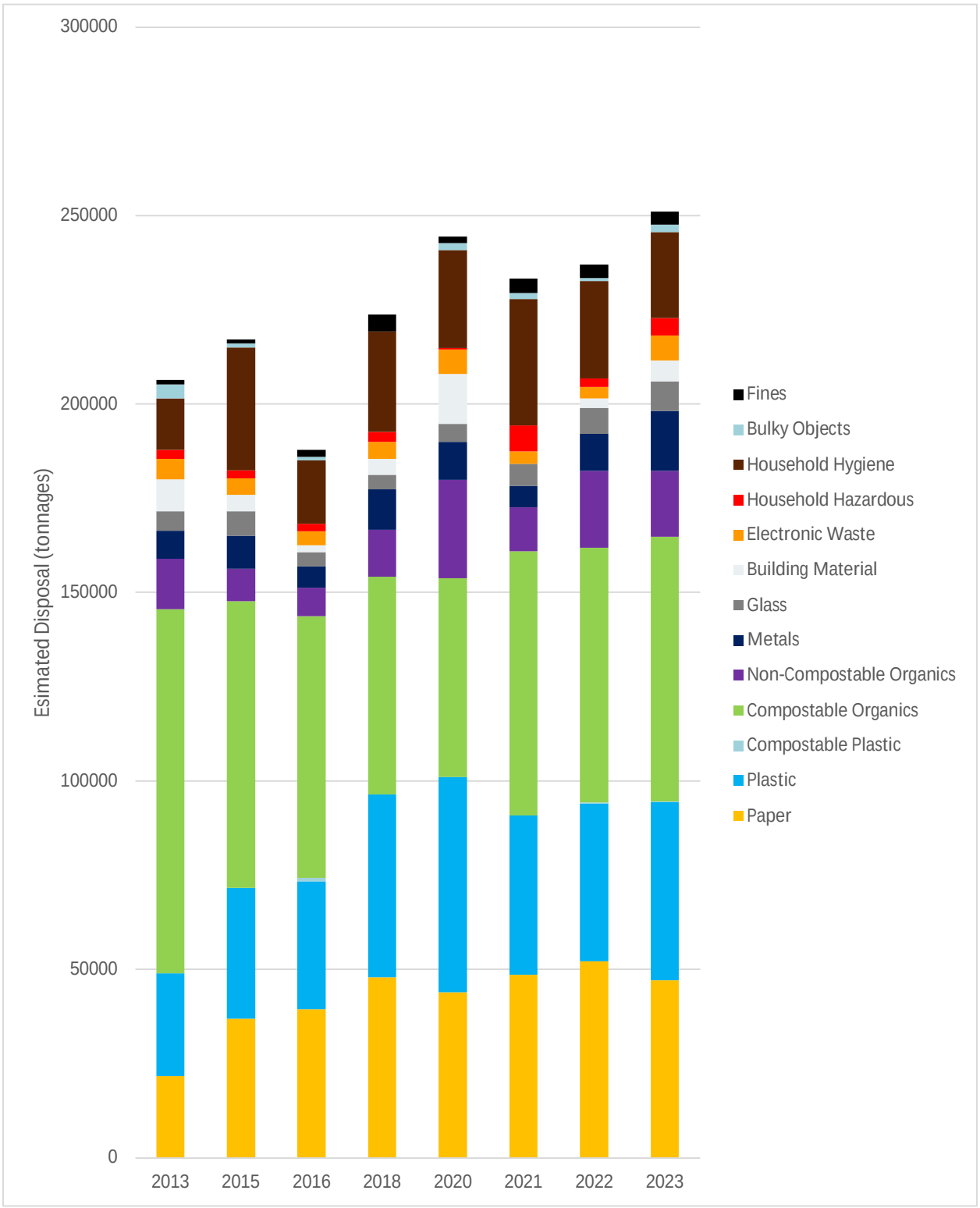


Figure 8: Commercial/Institutional Historical Comparison 2013 – 2023

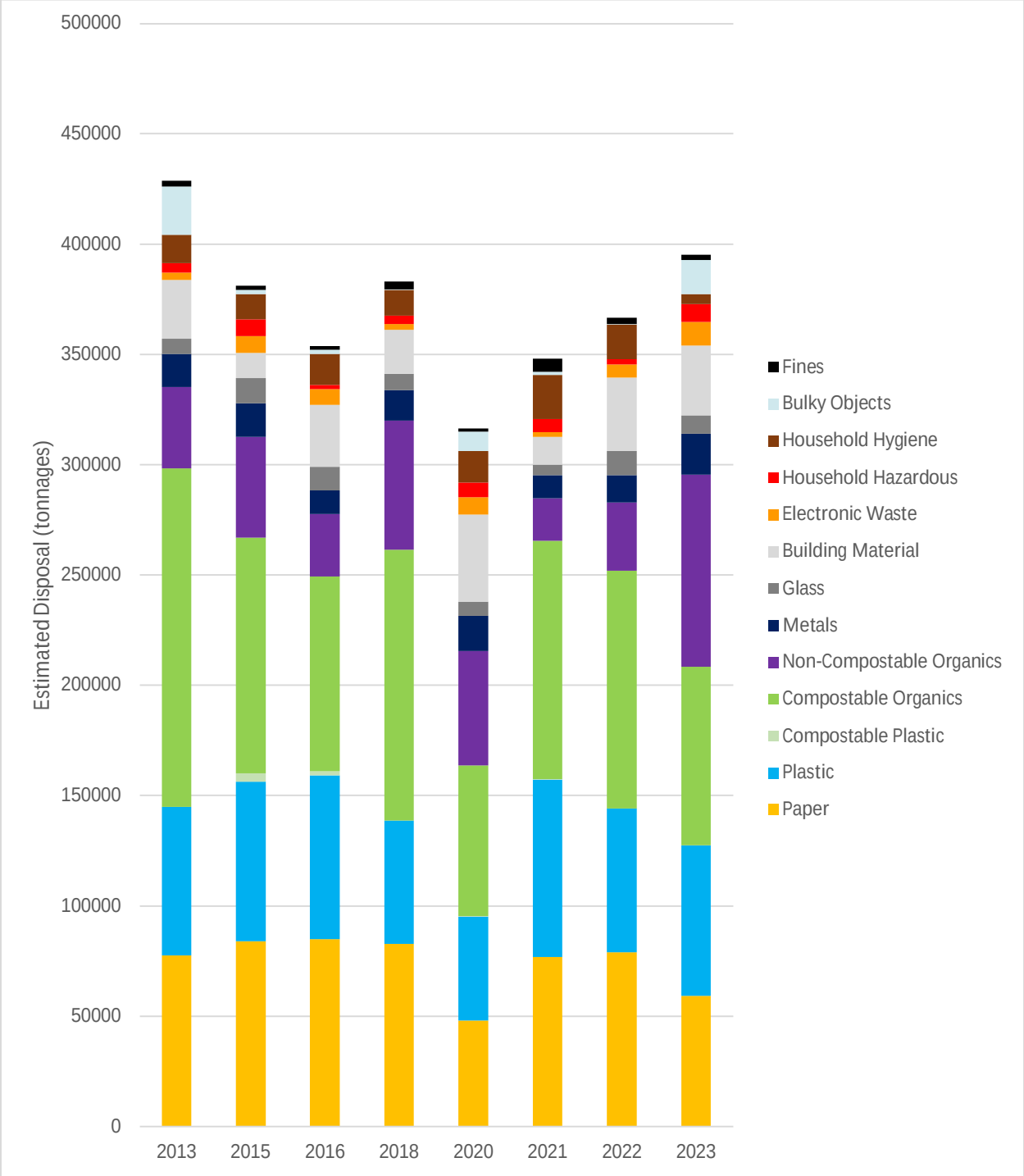


Figure 9: Small Load Historical Comparison 2013 – 2023

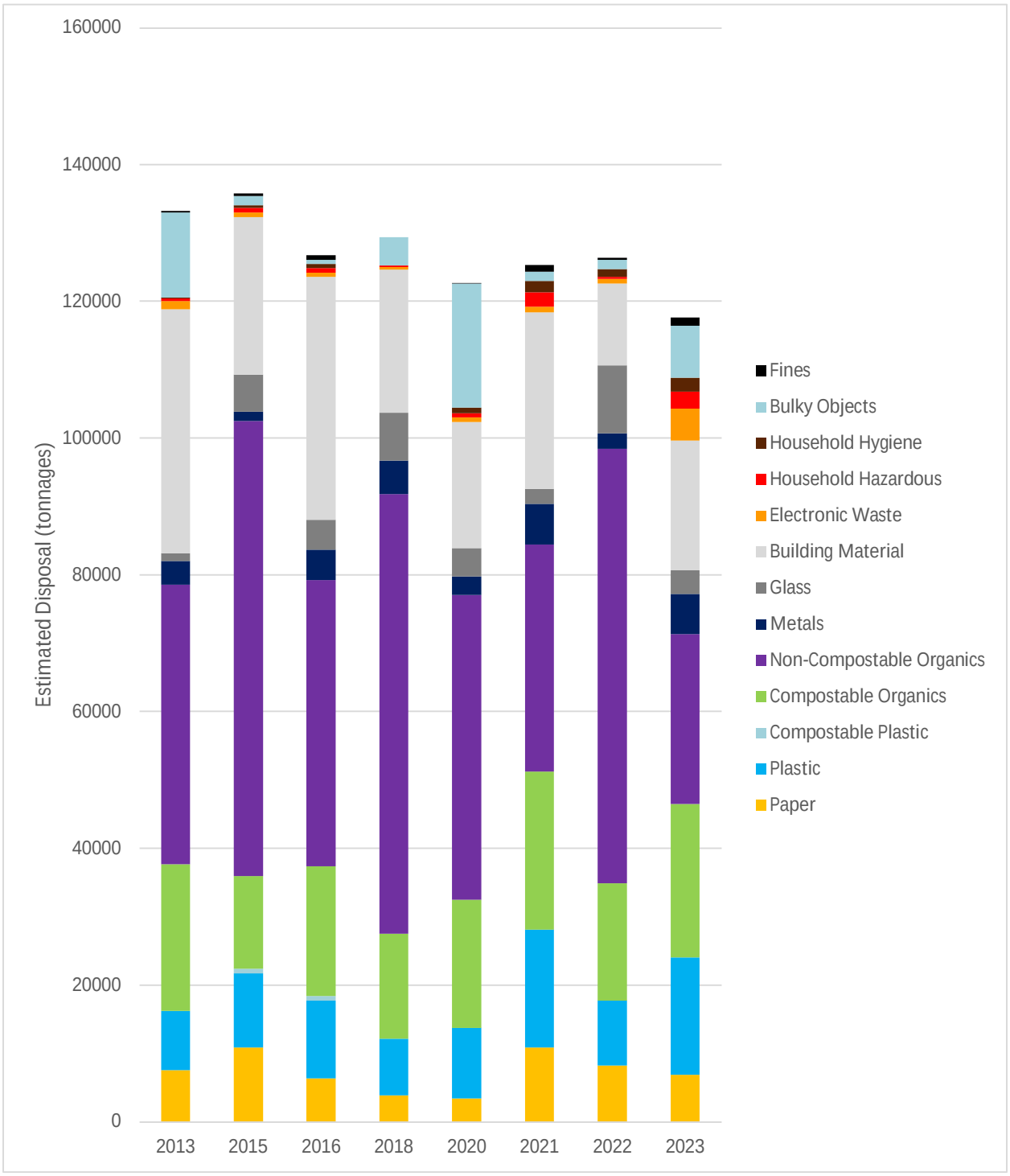
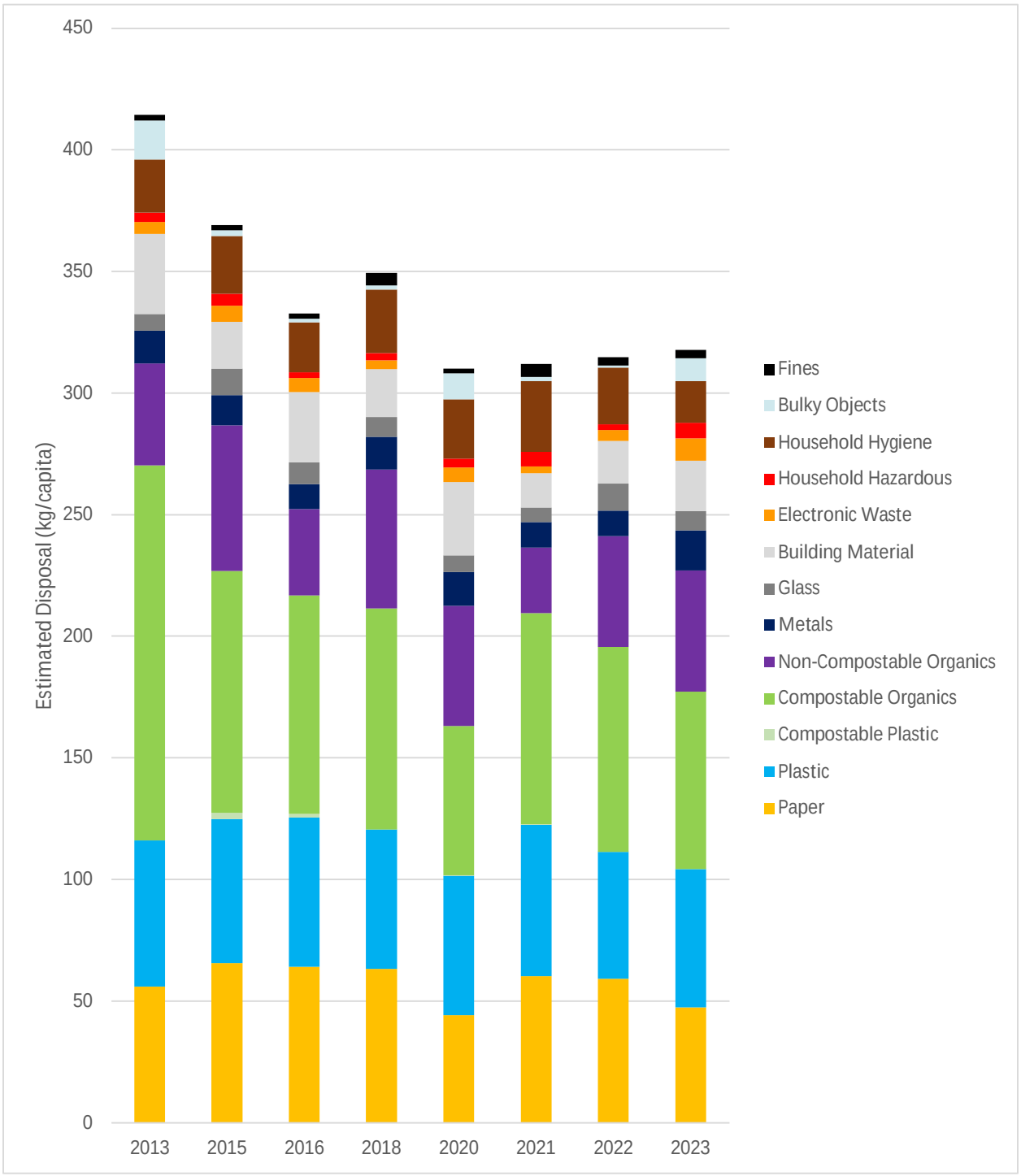


Figure 10: Combined All Sectors Historical Comparison 2013 – 2023



3.2.3.1 Summary of Historical Comparison

The waste composition in 2020 and 2021 was an outlier due to COVID-19 impacts, including business modifications and restrictions. Dine-in establishments closed on March 20, 2020, reopening with limited capacity on May 19, 2020. A mandatory mask policy for indoor public spaces, introduced on November 19, 2020, was briefly lifted in summer 2021 and reinstated before the 2021, lasting until March 11, 2022.

There was a significant decrease in waste disposed in 2020 compared to previous years, and 2023 was the first full calendar year since 2020 with no COVID-related restrictions such as mask mandates or indoor dining capacity limits. However, the estimated overall waste disposal rates stayed relatively similar in 2023 compared to 2020 to 2022. Since 2022, there has been a gradual but small increase in total waste disposed. Waste composition has also stayed similar and comparable between 2020 and 2023. Notably, compostable organics disposal has trended downwards, potentially due to the 'return to normal' after the temporary lifting of the organics ban on October 15, 2022.

Notable events in 2023 that may have influenced waste disposal trends in Metro Vancouver include:

- In January 2023, minimum fees for paper bags increased to $0.25 and $2 for new reusable bags in the City of Vancouver.
- Several municipalities in the region enacted plastic shopping bag bans and fees in 2021 and 2022.
- Provincial regulation was set to begin December 2023 in alignment with Federal regulation. Some retailers stopped supplying plastic bags in advance of these regulations; and
- On May 1, 2023 the minimum fee of $0.25 for single-use beverage cups was rescinded in the City of Vancouver.

Notable observations from waste composition data collected in 2023 to the previous year include:

- In the SF sector, the overall waste composition has stayed relatively consistent since 2016, and the overall disposal rate is decreasing year over year. Compared to 2022, the disposal of paper, compostable organics, non-compostable organics, and household hygiene has decreased, while the quantity of compostable plastic, metals, bulky objects, and household hazardous items increased.
- In the MF sector, the quantity of paper, glass, and non-compostable organics disposed decreased, while the quantity of plastic, compostable organics, metals, building materials, and electronics increased compared to 2022.
- In the CI sector, the quantity of paper, compostable organics, glass, and household hygiene decreased compared to 2022. The quantity of compostable plastic, non-compostable organics, electronics, household hazardous materials, and bulky objects increased compared to 2022.
- In the SL sector, the quantity of paper, non-compostable, glass, and bulky objects decreased compared to 2022, while the quantity of plastic, metals, building materials electronics, and household hazardous material increased.

- Overall, the quantity of paper and compostable organics has decreased compared to 2022. The quantity of non-compostable organics, metals, electronics, household hygiene materials, and bulky objects increased in the same period.

3.3 Functional Categories Composition

The waste composition study assigned a functional group describing the waste management model or end-fate of each material category. The following sections show the composition of the different functional categories for each waste stream and the combined adjusted values. Note that not all material categories were assigned a functional category, and some materials may be present in more than one functional category. The functional category assigned for material categories is provided in Appendix B.

3.3.1 Functional Categories Composition by Sector

The largest functional category by weight percentage in the SF and MF sectors was green bin materials, which comprised mainly food waste. The largest functional category by weight percentage in the CI and SL sector was construction & demolition (C&D) materials, such as finished wood and building materials. The second largest functional category by weight percentage for all four sectors was recyclable materials, which includes items accepted in most residential recycling programs or covered by extended producer responsibility programs in BC. Table 9 shows the functional categories composition of the 2023 waste composition in detail from most prevalent to least prevalent.

Table 9: Functional Categories Composition

Functional Category	Definition	Combined (% composition) [1]	SF (% composition) [1]	MF (% composition) [1]	CI (% composition) [1]	SL (% composition) [1]
Construction & Demolition	Items typically generated by construction, demolition, or renovation activities	25%	4%	6%	37%	42%
Green Bin	Food and yard waste and compostable paper	19%	32%	33%	11%	11%
Limited Recycling Options	Other items (excluding those above) that typically have few or no readily available options for recycling	19%	24%	19%	18%	17%
Recyclable	Items accepted in most residential recycling programs or covered by extended producer responsibility programs in BC	27%	25%	29%	27%	22%
Textiles	Clothing, household textiles, footwear, and accessories	8%	12%	8%	5%	8%
Single-Use Items	Single-use bags, cups, utensils, straws and takeout containers	2%	3%	4%	2%	1%
Personal Protective Equipment	Personal protective equipment commonly used in response to the COVID-19 pandemic (masks, gloves, and disinfectant wipes)	<1%	<1%	1%	<1%	<1%

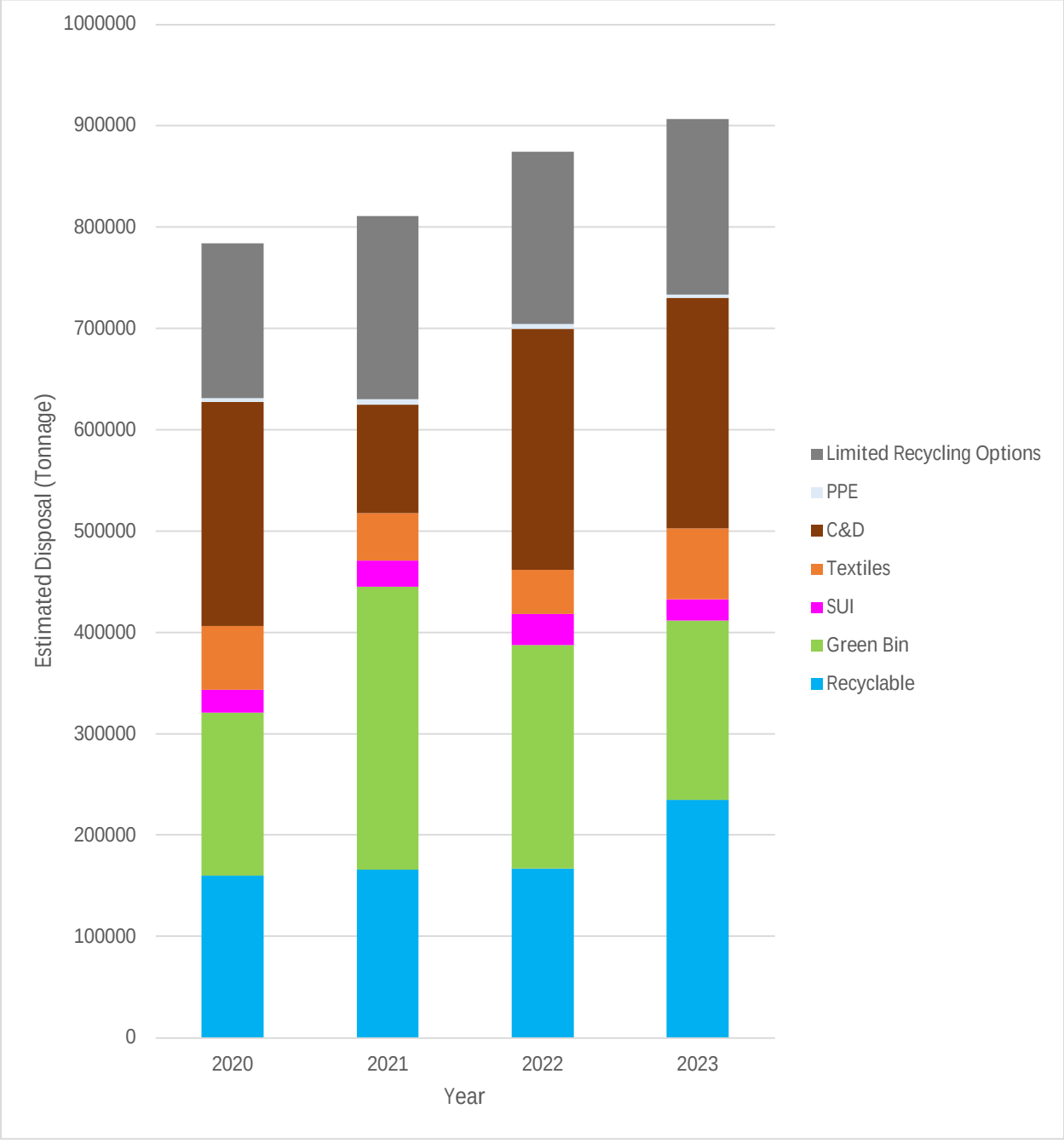
[1]All percentages in the results section were rounded to the nearest whole number. Percentages may not add up to 100%.

3.3.2 Historical Comparison for Functional Categories

Functional category composition analysis was completed for the first time in 2020; therefore, there is no older data on functional categories. Figure 11 displays a side-by-side comparison of functional categories from 2020 to 2023.

In comparison to 2021 and 2022, recyclable and textile waste increased in 2023 while green bin waste decreased. Green bin materials consisted primarily of food waste, and was the largest functional category in the SF and MF sectors. C&D waste represented the largest functional group in the CI and SL sector. Recyclable estimated disposed tonnages of SUIs, C&D materials, and green bin waste decreased in 2023 compared to 2022 quantities.

Figure 11: Historical Functional Categories 2020 – 2023

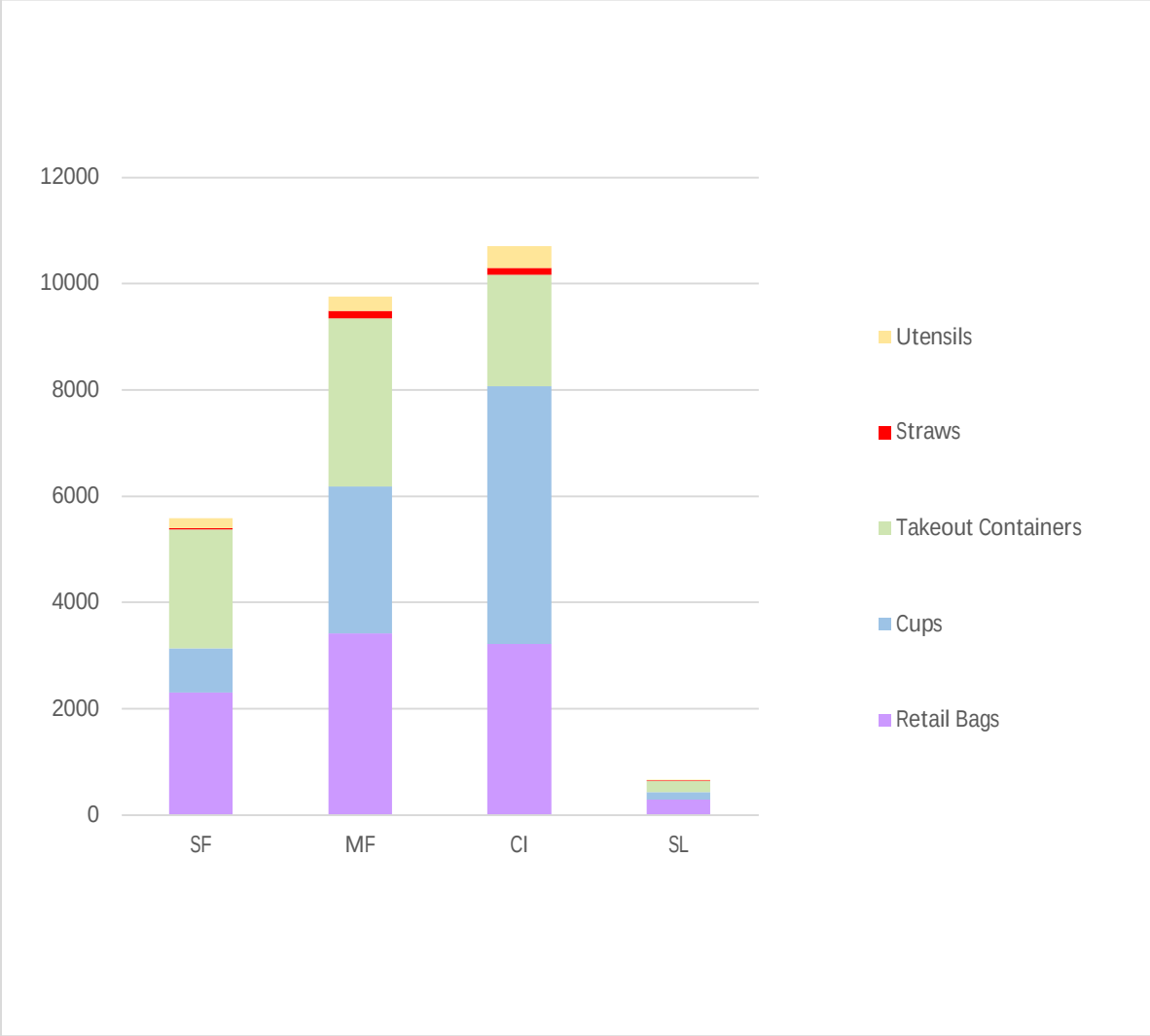


3.4 Single-Use Item Disposal

Metro Vancouver provided 2022 population data and facility inbound waste tonnages to be used with collected waste composition data, item counts, and 2018 unit weights to estimate the regional disposal rate of single-use item material categories. Sample outliers were observed that had item counts hundreds of units higher than the majority of samples within each sector. Three MF sector samples and one CI sector sample were determined to be outliers with significantly higher SUI material. In the MF sector, an example of an outlier is a sample where the sample is over three times the average of the sector count excluding the outlier. An example of an outlier identified in the CI category had 402 takeout containers whereas other CI samples ranged from 0-55 takeout containers. This indicated that on average CI category samples had 12 takeout containers. SUI disposal rate results without outlier samples are presented in the following section. Outlier samples were not removed from the analysis of waste and functional category composition as the outlier samples did not significantly influence results due to the low density of SUI materials.

Figure 12 presents the 2023 estimated disposal tonnage of SUIs for each sector.

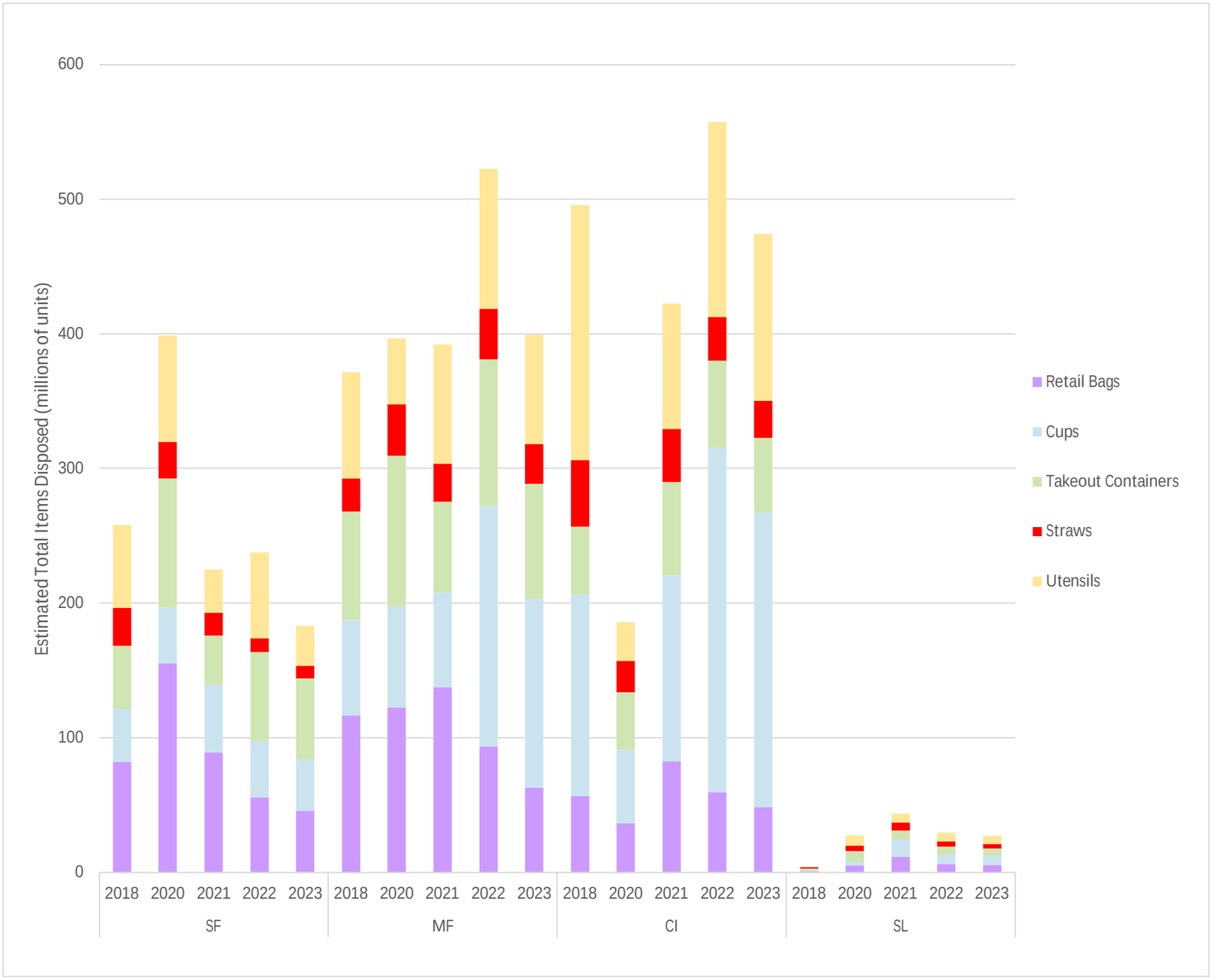
Figure 12: Estimated SUI Disposal by Sector and Category

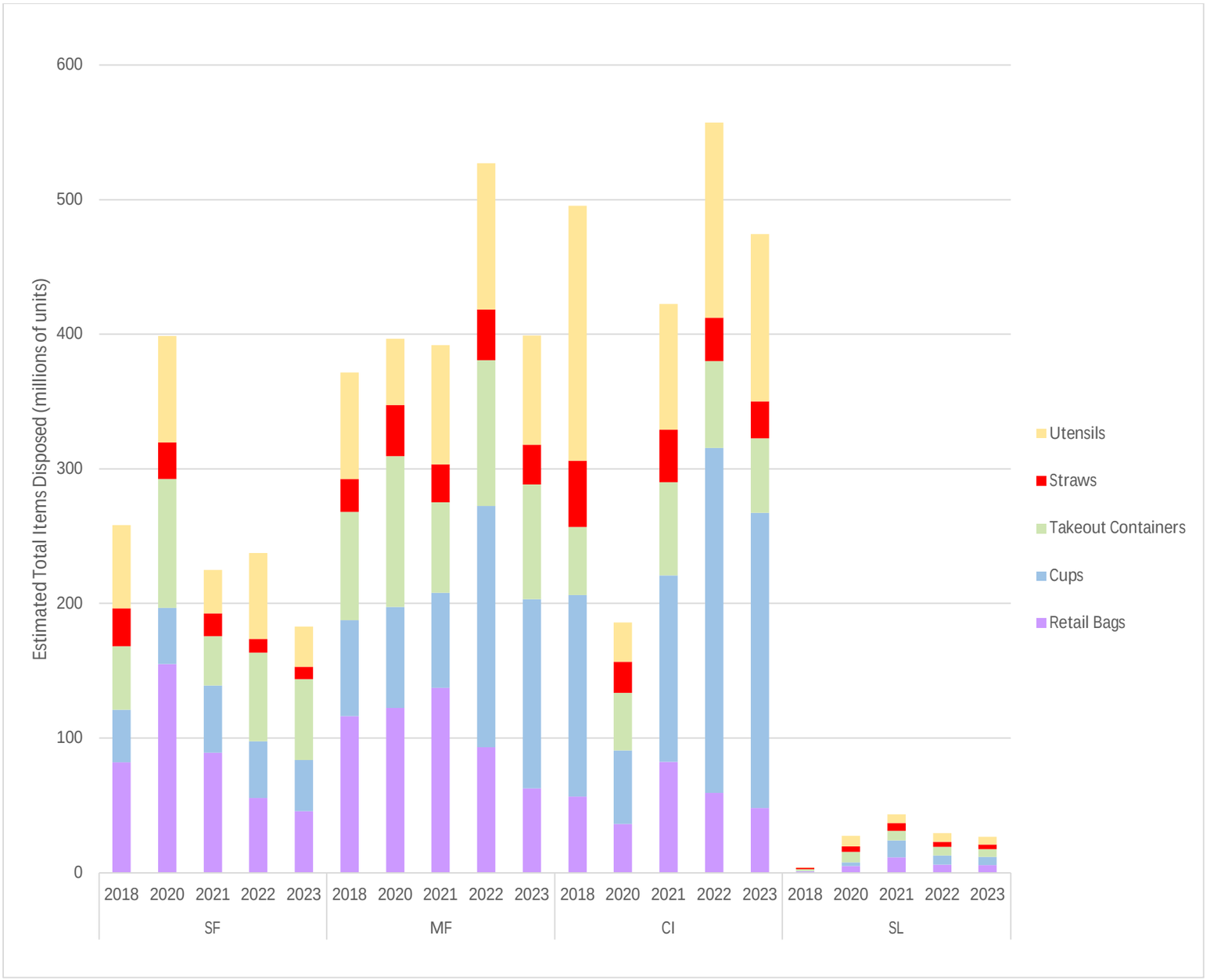


SUIs were most common in the MF and CI sectors. The largest component of SUIs varied by sector, with retail bags and takeout containers being most prevalent in the MF sector, and retail bags and cups being most prevalent in the CI sector.

Figure 13 presents the estimated SUI disposal in 2018, 2020, 2021, 2022, and 2023 by millions of units.

Figure 13: Estimated SUI Disposal in 2018, 2020, 2021, 2022, and 2023




600
500
400
300
200
100
0
Estimated Total Items Disposed (millions of units)
2018 2020 2021 2022 2023 2018 2020 2021 2022 2023 2018 2020 2021 2022 2023 2018 2020 2021 2022 2023
SF
MF
CI
SL
Utensils
Straws
Takeout Containers
Cups
Retail Bags

In general, SUI disposal for the SF, MF, and CI sectors in 2023 differed from previous years; however, SUI disposal in the SL sector in 2023 was similar to 2022. Total SUIs disposed decreased in every sector compared to 2022 other than the SL sector which stayed the same. The 2023 total estimated SUI disposal for the SF sector was lower than any other year, with significant decreases in total retail bags disposed. In the MF sector, the quantity of utensils disposed was higher in 2023 than previous years, while the quantity of takeout containers disposed decreased to its lowest amount since 2018. The 2021 waste composition study noted SUI disposal in 2020 was an outlier likely due to the COVID-19 pandemic and the assumed increase of takeout foods. Notably, the SF sector had significantly higher SUI disposal in 2020 than in other years, and the CI sector had significantly lower SUI disposal in 2020 than in other years. 2022 and 2023 disposal rates are more comparable to 2018 and 2019 but are showing a trend of decreasing SUIs disposed in the SF and CI sector.

Table 10 presents the per-capital disposal for SUIs in 2018, 2020, 2021, 2022, and 2023.

Table 10: Single-Use Items Disposal – Per-Capita Comparison for 2018, 2020, 2021, 2022, and 2023

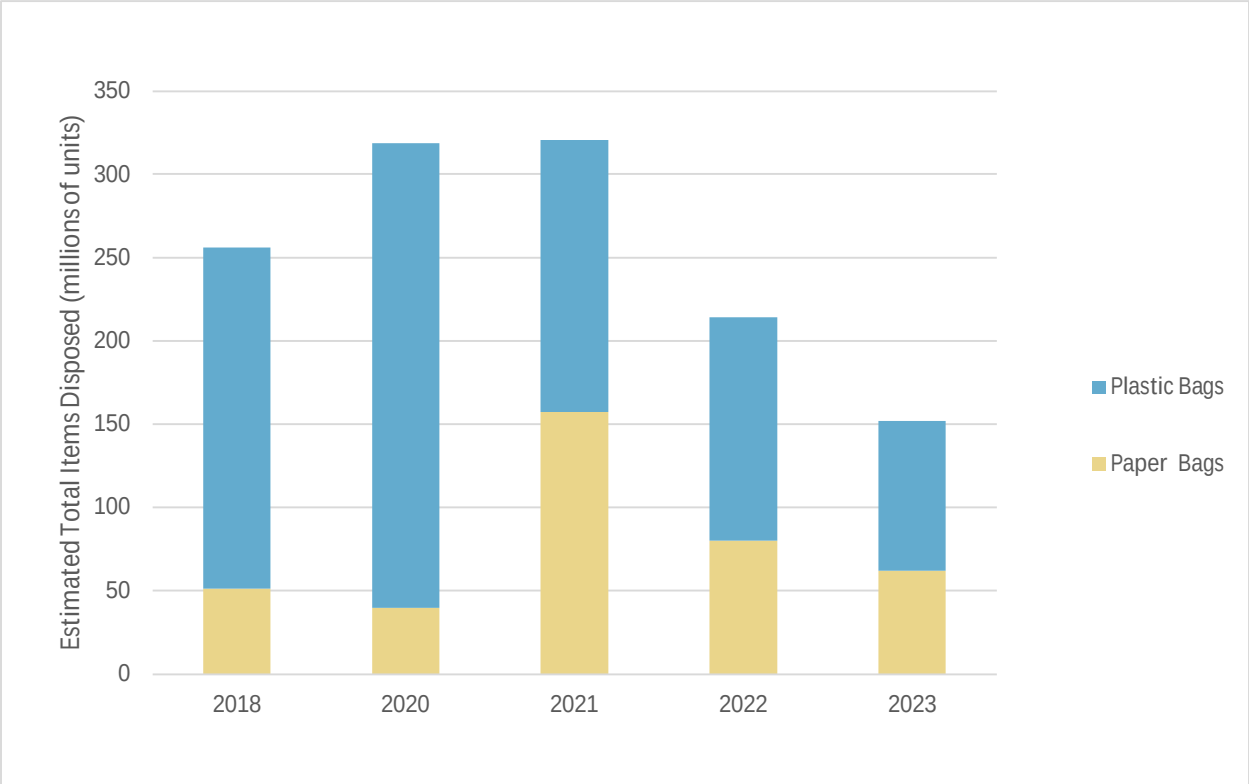
SUI Category	2018 (unit/capita)	2020 (unit/capita)	2021 (unit/capita)	2022 (unit/capita)	2023 (unit/capita)
Retail Bags	101	117	116	76	54
Cups	102	64	98	172	126
Takeout Containers	70	95	65	87	68
Straws	40	34	33	30	22
Utensils	130	49	80	114	88
Total	443	359	391	480	358

SUI disposal per capita had been trending upwards since 2020, with the largest increase in disposal between 2021 and 2022; however, 2023 showed a downward trend. The quantity of items disposed per capita decreased in all SUI categories compared to 2022, with the largest decrease in cups from 172 units/capita to 126 units/capita. The decrease in cups disposed in 2023 may be partially due to City of Vancouver mandatory fee for disposable cups (the by-law was repealed as of May 1, 2023).

Retail bags continued to decrease in 2023, and the estimated number of bags disposed of is about 45% of what was disposed of in 2022. Further investigation was done regarding the potential switch from plastic to paper for retail bags and the decrease in retail bags following Metro Vancouver's ban on plastic retail bags (as noted in Table 10 above).

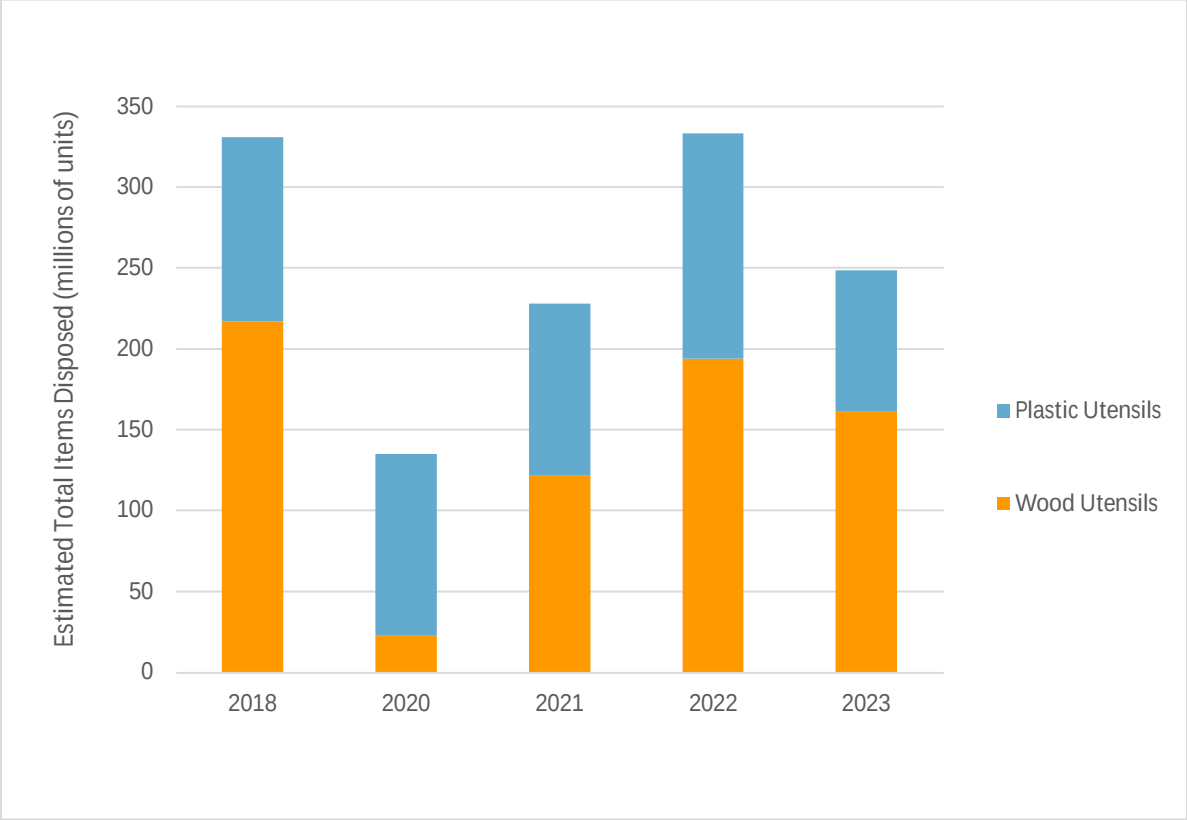
Figure 14 presents a historical comparison of retail bags disposed in Metro Vancouver by product material from 2018 to 2023.

Figure 14: Estimated SUI Retail Bag Disposal by Material



Overall, the number of retail bags disposed in Metro Vancouver has decreased since 2018, with the majority of the decrease coming from plastic bags. Compared to 2018 and 2020, the proportion of retail bags made of paper materials has grown; however, the disposal of paper bags has decreased since 2021. The municipalities of Surrey, Port Moody, Richmond and the City of Vancouver started plastic shopping bag bans and fees in 2021 and 2022.Additionally, provincial regulations required cutlery to only be supplied on request by the customer as of December 20, 2023 and many retailers and online platforms made these items by request well in advance of this provincial regulation. The combination of these reasons could have led to the public becoming accustomed to not using plastic and paper bags or utensils. Figure 15 presents a historical comparison of utensils disposed in Metro Vancouver by product material from 2018 to 2023.

Figure 15 Estimated SUI Utensils Disposed by Material



Overall, the number of utensils disposed in Metro Vancouver has increased since 2020 but decreased from 2022. Both wood and plastic and wood utensils decreased since 2022 and the proportion of plastic disposed is at its lowest since 2018. This may be the result of Metro Vancouver's Single-Use Item reduction strategy and the general population adopting new habits.

3.5 Personal Protective Equipment Disposal

Since 2020, waste composition studies have measured the quantity of PPE disposed. Metro Vancouver provided 2022 population data and total inbound waste tonnages for each facility sampled. This information was used with collected waste composition data to estimate the regional disposal rate of material categories. One MF sector sample out of 20 and one CI sector sample out of 37 were determined to be outliers with significantly higher PPE material. Using the same methodology described for SUI outliers, samples were considered outliers when it was observed that they had item counts hundreds of units higher than the majority of samples within each sector. A sample deemed an outlier in the MF sector had over 360 gloves while the rest of the samples averaged 18 gloves. Similarly, a sample in the CI sector had 364 gloves when the rest of the samples averaged 28 gloves. PPE disposal rate results without outlier samples are presented in the following section. Outlier samples were not removed from the analysis of waste and functional category composition as the outlier samples did not significantly influence results due to the low density of PPE materials.

Table 11 summarizes 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 11: Estimated Disposal of PPE Categories

PPE Category	SF (Tonnage)	MF (Tonnage)	CI (Tonnage)	SL (Tonnage)	Combined (Tonnage)
Masks	160	288	176	10	634
Gloves	224	501	1913	43	2681
Wipes	61	127	236	20	444
Total	445	916	2325	73	3759

Table 12 summarizes the approximate number of PPE items disposed. Additionally, the number of units disposed per capita is presented.

Table 12: 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	23	41	25	1	91	23
Gloves	27	59	227	5	318	27
Wipes	16	33	61	5	115	16
Total	65	134	313	12	524	65

Figure 16 presents the overall estimated disposal tonnage of PPE for all sectors. The greatest tonnage of PPE was disposed by the CI sector, mainly comprising gloves. However, the CI sector disposed fewer masks than the MF sector. The MF sector disposed a greater tonnage of all PPE categories compared to the SF sector.

Figure 16: Estimated PPE Disposal by Sector and Category

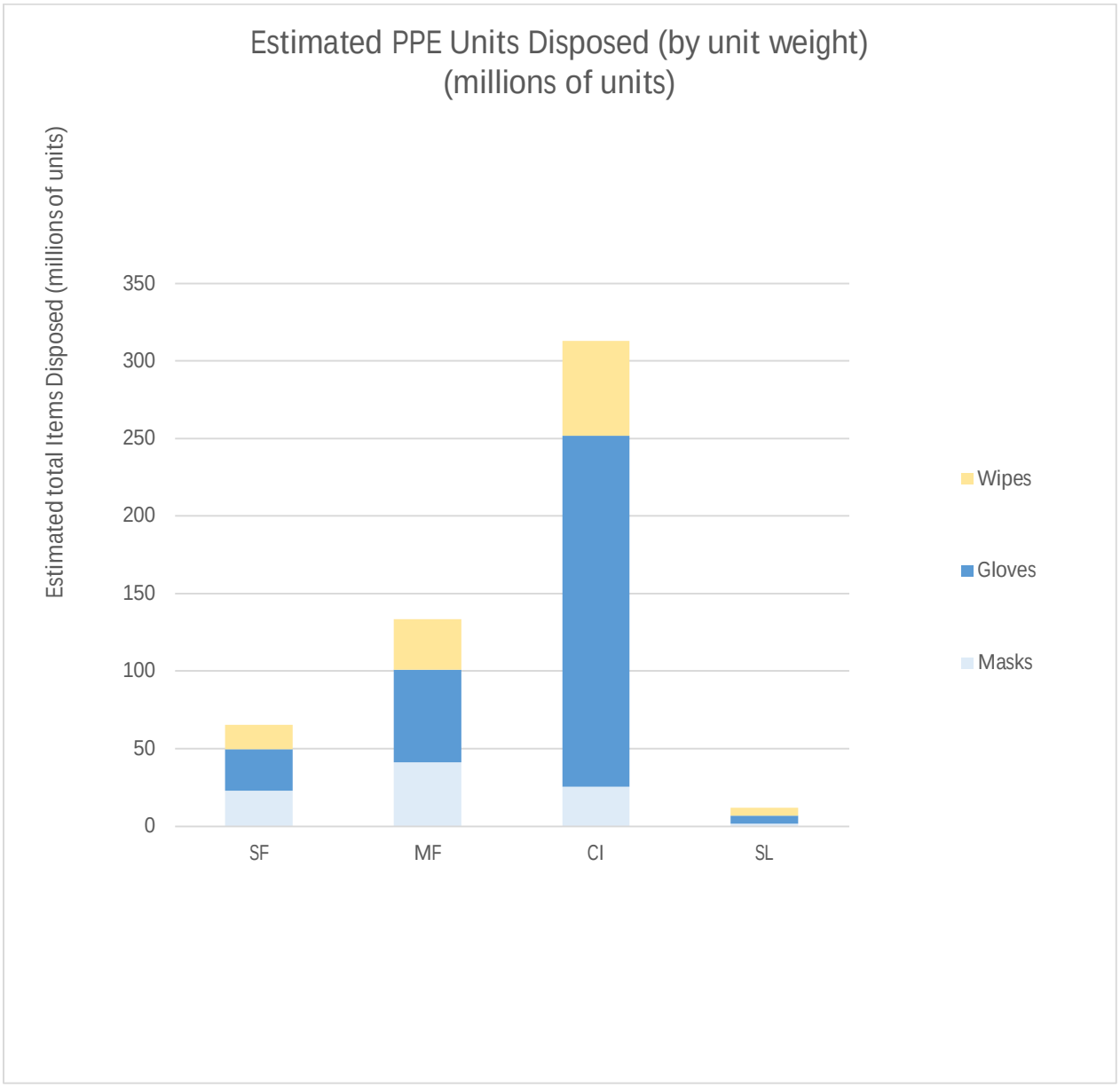
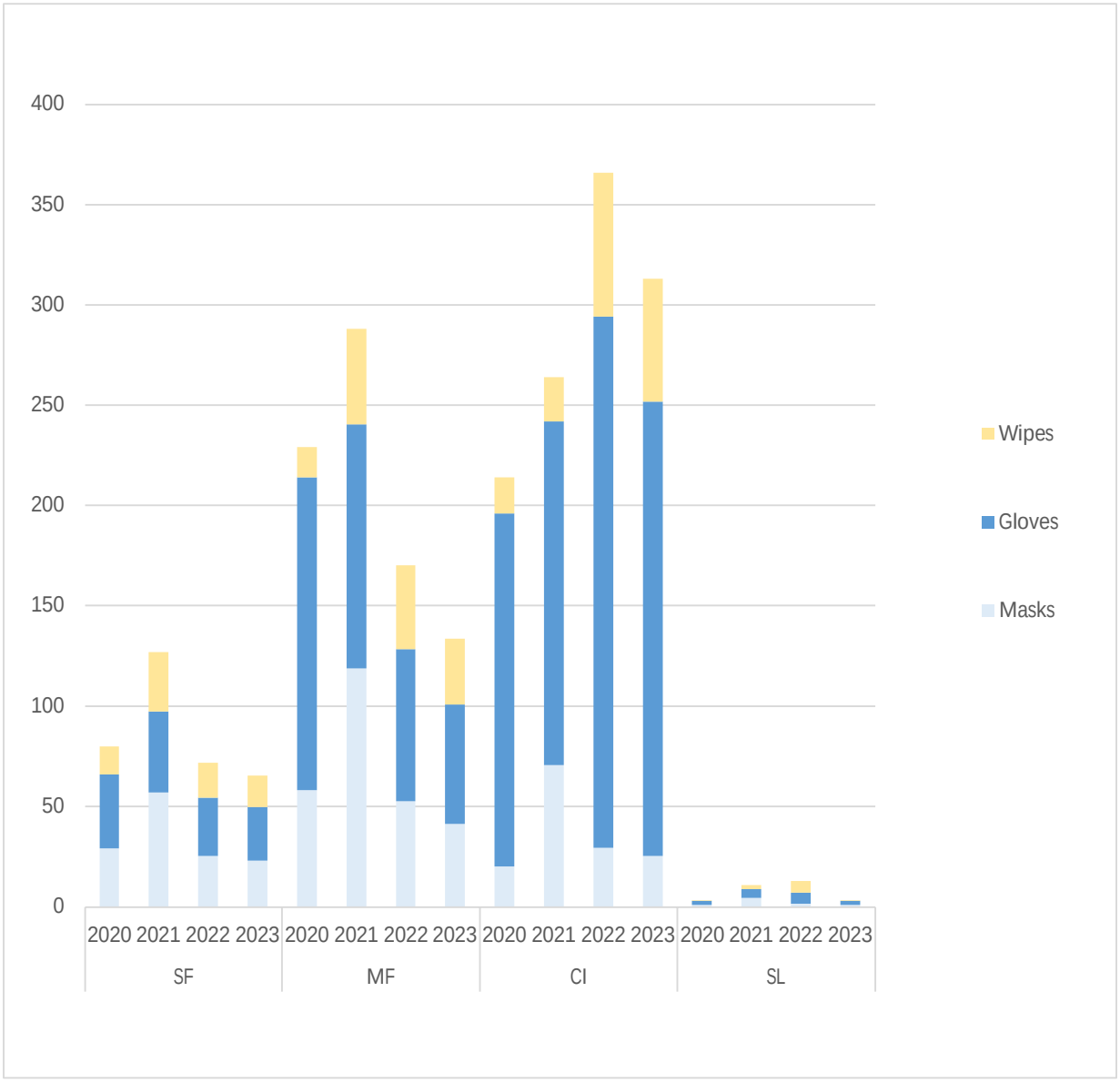


Figure 17 presents a historical comparison of the estimated disposal tonnage of PPE for each sector from 2020 to 2023. Quantities of PPE disposed decreased in every sector in 2023 compared to 2022. In the CI sector, quantities of PPE decreased compared to 2022 but are still significantly higher than previous years, with the greatest quantity of gloves and wipes disposed compared to previous years. However, wipes are difficult to identify in audits and may not always be used for personal protective purposes. In the MF sector, the estimated disposal of PPE decreased significantly compared to previous years.

Figure 17: Estimated PPE Disposal in 2020, 2021, 2022, and 2023



4.0 Limitations and Sources of Error

Limitations and potential sources of error for the study include the following:

- 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 snow. This was most evident during a two-day period of high snowfall during the fourth week of sampling.
- 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.
- 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.

5.0 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 from October 2023 to November 2023 are those reflected in this report.

Dillon prepared this report for the sole benefit of 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

Category Descriptions

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
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	
Paper	OCC	06	Other Soiled OCC	Green Bin	
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
Paper	Other Paper	14	Plastic-Lined Paper Cold Cups	SUI	Y
Paper	Other Paper	15	Plastic-Lined Paper Cups Labeled Compostable	SUI	Y
Paper	Other Paper	16	Paper Straws	SUI	Y
Paper	Other Paper	17	Unlined Paper Takeout Containers	SUI	Y
Paper	Other Paper	18	Plastic-Lined Paper Takeout Containers	SUI	Y
Paper	Other Paper	19	Plastic-Lined Paper Takeout Containers	SUI	Y
Paper	Other Paper	20	Paper bags	SUI	Y
Paper	Other Paper	21	Paper Party Décor	Recyclable	
Paper	Other Paper	22	Other Recyclable Paper	Recyclable	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Paper	Other Paper	23	Other Compostable Paper	Green Bin	
Paper	Other Paper	24	Non-compostable, Non-recyclable Paper	Limited Recycling Options	
Plastic	Film	25	Re-Used Plastic Bags	SUI	Y
Plastic	Film	26	Empty Plastic Bags	SUI	Y
Plastic	Film	27	HDPE & LDPE Consumables Packaging Bags and Film	Recyclable	
Plastic	Film	28	OFPP	Limited Recycling Options	
Plastic	Film	29	Garbage & Recycling Bags	Limited Recycling Options	
Plastic	Film	30	Freezer & Sandwich Bags	Limited Recycling Options	
Plastic	Film	31	Deposit Beverage Pouches	Recyclable	
Plastic	Film	32	Other Plastic Film		
Plastic	Textiles (Synthetic)	33	Clothing and accessories	Textiles	
Plastic	Textiles (Synthetic)	34	Household	Textiles	
Plastic	Textiles (Synthetic)	35	Reusable bags (Washable)	Textiles	Y
Plastic	Textiles (Synthetic)	36	Reusable bags (Non-washable)	Textiles	Y
Plastic	Textiles (Synthetic)	37	Other	Textiles	
Plastic	Rigid Beverage Containers	38	Dairy or Dairy Substitute	Recyclable	
Plastic	Rigid Beverage Containers	39	Deposit Containers – Water	Recyclable	
Plastic	Rigid Beverage Containers	40	Deposit Containers – Other	Recyclable	
Plastic	Rigid Beverage Containers	41	Rigid Plastic Cups	SUI	Y
Plastic	Rigid Beverage Containers	42	Other	Recyclable	
Plastic	Rigid (non-beverage)	43	# 1 PETE – Bottles and Jars	Recyclable	
Plastic	Rigid (non-beverage)	44	#1 PETE – Other Packaging	Recyclable	
Plastic	Rigid (non-beverage)	45	#2 HDPE – Bottles and Jugs	Recyclable	
Plastic	Rigid (non-beverage)	46	#2 HDPE – Tubs and Lids	Recyclable	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Plastic	Rigid (non-beverage)	47	#3 PVC	Recyclable	
Plastic	Rigid (non-beverage)	48	#4 LDPE	Recyclable	
Plastic	Rigid (non-beverage)	49	#5 PP	Recyclable	
Plastic	Rigid (non-beverage)	50	#6 PS – Non-Foam	Recyclable	
Plastic	Rigid (non-beverage)	51	#6 PS – Packing Foam	Recyclable	
Plastic	Rigid (non-beverage)	52	Foam Cups	SUI	Y
Plastic	Rigid (non-beverage)	53	Foam Takeout Containers	SUI	Y
Plastic	Rigid (non-beverage)	54	#6 PS – Foam foodware	Recyclable	
Plastic	Rigid (non-beverage)	55	#6 PS – Other PS Foam	Recyclable	
Plastic	Rigid (non-beverage)	56	Other Foam	Limited Recycling Options	
Plastic	Rigid (non-beverage)	57	#7 Mixed Resin Plastic	Recyclable	
Plastic	Rigid (non-beverage)	58	Uncoded Packaging/Containers	Recyclable	
Plastic	Rigid (non-beverage)	59	Rigid Plastic takeout Containers	SUI	Y
Plastic	Plastic Hangers	60	Rigid (non-beverage)	Limited Recycling Options	
Plastic	Rigid (non-beverage)	61	Non-durable plastic food containers		
Plastic	Other	62	Durable Plastic Products	Limited Recycling Options	
Plastic	Other	63	Plastic Straws	SUI	Y
Plastic	Other	64	Plastic Utensils	SUI	Y
Plastic	Other	65	Coffee Pods	Limited Recycling Options	
Compostable Plastic	Other	66	Other/Mixed Plastics	Limited Recycling Options	
Compostable Plastic	Foodware	67	Rigid Plastic Cups Labeled Compostable	SUI	Y
Compostable Plastic	Foodware	68	"Plastic Takeout Containers Labeled Compostable"	SUI	Y
Compostable Plastic	Foodware	69	Other Foodware Labeled Compostable	SUI	Y
Compostable Plastic	Film	70	Plastic Bags Labeled Compostable	SUI	Y
Compostable Plastic	Film	71	Bags and Liners	Limited Recycling Options	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Compostable Organics	Other Compostable Products and Packaging	72	Packaging , Bottles	Limited Recycling Options	
Compostable Organics	Yard & Garden	73	Small Yard Waste	Green Bin	
Compostable Organics		74	Large Yard Waste	Green Bin	
Compostable Organics	Food Waste - Unavoidable	75	Unavoidable Food Waste	Green Bin	
Compostable Organics	Food Waste - Avoidable	76	Plate Scrapings, Unfinished Meals	Green Bin	
Compostable Organics	Food Waste – Avoidable	77	Whole Fruits and Vegetables	Green Bin	
Compostable Organics	Food Waste – Avoidable	78	Whole Meats, Fish	Green Bin	
Compostable Organics	Food Waste – Avoidable	79	Full/Unused Ready-Made	Green Bin	
Compostable Organics	Food Waste – Avoidable	80	Baked Goods	Green Bin	
Compostable Organics	Food Waste – Avoidable	81	Dairy	Green Bin	
Compostable Organics	Food Waste – Avoidable	82	Liquids (drinks, oil in package)	Green Bin	
Compostable Organics	Food Waste – Avoidable	83	Candy and snacks	Green Bin	
Compostable Organics	Food Waste – Avoidable	84	Condiments and sauces	Green Bin	
Compostable Organics	Food Waste – Avoidable	85	Pet food	Green Bin	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Compostable Organics	Clean Wood	86	Wood Pallets	C&D	
Compostable Organics	Clean Wood	87	Unfinished Wood Furniture	C&D	Y
Compostable Organics	Clean Wood	88	Wood Utensils	SUI	
Compostable Organics	Clean Wood	89	Other Wood	C&D	
Non-compostable organics	Other Compostable Organics	90	Manure, Slaughterhouse, Animals		
Non-compostable organics	Treated or Painted Wood	91	Pressure Treated Wood	C&D	
Non-compostable organics	Treated or Painted Wood	92	Finished Wood	C&D	
Non-compostable organics	Treated or Painted Wood	93	Finished Wood Furniture	C&D	
Non-compostable organics	Textiles	94	Natural Fiber Clothing	Textiles	
Non-compostable organics	Textiles	95	Household	Textiles	Y
Non-compostable organics	Textiles	96	Reusable bags	Textiles	
Non-compostable organics	Textiles	97	Other	Textiles	
Non-compostable organics	Rubber	98	Tires	Recyclable	
Non-compostable organics	Rubber	99	Other Rubber	Recyclable	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Non-compostable organics	Leather / Multiple/Composite Organic Materials	100	Leather	Limited Recycling Options	
Non-compostable organics	Other	101	Composite Organic Materials (shoes)	Textiles	
Metals	Other	102	Other	Textiles	
Metals	Ferrous	103	Food Containers	Recyclable	
Metals	Ferrous	104	Spiral-Wound Containers	Recyclable	
Metals	Ferrous	105	Other Ferrous	Recyclable	
Metals	Bimetallic	106	Food Containers	Recyclable	
Metals	Non-Ferrous (copper, aluminum, brass)	107	Alcoholic	Recyclable	
Metals	Non-Ferrous (copper, aluminum, brass)	108	Non-Alcoholic	Recyclable	
Metals	Non-Ferrous (copper, aluminum, brass)	109	Food Containers	Recyclable	
Metals	Non-Ferrous (copper, aluminum, brass)	110	Foil Trays, Wrap	Recyclable	
Metals	Non-Ferrous (copper, aluminum, brass)	111	Other Non-Ferrous	Recyclable	
Metals	Non-Consumable Mixed Metals	112	Household	Recyclable	
Metals	Non-Consumable Mixed Metals	113	Machine Parts	Recyclable	
Glass	Non-Consumable Mixed Metals	114	Construction/Industrial	Recyclable	
Glass	Beverage Containers	115	Beer	Recyclable	
Glass	Beverage Containers	116	Other Alcohol	Recyclable	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Glass	Beverage Containers	117	Non-Alcoholic & Non-Dairy	Recyclable	
Glass	Beverage Containers	118	Dairy or Dairy Substitute	Recyclable	
Glass	Food Containers	119	Food Containers	Recyclable	
Glass	Other Glass and Ceramics	120	Other Glass and Ceramics	Limited Recycling Options	
Building Material	Other Glass and Ceramics	121	Light bulbs (Non-hazardous)	Recyclable	
Building Material	Gypsum / Drywall	122	Gypsum/Drywall	C&D	
Building Material	Masonry	123	Masonry	C&D	
Building Material	Rock, Sand, Dirt	124	Rock, Sand, Dirt	C&D	
Building Material	Rigid Asphalt	125	Rigid Asphalt	C&D	
Building Material	Carpet Waste	126	Carpet	C&D	
Building Material	Carpet Waste	127	Underlay	C&D	
Electronic Waste	Other Inorganics	128	Other Inorganics	C&D	
Electronic Waste	Computers and Peripherals	129	Desktop Computers	Recyclable	
Electronic Waste	Computers and Peripherals	130	Notebook Computers	Recyclable	
Electronic Waste	Computers and Peripherals	131	Computer Peripherals	Recyclable	
Electronic Waste	Computers and Peripherals	132	Computer Monitors	Recyclable	
Electronic Waste	Computers and Peripherals	133	Printers, Scanners	Recyclable	
Electronic Waste	Televisions & AV Equipment	134	Televisions	Recyclable	
Electronic Waste	Televisions & AV Equipment	135	Other Audio/Video	Recyclable	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Electronic Waste	Telephones & Telecommunications Equipment	136	Mobile Phones & Accessories	Recyclable	
Electronic Waste	Telephones & Telecommunications Equipment	137	Other	Recyclable	
Electronic Waste	Small Appliances & Floor Care Appliances	138	Small Appliances & Floor Care Appliances	Recyclable	
Electronic Waste	Electronic Toys	139	Electronic Toys	Recyclable	
Electronic Waste	Smoke Detectors	140	Smoke Detectors	Recyclable	
Household Hazardous	Other Electronics	141	Other Electronics	Recyclable	
Household Hazardous	Batteries	142	Lead Acid	Recyclable	
Household Hazardous	Batteries	143	Household Batteries (Non Lithium-Ion)	Recyclable	
Household Hazardous	Batteries	144	Lithium Ion Batteries	Recyclable	
Household Hazardous	Medical/Biological	145	Sharps		
Household Hazardous	Medical/Biological	146	Animal Carcass		
Household Hazardous	Medical/Biological	147	Other		
Household Hazardous	HHW	148	Stains/Preservatives	Recyclable	
Household Hazardous	HHW	149	Latex Paint	Recyclable	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Household Hazardous	HHW	150	Oil-Based Paint	Recyclable	
Household Hazardous	HHW	151	Paint Aerosols	Recyclable	
Household Hazardous	HHW	152	Solvents	Recyclable	
Household Hazardous	HHW	153	Cleaners, Soaps etc.	Recyclable	
Household Hazardous	HHW	154	Pesticides/Herbicides/Preservatives	Recyclable	
Household Hazardous	HHW	155	Motor Oil	Recyclable	
Household Hazardous	HHW	156	Oil Filters	Recyclable	
Household Hazardous	HHW	157	Antifreeze	Recyclable	
Household Hazardous	HHW	158	Pharmaceuticals	Recyclable	
Household Hazardous	HHW	159	Other Petroleum Based Products	Recyclable	
Household Hazardous	HHW	160	Other	Recyclable	
Household Hazardous	Mercury Containing Items	161	Thermostats and Switches	Recyclable	
Household Hazardous	Mercury Containing Items	162	CFLs	Recyclable	
Household Hazardous	Other HHW	163	Other HHW or Containers		
Household Hygiene	Biological	164	Diapers	Limited Recycling Options	

Primary	Secondary	Category Number	Tertiary	Functional Group	Count?
Household Hygiene	Biological	165	Pet Waste	Limited Recycling Options	
Household Hygiene	Biological	166	Other (sanitary products, condoms)	Limited Recycling Options	
Household Hygiene	Public Health	167	Masks	PPE	Y
Household Hygiene	Public Health	168	Gloves	PPE	Y
Household Hygiene	Public Health	169	Wipes	PPE	Y
Bulky Objects	Liquid Product	170	Personal Care	Limited Recycling Options	
Bulky Objects	White Goods	171	Large Appliances	Recyclable	
Bulky Objects	Furniture	172	Mattresses, Box Springs	Recyclable	
Bulky Objects	Furniture	173	Other Upholstered Furniture		
Fines	Furniture	174	Other Furniture		
	Fines	175	Fines	Limited Recycling Options	

Appendix B

Functional Categories Listing

Functional Category	Sorting Category
Green Bin	006 - Other Soiled OCC
	023 - Other Compostable Paper
	073 - Small Yard Waste
	074 - Large Yard Waste
	075 - Unavoidable Food Waste
	076 - Plate Scrapings, Unfinished Meals
	077 - Whole Fruits and Vegetables
	078 - Whole Meats, Fish
	079 - Full/Unused Ready-Made
	080 - Baked Goods
	081 - Dairy
	082 - Liquids (drinks, oil in package)
	083 - Candy and snacks
	084 - Condiments and sauces
	085 - Pet food
Limited Recycling Options	005 - Waxed OCC
	021 - Paper Party Décor
	024 - Non-compostable, non-recyclable paper
	029 - Garbage & Recycling Bags
	030 - Freezer and Sandwich Bags
	032 - Other Plastic Film
	056 - Other Foam
	060 – Plastic Hangers
	061 - Non-durable Plastic Food Containers
	062 - Durable Plastic Products
	066 - Other/Mixed Plastics
	071 - #7 Bio Flexible - Bags and Liners
	072 - Packaging , Bottles
	099 - Other Rubber
	102 - Other
	120 - Other Glass and Ceramics
	164 - Diapers
	165 - Pet Waste
	166 - Other (sanitary products, condoms)
	170 - Personal Care
	175 - Fines
Recyclable	001 - Junk Mail, Flyers, Unaddressed Mail
	002 - Other Fine Office Paper or Envelopes
	003 – Newsprint

Functional Category	Sorting Category
	004 - Clean Recyclable OCC
	007 - Cereal Boxes and Other Box Packaging
	008 - Telephone Books
	009 - Magazines
	010 - Books
	011 - Dairy or Dairy Substitute
	012 - Non-Dairy/Deposit
	022 - Other Recyclable Paper
	027 - HDPE & LDPE Consumables Packaging Bags and Film
	028 - Other Flexible Plastic Packaging (Multi-Layered and Other Flexible Resin)
	031 - Deposit Beverage Pouches
	038 - Deposit Containers - Dairy or Dairy Substitute
	039 - Deposit Containers – Water
	040 - Deposit Containers – Other
	042 - Other
	043 - # 1 PETE – Bottles and Jars
	044 - #1 PETE – Other Packaging
	045 - #2 HDPE – Bottles and Jugs
	046 - #2 HDPE – Tubs and Lids
	047 - #3 PVC
	048 - #4 LDPE
	049 - #5 PP
	050 - #6 PS – Non-Foam
	051 - #6 PS – Packing Foam
	054 - #6 PS – Foam foodware
	055 - #6 PS – Other PS Foam
	057 - #7 Mixed Resin Plastic
	058 - Uncoded Packaging/Containers
	098 - Tires
	103 - Food Containers
	104 - Spiral-Wound Containers
	105 - Other Ferrous
	106 - Food Containers
	107 - Alcoholic
	108 - Non-Alcoholic
	109 - Food Containers
	110 - Foil Trays, Wrap
	111 - Other Non-Ferrous
	112 - Household

Functional Category	Sorting Category
	113 - Machine Parts
	114 - Construction/Industrial
	115 - Beer
	116 - Other Alcohol
	117 - Non-Alcoholic & Non-Dairy
	118 - Dairy or Dairy Substitute
	119 - Food Containers
	121 - Light bulbs (Non-hazardous)
	129 - Desktop Computers
	130 - Notebook Computers
	131 - Computer Peripherals
	132 - Computer Monitors
	133 - Printers, Scanners
	134 - Televisions
	135 - Other Audio/Video
	136 - Mobile Phones & Accessories
	137 - Other
	138 - Small Appliances & Floor Care Appliances
	139 - Electronic Toys
	140 - Smoke Detectors
	141 - Other Electronics
	142 - Lead Acid
	143 - Household Batteries (Non Lithium-Ion)
	144 - Lithium Ion Batteries
	148 - Stains/Preservatives
	149 - Latex Paint
	150 - Oil-Based Paint
	151 - Paint Aerosols
	152 - Solvents
	153 - Cleaners, Soaps etc.
	154 - Pesticides/Herbicides/Preservatives
	155 - Motor Oil
	156 - Oil Filters
	157 - Antifreeze
	158 - Pharmaceuticals
	159 - Other Petroleum Based Products
	160 - Other
	161 - Thermostats and Switches
	162 - CFLs

Functional Category	Sorting Category
	171 - Large Appliances
	172 - Mattresses, Box Springs
Textiles	033 - Clothing and accessories
	034 - Household
	035 - Reusable bags (washable)
	036 - Reusable bags (non-washable)
	037 - Other
	094 - Natural Fiber Clothing
	095 - Household
	096 - Natural fiber bags
	097 - Other
	100 - Leather
	101- Composite Organic Materials (shoes)
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
	025 - Re-Used HDPE & LDPE Plastic Bags
	026 - Empty HDPE & LDPE Plastic Bags
	041 - Rigid Plastic Cups
	052 - Foam Cups
	054- Foam Takeout Containers
	059 - Rigid Plastic takeout Containers
	063 - Plastic Straws
	064 - Plastic Utensils
	067 - Rigid Plastic Cups Labeled Compostable
	"068 - Plastic Takeout Containers Labeled Compostable"
	069 - Other Foodware Labeled Compostable
	070 - #7 Bio Flexible - Plastic Bags Labeled Compostable
PPE	167 - Masks
	168 - Gloves
	169 - Wipes

Appendix C

All Waste Composition by Sector

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Category	SF	MF	CI	SL	Combined (n=100)
01-Paper	16%	19%	15%	6%	14%
1-Junk Mail, Flyers, Unaddressed Mail	0.3%	1.7%	0.1%	0.1%	0.5%
2-Other Fine Office Paper or Envelopes	2.4%	0.9%	0.6%	0.3%	0.9%
3-Newsprint	0.2%	0.1%	0.0%	0.0%	0.1%
4-Clean Recyclable OCC	0.2%	1.3%	3.1%	2.4%	1.9%
5-Waxed OCC	0.0%	0.0%	0.9%	0.0%	0.4%
6-Other Soiled OCC	0.2%	0.3%	0.1%	0.1%	0.2%
7-Cereal Boxes and Other Box Packaging	1.3%	1.9%	1.0%	1.1%	1.3%
8-Telephone Books	0.0%	0.0%	0.0%	0.0%	0.0%
9-Magazines	0.2%	0.1%	0.3%	0.0%	0.2%
10-Books	0.3%	1.5%	0.5%	0.1%	0.6%
11-Dairy or Dairy Substitute	0.1%	0.1%	0.1%	0.0%	0.1%
12-Non-Dairy/Deposit	0.1%	0.1%	0.0%	0.0%	0.1%
13-Plastic-Lined Paper Hot Cups	0.3%	0.4%	0.5%	0.1%	0.3%
14-Plastic-Lined Paper Cold Cups	0.2%	0.1%	0.3%	0.0%	0.2%
15-Plastic-Lined Paper Cups Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
16-Paper Straws	0.0%	0.0%	0.1%	0.0%	0.0%
17-Unlined Paper Takeout Containers	0.1%	0.1%	0.1%	0.0%	0.1%
18-Plastic-Lined Paper Takeout Containers	0.4%	0.4%	0.2%	0.1%	0.3%
19-Plastic-Lined Paper Takeout Containers	0.4%	0.4%	0.2%	0.1%	0.3%
20-Paper bags	0.8%	1.0%	0.3%	0.2%	0.5%
21-Paper Party Décor	0.0%	0.0%	0.0%	0.0%	0.0%
22-Other Recyclable Paper	0.4%	0.6%	1.2%	0.2%	0.7%
23-Other Compostable Paper	6.8%	6.7%	1.8%	0.8%	3.6%
24-Non-compostable, non-recyclable paper	1.0%	0.8%	3.5%	0.2%	1.8%
02-Plastic	20%	19%	17%	15%	18%
25 - Re-Used HDPE & LDPE Plastic Bags	0.1%	0.1%	0.0%	0.0%	0.0%
26 - Empty HDPE & LDPE Plastic Bags	0.1%	0.0%	0.0%	0.0%	0.0%
27 - HDPE & LDPE Consumables Packaging Bags and Film	1.1%	1.2%	1.3%	0.6%	1.0%
28 - Other Flexible Plastic Packaging (Multi-Layered and Other Flexible Resin)	3.5%	2.4%	3.1%	0.8%	2.5%
29 - Garbage & Recycling Bags	1.4%	1.6%	0.8%	0.7%	1.0%
30 - Freezer and Sandwich Bags	0.3%	0.2%	0.2%	0.0%	0.2%
31 - Deposit Beverage Pouches	0.1%	0.0%	0.0%	0.0%	0.1%
32 - Other Plastic Film	0.4%	0.3%	1.8%	0.2%	0.9%
33 - Clothing and accessories	2.2%	1.3%	0.2%	0.6%	1.0%
34 - Household	2.8%	2.1%	0.9%	1.5%	1.7%
35 - Reusable bags - Washable	0.2%	0.1%	0.0%	0.1%	0.1%
36 - Reusable bags - Non washable	0.0%	0.1%	0.0%	0.0%	0.0%
37 - Other	0.7%	0.6%	0.7%	0.8%	0.7%
38 - Deposit Containers - Dairy or Dairy Substitute	0.2%	0.2%	0.1%	0.0%	0.1%
39 - Deposit Containers – Water	0.0%	0.1%	0.1%	0.0%	0.1%
40 - Deposit Containers – Other	0.1%	0.2%	0.1%	0.1%	0.1%
41 - Rigid Plastic Cups	0.2%	0.2%	0.1%	0.1%	0.1%

Category	SF	MF	CI	SL	Combined (n=100)
42 - Other	0.7%	0.6%	0.7%	0.8%	0.7%
43 - # 1 PETE – Bottles and Jars	0.2%	0.3%	0.0%	0.1%	0.1%
44 - #1 PETE – Other Packaging	0.4%	0.5%	0.2%	0.1%	0.2%
45 - #2 HDPE – Bottles and Jugs	0.3%	0.4%	0.3%	0.2%	0.3%
46 - #2 HDPE – Tubs and Lids	0.1%	0.3%	0.1%	0.3%	0.2%
47 - #3 PVC	0.1%	0.0%	0.1%	0.3%	0.1%
48 - #4 LDPE	0.0%	0.0%	0.0%	0.0%	0.0%
49 - #5 PP	0.3%	0.5%	0.2%	0.2%	0.3%
50 - #6 PS – Non-Foam	0.1%	0.1%	0.1%	0.0%	0.1%
51 - #6 PS – Packing Foam	0.4%	0.0%	0.0%	0.1%	0.1%
52 - Foam Cups	0.0%	0.0%	0.0%	0.0%	0.0%
53 - Foam Takeout Containers	0.0%	0.0%	0.0%	0.0%	0.0%
54 - #6 PS – Foam Food Ware	0.4%	0.3%	0.0%	0.1%	0.2%
55 - #6 PS – Other PS Foam	0.0%	0.0%	0.0%	0.1%	0.0%
56 - Other Foam	0.2%	0.6%	0.1%	0.6%	0.3%
57 - #7 Mixed Resin Plastic	0.0%	0.1%	0.0%	0.0%	0.0%
58 - Uncoded Packaging/Containers	0.5%	0.4%	0.1%	0.1%	0.2%
59 - Rigid Plastic takeout Containers	0.4%	0.7%	0.1%	0.0%	0.3%
60 - Plastic Hangers	0.0%	0.1%	0.1%	0.0%	0.1%
61 - Non-durable Plastic Food Containers	0.0%	0.0%	0.1%	0.0%	0.0%
62 - Durable Plastic Products	1.9%	2.8%	5.4%	5.7%	4.2%
63 - Plastic Straws	0.0%	0.0%	0.0%	0.0%	0.0%
64 - Plastic Utensils	0.0%	0.1%	0.0%	0.0%	0.0%
65 - Coffee Pods	0.7%	0.2%	0.1%	0.0%	0.2%
66 - Other/Mixed Plastics	0.0%	0.0%	0.1%	0.3%	0.1%
03-Compostable Plastic	0%	0%	0%	0%	0%
67 - Rigid Plastic Cups Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
68 - Plastic Takeout Containers Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
69 - Other Food Ware Labeled Compostable	0.0%	0.0%	0.0%	0.0%	0.0%
70 - #7 Bio Flexible - Plastic Bags Labeled Compostable	0.1%	0.1%	0.0%	0.0%	0.0%
71 - #7 Bio Flexible - Bags and Liners	0.0%	0.0%	0.0%	0.0%	0.0%
72 - Packaging , Bottles	0.0%	0.0%	0.0%	0.0%	0.0%
04-Compostable Organics	24%	28%	20%	19%	23%
73 - Small Yard Waste	2.4%	1.1%	0.7%	4.8%	1.9%
74 - Large Yard Waste	0.0%	0.0%	0.0%	0.0%	0.0%
75 - Unavoidable Food Waste	10.8%	13.4%	1.4%	1.1%	5.7%
76 - Plate Scrapings, Unfinished Meals	1.6%	1.5%	0.4%	0.4%	0.8%
77 - Whole Fruits and Vegetables	2.2%	2.4%	0.1%	1.1%	1.2%
78 - Whole Meats, Fish	1.2%	0.5%	0.4%	0.1%	0.5%
79 - Full/Unused Ready-Made	0.7%	1.0%	1.3%	0.6%	0.9%
80 - Baked Goods	1.2%	2.8%	2.8%	0.5%	1.9%
81 - Dairy	0.8%	0.5%	0.2%	0.0%	0.3%

Category	SF	MF	CI	SL	Combined (n=100)
82 - Liquids (drinks, oil in package)	0.9%	0.6%	1.0%	0.3%	0.7%
83 - Candy and snacks	0.9%	0.9%	0.5%	0.2%	0.6%
84 - Condiments and sauces	0.7%	1.0%	0.2%	0.8%	0.6%
85 - Pet food	0.6%	0.0%	0.4%	0.0%	0.2%
86 - Wood Pallets	0.0%	1.0%	3.2%	0.0%	1.4%
87 - Unfinished Wood Furniture	0.0%	0.2%	0.5%	3.1%	0.9%
88 - Wood Utensils	0.1%	0.1%	0.0%	0.0%	0.0%
89 - Other Wood	0.1%	1.1%	6.8%	6.0%	4.1%
90 - Manure, Slaughterhouse, Animals	0.0%	0.0%	0.6%	0.0%	0.2%
05-Non-Compostable Organics	9%	7%	22%	21%	15%
91 - Pressure Treated Wood	0.0%	0.0%	5.1%	7.8%	0.6%
92 - Finished Wood	0.2%	0.5%	7.6%	7.2%	5.7%
93 - Finished Wood Furniture	2.4%	0.2%	5.3%	0.8%	7.7%
94 - Natural Fiber Clothing	3.5%	4.0%	0.1%	0.3%	2.2%
95 - Household	0.9%	1.8%	0.9%	1.5%	1.0%
96 - Reusable bags	0.0%	0.0%	0.0%	0.0%	0.0%
97 - Other	0.1%	0.7%	0.7%	0.8%	0.3%
98 - Tires	0.0%	0.0%	0.7%	0.0%	0.0%
99 - Other Rubber	0.2%	0.2%	0.6%	1.5%	0.2%
100 - Leather	0.1%	0.1%	0.2%	0.1%	0.1%
101 - Composite Organic Materials (shoes)	1.0%	1.1%	0.2%	0.3%	0.8%
102 - Other	0.0%	0.0%	0.7%	0.8%	0.0%
06-Metal	4%	6%	5%	5%	5%
103 - Food Containers	0.2%	0.5%	0.1%	0.2%	0.2%
104 - Spiral-Wound Containers	0.1%	0.0%	0.0%	0.0%	0.0%
105 - Other Ferrous	0.0%	0.0%	0.4%	0.1%	0.2%
106 - Food Containers	0.2%	0.5%	0.1%	0.2%	0.2%
107 - Alcoholic	0.0%	0.2%	0.1%	0.0%	0.1%
108 - Non-Alcoholic	0.0%	0.2%	0.1%	0.1%	0.1%
109 - Food Containers	0.2%	0.5%	0.1%	0.2%	0.2%
110 - Foil Trays, Wrap	0.5%	0.3%	0.1%	0.1%	0.2%
111 - Other Non-Ferrous	0.1%	0.1%	0.7%	0.0%	0.3%
112 - Household	2.8%	2.1%	0.9%	1.5%	1.7%
113 - Machine Parts	0.2%	0.1%	0.6%	0.8%	0.4%
114 - Construction/Industrial	0.3%	1.9%	1.7%	1.9%	1.5%
07-Glass	2%	3%	2%	3%	3%
115 - Beer	0.1%	0.2%	0.2%	0.1%	0.2%
116 - Other Alcohol	0.1%	0.8%	0.2%	0.0%	0.3%
117 - Non-Alcoholic & Non-Dairy	0.1%	0.3%	0.1%	0.0%	0.1%
118 - Dairy or Dairy Substitute	0.1%	0.1%	0.1%	0.0%	0.1%
119 - Food Containers	0.2%	0.5%	0.1%	0.2%	0.2%
120 - Other Glass and Ceramics	1.5%	1.1%	1.3%	2.5%	1.5%
121 - Light bulbs (Non-hazardous)	0.1%	0.1%	0.1%	0.1%	0.1%
08-Building Material	2%	2%	8%	16%	7%
122 - Gypsum/Drywall	1.0%	0.0%	0.6%	0.0%	0.4%

Category	SF	MF	CI	SL	Combined (n=100)
123 - Masonry	0.1%	0.0%	2.8%	5.4%	2.2%
124 - Rock, Sand, Dirt	0.0%	1.4%	0.5%	2.1%	0.9%
125 - Rigid Asphalt	0.0%	0.0%	0.0%	0.0%	0.0%
126 - Carpet	0.3%	0.0%	2.8%	5.2%	2.2%
127 - Underlay	0.0%	0.1%	0.2%	1.4%	0.4%
128 - Other Inorganics	0.5%	0.7%	1.2%	2.0%	1.1%
09-Electronic Waste	3%	3%	3%	4%	3%
129 - Desktop Computers	0.0%	0.0%	0.0%	0.0%	0.0%
130 - Notebook Computers	0.0%	0.1%	0.0%	0.0%	1.0%
131 - Computer Peripherals	0.1%	0.1%	0.0%	0.2%	0.1%
132 - Computer Monitors	0.0%	0.0%	0.0%	0.0%	0.0%
133 - Printers, Scanners	0.0%	0.0%	0.0%	0.0%	0.0%
134 - Televisions	0.0%	0.0%	0.0%	0.0%	0.0%
135 - Other Audio/Video	0.1%	0.1%	0.0%	0.5%	0.2%
136 - Mobile Phones & Accessories	0.0%	0.1%	0.0%	0.0%	0.0%
137 - Other	0.7%	0.6%	0.7%	0.8%	0.7%
138 - Small Appliances & Floor Care Appliances	1.3%	1.1%	0.8%	0.3%	0.9%
139 - Electronic Toys	0.2%	0.1%	0.0%	0.8%	0.2%
140 - Smoke Detectors	0.0%	0.0%	0.0%	0.0%	0.0%
141 - Other Electronics	0.9%	0.5%	1.1%	1.4%	1.0%
10-Household Hazardous	2%	2%	2%	2%	2%
142 - Lead Acid	0.1%	0.0%	0.0%	0.0%	0.0%
143 - Household Batteries (Non Lithium-Ion)	0.1%	0.0%	0.0%	0.0%	0.0%
144 - Lithium Ion Batteries	0.0%	0.0%	0.0%	0.0%	0.0%
145 - Sharps	0.0%	0.0%	0.0%	0.0%	0.0%
146 - Animal Carcass	0.0%	0.0%	0.0%	0.0%	0.0%
147 - Other	0.7%	0.6%	0.7%	0.8%	0.7%
148 - Stains/Preservatives	0.0%	0.0%	0.0%	0.0%	0.0%
149 - Latex Paint	0.1%	0.1%	0.1%	0.0%	0.1%
150 - Oil-Based Paint	0.0%	0.0%	0.1%	0.0%	0.0%
151 - Paint Aerosols	0.0%	0.0%	0.0%	0.0%	0.0%
152 - Solvents	0.0%	0.0%	0.1%	0.1%	0.0%
153 - Cleaners, Soaps etc.	0.1%	0.0%	0.2%	0.2%	0.1%
154 - Pesticides/Herbicides/Preservatives	0.0%	0.0%	0.1%	0.0%	0.0%
155 - Motor Oil	0.0%	0.0%	0.0%	0.0%	0.0%
156 - Oil Filters	0.0%	0.0%	0.0%	0.0%	0.0%
157 - Antifreeze	0.0%	0.1%	0.0%	0.0%	0.0%
158 - Pharmaceuticals	0.2%	0.3%	0.0%	0.0%	0.1%
159 - Other Petroleum Based Products	0.0%	0.0%	0.0%	0.0%	0.0%
160 - Other	0.7%	0.6%	0.7%	0.8%	0.7%
161 - Thermostats and Switches	0.0%	0.0%	0.0%	0.0%	0.0%
162 - CFLs	0.0%	0.0%	0.0%	0.0%	0.0%
163 - Other HHW or Containers	0.0%	0.0%	0.0%	0.0%	0.0%
11-Household Hygiene	14%	9%	1%	2%	6%
164 - Diapers	6.2%	4.3%	0.3%	0.6%	2.4%

Category	SF	MF	CI	SL	Combined (n=100)
165 - Pet Waste	5.3%	2.9%	0.1%	0.9%	1.9%
166 - Other (sanitary products, condoms)	0.9%	0.7%	0.1%	0.1%	0.4%
167 - Masks	0.0%	0.1%	0.0%	0.1%	0.0%
168 - Gloves	0.1%	0.3%	0.3%	0.0%	0.2%
169 - Wipes	0.1%	0.3%	0.1%	0.0%	0.1%
170 - Personal Care	0.9%	0.5%	0.3%	0.1%	0.4%
12-Bulky Objects	1%	1%	4%	6%	3%
171 - Large Appliances	0.0%	0.0%	0.0%	0.0%	0.0%
172 - Mattresses, Box Springs	0.0%	0.0%	0.0%	0.2%	0.0%
173 - Other Upholstered Furniture	1.0%	0.2%	1.0%	4.1%	1.5%
174 - Other Furniture	0.0%	0.6%	2.9%	2.2%	1.7%
13-Fines	2%	1%	1%	1%	1%
175-Fines	2.0%	1.4%	0.6%	1.0%	1.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix D

Selected Site Photos

Photo 1: Sorting area at Metro Vancouver North Surrey Recycling and Waste Centre.

Photo 2: Sorting area at Metro Vancouver United Boulevard Recycling and Waste Centre.

Photo 3: Sorting area at Metro Vancouver North Shore Recycling and Waste Centre.

Photo 4: Waste load being unloaded for sampling at North Surrey Recycling and Waste Centre.

Photo 5: At North Surrey R&WC, Small load at **drop-off, before sample selection.**

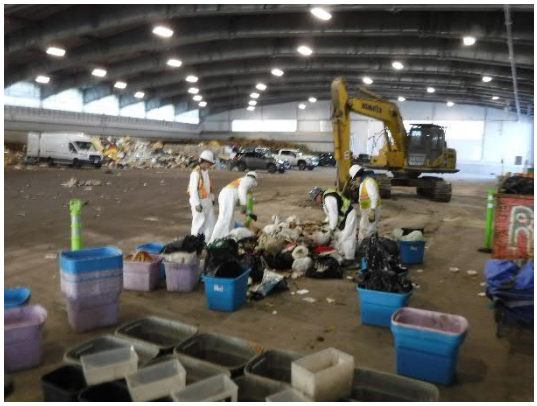

Photo 6: Sampling occurring from waste load at United Boulevard Recycling and Waste Centre.

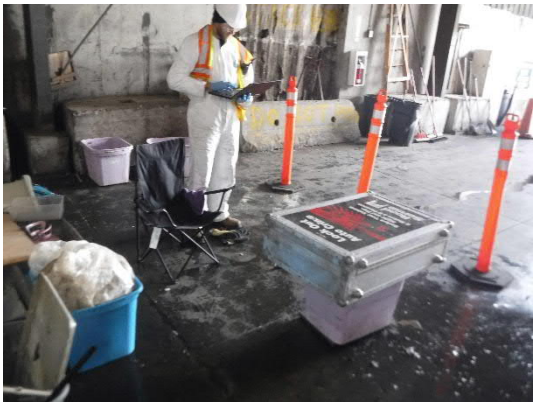

Photo 7: Weigh in.

Photo 8: Load SU-CI-003 at North Surrey Recycling and Waste Centre. (Commercial/ **Institution)**

Photo 9: Load UB2-SF-018 at United Boulevard Recycling and Waste Centre. (Single-Family)

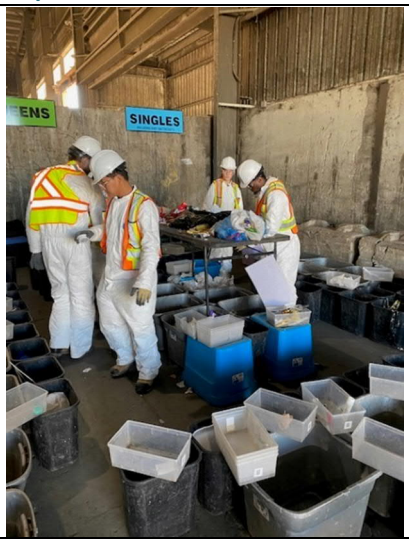

Photo 10: Sorting

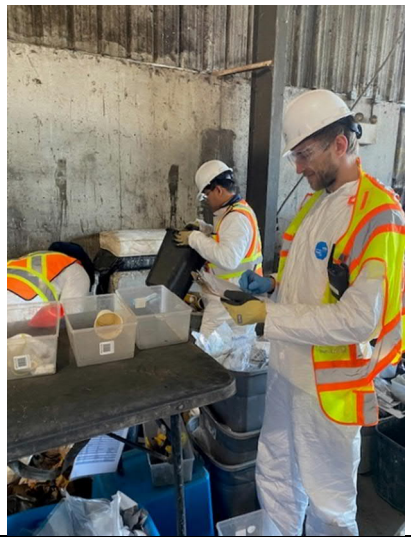

Photo 11: SUI count and photos.

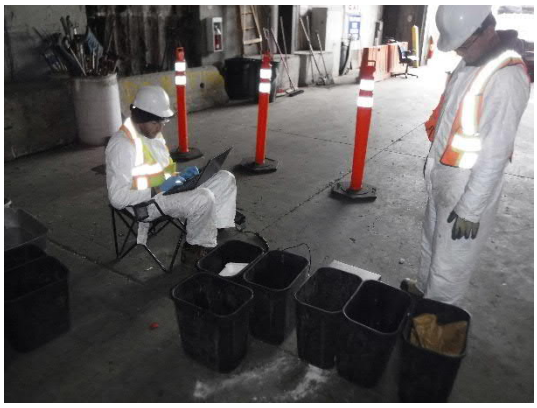

Photo 12: Weigh out.

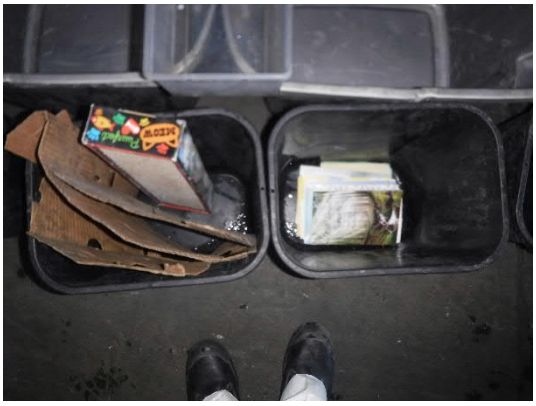

Photo 13: Paper, Clean Recyclable OCC (4), and Books (10).

Photo 14: Paper Cold Cups (14).

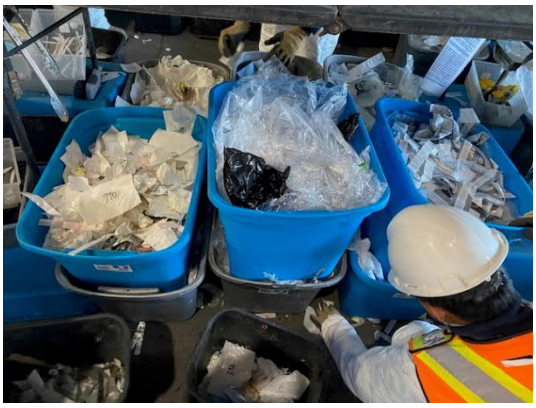

Photo 15: Paper, Non-compostable, non-**recyclable paper (24), and Plastic Film (27).**

Photo 16: Plastic, Deposit Containers- Dairy or Dairy Substitute (37).

Photo 17: Plastic, Rigid Plastic Cups (40), #6 PS-Non-foam (49), and Film, Empty Plastic bags (26).

Photo 18: Plastic, Other Foam (55).

Photo 19: Compostable organics, Food Waste-Avoidable, Whole Fruits and Vegetables (75).

Photo 20: Compostable Organics, Yard and Garden, Small Yard Waste (71), and Food Waste-Avoidable, Plate Scrapings, Unfinished Meals (74).

	
Photo 21: Plastic, Textiles (Synthetic), Clothing and accessories (33), Household (34), Other (36), **and Non-Compostable Organics, Textiles,** Natural Fiber Clothing (92), Household (93).	Photo 22: Building Materials, Masonry (121).
	
Photo 23: Household Hazardous, Medical/Biological, Sharps (143), Household Hygiene, Biological, Diapers (162), and Pet Waste (163).	Photo 24: Single-use items, Paper straws (16), Wooden utensils (86), Disposable gloves (166), and Wipes (167).

Appendix E

All SUI Counts by Sector

Category	Regional Disposal Count (millions of units)				
	SF	MF	CI	SL	Total
Retail Bags	63.38	99.35	62.93	11.23	223.56
20-Paper bags	40.38	73.42	40.54	7.57	159.02
25-Re-Used HDPE & LDPE Plastic Bags	9.12	12.10	3.11	1.65	25.29
26-Empty HDPE & LDPE Plastic Bags	10.90	10.72	6.98	1.40	29.44
35-Reusable Bags (synthetic - washable)	<1	<1	<1	<1	<1
36-Reusable Bags (synthetic - non-washable)	<1	<1	<1	<1	<1
70-#7 Bio Flexible - Plastic Bags Labeled Compostable	2.35	2.65	2.64	0.60	8.12
71-#7 Bio Flexible – Bags and Liners	<1	<1	<1	<1	<1
96-Reusable Bags (non-compostable organics)	0.64	0.46	0.66	<1	1.69
Cups	60.89	109.61	180.31	7.22	326.66
13-Plastic-Lined Paper Hot Cups	18.52	53.71	101.24	2.51	156.40
14-Plastic-Lined Paper Cold Cups	27.63	21.67	48.97	1.65	95.41
15-Plastic-Lined Paper Cups Labeled Compostable	0.14	1.15	1.32	<1	2.20
41-Rigid Plastic Cups	14.60	31.23	27.74	3.06	70.29
52-Foam Cups	0.07	1.84	0.09	<1	1.52
67-Rigid Plastic Cups Labeled Compostable	<1	0.00	0.94	<1	0.85
Takeout Containers	55.76	114.56	75.20	6.67	217.72
17-Unlined Paper Takeout Containers	3.99	10.26	13.40	1.00	25.97
18-Plastic-Lined Paper Takeout Containers	19.16	33.77	27.74	2.36	76.38
19-Plastic-Lined Paper Takeout Containers	19.16	33.77	27.74	2.36	76.38
53-Foam Takeout Containers	0.14	0.23	0.38	0.05	0.76
59-Rigid Plastic takeout Containers	13.32	36.54	5.94	0.90	49.48
68-Plastic Takeout Containers Labeled Compostable	<1	<1	<1	<1	<1
Straws	23.86	41.49	71.52	4.51	130.51
16-Paper Straws	16.10	25.47	66.71	2.56	101.92
63-Plastic Straws	7.76	16.02	4.81	1.95	28.59
Utensils	12.11	113.41	84.45	4.71	224.99
64-Plastic Utensils	12.11	47.25	46.42	1.70	93.55
69-Other Foodware Labeled Compostable	<1	<1	<1	<1	<1
88-Wood Utensils	36.82	66.16	38.02	3.01	131.44
PPE	71.57	177.15	174.65	6.97	1022
167-Masks	9.83	25.93	11.23	0.95	42.07
168-Gloves	16.66	81.72	131.25	2.16	199.61
169-Wipes	45.08	69.5	31.17	3.86	138.90
Other	<1	<1	<1	<1	<1
87-Unfinished Wood Furniture	<1	<1	<1	<1	<1