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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

2021 Multi-Family Waste Composition Study Metro Vancouver Region

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METRO
TESTING + ENGINEERING



Executive Summary

Metro Testing & Engineering (MTE) is pleased to present the findings of the 2021 Multi-Family Residential Waste Composition Study (“the Study”) completed for Metro Vancouver.

The purpose of the Study was to characterize the waste stream, to estimate contamination rates in recycling and organic bins and to estimate organics, recycling, and waste generation rates for multi-family (MF) buildings within the Metro Vancouver region. Samples were obtained directly from multi-family garbage and recycling rooms. Given that the Study was completed during the COVID-19 pandemic, the results provide a snapshot of how disposal habits may have changed due to the pandemic.

The Study was completed at two (2) facilities in the Metro Vancouver region. Samples of waste were sorted at the North Surrey Recycling and Waste Centre, and Vancouver South Transfer Station.

Waste Composition

Multi-family (MF) residential waste was sorted into 13 primary categories and 172 secondary/tertiary categories. The table below summarizes the waste composition results by primary category for all multi-family residential buildings. Categories which comprised more than 10% of the overall weight are highlighted.

Summarized Multi-Family Waste Composition

Primary Category	Weight %	90% Confidence Interval
Paper	14.5%	+/-0.8%
Plastic	16.5%	+/- 0.9%
Compostable Plastic	0.0%	+/-0.0%
Compostable Organics	37.2%	+/- 1.7%
Non-Compostable Organics	3.8%	+/-1.0%
Metals	2.5%	+/-0.3%
Glass	3.2%	+/-0.4%
Building Material	1.7%	+/-0.9%
Electronic Waste	1.7%	+/-0.5%
Household Hazardous	0.6%	+/-0.1%
Household Hygiene	15.2%	+/-1.7%
Bulky Objects	2.6%	+/-1.2%
Fines	0.7%	+/-0.1%
PPE	Weighted Mean	90% Confidence Interval
Mask	0.15%	+/-0.02%
Gloves	0.16%	+/-0.04%
Wipes	0.19%	+/-0.03%

The largest component of multi-family waste was compostable organics (37.2%), followed by plastic (16.5%), household hygiene (15.2%) and paper (14.5%). Compostable organics were mainly composed of food waste (34.5% of total waste). Avoidable and unavoidable food waste were 20.5% and 13.9% of the total waste, respectively. Plastic mainly consisted of film (6.8% of



total waste) and synthetic textiles (3.7% of total waste). Household hygiene primarily consisted of biological waste (14.2% of total waste).

Single-Use Items

This is the first year that single-use items (SUIs) have been analyzed as part of the Multi-Family study. The following table shows the estimated units disposed of SUIs in multi-family buildings in 2021.

Single-Use Items Disposal Rates

SUI Item	Units Disposed/Capita ¹	90% Confidence Interval
Retail Bags	109	+/-15
Disposable Cups	51	+/-11
Takeout Containers	69	+/-19
Straws	42	+/-6
Utensils	85	+/-15
Total	356	+/-66

¹ Per capita values are based on the 2020 multi-family population of 1,132,476

Personal Protective Equipment

Due to the Study occurring during the on-going COVID-19 pandemic, personal protective equipment (PPE) such as masks, gloves, and disinfectant wipes were weighed and counted as separate categories to determine the prevalence of these items in the waste stream. The following table summarizes the estimated number of PPE disposed in each waste stream based on the annual tonnage.

COVID-19 PPE Disposal Rates

Category	Item	Units Disposed/Capita ¹	90% Confidence Interval
PPE	Masks	59	+/-8
	Gloves	44	+/-10
	Wipes	73	+/-13
Total		175	+/-31

¹ Per capita values are based on the 2020 multi-family population of 1,132,476

Recycling Contamination Rates

Recycling was visually inspected for contamination during this study. As there was a variance between multi-stream results and single-stream results, the two analyses were done separately.

The percentage of multi-stream bins that were observed to have contamination is presented below. The mixed containers bins appeared to most frequently contain contamination.

Multi-Stream Contamination

Multi-Stream Contamination				
	Mixed Containers	Paper	Glass	Cardboard
Number of Bins Sampled	245	250	82	49
% Contaminated	50.2%	31.2%	41.5%	30.6%



The percentage of single-stream bins that were observed to have contamination is presented below. 45% to 55% of all bins observed contained contamination.

Single-Stream Contamination

Single-Stream Contamination			
	Single Stream ¹	Glass	Cardboard
Number of Bins Sampled	88	20	11
% Contaminated	54.5%	55.0%	45.5%

¹ Single stream systems include both paper and mixed containers comingled in one receptacle

Generation Rates

Generation rates for recycling and organics were calculated using data obtained from questionnaires and during each site visit. US EPA densities were used to convert volume estimates to weight.

Recycling Generation

Recycling Generation						
Category	Overall Kg/Capita ¹	Mixed Containers Kg/Capita	Mixed Paper Kg/Capita	Glass Kg/Capita	Single Stream Kg/Capita	Cardboard Kg/Capita
Multi-stream	97	14	56	5	N/A	23
Single Stream	127	N/A	N/A	5	101	21
Combined	103	11	44	5	20	23

¹ Per capita values are based on the 2020 multi-family population of 1,132,476

The calculated generation for organics in multi-family homes was 49.5 kg/capita.

NOTE TO THE READER

The samples collected and sorted for this study are “snapshots” in time, meaning the reported quantities are estimates and only represent the conditions for the period of time in which they were collected. Seasonal and annual variability, weather, and other factors can affect the amount and composition of waste and recyclables generated by the various sectors at any given time. In particular, this study was completed during the COVID-19 Pandemic and is not fully comparable to previous years.



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1.0 Introduction

Metro Testing & Engineering (MTE) was retained by Metro Vancouver to complete the 2021 Multi-Family Residential Waste Composition Study. The purpose of this study was to characterize the garbage, recycling, and organic streams from multi-family (MF) buildings and provide a disposal rate estimate and recycling rate estimate within the Metro Vancouver region. Given that the study was completed during the COVID-19 pandemic, the results provide a snapshot of how disposal habits may have been affected due to the pandemic.

The samples were collected from various locations across the Metro Vancouver region and brought to the Vancouver South Transfer Station and North Surrey Recycling and Waste Centre (formerly Surrey Transfer Station) for sorting.

The parameters used for representation included geographic subregion (Northeast, North Shore, Inner Municipalities, Vancouver, South of Fraser), building type (apartments with 5 or more storeys, apartment with less than 5 storeys, and row houses), and ownership type (rented or owned).

This report summarizes the methodology employed for each objective of this waste composition study and provides an analysis of the material composition, estimated disposal and recycling rates, and quantities of personal protective equipment (PPE) and single-use items (SUIs) disposed in each sector.

2.0 Scope of Work

Samples for Metro Vancouver's multi-family waste composition study were collected directly from buildings, rather than using hauling companies, to allow for the attribution of samples in specific geographic subregions, building types, and ownership types.

The project was divided into three tasks:

- Building Recruitment.
- Collection and Sampling; and
- Analysis and Reporting.

3.0 Methodology

The sampling for the Study was based on industry accepted techniques, previous experience gained by MTE completing studies with similar objectives, and Metro Vancouver's previous multi-family waste composition study completed in 2017. The following sections outline the methodology used for the business recruitment, fieldwork of the Study and methods used for data analysis.

3.1 Building Recruitment

The goal of this task was to recruit 100 buildings (+12 contingency) according to geographic subregion, building type and ownership type.

The samples were collected from five (5) different geographic sub regions. The breakdown of the sampling by subregion was as follows.



Table 3-1 - Geographic Subregion

Geographic subregion	Percentage of regional multi-family population	Estimated number of buildings to include	Samples Collected
Northeast (Coquitlam, Maple Ridge, Pitt Meadows, Port Coquitlam, Port Moody)	11%	10 – 12	13
North Shore (City of North Vancouver, District of North Vancouver, West Vancouver)	6%	5 – 8	13
Inner Municipalities (Burnaby, New Westminster, Richmond)	34%	30 – 35	29
Vancouver (City of Vancouver and UBC)	26%	25 – 30	34
South of Fraser (Delta, City of Langley, Township of Langley, Surrey, White Rock)	23%	20 - 25	13

The following figure shows the geographical subregions on a map of Metro Vancouver.

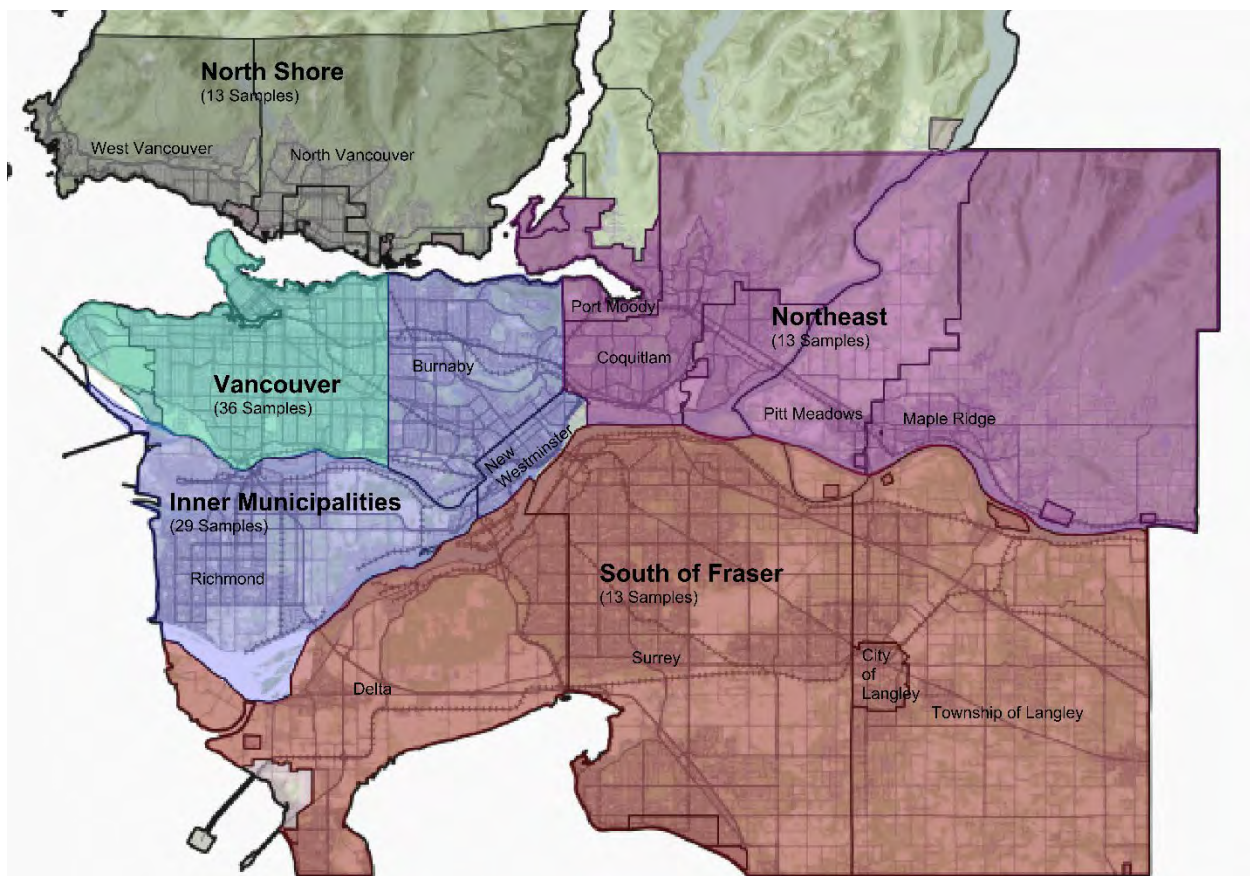


Figure 1 - Geographical Subregions



Samples were collected from three (3) different building types. The breakdown of the building types was as follows:

Table 3-2 - Building Type

Building Type	Percentage of regional multi-family units	Estimated number of buildings to include	Samples Collected
Apartment (Greater than or equal to 5 Storeys)	32%	30 – 40	29
Apartment (Less than 5 Storeys)	49%	40 – 55	41
Row Houses	19%	5 – 20	32

Samples were collected from two (2) different ownership types. The breakdown of the ownership types was as follows.

Table 3-3 - Ownership Type

Ownership Type	Percentage of regional multi-family units	Estimated number of buildings to include	Samples Collected
Rented	36%	30 – 40	44
Owned	64%	60 – 70	58

Metro Vancouver provided building contact information through municipal members, Metro Vancouver Housing Corporation, BC Housing, and property management contacts. Approximately 60% of the buildings came from Metro Vancouver's contacts. The rest was recruited by MTE.

The following procedure was used to recruit buildings to participate in our project:

- Initial call to confirm eligibility, participation and obtain contact information.
- Once the building's participation is confirmed, conduct a survey, where questions are provided by Metro Vancouver, to obtain more information of the site. Some of the information asked for includes:
 - Frequency of waste pick-up
 - Streams collected
 - Collection days and time
 - Type of building
 - Amount of rental or owned units.
- Once the list of participants is confirmed, a schedule was created for sample collection.
- Calls were scheduled to confirm sample collection a day or two prior to the collection crew's arrival.



3.2 Collection and Sampling

Sampling and sorting were completed between 12th July 2021 and 18th August 2021. The samples were collected directly from buildings and brought to either the Vancouver South Transfer Station (VSTS) for the first three weeks or the North Surrey Recycling and Waste Centre for the last three weeks. The goal for each day was to collect and sort four samples per day. There was one sort team at the facility and two collection teams, who took part in the sorting once the collection was done for the day.

Sample collection was scheduled for each building with the intention of arriving immediately prior to the scheduled waste collection, typically the day before. This was to ensure a representative sample was collected in a typical waste period of multi-family households. The collection team collected directly from the buildings with the max sample weight being approximately 100 kg. If 100 kg was not available, the entire contents of the collection container was used.

While onsite, a site assessment survey was completed for each location. The assessment included the following:

- Number, type, and size of collection container for each stream (garbage, recycling, organics, and any others).
- Estimation of recycling and organic quantities (% full of container, weight where possible)
- Visual estimation of recycling and organics contamination.
- Other site assessment criteria that were provided by Metro Vancouver.

Once the sample collection and site assessment were complete, the samples were transported to the sorting location. The samples were sorted into the material categories provided by Metro Vancouver. A copy of the material categories provided by Metro Vancouver is attached in Appendix I. Photographs were taken during the sample collection and sorting. Selected site photographs are attached in Appendix II.

While everything was completed to ensure the collection of an adequate sample, there were times when the MTE sample crew arrived and there was not enough sample.

3.3 Analysis and Reporting

Data was compiled into spreadsheets throughout the course of the fieldwork. The analysis was completed in accordance with the previous studies completed in 2017. The composition by weight percentage was calculated using the total weight sorted for each material category and total sample weight. For items that recorded lower weights, if there were not enough items to register a weight, a minimum of 0.01 kg was used (the minimum weight the scale could provide).

The following data analyses are provided:

- Garbage composition by weight, overall and for each geographic subregion, building type and ownership type, both by functional categories and material categories.
- Recycling and organics contamination rate, overall and by geographic subregion, building type and ownership type.
- Disposal and recycling rates in kg/capita, for sector as a whole, and by geographic subregion, building type, and ownership type.



- Single-use item weights and counts, overall and by subregion, building types and ownership types, organized by single-use item type (retail bags, cups, takeout containers, straws, and utensils).
- Comparison with multi-family results from 2017, overall and by geographic subregion, building type and ownership type.

3.3.1 Waste Composition and Disposal

Overall regional composition was calculated using the weighted average for each material category for the different waste sectors. Composition by weight percentage was calculated using the total weight sorted for each material category and total sampling weight. The confidence interval for each waste sector was calculated to the 90% confidence level. The weighted average of all categories is presented in Appendix III.

Estimated disposal tonnages of the material categories were calculated using the 2019 multi-family disposal (tonnage) for the material composition. Population data for 2020 was used for the geographical subregions. For the building and ownership type calculations only the 2016 data was available.

3.3.2 Single-Use Items

Densities (Appendix IV) were calculated using data from the transfer station waste samples. The density of each SUI analysed was calculated by taking the total weight of the SUI and dividing by the total number of units counted. Samples where SUIs were counted but did not register a weight on the scale were excluded when calculating the densities to reduce inaccuracy.

The disposed weight per capita was calculated using the projected disposed tonnage for each sector in 2020, population data provided by Metro Vancouver, and the weight percentage of each item. The combined regional average was weighted using the total disposed tonnage of each sector sampled. The disposed number of SUIs per capita was also calculated using the density (g/unit) and the disposal per capita (kg/capita). This method was also used to calculate the disposal of PPE items.

3.4 Quality Assurance and Quality Control Procedures

Quality Assurance (QA) and Quality Control (QC) was completed as described below to ensure the accuracy of the collected data.

- Weigh scales were calibrated prior to commencing fieldwork to reduce any possible instrument error.
- Raw waste composition data was reviewed on a daily basis following sorting to determine if items had been omitted from the datasheets. The pre-sorted weight of each sample was compared to the final calculated sample weight after sorting to ensure that the results were within +/- 5%.
- In the office, staff reviewed the accuracy of 100% of the data that was transcribed into spreadsheet format to ensure all data had been transferred correctly.



4.0 Overall Waste Composition Results

A total of 102 samples were sorted in the entirety of this waste composition study. The results of the study are presented below.

Table 4-1 below presents primary categories that comprised over 10% of the total multi-family waste, along with significant (largest 1, 2, or 3 categories making up more than 68% of the primary category) secondary and tertiary sub-categories within each primary category. The waste consisted primarily of compostable organics, plastic and household hygiene, and paper.

Table 4-1 - Breakdown of Material Categories (>10%)

Primary Category	Secondary Category	Significant Tertiary Categories
37.2% Compostable Organics	34.5% Food Waste	20.5% Avoidable Food Waste
		13.9 % Unavoidable Food Waste
16.5% Plastic	6.8% Film	4.1% Consumables Packaging Bags and Film
		1.0% Garbage Bags
	3.7% Textiles (synthetic)	1.4% Clothing and accessories
		1.4% Household
	3.5% Rigid (non-beverage)	0.7% #5 PP
2.0% Other Plastics	0.9% Durable Plastic Products	
15.2% Household Hygiene	14.2% Biological	5.2% Diapers
		7.0% Pet Waste
		2.0% Other (sanitary products, condoms)
14.5% Paper	9.6% Other Paper	7.0% Other Compostable Paper
	1.7% Boxboard	-

Note: Percentages shown in Table 4 are relative to total multi-family waste composition. Not all secondary and tertiary categories are shown for each corresponding primary category, only more significant components. See Appendix III for a complete breakdown.

Table 4-2 below presents the composition results and the 90% confidence interval. For COVID-19 PPE found in the waste, the percent composition of masks, gloves and wipes were fairly similar. A breakdown of all subcategories can be found in Appendix III.

Table 4-2 - Multi-Family Waste Composition Results

Primary Category	Weight %	90% Confidence Interval
Paper	14.5%	+/-0.8%
Plastic	16.5%	+/-0.9%
Compostable Plastic	0.0%	+/-0.0%
Compostable Organics	37.2%	+/-1.7%
Non-Compostable Organics	3.8%	+/-1.0%



Primary Category	Weight %	90% Confidence Interval
Metals	2.5%	+/-0.3%
Glass	3.2%	+/-0.4
Building Material	1.7%	+/-0.9%
Electronic Waste	1.7%	+/-0.5%
Household Hazardous	0.6%	+/-0.1%
Household Hygiene	15.2%	+/-1.7%
Bulky Objects	2.6%	+/-1.2%
Fines	0.7%	+/-0.1%
PPE	Weighted Mean	90% Confidence Interval
Mask	0.15%	+/-0.02%
Gloves	0.16%	+/-0.04%
Wipes	0.19%	+/-0.03%

Results of the total composition for multi-family waste with each primary category is presented in Figure 2 below.

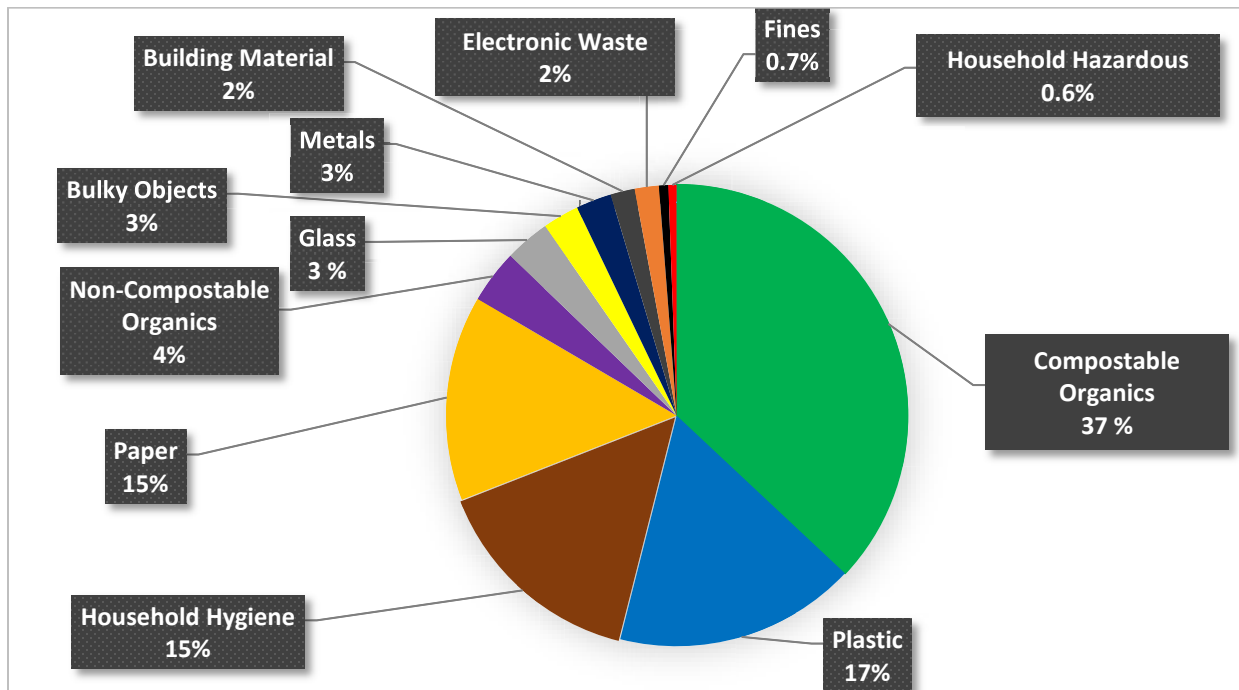


Figure 2 - Overall Waste Composition

4.1 Waste Composition Results

The waste composition results were broken down into the following subcategories:

- Geographic subregions;



- Building type; and
- Ownership type.

4.1.1 Geographic Subregions

The samples collected from the Metro Vancouver region was organized as per their geographic subregions. The geographic subregions identified in the study include:

- Northeast (Coquitlam, Maple Ridge, Pitt Meadows, Port Moody);
- North Shore (City of North Vancouver, District of North Vancouver, West Vancouver);
- Inner Municipalities (Burnaby, New Westminster, Richmond);
- Vancouver (City of Vancouver and UBC); and
- South of Fraser (Delta, City of Langley, Township of Langley, White Rock)

A total of 102 samples were sorted in the entirety of this waste composition study. Table 4-3 below summarizes the total amount of material sorted, average sample weight, and variability in the samples by geographic subregions.

Table 4-3 - Sampling Results Summary Geographic Subregion

Geographic Subregion	Number of Samples	Total Weight of Material Sorts (kg)	Average Weight (kg)	90% Confidence Interval
Northeast	13	1189	92	+/-7%
North Shore	13	1066	81	+/-13%
Inner Municipalities	29	2482	87	+/-6%
Vancouver	34	2544	77	+/-9%
South of Fraser	13	1052	82	+/-13%
Total	102	8332	84	-

There was higher variability in the results depending on the number of samples collected that were under 100 kg.

Table 4-4 below presents the weighted average percentages, by primary material categories, in comparison to the total amount of material sorted by their geographic subregions. These results present the overall waste composition results with their 90% confidence levels.



Table 4-4 - Geographical Subregion Waste Composition Results

Categories	%Weight									
	Northeast	90% Confidence Interval	North Shore	90% Confidence Interval	Inner Municipalities	90% Confidence Interval	Vancouver	90% Confidence Interval	South of Fraser	90% Confidence Interval
Paper	13.2%	+/-1.9%	15.0%	+/-1.6%	14.9%	+/-1.6%	13.9%	+/-1.7%	15.6%	+/-1.8%
Plastic	15.1%	+/-1.7%	14.4%	+/-2.3%	16.8%	+/-2.9%	17.4%	+/-1.6%	17.6%	+/-3.0%
Compostable Plastic	0.0%	+/-0.0%	0.0%	+/-0.0%	0.0%	+/-0.0%	0.0%	+/-0.0%	0.0%	+/-0.0%
Compostable Organics	35.6%	+/-5.5%	39.6%	+/-5.5%	37.6%	+/-3.4%	36.4%	+/-3.1%	37.3%	+/-2.8%
Non-Compostable Organics	7.2%	+/-7.3%	2.8%	+/-1.3%	3.3%	+/-1.1%	3.6%	+/-0.8%	2.4%	+/-0.8%
Metals	2.7%	+/-0.7%	2.3%	+/-0.7%	2.6%	+/-0.8%	2.4%	+/-0.5%	2.5%	+/-0.7%
Glass	3.2%	+/-1.3%	3.6%	+/-1.1%	2.7%	+/-0.6%	3.2%	+/-0.6%	3.6%	+/-0.9%
Building Material	1.9%	+/-3.2%	0.6%	+/-0.5%	2.4%	+/-2.4%	0.7%	+/-0.4%	3.3%	+/-4.0%
Electronic Waste	0.5%	+/-0.3%	1.1%	+/-0.7%	0.9%	+/-0.4%	2.7%	+/-1.4%	3.0%	+/-1.5%
Household Hazardous	0.6%	+/-0.2%	0.6%	+/-0.4%	0.9%	+/-0.3%	0.3%	+/-0.1%	0.6%	+/-0.3%
Household Hygiene	14.7%	+/-3.1%	15.3%	+/-3.9%	14.8%	+/-2.3%	16.9%	+/-4.0%	12.4%	+/-3.5%
Bulky Objects	4.7%	+/-4.7%	4.0%	+/-2.2%	2.4%	+/-3.0%	1.6%	+/-1.8%	1.1%	+/-1.0%
Fines	0.6%	+/-0.2%	0.5%	+/-0.2%	0.7%	+/-0.2%	0.8%	+/-0.3%	0.6%	+/-0.3%
Total %	100.0%		100.0%		100.0%		100.0%		100.0%	
SUI %	3.3%		3.4%		4.2%		4.3%		4.3%	
# of Samples	13		13		29		34		13	



4.1.2 Building Type

The samples collected from the Metro Vancouver region were organized as per their building types. The building types identified in the study include:

- Apartments with 5 or more storeys;
- Apartments with less than 5 storeys; and
- Row houses.

Table 4-5 below summarizes the total amount of material sorted, average sample weight, and variability in the samples by building type.

Table 4-5 – Sample Result Summary Building Type

Building Type	Number of Samples	Total Weight of Material Sorts (kg)	Average Weight (kg)	90% Confidence Interval
Apartment (>5 stories)	29	2574	90	7
Apartment (<5 stories)	41	2574	78	7
Row Houses	32	2713	83	8
Total	102	7862	250	-

Table 4-6 below presents the weighted average percentages, by primary material categories, in comparison to the total amount of material sorted by their building type. These results present the overall waste composition results with their 90% confidence levels.

Table 4-6 – Building Type Waste Composition

Categories	%Weight					
	Apartment (>5 storeys)	90% Confidence Interval	Apartment (<5 storeys)	90% Confidence Interval	Row Houses	90% Confidence Interval
Paper	14.1%	+/-1.5%	15.0%	+/-1.4%	14.1%	+/-1.2%
Plastic	15.6%	+/-1.8%	17.4%	+/-1.3%	16.3%	+/-1.5%
Compostable Plastic	0.0%	+/-0.0%	0.0%	+/-0.0%	0.0%	+/-0.0%
Compostable Organics	35.0%	+/-3.5%	38.6%	+/-2.3%	37.3%	+/-3.4%
Non-Compostable Organics	6.0%	+/-3.4%	2.2%	+/-0.6%	3.4%	+/-0.8%
Metals	2.0%	+/-0.5%	2.8%	+/-0.6%	2.6%	+/-0.5%
Glass	3.6%	+/-0.8%	3.2%	+/-0.5%	2.7%	+/-0.6%
Building Material	1.5%	+/-1.8%	1.1%	+/-1.1%	3.2%	+/-2.2%
Electronic Waste	0.8%	+/-0.4%	1.9%	+/-1.1%	2.3%	+/-0.8%



Categories	%Weight					
	Apartment (>5 storeys)	90% Confidence Interval	Apartment (<5 storeys)	90% Confidence Interval	Row Houses	90% Confidence Interval
Household Hazardous	0.5%	+/-0.2%	0.6%	+/-0.2%	0.6%	+/-0.2%
Household Hygiene	15.8%	+/-2.7%	14.8%	+/-1.9%	15.2%	+/-4.1%
Bulky Objects	4.4%	+/-3.2%	1.8%	+/-1.9%	1.6%	+/-0.9%
Fines	0.6%	+/-0.2%	0.7%	+/-0.2%	0.7%	+/-0.2%
Total %	100.0%		100.0%		100.0%	
SUI %	3.9%		3.9%		3.6%	
Number of Samples	29		41		32	

4.1.3 Ownership Type

This section presents the waste composition results according to unit ownership types. The unit ownership types identified in the study include:

- Owned Units (condominiums)
- Rented Units
- Mixed (buildings where there are a mix of owned and rented units). Data not included in the tables, but mixed building samples were still included in the totals.

Table 4-7 below summarizes the total amount of material sorted, average sample weight, and variability in the samples by ownership type.

Table 4-7 – Sample Result Summary by Ownership Type

Ownership Type	Number of Samples	Total Weight of Material Sorts (kg)	Average Weight (kg)	90% Confidence Interval
Rented Household	44	3608	84	6
Owned Household	58	4720	82	6

Table 4-8 – Ownership Type Waste Composition below presents the weighted average percentages, by primary material categories, in comparison to the total amount of material sorted by their ownership type. These results present the overall waste composition results with their 90% confidence levels.

Table 4-8 – Ownership Type Waste Composition

Categories	%Weight			
	Rented	90% Confidence Interval	Owned	90% Confidence Interval
Paper	14.6%	+/-1.3%	14.5%	+/-1.0%
Plastic	15.2%	+/-1.3%	17.5%	+/-1.2%



Categories	%Weight			
	Rented	90% Confidence Interval	Owned	90% Confidence Interval
Compostable Plastic	0.0%	+/-0.0%	0.0%	+/-0.0%
Compostable Organics	38.5%	+/-2.3%	36.4%	+/-2.5%
Non-Compostable Organics	4.3%	+/-2.2%	3.3%	+/-0.7%
Metals	2.6%	+/-0.3%	2.5%	+/-0.5%
Glass	3.4%	+/-0.6%	3.1%	+/-0.5%
Building Material	0.9%	+/-1.1%	2.3%	+/-1.4%
Electronic Waste	2.4%	+/-1.1%	1.2%	+/-0.4%
Household Hazardous	0.4%	+/-0.1%	0.6%	+/-0.2%
Household Hygiene	14.3%	+/-2.3%	15.7%	+/-2.3%
Bulky Objects	2.9%	+/-1.9%	2.3%	+/-1.6%
Fines	0.6%	+/-0.2%	0.6%	+/-0.1%
Total %	100.0%		100.0%	
SUI %	3.7%		4.0%	
Number of Samples	44		58	

4.1.4 Functional Categories

This study assigned Functional Categories to the various material categories to aggregate materials made of different materials that share a similar end fate or management paradigm. Table 4-9 defines the functional categories included in this study.

Table 4-9 – Functional Categories

Functional Category	Definition
Recyclable	Items accepted in most residential recycling programs or covered by extended producer responsibility programs in BC
Green Bin	Items accepted in most residential green bin programs
Single-Use Items	Single-Use food and beverage packaging
Textiles	Clothing, household textiles, footwear, and accessories
Construction & Demolition	Items typically generated by construction, demolition, or renovation activities
Personal Protective Equipment	Personal protective equipment commonly used in response to the COVID-19 pandemic
Limited Recycling Options	Other items (excluding those above) that typically have few or no readily available options for recycling



Table 4-10 presents the weighted average of the primary material composition for multi-family residential garbage organized by functional categories in the Metro Vancouver region. As shown in the table below, the majority of the garbage were items that should go in the green bin, followed by items with limited recycling options, and recyclable items.

Table 4-10 – Primary Material Composition

Functional Category	Percent Composition
Recyclable	18%
Green Bin	44%
Single-Use Items	3%
Textiles	5%
Construction & Demolition	3%
Personal Protective Equipment	0.5%
Limited Recycling Options	22%

4.2 Estimated Waste Disposal

Table 4-11 through Table 4-14 summarize the estimated waste disposal in kg/capita for multi-family buildings in the region, by geographic subregions, by building type and by ownership type.

Table 4-11 presents the estimated disposal of material categories for multi-family homes as a region.



Table 4-11 – Estimated Waste Disposal Overall

	Combined Average		
Disposed Tonnage	233,702		
Population	1,132,476		
Primary Categories	Weight %	kg/capita	90% CI
Paper	14.5%	29.9	+/-0.8%
Plastic	16.5%	34.1	+/-0.9%
Compostable Plastic	0.0%	0.0	+/-0.01%
Compostable Organics	37.2%	76.7	+/-1.7%
Non-Compostable Organics	3.8%	7.8	+/-1.3%
Metals	2.5%	5.2	+/-0.3%
Glass	3.2%	6.6	+/-0.4%
Building Material	1.7%	3.5	+/-0.9%
Electronic Waste	1.7%	3.5	+/-0.5%
Household Hazardous	0.6%	1.2	+/-0.1%
Household Hygiene	15.2%	31.4	+/-1.7%
Bulky Objects	2.6%	5.3	+/-1.2%
Fines	0.7%	1.4	+/-0.1%
Total	100.0%	206.4	-



Table 4-12 below shows the estimated disposal of material categories for the different geographical regions of Metro Vancouver.

Table 4-12 – Estimated Waste Disposal by Geographic Region

	Geographic Subregions														
	Northeast			North Shore			Inner Municipalities			Vancouver			South of Fraser		
Disposed Tonnage	25,258			14,678			60,200			78,927			54,640		
Population	122,394			71,129			291,716			382,464			264,773		
Primary Categories	Weight %	Estimated kg/capita	90% CI	Weight %	Estimated kg/capita	90% CI	Weight %	Estimated kg/capita	90% CI	Weight %	Estimated kg/capita	90% CI	Weight %	Estimated kg/capita	90% CI
Paper	13.2%	27.3	+/-1.9%	15.0%	31.0	+/-1.6%	14.9%	30.8	+/-1.6%	13.9%	28.7	+/-1.7%	15.6%	32.2	+/-1.8%
Plastic	15.1%	31.1	+/-1.7%	14.4%	29.8	+/-2.3%	16.8%	34.6	+/-1.5%	17.4%	35.8	+/-1.6%	17.6%	36.4	+/-3.0%
Compostable Plastic	0.0%	0.0	+/-0.01%	0.0%	0.0	+/-0.01%	0.0%	0.0	+/-0.01%	0.0%	0.0	+/-0.01%	0.0%	0.0	+/-0.01%
Compostable Organics	35.6%	73.6	+/-5.5%	39.6%	81.7	+/-5.5%	37.6%	77.6	+/-3.3%	36.4%	75.2	+/-3.1%	37.3%	77.0	+/-2.8%
Non-Compostable Organics	7.2%	14.8	+/-7.3%	2.8%	5.8	+/-1.3%	3.3%	6.8	+/-1.1%	3.6%	7.5	+/-0.8%	2.4%	4.9	+/-0.8%
Metals	2.7%	5.6	+/-0.7%	2.3%	4.7	+/-0.7%	2.6%	5.4	+/-0.8%	2.4%	4.9	+/-0.5%	2.5%	5.1	+/-0.7%
Glass	3.2%	6.7	+/-1.3%	3.6%	7.4	+/-1.1%	2.7%	5.6	+/-0.6%	3.2%	6.7	+/-0.6%	3.6%	7.5	+/-0.9%
Building Material	1.9%	3.8	+/-1.3%	0.6%	1.3	+/-0.5%	2.4%	5.0	+/-2.4%	0.7%	1.5	+/-0.4%	3.3%	6.8	+/-4.0%
Electronic Waste	0.5%	1.1	+/-0.3%	1.1%	2.4	+/-0.7%	0.9%	1.9	+/-0.4%	2.7%	5.6	+/-1.4%	3.0%	6.2	+/-1.5%
Household Hazardous	0.6%	1.2	+/-0.2%	0.6%	1.2	+/-0.4%	0.9%	1.8	+/-0.3%	0.3%	0.6	+/-0.1%	0.6%	1.2	+/-0.3%
Household Hygiene	14.7%	30.3	+/-3.1%	15.3%	31.7	+/-3.9%	14.8%	30.6	+/-2.3%	16.9%	34.8	+/-4.0%	12.4%	25.7	+/-3.5%
Bulky Objects	4.7%	9.8	+/-4.7%	4.0%	8.3	+/-2.2%	2.4%	5.0	+/-3%	1.6%	3.4	+/-1.8%	1.1%	2.2	+/-1.0%
Fines	0.6%	1.2	+/-0.2%	0.5%	1.1	+/-0.2%	0.7%	1.4	+/-0.2%	0.8%	1.6	+/-0.3	0.6%	1.2	+/-0.3%
Total	100.0%	206.4	-	100.0%	206.4	-	100.0%	206.4	-	100.0%	206.4	-	100.0%	206.4	-



Table 4-13 presents the estimated disposal of material categories for the different ownership types in the Metro Vancouver area.

Table 4-13 – Estimated Waste Disposal by Ownership Type

Building Type									
	Apartment (5 or more storeys)			Apartment (Fewer than 5 storeys)			Row Houses		
Disposed Tonnage	75,190			113,731			44,782		
Population	317,610			480,412			189,164		
Primary Categories	Weight %	Estimated kg/capita	CI	Weight %	Estimated kg/capita	CI	Weight %	Estimated kg/capita	CI
Paper	14.1%	33.4	+/-1.5%	15.0%	35.4	+/-1.4%	14.1%	33.5	+/-1.2%
Plastic	15.6%	36.9	+/-1.8%	17.4%	41.2	+/-1.3%	16.3%	38.5	+/-1.5%
Compostable Plastic	0.0%	0.0	+/-0.01%	0.0%	0.0	+/-0.1%	0.0%	0.0	+/-0.01%
Compostable Organics	35.0%	82.9	+/-3.5%	38.6%	91.4	+/-2.3%	37.3%	88.3	+/-3.4%
Non-Compostable Organics	6.0%	14.2	+/-3.4%	2.2%	5.1	+/-0.6%	3.4%	8.0	+/-0.8%
Metals	2.0%	4.8	+/-0.5%	2.8%	6.6	+/-0.6%	2.6%	6.1	+/-0.5%
Glass	3.6%	8.5	+/-0.8%	3.2%	7.6	+/-0.6%	2.7%	6.5	+/-0.6%
Building Material	1.5%	3.7	+/-1.8%	1.1%	2.7	+/-1.1%	3.2%	7.5	+/-2.2%
Electronic Waste	0.8%	1.9	+/-0.4%	1.9%	4.4	+/-1.1%	2.3%	5.6	+/-0.8%
Household Hazardous	0.5%	1.2	+/-0.3%	0.6%	1.5	+/-0.2%	0.6%	1.3	+/-0.2%
Household Hygiene	15.8%	37.3	+/-2.7%	14.8%	35.1	+/-1.9%	15.2%	35.9	+/-4.1%
Bulky Objects	4.4%	10.4	+/-3.2%	1.8%	4.2	+/-1.9%	1.6%	3.8	+/-1.0%
Fines	0.6%	1.4	+/-0.2%	0.7%	1.6	+/-0.2%	0.7%	1.7	+/-0.2%
Total	100%	236.7	-	100.0%	236.7	-	100.0%	236.7	-



Table 4-14 Present the estimated disposal of material categories by ownership type.

Table 4-14 – Estimated Waste Deposal by Ownership Type

Ownership						
	Rented			Owned		
Disposed Tonnage	116,086			117,616		
Population	490,359			496,826		
Primary Categories	Weight %	Estimated kg/capita	CI	Weight %	Estimated kg/capita	CI
Paper	14.6%	34.6	+/-1.3%	14.5%	34.2	+/-1.0%
Plastic	15.2%	35.9	+/-1.3%	17.5%	41.3	+/-1.1%
Compostable Plastic	0.0%	0.0	+/-0.1%	0.0%	0.0	+/-0.01%
Compostable Organics	38.5%	91.1	+/-2.3%	36.4%	86.2	+/-2.5%
Non-Compostable Organics	4.3%	10.1	+/-2.2%	3.3%	7.8	+/-0.7%
Metals	2.6%	6.1	+/-0.3%	2.5%	5.9	+/-0.5%
Glass	3.4%	8.0	+/-0.6%	3.1%	7.3	+/-0.5%
Building Material	0.9%	2.1	+/-1.1%	2.3%	5.5	+/-1.4%
Electronic Waste	2.4%	5.6	+/-1.1%	1.2%	2.9	+/-0.4%
Household Hazardous	0.4%	0.9	+/-0.1%	0.6%	1.5	+/-0.2%
Household Hygiene	14.3%	33.9	+/-2.3%	15.7%	37.1	+/-2.3%
Bulky Objects	2.9%	6.8	+/-1.9%	2.3%	5.5	+/-1.6%
Fines	0.6%	1.5	+/-0.2%	0.6%	1.5	+/-0.1%
Total	100.0%	236.7	-	100.0%	236.7	-



4.3 Historical Comparison

Strictly multi-family focused waste composition studies were conducted in 2006, 2017 and now in 2021. In 2013, the multi-family data was obtained as part of the waste composition monitoring program. The data from 2006, 2017 and 2021 is likely more accurate, and there are less sources of error. Figure 3 below presents a comparison of the data from 2006, 2013, 2017, and 2021 for the entire region. Table 4-15 and Table 4-16 show a comparison of the 2021 and 2017 multi-family data.

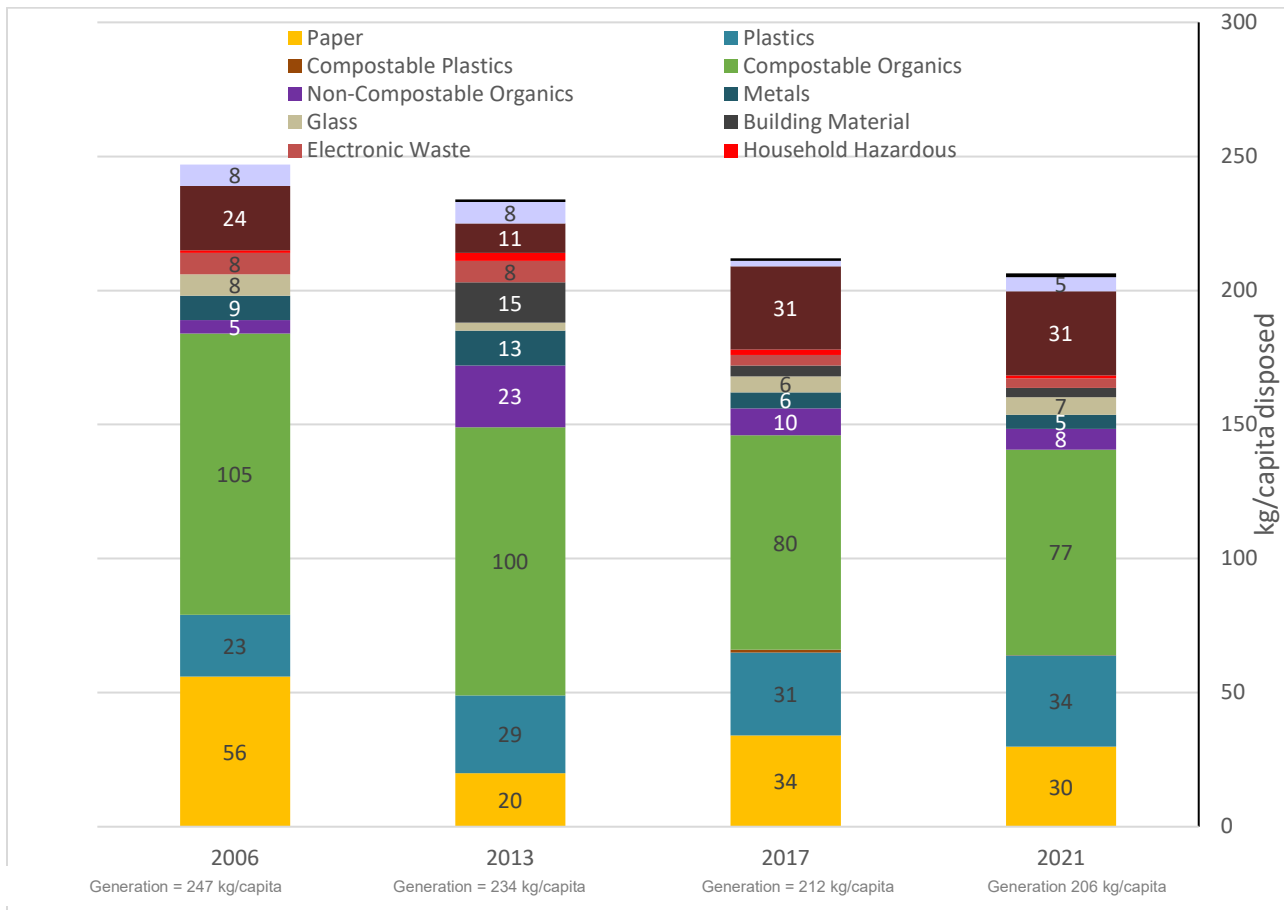


Figure 3 – Historical Comparison of Multi-Family Disposal Rates



Figure 3 above shows a decrease in kilograms per-capita produced year after year. Here are a few areas of note:

- Compostable organics have decreased since the first report was completed in 2006, with a total change of 28 kg/capita less organics produced from 2006 through 2021.
- Plastics have slightly increased year over year since 2006, with a total increase of 11 kg/capita between 2006 and 2021.

Table 4-15 shows a comparison of the material categories between 2021 and 2017 based on Building Type.

Table 4-15 – Historical Data Comparison by Building Type

Year	Building Type					
	Apartment (>5 stories)		Apartment (<5 stories)		Row Houses	
	2021	2017	2021	2017	2021	2017
# of Samples	29	36	41	51	32	13
Category	Weight%	Weight%	Weight%	Weight%	Weight%	Weight %
Paper	14.1%	17.6%	15.0%	15.5%	14.1%	13.8%
Plastic	15.6%	15.0%	17.4%	14.7%	16.3%	13.9%
Compostable Plastic	0.0%	0.3%	0.0%	0.2%	0.0%	0.3%
Compostable Organics	35.0%	38.0%	38.6%	38.0%	37.3%	36.4%
Non-Compostable Organics	6.0%	5.2%	2.2%	4.5%	3.4%	4.8%
Metals	2.0%	3.0%	2.8%	2.5%	2.6%	3.2%
Glass	3.6%	3.8%	3.2%	2.7%	2.7%	2.1%
Building Material	1.5%	0.8%	1.1%	1.4%	3.2%	4.1%
Electronic Waste	0.8%	1.5%	1.9%	1.8%	2.3%	1.6%
Household Hazardous	0.5%	1.3%	0.6%	1.1%	0.6%	0.6%
Household Hygiene	15.8%	11.4%	14.8%	16.2%	15.2%	18.2%
Bulky Objects	4.4%	0.7%	1.8%	0.2%	1.6%	0.0%
Fines	0.6%	1.4%	0.7%	1.3%	0.7%	1.1%
Total	100.0%	100.0%	100.0%	100.1%	100.0%	100.1%



Table 4-16 shows a comparison of material categories between 2021 and 2017 based on Ownership Type.

Table 4-16 – Historical Comparison based on Ownership Type

Ownership Type	Rented		Owned	
	2021	2017	2021	2017
# of Samples	44	51	58	46
Category	Weight%	Weight%	Weight%	Weight%
Paper	14.6%	16.0%	14.5%	15.9%
Plastic	15.2%	13.5%	17.5%	15.9%
Compostable Plastic	0.0%	0.2%	0.0%	0.3%
Compostable Organics	38.5%	40.0%	36.4%	35.3%
Non-Compostable Organics	4.3%	4.3%	3.3%	5.2%
Metals	2.6%	2.2%	2.5%	3.4%
Glass	3.4%	2.6%	3.1%	3.6%
Building Material	0.9%	0.9%	2.3%	2.4%
Electronic Waste	2.4%	1.7%	1.2%	1.8%
Household Hazardous	0.4%	0.8%	0.6%	1.5%
Household Hygiene	14.3%	15.9%	15.7%	13.4%
Bulky Objects	2.9%	0.5%	2.3%	0.1%
Fines	0.6%	1.4%	0.6%	1.2%
Total	100.0%	100.0%	100.0%	100.0%

4.4 Single-Use Item Disposal

Table 4-17 and Table 4-18 present the estimated disposal of SUIs in the multi-family residential waste streams. The number of units presented is an estimate of the number of units that are produced in the region based on the 2019 disposal tonnage and counts that were completed during the Study.

As shown in previous studies completed for Metro Vancouver takeout containers contribute more than the other SUI disposal when comparing by tonnage. The other SUIs typically weigh less and therefore are not as prevalent in the waste composition. Retail bags and takeout containers comprise approximately 60% to 80% of the disposal of all SUIs in the waste streams.



Table 4-17 presents the estimated disposal of single-use items for the entire Metro Vancouver region.

Table 4-17 – Estimated Disposal of Single-Use Items

Category	Item	%Weight	Tonnes	Units	Kilograms / Capita	Units / Capita	90 % Confidence Interval (CI Units/Capita)
Retail Bags	Paper bags	0.32%	746	10,000,000	0.66	9	+/-2
	Re-used Plastic Bags	0.77%	1811	77,600,000	1.60	69	+/-7
	Empty Plastic Bags	0.22%	508	34,900,000	0.45	31	+/-5
	Plastic Bags Labelled Compostable	0.00%	6	400,000	0.005	0.4	+/-0.2
Total Retail Bags		1.31%	3070	122,900,000	2.71	109	+/-15
Cups	Plastic-Lined Paper Hot Cups	0.21%	487	17,000,000	0.43	15	+/-4
	Plastic-Lined Paper Cold Cups	0.14%	321	16,200,000	0.28	14	+/-2
	Plastic-Lined Paper Cups Labelled Compostable	0.01%	14	1,200,000	0.01	1	+/-1
	Foam Cups	0.00%	4	400,000	0.004	0.4	+/-0.3
	Rigid Plastic Cups	0.19%	448	23,100,000	0.40	20	+/-4
	Rigid Plastic Cups Labeled Compostable	0.00%	4	300,000	0.003	0.3	+/-0.4
Total Cups		0.55%	1277	58,200,000	1.13	51	+/-11
Takeout Containers	Unlined Paper Takeout Containers	0.32%	756	19,900,000	0.67	18	+/-3
	Plastic-Lined Paper Takeout Containers - Flat/clamshell	0.20%	466	13,200,000	0.41	12	+/-2
	Plastic-Lined Paper Takeout Containers - bowls	0.10%	241	8,000,000	0.21	7	+/-8
	Foam Takeout Containers	0.08%	177	11,500,000	0.16	10	+/-2
	Rigid Plastic Takeout Containers	0.59%	1387	25,900,000	1.22	23	+/-4
	Plastic Takeout Containers	0.00%	2	100,000	0.001	0.1	+/-0.2



Category	Item	%Weight	Tonnes	Units	Kilograms / Capita	Units / Capita	90 % Confidence Interval (CI Units/Capita)
	Labelled Compostable						
Total Takeout Containers		1.30%	3028	78,600,000	2.67	69	+/-19
Straws	Paper Straws	0.01%	31	7,000,000	0.03	6	+/-1
	Plastic Straws	0.02%	52	40,700,000	0.05	36	+/-5
Total Straws		0.04%	84	47,700,000	0.07	42	+/-6
Utensils	Plastic Utensils	0.08%	183	48,500,000	0.16	43	+/-8
	Wood Utensils	0.07%	162	47,800,000	0.14	42	+/-7
	Other Foodware Labeled Compostable	0.00%	1	0	0.00	0	n/a
Total Utensils		0.15%	346	96,300,000	0.31	85	+/-15
Total of All Disposed SUIs		3.34%	7805	403,700,000	7	356	+/-66

Notes:

1. For the purpose of this study, compostable refers to any products that are marketed as compostable and biodegradable, regardless of their actual performance in composting systems.
2. Paper hot cups and paper cold cups both contain plastic liners. Paper hot cups labelled compostable typically have a PLA plastic liner

4.5 Personal Protective Equipment Disposal

Due to the Study occurring during the on-going COVID-19 pandemic, personal protective equipment (PPE) such as mask, gloves, and disinfectant wipes were weighed and counted as separate categories to determine the prevalence of these items in the waste stream. Table 4-18 below presents the personal protective equipment composition.

Table 4-18– Personal Protective Equipment Composition

Category	Item	%Weight	90% Confidence Interval	Units	Kilograms/ Capita	Units/Capita	90 % Confidence Interval (CI Units/Capita)
PPE	Masks	0.15%	+/-0.02%	66,600,000	0.30	59	+/-8
	Gloves	0.16%	+/-0.04%	49,600,000	0.32	44	+/-10
	Wipes	0.19%	+/-0.03%	82,300,000	0.38	73	+/-13
Total PPE		0.49%		198,500,000	1.01	175	+/-32

5.0 Recycling and Organics Results

Recycling composition was estimated visually on-site. In total, ninety-nine (99) recycling samples were completed. There were fewer recycling samples than waste samples as some of the building



managers or strata members did not realize that garbage and recycling were picked-up on separate days and some recycling samples were missed.

Of these samples seventy-nine (79) were from multi-stream recycling systems and twenty (20) were from single-stream recycling systems. Table 5-1 below presents the number of samples that were completed for each recycling type for multi and single-stream recycling systems.

Table 5-1 – Number of Samples for each Recycling Stream

Recycling System	Total Samples	Mixed Containers	Mixed Paper	Mixed Containers and Paper	Glass Samples	Cardboard	Other Recycling
Multi-Stream	79	79	79	-	57	40	13
Single-Stream	20	-	-	20	8	7	1
Total	99	79	79	20	65	47	14

In addition to the standard streams listed in the table above there were a few buildings with different recycling streams as follows:

- Styrofoam
- Textiles
- Electronic Waste
- Refundables

5.1 Material Contamination Rate

The recycling contamination rates are reported based on the number of bins that were found to contain contamination.

5.1.1 Multi-Stream Contamination Rate

Table 5-2 below summarizes the contamination that was found in the multi-stream bins. The percent contamination represents the percentage of bins that contained contamination.

Table 5-2 – Recycling Contamination Rate Multi-Stream

Multi-Stream Contamination				
	Mixed Containers	Paper	Glass	Cardboard
Number of Bins Sampled	245	250	82	49
% Contaminated	50.2%	31.2%	41.5%	30.6%

The cleanest bins appeared to be cardboard (30.6%) and paper (31.2%). Approximately 50% of all mixed container bins were contaminated.



5.1.2 Single-Stream Contamination Rate

Table 5-3 below summarizes the contamination that was found in the single-stream bins. The percent contamination represents the number of bins that were observed to contain contamination.

Table 5-3 – Recycling Contamination Rate Single-Stream

Single-Stream Contamination			
	Single Stream	Glass	Cardboard
Number of Bins Sampled	88	20	11
% Contaminated	54.5%	55.0%	45.5%

The rate of contamination in the single-stream bins was approximately 55% of all bins observed.

5.2 Organics Contamination Rate

Table 5-4 below summarizes the contamination that was found in the organic bins. Of the 276 organic bins that were observed 56% of them contained contamination.

Table 5-4 – Organic Contamination Rate Overall

Organic Contamination	
	Single Stream
Number of Bins Sampled	276
% Contaminated	55.8%

6.0 Recycling and Organic Recycling Rates Per-Capita

After the completion of the sampling, the data from the visual audits and the questionnaires were combined to determine the kg/capita disposal for recycling and organics. This was done by the following method:

1. Counted the number of days since collection for each stream.
2. Used the number of days since the last collection to determine an adjusted number of units (representing the number of units generating a full weeks' worth of recycling).
3. Converted volume estimates to kg using published US EPA densities (https://www.epa.gov/sites/default/files/2016-4/documents/volume_to_weight_conversion_factors_memo_randum_04192016_508fnl.pdf)



4. Took the total kg from the organics and recycling data and multiplied by 52 weeks then divided by the adjusted number of units times average population per unit to get generation in kg per capita per year (This assumes that the amount collected from each unit represents a week's worth if the number of units is adjusted for when the actual collection day was).

Table 6-1 below shows the calculated kg/capita that is produced in each of the recycling streams. There appears to be 30 kg/capita more material generated in single stream recycling though this does not say anything about the quality of the material.

Table 6-1 – Recycling Generation in Kg/Capita

Recycling Generation						
Category	Overall Kg/Capita	Mixed Containers Kg/Capita	Mixed Paper Kg/Capita	Glass Kg/Capita	Single Stream Kg/Capita	Cardboard Kg/Capita
Multi-stream	97	14	56	5	N/A	23
Single Stream	127	N/A	N/A	5	101	21
Combined	103	11	44	5	20	23

The calculated generation for organics in multi-family homes was 49.5 kg/capita.

7.0 Limitations and Sources of Error

The following are limitations and potential sources of error in the Study:

- Small discrepancies between the total sample mass and the sum of the sorted category masses can occur at the end of sorting a sample. Errors in the recording of field data are possible reasons for the sum of the category masses being different from the total sample mass. Such errors were minor and are controlled by our QA/QC procedures for error checking the data.
- Sample material falling to the floor and changes in moisture content during the sort could result in a sorted category mass that was different than the total sample mass.
- Larger bulky items found in the waste that were not able to be weighed in the field were noted and estimated by researching the average weight of similar objects.
- In some instances, the COVID-19 PPE item disinfectant wipes may have not been distinguishable between normal tissues/sanitary wipes and therefore may not have been accurately sorted in the field.



8.0 Closure and Professional Statement

MTE prepared the foregoing report for the exclusive use and information of the Client. The information and data were collected and compiled in accordance with the general level of care and skill normally exercised by environmental science and engineering professionals practicing under similar circumstances.

During the preparation of this report, MTE has relied on reports, data, studies, specifications, documents, and other information provided by others. MTE has taken care to verify the information provided where possible but makes no warranty as to the accuracy of the reports, data, studies, specifications, documents, and other information prepared by others and accepts no responsibility for information contained in them.

Any use by a third party of the foregoing report, or any reliance upon or decisions made by a third party based upon them, are the sole responsibility of such third parties. MTE accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on the foregoing report.

Thank you for choosing MTE for this project. Should you have questions concerning this report, or if you require additional information, please contact the undersigned at (604) 436-9111.

Metro Testing & Engineering Ltd.

Prepared By:

Reviewed By:

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PERMIT TO PRACTICE	
METRO TESTING & ENGINEERING LTD.	
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RR EGBC ID #	<u>22422</u>
DATE	<u>2022-04-21</u>
PERMIT NUMBER: 1000648	
Engineers and Geoscientists of British Columbia (EGBC)	



APPENDICES



APPENDIX I

MATERIAL CATEGORIES

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
1	Paper	Fine, Office, Envelopes	Junk Mail, Flyers, Unaddressed Mail		Recyclable
2	Paper	Fine, Office, Envelopes	Other Fine Office Paper or Envelopes		Recyclable
3	Paper	Newsprint	Newsprint		Recyclable
4	Paper	OCC	Clean Recyclable OCC		Recyclable
5	Paper	OCC	Waxed OCC	Non-recyclable, compostable	Limited recycling options
6	Paper	OCC	Other Soiled OCC	Contaminated with food/blood/grease, dirty pizza boxes	Green Bin
7	Paper	Boxboard	Cereal Boxes and Other Box Packaging		Recyclable
8	Paper	Bound Paper Products	Telephone Books		Recyclable
9	Paper	Bound Paper Products	Magazines		Recyclable
10	Paper	Bound Paper Products	Books		
11	Paper	Beverage Containers – Gable top/Drink Box/Aseptic	Dairy or Dairy Substitute		Recyclable
12	Paper	Beverage Containers – Gable top/Drink Box/Aseptic	Non-Dairy/Deposit		Recyclable
13	Paper	Other Paper	Plastic-Lined Paper Hot Cups	Coffee, tea, drinks, etc., not including compostable	SUI
14	Paper	Other Paper	Plastic-Lined Paper Cold Cups	Fountain drinks, slurpees etc.	SUI
15	Paper	Other Paper	Plastic-Lined Paper Cups Labeled Compostable	Hot or cold beverage containers labeled compostable	SUI
16	Paper	Other Paper	Paper Straws	Paper straws	SUI
17	Paper	Other Paper	Unlined Paper Takeout Containers	Fibre based to-go containers e.g., Unbranded pulp clamshells	SUI

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
18	Paper	Other Paper	Plastic-Lined Paper Takeout Containers	Fold-flat fibre based to-go containers – coated e.g., Fast food containers.	SUI
19	Paper	Other Paper	Plastic-Lined Paper Takeout Containers	Fibre-based bowl containers – coated e.g., Soup or curry containers	SUI
20	Paper	Other Paper	Paper bags	Grocery bags, retail carryout	SUI
21	Paper	Other Paper	Other Recyclable Paper	Kraft paper, moulded pulp, recyclable polycoat containers	Recyclable
22	Paper	Other Paper	Other Compostable Paper	paper plates, tissue paper, toweling, etc.	Green Bin
23	Paper	Other Paper	Non-compostable, non-recyclable paper	Tar paper, laminated paper. Coated paper etc.	Limited recycling options
24	Plastic	Film	Re-Used Plastic Bags	Retail & Grocery - Re-used as kitchen catchers: HDPE & LDPE retail and grocery carry out plastic bags containing waste e.g., household or for containing recyclables or organics	SUI
25	Plastic	Film	Empty Plastic Bags	Retail & Grocery - Empty: HDPE and LDPE retail and grocery carryout bags that have not been reused	SUI
26	Plastic	Film	Consumables Packaging Bags and Film	Dry cleaning bags, bread bags, frozen food bags, milk bags, 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.	Recyclable
27	Plastic	Film	Garbage Bags Sandwich/Freezer Bags	HDPE & LDPE garbage bags, kitchen catchers, blue or clear bags for recyclables	Limited recycling options
28	Plastic	Film	Freezer Bags	HDPE & LDPE sandwich, freezer bags, Ziplocs and other food use bags	Limited recycling options
29	Plastic	Film	Deposit Beverage Pouches		Recyclable

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
30	Plastic	Film	Other Plastic Film	Pallet / distribution wrap and lumber wrap (nonwoven), tarps, other plastic film	Limited recycling options
31	Plastic	Textiles (Synthetic)	Clothing and accessories	Includes all clothing, lingerie, socks, costumes, snowsuits, swimwear, bags, purses, backpacks, gloves, mittens, hats, scarves, wallets etc. primarily made of synthetic materials	Textiles
32	Plastic	Textiles (Synthetic)	Household	Includes all linens, towels, curtains, tablecloths, pet clothes etc. made of synthetic materials	Textiles
33	Plastic	Textiles (Synthetic)	Reusable bags	Reusable retail carryout bags made of synthetic materials	Textiles
34	Plastic	Textiles (Synthetic)	Other Donatable Textiles	All other donatable textiles (e.g., stuffed toys and animals, masks, pet collars and leashes made of synthetic materials) regardless of condition	Textiles
35	Plastic	Textiles (Synthetic)	Other Textiles	All other textiles (e.g., drop cloths, artificial turf, filter fabric)	
36	Plastic	Rigid Beverage Containers	Dairy or Dairy Substitute		Recyclable
37	Plastic	Rigid Beverage Containers	Deposit Containers – Water	Water Bottles	Recyclable
38	Plastic	Rigid Beverage Containers	Deposit Containers – Other	All other deposit beverage bottles: juice, pop, alcohol	Recyclable
39	Plastic	Rigid Beverage Containers	Rigid Plastic Cups	Plastic beverage cups for iced coffee, tea, drinks, etc.	SUI
40	Plastic	Rigid Beverage Containers	Other	Non-deposit juice, water or pop containers	Recyclable
41	Plastic	Rigid (non-beverage)	# 1 PETE – Bottles and Jars	Other Bottles and Jars: #1, cooking oil, peanut butter, dish soap, mouthwash, etc. (excluding bottles that contained HHW)	Recyclable

No	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
42	Plastic	Rigid (non-beverage)	#1 PETE – Other Packaging	Other Packaging: #1, bakery, clamshells, trays, openable trays, egg cartons	Recyclable
43	Plastic	Rigid (non-beverage)	#2 HDPE – Bottles and Jugs	Other Bottles and Jugs: #2, laundry soap, shampoo, windshield washer fluid, etc. (excluding bottles that contained HHW)	Recyclable
44	Plastic	Rigid (non-beverage)	#2 HDPE – Tubs and Lids	Wide mouth tubs and lids, dairy tubs, pails, lawn, garden, pool supplies, kitty litter, etc.	Recyclable
45	Plastic	Rigid (non-beverage)	#3 PVC	Bottles and Jars: #3 bottles and jars, lotions, soaps, bug repellents, shampoos, etc.	Recyclable
46	Plastic	Rigid (non-beverage)	#4 LDPE	Wide mouth tubs and lids, dairy tubs, etc.	Recyclable
47	Plastic	Rigid (non-beverage)	#5 PP	Wide mouth tubs and lids, dairy tubs, pails, lawn, garden, pool supplies, kitty litter, etc.	Recyclable
48	Plastic	Rigid (non-beverage)	#6 PS – Non-Foam	#6 PS (non-foam), trays, clamshells, lids, pill and vitamin bottles, seedling trays, etc.	Recyclable
49	Plastic	Rigid (non-beverage)	#6 PS – Packing Foam	#6 PS (foam) EPS used to protect boxed products such as TVs, electronics etc.	Recyclable
50	Plastic	Rigid (non-beverage)	Foam Cups	#6 Expanded polystyrene Cups	SUI
51	Plastic	Rigid (non-beverage)	Foam Takeout Containers	#6 Expanded polystyrene Takeout containers	SUI
52	Plastic	Rigid (non-beverage)	#6 PS – Foam foodware	Meat trays, egg cartons	Recyclable
53	Plastic	Rigid (non-beverage)	#6 PS – Other PS Foam	Packaging peanuts, seedling trays, other EPS	Recyclable
54	Plastic	Rigid (non-beverage)	Other Foam	Non-EPS Foam	Limited recycling options



No	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
55	Plastic	Rigid (non-beverage)	#7 Mixed Resin Plastic	Food containers, mustard, ketchup and some juices	Recyclable
56	Plastic	Rigid (non-beverage)	Uncoded Packaging/Containers	Blister packaging, tubes for pharmaceutical & health care/cosmetic products, plant pots, unmarked/coded packaging, etc.	Recyclable
57	Plastic	Rigid (non-beverage)	Rigid Plastic takeout Containers	Clamshells, plastic non-foam, non-compostable containers used for takeout (most likely #1 PETE but possibly others)	SUI
58	Plastic	Other	Durable Plastic Products	Non-packaging such as VCR tapes, CDs, toys, games, plant pots, Tupperware, furniture, siding, plumbing pipes, etc.	Limited recycling options
59	Plastic	Other	Plastic Straws		SUI
60	Plastic	Other	Plastic Utensils		SUI
61	Plastic	Other	Coffee Pods		
62	Plastic	Other	Other/Mixed Plastics		Limited recycling options
63	Compostable Plastic	Foodware	Rigid Plastic Cups Labeled Compostable		SUI
64	Compostable Plastic	Foodware	Plastic Takeout Containers Labeled Compostable		SUI
65	Compostable Plastic	Foodware	Other Foodware Labeled Compostable	Compostable cutlery, straws or other	SUI
66	Compostable Plastic	Film	Plastic Bags Labeled Compostable	Compostable grocery or other retail carryout	SUI
67	Compostable Plastic	Film	Bags and Liners	Compostable kitchen catcher bags, totter liners, overwrap, etc.	Limited recycling options
68	Compostable Plastic	Other Compostable Products and Packaging	Packaging, Bottles	Bags, pop bottles, water bottles, or other compostable packaging	Limited recycling options



No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
69	Compostable Organics	Yard & Garden	Small Yard Waste	Small yard waste (leaves, branches, brush, grass clippings, wood chips, plant material, potting soil, peat, etc.)	Green Bin
70	Compostable Organics	Yard & Garden	Large Yard Waste	Other large yard wastes (branches, etc. over 15 cm dia. or 1 m long)	Green Bin
71	Compostable Organics	Food Waste - Unavoidable	Unavoidable Food Waste	Unavoidable food waste arising from food/drink preparation (bones, egg shells, tea bags, peels, oil, fats)	Green Bin
72	Compostable Organics	Food Waste - Avoidable	Plate Scrapings, Unfinished Meals		Green Bin
73	Compostable Organics	Food Waste - Avoidable	Whole Fruits and Vegetables		Green Bin
74	Compostable Organics	Food Waste - Avoidable	Whole Meats, Fish		Green Bin
75	Compostable Organics	Food Waste - Avoidable	Full/Unused Ready-Made	Packaged items, canned foods,	Green Bin
76	Compostable Organics	Food Waste - Avoidable	Baked Goods		Green Bin
77	Compostable Organics	Food Waste - Avoidable	Dairy	Yogurt, cheese, butter	Green Bin
78	Compostable Organics	Food Waste - Avoidable	Liquids (drinks, oil in package)		Green Bin
79	Compostable Organics	Food Waste - Avoidable	Candy and snacks	Chips, candy, nuts	Green Bin
80	Compostable Organics	Food Waste - Avoidable	Condiments and sauces	Condiments, pasta sauce, salsa in container	Green Bin
81	Compostable Organics	Food Waste - Avoidable	Pet food		Green Bin
82	Compostable Organics	Clean Wood	Wood Pallets	Unpainted, untreated	C&D
83	Compostable Organics	Clean Wood	Unfinished Wood Furniture	No composites	C&D
84	Compostable Organics	Clean Wood	Wood Utensils	Chopsticks, stir sticks, other wood utensils	SUI
85	Compostable Organics	Clean Wood	Other Wood	Mixed/dimensional lumber, rotting wood - unpainted, untreated	C&D
86	Compostable Organics	Other Compostable Organics	Manure, Slaughterhouse, Animals	Manure, animals prepared for food	

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
87	Non-Compostable Organics	Treated or Painted Wood	Pressure Treated Wood	Treated lumber, shingles, decking etc.	C&D
88	Non-Compostable Organics	Treated or Painted Wood	Finished Wood	Flooring, paneling, siding, glued particle board, plywood, OSB - painted, stained or finished	C&D
89	Non-Compostable Organics	Treated or Painted Wood	Finished Wood Furniture	Not multi-material	C&D
90	Non-Compostable Organics	Textiles	Natural Fiber Clothing	Includes all clothing, lingerie, socks, costumes, snowsuits, swimwear, bags, purses, backpacks, gloves, mittens, hats, scarves, wallets etc. primarily made of natural materials	Textiles
91	Non-Compostable Organics	Textiles	Household	Includes all linens, towels, curtains, tablecloths, pet clothes etc. made of natural materials	Textiles
92	Non-Compostable Organics	Textiles	Reusable bags	Reusable retail carryout bags made of natural materials	Textiles
93	Non-Compostable Organics	Textiles	Other	All other textiles (e.g., stuffed toys and animals, masks, pet collars and leashes made of natural materials)	Textiles
94	Non-Compostable Organics	Rubber	Tires		Recyclable
95	Non-Compostable Organics	Rubber	Other Rubber	Gloves	Limited recycling options
96	Non-Compostable Organics	Leather / Multiple/Composite Organic Materials	Leather	Jackets, purses, belts	Textiles
97	Non-Compostable Organics	Other	Composite Organic Materials (shoes)	Includes all footwear, sport shoes, insoles etc.	Textiles
98	Non-Compostable Organics	Other	Other	Wax and other non-compostable materials	Limited recycling options
99	Metals	Ferrous	Food Containers		Recyclable

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
100	Metals	Ferrous	Spiral-Wound Containers	Frozen juice containers, coffee cans, chip and nut containers	Recyclable
101	Metals	Ferrous	Other Ferrous		Recyclable
102	Metals	Bimetallic	Food Containers		Recyclable
103	Metals	Non-Ferrous (copper, aluminum, brass)	Alcoholic		Recyclable
104	Metals	Non-Ferrous (copper, aluminum, brass)	Non-Alcoholic		Recyclable
105	Metals	Non-Ferrous (copper, aluminum, brass)	Food Containers		Recyclable
106	Metals	Non-Ferrous (copper, aluminum, brass)	Foil Trays, Wrap		Recyclable
107	Metals	Non-Ferrous (copper, aluminum, brass)	Other Non-Ferrous		Recyclable
108	Metals	Non-Consumable Mixed Metals	Household	Kitchen & bathroom fixtures, coat hangers, other metal fixtures, closet doors, filing cabinets, furnishings, etc.	Recyclable
109	Metals	Non-Consumable Mixed Metals	Machine Parts	Auto parts, electric motors, bicycles and parts, lawn mowers, etc.	Recyclable
110	Metals	Non-Consumable Mixed Metals	Construction/Industrial	Nails, screws, handheld tools, drywall trim, flashing, baseboard heaters, industrial doors, panels, etc.	Recyclable
111	Glass	Beverage Containers	Beer		Recyclable
112	Glass		Other Alcohol		Recyclable
113	Glass		Non-Alcoholic & Non-Dairy		Recyclable
114	Glass		Dairy or Dairy Substitute		Recyclable
115	Glass	Food Containers	Food Containers		Recyclable

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
116	Glass	Other Glass and Ceramics	Other Glass and Ceramics	Dishware, mirrors, incandescent light bulbs, fibreglass insulation, plant pots, coffee cups	Limited recycling options
117	Glass	Other Glass and Ceramics	Light bulbs (Non-hazardous)	Incandescent and halogen light bulbs	Recyclable
118	Building Material	Gypsum / Drywall	Gypsum/Drywall		
119	Building Material	Masonry	Masonry		C&D
120	Building Material	Rock, Sand, Dirt	Rock, Sand, Dirt		C&D
121	Building Material	Rigid Asphalt	Rigid Asphalt		C&D
122	Building Material	Carpet Waste	Carpet		C&D
123	Building Material	Carpet Waste	Underlay		C&D
124	Building Material	Other Inorganics	Other Inorganics	Insulation, Linoleum, Laminate, Stucco etc.	C&D
125	Electronic Waste	Computers and Peripherals	Desktop Computers		Recyclable
126	Electronic Waste	Computers and Peripherals	Notebook Computers		Recyclable
127	Electronic Waste	Computers and Peripherals	Computer Peripherals	Including key board, mouse, cables, modems, routers and external hardware other than below	Recyclable
128	Electronic Waste	Computers and Peripherals	Computer Monitors		Recyclable
129	Electronic Waste	Computers and Peripherals	Printers, Scanners		Recyclable
130	Electronic Waste	Televisions & AV Equipment	Televisions		Recyclable
131	Electronic Waste	Televisions & AV Equipment	Other Audio/Video		Recyclable
132	Electronic Waste	Telephones & Telecommunications Equipment	Mobile Phones & Accessories		Recyclable
133	Electronic Waste	Telephones & Telecommunications Equipment	Other	Land line phones and accessories, fax machines	Recyclable
134	Electronic Waste	Small Appliances & Floor Care Appliances	Small Appliances & Floor Care Appliances	Microwaves, toasters, vacuum cleaners, coffee makers, corded and cordless, etc.	Recyclable

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
135	Electronic Waste	Electronic Toys	Electronic Toys		Recyclable
136	Electronic Waste	Smoke Detectors	Smoke Detectors		Recyclable
137	Electronic Waste	Other Electronics	Other Electronics		Recyclable
138	Household Hazardous	Batteries	Lead Acid	Car, truck, boat, wheel chair, golf cart batteries over 2 kg under BCBCP Stewardship Program	Recyclable
139	Household Hazardous	Batteries	Household Batteries (Non-Lithium-Ion)	Small, Rechargeable and Non-Rechargeable Batteries (Ni-Cd, Ni-MH, and Pb under 5 kg).	Recyclable
140	Household Hazardous	Batteries	Lithium-Ion Batteries	Small, lithium rechargeable (Li-ion) and single use lithium metal batteries under 5 kg	Recyclable
141	Household Hazardous	Medical/Biological	Sharps	Needles	
142	Household Hazardous	Medical/Biological	Animal Carcass		
143	Household Hazardous	Medical/Biological	Other	Bandages, IV bags, etc.	
144	Household Hazardous	HHW	Stains/Preservatives		Recyclable
145	Household Hazardous	HHW	Latex Paint		Recyclable
146	Household Hazardous	HHW	Oil-Based Paint		Recyclable
147	Household Hazardous	HHW	Paint Aerosols		Recyclable
148	Household Hazardous	HHW	Solvents		Recyclable
149	Household Hazardous	HHW	Cleaners, Soaps etc.		Recyclable

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
150	Household Hazardous	HHW	Pesticides/Herbicides/Preservatives	With PCP Reg. #	Recyclable
151	Household Hazardous	HHW	Motor Oil		Recyclable
152	Household Hazardous	HHW	Oil Filters		Recyclable
153	Household Hazardous	HHW	Antifreeze		Recyclable
154	Household Hazardous	HHW	Pharmaceuticals		Recyclable
155	Household Hazardous	HHW	Other Petroleum Based Products		Recyclable
156	Household Hazardous	HHW	Other		
157	Household Hazardous	Mercury Containing Items	Thermostats and Switches		Recyclable
158	Household Hazardous	Mercury Containing Items	CFLs		Recyclable
159	Household Hazardous	Other HHW	Other HHW or Containers		
160	Household Hygiene	Biological	Diapers		Limited recycling options
161	Household Hygiene	Biological	Pet Waste	Animal feces, bedding, cat litter	Limited recycling options
162	Household Hygiene	Biological	Other (sanitary products, condoms)	Sanitary napkins, tampons, condoms	Limited recycling options
163	Household Hygiene	PPE	Masks - Disposable	Disposable surgical masks, N95s or similar	PPE
164	Household Hygiene	PPE	Masks - Reusable	Reusable masks and face coverings	PPE
165	Household Hygiene	PPE	Gloves	Nitrile or latex gloves	PPE
166	Household Hygiene	PPE	Wipes	Single-use disinfectant wipes	PPE
167	Household Hygiene	Liquid Product	Personal Care	Full shampoo bottles, beauty products, creams, etc.	Limited recycling options

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments/Examples	Functional Category
168	Bulky Objects	White Goods	Large Appliances		Recyclable
169	Bulky Objects	Furniture	Mattresses, Box Springs		Recyclable
170	Bulky Objects	Furniture	Other Upholstered Furniture		
171	Bulky Objects	Furniture	Other Furniture	Multi-material furniture (e.g., plastic, metal, small amount wood)	
172	Fines	Fines	Fines	Items too small to classify efficiently (e.g., bread tabs, twist ties, typically <1")	Limited recycling options



RECYCLING	
No.	Primary Category
1	Plastic film
2	Glass-Recyclable
3	Glass-Household
4	Non-Recyclable Plastic
5	Food or food soiled Material
6	Metal Objects
7	Household Hazardous Waste
8	EPS
9	Compostable Plastic
10	Single-used-items
11	Other
12	Non-contamination



ORGANICS	
No.	Primary Category
1	Plastic Film
2	Compostable Plastic
3	Other





APPENDIX II

SELECTED SITE PHOTOGRAPHS



Photo 1: Waste Technician Collecting sample from the garbage bin



Photo 2-Waste Technicians sorting sample into individual categories at Surrey Transfer Station



Photo 3-Organic Bin at the site of Sample number 1







Photo 6-Garbage Room with Compactor at the site of Sample Number 37



Photo 7-Newsprint Bin at the site of Sample Number 53



Photo 8-Bulky Items Placed besides the garbage bin at the site of Sample Number 63



Photo 9-Organic Bin at the site of Sample Number 70



Photo 11-Garbage Bin at the site of Sample Number 88



Photo 12-Mixed Paper Bin at the site of Sample Number 92



Photo 13-Glass Bin at the site of Sample Number 98



Photo 14-Recycling Bins at the site of Sample Number 100



Photo 15-Cardboard Bin at the site of Sample Number 102



Photo 16-Collected Sample ready to sort at the VSTS (Sample Number 26)



APPENDIX III

WEIGHTED AVERAGE – ALL CATEGORIES

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Paper				
Fine, Office, Envelopes	Junk Mail, Flyers, Unaddressed Mail	0.35%	0.01	0.13%
	Other Fine Office Paper or Envelopes	1.17%	0.01	0.18%
Newsprint	Newsprint	0.42%	0.01	0.11%
OCC	Clean Recyclable OCC	0.47%	0.01	0.14%
	Waxed OCC	0.03%	0.00	0.02%
	Other Soiled OCC	0.12%	0.00	0.05%
Boxboard	Cereal Boxes and Other Box Packaging	1.74%	0.01	0.19%
Bound Paper Products	Telephone Books	0.00%	0.00	0.00%
	Magazines	0.06%	0.00	0.05%
	Books	0.25%	0.01	0.19%
Beverage Containers – Gable top/Drink Box/Aseptic	Dairy or Dairy Substitute	0.18%	0.00	0.04%
	Non-Dairy/Deposit	0.08%	0.00	0.02%
Other Paper	Plastic-Lined Paper Hot Cups	0.21%	0.00	0.05%
	Plastic-Lined Paper Cold Cups	0.14%	0.00	0.02%
	Plastic-Lined Paper Cups Labeled Compostable	0.01%	0.00	0.00%
	Paper Straws	0.01%	0.00	0.00%
	Unlined Paper Takeout Containers	0.32%	0.00	0.05%
	Plastic-Lined Paper Takeout Containers - Flat/clamshell	0.20%	0.00	0.03%
	Plastic-Lined Paper Takeout Containers - bowls	0.10%	0.01	0.12%
	Paper bags	0.32%	0.01	0.09%
	Other Recyclable Paper	0.55%	0.01	0.17%
	Other Compostable Paper	6.97%	0.03	0.46%
	Non-compostable, non-recyclable paper	0.79%	0.01	0.09%
Total Paper		14.47%	0.05	0.80%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Plastic				
Film	Re-Used Plastic Bags	0.77%	0.00	0.07%
	Empty Plastic Bags	0.22%	0.00	0.04%
	Consumables Packaging Bags and Film	4.09%	0.02	0.31%
	Garbage Bags Sandwich/Freezer Bags	1.04%	0.00	0.07%
	Freezer Bags	0.21%	0.00	0.02%
	Deposit Beverage Pouches	0.00%	0.00	0.00%
	Other Plastic Film	0.44%	0.01	0.12%
Textiles (Synthetic)	Clothing and accessories	1.44%	0.02	0.35%
	Household	1.44%	0.02	0.36%
	Reusable bags	0.10%	0.00	0.05%
	Other Donatable Textiles	0.55%	0.01	0.19%
	Other Textiles	0.15%	0.01	0.12%
Rigid Beverage Containers	Dairy or Dairy Substitute	0.08%	0.00	0.02%
	Deposit Containers – Water	0.10%	0.00	0.02%
	Deposit Containers – Other	0.16%	0.00	0.03%
	Rigid Plastic Cups	0.19%	0.00	0.04%
	Other	0.00%	0.00	0.00%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Rigid (non-beverage)	# 1 PETE – Bottles and Jars	0.39%	0.00	0.06%
	#1 PETE – Other Packaging	0.47%	0.00	0.06%
	#2 HDPE – Bottles and Jugs	0.36%	0.00	0.05%
	#2 HDPE – Tubs and Lids	0.03%	0.00	0.01%
	#3 PVC	0.00%	0.00	0.00%
	#4 LDPE	0.02%	0.00	0.01%
	#5 PP	0.68%	0.01	0.16%
	#6 PS – Non-Foam	0.11%	0.00	0.02%
	#6 PS – Packing Foam	0.11%	0.01	0.09%
	Foam Cups	0.00%	0.00	0.00%
	Foam Takeout Containers	0.08%	0.00	0.02%
	#6 PS – Foam foodware	0.20%	0.00	0.03%
	#6 PS – Other PS Foam	0.01%	0.00	0.01%
	Other Foam	0.03%	0.01	0.10%
	#7 Mixed Resin Plastic	0.05%	0.00	0.02%
	Uncoded Packaging/Containers	0.37%	0.00	0.04%
	Rigid Plastic takeout Containers	0.59%	0.01	0.11%
	Other	Durable Plastic Products	0.85%	0.01
Plastic Straws		0.02%	0.00	0.00%
Plastic Utensils		0.08%	0.00	0.01%
Coffee Pods		0.41%	0.01	0.11%
Other/Mixed Plastics		0.65%	0.02	0.34%
Total Plastic		16.51%	0.05	0.87%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Compostable Plastic				
Foodware	Rigid Plastic Cups Labeled Compostable	0.00%	0.00	0.00%
	Plastic Takeout Containers Labeled Compostable	0.00%	0.00	0.00%
	Other Foodware Labeled Compostable	0.00%	0.00	0.00%
Film	Plastic Bags Labeled Compostable	0.00%	0.00	0.00%
	Bags and Liners	0.00%	0.00	0.00%
Other Compostable Products and Packaging	Packaging, Bottles	0.00%	0.00	0.00%
Total Compostable Plastic		0.01%	0.00	0.01%
Compostable Organics				
Yard & Garden	Small Yard Waste	2.27%	0.05	0.89%
	Large Yard Waste	0.03%	0.00	0.04%
Food Waste	Unavoidable Food Waste	13.92%	0.07	1.10%
	Plate Scrapings, Unfinished Meals	5.58%	0.03	0.56%
	Whole Fruits and Vegetables	5.71%	0.04	0.62%
	Whole Meats, Fish	1.36%	0.01	0.24%
	Full/Unused Ready-Made	1.28%	0.02	0.34%
	Baked Goods	2.60%	0.02	0.30%
	Dairy	0.74%	0.01	0.15%
	Liquids (drinks, oil in package)	1.04%	0.01	0.20%
	Candy and snacks	0.96%	0.01	0.13%
	Condiments and sauces	1.19%	0.01	0.19%
	Pet food	0.08%	0.00	0.03%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Clean Wood	Wood Pallets	0.00%	0.00	0.00%
	Unfinished Wood Furniture	0.03%	0.00	0.07%
	Wood Utensils	0.07%	0.00	0.01%
	Other Wood	0.32%	0.02	0.30%
Other Compostable Organics	Manure, Slaughterhouse, Animals	0.00%	0.00	0.00%
Total Compostable Organics		37.17%	0.11	1.74%
Non-Compostable Organics				
Treated or Painted Wood	Pressure Treated Wood	0.03%	0.00	0.04%
	Finished Wood	1.19%	0.06	0.97%
	Finished Wood Furniture	0.20%	0.01	0.15%
Textiles	Natural Fiber Clothing	0.44%	0.01	0.14%
	Household	0.38%	0.01	0.15%
	Reusable bags	0.01%	0.00	0.00%
	Other	0.05%	0.00	0.06%
Rubber	Tires	0.03%	0.00	0.02%
	Other Rubber	0.35%	0.01	0.15%
Leather / Multiple/Composite Organic Materials Other	Leather	0.01%	0.00	0.01%
	Composite Organic Materials (shoes)	0.72%	0.01	0.20%
	Other	0.37%	0.01	0.17%
Total Non-Compostable Organics		3.77%	0.06	1.03%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Metal				
Ferrous	Food Containers	0.01%	0.00	0.02%
	Spiral-Wound Containers	0.07%	0.00	0.02%
	Other Ferrous	0.05%	0.00	0.06%
Bimetallic	Food Containers	0.04%	0.00	0.03%
	Beverage Containers	0.00%	0.00	0.00%
Non-Ferrous (copper, aluminum, brass)	Alcoholic	0.10%	0.00	0.03%
	Non-Alcoholic	0.10%	0.00	0.02%
	Food Containers	0.51%	0.00	0.07%
	Foil Trays, Wrap	0.45%	0.00	0.06%
	Other Non-Ferrous	0.04%	0.00	0.02%
Non-Consumable Mixed Metals	Household	0.89%	0.01	0.24%
	Machine Parts	0.14%	0.01	0.09%
	Construction/Industrial	0.11%	0.00	0.07%
Total Metals		2.50%	0.02	0.31%
Glass				
Beverage Containers	Beer	0.10%	0.00	0.05%
	Other Alcohol	0.41%	0.01	0.13%
	Non-Alcoholic & Non-Dairy	0.28%	0.01	0.09%
	Dairy or Dairy Substitute	0.01%	0.00	0.01%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Food Containers	Food Containers	0.85%	0.01	0.16%
Other Glass and Ceramics	Other Glass and Ceramics	1.46%	0.02	0.29%
	Light bulbs (Non-hazardous)	0.06%	0.00	0.05%
Total Glass		3.18%	0.02	0.37%
Building Material				
Gypsum / Drywall	Gypsum/Drywall	0.33%	0.02	0.33%
Masonry	Masonry	0.35%	0.03	0.42%
Rock, Sand, Dirt	Rock, Sand, Dirt	0.00%	0.00	0.00%
Rigid Asphalt	Rigid Asphalt	0.00%	0.00	0.00%
Carpet Waste	Carpet	0.22%	0.01	0.15%
	Underlay	0.04%	0.00	0.05%
Other Inorganics	Other Inorganics	0.77%	0.04	0.63%
Total Building Material		1.71%	0.06	0.94%
Electronic Waste				
Computers and Peripherals	Desktop Computers	0.00%	0.00	0.00%
	Notebook Computers	0.00%	0.00	0.00%
	Computer Peripherals	0.16%	0.01	0.13%
	Computer Monitors	0.00%	0.00	0.00%
	Printers, Scanners	0.00%	0.00	0.00%
Televisions & AV Equipment	Televisions	0.16%	0.01	0.18%
	Other Audio/Video	0.04%	0.00	0.03%
Telephones & Telecommunications Equipment	Mobile Phones & Accessories	0.04%	0.00	0.02%
	Other	0.06%	0.00	0.07%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Small Appliances & Floor Care Appliances	Small Appliances & Floor Care Appliances	0.64%	0.02	0.30%
Electronic Toys	Electronic Toys	0.03%	0.00	0.02%
Smoke Detectors	Smoke Detectors	0.00%	0.00	0.00%
Other Electronics	Other Electronics	0.57%	0.02	0.26%
Total Electronic Waste		1.70%	0.03	0.52%
Household Hazardous				
Batteries	Lead Acid	0.00%	0.00	0.00%
	Household Batteries (Non-Lithium-Ion)	0.07%	0.00	0.02%
	Lithium-Ion Batteries	0.02%	0.00	0.03%
Medical/Biological	Sharps	0.01%	0.00	0.00%
	Animal Carcass	0.00%	0.00	0.00%
	Other	0.05%	0.00	0.05%
HHW	Stains/Preservatives	0.00%	0.00	0.00%
	Latex Paint	0.02%	0.00	0.03%
	Oil-Based Paint	0.00%	0.00	0.00%
	Paint Aerosols	0.00%	0.00	0.00%
	Solvents	0.00%	0.00	0.00%
	Cleaners, Soaps etc.	0.12%	0.00	0.05%
	Pesticides/Herbicides/Preservatives	0.01%	0.00	0.02%
	Motor Oil	0.01%	0.00	0.01%
	Oil Filters	0.00%	0.00	0.00%
	Antifreeze	0.00%	0.00	0.01%
	Pharmaceuticals	0.13%	0.00	0.04%
	Other Petroleum Based Products	0.03%	0.00	0.02%
	Other	0.04%	0.00	0.03%

Material Category		Weighted %	Standard Deviation	Confidence Intervals (90%)
Mercury Containing Items	Thermostats and Switches	0.00%	0.00	0.00%
	CFLs	0.00%	0.00	0.00%
Other HHW	Other HHW or Containers	0.06%	0.00	0.06%
Total Household Hazardous		0.57%	0.01	0.12%
Household Hygiene				
Biological	Diapers	5.19%	0.07	1.13%
	Pet Waste	6.99%	0.07	1.10%
	Other (sanitary products, condoms)	2.00%	0.02	0.32%
Health	Masks	0.15%	0.00	0.02%
	Gloves	0.16%	0.00	0.04%
	Wipes	0.19%	0.00	0.03%
Liquid Product	Personal Care	0.53%	0.01	0.15%
Total Household Hygiene		15.20%	0.10	1.67%
Bulky Objects				
White Goods	Large Appliances	0.07%	0.03	0.47%
Furniture	Mattresses, Box Springs	0.10%	0.01	0.16%
	Other Upholstered Furniture	0.17%	0.01	0.24%
	Other Furniture	2.22%	0.06	0.92%
Total Bulky Objects		2.56%	0.08	1.23%
Fines			0.00	0.00%
Fines	Fines	0.66%	0.01	0.12%
Total Fines		0.66%	0.01	0.12%



APPENDIX IV

SINGLE-USE ITEMS DENSITIES

Category	Item	Number of Samples	g/unit	90% Confidence Interval (g/unit)
Retail Bags	Paper bags	88	61.27	15.32
	Re-used Plastic Bags	102	15.19	1.08
	Empty Plastic Bags	99	9.04	0.61
	Plastic Bags Labelled Compostable	7	12.50	4.03
Cups	Plastic-Lined Paper Hot Cups	93	22.24	1.39
	Plastic-Lined Paper Cold Cups	90	18.65	1.00
	Plastic-Lined Paper Cups Labelled Compostable	8	20.42	23.75
	Foam Cups	5	3.95	2.48
	Rigid Plastic Cups	95	21.59	6.17
	Rigid Plastic Cups Labeled Compostable	3	14.44	14.51
Takeout Containers	Unlined Paper Takeout Containers	92	30.08	2.01
	Plastic-Lined Paper Takeout Containers - Flat/clamshell	82	33.24	2.53
	Plastic-Lined Paper Takeout Containers - bowls	61	29.90	4.85
	Foam Takeout Containers	68	16.26	1.91
	Rigid Plastic Takeout Containers	96	43.53	3.22
	Plastic Takeout Containers Labelled Compostable	2	30.00	16.45
Straws	Paper Straws	85	2.64	0.60
	Plastic Straws	97	1.19	0.30
Utensils	Plastic Utensils	95	4.21	0.28
	Wood Utensils	89	4.86	0.40
	Other Foodware Labeled Compostable	3	6.00	3.66
PPE	Masks	100	4.43	0.22
	Gloves	96	5.39	0.33
	Wipes	97	3.86	0.31