



metrovancover

SERVICES AND SOLUTIONS FOR A LIVABLE REGION

2016 WASTE COMPOSITION MONITORING PROGRAM



Prepared for:
Metro Vancouver
4330 Kingsway, Burnaby, BC V5H 4G8

December 2016
Issued for Use



Prepared by:
Tetra Tech EBA Inc.
1000-10th FL, 885 Dunsmuir St., Vancouver, BC V6C 1N5
Phone: 604.685.0275

EXECUTIVE SUMMARY

Tetra Tech EBA Inc. (Tetra Tech) was retained by Metro Vancouver to conduct the 2016 Waste Composition Monitoring Program. The waste composition sorting was conducted from June to September 2016.

The objectives for the 2016 Waste Composition Monitoring Program were to establish current waste composition data for the following material streams:

- Single family (SF), multi-family (MF), drop-off (DO), and industrial, commercial, and institutional (ICI) municipal solid waste (MSW);
- SF, MF and ICI organic material;
- Streetscape MSW; and
- Abandoned waste and large item pick-up programs.

The majority of sampling was undertaken at five facilities. Garbage samples were collected and sorted at the Surrey Transfer Station (STS), the Metro Vancouver Waste to Energy Facility in Burnaby (WTE), and the Vancouver South Transfer Station (VSTS). The organics samples were collected and sampled at the North Shore Transfer Station (NSTS) Harvest Power organics drop-off area (NSHP) and Richmond Harvest Power (RHP). Waste composition sorting was also conducted on material from streetscape bins in five municipalities, and waste composition data was collected from abandoned waste and large item pick-up collection routes in three municipalities.

Samples were distributed across the four primary sources with more samples allocated to more variable sources. Primary waste composition results for each source and the combined average are summarized in Table E1.

Table E1: Waste Composition Results Summary - Primary Categories¹

Primary Category	Combined Average	By Sector			
		SF (N=12)	MF (N=14)	ICI (N=31)	DO (N=21)
Disposed Tonnes²	830,461	162,139	187,860	353,733	126,729
Paper	19%	18%	21%	24%	5%
Plastic	19%	21%	18%	21%	9%
Compostable Products and Packaging	<1%	<1%	<1%	<1%	<1%
Compostable Organics	27%	29%	37%	25%	15%
Non-Compostable Organics	11%	7%	4%	8%	33%
Metals	3%	3%	3%	3%	4%
Glass	3%	2%	2%	3%	4%
Building Material	9%	4%	1%	8%	28%
Electronic Waste	2%	2%	2%	2%	1%
Household Hazardous	1%	1%	1%	1%	<1%
Household Hygiene	6%	12%	9%	4%	<1%
Bulky Objects	<1%	<1%	<1%	<1%	<1%
Fines	1%	1%	1%	1%	<1%

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

² Total tonnes disposed in 2015

The largest component of the garbage was compostable organics (27%), followed by plastic and paper (19% each). Compostable organics mainly comprised food waste (21% of total waste), of which 12% of food was considered avoidable and 9% was unavoidable. Plastic film (8%) was the largest component of plastic, followed by durable plastic products (4%) and synthetic textiles (4%). The largest portion of paper was food soiled compostable paper (11%) followed by clean corrugated cardboard (3%) and office paper (2%). The fourth largest portion of the garbage stream was non-compostable organics (11%), largely from the Drop-Off sector, which consisted primarily of treated or painted wood (11%).

A summary of waste disposed by sector from 2011 to 2016 is presented in Table E2. A historical comparison of waste disposal per capita by primary category from 2011 to 2016 is provided for the combined sectors excluding demolition and land clearing (DLC) (Figure E1).

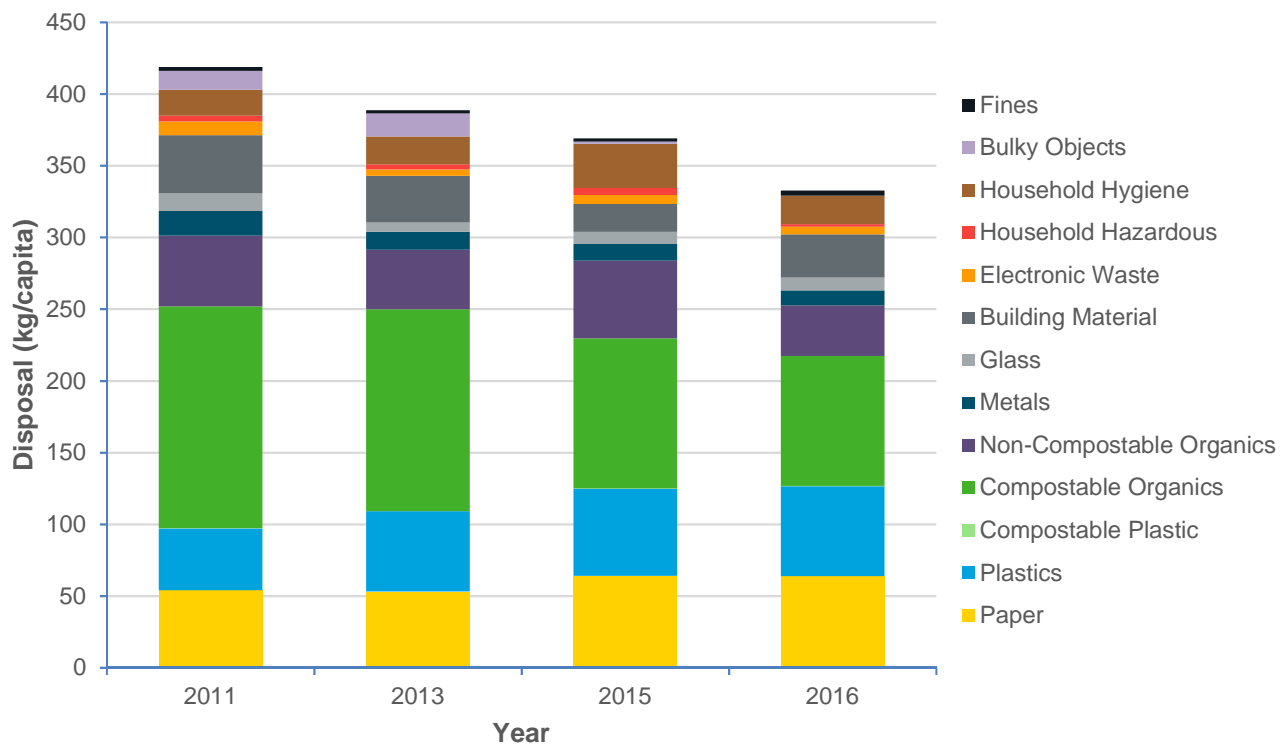


Figure E1: Waste Disposal per Capita by Primary Category Composition (2011-2016) – All Sectors Combined (excluding DLC)

Table E2: Historical Waste Disposal by Sector

Sector	2011	2013	2015	2016
SF (kg/capita)	170	156	117	107
MF (kg/capita)	214	208	224	191
ICI (kg/employee)	407	307	295	273
DO (kg/capita)	102	90	91	84
Combined (kg/capita)	419	389	369	333

Trends observed in the per capita waste disposal include:

- Waste disposal per capita decreased in every sector sampled between 2015 and 2016.
- The amount of compostable organics decreased in every sector except DO between 2015 and 2016.
- SF Residential compostable organics disposed per capita have significantly decreased by close to 60% (from 78 to 31 kg per capita) from 2011 to 2016. The ICI sector compostable organics also decreased dramatically during this time period, from 138 to 69 kg per employee. MF Residential compostable organics have also decreased between 2011 and 2016, from 84 to 71 kg per capita.
- In 2016, SF Residential compostable organics comprised 29% of the waste stream, this is a decrease of 5%, compared to 2015 where organics comprised 34% of the waste stream.
- While MF Residential compostable organics are decreasing consistently each year, they have not made nearly the same reductions in this category when compared to the SF Residential or ICI sectors.
- In the DO and ICI sector, building material became a larger portion of the waste stream. In the ICI sector, the percentage of building materials in the waste stream increased from 15 to 23 kg per capita, and in the DO sector, they increased from 16 to 24 kg per capita.
- The amount of building material disposed was significantly larger in 2016 than 2015, increasing from 19 to 30 kg per capita.

Streetscapes

Streetscape samples were collected and labelled by staff in five representative municipalities. Contents of each bin included in the study were collected and represented all materials put in the bin since the last collection. Bags from each streetscape station (including separate recyclable material streams) were sorted as separate samples. Overall, 34% of the garbage stream was compostable materials, and 23% of the garbage stream was recyclable materials (2% Bottles and Cans, 6% Containers and 15% Paper). For the mixed containers and deposit containers stream, over 50% of the stream was contamination by weight. For the organics stream, the contamination rate was 20%, and for paper the contamination rate was 18%.

Table E3: Combined Streetscape Waste Composition^{1, 2}

		Streetscape Labelled Stream			
		Garbage	Mixed or Deposit Containers	Paper	Organics
Composition of Materials in Stream	Weighted Average	Weighted Average	Weighted Average	Weighted Average	Weighted Average
	Bottles & Cans	2%	19%	1%	1%
	Containers	6%	20%	0%	3%
	Paper	15%	17%	82%	4%
	Organics	34%	24%	9%	80%
	Garbage	44%	20%	7%	12%

¹ Green shading indicates materials that were placed in the correct stream by users based on the streams available at the Streetscape station.

² Percentages are rounded to the nearest whole number and therefore may not add up to 100%.

After the contamination is subtracted from the recycling and compostable streams, a diversion rate of 40% is being achieved at stations that have a diversion option available (the solo garbage can samples were excluded from this particular analysis). If all composting and recyclables in the garbage were properly sorted, a total diversion rate of 74% could be achieved at streetscape stations. Figure E2 shows the breakdown of all the waste from all the streams and stations in the study, displayed by the proper material stream the material should be disposed in.

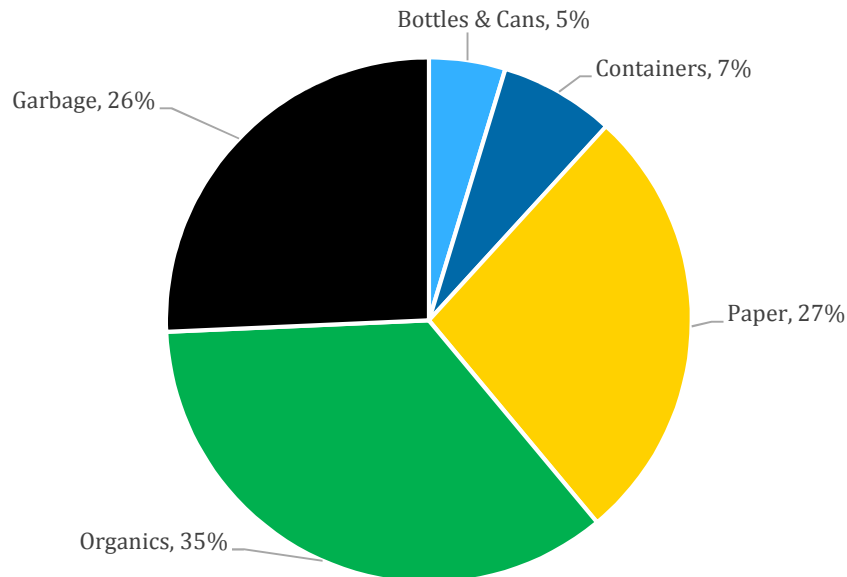


Figure E2: Total Disposal Combined All Streams and Bins

Abandoned Waste and Large Item Pick-up

Abandoned waste and large item samples were analyzed visually. Tetra Tech staff worked directly with municipal staff to determine routes to include in the study. The abandoned waste and large item pick-up sampling results are reported by estimated volume and by number of items.

Each location visited was considered a sample for this study. For abandoned waste, in 52 samples observed over the period of two days, a total of 132 items were recorded – an average of 2.5 items per sample. Several samples had plastic tubs and cardboard boxes that were filled with items. The items most commonly observed were couches (21), followed by durable plastic products (mostly children’s items such as toys and car seats) (15). Nine mattresses were found, and there were 8 instances of general litter or bagged household waste being abandoned.

For large item pick-up, in 103 samples observed over the period of two days, a total of 169 items were recorded – an average of 1.6 items per sample. The items most commonly observed were couches (67), followed by other types of wooden furniture (31), which mostly included tables and cabinets. Furniture made of treated wood, untreated wood, and composite wood (such as plywood or particle board) were included in this item count. 17 armchairs were observed, making that the next most common item to be disposed of. Chairs (all material types) were the next most common item disposed of (17), followed by beds and bed frames (all material types but not including mattresses) (8). Wood (including pallets) was also observed 8 times. Several other items occurred commonly, such as household appliances, toilets, mattresses, and plastic children’s items (such as car seats and strollers).

The large item pick-up stream tended to vary less in composition than the abandoned item waste stream. The large item pick-up stream tended to have very large items (mostly furniture) while the abandoned waste stream tended to have bulky but smaller items, like large toys and car seats – items that may not fit into a garbage can but that owners may not consider large enough to justify calling for large item pick-up.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
1.0 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Scope of Work	2
1.2.1 Garbage and Organics Sampling	2
1.2.2 Streetscape, Abandoned Waste and Large Item Pick-Up Sampling.....	3
2.0 METHODOLOGY	4
2.1 Sample Collection	4
2.1.1 Garbage	4
2.1.2 Organics.....	4
2.1.3 Streetscape Composition Study	4
2.1.4 Abandoned Waste and Large Item Pick-Up	5
2.2 Data Analysis and Statistical Evaluation	5
2.2.1 Garbage, Organics, and Streetscape Samples	5
2.2.2 Abandoned Waste and Large Item Pick-Up	5
3.0 WASTE COMPOSITION RESULTS.....	6
3.1 Single Family Residential	6
3.1.1 Garbage	6
3.1.2 Organics.....	7
3.2 Multi-Family Residential.....	9
3.2.1 Garbage	9
3.2.2 Organics.....	10
3.3 Industrial, Commercial and Institutional.....	12
3.3.1 Garbage	12
3.3.2 Organics.....	13
3.4 Drop-Off (Self-Haul)	15
3.5 Combined Waste Composition Results	16
3.5.1 Garbage	16
3.5.2 Organics.....	18
4.0 WASTE DISPOSAL PER CAPITA.....	19
4.1 Historical Comparison.....	20
4.2 Organics Historical Comparison	23
5.0 STREETScape COMPOSITION RESULTS	24
5.1 Composition of Streetscape Station Streams.....	25
5.1.1 Primary Category Composition.....	27
5.2 Streetscape Diversion Performance and Potential.....	30
6.0 ABANDONED WASTE AND LARGE ITEM PICK-UP.....	32
6.1 Abandoned Waste	32
6.2 Large Item Pick-up.....	34
7.0 CLOSURE.....	36

LIST OF TABLES IN TEXT

Table E1: Waste Composition Results Summary - Primary Categories	i
Table E2: Historical Waste Disposal by Sector	ii
Table E3: Combined Streetscape Waste Composition	iii
Table 1: Garbage Samples Completed	2
Table 2: Organics Samples Completed.....	2
Table 3: Streetscape Samples Completed	3
Table 4: Bulky Items & Illegal Dumping Samples Completed	3
Table 5: Waste Composition for Single Family Residential Garbage – Primary Categories	7
Table 6: Composition for Single Family Residential Organics	8
Table 7: Waste Composition for Multi-Family Residential Garbage - Primary Categories	10
Table 8: Composition for Multi-Family Residential Organics	11
Table 9: Waste Composition for Industrial, Commercial, and Institutional Garbage – Primary Categories.....	13
Table 10: Composition for Industrial, Commercial, and Institutional Organics	14
Table 11: Waste Composition for Drop-Off Garbage by Facility - Primary Categories.....	16
Table 12: Waste Composition Results Summary - Primary Categories.....	17
Table 13: Organics Composition Results Summary - Primary Categories.....	18
Table 14: Waste Disposal per Capita by Primary Categories.....	19
Table 15: Historical Waste Disposal by Sector.....	20
Table 16: Streetscape Stations and Sample Summary	24
Table 17: Streetscape Material Composition by Station Stream.....	25
Table 18: Combined Streetscape Waste Composition	27
Table 19: Streetscape Diversion Rate and Diversion Potential	30

LIST OF FIGURES IN TEXT

Figure E1: Waste Disposal per Capita by Primary Category Composition (2011-2016) – All Sectors Combined (excluding DLC).....	ii
Figure E2: Total Disposal Combined All Streams and Bins.....	iv
Figure 1: Primary Category Composition – Single Family Residential Garbage (N=12)	6
Figure 2: Primary Category Composition – Single Family Residential Organics (N=25).....	8
Figure 3: Primary Category Composition – Multi-Family Residential Garbage (N=14)	9
Figure 4: Primary Category Composition – Multi-Family Residential Organics (N=6)	11
Figure 5: Primary Category Composition – Industrial, Commercial, & Institutional Garbage (N=31).....	12
Figure 6: Primary Category Composition – Industrial, Commercial, & Institutional Organics (N=16)	14
Figure 7: Primary Category Composition – Drop-Off Garbage (N=21)	15
Figure 8: Primary Category Composition – Combined Garbage (N=78).....	17
Figure 9: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Single Family Residential	21
Figure 10: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Multi-Family Residential	21

Figure 11: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Industrial, Commercial, & Institutional 22

Figure 12: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Drop-Off 22

Figure 13: Waste Disposal per Capita by Primary Category Composition (2011-2016) – All Sectors Combined (excluding DLC)..... 23

Figure 14: Combined Primary Material Category Composition – Garbage Stream..... 28

Figure 15: Combined Primary Material Category Composition – Mixed Containers Stream 28

Figure 16: Combined Primary Material Category Composition – Paper Stream 29

Figure 17: Combined Primary Material Category Composition – Organics Stream 29

Figure 18: Total Disposal Combined All Streams and Bins 31

Figure 19: Waste Composition by Volume – Abandoned Waste (N=52) 32

Figure 20: Waste Composition by Item Description – Abandoned Waste (N=52)..... 33

Figure 21: Waste Composition by Volume – Large Item Pick-up (N=103)..... 34

Figure 22: Waste Composition by Item Description – Large Item Pick-Up (N=103)..... 35

APPENDIX SECTIONS

TABLES

Table A Garbage Composition – All Categories and Sectors

Table B Organics Composition – All Categories and Sectors

Table C Streetscape Composition – All Categories and Material Streams

Table D Abandoned Waste and Large Item Pick-Up Volumetric Composition - Primary Categories

APPENDICES

Appendix A Tetra Tech’s General Conditions

Appendix B Garbage Category Descriptions

Appendix C Organics Category Descriptions

Appendix D Streetscape Category Descriptions

Appendix E Garbage – Select Site Photographs

Appendix F Organics – Select Site Photographs

Appendix G Streetscape – Select Site Photographs

Appendix H Abandoned Waste and Large Item Pick-Up – Select Site Photographs

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
DLC	Demolition and Land Clearing
DO	Drop-off from residential and commercial sources (self-haul)
EPR	Extended Producer Responsibility
HDPE	High Density Polyethylene (#2 plastic, rigid container and flexible film)
ICI	Industrial, Commercial and Institutional
LDPE	Low-density Polyethylene (#4 plastic, rigid items and flexible film)
MF	Multi-Family Residential
MSW	Municipal Solid Waste
NSTS	North Shore Transfer Station
NSHP	North Shore Harvest Power Organics Drop-off
PETE	Polyethylene Terephthalate (#1, rigid bottles and thermoforms)
PP	Polypropylene (#5 rigid container)
PPP	Packaging and Printed Paper
PS	Polystyrene (#6 rigid and expanded)
PVC	Polyvinyl Chloride (#3 rigid container)
RHP	Richmond Harvest Power
SF	Single Family Residential
STS	Surrey Transfer Station
WTE	Metro Vancouver Waste to Energy Facility in Burnaby
VSTS	Vancouver South Transfer Station

Terminology	Definition
Hauler	Vehicle delivering the waste to a solid waste or organics processing facility
Load	Amount of waste contained in a hauler truck
Load Source	Origin of a specific sample
Material Categories	Types of materials groupings assessed for the waste composition
Sample	Portion of the load that was sorted and weighed
Station	Streetscape collection container that can have up to four different material streams
Stream	The container options for recyclables and organics at a streetscape station

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Metro Vancouver and their agents. Tetra Tech EBA Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Metro Vancouver, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA Inc.'s Services Agreement. Tetra Tech's General Conditions are provided in Appendix A of this report.

NOTE TO THE READER

The samples collected and audited 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. Even with combined educational, regulatory and financial initiatives the reader should not assume that it is necessarily easy, practical, or economical to recover a substantial portion of a disposed material from a mixed waste stream or at its source.

1.0 INTRODUCTION

Tetra Tech EBA Inc. (Tetra Tech) was retained by Metro Vancouver to conduct the 2016 Waste Composition Monitoring Program. The waste composition sorting was conducted from June to September 2016.

The Scope of Work for the 2016 Waste Composition Monitoring Program includes the following waste composition analysis components:

- Single family (SF), multi-family (MF), drop-off (DO), and industrial, commercial, and institutional (ICI) municipal solid waste (MSW);
- SF, MF and ICI organic material;
- Streetscape MSW; and
- Abandoned waste and large item pick-up.

The majority of sampling was undertaken at five facilities. Garbage samples were collected and sorted at the Surrey Transfer Station (STS), the Metro Vancouver Waste to Energy Facility in Burnaby (WTE), and the Vancouver South Transfer Station (VSTS). The organics samples were collected and sampled at the North Shore Transfer Station (NSTS) Harvest Power organics drop-off area (NSHP) and Richmond Harvest Power (RHP). Waste composition sorting was also conducted on material from streetscape bins in five municipalities, and waste composition data was collected from abandoned waste and large item pick-up collection routes in three municipalities.

This report discusses the methodology employed for the composition auditing and provides the results and analysis from the sort broken down by each sector, and as a regional average. Using available waste generation data for each sector, the waste disposal per capita was calculated for the material categories, and the results were compared to previous years waste generation profiles. For streetscapes, the data is presented to show the current diversion rate achieved by streetscape containers, along with the contamination rates in each separated material stream. A summary of the composition of abandoned and large item pick-up waste is presented, along with a breakdown of the items encountered.

1.1 BACKGROUND

Metro Vancouver provides essential services, including managing the region's solid waste for over two million residents in British Columbia's lower mainland. This includes a WTE facility and five transfer stations. Combined with the City of Vancouver's transfer station and local landfill, this public-sector system provides transfer and disposal services to residents, agencies and businesses in the region.

Metro Vancouver is also responsible for long-term planning and disposal of the waste generated by residents and businesses in the region. Metro Vancouver has set a waste reduction and recycling goal for the region to achieve 80% diversion of its waste from disposal.

Waste composition monitoring is required to track the progress in achieving the desired diversion targets and to identify areas where more progress is needed to achieve the region's diversion goals. This study is intended to produce information that local governments, businesses, and institutions can use as they enhance their waste management and recycling programs.

1.2 SCOPE OF WORK

1.2.1 Garbage and Organics Sampling

Tetra Tech prepared a sampling framework and protocol customized for this study, working from data completeness, scheduling, safety, and budgetary perspectives. The location and dates the study took place are summarized in Table 1 along with the total number of garbage samples completed. The total number of samples from each sector was chosen by taking into account the total proportion of garbage received from each sector in the region in 2014, and the overall variation of the waste stream expected from each sector. This resulted in fewer samples from the SF sector given less sample variation, and additional samples for the ICI and DO sector as those sectors have more variability.

Table 1: Garbage Samples Completed

Sector	Proportion of Metro Vancouver Garbage (2014)	STS	VSTS	WTE	Total
Sorting Dates (2016)		June 20-24	July 4-8	July 11-19	
SF	20%	5	5	2	12
MF	24%	3	5	6	14
ICI	41%	7	8	16	31
DO	15%	13	8	N/A ¹	21
Total	100%	28	21	23	78

¹No drop-off samples are accepted at the WTE.

In total, 78 garbage samples totaling 7,790 kg were sorted at the three facilities. The overall average sample weight for all samples was 99.9 kg. Some drop-off samples were smaller or larger than this target as the entire drop-off load would be sampled if the load weight was less than or close to 100 kg. Drop-off garbage sample weights ranged from 17.7 kg to 124.8 kg. Garbage samples were sorted into 13 primary categories, and a total of 142 material subcategories. This included specific subcategories for the identification of food waste as avoidable or unavoidable. In this study, avoidable food waste refers to foods that could have been eaten and this was sorted into ten secondary categories to identify avoidable food waste such as plate scraping, fruits and vegetables, meats, etc. Unavoidable food waste refers to waste arising from food or drink preparation that is not edible under normal situations, like bones, egg shells, and tea bags. Please see Appendix B Garbage Material Categories for the breakdown.

The total number of samples along with and dates for organics sampling and sorting are summarized in Table 2.

Table 2: Organics Samples Completed

Sector	NSHP	RHP	Total
Sorting Dates (2016)	June 27-29	July 20-21	
SF	21	4	25
MF	2	4	6
ICI	5	11	16
Total	28	19	47

In total, 47 organics samples totaling 4,722 kg were sorted. The target sample size was 100 kg and sample weights ranged from 50 kg to 125 kg. This variation was because samples were visually estimated to be 100 kg prior to sorting and the actual weight was not confirmed until after each sample was sorted. The average sample weight was 100.5 kg. Organic samples were sorted into 16 primary categories and a total of 29 subcategories. Please see Appendix D Streetscape Material Categories for the breakdown.

1.2.2 Streetscape, Abandoned Waste and Large Item Pick-Up Sampling

The total number of samples, along with the locations and dates for streetscape sampling are outlined in Table 3.

Table 3: Streetscape Samples Completed

Station/Stream	Municipality A	Municipality B	Municipality C	Municipality D	Municipality E	Total
Sorting Dates (2016)	July 27	July 25	July 29	July 28	July 26	
Number of Stations	9	9	10	9	4	41
Number of Samples						
Garbage	9	9	10	9	4	41
Organics	-	-	10	-	6 ¹	16
Paper	9	6	-	9	-	24
Deposit Containers	-	6	-	7	2	15
Mixed Containers	9	-	10	2	-	21
Total	27	21	30	27	12	117

¹Two stations had two organics bins

Samples from Municipality A, B, and C were sorted at the VSTS. Samples from Municipality D and E were sorted at the municipalities' respective Works Yards. In total, 117 streetscape samples from 41 disposal stations, totaling 370 kg, were sorted. The composition of the available streams varied both between municipalities and, occasionally, within municipalities. The possible streams are garbage, organics, paper, deposit containers, and mixed containers. There was no target sample size, rather, the entire sample consisting of all material in the collection container was sorted in all instances. The samples ranged from 0.1 kg to 11.8 kg. The average sample size was 3.1 kg. Streetscape samples were sorted into 14 primary categories and a total of 38 subcategories. See Appendix D for the breakdown.

The total number of samples, along with the locations and dates for large item and abandoned waste sampling are outlined in Table 4. Large item and abandoned waste samples were visual audits completed by following the collection vehicles for the days as indicated in Table 4. At each stop, the materials picked up were documented and recorded.

Table 4: Bulky Items & Illegal Dumping Samples Completed

Sample Type	Municipality A	Municipality B	Municipality C	Total
Analysis Dates	August 30-31	September 1 & 7	September 9	
Large Items	40	55	9	103
Abandoned Waste	15	36	-	51
Total	55	90	9	154

2.0 METHODOLOGY

2.1 SAMPLE COLLECTION

Sample collection and sorting was completed by waste sorters who were trained on safety and material sorting procedures prior to the fieldwork with oversight from a site supervisor. Personal protective equipment was used by staff according to the specifications of Tetra Tech's Health and Safety Plan, which factored in special requirements for working at each solid waste facility. Safety meetings were conducted daily to emphasize key concerns including how to handle material hazards such as sharp or hazardous materials, safe lifting of garbage bags, and working around vehicles. The Tetra Tech site supervisor worked closely with the solid waste facility staff to coordinate identification and selection of the loads to be sampled as they arrived with minimal interruption of daily operations. Select sample photographs can be found in Appendices E through H.

2.1.1 Garbage

As selected loads for sampling arrived at the transfer station, Tetra Tech's field supervisor was in radio communication with the scale and loader operators to ensure the load was emptied on the tipping floor. For all loads at the VSTS, the loader operator collected one loader bucket of material that was approximately 300 kg to 500 kg in weight on average and delivered it to the sorting area. At VSTS, load selection was completed by the scale and loader operator and this introduced potential bias when selecting DO loads, as staff for the first few days were incorrectly avoiding homogeneous loads that arrived. For all loads at the WTE facility and the STS, the loads were sampled directly from a portion of the load was tipped adjacent to the sorting area. In most instances, it was not possible to dump the entire load in an area for an audit member to view the contents of the entire load to record any large or bulky items that were in the load.

The field team assisted the supervisor in collecting a sample which consisted of 100 kg of garbage using a rough grid pattern to minimize potential bias. The sample was photographed and pre-weighed prior to sorting. The materials were then sorted into bins. Sample weights for each material category were recorded and the tare weight of each bin was subtracted to determine the net sample weight.

2.1.2 Organics

As selected loads for sampling arrived at the transfer station, Tetra Tech's field supervisor was in radio communication with the scale and loader operators to ensure the load was emptied on the tipping floor. The loader operator collected one loader bucket of material that was approximately 100 kg in weight and delivered it to the sorting area. The sample was photographed prior to sorting. Using a rough grid pattern to minimize potential bias, the materials were then sorted directly into bins. Sample weights for each material category were recorded and the tare weight of each bin was subtracted to determine the net sample weight.

It should be noted that samples coming from restaurants, malls, and other food service business were considered ICI samples and prioritized for the study; samples from businesses that create primarily yard and garden waste, such as landscapers, were not considered in this study.

2.1.3 Streetscape Composition Study

Streetscape samples were collected and labelled by staff in each respective municipality. Contents of each bin included in the study were collected and represented all materials put in the bin since the last collection. For streetscape samples from two municipalities, the samples were picked up by Tetra Tech staff from the municipality's Works Yard and transferred to the VSTS for sorting. One municipality had their staff transfer samples to the VSTS for sorting. Samples from the remaining two municipalities were sorted in the municipality's respective Works Yards.

Bags from each streetscape station (including separate recyclable material streams) were sorted as separate samples. Each sample was photographed and weighed prior to sorting. The contents of each sample were then sorted in their entirety. Sample weights for each material category were recorded and the tare weight of each bin was subtracted to determine the net sample weight.

2.1.4 Abandoned Waste and Large Item Pick-Up

Abandoned waste and large item samples were analyzed visually. Tetra Tech staff worked directly with municipal staff to determine routes to include in the study. Samples were obtained by following the collection truck during a route, or route maps were provided by municipal staff and locations were visited by Tetra Tech staff prior to collection.

Each sample's location was recorded and photographed before being picked up by the hauler. The weight of each sample was estimated. Furthermore, the percent by volume of each item in the load was estimated. If samples consisted of MSW and it was not possible to estimate the percent by volume of each item in the sample, the percent by volume of each primary material category was estimated.

2.2 DATA ANALYSIS AND STATISTICAL EVALUATION

2.2.1 Garbage, Organics, and Streetscape Samples

Data was compiled electronically throughout the course of the field work for garbage and streetscape samples, and manually for organics samples. Data collection logs and scale tickets (if applicable) were reviewed daily to ensure accuracy. Quality assurance and quality control methods were then employed for accuracy including ensuring the difference between pre-sorting weights of each sample with the calculated final sample weight after sorting was within an acceptable margin of accuracy. The average was calculated using a weighted mean for each waste sector and material category. Standard deviations and 90% confidence intervals for primary material categories by waste sector were calculated. These parameters were determined using waste composition percentages to normalize the data set, as each sample can have a different total sample weight.

2.2.2 Abandoned Waste and Large Item Pick-Up

To ensure maximum accuracy, samples were visually audited by estimating the percent by volume of each item or primary material category. Because of the large possible variations in density for primary material categories and items, this data was not converted into weights. Photographs were taken of each sample and were employed in quality assurance and quality control methods.

3.0 WASTE COMPOSITION RESULTS

The waste composition results are reported as weighted average percentages by primary material category in the following sections. All percentages in this section refer to the percentage of material in comparison to the total amount of material. Weighted average percentages were calculated by combining all sample data for each sector and/or facility. A 90% confidence interval was calculated for each set of results presented. A summary of the results for all 142 material categories is included in Table A for garbage and Table B for all 28 organics categories. Select photographs from the field auditing are included in Appendices E and F.

3.1 SINGLE FAMILY RESIDENTIAL

3.1.1 Garbage

Figure 1 presents the weighted average primary material composition for SF Residential garbage. The largest component of the garbage was compostable organics (29%), followed by plastic (21%), and paper (18%). Compostable organics mainly comprised food waste (27%), of which 16% of food was avoidable and 11% was unavoidable. The largest portion of plastic was plastic film (9%), followed by textiles (5%) and rigid plastic containers (4%). The largest component of paper was other paper (primarily compostable paper such as napkins, paper plates, and food soiled paper) at 11% followed by fine paper (2%) and boxboard (2%). The fourth largest portion of the garbage stream was household hygiene (12%) which consisted primarily of diapers (6%).

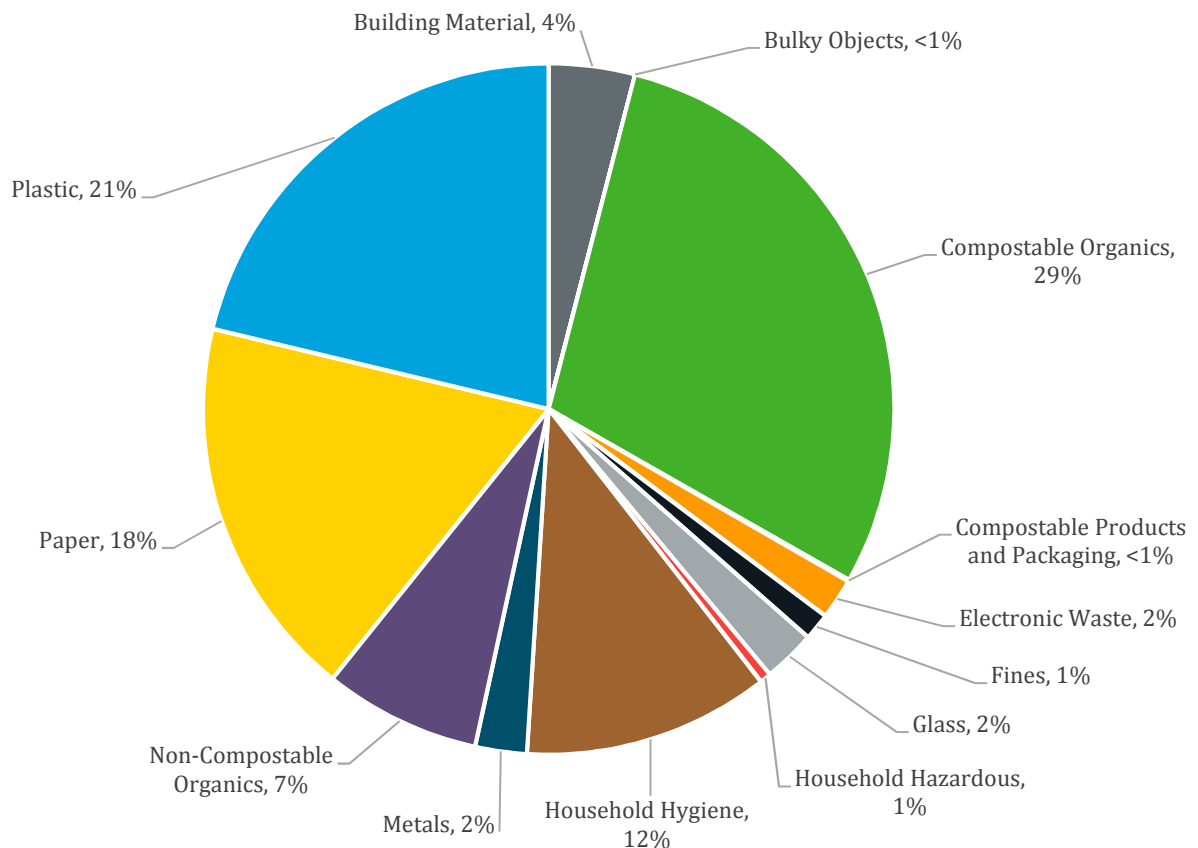


Figure 1: Primary Category Composition – Single Family Residential Garbage (N=12)

Waste composition results for SF Residential garbage and the 90% confidence intervals are presented Table 5. The calculated confidence intervals for the primary material categories were low (<3%), indicating that there was good consistency in composition from sample to sample.

Table 5: Waste Composition for Single Family Residential Garbage – Primary Categories¹

Primary Category	Weighted Average (N=12)	90% Confidence Interval ²	STS (N=5)	VSTS (N=5)	WTE (N=2)
Paper	18%	±3%	18%	16%	23%
Plastic	21%	±2%	24%	<1%	19%
Compostable Products and Packaging	<1%	-	<1%	<1%	<1%
Compostable Organics	29%	±3%	28%	29%	32%
Non-Compostable Organics	7%	±2%	5%	9%	8%
Metals	2%	-	3%	2%	2%
Glass	2%	±1%	2%	4%	1%
Building Material	4%	±2%	2%	7%	1%
Electronic Waste	2%	±2%	3%	1%	1%
Household Hazardous	1%	-	1%	<1%	<1%
Household Hygiene	12%	±3%	13%	1<1%	11%
Bulky Objects	<1%	-	<1%	<1%	<1%
Fines	1%	-	1%	1%	1%

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

²Only 90% confidence intervals greater than 1% are reported.

3.1.2 Organics

Figure 2 presents the weighted average primary material composition for SF Residential organics, along with compostable organics being further subdivided into secondary categories of yard and garden debris, food waste, and clean wood. Categories with less than 1% were grouped into ‘other’. The largest component of organics were uncontaminated compostable organics (95%), which consisted mostly of yard and garden (88%) and food waste (6%). The remaining 1% was made up of clean wood.

The second largest portion of the organics stream was compostables in bags (plastic bags filled with compostable materials)¹ (2%). All plastic bags encountered in samples of residential organics were included as contamination. During the sampling, plastic bags filled with compost and/or garbage were left intact, contents unsorted, and weighed under the respective material category (please see Appendix C for Organics Category Descriptions). The next largest portion was compostable paper (1%). Other contaminants identified in the samples totaled less than 1% and included mainly small amounts of plastic film and treated wood. These fractions amount to an overall contamination rate in the SF organics stream of approximately 3% by weight.

¹ For residential samples, plastic bags are inclusive of all plastic bag types including those labeled as compostable, biodegradable, and non-compostable. See Appendix B Garbage Material Categories for plastic bag definitions.

Food waste accounted for 6% of the total amount of organics, and compostables in bags accounted for 2% of the total organics. Compostables in bags were primarily food scraps, and therefore the total amount of food scraps being put out for organics collection in bags accounts for ¼ of the food scraps in the organics stream.

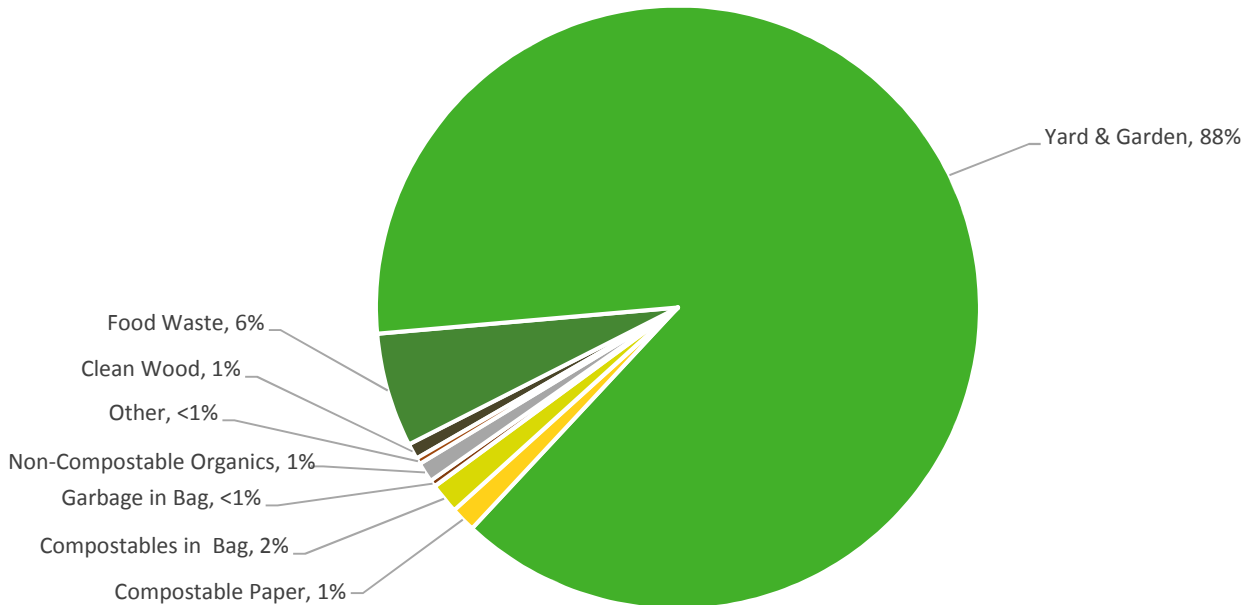


Figure 2: Primary Category Composition – Single Family Residential Organics (N=25)

Waste composition results for SF Residential organics and the 90% confidence intervals are presented in Table 6. The calculated confidence intervals for the primary material categories were very low (<2%), indicating that there was consistency in composition from sample to sample. The compostable organics primary category is further broken down into the subcategories of clean wood, food waste, and yard & garden waste.

Table 6: Composition for Single Family Residential Organics¹

Primary Category	Weighted Average (N=25)	90% Confidence Interval ²	NSHP (N=21)	RHP (N=4)
Garbage in Bag	<1%	-	<1%	1%
Compostables in Bag	2%	±1%	2%	1%
Compostable Paper	1%	±1%	<1%	4%
Plastic	<1%	-	<1%	1%
Compostable Organics (Total)	95%	±2%	97%	89%
Clean Wood	1%	±1%	<1%	3%
Food Waste	6%	±2%	7%	4%
Yard & Garden	88%	±3%	91%	81%
Non-Compostable Organics	1%	±1%	<1%	4%

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

²Only 90% confidence intervals greater than 1% are reported.

3.2 MULTI-FAMILY RESIDENTIAL

3.2.1 Garbage

Figure 3 presents the weighted average primary material composition for MF Residential garbage. The largest component of the garbage was compostable organics (37%), followed by paper (21%), and plastic (18%). Compostable organics mainly comprised food waste (34%), of which 19% of food was avoidable and 15% was unavoidable. Other paper (primarily compostable paper such as food soiled paper) was the largest component of paper (10%), followed by fine paper (3%), clean corrugated cardboard (2%) and boxboard (2%). The largest portion of plastic was plastic film (8%). The fourth largest portion of the garbage stream was household hygiene (9%) which consisted primarily of diapers (6%).

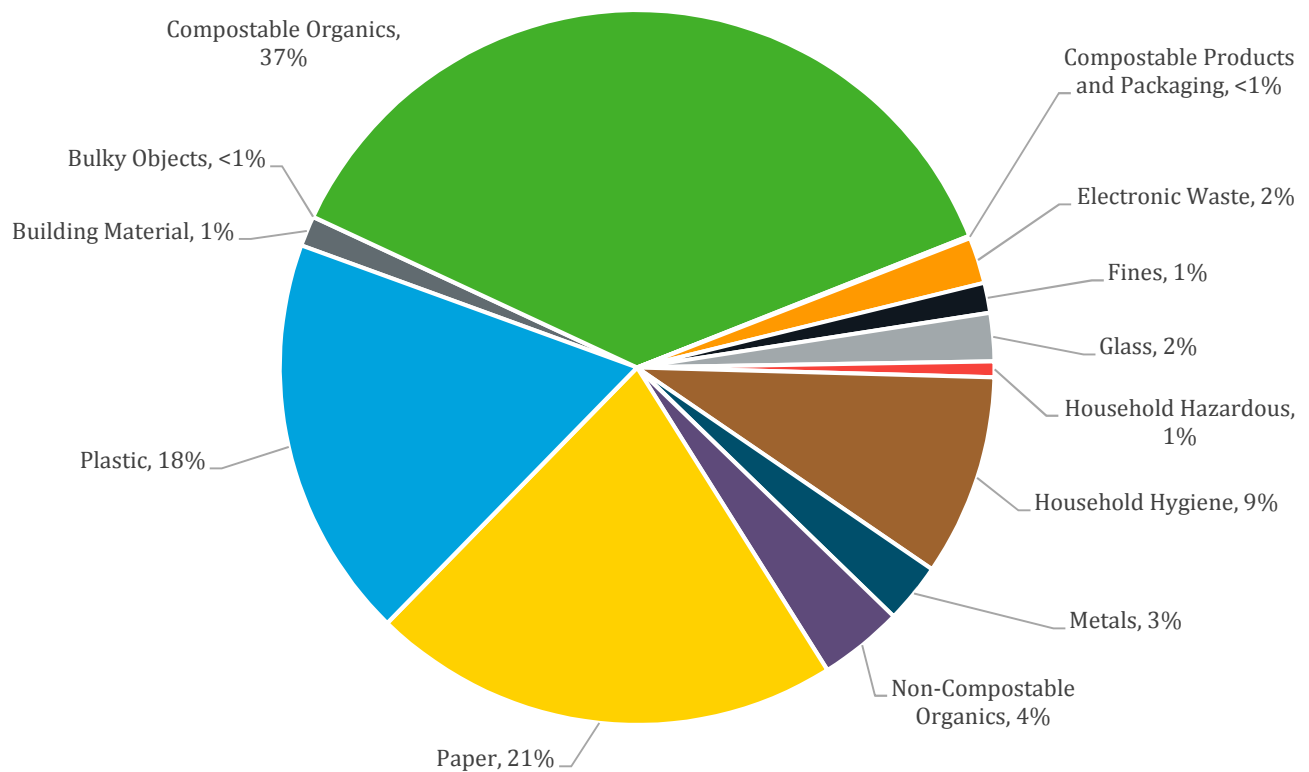


Figure 3: Primary Category Composition – Multi-Family Residential Garbage (N=14)

Waste composition results for MF Residential garbage and the 90% confidence intervals are presented in Table 7. The calculated confidence intervals for the primary material categories were <5%, indicating that samples were relatively consistent.

Table 7: Waste Composition for Multi-Family Residential Garbage - Primary Categories¹

Primary Category	Weighted Average (N=14)	90% Confidence Interval ²	STS (N=3)	VSTS (N=5)	WTE (N=6)
Paper	21%	±3%	26%	18%	21%
Plastic	18%	±2%	22%	19%	15%
Compostable Products and Packaging	<1%	-	<1%	<1%	<1%
Compostable Organics	37%	±5%	27%	40%	40%
Non-Compostable Organics	4%	±1%	1%	5%	4%
Metals	3%	±1%	4%	3%	2%
Glass	2%	-	2%	2%	2%
Building Material	1%	±2%	4%	<1%	1%
Electronic Waste	2%	±2%	1%	<1%	4%
Household Hazardous	1%	-	1%	<1%	1%
Household Hygiene	9%	±3%	8%	10%	8%
Bulky Objects	<1%	-	<1%	<1%	<1%
Fines	1%	±1%	1%	1%	1%

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

²Only 90% confidence intervals greater than 1% are reported.

3.2.2 Organics

Figure 4 presents the weighted average primary material composition for MF Residential organics, with compostable organics further subdivided into secondary categories for yard and garden, food waste, and clean wood. Categories with less than 1% were grouped into ‘other’. The largest component of organics were uncontaminated compostable materials (96%), which consisted mostly of food waste (79%) and yard and garden (17%). The second largest portion of the organics stream compostable paper (2%). It should be noted that while the SF Residential Organics collection program disallows plastic of any kind, the MF Residential Organics collection program permits use of compostable cart liners, thus, organics in a compostable bag were classified as uncontaminated organics. However, organics in non-compostable plastic bags were left intact, contents unsorted, and weighed under the respective material category (please see Appendix C for Organics Category Descriptions). Organics in non-compostable plastic bags were less than 0.5% of the organics stream.

The most common contaminant was garbage in bags (1%), (plastic bags filled with garbage). Other contaminants identified in the samples totaled less than 1% and included garbage in bag (plastic bags filled with garbage), small amounts of plastic film and glass. These fractions amount to an overall contamination rate in the SF organics stream of approximately 2%.

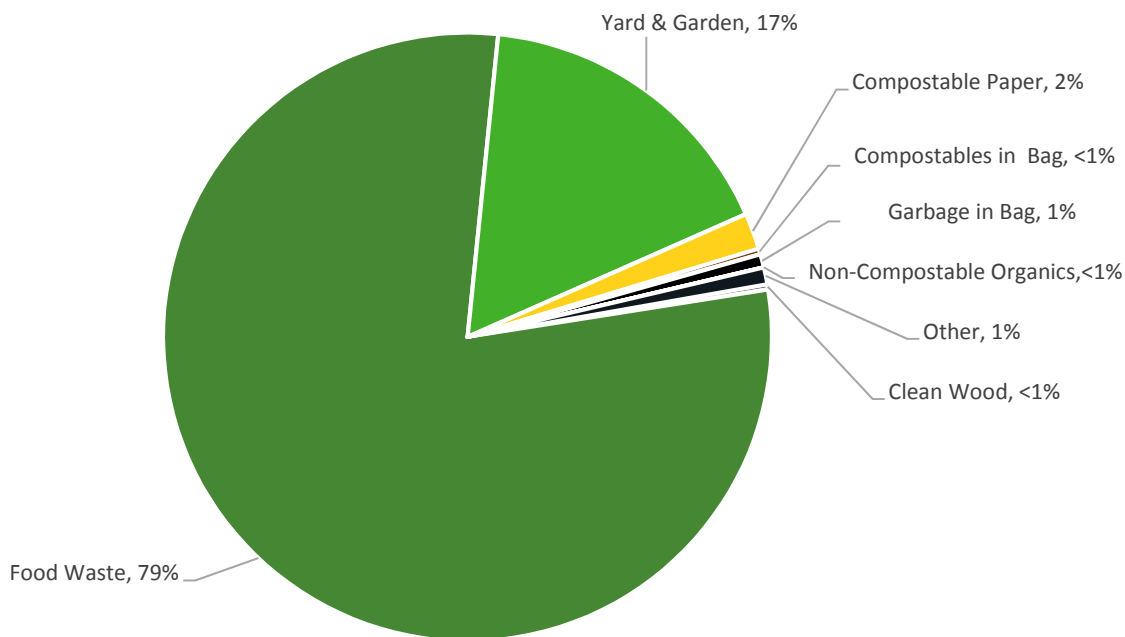


Figure 4: Primary Category Composition – Multi-Family Residential Organics (N=6)

Waste composition results for MF Residential organics and the 90% confidence intervals are presented in Table 8. The calculated confidence intervals for the primary material categories were very low (<2%), indicating that sample composition was relatively consistent. The Compostable Organics primary category is further broken down into the subcategories of clean wood, food waste, and yard & garden waste. Yard & garden waste and food waste, had higher confidence intervals (<7%), as the proportion of these subcategories varied more between samples.

Table 8: Composition for Multi-Family Residential Organics¹

Primary Category	Weighted Average (N=6)	90% Confidence Interval ²	NSHP (N=2)	RHP (N=4)
Garbage in Bag	1%	±1%	<1%	1%
Compostables in Bag	<1%	-	<1%	<1%
Compostable Paper	2%	±1%	<1%	3%
Plastic	1%	±1%	1%	1%
Compostable Organics (Total)	96%	±2%	99%	95%
Clean Wood	<1%	-	<1%	<1%
Food Waste	79%	±8%	79%	79%
Yard & Garden	17%	±7%	2<1%	16%

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

²Only 90% confidence intervals greater than 1% are reported.

3.3 INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL

3.3.1 Garbage

Figure 5 presents the weighted average primary material composition for ICI garbage. The largest component of the garbage was compostable organics (25%), followed by paper (24%), and plastic (21%). Compostable organics was mainly comprised food waste (18%), of which 11% of food was avoidable and 7% was unavoidable. Another notable category found in compostable organics was wood pallets (5%). Compostable paper (such as food soiled paper) was the largest component of paper (9%). The largest components of plastic were plastic film (9%) and durable plastic products (e.g., toys) (4%). The next largest components of the garbage were building material (8%) and non-compostable organics, such as treated or painted wood (8%).

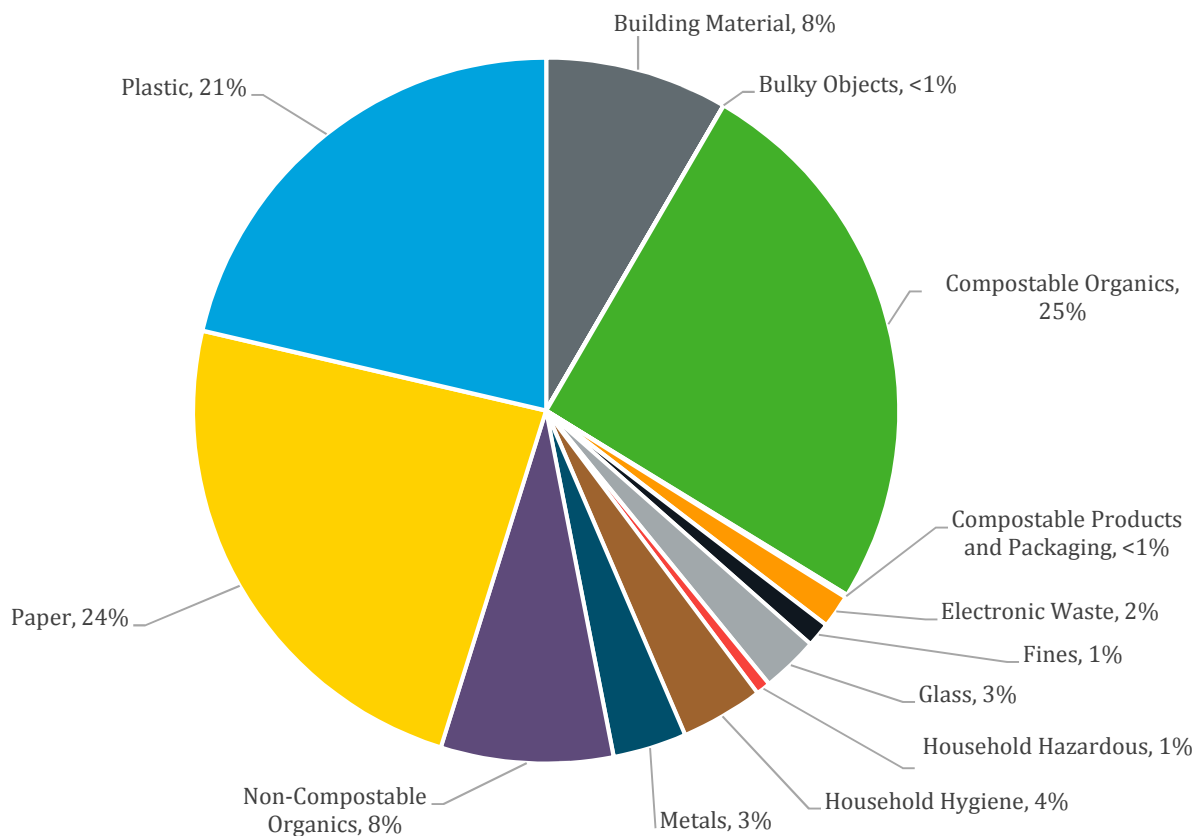


Figure 5: Primary Category Composition – Industrial, Commercial, & Institutional Garbage (N=31)

Primary material composition results for ICI garbage overall, the 90% confidence interval, and results by solid waste facility are presented in Table 9. The calculated confidence intervals for each material category were higher than residential garbage due to the higher variability in the range of generators (i.e., different business sectors). However, all confidence levels were within 6%, indicating acceptable consistency in composition from sample to sample and between solid waste facilities. Samples at the VSTS and WTE included significantly more paper than STS. The vast majority of samples at VSTS were composed of paper, plastic, and compostable organics.

While the sampled composition varied between sampling locations, it is worth noting that all of the weighted averages found in 2016 (summarized in Table 9) are within the confidence interval of the 2015 results², further indicating that there is acceptable consistency in composition from sample to sample and between solid waste facilities.

Table 9: Waste Composition for Industrial, Commercial, and Institutional Garbage – Primary Categories¹

Primary Category	Weighted Average (N=31)	90% Confidence Interval ²	STS (N=7)	VSTS (N=8)	WTE (N=16)
Paper	24%	±6%	15%	29%	25%
Plastic	21%	±4%	27%	20%	19%
Compostable Products and Packaging	<1%	-	<1%	<1%	<1%
Compostable Organics	25%	±5%	21%	33%	24%
Non-Compostable Organics	8%	±3%	5%	4%	11%
Metals	3%	±1%	6%	4%	2%
Glass	3%	±2%	2%	2%	3%
Building Material	8%	±5%	10%	1%	11%
Electronic Waste	2%	±1%	3%	1%	1%
Household Hazardous	1%	-	1%	1%	1%
Household Hygiene	4%	±2%	8%	4%	1%
Bulky Objects	<1%	-	<1%	<1%	<1%
Fines	1%	-	2%	1%	1%

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

²Only 90% confidence intervals greater than 1% are reported.

3.3.2 Organics

Figure 6 presents the weighted average primary material composition for ICI organics, along with compostable organics being further subdivided into secondary categories of yard and garden waste, food waste, and clean wood. Categories with less than 1% were grouped into ‘other’. The largest component of organics was uncontaminated compostable materials (78%), which consisted mostly of food waste (68%) and yard and garden waste (10%).

The second largest portion of the organics stream was compostable paper (12%), which appeared to be mostly food soiled paper, paper towels for handwashing, and compostable paper packaging for takeout food. The next largest portion was garbage in bags (4%). If a bag of garbage was observed to have a significant amount of non-compostable garbage in it, it was classified this way, regardless of whether the bag itself was made of compostable plastic or not. There was a considerable amount of compostables in bags (3%). These and other

² Metro Vancouver 2015 Waste Composition Monitoring Program: http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/2015_Waste_Composition_Report.pdf

contaminants (small amounts of film, non-compostable organics, and glass) make up approximately 7% of the organics stream, considerably higher than is seen in other sectors.

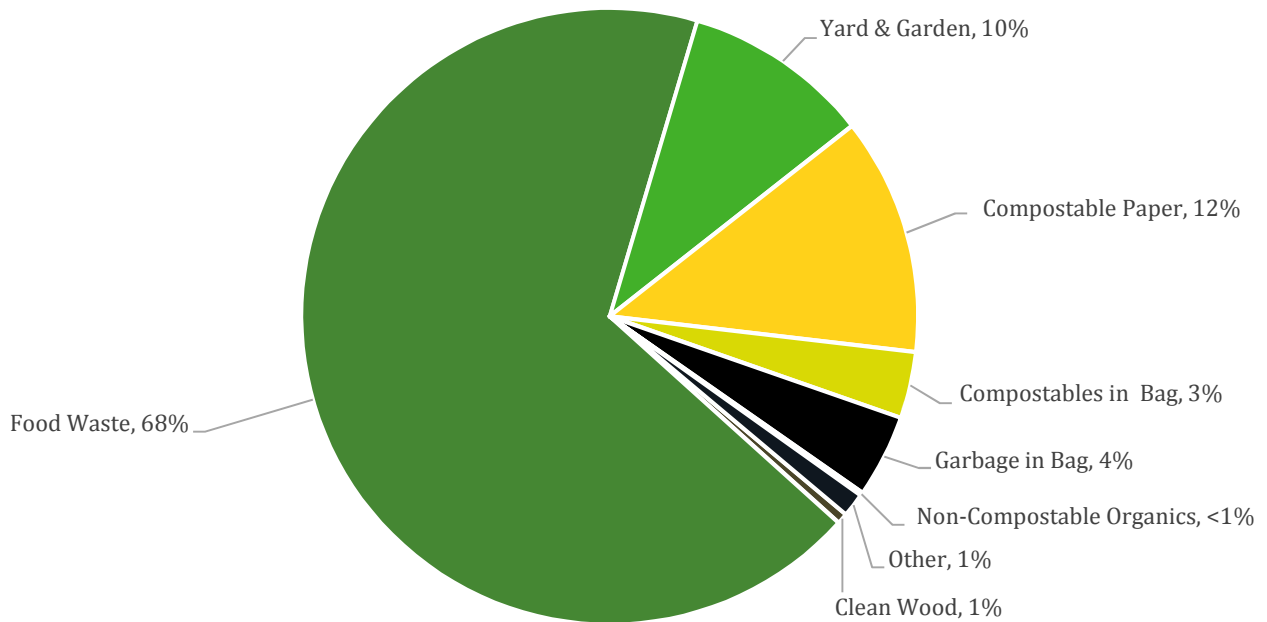


Figure 6: Primary Category Composition – Industrial, Commercial, & Institutional Organics (N=16)

Waste composition results for ICI organics and the 90% confidence intervals are presented in Table 10. Note that secondary categories with results less than 1% were not presented. The calculated confidence intervals for the primary material categories were considerably higher than in other sectors, as high as 14%, indicating that there was variation in composition from sample to sample. The primary reasons for this were the variation in contamination rates and the variety of types of Industrial, Commercial, and Institutional facilities.

Table 10: Composition for Industrial, Commercial, and Institutional Organics¹

Primary Category	Weighted Average (N=16)	90% Confidence Interval ²	NSHP (N=5)	RHP (N=11)
Garbage in Bag	4%	±6%	<1%	6%
Compostables in Bag	3%	±5%	<1%	5%
Compostable Paper	12%	±5%	6%	15%
Compostable Plastics	<1%	-	1%	<1%
Plastic	1%	±1%	<1%	1%
Compostable Organics (Total)	79%	±9%	92%	72%
Clean Wood	1%	±1%	<1%	1%
Food Waste	68%	±14%	72%	66%
Yard & Garden	10%	±10%	20%	5%

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

²Only 90% confidence intervals greater than 1% are reported.

3.4 DROP-OFF (SELF-HAUL)

Figure 7 presents the weighted average primary material composition for DO garbage. The largest component of the garbage was non-compostable organics (32%), followed by building material (28%) plastic (21%) and compostable organics (15%). Non-compostable organics mainly comprised painted or treated wood (31%), and compostable organics is primarily clean wood (9%) and food waste (5%). The largest components of building material were other inorganics (15%), primarily asphalt roofing shingles, masonry (4%), and gypsum (3%). Gypsum was found both in small pieces that were mixed in with other waste, and in a few instances in more significant amounts in bags including one sample that was 60% gypsum. In all instances staff were notified at the facilities and managed the gypsum material following protocol.

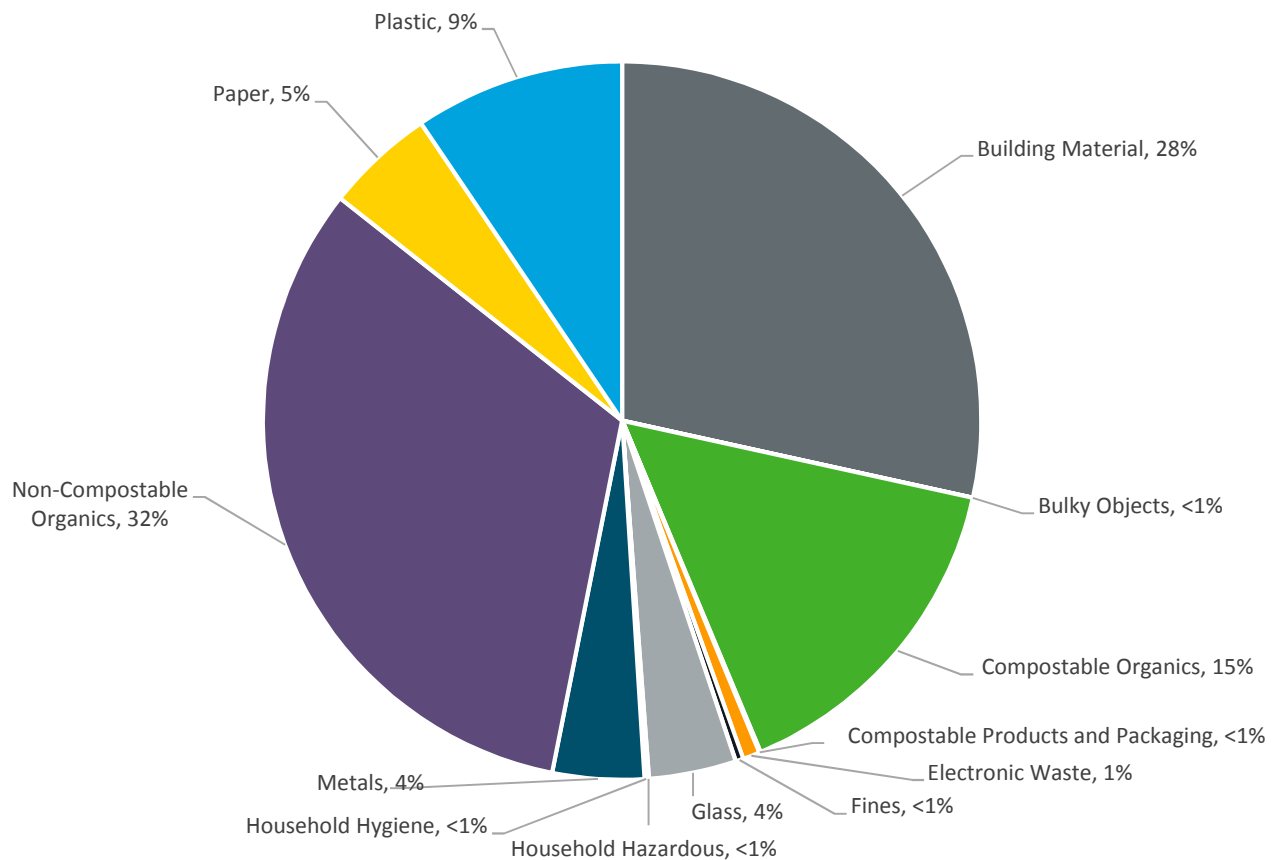


Figure 7: Primary Category Composition – Drop-Off Garbage (N=21)

Primary material composition results for Drop-Off garbage overall, the 90% confidence interval, and results by solid waste facility are presented in Table 11. As expected, the 90% confidence intervals for each material category were higher for Drop-Off garbage due to the variability in the types of users of the transfer stations; the confidence levels for primary categories were less than 15%. The majority of users were contractors with varying amounts of wood waste and building materials. Other users were residential customers with waste from renovations, clean-ups, or home moves. Often samples would be composed almost exclusively of one material type, such as wood or asphalt shingles.

Table 11: Waste Composition for Drop-Off Garbage by Facility - Primary Categories¹

Primary Category	Weighted Average (N=21)	90% Confidence Interval ²	STS (N=13)	VSTS (N=8)
Paper	5%	±3%	5%	5%
Plastic	11%	±10%	12%	3%
Compostable Products and Packaging	<1%	-	<1%	<1%
Compostable Organics	13%	±7%	13%	18%
Non-Compostable Organics	30%	±14%	31%	31%
Metals	4%	±4%	2%	7%
Glass	5%	±5%	1%	8%
Building Material	31%	±15%	35%	26%
Electronic Waste	1%	±1%	1%	<1%
Household Hazardous	<1%	-	<1%	<1%
Household Hygiene	<1%	-	<1%	<1%
Bulky Objects	<1%	-	<1%	<1%
Fines	<1%	-	<1%	1%

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

²Only 90% confidence intervals greater than 1% are reported.

3.5 COMBINED WASTE COMPOSITION RESULTS

3.5.1 Garbage

The combined (SF, MF, ICI, and DO) weighted average primary material composition results are presented in Figure 8. To calculate the combined average, a weighting was used to combine the results from sector based on the total tonnage of material that was received from each sector in 2015 as presented in Table 14. The weightings included: SF = 19.5%, MF = 22.6%, ICI = 42.6% and DO = 15.3%.

The largest component of the garbage was compostable organics (27%), followed by plastic and paper (19% each). Compostable organics mainly comprised food waste (21% of total waste), of which 12% of food was considered avoidable and 9% was unavoidable. Plastic film (8%) was the largest component of plastic, followed by durable plastic products (4%) and synthetic textiles (4%). The largest portion of paper was food soiled compostable paper (11%) followed by clean corrugated cardboard (3%) and office paper (2%). The fourth largest portion of the garbage stream was non-compostable organics (11%), largely from the Drop-Off sector, which consisted primarily of treated or painted wood (11%).

During the study very little compostable plastic materials were found. In total it amounted to approximately 0.1% of the overall waste composition. Compostable plastic materials that were identified were primarily compostable plastic packaging in SF Residential samples, and compostable plastic bags in ICI samples.

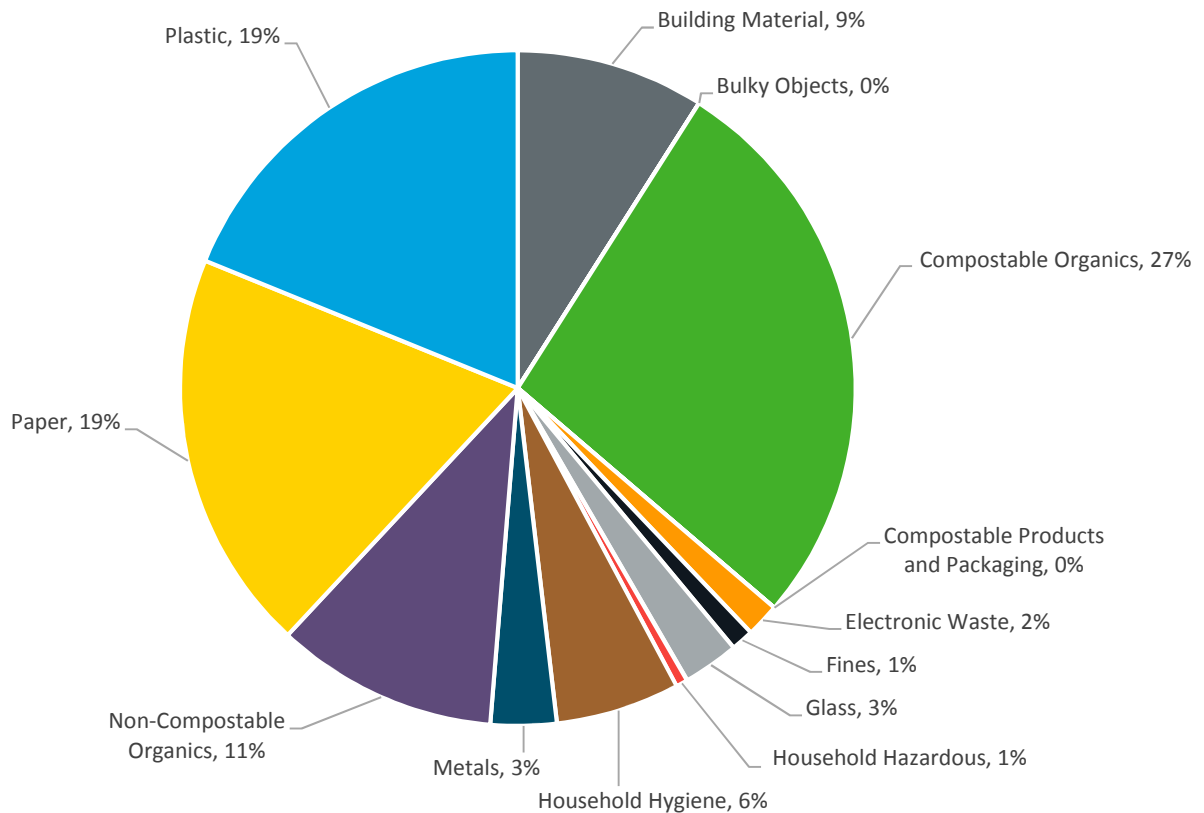


Figure 8: Primary Category Composition - Combined Garbage (N=78)

Waste composition results for the combined sectors and 90% confidence intervals are presented in Table 12 along with the results by sector. The calculated confidence intervals for each material category were less than 5% by category.

Table 12: Waste Composition Results Summary - Primary Categories¹

Primary Category	Combined Average (N = 78)	90% Confidence Interval ²	By Sector			
			SF (N=12)	MF (N=14)	ICI (N=31)	DO (N=21)
Paper	19%	±3%	18%	21%	24%	5%
Plastic	19%	±3%	21%	18%	21%	9%
Compostable Products and Packaging	<1%	-	<1%	<1%	<1%	<1%
Compostable Organics	27%	±3%	29%	37%	25%	15%
Non-Compostable Organics	11%	±4%	7%	4%	8%	33%
Metals	3%	±1%	3%	3%	3%	4%
Glass	3%	±1%	2%	2%	3%	4%
Building Material	9%	±5%	4%	1%	8%	28%

Primary Category	Combined Average (N = 78)	90% Confidence Interval ²	By Sector			
			SF (N=12)	MF (N=14)	ICI (N=31)	DO (N=21)
Electronic Waste	2%	±1%	2%	2%	2%	1%
Household Hazardous	1%	-	1%	1%	1%	<1%
Household Hygiene	6%	±1%	12%	9%	4%	<1%
Bulky Objects	<1%	-	<1%	<1%	<1%	<1%
Fines	1%	-	1%	1%	1%	<1%

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

² Only 90% confidence intervals greater than 1% are reported.

3.5.2 Organics

The SF, MF and ICI primary material composition results are presented in Table 13. The overall weighted average has not been calculated because specific organics tonnage data per sector is unavailable. Overall the SF samples are a majority yard & garden materials, and the MF and ICI sector were primarily food waste.

Table 13: Organics Composition Results Summary - Primary Categories¹

Primary Category	By Sector		
	SF (N=25)	MF (N=6)	ICI (N=16)
Garbage in Bag	<1%	1%	4%
Compostables in Bag	2%	<1%	3%
Compostable Paper	1%	2%	12%
Plastic	<1%	1%	1%
Compostable Plastics	<1%	<1%	<1%
Compostable Organics (Total)	95%	96%	78%
Yard & Garden	88%	17%	10%
Food Waste	6%	79%	68%
Clean Wood	1%	<1%	1%
Non-Compostable Organics	1%	<1%	<1%

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

4.0 WASTE DISPOSAL PER CAPITA

Waste disposal per capita by primary categories for the combined sectors and individual sectors are presented in Table 14. Solid waste disposed and population by sector (in the case of ICI, number of employees) for the previous year (2015) was provided by Metro Vancouver. This data was used to generate estimates of waste disposed per capita using the waste composition results for 2016. Waste disposal per capita estimates by tertiary/quaternary categories are included in Table A at the end of this report.

Table 14: Waste Disposal per Capita by Primary Categories

Primary Category	Combined Average (N=78)		By Sector							
	% ³	kg/capita	SF (N=12)		MF (N=14)		ICI (N=31)		DO (N=21)	
Disposed Tonnes¹	830,461		162,139		187,860		353,733		126,729	
Population or Number of Employees	2,497,052		1,511,429		985,623		1,295,752		1,511,429 ²	
Primary Category	% ³	kg/capita	% ³	kg/capita	% ³	kg/capita	% ³	kg/employee	% ³	kg/capita
Paper	19%	64	18%	19	21%	41	24%	65	5%	4
Plastics	19%	63	21%	23	18%	35	21%	58	9%	8
Compostable Plastics	<1%	<1	<1%	<1	<1%	<1	<1%	<1	<1%	<1
Compostable Organics	27%	91	29%	31	37%	71	25%	69	15%	13
Non-Compostable Organics	11%	35	7%	8	4%	7	8%	22	32%	27
Metals	3%	10	2%	3	3%	5	3%	9	4%	3
Glass	3%	9	2%	3	2%	4	3%	7	4%	3
Building Material	9%	30	4%	4	1%	3	8%	23	28%	24
Electronic Waste	2%	5	2%	2	2%	4	2%	4	1%	1
Household Hazardous	1%	2	1%	1	1%	1	1%	2	<1%	<1
Household Hygiene	6%	20	12%	12	9%	17	4%	10	<1%	<1
Bulky Objects	<1%	<1	<1%	<1	<1%	<1	<1%	<1	<1%	<1
Fines	1%	4	1%	1	1%	3	1%	3	<1%	<1
Total	-	333	-	107	-	191	-	273	-	84

¹ Total tonnes disposed in 2015

² SF Population

³ Percentages are rounded to the nearest whole number and therefore may not add up to 100%.

4.1 HISTORICAL COMPARISON

A summary of waste disposed by sector from 2011 to 2016 is presented in Table 15. A historical comparison of waste disposal per capita by primary category from 2011 to 2016 is provided in the following graphs by sector (Figure 9 to Figure 12) and for the combined sectors excluding demolition and land clearing (DLC) (Figure 13). This information can be used to help evaluate how waste reduction and diversion programs are affecting the quantity and proportion of materials disposed at Metro Vancouver solid waste facilities. Historical data was obtained from the 2011, 2013, and 2015 Metro Vancouver Waste Composition Monitoring Program reports.

Trends observed in the per capita waste disposal include:

- Waste disposal per capita decreased in every sector sampled between 2015 and 2016.
- The amount of compostable organics decreased in every sector except DO between 2015 and 2016.
- SF Residential compostable organics disposed per capita have significantly decreased by close to 60% (from 78 to 31 kg per capita) from 2011 to 2016. The ICI sector compostable organics also decreased dramatically during this time period, from 138 to 69 kg per employee. MF Residential compostable organics have also decreased between 2011 and 2016, from 84 to 71 kg per capita.
- In 2016, SF Residential compostable organics comprised 29% of the waste stream, this is a decrease of 5%, compared to 2015 where organics comprised 34% of the waste stream.
- While MF Residential compostable organics are decreasing consistently each year, they have not made nearly the same reductions in this category when compared to the SF Residential sector.
- In the ICI sector, compostable organics disposed has decreased from 83 to 69 kg per capita between 2015 and 2016.
- The amount of non-compostable organics has decreased significantly from 2015 to 2016, from 54 to 35 kg per capita.
- The amount of paper and plastic disposed has stayed relatively constant since 2013.
- In the DO and ICI sector, building material became a larger portion of the waste stream. In the ICI sector, the percentage of building materials in the waste stream increased from 15 to 23 kg per capita, and in the DO sector, they increased from 16 to 24 kg per capita.
- The amount of building material disposed was significantly larger in 2016 than 2015, increasing from 19 to 30 kg per capita.

Table 15: Historical Waste Disposal by Sector

Sector	2011	2013	2015	2016
SF (kg/capita)	170	156	117	107
MF (kg/capita)	214	208	224	191
ICI (kg/employee)	407	307	295	273
DO (kg/capita)	102	90	91	84
Combined (kg/capita)	419	389	369	333

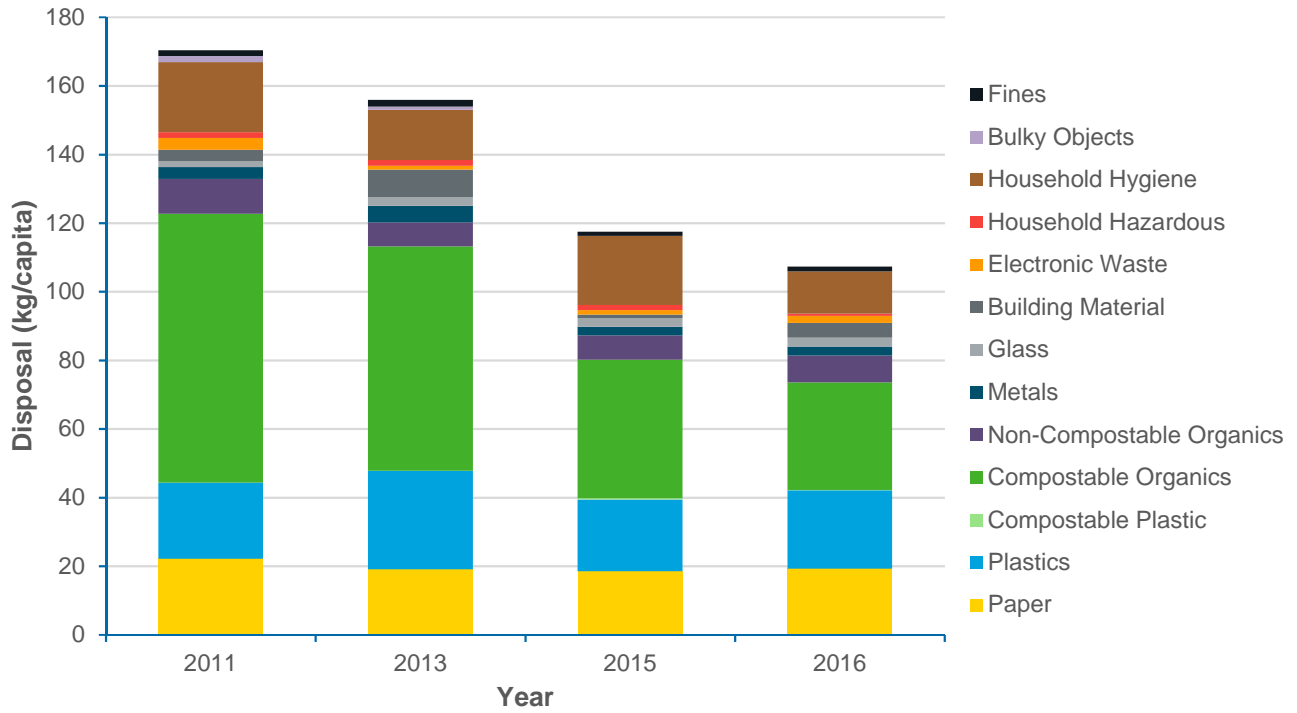


Figure 9: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Single Family Residential

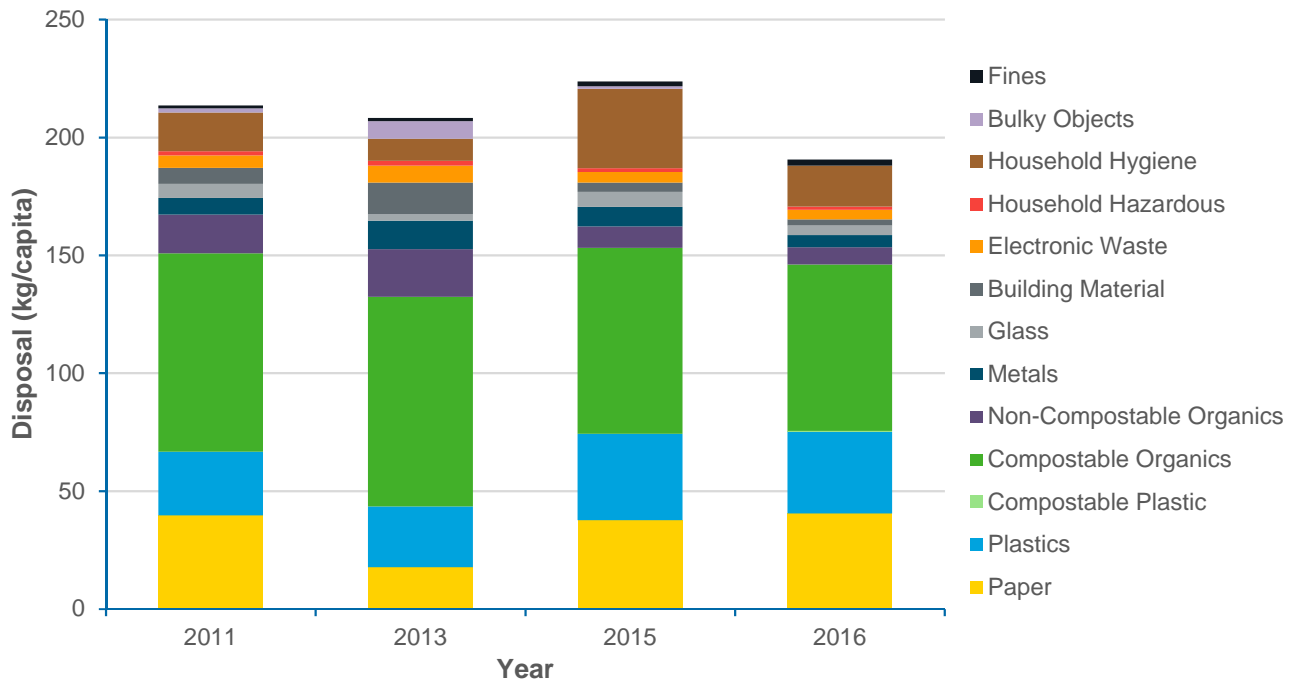


Figure 10: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Multi-Family Residential

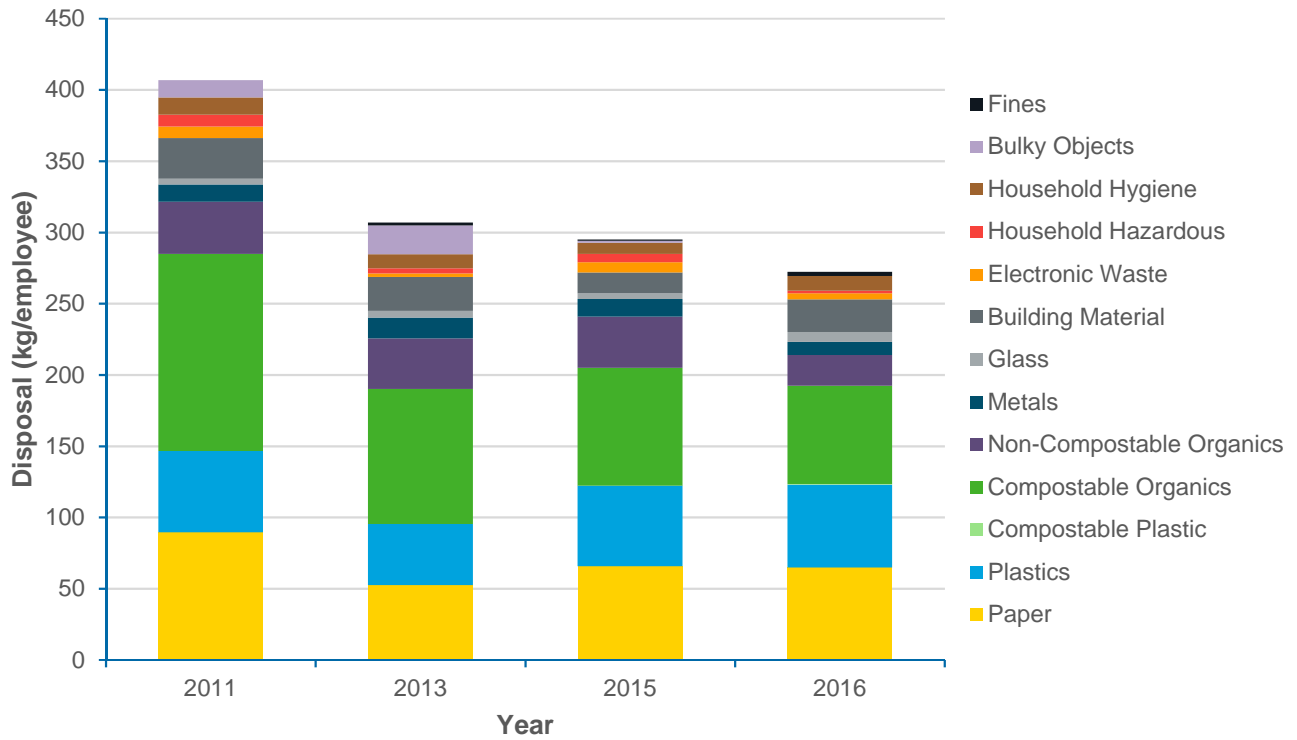


Figure 11: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Industrial, Commercial, & Institutional

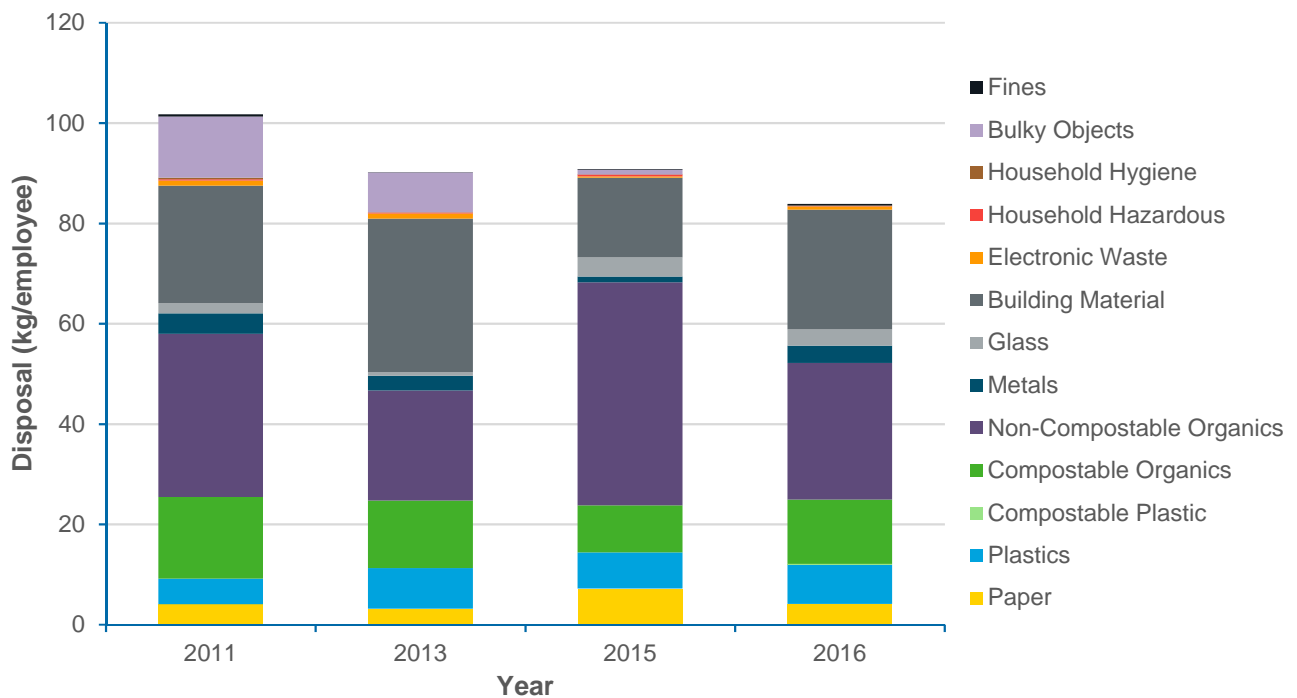


Figure 12: Waste Disposal per Capita by Primary Category Composition (2011-2016) – Drop-Off

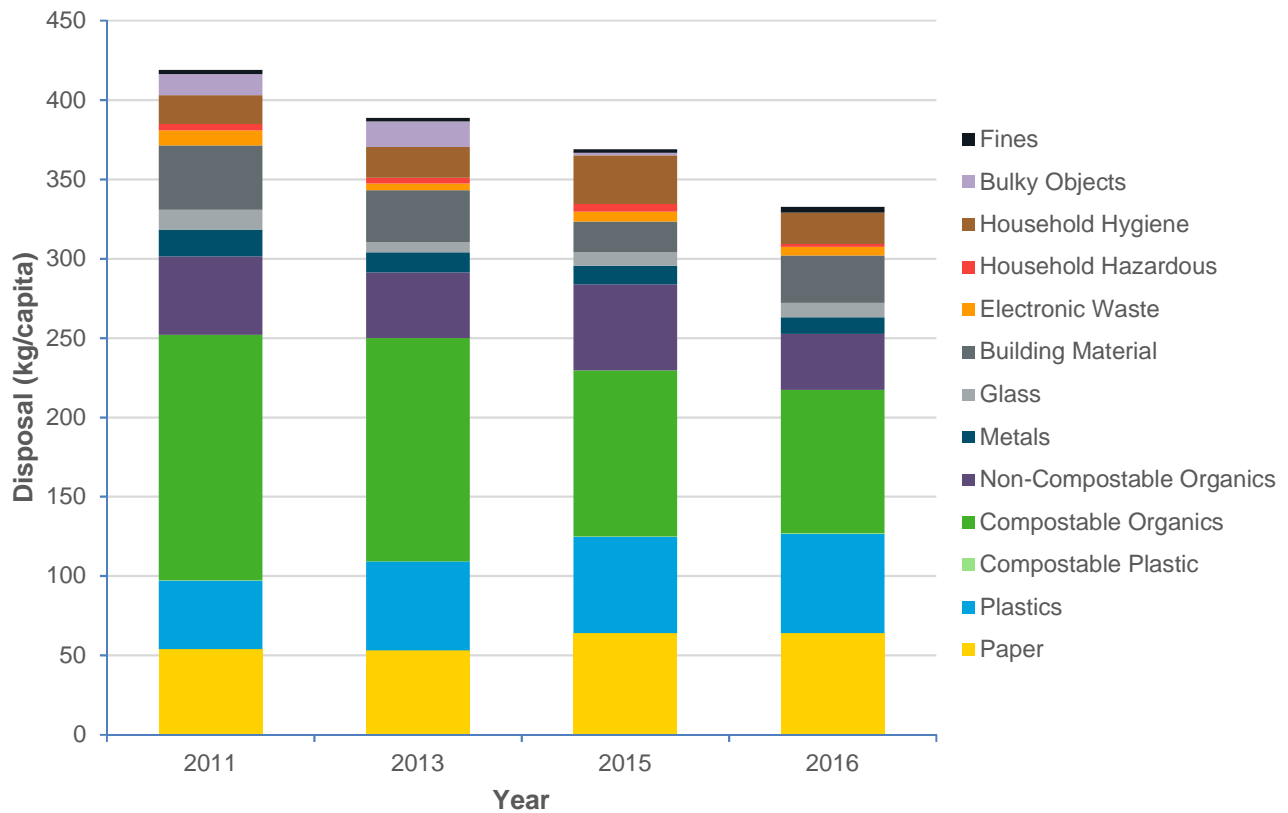


Figure 13: Waste Disposal per Capita by Primary Category Composition (2011-2016) – All Sectors Combined (excluding DLC)

4.2 ORGANICS HISTORICAL COMPARISON

In 2016, the largest component of SF organics were uncontaminated compostable organics (95%), which consisted mostly of yard and garden (88%) and food waste (6%). This is a notable change in composition from the 2015 SF organics composition; in 2015, yard and garden waste made up 74% of the total organics, and food waste made up 22%. The 2015 study took place in November, whereas this study took place in July and seasonal variations are expected with more yard waste during the summer months. Furthermore, the 2015 waste composition study occurred immediately after Halloween, and many discarded pumpkins led to a higher proportion of food waste.

5.0 STREETScape COMPOSITION RESULTS

The streetscape waste composition results are reported as weighted average percentages by the station stream in the following sections. 'Station stream' refers to the type of disposal that was indicated on the waste container, such as 'Mixed Paper' or 'Organics.' Two large municipalities (>150,000 residents), two mid-sized municipalities (between 50,000 and 150,000 residents, and one small municipality (<50,000 residents) were analyzed separately and all the data combined to determine the overall diversion occurring at streetscape stations and the potential diversion that could be achievable if all material were put into the proper recycling and organics stream. A summary of the results for all categories is included in Table C. Select photographs from the field auditing are included in Appendix G. Table 16 summarizes the total number of stations included in the study, and the number of samples completed broken down by how the streams were labelled at the stations. Further details about each municipality's samples are included below.

Table 16: Streetscape Stations and Sample Summary

Station/Stream	Municipality A	Municipality B	Municipality C	Municipality D	Municipality E	Total
Number of Stations	9	9	10	9	4	41
Number of Samples						
Garbage	9	9	10	9	4	41
Organics	-	-	10	-	6 ¹	16
Paper	9	6	-	9	-	24
Deposit Containers	-	6	-	7	2	15
Mixed Containers	9	-	10	2	-	21
Total	27	21	30	27	12	117

¹Two stations had two organics bins

Municipality A

Samples were taken from 9 distinct sampling locations in Municipality A. All locations had three streams: garbage, paper, and mixed containers, thus 27 samples were taken total. Samples in Municipality A ranged from 0.4 kg to 8.6 kg. The average garbage sample was 2.6 kg, the average paper stream sample was 4.3 kg, and the average mixed container sample was 2.5 kg.

Municipality B

Samples were taken from 9 distinct sampling locations in Municipality B. Six locations had three streams: garbage, paper deposit containers, and three locations had garbage only, thus 21 samples were taken total. Samples in Municipality B ranged from 0.4 kg to 11.2 kg. The average garbage sample was 5.2 kg, the average paper stream sample was 1.8 kg, and the average deposit container sample was 2.6 kg.

Municipality C

Samples were taken from 10 distinct sampling locations in Municipality C. All locations had garbage, organics, and mixed container streams, thus 30 samples were taken total. Samples in Municipality C ranged from 0.5 kg to

11.8 kg. The average garbage sample was 3.6 kg, the average organics stream sample was 4.8 kg, and the average mixed container sample was 1.9 kg.

Municipality D

Samples were taken from 4 distinct sampling locations in Municipality D. All locations had a garbage stream, two locations had a deposit container stream, and three locations had an organics stream, one of which had two organics bins which were sorted as two separate samples. Thus, 12 samples were sorted in total. Samples in the Municipality D ranged from 0.4 kg to 8.0 kg. The average garbage sample was 3.3 kg, the average organics stream sample was 2.8 kg, and the average mixed container sample was 1.8 kg.

Municipality E

Samples were taken from 9 distinct sampling locations in Municipality E. All locations had a garbage and paper stream, 2 locations had a mixed containers stream, and 7 locations had a deposit containers stream, thus 27 samples were taken in total. Samples in Municipality E ranged from 0.1 kg to 10.5 kg. The average garbage sample was 2.1 kg, the average paper stream sample was 2.8 kg, the average mixed container sample was 0.3 kg, and the average deposit containers stream sample was 1.4 kg.

5.1 COMPOSITION OF STREETScape STATION STREAMS

Table 17 summarizes the material composition of each station stream. Compostable materials are a summary of all material categories that can be put into the organics stream, recyclable materials are all containers or deposit containers that could be recycled in the stream, and garbage is all other material including some items that could be recycled at depots. The cells highlighted in green shows the material that was placed in the proper stream available, and the remainder of the material found in that stream should have been put into another bin available.

Table 17: Streetscape Material Composition by Station Stream^{1, 2}

	City	Composition	Streetscape Labelled Station Stream			
			Garbage	Mixed or Deposit Containers	Paper	Organics
Composition of Materials in Stream	Municipality A	Bottles & Cans	2%	8%	0%	-
		Containers	6%	28%	0%	-
		Paper	17%	10%	86%	-
		Organics	30%	17%	3%	-
		Garbage	46%	36%	10%	-
	Municipality B	Bottles & Cans	2%	19%	3%	-
		Containers	7%	13%	2%	-
		Paper	11%	11%	42%	-
		Organics	38%	37%	44%	-
		Garbage	42%	19%	9%	-

	City	Composition	Streetscape Labelled Station Stream			
			Garbage	Mixed or Deposit Containers	Paper	Organics
	Municipality C	Bottles & Cans	1%	8%	-	0%
		Containers	4%	22%	-	3%
		Paper	11%	32%	-	3%
		Organics	24%	31%	-	79%
		Garbage	60%	6%	-	14%
	Municipality D	Bottles & Cans	2%	39%	0%	-
		Containers	9%	15%	0%	-
		Paper	37%	13%	93%	-
		Organics	35%	12%	3%	-
		Garbage	17%	20%	3%	-
	Municipality E	Bottles & Cans	1%	84%	-	2%
		Containers	4%	1%	-	4%
		Paper	6%	3%	-	5%
		Organics	46%	9%	-	83%
		Garbage	43%	3%	-	5%

¹ Green shading indicates materials that were placed in the correct stream by users based on the streams available at the sorting station.

² Percentages are rounded to the nearest whole number and therefore may not add up to 100%.

Overall results were consistent between municipalities, where mixed or deposit container streams had the highest amount of contamination, and paper and organics streams had lower amounts of contamination. The results are weight-based, thus, the reason for the higher contamination rates in the mixed or deposit container streams are the relative weights of materials – containers are relatively light in comparison to the contamination found (usually organics or liquids). This same explanation accounts for the relatively low contamination rates found in the organics and paper streams, since these items are heavy relative to the contamination (usually plastics) often found in these streams, so a larger volume of items such as plastics are needed to impact the weight-based contamination rate.

Table 18 presents the average composition for all municipalities combined. Samples were taken from 41 distinct sampling locations, which all had a garbage stream and a variety of other streams. The cells highlighted in green shows the material that was placed in the proper stream available, and the remainder of the material found in that stream should have been put into another bin available.

Table 18: Combined Streetscape Waste Composition^{1, 2}

		Streetscape Labelled Sample Stream							
		Garbage		Mixed or Deposit Containers		Paper		Organics	
Composition of Materials in Stream	Number of Samples (N)	43		21		24		16	
		Weighted Average	90% Confidence Interval	Weighted Average	90% Confidence Interval	Weighted Average	90% Confidence Interval	Weighted Average	90% Confidence Interval
	Bottles & Cans	2%	1%	19%	13%	1%	2%	1%	1%
	Containers	6%	2%	20%	9%	0%	0%	3%	2%
	Paper	15%	4%	17%	9%	82%	10%	4%	2%
	Organics	34%	5%	24%	8%	9%	7%	80%	5%
	Garbage	44%	6%	20%	6%	7%	5%	12%	4%

¹ Green shading indicates materials that were placed in the correct stream by users based on the streams available at the sorting station.

² Percentages are rounded to the nearest whole number and therefore may not add up to 100%.

Overall, 34% of the garbage stream is compostable materials, and 23% of the garbage stream is recyclable materials. For the mixed containers and deposit containers stream, over 50% of the stream is contamination by weight. For the organics stream, the contamination rate was 20%, and for paper the contamination rate was 18%.

5.1.1 Primary Category Composition

Figures 14 to 17 detail the material composition by primary category for each streetscape stream. The primary categories do not directly align with which materials are classified as compostable, recyclable or garbage as presented in Section 5.1, and provide an overall breakdown of the material using the categories presented in Appendix D. Paper was the largest portion of the garbage stream (27%) followed by organics (22%) and household hygiene (20%). Household hygiene included categories such as pet waste (16%) and diapers (4%), and made up a majority of the total. Bagged household waste (13%) included instances where there were multiple plastic shopping bags full of diapers, or shopping bags full of garbage that appeared to be from a household such as food scraps, textiles, packaging and an assortment of garbage more commonly generated in a household.

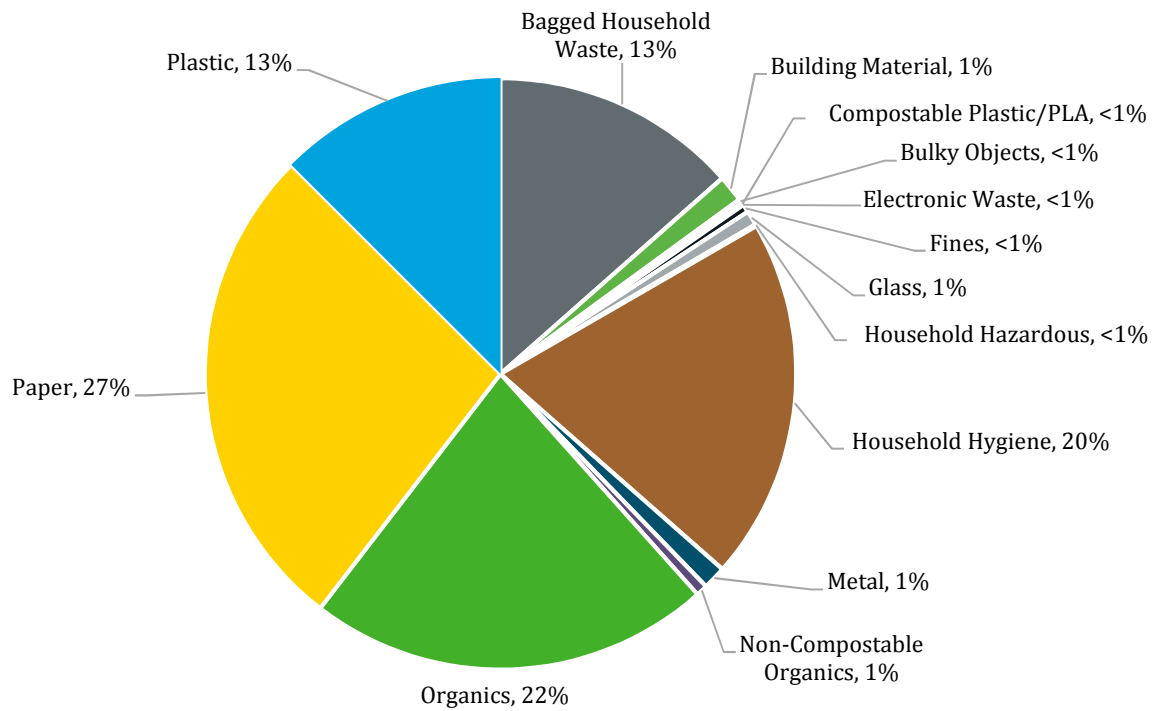


Figure 14: Combined Primary Material Category Composition – Garbage Stream

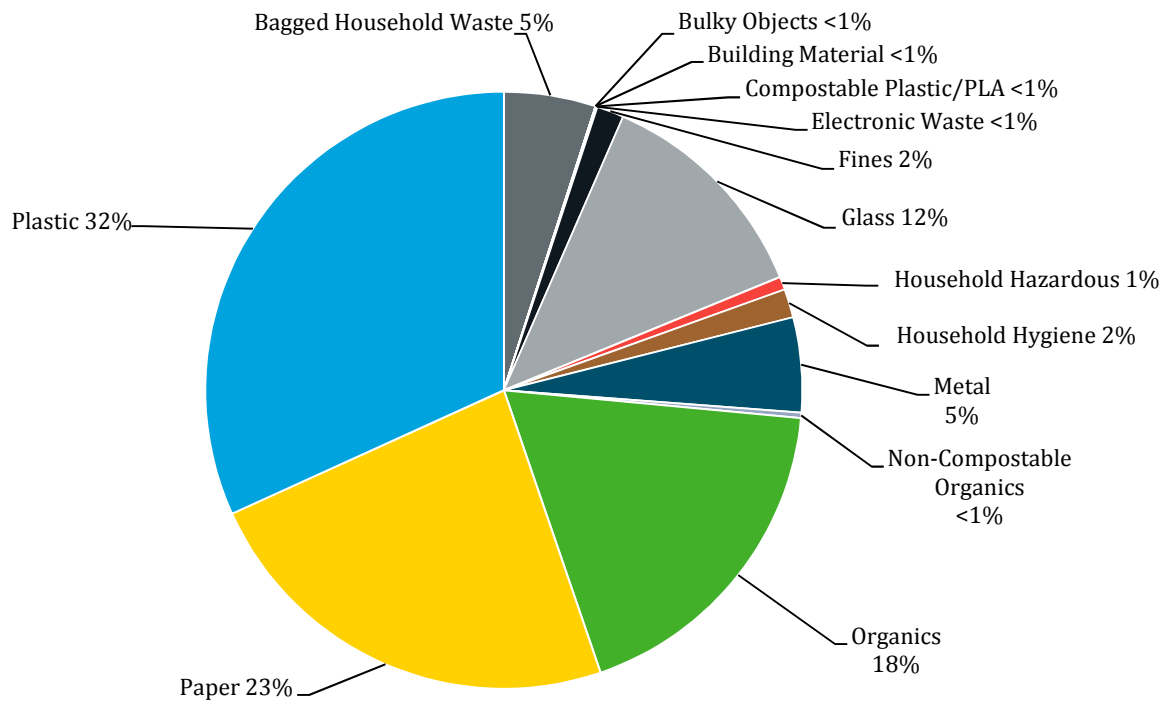


Figure 15: Combined Primary Material Category Composition – Mixed Containers Stream

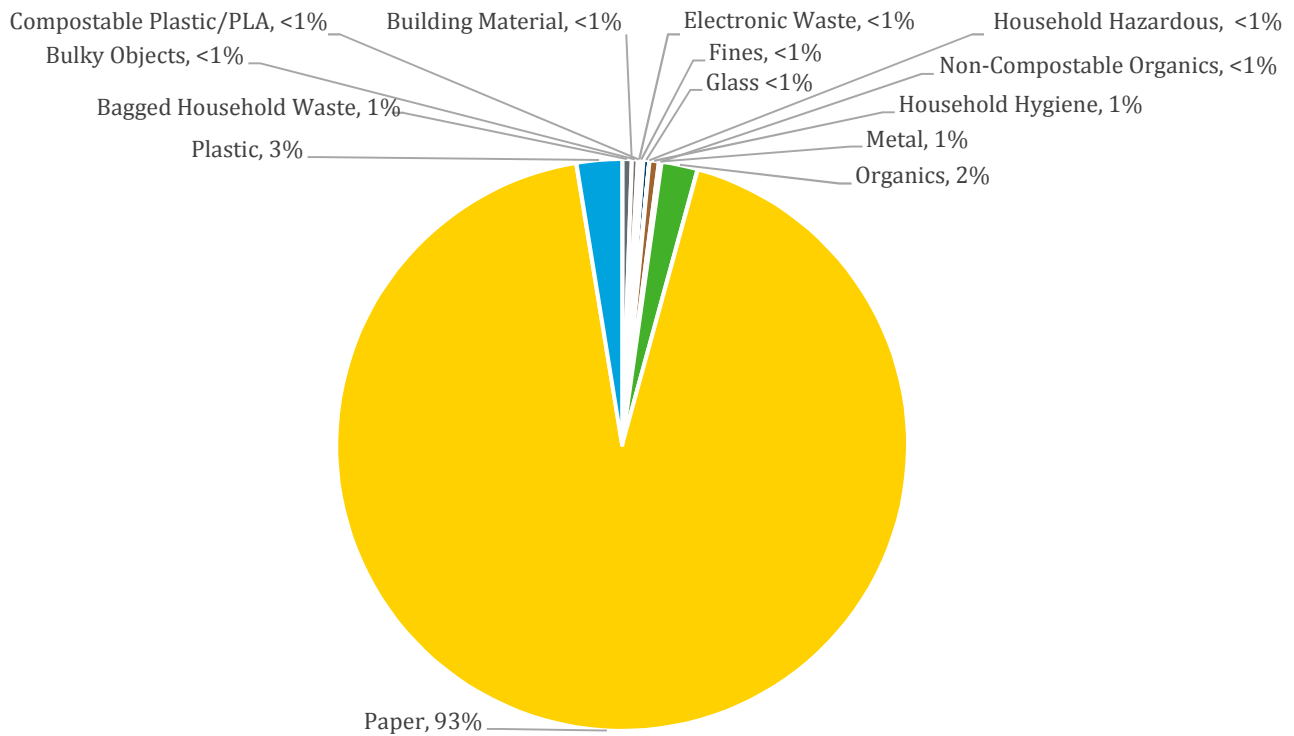


Figure 16: Combined Primary Material Category Composition – Paper Stream

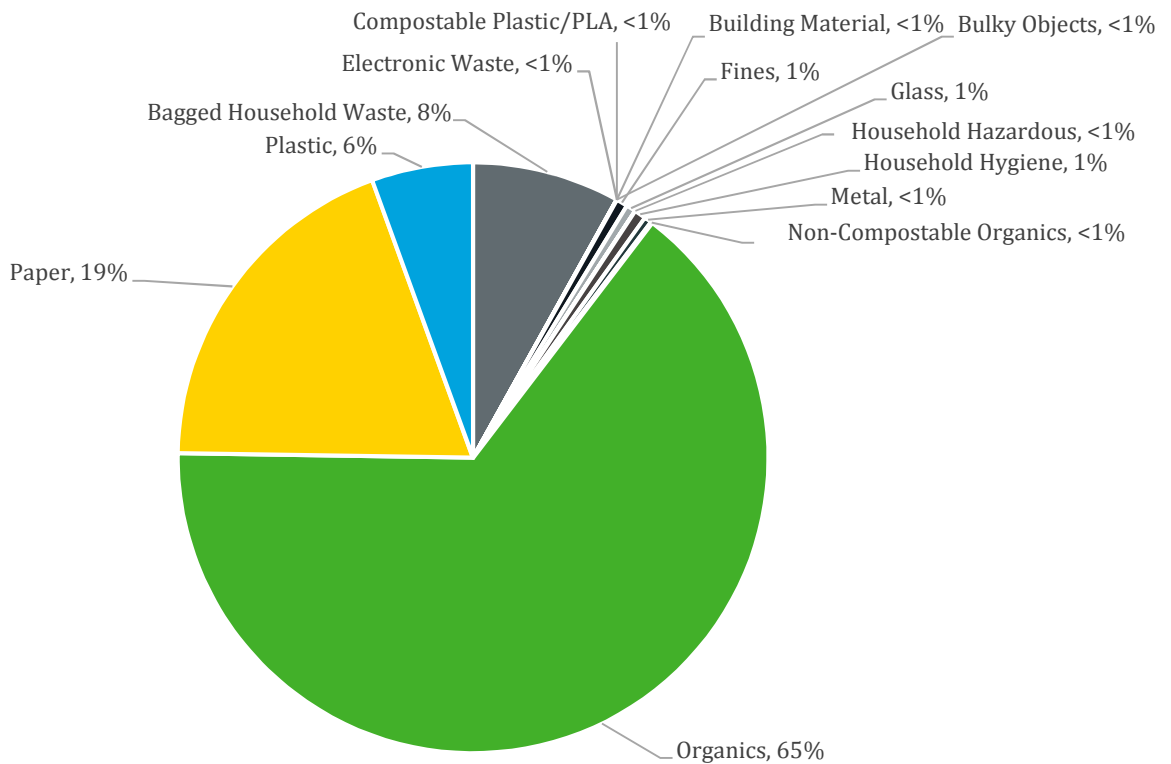


Figure 17: Combined Primary Material Category Composition – Organics Stream

5.2 STREETSCAPE DIVERSION PERFORMANCE AND POTENTIAL

The overall performance of the current streetscape diversion program is summarized in Table 19. The three solo garbage cans that were part of the study were removed from this analysis as there is no convenient diversion option available at a solo garbage can. The terminology in Table 19 includes:

- **Apparent diversion** is the total weight of all materials collected in the recycling and composting streams divided by the total weight of all materials collected from all streams. The weight of the contamination identified in the recycling and composting streams is counted as diversion.
- **Actual diversion** is the total weight of acceptable materials in the recycling and composting streams divided by the total weight of all materials collected from all streams. The weight of the contamination identified in the recycling and composting streams is not counted as diversion.
- **Potential diversion** assumes all materials are sorted into the proper streams available and equals total weight of all materials that could be placed into the recycling and composting streams divided by the total weight of all materials collected from all streams.

After the contamination is subtracted from the recycling and compostable streams, a diversion rate of 40% is being achieved at stations that have a diversion option available (the solo garbage can samples were excluded from this particular analysis). If all composting and recyclables in the garbage were properly sorted, a total diversion rate of 74% could be achieved at streetscape stations. Figure 18 shows the breakdown of all the waste from all the streams and stations in the study, displayed by the proper material stream the material should be disposed in.

Table 19: Streetscape Diversion Rate and Diversion Potential¹

	Municipality A	Municipality B	Municipality C	Municipality D	Municipality E	Average
Apparent Diversion	72%	46%	65%	65%	47%	59%
Actual Diversion	49%	16%	42%	54%	40%	40%
Bottles & Cans	-	9%	-	10%	7%	4%
Containers	10%	-	6%	0%	-	4%
Paper	39%	8%	-	43%	-	17%
Organics	-	-	37%	-	33%	15%
Potential Diversion	73%	68%	71%	89%	75%	74%
Bottles & Cans	3%	6%	2%	8%	8%	5%
Containers	9%	7%	7%	6%	4%	7%
Paper	47%	16%	11%	59%	5%	27%
Organics	14%	39%	51%	16%	58%	35%

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

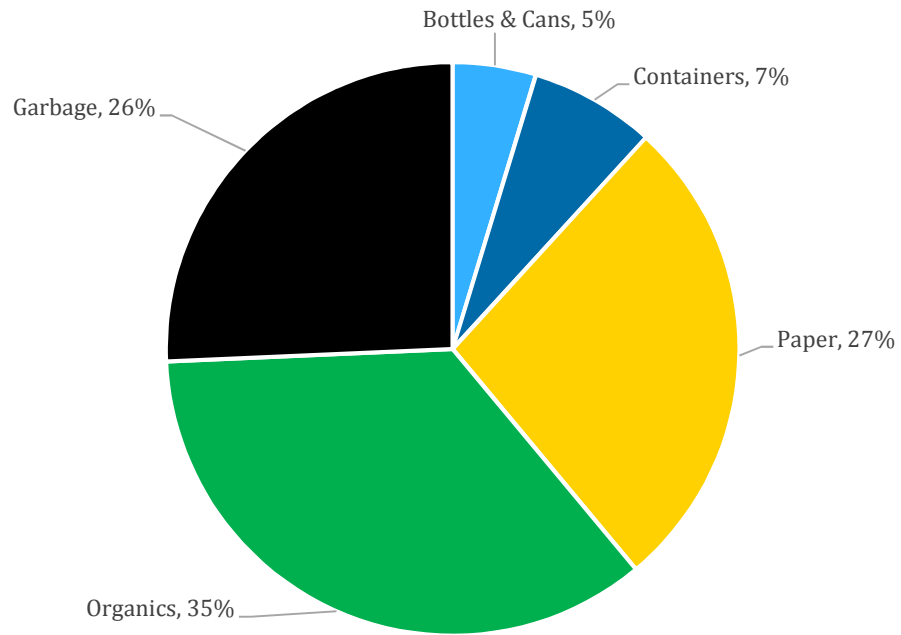


Figure 18: Total Disposal Combined All Streams and Bins

6.0 ABANDONED WASTE AND LARGE ITEM PICK-UP

The abandoned waste and large item pick-up sampling results are reported by estimated volume and by number of items. While visual analysis can be accurate to determine volumetric estimates of waste composition, on these routes, trucks were moving quickly and staff wrote down a description of items picked up and a rough volume estimate – photographs were taken and relied upon in the data analysis. The volumetric composition in the following section is meant only to give an idea of sample composition. The item count is the most reliable source of data. A summary of results is included in Table D. Select photographs from the field auditing are included in Appendix H.

6.1 ABANDONED WASTE

Fifty two abandoned waste samples were visually analyzed by following the large items pick-up routes in two municipalities. The average sample weight was estimated to be 44 kg.

Figure 19 presents the volumetric analysis of abandoned waste samples. The largest component of the waste stream was, predictably, ‘bulky items’, which comprised 43% of the waste stream. Of this, 38% was furniture, while 4% was white goods (appliances). The next largest component of the waste stream was plastic (20%), 15% of which was durable plastic products. These durable plastic products were mostly children’s items, such as car seats and toys.

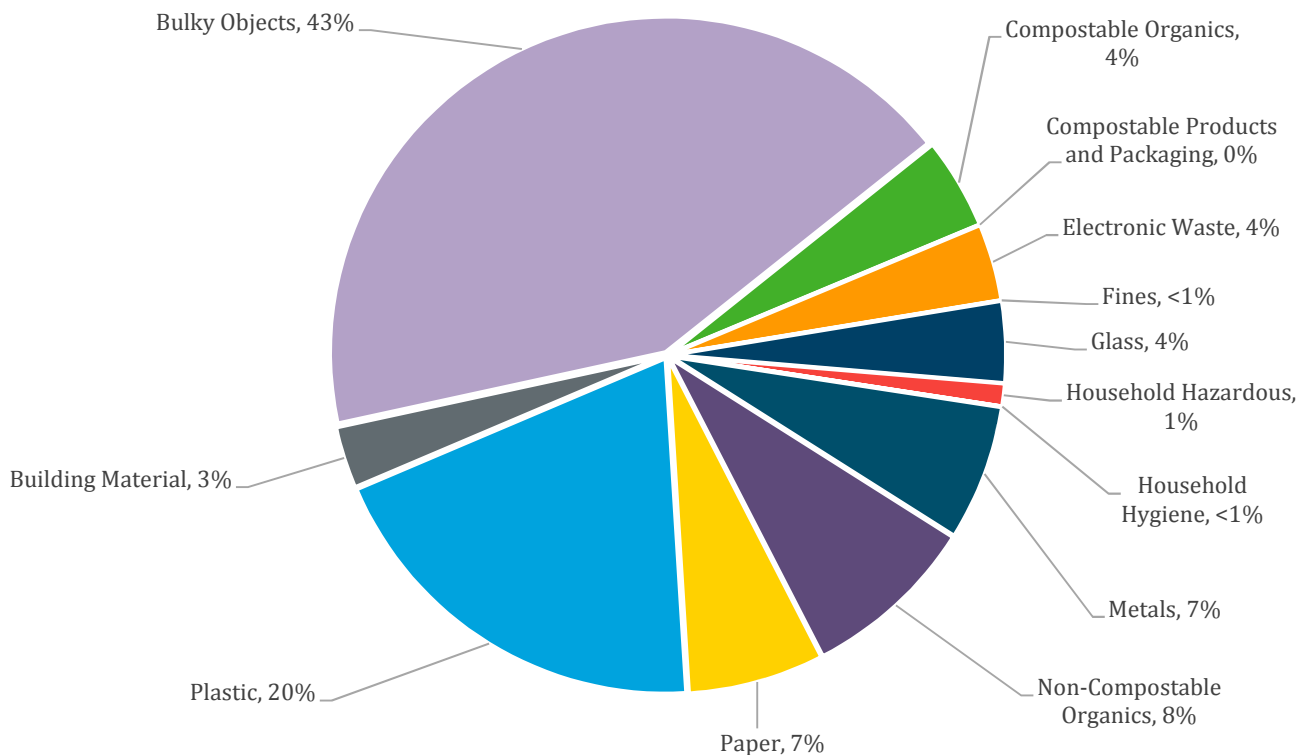


Figure 19: Waste Composition by Volume – Abandoned Waste (N=52)

Figure 20 presents the number of items observed while following the large item pick-up routes. This figure does not use the primary categories used in the rest of this waste composition study, however, the qualitative descriptions of item type may present a more clear idea of the waste composition.

Each location visited was considered a sample for this study. For abandoned waste, in 52 samples observed over the period of two days, 132 items were recorded – an average of 2.5 items per sample. Several samples had plastic tubs and cardboard boxes that were filled with items. The items most commonly observed were couches (21), followed by durable plastic products (mostly children’s items such as toys and car seats) (15). Other items included an assortment of small items at a location such as umbrellas, tarps, exercise bike, newspapers, paint cans, and other smaller items. Nine mattresses were found, and there were 8 instances of general litter or bagged household waste being abandoned.

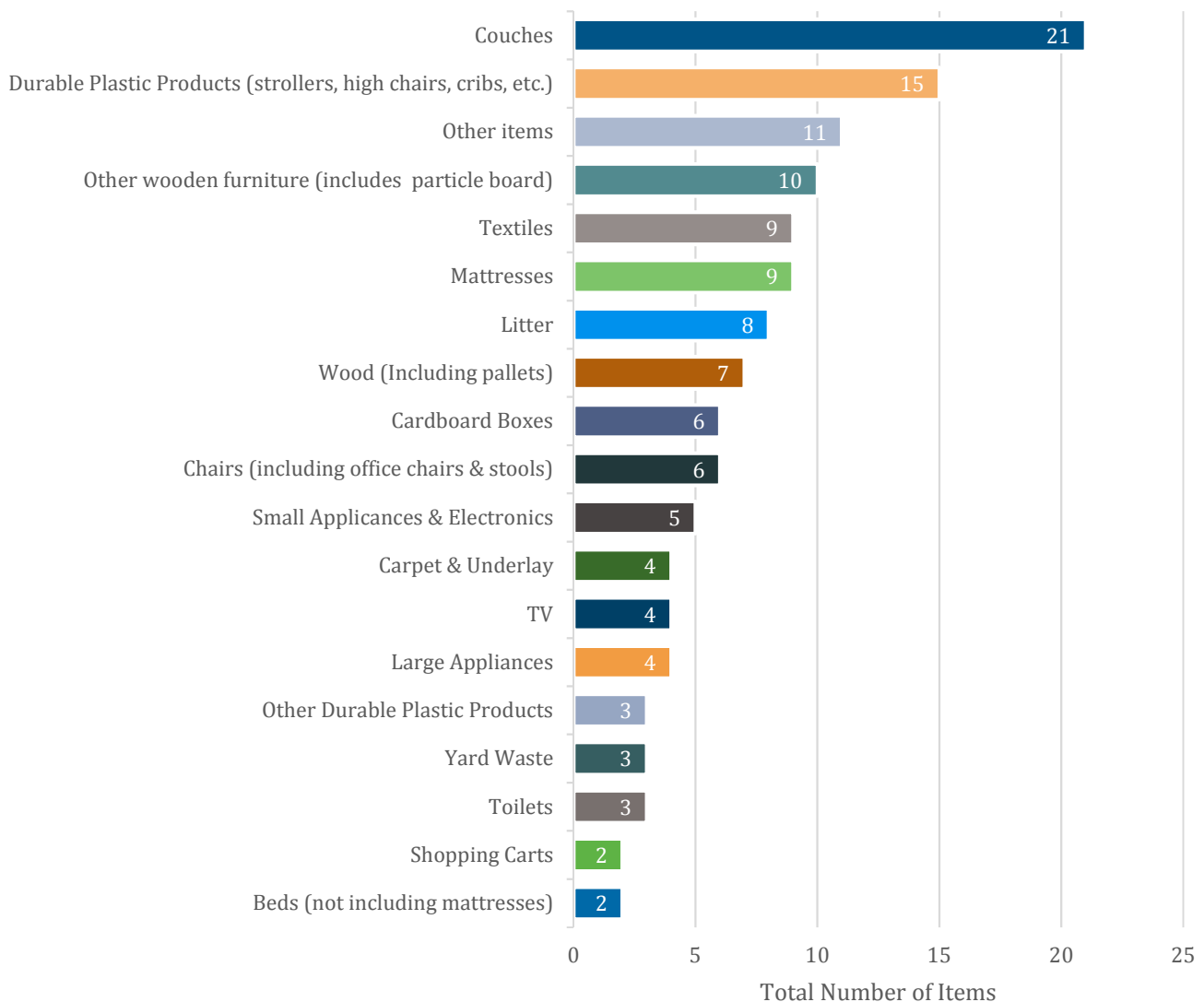


Figure 20: Waste Composition by Item Description – Abandoned Waste (N=52)

6.2 LARGE ITEM PICK-UP

The large item pick-up routes had a total of 103 samples that were visually analyzed. The average sample weight was estimated to be 56 kg.

Figure 21 presents the volumetric analysis of large item pick-ups. The largest composition of the waste was 'bulky items', which comprised 64% of the waste stream. Of these, 59% were furniture, while 5% were white goods (appliances). The next largest component of the waste stream was non-compostable organics (26%), which was entirely comprised of painted or treated wood.

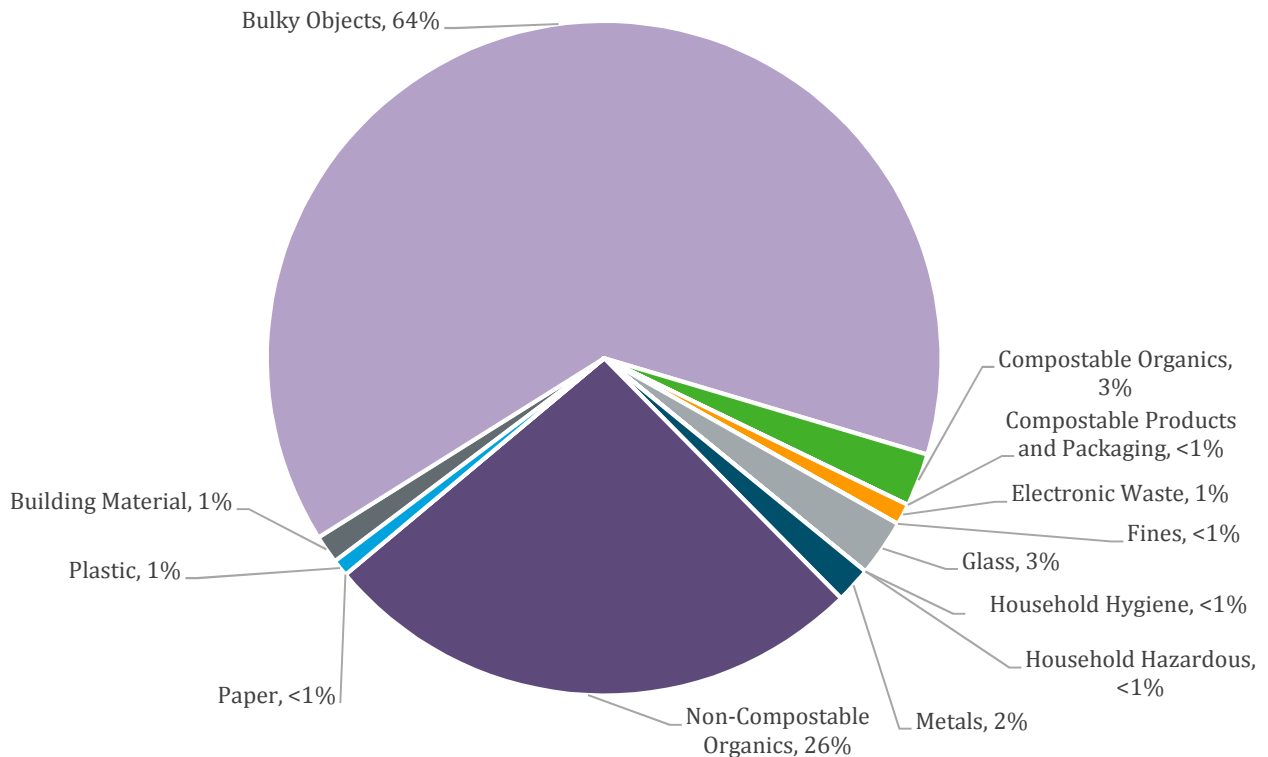


Figure 21: Waste Composition by Volume – Large Item Pick-up (N=103)

Figure 22 presents the number of items observed while following the large item pick-up routes. This figure does not use the primary categories used in the rest of this waste composition study, however, the qualitative descriptions of item type may present a more clear idea of the waste composition.

In 103 samples, 169 items were recorded – an average of 1.6 items per sample. The items most commonly observed were couches (67), followed by other types of wooden furniture (31), which mostly included tables and cabinets. Furniture made of treated wood, untreated wood, and composite wood (such as plywood or particle board) were included in this item count. 17 armchairs were observed, making that the next most common item to be disposed of. Chairs (all material types) were the next most common item disposed of (17), followed by beds and bed frames (all material types but not including mattresses (8). Wood (including pallets) was also observed 8 times. Several other items occurred commonly, such as household appliances, toilets, mattresses, and plastic children’s items (such as car seats and strollers). Other items included a toolbox, and foam cushions.

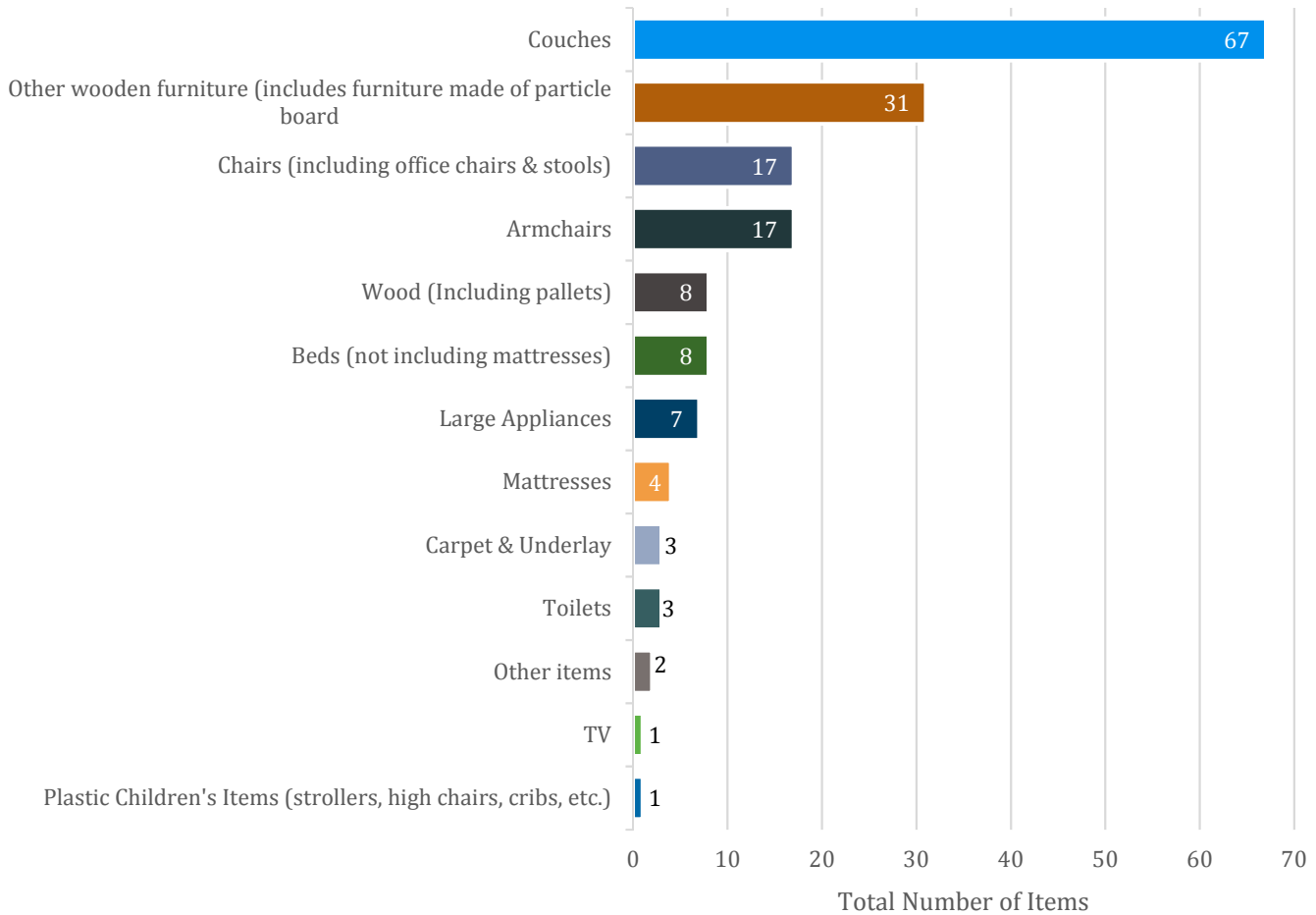


Figure 22: Waste Composition by Item Description – Large Item Pick-Up (N=103)

The large item pick-up stream tended to vary less in composition than the abandoned item waste stream. The large item pick-up stream tended to have very large items (mostly furniture) while the abandoned waste stream tended to have bulky but smaller items, like large toys and car seats – items that may not fit into a garbage can but that owners may not consider large enough to justify calling for large item pick-up.

7.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech EBA Inc.



Prepared by:
Melissa Nielsen, E.I.T.
Project Engineer
Solid Waste Management Practice
Direct Line: 604.317.8276
Melissa.Nielsen@tetrattech.com



Prepared by/Reviewed by:
Avery Gottfried, ME, P.Eng.
Solid Waste Planning Engineer
Solid Waste Management Practice
Direct Line: 604.830.6989
Avery.Gottfried@tetrattech.com



Reviewed by:
Tamara Shulman, BA
Team Lead – Planning
Solid Waste Management Practice
Direct Line: 604.608.8636
Tamara.Shulman@tetrattech.com

/sy

TABLES

Table A	Garbage Composition – All Categories and Sectors
Table B	Organics Composition – All Categories and Sectors
Table C	Streetscape Composition – All Categories and Material Streams
Table D	Abandoned Waste and Large Item Pick-Up Volumetric Composition - Primary Categories

Table A: Garbage Composition – All Categories and Sectors

Category	SF	MF	ICI	DO	Combined
Paper					
001 Junk Mail, Flyers, Unaddressed Mail	0.6%	0.5%	0.4%	0.1%	0.4%
002 Other Fine Office Paper or Envelopes	1.6%	2.2%	1.7%	0.5%	1.6%
003 Newsprint	0.9%	1.9%	0.6%	0.1%	0.9%
004 Clean Recyclable OCC	0.8%	2.0%	2.1%	1.3%	1.7%
005 Waxed OCC	0.0%	0.0%	0.6%	0.0%	0.3%
006 Other soiled OCC	0.1%	0.3%	1.1%	0.0%	0.6%
007 Cereal Boxes and Other Box Packaging	2.0%	2.0%	1.5%	0.2%	1.5%
008 Telephone Books	0.0%	0.0%	0.0%	0.0%	0.0%
009 Magazines	0.4%	1.1%	0.3%	0.0%	0.5%
010 Books	0.2%	0.3%	0.0%	0.0%	0.1%
011 Dairy or Dairy Substitute	0.2%	0.2%	0.1%	0.0%	0.1%
012 Non-Dairy/Deposit	0.1%	0.1%	0.1%	0.0%	0.1%
013 Single Serving Cups and Lids	0.6%	0.6%	1.2%	0.2%	0.8%
014 Other Compostable Paper	10.2%	9.9%	9.4%	1.6%	8.4%
015 Non-Compostable, Non-Recyclable Paper	0.4%	0.2%	4.7%	0.9%	2.3%
Plastic					
016 Re-used Retail & Grocery bags	0.9%	0.6%	0.3%	0.1%	0.5%
017 Empty Retail & Grocery Bags	0.8%	0.7%	0.4%	0.1%	0.5%
018 Consumables Packaging Bags and Film	5.2%	4.8%	3.4%	0.7%	3.7%
019 Garbage Bags	1.1%	1.3%	1.3%	0.1%	1.1%
020 Freezer/Sandwich Bags	0.2%	0.1%	0.1%	0.0%	0.1%
021 Deposit Beverage Pouches	0.0%	0.0%	0.0%	0.0%	0.0%
022 Other Plastic Film	0.7%	0.3%	3.9%	0.3%	1.9%
023 Clothing and Accessories	2.2%	3.2%	0.7%	0.1%	1.4%
024 Household	1.7%	1.2%	0.7%	0.2%	0.9%
025 Other	1.2%	0.1%	2.1%	0.0%	1.2%
026 Dairy or Dairy Substitute	0.1%	0.2%	0.1%	0.0%	0.1%
027 Deposit Containers - Water	0.1%	0.1%	0.1%	0.0%	0.1%
028 Deposit Containers - Other	0.1%	0.1%	0.1%	0.0%	0.1%
029 Single Serving Cups	0.5%	0.2%	0.3%	0.0%	0.3%

Category	SF	MF	ICI	DO	Combined
030 Other	0.0%	0.0%	0.1%	0.0%	0.0%
031 # 1 PETE - Bottles and Jars	0.3%	0.1%	0.1%	0.0%	0.1%
032 #1 PETE - Other Packaging	0.2%	0.4%	0.2%	0.0%	0.2%
033 #2 HDPE - Bottles and Jugs	0.5%	0.7%	0.4%	0.1%	0.4%
034 #2 HDPE - Tubs and Lids	0.1%	0.1%	0.7%	0.0%	0.3%
035 #3 PVC	0.0%	0.0%	0.0%	0.0%	0.0%
036 #4 LDPE	0.0%	0.0%	0.0%	0.0%	0.0%
037 #5 PP	0.3%	0.6%	0.4%	0.0%	0.4%
038 #6 PS - Non-Foam	0.3%	0.2%	0.2%	0.0%	0.2%
039 #6 PS - Foam	1.5%	0.9%	0.7%	0.2%	0.8%
040 #7 Mixed Resin Plastic	0.0%	0.0%	0.0%	0.0%	0.0%
041 Uncoded packaging/containers	0.6%	0.5%	0.4%	0.1%	0.4%
042 Durable Plastic Products	2.0%	1.4%	4.5%	7.2%	3.7%
043 Coffee Pods	0.4%	0.2%	0.2%	0.0%	0.2%
044 Other/mixed plastics	0.1%	0.0%	0.0%	0.0%	0.0%
Compostable Products And Packaging					
045 Cutlery, cups, lids, boxes, trays	0.1%	0.1%	0.1%	0.1%	0.1%
046 Bags and liners	0.0%	0.0%	0.0%	0.0%	0.0%
047 Laminated compostable chip bags, bottles	0.0%	0.0%	0.0%	0.0%	0.0%
Compostable Organics					
048 Small yard waste	0.9%	2.1%	1.5%	0.3%	1.4%
049 Large yard waste	0.0%	0.9%	0.0%	0.0%	0.2%
050 Unavoidable food waste	11.0%	15.1%	7.7%	2.3%	9.2%
051 Plate scrapings, unfinished meals	9.2%	8.8%	5.8%	2.0%	6.6%
052 Whole fruits and vegetables	1.9%	3.1%	1.3%	0.3%	1.6%
053 Whole meats, fish	0.7%	0.9%	0.7%	0.1%	0.7%
054 Full/unused ready-made	0.1%	0.3%	0.2%	0.1%	0.2%
055 Baked goods	1.1%	2.6%	0.8%	0.3%	1.2%
056 Dairy	0.3%	0.2%	0.1%	0.0%	0.1%
057 Liquids (drinks, oil in package)	0.5%	1.0%	0.8%	0.0%	0.7%
058 Candy and Snacks	0.9%	1.0%	0.4%	0.1%	0.6%
059 Condiments and Sauces	0.8%	0.8%	0.3%	0.2%	0.5%

Category	SF	MF	ICI	DO	Combined
060 Pet Food	0.1%	0.0%	0.0%	0.0%	0.0%
061 Wood pallets	0.1%	0.0%	5.0%	0.9%	2.3%
062 Unfinished wood furniture	0.0%	0.2%	0.0%	0.0%	0.0%
063 Other wood	1.4%	0.1%	0.7%	8.5%	1.9%
064 Manure, slaughterhouse, animals	0.3%	0.0%	0.0%	0.0%	0.1%
Non-Compostable Organics					
065 Pressure Treated Wood	0.5%	0.0%	0.8%	9.7%	1.9%
066 Finished Wood	2.7%	0.8%	3.6%	19.0%	5.2%
067 Finished Wood furniture	0.0%	0.2%	0.8%	2.2%	0.7%
068 Natural Fiber Clothing	2.1%	1.3%	0.3%	0.3%	0.9%
069 Household	0.3%	0.3%	0.4%	0.6%	0.4%
070 Other	0.0%	0.0%	0.0%	0.0%	0.0%
071 Tires	0.0%	0.0%	0.2%	0.0%	0.1%
072 Other Rubber	0.7%	0.5%	1.5%	0.6%	1.0%
073 Leather	0.5%	0.1%	0.1%	0.0%	0.2%
074 Composite Organic Materials (shoes)	0.3%	0.6%	0.2%	0.1%	0.3%
075 Other (wax, non-compostable)	0.1%	0.0%	0.0%	0.0%	0.0%
Metals					
076 Food Containers	0.4%	0.3%	0.2%	0.0%	0.2%
077 Spiral-wound Containers	0.1%	0.0%	0.2%	0.0%	0.1%
078 Other Ferrous	0.4%	0.3%	0.2%	0.0%	0.2%
079 Food Containers	0.1%	0.4%	0.2%	0.0%	0.2%
080 Alcoholic	0.0%	0.0%	0.0%	0.0%	0.0%
081 Non-Alcoholic	0.0%	0.1%	0.1%	0.0%	0.1%
082 Food containers	0.0%	0.1%	0.0%	0.0%	0.0%
083 Foil trays, wrap	0.5%	0.3%	0.4%	0.0%	0.3%
084 Other Non-Ferrous	0.1%	0.1%	0.1%	0.0%	0.1%
085 Household	0.4%	1.1%	0.9%	3.0%	1.2%
086 Machine Parts	0.0%	0.0%	0.4%	0.0%	0.2%
087 Construction/Industrial	0.4%	0.0%	0.7%	1.0%	0.6%

Category	SF	MF	ICI	DO	Combined
Glass					
088 Beer	0.0%	0.1%	0.0%	0.0%	0.1%
089 Other Alcohol	0.2%	0.2%	0.1%	0.0%	0.1%
090 Non-Alcoholic & Non-Dairy	0.0%	0.4%	0.0%	0.0%	0.1%
091 Dairy or Dairy Substitute	0.1%	0.0%	0.0%	0.0%	0.0%
092 Food Containers	0.4%	0.5%	0.3%	0.0%	0.3%
093 Other Glass and Ceramics	1.7%	0.9%	2.1%	3.9%	2.0%
Building Materials					
094 Gypsum/Drywall	2.2%	0.9%	0.9%	3.0%	1.5%
095 Masonry	0.3%	0.1%	0.8%	3.7%	1.0%
096 Rock, Sand, Dirt	0.0%	0.0%	0.0%	0.0%	0.0%
097 Rigid Asphalt	0.6%	0.0%	0.7%	0.2%	0.5%
098 Carpet Waste	0.9%	0.3%	2.4%	7.0%	2.3%
099 Other Inorganics	0.1%	0.0%	3.6%	14.7%	3.8%
Electronic Waste					
100 Desktop Computers	0.0%	0.0%	0.0%	0.0%	0.0%
101 Notebook Computers	0.0%	0.2%	0.0%	0.0%	0.1%
102 Computer Peripherals	0.1%	0.1%	0.7%	0.1%	0.3%
103 Computer Monitors	0.0%	0.0%	0.0%	0.0%	0.0%
104 Printers, Scanners	0.7%	0.6%	0.5%	0.0%	0.5%
105 Televisions	0.0%	0.0%	0.0%	0.0%	0.0%
106 Other audio/video	0.2%	0.3%	0.1%	0.0%	0.1%
107 Mobile Phones & Accessories	0.0%	0.0%	0.0%	0.0%	0.0%
108 Other	0.0%	0.0%	0.0%	0.0%	0.0%
109 Small Appliances	0.5%	0.8%	0.0%	0.6%	0.4%
110 Electronic Toys	0.0%	0.0%	0.0%	0.0%	0.0%
111 Smoke Detectors	0.0%	0.0%	0.1%	0.0%	0.0%
112 Other Electronics	0.4%	0.1%	0.1%	0.1%	0.2%
Household Hazardous					
113 Lead acid	0.0%	0.0%	0.0%	0.0%	0.0%
114 All other batteries	0.1%	0.1%	0.0%	0.0%	0.0%
115 Sharps	0.0%	0.0%	0.0%	0.0%	0.0%

Category	SF	MF	ICI	DO	Combined
116 Animal Carcass (Pets)	0.0%	0.0%	0.0%	0.0%	0.0%
117 Other	0.0%	0.0%	0.0%	0.0%	0.0%
118 Stains/preservatives	0.0%	0.0%	0.0%	0.0%	0.0%
119 Latex Paint	0.0%	0.2%	0.3%	0.0%	0.2%
120 Oil-based Paint	0.1%	0.0%	0.0%	0.0%	0.0%
121 Paint Aerosols	0.0%	0.0%	0.0%	0.0%	0.0%
122 Solvents	0.0%	0.0%	0.2%	0.0%	0.1%
123 Cleaners, Soaps etc.	0.0%	0.1%	0.0%	0.0%	0.0%
124 Pesticides/Herbicides/Preservatives	0.0%	0.0%	0.0%	0.0%	0.0%
125 Motor Oil	0.0%	0.0%	0.0%	0.0%	0.0%
126 Oil Filters	0.0%	0.0%	0.0%	0.0%	0.0%
127 Antifreeze	0.0%	0.0%	0.0%	0.0%	0.0%
128 Pharmaceuticals	0.2%	0.1%	0.0%	0.0%	0.1%
129 Other Petroleum Based Products	0.1%	0.1%	0.0%	0.0%	0.0%
130 Other HHW or containers	0.0%	0.0%	0.0%	0.0%	0.0%
131 Thermostats and switches	0.0%	0.0%	0.0%	0.0%	0.0%
132 CFLs	0.0%	0.0%	0.0%	0.0%	0.0%
133 Other HHW	0.0%	0.2%	0.0%	0.0%	0.1%
Household Hygiene					
134 Diapers	6.2%	5.5%	1.8%	0.0%	3.2%
135 Pet Waste	3.5%	2.3%	1.3%	0.0%	1.8%
136 Other (sanitary products, condoms)	1.1%	0.9%	0.5%	0.0%	0.6%
137 Personal care	0.8%	0.4%	0.2%	0.1%	0.3%
Bulky Objects					
138 Large Appliances	0.0%	0.0%	0.0%	0.0%	0.0%
139 Mattresses, Box Springs	0.0%	0.0%	0.0%	0.0%	0.0%
140 Other upholstered Furniture	0.0%	0.0%	0.0%	0.0%	0.0%
141 Other furniture	0.0%	0.0%	0.0%	0.0%	0.0%
Fines					
142 Fines	1.3%	1.4%	1.1%	0.4%	1.1%

Table B: Organics Composition – All Categories and Sectors

Category	ICI	MF	SF
Garbage In Bag			
001 Garbage in Bag	4.4%	0.7%	0.4%
Compostables in Bag			
002 Compostables in Bag	3.5%	0.3%	1.6%
Compostable Paper			
003 Newsprint	0.9%	0.7%	0.1%
004 Fine, office, envelopes	5.8%	0.4%	1.1%
005 Food-soiled paper	5.7%	0.8%	0.2%
Non-Compostable Paper			
006 Beverage containers	0.0%	0.0%	0.0%
007 Other non-compostable paper	0.2%	0.0%	0.0%
Plastic			
008 Film	0.2%	0.6%	0.2%
009 Textiles	0.0%	0.0%	0.0%
010 Rigid Beverage Containers	0.0%	0.0%	0.0%
011 Rigid (non-beverage)	0.3%	0.2%	0.0%
012 Other Plastics	0.0%	0.0%	0.0%
Compostable Plastics			
013 Foodware	0.1%	0.0%	0.0%
014 Film	0.2%	0.0%	0.0%
015 Other Compostable Plastics	0.0%	0.0%	0.0%
Compostable Organics			
016 Yard & Garden	9.8%	16.8%	88.3%
017 Food Waste	67.9%	79.1%	6.1%
018 Clean Wood	0.6%	0.3%	0.8%
Non-Compostable Organics			
019 Treated or Painted Wood	0.0%	0.0%	1.1%
020 Other	0.2%	0.0%	0.0%

Category	ICI	MF	SF
Metals			
021 Metals	0.0%	0.0%	0.0%
Glass			
022 Glass	0.1%	0.1%	0.0%
Building Material			
023 Building Material	0.0%	0.0%	0.1%
Electronic Waste			
024 Electronic Waste	0.0%	0.0%	0.0%
Household Hazardous			
025 Household Hazardous	0.0%	0.0%	0.0%
Household Hygiene			
026 Pet Waste	0.0%	0.0%	0.0%
027 Other biological	0.0%	0.0%	0.0%
Bulky Objects			
028 Bulky Objects	0.0%	0.0%	0.0%
Fines			
029 Fines	0.0%	0.0%	0.0%

Table C: Streetscape Composition – All Categories and Material Streams

Category	Total	Bottles/ Cans	Containers	Garbage	Organics	Paper
Paper						
1 Refundable Deposit	0.4%	0.8%	0.8%	0.3%	0.1%	0.2%
2 Recyclable Foodware	4.9%	6.6%	15.8%	4.9%	2.0%	0.7%
3 Other Recyclable Paper	22.2%	4.1%	4.6%	9.7%	1.6%	81.5%
4 Compostable Foodware	3.3%	2.7%	0.6%	3.6%	4.6%	3.3%
5 Other Compostable Paper	7.2%	3.0%	5.6%	8.4%	10.9%	4.0%
6 Other/Non-MMBC Foodware	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
7 Other/Non-MMBC	0.8%	0.3%	0.0%	0.1%	0.0%	3.4%
Plastic						
8 Refundable Deposit	0.9%	5.6%	4.7%	0.4%	0.3%	0.0%
9 Rigid Foodware	0.4%	11.3%	17.4%	5.0%	2.8%	0.4%
10 Rigid Packaging	0.1%	0.2%	4.8%	0.7%	0.0%	0.1%
11 Styrofoam Foodware	2.1%	0.0%	0.5%	0.7%	0.3%	0.0%
12 Styrofoam Packaging	0.8%	0.2%	0.0%	0.2%	0.1%	0.0%
13 Flexible Film Packaging	1.8%	1.7%	3.8%	2.5%	0.8%	1.5%
14 Flexible Film Products and Other Plastic Packaging (Non-PPP)	0.1%	0.8%	0.5%	1.2%	0.5%	0.2%
15 Durable Products	1.2%	1.7%	7.0%	1.6%	0.8%	0.1%
16 Synthetic Textiles	5.6%	0.0%	0.0%	0.1%	0.0%	0.2%
Metal						
17 Refundable Deposit	0.7%	3.9%	1.2%	0.4%	0.2%	0.1%
18 Recyclable	0.3%	0.7%	1.5%	0.0%	0.0%	0.0%
19 Other/Non-MMBC	0.7%	3.3%	0.5%	0.9%	0.2%	0.0%
Glass						
20 Refundable Deposit	2.4%	24.5%	1.4%	0.5%	0.0%	0.3%
21 Recyclable	0.3%	0.0%	1.8%	0.0%	0.5%	0.0%
22 Other/Non-MMBC	0.2%	1.4%	0.0%	0.3%	0.0%	0.0%

Category	Total	Bottles/ Cans	Containers	Garbage	Organics	Paper
Compostable Plastic/PLA						
23 Foodware, Film	0.1%	0.2%	0.0%	0.1%	0.0%	0.1%
Organics						
24 Food and Yard Waste	19.5%	8.8%	2.6%	16.9%	61.8%	1.6%
25 Liquids	5.3%	10.3%	14.9%	5.1%	3.1%	0.4%
26 Clean Wood	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
27 Dirty and Treated Wood	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Non-Compostable Organics						
28 Natural Textiles	0.3%	0.5%	0.0%	0.6%	0.0%	0.0%
29 Other	0.0%	0.2%	0.0%	0.0%	0.1%	0.0%
Building Material						
30 Building Material	0.6%	0.0%	0.0%	1.5%	0.0%	0.0%
Electronic Waste						
31 Electronic Waste	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Household Hazardous						
32 EPR Program Materials	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
33 Other	0.1%	1.6%	0.1%	0.0%	0.0%	0.0%
Household Hygiene						
34 Personal Hygiene	1.9%	0.9%	0.0%	4.3%	0.1%	0.1%
35 Pet Waste	6.7%	2.3%	0.5%	15.5%	0.6%	0.4%
Bulky Objects						
36 Bulky Objects	0.2%	0.0%	0.0%	0.2%	0.0%	0.3%
Fines						
37 Fines	0.6%	2.4%	0.8%	0.4%	0.6%	0.2%
Bagged Household Waste						
38 Bagged Household Waste	8.1%	0.0%	8.3%	13.5%	8.1%	0.5%

Table D: Abandoned Waste and Large Item Pick-Up Volumetric Composition – Primary Categories

Primary Category	Abandoned Waste	Large Item Pick-Up
Paper	7%	0%
Plastic	20%	1%
Compostable Products and Packaging	0%	0%
Compostable Organics	4%	3%
Non-Compostable Organics	8%	26%
Metals	7%	2%
Glass	4%	3%
Building Material	3%	1%
Electronic Waste	4%	1%
Household Hazardous	1%	0%
Household Hygiene	0%	0%
Bulky Objects	43%	64%
Fines	0%	0%

APPENDIX A

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.1 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of TETRA TECH's client. TETRA TECH does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than TETRA TECH's Client unless otherwise authorized in writing by TETRA TECH. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the report, if required, may be obtained upon request.

1.2 ALTERNATE REPORT FORMAT

Where TETRA TECH submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed TETRA TECH's instruments of professional service); only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by TETRA TECH shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of TETRA TECH's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except TETRA TECH. The Client warrants that TETRA TECH's instruments of professional service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.

1.4 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of the report, TETRA TECH may rely on information provided by persons other than the Client. While TETRA TECH endeavours to verify the accuracy of such information when instructed to do so by the Client, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B

GARBAGE CATEGORY DESCRIPTIONS

Appendix B: Garbage Category Descriptions

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments
1	Paper	Fine, Office, Envelopes	Junk Mail, Flyers, Unaddressed Mail	
2			Other Fine Office Paper or Envelopes	
3		Newsprint	Newsprint	
4		OCC	Clean Recyclable OCC	
5			Waxed OCC	Non-recyclable, compostable
6			Other Soiled OCC	Contaminated with food/blood/grease, dirty pizza boxes
7		Boxboard	Cereal Boxes and Other Box Packaging	
8		Bound Paper Products	Telephone Books	
9			Magazines	
10			Books	
11		Beverage Containers – Drink Box/Aseptic/Gabletop Containers	Dairy or Dairy Substitute	
12			Non-Dairy/Deposit	
13		Other Paper	Single Serving Cups	Coffee, tea, drinks, etc.
14			Other Compostable Paper	paper plates, tissue paper, toweling, etc.
15			Non-compostable, non-recyclable paper	Tar paper, laminated paper. Coated paper, etc.
16	Plastic	Film	Re-Used Retail & Grocery Bags	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)
17			Empty Retail & Grocery Bags	Empty: HDPE and LDPE retail and grocery carryout bags that have not been reused
18			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

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments
				food bags; candy wraps; pasta bags; boil in a bag; plastic based food pouches; bubble wrap; cling wrap etc.
19			Garbage Bags Sandwich/Freezer Bags	HDPE & LDPE garbage bags, kitchen catchers, blue or clear bags for recyclables
20			Freezer Bags	HDPE & LDPE sandwich, freezer bags, ziplocs and other food use bags
21			Deposit Beverage Pouches	
22			Other Plastic Film	Pallet / distribution wrap and lumber wrap (nonwoven), tarps, other plastic film
23		Textiles (Synthetic)	Clothing and accessories	Wearable or formerly wearable , potentially donatable
24			Household	Linens, blankets etc.
25			Other	All other textiles (e.g., filter fabric, artificial turf)
26		Rigid Beverage Containers	Dairy or Dairy Substitute	
27			Deposit Containers – Water	Water Bottles
28			Deposit Containers – Other	All other deposit beverage bottles: juice, pop, alcohol
29			Single Serving Cups	PE, PS, coffee, tea, drinks, etc.
30			Other	Non-deposit juice, water or pop containers
31		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)
32			#1 PETE – Other Packaging	Other Packaging: #1, bakery, clamshells, trays, ovenable trays, egg cartons
33			#2 HDPE – Bottles and Jugs	Other Bottles and Jugs: #2, laundry soap, shampoo, windshield washer fluid, etc. (excluding bottles that contained HHW)
34			#2 HDPE – Tubs and Lids	Wide mouth tubs and lids, dairy tubs, pails, lawn, garden, pool supplies, kitty litter, etc.

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments	
35			#3 PVC	Bottles and Jars: #3 bottles and jars, lotions, soaps, bug repellents, shampoos, etc.	
36			#4 LDPE	Wide mouth tubs and lids, dairy tubs, etc.	
37			#5 PP	Wide mouth tubs and lids, dairy tubs, pails, lawn, garden, pool supplies, kitty litter, etc.	
38			#6 PS – Non-Foam	#6 PS (non-foam), trays, clamshells, lids, pill and vitamin bottles, seedling trays, etc.	
39			#6 PS – Foam	#6 PS (foam), food trays, clamshells, seedling trays, PS used to protect boxed product, etc.	
40			#7 Mixed Resin Plastic	Food containers, mustard, ketchup and some juices	
41			Uncoded Packaging/Containers	Blister packaging, tubes for pharmaceutical & health care/cosmetic products, plant pots, unmarked/coded packaging, etc.	
42			Other	Durable Plastic Products	Non-packaging such as VCR tapes, CDs, toys, games, plant pots, Tupperware, furniture, siding, plumbing pipes, etc.
43				Coffee Pods	
44				Other/Mixed Plastics	
45			Compostable Products and Packaging	Foodware	Cutlery, Cups, Lids, Boxes, Trays
46	Film	Bags and Liners		Compostable kitchen catcher bags, toter liners, overwrap, grocery bags, etc.	
47	Other Compostable Products and Packaging	Packaging , Bottles		Bags, pop bottles, water bottles, or other compostable packaging	
48	Compostable Organics	Yard & Garden	Small Yard Waste	Small yard waste (leaves, branches, brush, grass clippings, wood chips, plant material, potting soil, peat, etc.)	
49			Large Yard Waste	Other large yard wastes (branches, etc. over 15 cm dia. or 1 m long)	

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments	
50	Food Waste	Food Waste	Unavoidable Food Waste	Unavoidable food waste arising from food/drink preparation (bones, egg shells, tea bags, peels, oil, fats)	
51			Plate Scrapings, Unfinished Meals		
52			Whole Fruits and Vegetables		
53			Whole Meats, Fish		
54			Full/Unused Ready-Made	Packaged items, canned foods,	
55			Baked Goods		
56			Dairy	Yogurt, cheese, butter	
57			Liquids (drinks, oil in package)		
58			Candy and snacks	Chips, candy, nuts	
59			Condiments and sauces	Condiments, pasta sauce, salsa in container	
60			Pet food		
61			Clean Wood	Wood Pallets	Unpainted, untreated
62				Unfinished Wood Furniture	No composites
63				Other Wood	Mixed/dimensional lumber, rotting wood - unpainted, untreated
64	Other Compostable Organics	Manure, Slaughterhouse, Animals	Manure, animals prepared for food		
65	Non-Compostable Organics	Treated or Painted Wood	Pressure Treated Wood	Treated lumber, shingles, decking etc.	
66			Finished Wood	Flooring, paneling, siding, glued particle board, plywood, OSB - painted, stained or finished	
67			Finished Wood Furniture	Not multi-material	
68	Textiles	Textiles	Natural Fiber Clothing		
69			Household	Drapes, blankets and linens, towels, sheets, table cloths, stuffed toys	
70			Other	Drop cloths	
71	Rubber	Rubber	Tires		
72			Other Rubber	Gloves	
73			Leather	Jackets, purses, belts	

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments	
74		Leather/ Multiple/Composite Organic Materials	Composite Organic Materials (shoes)	Including leather footwear	
75			Other	Wax and other non-compostable materials	
76	Metals	Ferrous	Food Containers		
77			Spiral-Wound Containers	Frozen juice containers, coffee cans, chip and nut containers	
78			Other Ferrous		
79		Bimetallic	Food Containers		
80		Non-Ferrous (copper, aluminium, brass)	Alcoholic		
81			Non-Alcoholic		
82			Food Containers		
83			Foil Trays, Wrap		
84			Other Non-Ferrous		
85		Non-Consumable Mixed Metals	Household	Kitchen & bathroom fixtures, coat hangers, other metal fixtures, closet doors, filing cabinets, furnishings, etc.	
86			Machine Parts	Auto parts, electric motors, bicycles and parts, lawn mowers, etc.	
87			Construction/Industrial	Nails, screws, handheld tools, drywall trim, flashing, baseboard heaters, industrial doors, panels, etc.	
88		Glass	Beverage Containers	Beer	
89				Other Alcohol	
90	Non-Alcoholic & Non-Dairy				
91	Dairy or Dairy Substitute				
92	Food Containers	Food Containers			
93	Other Glass and Ceramics	Other Glass and Ceramics	Dishware, mirrors, incandescent light bulbs, fibreglass insulation, plant pots, coffee cups		
94	Building Material	Gypsum / Drywall	Gypsum/Drywall		
95		Masonry	Masonry		
96		Rock, Sand, Dirt	Rock, Sand, Dirt		
97		Rigid Asphalt	Rigid Asphalt		
98		Carpet Waste	Carpet Waste		

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments
99		Other Inorganics	Other Inorganics	Insulation, Linoleum, Laminate, Stucco, etc.
100	Electronic Waste	Computers and Peripherals	Desktop Computers	
101			Notebook Computers	
102			Computer Peripherals	Including key board, mouse, cables, modems, routers and external hardware other than below
103			Computer Monitors	
104			Printers, Scanners	
105			Televisions & AV Equipment	Televisions
106		Other Audio/Video		
107		Telephones & Telecommunications Equipment	Mobile Phones & Accessories	
108			Other	Land line phones and accessories, fax machines
109		Small Appliances & Floor Care Appliances	Small Appliances & Floor Care Appliances	Microwaves, toasters, vacuum cleaners, coffee makers, corded and cordless, etc.
110		Electronic Toys	Electronic Toys	
111		Smoke Detectors	Smoke Detectors	
112		Other Electronics	Other Electronics	
113	Household Hazardous	Batteries	Lead Acid	Car, truck, boat, wheel chair, golf cart batteries over 2 kg under BCBCP Stewardship Program
114			All Other Batteries	All types of Rechargeable and Non Rechargeable Batteries Ni-Cd, Ni-MH, Li-ion and Small Pb under 1 kg, Dry cell, alkaline, copper top, button cell and other household batteries
115		Medical/Biological	Sharps	Needles
116			Animal Carcass	
117			Other	Bandages, IV bags, etc.
118		HHW	Stains/Preservatives	
119			Latex Paint	
120			Oil-Based Paint	
121			Paint Aerosols	

No.	Primary	Secondary	Tertiary/Quaternary	Additional Comments	
122			Solvents		
123			Cleaners, Soaps etc.		
124			Pesticides/Herbicides/Preservatives	With PCP Reg. #	
125			Motor Oil		
126			Oil Filters		
127			Antifreeze		
128			Pharmaceuticals		
129			Other Petroleum Based Products		
130			Other		
131			Mercury Containing Items	Thermostats and Switches	
132				CFLs	
133				Other HHW	Other HHW or Containers
134			Household Hygiene	Biological	Diapers
135	Pet Waste	Animal feces, bedding, cat litter			
136	Other (sanitary products, condoms)	Sanitary napkins, tampons, condoms			
137	Liquid Product	Personal Care		Full shampoo bottles, beauty products, creams, etc.	
138	Bulky Objects	White Goods	Large Appliances		
139		Furniture	Mattresses, Box Springs		
140			Other Upholstered Furniture		
141			Other Furniture	Multi-material furniture (e.g., plastic, metal, small amount wood)	
142	Fines	Fines	Fines	Items too small to classify efficiently (e.g., bread tabs, twist ties, typically <1")	

APPENDIX C

ORGANICS CATEGORY DESCRIPTIONS

Appendix C: Organics Category Descriptions

	Primary	Secondary	Description
1	Garbage in Bag		Material other than Compostable Organics contained in a plastic bag, or mixed waste contained in a plastic bag (all bags, including compostable, non-compostable, biodegradable, degradable, etc.) Weigh entire bag; do not sort contents.
2	Compostables in Bag		Compostable Organics contained in a plastic bag (all bags, including compostable, non-compostable, biodegradable, degradable, etc.) Residential organics: <i>any plastic bags are considered contamination. Weigh entire bag; do not sort contents</i> Commercial organics: <i>businesses may use compostable plastic bin liners; if compostables are contained in a compostable bag, weigh the bag and contents separately into material categories</i>
3	Compostable Paper	Newsprint	Newspaper, flyers, inserts, dailies
4		Fine, office, envelopes	Junk mail, unaddressed mail, bills and statements, computer paper, writing paper, envelopes, waxed and unwaxed corrugated cardboard, boxboard, kraft paper, books, magazines, catalogues, telephone directories,
5		Food-soiled paper	Napkins, paper towels, paper plates, paper cups, foodware, moulded pulp
6	Non-Compostable Paper	Beverage containers	Polycoat gable top cartons, aseptic containers (Tetra Pak)
7		Other non-compostable paper	Photograph paper, tar paper, paper adhered to plastic or metal, composite paper products, paper contaminated with grease/blood or animal feces, paint
8	Plastics	Film	Bags, over-wrap, stretch film, multi-layer or laminated plastic films, food wrap, shrink wrap, bubble wrap, beverage pouches (milk, juice) tarps, or other plastic film (biodegradable, degradable, etc.)
9		Textiles	Synthetic clothing or textiles (blends, polyester, Gore-tex, fleece, nylon, blankets, reuseable bags, etc.)
10		Rigid Beverage Containers	Bottles, jugs, cups, etc.
11		Rigid (non-beverage)	#1 PETE, #2 HDPE, #3 PVC, #4 LDPE, #5 PP, #6 PS, #7 Mixed Resin Plastic; Other rigid plastic packaging or containers (plant pots, unmarked/coded packaging, etc.)
12		Other Plastics	Durable plastic products (VCR tapes, CDs, toys, games, furniture, siding, etc.)

	Primary	Secondary	Description
13	Compostable Products and Packaging	Foodware	Compostable cutlery (including chopsticks, wooden cutlery), cups, lids, bowls, plates, deli containers, trays, etc.
14		Film	Compostable kitchen catcher bags, toter liners, overwrap, grocery bags, etc.
15		Other Compostable Products and Packaging	Chip bags, pop bottles, water bottles, or other compostable packaging
16	Compostable Organics	Yard & garden	Small and large yard waste (leaves, branches, brush, grass clippings, wood chips, plant material, potting soil, peat, etc.)
17		Food Waste	Coffee grounds and filters; tea bags and tea leaves; eggs and eggshells; dairy products; bread, baked goods, pasta; meat, poultry, fish, shellfish, bones, fat, shells; raw, cooked or processed fruit, vegetables, grains, nuts and seeds, and peelings and shells; oils, butter, and sauces, combined with food
18		Clean Wood	Wood pallets; unfinished wood furniture (no composites); recycled wood free of paint, persistent chemicals, or glues; other wood (mixed lumber, rotting wood) - all unpainted, untreated
19	Non-Compostable Organics	Treated or Painted Wood	Pressure treated wood (treated lumber, shingles, decking, etc.); finished wood (flooring, panelling, siding, glued particle board, plywood, OSB) - painted, stained, or finished; finished wood furniture (no composites)
20		Other	Textiles, leather, rubber, multiple/composite organic materials (footwear, etc.)
21	Metals		Beverage containers, food containers, foil wraps or trays, non-consumables mixed metals (household, machine parts, piping, hardware, tools, scrap metal), other metals
22			Beverage containers, food containers, foil wraps or trays, non-consumables mixed metals (household, machine parts, piping, hardware, tools, scrap metal), other metals
23	Building Material	Gypsum/drywall/plaster	Gypsum, drywall, plaster; masonry (bricks, blocks, concrete, etc.); rock, sand, dirt, ceramic, porcelains (e.g., toilets, sinks); rigid asphalt products (roofing shingles, asphalt, etc.); carpet waste (and underlay); other inorganics (fiberglass and cellulose insulation, etc.)
24	Electronic Waste		Computers & peripherals; medical and monitoring devices; TV and audio/video equipment; video gaming systems; electronic musical instruments; telephones & telecommunications equipment; small appliances & power tools; electronic toys, lighting products, smoke alarms

	Primary	Secondary	Description
25	Household Hazardous		Batteries; medical/biological; HHW (product and/or container); mercury-containing items; other HHW
26	Household Hygiene	Pet Waste	Animal feces, bedding, cat litter
27		Other biological	Diapers, other (sanitary napkins, tampons, condoms)
28	Bulky Objects		White goods, large appliances, upholstered furniture, other furniture (e.g., composite furniture)
29	Fines		Fines (items too small to classify efficiently (e.g. bread tabs, twist ties, typically <1"))

APPENDIX D

STREETSCAPE CATEGORY DESCRIPTIONS

Appendix D. Streetscape Category Descriptions

#	Primary	Sorting Sub-Category	Description
1	Paper	Refundable Deposit	tetrapaks, bottle deposit
2		Recyclable Foodware	coffee and drink cups (polycoat cups and containers (hot and cold))
3		Other Recyclable Paper	fine, office, newspaper, cardboard
4		Compostable Foodware	take out containers and single serve foodservice packaging (e.g./fast food kraft bags)
5		Other Compostable Paper	food-soiled paper, paper towels, waxed paper
6		Other/Non-MMBC Foodware	non-recyclable foodware (e.g., foil lined, composite paper)
7		Other/Non-MMBC	books, tar paper, composites
8	Plastic	Refundable Deposit	beverage container or deposit
9		Rigid Foodware	#1-7 or uncoded single use containers and cups used for food service or take-out
10		Rigid Packaging	#1-7, uncoded, excludes styrofoam
11		Styrofoam Foodware	cups and take out containers
12		Styrofoam Packaging	styrofoam
13		Flexible Film Packaging	# 2 HDPE & # 4 LDPE film, dry cleaning bags, bread bags, frozen food bags, milk bags, toilet paper and paper towel over-wrap, lawn seed bags, grocery and retail carry-out bags
14		Flexible Film Products and Other Plastic Packaging (Non-PPP)	non-packaging such as Garbage bags, kitchen catchers, Ziploc bags, tarps, pallet wrap, laminated plastic film - chip bags, vacuum sealed bags, cereal liners, candy wraps, pasta bags, boil in a bag, food pouches, film plastic other than # 2 HDPE and # 4 LDPE including PLA, PHA, PHB plastic packaging, PE foam packaging, blister packaging
15		Durable Products	non-packaging such as tapes, toys, straws, cutlery, household objects
16		Synthetic Textiles	polyester, fleece, goretex
17		Metal	Refundable Deposit
18	Recyclable		metal containers
19	Other/Non-MMBC		metal objects
20	Glass	Refundable Deposit	bottle deposit glass

#	Primary	Sorting Sub-Category	Description
21		Recyclable	glass containers
22		Other/Non-MMBC	glass and ceramic objects
23	Compostable Plastic/PLA	Foodware, Film	Compostable or biodegradable cups, PLA utensils, PLA food containers/food packaging
24	Organics	Food and Yard Waste	food that could have been eaten, peelings, bones, coffee grounds, shells
25		Liquids	remaining liquids found in non-hazardous waste containers
26		Clean Wood	pallets, plywood (no paint, no treatment, compostable)
27		Dirty and Treated Wood	plywood, gluelam, flakeboard, stained or painted wood - co-gen
28	Non-Compostable Organics	Natural Textiles	clothing, linens
29		Other	leather, rubber, wax - non-clothing, non-hygiene
30	Building Material	Building Material	construction material - carpet, gypsum, asphalt, insulation, aggregate
31	Electronic Waste	Electronic Waste	anything with a cord or battery operated
32	Household Hazardous	EPR Program Materials	batteries, products, mercury containing, paints, oil
33		Other	sharps, glues, caulking
34	Household Hygiene	Personal Hygiene	diapers, hygiene products, personal care
35		Pet Waste	pet waste
36	Bulky Objects	Bulky Objects	furniture, appliances, mattresses
37	Fines	Fines	<1" size
38	Bagged Household Waste	Bagged Household Waste	Illegally dumped items: typically small tied bags containing household items that would clearly not be generated in a park or on the street (e.g., diapers, bag of kitchen or bathroom waste)

APPENDIX E

GARBAGE – SELECT SITE PHOTOGRAPHS



Photo 1: Institutional, Commercial and Industrial Sample (Waste-to-Energy)



Photo 2: Multi-family Residential Sample (Waste-to-Energy)



Photo 3: Drop-off Sample (Vancouver South Transfer Station)



Photo 4: Single-family Residential Sample (Vancouver South Transfer Station)



Photo 5: Industrial, Commercial and Institutional Sample (Surrey Transfer Station)



Photo 6: Drop-off Sample (Surrey Transfer Station)



Photo 7: 2 – Fine Office Paper



Photo 8: 13 – Single Serving Cups (Paper)



Photo 9: 19 - Garbage bags, 20 – Ziploc bags, 22 – Other film



Photo 10: 29 – Single Serving Cups (Plastic)



Photo 11: 32 – PETE Other Packaging



Photo 12: 39 - #6 Polystyrene Foam Plastic



Photo 13: 42 – Durable Plastic Products



Photo 14: 45 – Compostable Foodware



Photo 15: 52 – Whole Fruits and Vegetables



Photo 16: 55 – Full, Unused Ready Made



Photo 17: 72 – Other Rubber (Gloves, etc.)



Photo 18: 93 – Other Glass and Ceramics (Fibreglass Insulation)



Photo 19: 134 - Diapers



Photo 20: 135 – Pet Waste

APPENDIX F

ORGANICS – SELECT SITE PHOTOGRAPHS



Photo 1: Industrial, Commercial and Institutional Organics Sample (North Shore Transfer Station)



Photo 2: Single Family Residential Organics Sample (North Shore Transfer Station – Harvest Power Drop-off)



Photo 3: Industrial, Commercial and Institutional Organic Sample (Richmond Harvest Power)



Photo 4: Multi-Family Residential Organics Sample (Richmond Harvest Power)

APPENDIX G

STREETSCAPE – SELECT SITE PHOTOGRAPHS



Photo 1: Streetscape Garbage Sample (Municipality A)



Photo 2: Streetscape Paper Sample (Municipality A)



Photo 3: Streetscape Mixed container Sample (Municipality A)



Photo 4: Streetscape Garbage Sample (Municipality B)



Photo 5: Streetscape Paper Sample (Municipality B)



Photo 6: Streetscape Deposit Container Sample (Municipality B)



Photo 7: Streetscape Garbage Sample (Municipality C)

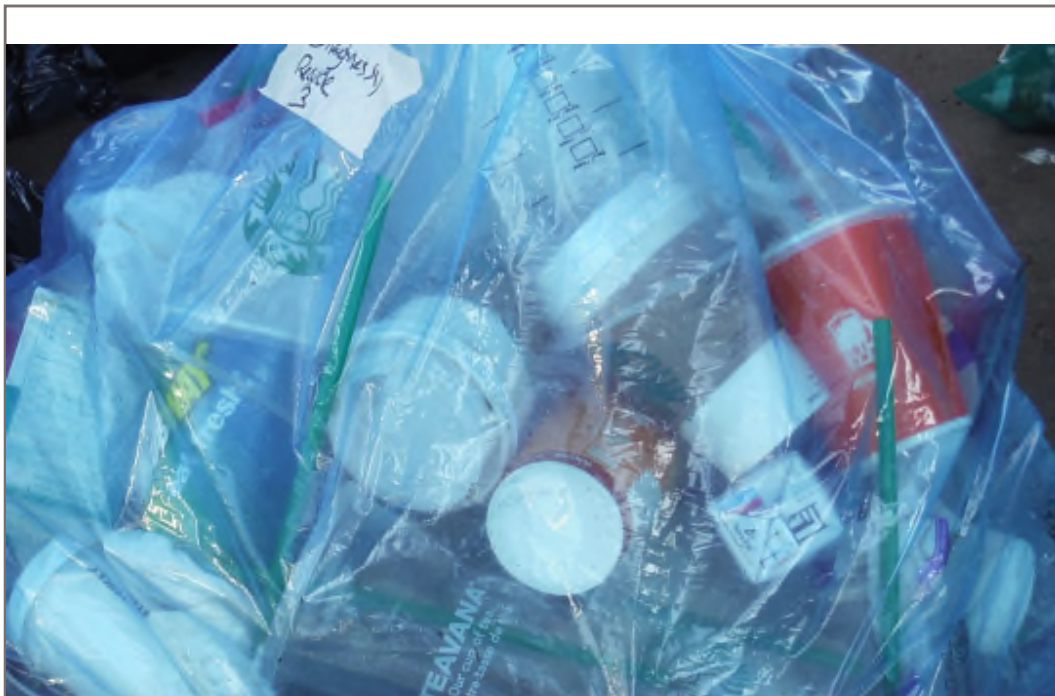


Photo 8: Streetscape Recyclables Sample (Municipality C)



Photo 9: Streetscape Organics Sample (Municipality C)

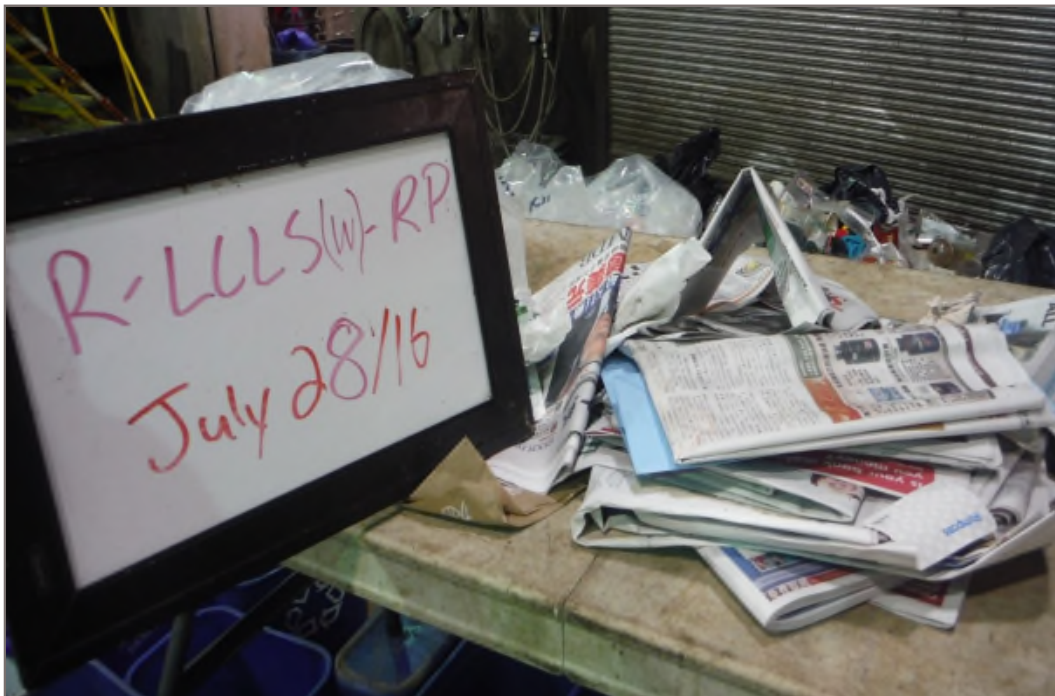


Photo 10: Streetscape Paper Sample (Municipality D)



Photo 11: Streetscape Recyclable Containers Sample (Municipality D)



Photo 12: Streetscape Garbage Sample (Municipality D)



Photo 13: Streetscape Garbage Sample (Municipality E)



Photo 14: Streetscape Organics Sample (Municipality E)



Photo 15: Streetscape Recyclable Containers Sample (Municipality E)



Photo 16: 4 – Paper Compostable Foodware (Municipality E)



Photo 17: 9 – Plastic – Ridgid Foodware (Municipality E)



Photo 18: 24 – Organics – Food and Yard Waste (Municipality E)

APPENDIX H

ABANDONED WASTE AND LARGE ITEM PICK-UP – SELECT SITE PHOTOGRAPHS



Photo 1: Bulky Item Sample No. B-B-1 (Municipality A)



Photo 2: Bulky Item Sample No. B-B-20 (Municipality A)



Photo 3: Bulky Item Sample No. R-B-2 (Municipality D)



Photo 4: Bulky Item Sample No. R-B-3 (Municipality D)



Photo 5: Illegal Dumping Sample No. B-I-3 (Municipality A)



Photo 6: Illegal Dumping Sample No. S-I-3 (Municipality F)

