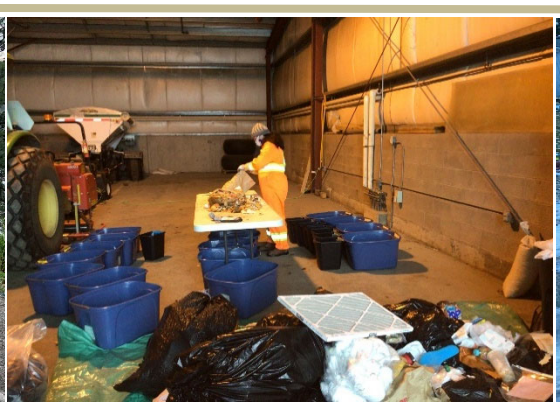
TETRA TECH

City of Kamloops
Organics Pilot 2021-2022 Waste Composition Study


PRESENTED TO
City of Kamloops

DECEMBER 20, 2022
ISSUED FOR REVIEW_REV 02
FILE: 704-SWM.PLAN03216-02

This "Issued for Review" document is provided solely for the purpose of client review and presents our interim findings and recommendations to date. Our usable findings and recommendations are provided only through an "Issued for Use" document, which will be issued subsequent to this review. Final design should not be undertaken based on the interim recommendations made herein. Once our report is issued for use, the "Issued for Review" document should be either returned to Tetra Tech Canada Inc. (Tetra Tech) or destroyed.

Tetra Tech Canada Inc.
Suite 1000 – 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5 CANADA
Tel 604.685.0275 Fax 604.684.6241

This page intentionally left blank.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 METHODOLOGY 1
2.1 Sampling Plan – Selected Homes 1
2.2 Collection from Selected Homes 3
2.3 Material Categories 4

3.0 RESULTS 5
3.1 Set Outs and Collection 5
3.1.1 Winter 2021 5
3.1.2 Summer 2022 5
3.2 Waste Generation and Composition 6
3.2.1 Winter 2021 Waste Generation 6
3.2.2 Summer 2022 Waste Generation 7
3.2.3 Winter 2021 Pilot Organic Waste Composition 9
3.2.4 Summer 2022 Pilot Organic Waste Composition 10
3.2.5 Comparison Pilot and Control Garbage Waste Composition 11
3.2.6 Organics Waste Diversion and Reduction Potential 13
3.3 Waste Generation by Zone 14
3.4 Organic Waste Diversion and Reduction Potential by Zone 15
3.5 SSO Truck Load 17

4.0 SUMMARY AND RECOMMENDATIONS 18

5.0 CLOSURE 20

LIST OF TABLES IN TEXT

Table 2-1: Summary of Homes Sampled during Winter 2021 Event 2
Table 2-2 : Summary of Homes Sampled during Summer 2022 Event 3
Table 3-1: Winter 2021 Set Outs and Set Out Rates 5
Table 3-2: Summer 2021 Set Outs and Set Out Rates 6
Table 3-3: Winter 2021 Weekly Waste Generated per Household (kg/HH/week) 6
Table 3-4: Summer 2022 Weekly Waste Generated per Household (kg/HH/week) 8
Table 3-5: Overall Garbage Composition in Kg per Household (kg/HH) 11
Table 3-6: Organics Waste Diversion and Reduction Potential 13
Table 3-7: Pilot and Control Garbage Waste Generation per Zone 14
Table 3-8: Winter 2021 Diversion Reduction Potential Across Five Zones 16
Table 3-9: Summer 2022 Diversion Reduction Potential Across Five Zones 16

LIST OF FIGURES IN TEXT

Figure 2-1: Sample Collection....4
Figure 3-1: Winter 2021 Weekly Waste Generation Comparison....7
Figure 3-2: Summer 2022 Weekly Waste Generation Comparison....8
Figure 3-3: Winter 2021 Overall Organic Waste Composition....9
Figure 3-4: Summer 2022 Overall Organic Waste Composition....10
Figure 3-5: Overall Pilot and Control Garbage Composition....12
Figure 3-6: Winter 2021 - Waste Generation Comparison Across Five Zones....14
Figure 3-7: Waste Generation Comparison Across Five Zones....15
Figure 3-8: Summer 2022 - Waste Generation Overall Average Comparison Across Five Zones....15
Figure 3-9: SSO Truck Load Contamination....17

APPENDIX SECTIONS

Appendix A Limitations on the Use of This Document
Appendix B Acceptable Materials
Appendix C Selected Photographs
Appendix D Maps
Appendix E Material Categories
Appendix F Waste Composition Results

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
City	City of Kamloops
EOW	Every-other-week
GHG	Greenhouse Gas
HH	Household
Pilot Program	Curbside Organics Waste Collection Program
SSO	Source Separated Organics
Tetra Tech	Tetra Tech Canada Inc.

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the City of Kamloops and their agents. Tetra Tech Canada 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 the City of Kamloops, 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 document is subject to the Limitations on the Use of this Document attached in Appendix A or Contractual Terms and Conditions executed by both parties.

NOTE TO THE READER

The samples collected and characterized 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. 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 Canada Inc. (Tetra Tech) was retained by the City of Kamloops (City) to conduct a comprehensive residential curbside waste composition study as part of the City's pilot Curbside Organics Waste Collection Program (pilot program). Tetra Tech has conducted two sorting events: Winter 2021 (December 8 to 14, 2021) and Summer 2022 (July 4 to 8, 2022).

The City launched the pilot program for a select number of homes in September 2021. A source separated organics (SSO) collection service was provided to five (5) collection zones – one zone for each collection day of the week. This waste composition study measured and compared waste management practices in two areas; pilot areas and control areas.

- **Pilot area:** single-family properties that receive curbside SSO collection.
- **Control area:** homes with no curbside SSO collection (current service level provided by City).

This study was conducted to characterize the amount of organic and non-organic materials that are currently being discarded in garbage and SSO streams. The collected data will allow the City to better understand how residents are adapting to the new pilot program, inform initiatives to prevent wasted food, highlight opportunities for municipal policy and program work related to food waste and organic waste, and identify ways to reduce greenhouse gas (GHG) emissions. A list of acceptable materials for the organics stream provided by the City is shown in Appendix B.

Project objectives consist of the following:

- Examine the organic composition of curbside collected garbage and SSO streams;
- Examine the SSO participation rate in the pilot areas; and
- Examine the contamination in a SSO load (Winter 2021 Sorting Event only).

2.0 METHODOLOGY

The following section describes the methodology that was undertaken to conduct this study. Appendix C includes photos that highlight some of the activities.

2.1 Sampling Plan – Selected Homes

Tetra Tech worked with City staff during each sorting event to select households (HH) for the study. During the Winter 2021 event, a total of 272 homes were selected (152 in the pilot area and 120 in the control area) and during the Summer 2022 event, a total of 266 homes were selected (147 in the pilot area and 119 in the control area). The selected pilot homes were spread out across five pilot zones with different collection days, refer to Appendix D for details. To compare results with the pilot areas, approximately 120 control homes were selected that were in close proximity to the pilot homes. Table 2-1 summarizes the number of homes (both pilot and control areas), designated zone, collection date, and the general characteristics by zone collected during Winter 2021 sorting event and Table 2-2 during the Summer 2022 sorting event. It is important to note that the pilot areas have garbage collected every-other-week (EOW) and organics collected weekly. Whereas for the control areas, garbage is collected weekly and there is no curbside organic waste collection.

A different selection of pilot homes were selected during the Summer 2022 event for Zone 5 to ensure the safety of Tetra Tech staff and ensure accurate participation information and material for sampling. The homes selected were within two blocks of previously sampled homes to collect comparable data. This change was approved by the City.

During the Summer 2022 event, collection crews accidently collected from the second set of selected pilot homes in Zone 3 before the Tetra Tech team could collect a sample. With the help of City staff and collection crews, 12 alternate homes were selected for the sample. These homes were also in Zone 3 and were within two blocks of the originally selected homes to ensure comparable data.

Table 2-1: Summary of Homes Sampled during Winter 2021 Event

Collection Day	Zone	Pilot	Control	Total Number of Homes
Wednesday, December 8	Zone 3	▪ 14 homes in a row (one side) ▪ 17 homes in a row (backyards connected with a back alley lane)	▪ 10 homes in a row (one side) ▪ 13 homes in a row (backyards connected with a back alley lane)	54
Thursday, December 9	Zone 4	▪ 17 homes in a row within a cul-de-sac ▪ 14 homes in a row (one side)	▪ 11 homes in a row (one side) ▪ 12 homes in a row (one side)	54
Friday, December 10	Zone 5	▪ 13 homes in a row (one side) ▪ 13 homes in a row (one side)	▪ 10 homes in a row (one side) ▪ 14 homes in a row within a cul-de-sac	50
Monday, December 13	Zone 1	▪ 15 homes in a row within a cul-de-sac ▪ 17 homes in a row within a cul-de-sac	▪ 12 homes in a row (one side) ▪ 14 homes in a row (one side)	58
Tuesday, December 14	Zone 2	▪ 16 homes in a row (backyards connected with a back alley lane) ▪ 16 homes in a row (backyards connected with a back alley lane)	▪ 10 homes in a row (one side) ▪ 14 homes in a row (one side)	56
Total		**152**	**120**	**272**

Table 2-2 : Summary of Homes Sampled during Summer 2022 Event

Collection Day	Zone	Characteristics		Total Number of Homes
		Pilot	Control	
Monday, July 3	North Kamloops/McDonald Park (Zone 3, red)	▪ 14 homes in a row (one side) ▪ 12 homes in a row (backyards connected with a back alley lane)	▪ 10 homes in a row (one side) ▪ 13 homes in a row (backyards connected with a back alley lane)	49
Tuesday, July 4	Upper Sahali (Zone 4, orange)	▪ 17 homes in a row within a cul-de-sac ▪ 14 homes in a row (one side)	▪ 11 homes in a row (one side) ▪ 12 homes in a row (one side)	54
Wednesday, July 5	Valleyview/Juniper West (Zone 5, green)	▪ 13 homes in a row (one side) ▪ 13 homes in a row (one side)	▪ 10 homes in a row (one side) ▪ 14 homes in a row within a cul-de-sac	50
Thursday, July 6	Westsyde (Zone 1, yellow),	▪ 15 homes in a row within a cul-de-sac ▪ 17 homes in a row within a cul-de-sac	▪ 11 homes in a row (one side) ▪ 14 homes in a row (one side)	57
Friday, July 8	Brock/North Kamloops (Zone 2, blue)	▪ 16 homes in a row (backyards connected with a back alley lane) ▪ 16 homes in a row (backyards connected with a back alley lane)	▪ 10 homes in a row (one side) ▪ 14 homes in a row (one side)	56
Total		**147**	**119**	**266**

2.2 Collection from Selected Homes

Before any material was collected, Tetra Tech staff conducted a safety tailgate meeting and scanned the area to identify potential safety hazards. Staff then recorded the number of garbage, SSO, and recycling set outs from the selected homes. During collection, staff would also record general observations and resident encounters. Recorded observations would include any additional materials placed outside the garbage cart or if there was a large amount of contamination (e.g., building materials) in or around the garbage cart. During the Summer 2022 event, Tetra Tech staff recorded the size of the cart and weight of garbage and organics placed onto the curbside for collection. This helped to ensure that a 100 kg sample was collected from each sample zone.

Tetra Tech staff transferred the contents of each HH's 120 to 360 litres garbage cart and 120 litres organics cart into large separate bags. Only materials that were placed inside the bag were characterized (as shown in Figure 2-1). Each bag had a sample label inside for identification purposes. All home addresses were confidential and were only provided to the field supervisor for coordination purposes. Measures were taken to ensure all data collected remained anonymous and results were aggregated.

Figure 2-1: Sample Collection

Once the samples were collected, Tetra Tech staff checked that all samples were secured before transporting it to the designated sorting area. Samples were then unloaded at the designated sorting area. The sorting team would organize the sample bags to ensure all samples were accounted for, labelled properly, and secured to ensure samples were not mixed or co-mingled. Before samples were hand sorted, staff would weigh each sample to determine the pre-weight. Each sample was then hand sorted into its respective material category. After sorting each sample, the sorted material categories were weighed, and the results were recorded. Photos were taken before and after sorting to maintain a photo record. All of the sorted garbage and organics was discarded into its designated bin provided by the City.

2.3 Material Categories

Material categories were developed in consultation with the City. Appendix E provides a description of each category and includes examples. There are two primary categories: organics and non-organics. The non-organics generally consist of materials that are not compostable such as glass, metals, and plastics. The organics category consists of compostable materials and is broken down further into the following 10 secondary categories:

- Food-soiled paper;
- Compostable or biodegradable bags;
- Yard waste in compostable bags;
- Yard waste-loose;
- Other yard waste;
- Food waste in compostable bags;
- Food waste in unacceptable bag;
- Food waste-loose;
- Clean wood; and
- Other compostable organics.

3.0 RESULTS

The following section discusses and summarizes the results of the Winter 2021 and Summer 2022 sorting event. Further details of the waste composition results are presented in Appendix F.

3.1 Set Outs and Collection

The following subsection discusses observed participation rates by summarizing the average number of set outs, calculating set out rates, and recording the number of homes where garbage and organics were collected.

3.1.1 Winter 2021

Table 3-1 lists the number of set outs from the selected homes and calculates set out rate (percent of HHs that set out their garbage and/or organics carts) during the Winter 2021 sorting event. Only carts that were placed along the curb or alleyway for easy access by the collection truck are considered set out.

- For the garbage stream, the average set out rate was 74% in the pilot areas and 79% in the control areas.
- For the SSO stream, the average set out rate was 43%. This suggests that a little over half of the HHs that set out their garbage also use the SSO program.

Table 3-1: Winter 2021 Set Outs and Set Out Rates

	Pilot Area					Control Area		
Zone	Average Number of Homes Selected	Average Number of Homes with a Garbage Set Out	Garbage Set Out Rate (%)	Average Number of Homes with an Organics Set Out	Organics Set Out Rate (%)	Number of Homes Selected	Average Number of Homes with Garbage Set Out	Garbage Set Out Rate (%)
Zone 1	16	11.5	72%	6.5	41%	13	11	85%
Zone 2	16	9	56%	5	31%	12	8	66%
Zone 3	15.5	11.5	76%	4	27%	11.5	9.5	82%
Zone 4	15.5	13	84%	9	60%	11.5	9.5	83%
Zone 5	13	11	85%	7	54%	12	9	79%
Average	**15.2**	**11.2**	**74%**	**6.3**	**43%**	**12**	**9.4**	**79%**

3.1.2 Summer 2022

Table 3-2 lists the number of set outs from the selected homes and calculates the set out rate (percent of HHs that set out their garbage and/or organics carts) during the Summer 2022 sorting event. Only carts that were placed along the curb or alleyway for easy access by the collection truck are considered set out.

- For the garbage stream, the average set out rate was 76% in the pilot areas and 76% in the control areas.
- For the SSO stream, the average set out rate was 54%. An increase of 11% to the average set out rate from the Winter 2021 Sorting Event.

Table 3-2: Summer 2021 Set Outs and Set Out Rates

	Pilot Area					Control Area		
Zone	Number of Homes Selected	Average Number of Homes with a Garbage Set Out	Garbage Set Out Rate (%)	Average Number of Homes with an Organics Set Out	Organics Set Out Rate (%)	Number of Homes Selected	Average Number of Homes with Garbage Set Out	Garbage Set Out Rate (%)
Zone 1	16	13	82%	8.5	54%	12.5	9.5	76%
Zone 2	16	12	75%	6.5	41%	12	8.5	72%
Zone 3	13	9	70%	8	63%	11.5	8.5	73%
Zone 4	15.5	12	78%	9.5	62%	11.5	8.5	74%
Zone 5	13	10	77%	6.5	50%	12	9.5	82%
Average	**14.7**	**11.2**	**76%**	**7.8**	**54%**	**11.9**	**8.9**	**76%**

3.2 Waste Generation and Composition

3.2.1 Winter 2021 Waste Generation

Table 3-3 summarizes the amount of waste generated on a weekly basis, in kilograms per HH per week during the Winter 2021 sorting event. The following discusses the results of each stream from their respective areas.

- For the organics stream, the average amount of material collected from HHs that set out organic carts was 3.37 kg/HH/week. The composition of the SSO stream was 3.32 kg/HH of compostable material and 0.05 kg/HH of non-organic material.
- For garbage in the pilot areas, the average amount of garbage collected from HHs that set out garbage carts was 17.1 kg/HH. This garbage is collected EOW in the pilot areas, the amount of garbage measured is for a two week period. Therefore, the calculated amount of garbage in the pilot area is 8.55 kg/HH/week. The composition of the garbage is 3.04 kg/HH compostable materials and 5.51 kg/HH non-organic materials.
- For the control area where garbage is collected weekly, the average amount of garbage collected is 14.87 kg/HH/week. The composition of the control garbage stream is 7.37 kg/HH compostable material and 7.50 kg/HH non-organic material.

Table 3-3: Winter 2021 Weekly Waste Generated per Household (kg/HH/week)

	Pilot Area		Control Area
	Organics (kg/HH)	Garbage (kg/HH) [1]	Garbage (kg/HH)
Compostable	3.32	3.04	7.37
Non-Organics	0.05	5.51	7.50
Total	**3.37**	**8.55**	**14.87**

[1] Calculated figure since garbage from the pilot area is collected EOW and consists of garbage that has accumulated over a two-week period.

Figure 3-1 illustrates the average weekly collection on a per HH basis for each stream collected during the Winter 2021 sorting event. To provide a representative comparison of the average materials discarded per HH, the amount of control garbage (14.86 kg/HH) can be compared to the combined amount of pilot organic and pilot garbage (11.92 kg/HH). It is also interesting to note that the control garbage contained more compostable material than the combined compostable material in the pilot organics and pilot garbage streams.

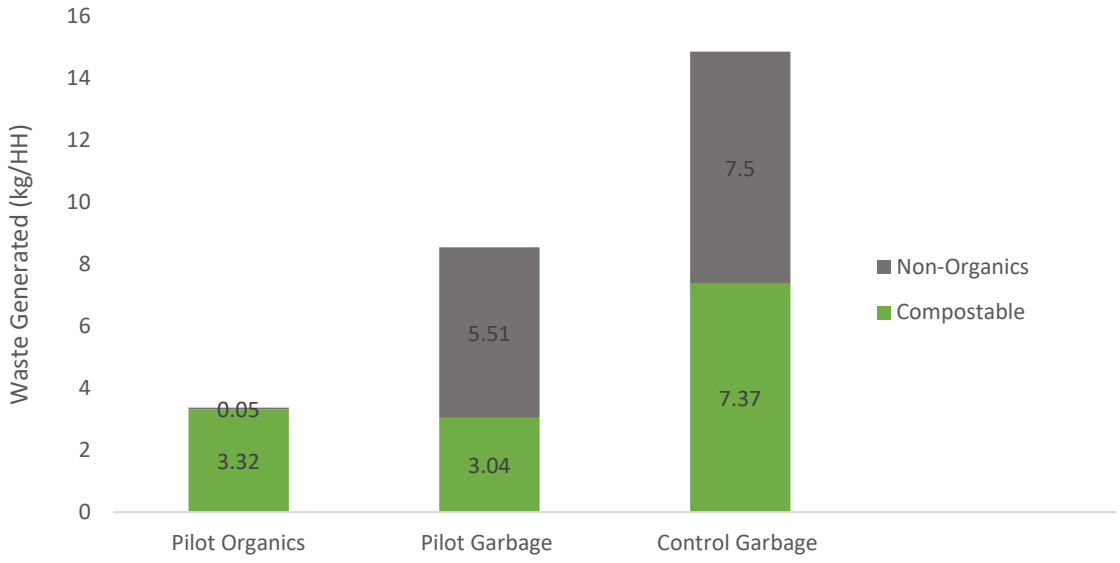


Figure 3-1: Winter 2021 Weekly Waste Generation Comparison

3.2.2 Summer 2022 Waste Generation

Table 3-4 summarizes the amount of waste generated on a weekly basis, in kilograms per HH per week during the Summer 2022 sorting event. The following discusses the results of each stream from their respective areas.

- For the organics stream, the average amount of material collected from HH that set out organic carts was 10.25 kg/HH/week. The composition of the SSO stream, by weight, was 10.06 kg/HH compostable material and 0.19 kg/HH non-organic material.
- For garbage in the pilot areas, the average amount of garbage collected from HH that set out garbage carts was 16.36 kg/HH. This garbage is collected EOW in the pilot areas, the amount of garbage measured is for a two week period. Therefore, the calculated amount of weekly garbage in the pilot area is 8.18 kg/HH/week. The composition of the garbage is 3.39 kg/HH compostable materials and 4.80 kg/HH non-organic materials.
- For the control area where garbage is collected weekly, the average amount of garbage collected is 19.19 kg/HH/week. The composition of the control garbage stream is 10.20 kg/HH compostable material and 8.99 kg/HH non-organic material.

Table 3-4: Summer 2022 Weekly Waste Generated per Household (kg/HH/week)

	Pilot Area		Control Area
	Organics (kg/HH)	Garbage (kg/HH)[1]	Garbage (kg/HH)
Compostable	10.06	3.39	10.20
Non-Organics	0.19	4.80	8.99
Total	**10.25**	**8.18**	**19.19**

[1] Calculated figure since garbage from the pilot area is collected EOW and consists of garbage that has accumulated over a two-week period.

Figure 3-2 illustrates the average weekly collection on a per HH basis for each stream collected. To provide a representative comparison of the average materials discarded per HH, the amount of control garbage (19.19 kg/HH) can be compared to the combined amount of pilot organic and pilot garbage (18.43 kg/HH).

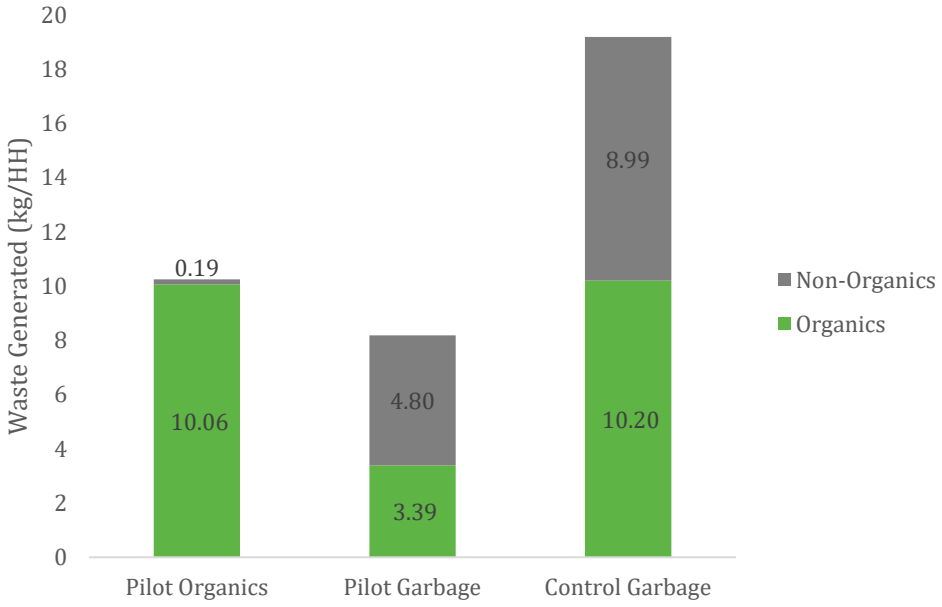


Figure 3-2: Summer 2022 Weekly Waste Generation Comparison

3.2.3 Winter 2021 Pilot Organic Waste Composition

Figure 3-3 shows the Winter 2021 organic waste stream composition for all five zones. 98% of the organics stream was material that is considered compostable. The majority of the compostable material was loose food waste (40%), loose yard waste (24%), and food waste in compostable bags (20%). These three secondary categories represent 84% of the organics waste stream. This is a snapshot of the types and relative quantities of materials that were discarded by residents in the organics cart at this time of the year and at this stage of the pilot project.

The contamination rate in the organics stream is 2%. Contaminants are non-organic materials (i.e., plastics, glass, and metal). It should be noted that there was a significant amount of food waste in unacceptable bags (7% of organics stream). Unacceptable bag includes compostable and biodegradable plastic bags and are not accepted at the composting facility that the City contracts with. These items take much longer to breakdown and leave microplastics behind reducing the quality of the compost product.

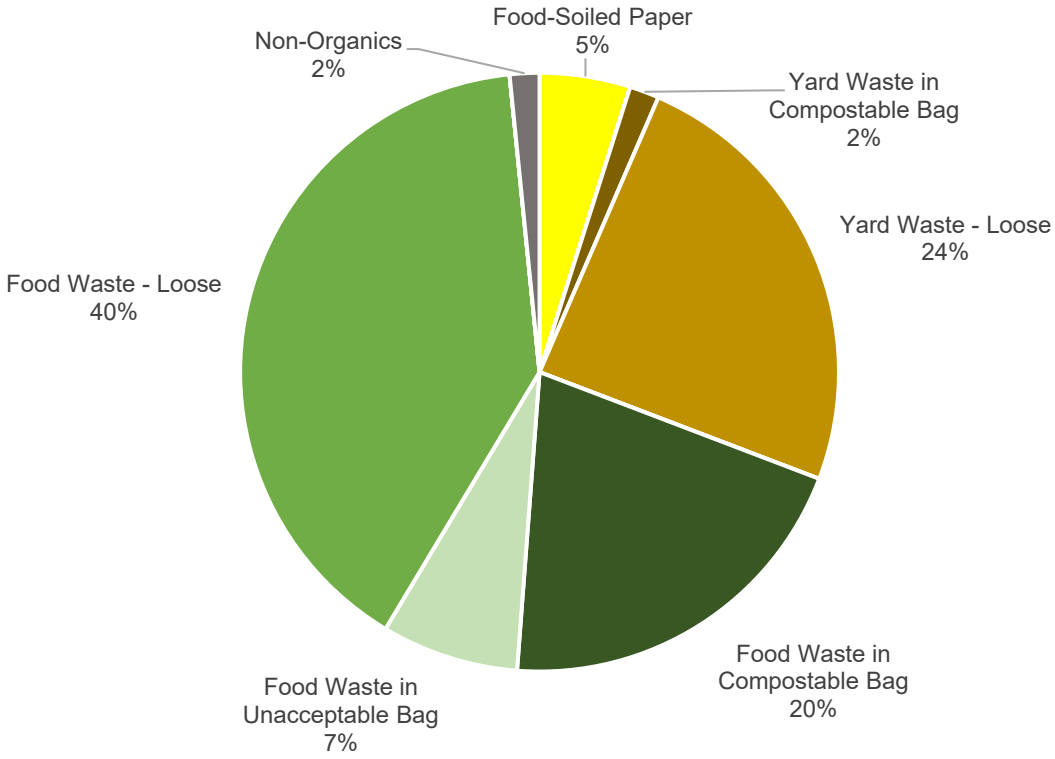


Figure 3-3: Winter 2021 Overall Organic Waste Composition

3.2.4 Summer 2022 Pilot Organic Waste Composition

Figure 3-4 shows the organic waste stream composition for all five zones. 98% of the organics stream was material that is considered compostable. The majority of the compostable material was loose yard waste (49%), loose food waste (22%), and food waste in compostable bags (9%). These three secondary categories represent 80% of the organics waste stream. This is a snapshot of the types and relative quantities of materials that were discarded by residents in the organics cart at this time of the year and at this stage of the pilot project.

The contamination rate in the organics stream is 2%. Contaminants are non-organic materials (i.e., plastics, glass, and metal). It should be noted that there was a significant amount of food waste in unacceptable bags (8% of organics stream). Unacceptable bag includes compostable and biodegradable plastic bags and are not accepted at the composting facility that the City contracts with. These items take much longer to breakdown and leave microplastics behind reducing the quality of the compost product.

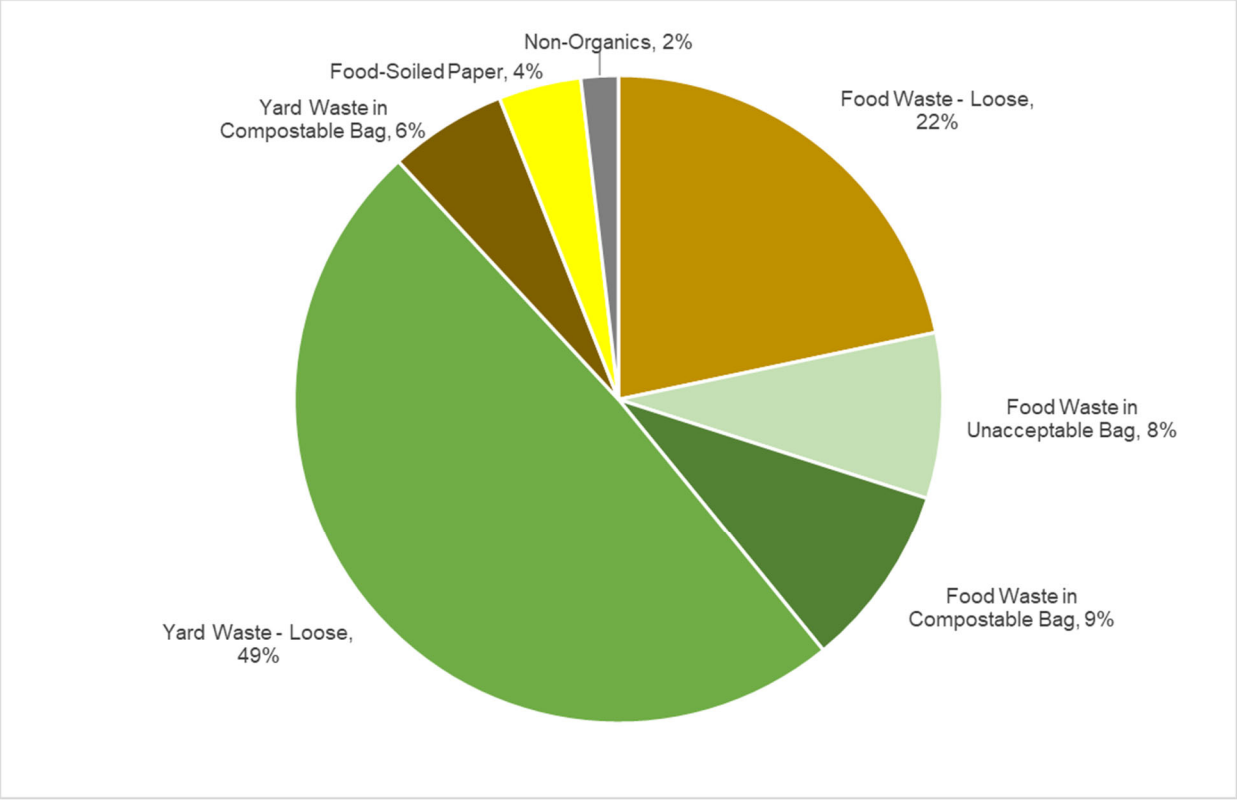


Figure 3-4: Summer 2022 Overall Organic Waste Composition

3.2.5 Comparison Pilot and Control Garbage Waste Composition

Table 3-5 summarizes and compares the garbage composition for the pilot and control areas for both sampling events. This is a snapshot of the types and relative quantities of materials that were discarded by residents in their garbage cart. Breakdown of compostable organics is shown to identify the amount and composition of compostables in garbage stream.

Table 3-5: Overall Garbage Composition in Kg per Household (kg/HH)

	Winter 2021		Summer 2022	
	Pilot Garbage (kg/HH)	Control Garbage (kg/HH)	Pilot Garbage (kg/HH)	Control Garbage (kg/HH)
Compostable	**3.04**	**7.37**	**3.39**	**10.20**
Food-Soiled Paper	0.42	0.74	0.39	0.96
Compostable or Biodegradable Bags	0.00	0.01	0.00	-
Yard Waste in Compostable Bag	0.19	0.13	0.14	1.67
Yard Waste - Loose	0.04	0.24	0.27	0.72
Other Yard Waste	0.01	0.22	-	-
Food Waste in Compostable Bag	0.05	0.11	0.08	0.11
Food Waste in Unacceptable Bag	1.32	2.52	1.62	3.29
Food Waste - Loose	0.96	3.38	0.70	3.40
Clean Wood	0.04	0.01	0.17	0.04
Other Compostable Organics	0.01	0.01	0.02	0.02
Non-Organics	**5.51**	**7.50**	**4.80**	**8.99**
Total	**8.55**	**14.87**	**8.19**	**19.19**

During the Winter 2021 sampling event, the HHs in the control areas generated more garbage than the HHs in the pilot areas (8.55 kg/HH/week vs. 14.86 kg/HH/week). The HHs in the control areas (that had no organics cart) discarded more than twice the amount of compostable material compared to HHs in the pilot areas that had organics carts (7.37 kg/HH vs. 3.04 kg/HH).

During the Summer 2022 sampling event, the HHs in the control areas also generated more garbage than the HH in the pilot areas (8.18 kg/HH/week vs. 19.19 kg/HH week). The HHs in the control areas (that had no organics cart) discarded more than triple the amount of compostable material compared to HHs in the pilot areas that had organics carts (10.20 kg/HH vs. 3.39 kg/HH).

Figure 3-5 compares the composition of pilot and control area garbage during both sampling events as a percentage to demonstrate the difference between the pilot and control area.

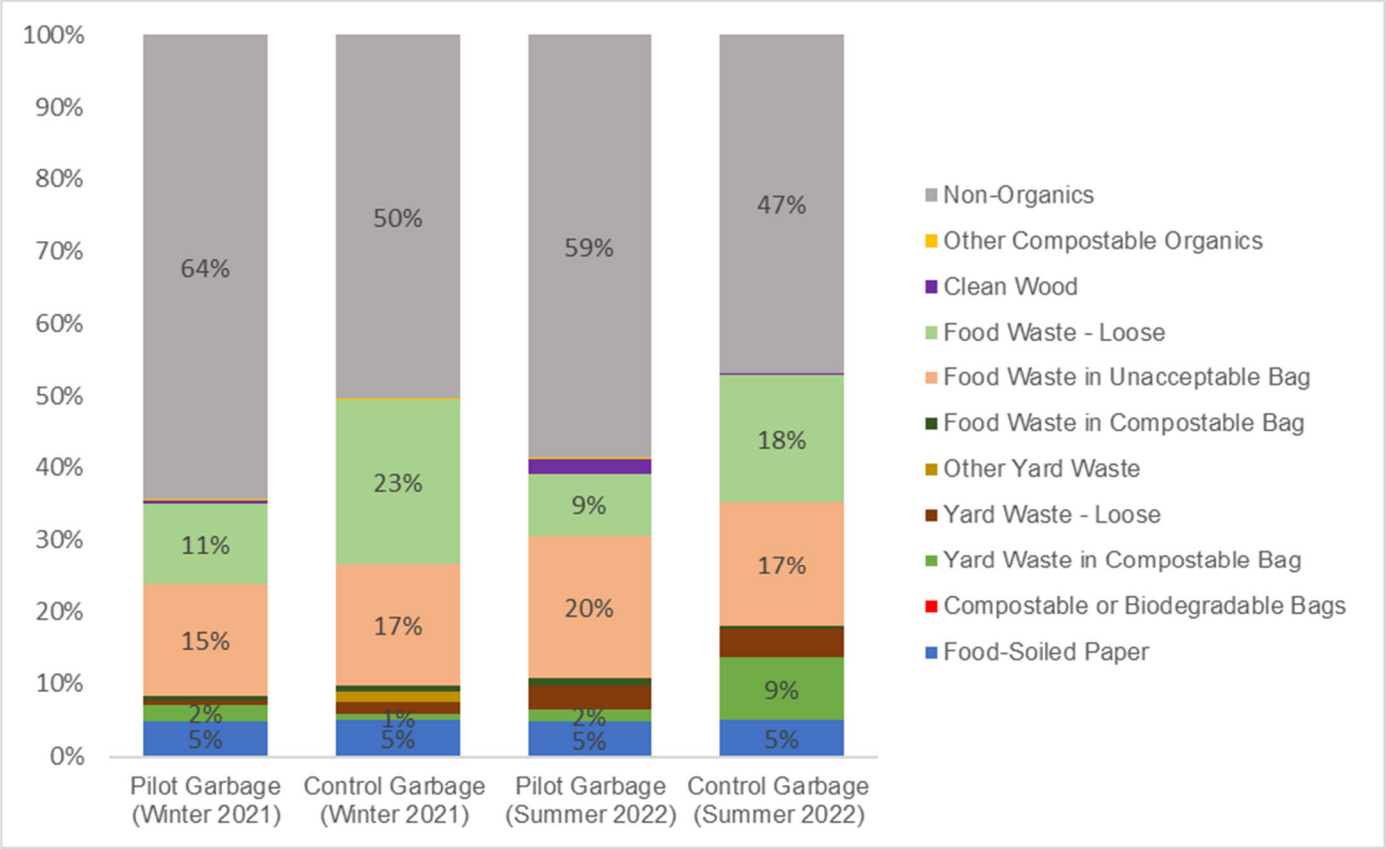


Figure 3-5: Overall Pilot and Control Garbage Composition

When comparing the garbage results from the Winter 2021 sampling event and Summer 2022 sampling event, non-organics made up the majority of the pilot area and control area garbage (Winter 2021: pilot - 64% and control - 50%, Summer 2022: pilot – 59% and control – 47%).

Winter 2021 Sample Event

The Winter 2021 sample event showed that compostables in the pilot garbage stream consisted primarily of food waste in unacceptable bag (15%), food waste - loose (11%), and food-soiled paper (5%). Compostable in control garbage consisted primarily of food waste - loose (23%), food waste in unacceptable bag (17%), and food-soiled paper (5%). Comparing the compostable materials between the two areas showed that the most significant difference was the amount of loose food waste (12% difference). The overall difference of compostable between pilot and control garbage was 14%.

Summer 2022 Sample Event

The Summer 2022 sample event showed that compostables in the pilot garbage stream consisted primarily of food waste in unacceptable bag (20%), food waste - loose (9%), and food-soiled paper (5%). Compostable in control

garbage consisted primarily of food waste – loose (18%), food was in unacceptable bag (17%), yard waste in compostable bag (9%), and food-soiled paper (5%). Comparing the compostable materials between the two areas showed that the most significant difference was the amount of loose food waste (9% difference). The overall difference of compostable between pilot and control garbage was 12%.

3.2.6 Organics Waste Diversion and Reduction Potential

This section summarizes the overall organic waste diversion and reduction potential as shown in Table 3-6. The average amount of waste (garbage + organics) discarded during the Winter 2021 sorting event was 11.93 kg/HH. It was 18.43kg/HH during the Summer 2022 sorting event. In Winter 2021, 3.37 kg/HH was diverted into the organics stream which is 28% of the materials discarded. In Summer 2022, 10.25 kg/HH was diverted into the organics stream which is 56%.

In Winter 2021, the amount of organic materials in the pilot garbage stream was 3.04 kg/HH (35.6% of garbage). The capture rate was 53%; it was calculated by dividing the amount of organics diverted by the sum of the amount of organics diverted and organic materials still in the garbage. The sum of the organics is the amount of organics that could potentially be diverted into the organics waste stream. Contamination rate was low at 1.6% of the amount of organic waste diverted.

In Summer 2022, the amount of organic materials in the pilot garbage stream was 3.39 kg/HH (41.4% of garbage). The capture rate was 75%; it was calculated by dividing the amount of organics diverted by the sum of the amount of organics diverted and organic materials still in the garbage. The sum of the organics is the amount of organics that could potentially be diverted into the organics waste stream. Contamination rate was low at 1.9% of the amount of organic waste diverted.

Only the HHs that use organics cart in the pilot areas were collected and sorted. These HHs only represented 43% (Winter 2021) and 54% (Summer 2022) as per the organic set out rate. As a result, diversion rate is not representative of the entire pilot area. The calculated diversion rate only applies to HH that used their organics cart. Pilot HH that don't use organics cart would have a similar result to those of the HHs in the control area.

Table 3-6: Organics Waste Diversion and Reduction Potential

Parameter – Every-Other-Week	Values (Winter 2021)	Values (Summer 2022)
Pilot - Organics diverted (kg/HH)	3.37	10.25
Pilot Garbage disposed (kg/HH)	8.55	8.18
Pilot - Total waste (garbage and organics) (kg/HH)	11.93	18.43
Control - Garbage (kg/HH)	14.86	19.19
% diversion (excluding recyclables)	28%	56%
% organics in pilot garbage	35.6%	41.4%
Organic materials in garbage (kg/HH)	3.04	3.39
% capture or recovery rate	53%	75%
% contamination (%)	1.6%	1.9%
Organic set out rate	**43%**	**54%**

3.3 Waste Generation by Zone

Table 3-7 summarizes the amount of waste generated in kilograms per HH by zone. In the pilot areas, Zone 4 has the most amount of organics diverted and Zone 3 has the least amount. In the pilot areas, garbage in Zone 2 has the most amount of garbage discarded and Zone 1 has the least amount. In the control areas, garbage in Zone 2 has the most amount of garbage and Zone 5 has the least amount. Overall, Zone 2 generates more garbage compared to other zones.

Table 3-7: Pilot and Control Garbage Waste Generation per Zone

Zone	Pilot Organics (kg/HH) Winter 2021	Pilot Organics (kg/HH) Summer 2022	Pilot Garbage (kg/HH) Winter 2021	Pilot Garbage (kg/HH) Summer 2022	Control Garbage (kg/HH) Winter 2021	Control Garbage (kg/HH) Summer 2022
Zone 1	3.68	12.40	6.31	5.28	16.97	14.68
Zone 2	3.90	12.54	10.39	5.67	17.85	13.83
Zone 3	1.41	5.40	10.05	6.08	14.59	11.97
Zone 4	4.11	10.62	7.71	5.64	12.98	16.04
Zone 5	3.78	13.06	8.31	7.11	11.93	14.27
Overall Average	**3.38**	**10.80**	**8.55**	**5.96**	**14.86**	**14.16**

Figure 3-6 and Figure 3-7 compares the waste generated from the pilot and control areas across five zones during both seasons. The overall average was shown in horizontal line to show the comparison between zones and the overall waste generated. Fluctuations were observed when comparing zone by zone.

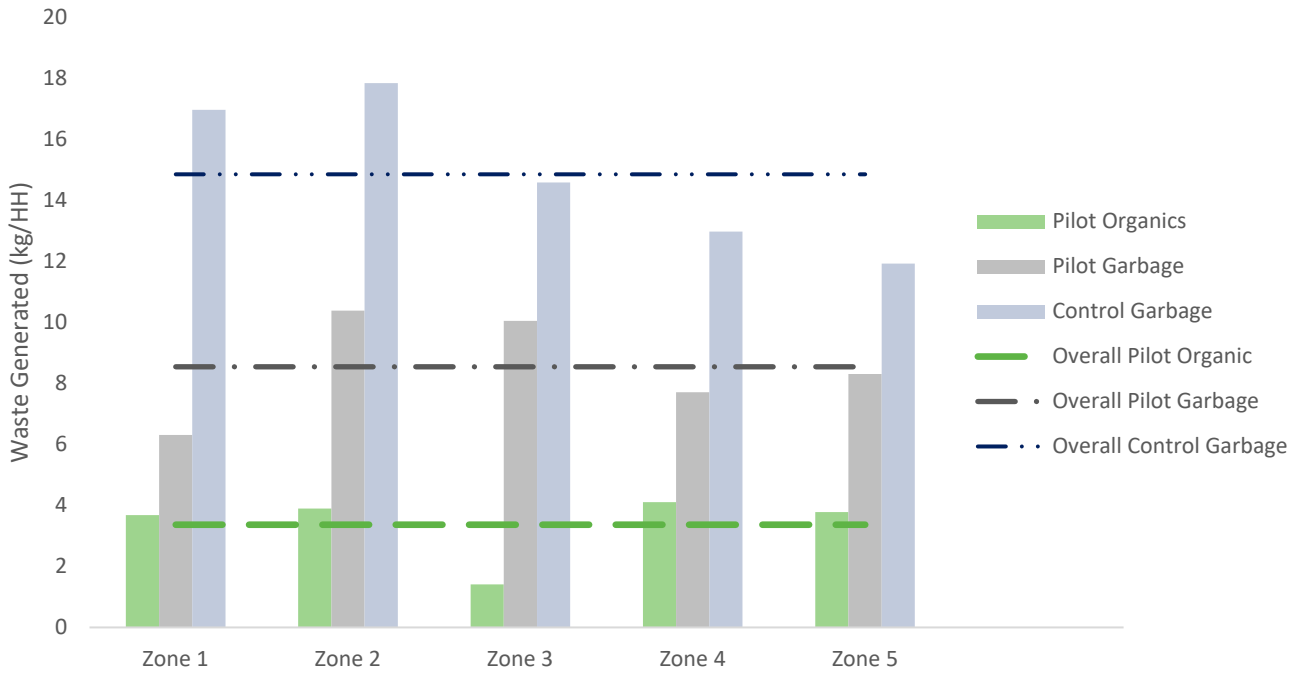


Figure 3-6: Winter 2021 - Waste Generation Comparison Across Five Zones

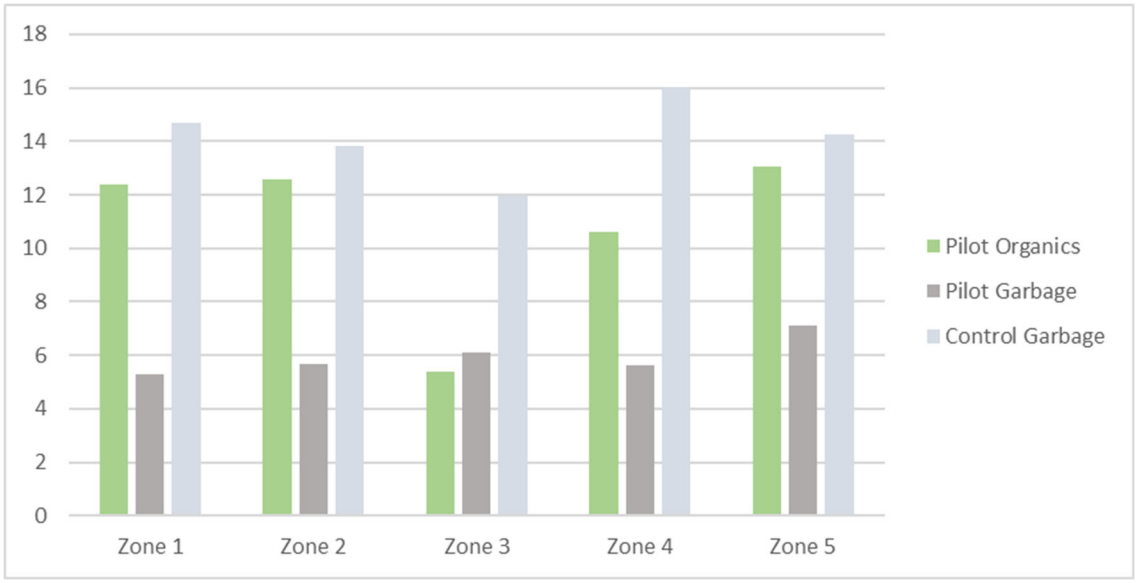


Figure 3-7: Waste Generation Comparison Across Five Zones

Figure 3-8 compares the overall average of all zones in both seasons. The largest difference can be seen when comparing the pilot organics zones in Winter 2021 (3.37 kg/HH) to Summer 2022 (10.8 kg/HH).

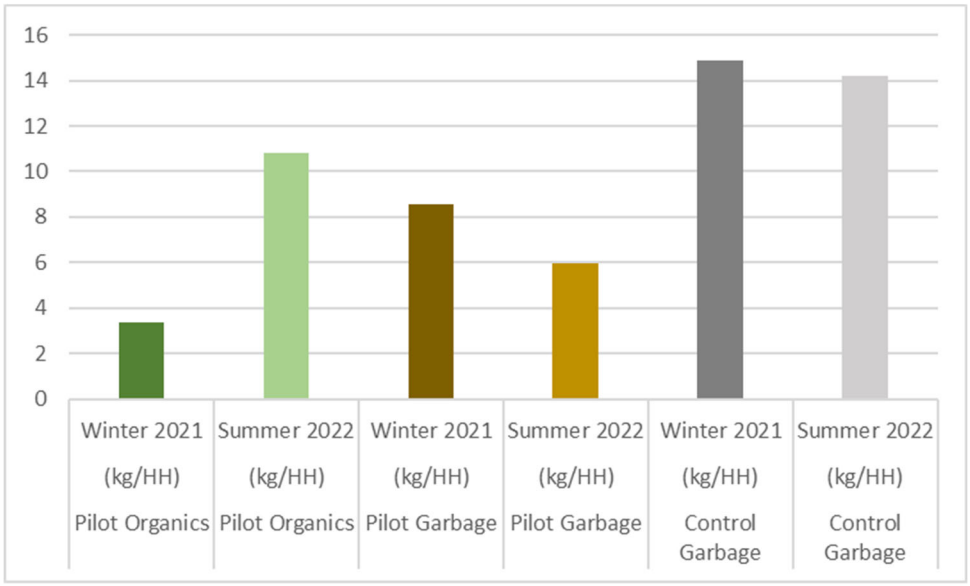


Figure 3-8: Summer 2022 - Waste Generation Overall Average Comparison Across Five Zones (Winter 2021 vs Summer 2022)

3.4 Organic Waste Diversion and Reduction Potential by Zone

Table 3-8 and Table 3-9 summarize the diversion and reduction potential across the five zones in both seasons. The following findings were noted:

- The weight of organic waste diverted ranges from 1.41 kg/HH to 4.11 kg/HH.

- The total amount of discarded waste (garbage and organics) ranges from 9.99 kg/HH to 14.29 kg/HH.
- The diversion rate range is 12% to 37% across the five zones.
- The amount of organic materials in pilot garbage is within 1.46 kg/HH to 5.23 kg/HH or 23.2% to 50.3%.
- The capture rate ranges from 28% to 72%.
- Contamination rate is relatively low and ranges from 0.3% to 2.1% of the amount of organic waste diverted.

Only HHs that use organics carts in pilot areas across five zones were collected and sorted. These HHs had a set out rate of 27% to 60% as per the organic set out rate. As a result, diversion rate is not representative of the pilot area. The calculated diversion rate only applies to HH that used their organics cart. Pilot HHs that don't use organics cart would have a similar result with control HH.

Table 3-8: Winter 2021 Diversion Reduction Potential Across Five Zones

Parameter - Weekly	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Overall
Pilot - Organics diverted (kg/HH)	3.68	3.90	1.41	4.11	3.78	3.37
Pilot Garbage disposed (kg/HH)	6.31	10.39	10.05	7.71	8.31	8.55
Pilot - Total waste (garbage and organics) (kg/HH)	9.99	14.29	11.46	11.81	12.08	11.93
Control - Garbage (kg/HH)	16.97	17.85	14.59	12.98	11.93	14.86
% diversion (excluding recyclables)	37%	27%	12%	35%	31%	28%
% organics in pilot garbage	23.2%	50.3%	36.0%	31.5%	29.9%	35.6%
Organic materials in garbage (kg/HH)	1.46	5.23	3.62	2.43	2.49	3.04
% capture or recovery rate	72%	43%	28%	63%	60%	53%
% contamination (%)	2.0%	1.8%	2.0%	0.3%	2.1%	1.6%

Table 3-9: Summer 2022 Diversion Reduction Potential Across Five Zones

Parameter - Weekly	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Overall
Pilot - Organics diverted (kg/HH)	12.40	12.54	5.40	10.62	13.06	10.25
Pilot Garbage disposed (kg/HH)	5.28	5.67	6.08	5.64	7.11	8.18
Pilot - Total waste (garbage and organics) (kg/HH)	17.68	18.21	11.48	16.26	20.17	18.43
Control - Garbage (kg/HH)	14.68	13.83	11.97	16.04	14.27	19.19
% diversion (excluding recyclables)	70%	69%	47%	65%	65%	56%
% organics in pilot garbage	45.1%	48.0%	42.8%	36.4%	36.3%	41.4%
Organic materials in garbage (kg/HH)	2.38	2.72	2.60	2.06	2.58	3.39
% capture or recovery rate	84%	82%	68%	84%	84%	75%
% contamination (%)	3.0%	3.0%	3.1%	0.8%	1.1%	1.9%

3.5 SSO Truck Load

Figure 3-9 illustrates the composition of contaminants in the SSO truck load characterized during the Winter 2021 event. The total weight of the SSO truck load was 1,490 kg. Approximately 23.20 kg of contaminants were found and pulled out from the sample. The SSO truck load was primarily composed of organics (98.4%) and contaminants (1.6%). This load was not as contaminated compared to the other SSO truck load.

The SSO load was collected from Zone 1 and is comparable with the contamination rate of Zone 1 sorted pilot organics. There is a 0.4% decrease in the amount of contaminant in the SSO truck load (1.6%) when compared to Zone 1 contamination rate (2.0%). Contaminants found in the SSO load includes batteries, plastic film, garbage bags, painted wood, and sanitary products (diapers). Examples are shown in Photos 1 to 6.

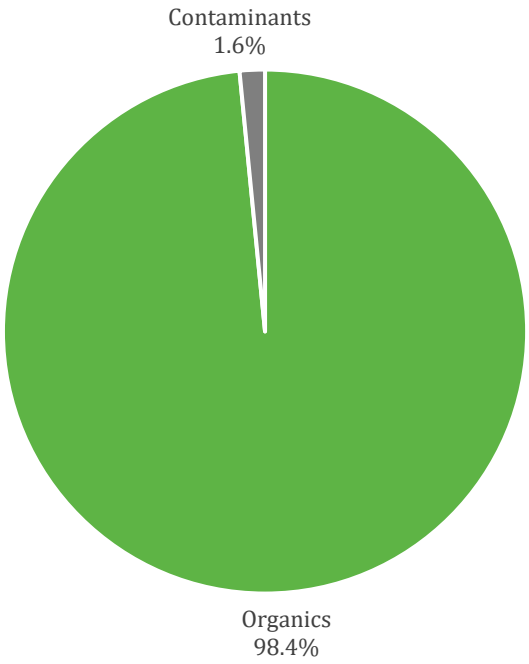


Figure 3-9: SSO Truck Load Contamination

Photo 1: Entire Load from SSO Truck

Photo 2: Plastic Film

Photo 3: Treated Wood and Mixed Packaging Materials

Photo 4: Batteries

Photo 5: Bags of Garbage

Photo 6: Plastic Packaging Materials

4.0 SUMMARY AND RECOMMENDATIONS

The following is commentary from on-site observations and interpretation of the results.

- Results from the Winter 2021 and Summer 2022 sorting events show that more residents in the Organics Pilot Study are using their green carts and diverting organic materials out of the garbage stream into the SSO stream. Based on the waste composition results, compostable organics represented 50% of the garbage stream in the control areas whereas the pilot areas compostable organics represented 36%, a 14% decrease in compostable organics in the garbage stream.
- In the SSO stream, food waste-loose was the most common organic material discarded in all zones. Tetra Tech's observation in other municipalities, the green cart roll-out has a quick uptake and higher use for yard waste. Usually, yard waste is easily distinguished by residents as SSO material and often generates fewer concerns about the "yuck or ick" factor often associated with kitchen scraps and food waste. But considering that the sorting event occurred in winter month (December) it is expected that less yard waste was generated at this time of the year at HHs.

Tetra Tech has identified the following recommendations, including opportunities for education and communication to support the future rollout of a city-wide organic collection program.

- Communication to residents should be consistent and easy to understand, regarding program changes and expectations. Consider the use of images and infographics to support written information (i.e., how to use the cart, what materials can go into the cart, how to place the cart out for collection, cart collection date).
- Communication to target and address seasonal variations, especially on food and yard waste (i.e., what to do with fallen leaves, garden waste, other yard waste in the fall, holiday food waste disposal options, frozen materials in the carts in winter).
- To minimize potential service impacts to residents, provide additional resources and operational support to front line staffs involved with program changes, especially before and after rollout of the program.
- Develop a list of Frequently Asked Questions (FAQs), How-To Guide, or other supporting education and communication materials in advance of the program rollout. Hire and train customer service staff in advance of the rollout and be prepared to revise or update materials as feedback is received.

Establish which materials are acceptable or unacceptable in the organics stream (largely based on processing options) and maintain consistency with what is communicated to residents in order to avoid confusion or frustration with frequent changes over time.

- Provide residents with advance notice of a timeframe when they can expect their rollout carts to be delivered and be flexible in case of delays with cart delivery or deployment.
- Remind residents to empty food waste out of containers (glass or plastic), rinse containers prior to placing into the recycling stream, and to place food waste into the green cart.
- Focus on food and kitchen waste diversion options (especially in the winter season) as well as remind residents about the seasonal top up program available for yard waste.
- Carts are only distinguishable by its lid colour, it is recommended that a sticker would be applied on the side to avoid pick-up mistakes by truck drivers, especially in winter season where lids could be covered in snow and there is less light early in the mornings.

5.0 CLOSURE

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

Respectfully submitted,
Tetra Tech Canada Inc.

d

Prepared by:
Francis Tantia, EPt
Environmental Technician
Solid Waste Management Practice
Direct Line: 403.203.3355
Francis.Tantia@tetratech.com

Prepared by:
Kentson Yan, M.Sc., P.Eng.
Project Engineer
Solid Waste Management Practice
Direct Line: 403.723.1556
Kentson.Yan@tetratech.com

Reviewed by:
Wilbert Yang, P.Eng.
Senior Planning Engineer
Solid Waste Management Practice
Direct Line: 604.608.8648
Wilbert.Yang@tetratech.com

/lc:lm

APPENDIX A

LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document 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 Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or 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. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. 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 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document 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 conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 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.

APPENDIX B

ACCEPTABLE MATERIALS

Figure B-1: Acceptable Materials in Organics Cart

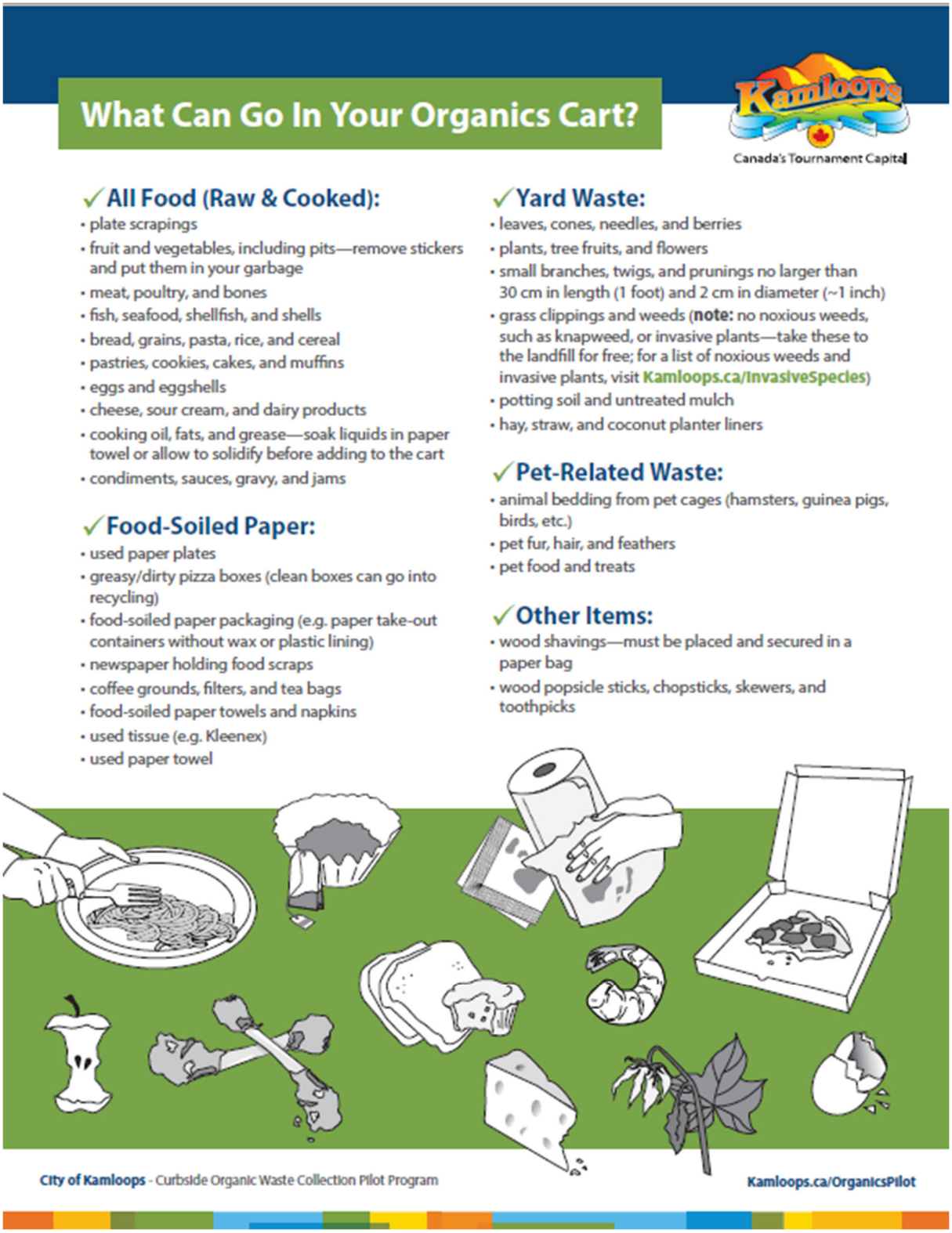


Figure B-2: Unaccpetable Materials in Organics Cart

APPENDIX C

SELECTED PHOTOGRAPHS

Photo 1: Field staff weighing out carts at the curb

Photo 2: Field staff collecting materials from the curb

Photo 3: Sorting Area

Photo 4: Field staff sorting a sample at the sorting area

Photo 5: A typical pilot area garbage sample

Photo 6: A typical control area garbage sample

Photo 7: A typical pilot area organics sample

Photo 8: Source separated organics from a truck load sample

Photo 9: Example of contamination - food waste in unacceptable bags

Photo 10: Example of food-soiled paper

Photo 11: Example of yard waste in compostable bag

Photo 12: Example of yard waste in an unacceptable bag (plastic garbage bag)

Photo 13: Example of other compostable organics

Photo 14: Example of loose yard waste

Photo 15: Example of loose food waste

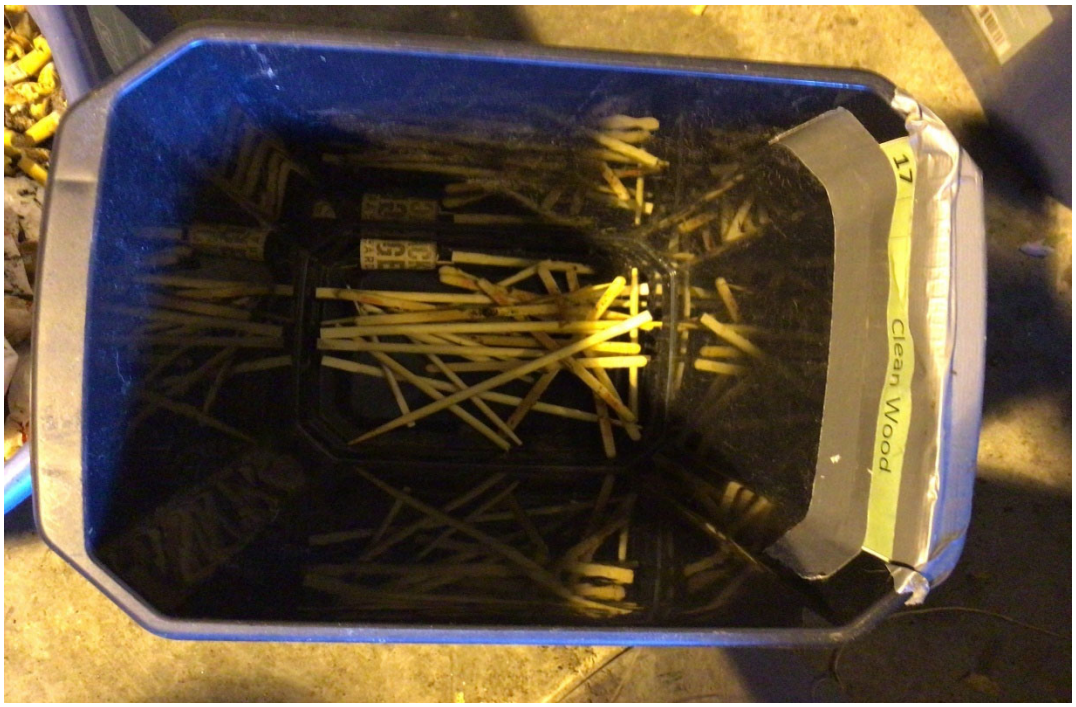


Photo 16: Example of clean wood

Photo 17: Example of food waste in compostable bag

Photo 18: Example of compostable or biodegradable bag

Photo 19: Example of metal beverage refundables

Photo 20: Example of plastic beverage refundables

Photo 21: Example of recyclable paper

Photo 22: Example of recyclable glass jars and containers

Photo 23: Example of recyclable plastic bags and containers

Photo 24: Example of diapers, personal hygiene, and HHW in plastic bags

Photo 25: Example of textiles

Photo 26: Example of other yard waste

Photo 27: Example of non-organics: non-recyclable plastic

Photo 28: Example of other contamination – Electronic waste

APPENDIX D

MAPS

Figure D-1: City of Kamloops Zone Boundaries

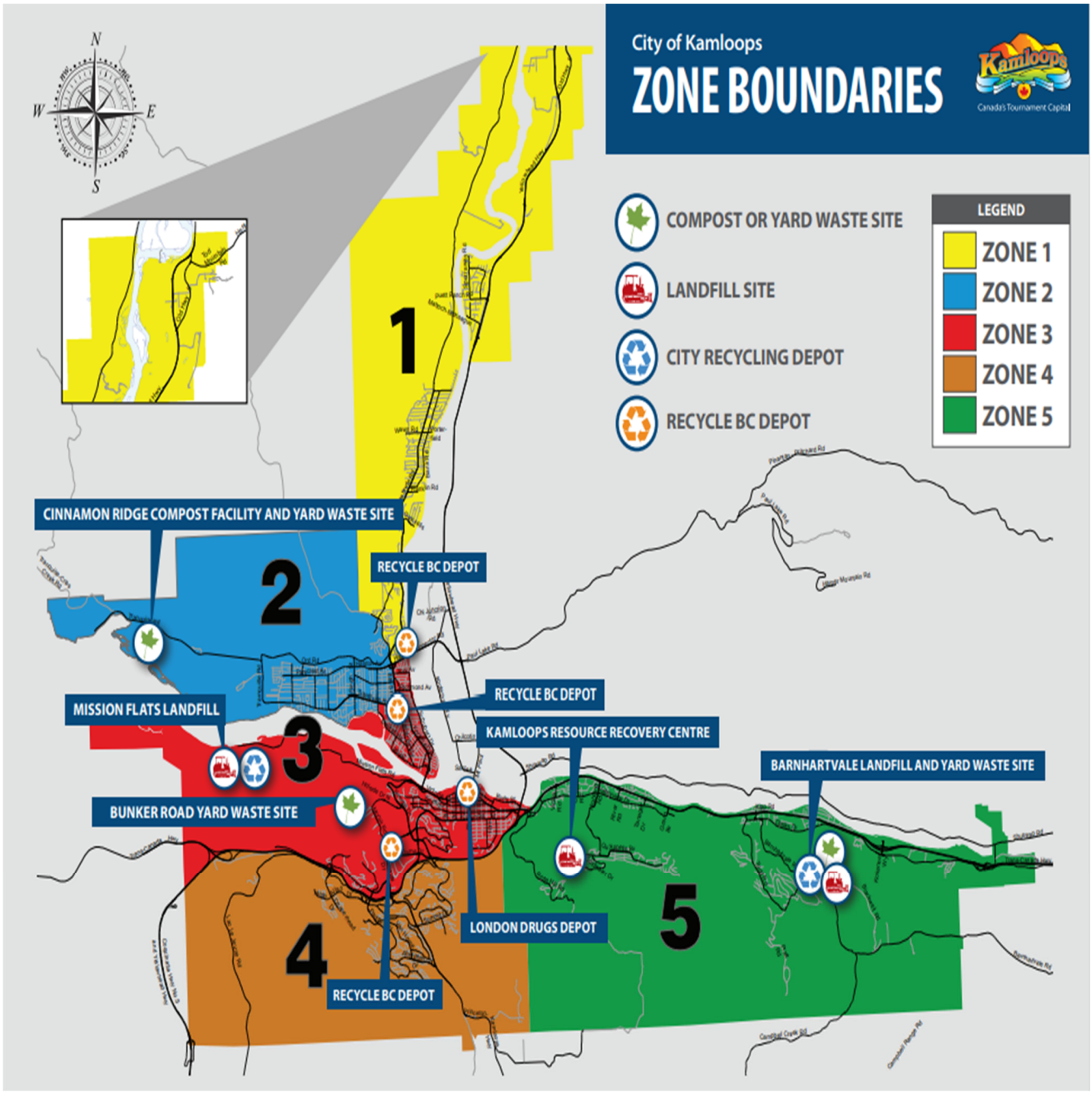


Figure D-2: Zone 1 Pilot Area

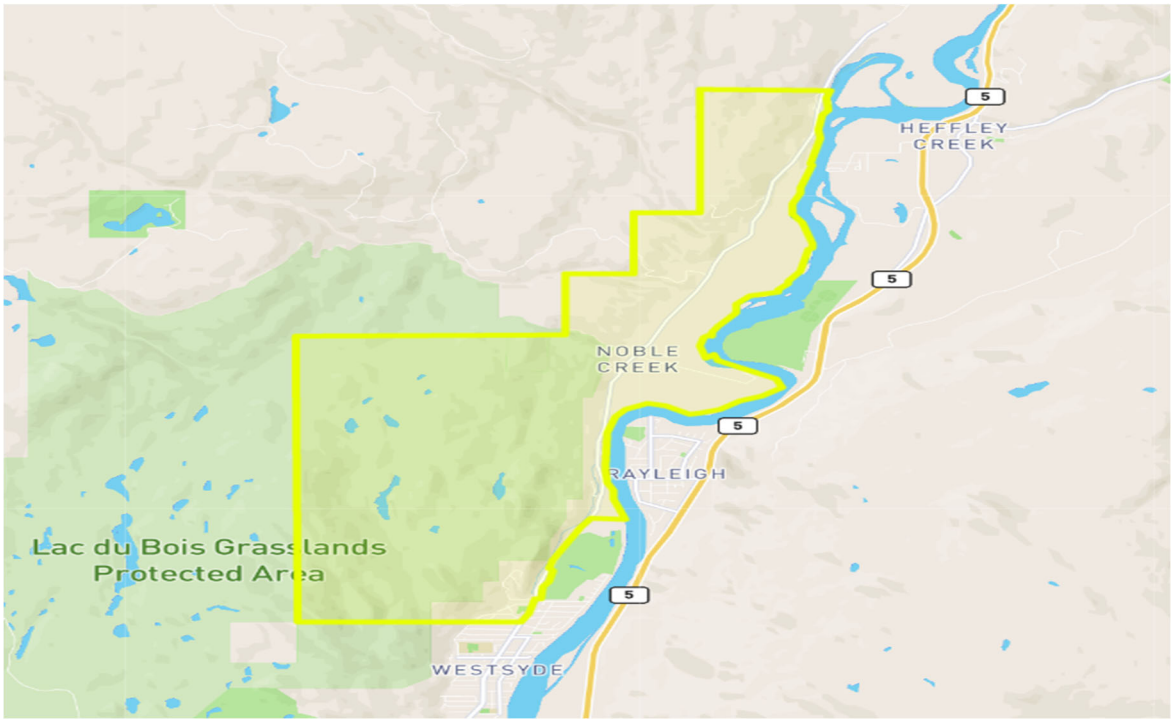


Figure D-3: Zone 2 and 3 Pilot Area

Figure D-4: Zone 4 Pilot Area

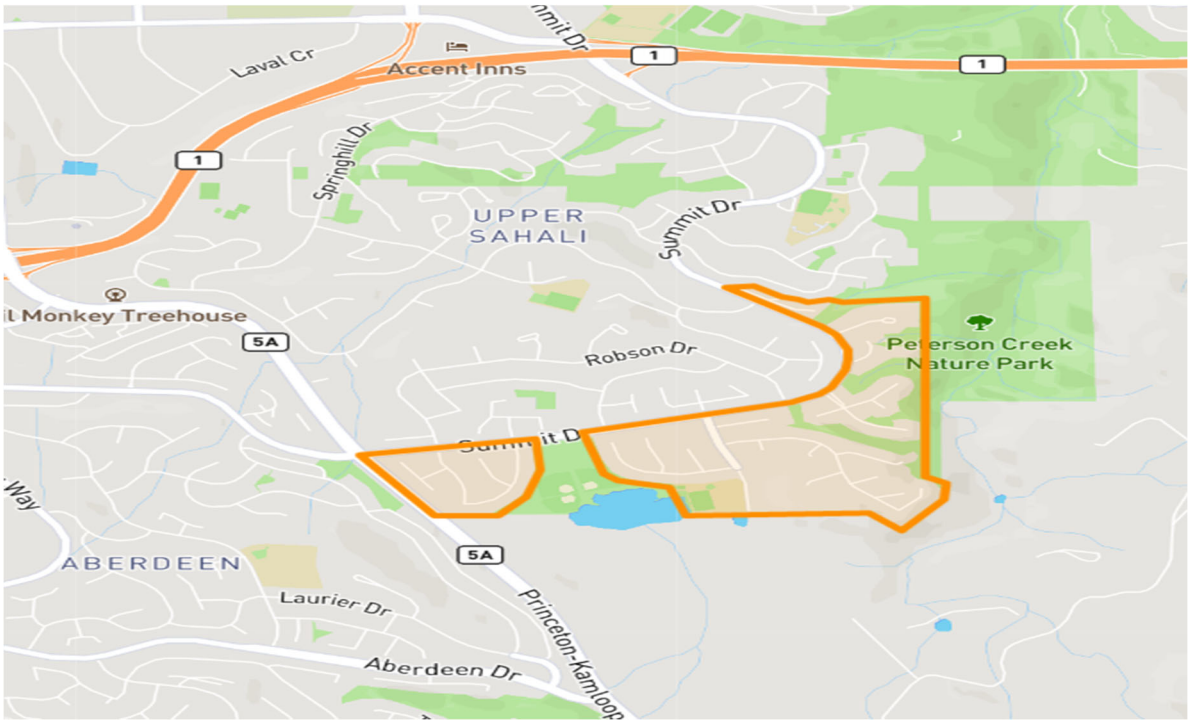
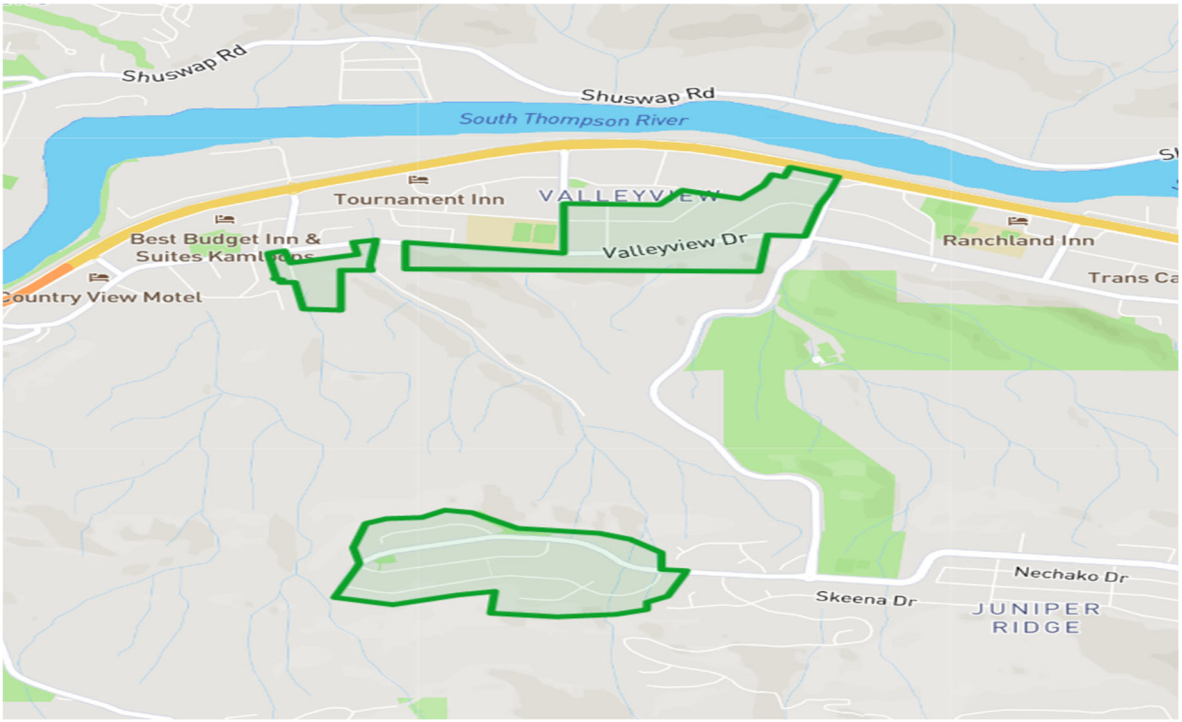


Figure D-5: Zone 5 Pilot Area



APPENDIX E

MATERIAL CATEGORIES

Table E-1: Description of Sorting Categories

#	Primary Category	Secondary Categories	Description and/or Examples
01	Non-Organics	Recyclable Paper	Office paper, fine paper, newsprint, flyers & inserts, telephone books, catalogues, calendars, envelopes, bills, cash register receipts, gift wrap, magazines, shredded paper, office & writing paper, cash register receipts, Cardboard boxes, pizza boxes Boxboard, moulded pulp, craft paper - cereal boxes, egg cartons, takeout food containers (clean), paper bags including multiple paper layers, paper cups, paper packaging
02	Non-Organics	Non-Recyclable Paper	Paper lined or coated with other materials including plastic, foil and wax (multilayered packaging, waxed cardboard, laminated paper, photographs, sandpaper, padded paper mailing envelopes). Tissues and paper soiled with body fluids or cleaning products (not appropriate for composting)
03	Organics	Food Soiled Paper	Food Soiled paper towels, tissues, paper plates and containers
04	Non-Organics	Recyclable Glass	Glass deposit beverage container, bottles, jars
05	Non-Organics	Other Glass	Broken glass, ceramics, sheet glass, drinking glass, etc.
06	Non-Organics	Recyclable Metal	Metal deposit beverage container, Metal packaging (ferrous and non-ferrous), cans, aluminum foil, foil tray, empty aerosol can
07	Non-Organics	Other Metal	Pots and pan, coat hangers, metal parts, nails and screws, metal fixtures, etc.
08	Non-Organics	Recyclable Plastic	Plastic deposit beverage container, plastic containers, clamshells, shampoo bottles, yogurt tubs, garden pots, plastic film, grocery bags, rigid flexible plastic packaging, rigid plastic packaging, plastic cups, plastic jars, etc.
09	Organics	Compostable or Biodegradable bags	Plastics labeled "compostable" or "biodegradable"
10	Non-Organics	Non-Recyclable Plastic	Polystyrene products, plastic plates and cutlery, straws, chip bags, wrappers, motor oil containers, plastic paint cans, toys, garden hose, rope, single use mask, cleaning wipes, etc.
11	Organics	Yard Waste in Compostable Bag	Yard waste (grass, leaves, etc.) in compostable paper bag
12	Organics	Yard Waste-Loose	Loose yard waste (grass, leaves, etc.)
13	Organics	Other Yard Waste	Hay, straw, wood shavings, dirt, etc.
14	Organics	Food Waste in Compostable Bag	Food waste in compostable paper bag or packaging and food waste wrapped in compostable paper
15	Organics	Food Waste in Unacceptable Bag	Food waste in plastic bags, plastic packaging or unacceptable bag (including compostable or biodegradable bag)
16	Organics	Food Waste-Loose	Lose food waste
17	Organics	Clean Wood	Clean with no paint, stain or glue, unpainted pallets or skids, chopsticks
18	Organics	Other Compostable Organics	Animal carcasses, pet fur, hair
19	Non-Organics	Animal Waste	Animal manure, Kitty litter, animal bedding material, puppy training pads, pet food and treats
20	Non-Organics	Diapers, Personal Hygiene, HHW	Household hazardous waste, diapers, sanitary napkins, tampons, dental floss, Q-tips, etc.
21	Non-Organics	Textiles	Clothing (natural fibres, blends, polyester, Gore-Tex, fleece, nylon, etc.), Bedding, shoes, stuffed toy, pillows, rags, cloth towels
22	Non-Organics	Painted or Treated Wood	Painted, stained or treated wood. Plywood, wood shingles, particle board, laminate flooring, wood furniture
23	Non-Organics	Other	Electronics, building material, tires, batteries, fines, etc.

APPENDIX F

WASTE COMPOSITION RESULTS

Table F-1: Waste Composition Results for Zone 1

Category		Winter 2021			Fall 2022		
		Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)	Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)
01	Recyclable Paper	0.05	0.51	0.60	0.07	0.36	0.64
02	Non-Recyclable Paper	0.02	0.24	0.24	0.01	0.08	0.11
03	Food-Soiled Paper	0.22	0.47	0.70	0.31	0.42	0.58
04	Recyclable Glass	0.00	0.34	0.24	0.00	0.16	0.65
05	Other Glass	0.00	0.08	0.12	0.00	0.13	0.30
06	Recyclable Metal	0.00	0.13	0.21	0.00	0.16	0.36
07	Other Metal	0.00	0.06	0.15	0.01	0.15	0.18
08	Recyclable Plastic	0.00	0.35	0.44	0.00	0.35	0.34
09	Compostable and Biodegradable Bag	0.00	0.00	0.00	0.00	0.00	0.00
10	Non-Recyclable Plastic	0.01	1.33	1.13	0.00	0.58	0.90
11	Yard Waste in Compostable Bag	0.01	0.00	0.01	1.35	0.45	1.94
12	Yard Waste - Loose	0.91	0.03	0.55	7.43	0.61	0.10
13	Other Yard Waste	0.00	0.00	0.00	0.00	0.00	0.00
14	Food Waste in Compostable Bag	1.08	0.05	0.15	1.53	0.20	0.06
15	Food Waste in Unacceptable Bag	0.25	1.18	2.32	0.00	1.38	2.80
16	Food Waste - Loose	1.14	1.15	4.66	1.40	0.62	3.06
17	Clean Wood	0.00	0.01	0.01	0.00	1.07	0.05
18	Other Compostable Organics	0.00	0.04	0.02	0.00	0.01	0.00
19	Animal Waste	0.00	4.85	1.84	0.28	0.88	0.89
20	Diapers, Personal Hygiene, HHW	0.00	1.13	0.69	0.00	1.08	0.50
21	Textiles	0.00	0.29	0.46	0.00	0.54	0.13
22	Painted or Treated Wood	0.00	0.02	0.49	0.00	0.40	0.04
23	Other	0.00	0.36	1.92	0.00	0.90	0.63
	Total	**3.68**	**12.62**	**16.97**	**12.40**	**10.55**	**14.28**

Table F-2: Waste Composition Results for Zone 2

Category		Winter 2021			Fall 2022		
		Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)	Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)
01	Recyclable Paper	0.06	1.00	1.19	0.37	0.35	0.48
02	Non-Recyclable Paper	0.01	0.29	0.19	0.00	0.08	0.08
03	Food-Soiled Paper	0.12	0.97	0.88	0.18	0.33	0.76
04	Recyclable Glass	0.00	0.67	0.21	0.00	0.12	0.14
05	Other Glass	0.00	0.16	0.02	0.00	0.08	0.06
06	Recyclable Metal	0.00	0.28	0.18	0.00	0.11	0.11
07	Other Metal	0.00	0.05	0.37	0.00	0.75	0.23
08	Recyclable Plastic	0.00	0.69	0.67	0.00	0.36	0.58
09	Compostable and Biodegradable Bag	0.00	0.00	0.00	0.00	0.00	0.00
10	Non-Recyclable Plastic	0.00	1.44	1.22	0.00	0.65	0.96
11	Yard Waste in Compostable Bag	0.26	1.89	0.00	0.00	0.31	0.85
12	Yard Waste - Loose	0.85	0.15	0.48	9.57	0.51	0.13
13	Other Yard Waste	0.00	0.00	0.00	0.00	0.00	0.00
14	Food Waste in Compostable Bag	0.44	0.23	0.29	0.71	0.13	0.16
15	Food Waste in Unacceptable Bag	0.29	3.95	3.89	0.29	2.98	2.04
16	Food Waste - Loose	1.87	3.15	3.70	1.42	1.13	2.33
17	Clean Wood	0.00	0.06	0.02	0.00	0.05	0.02
18	Other Compostable Organics	0.00	0.05	0.02	0.00	0.01	0.02
19	Animal Waste	0.00	1.11	1.25	0.00	0.74	1.21
20	Diapers, Personal Hygiene, HHW	0.00	2.05	1.02	0.00	0.86	0.98
21	Textiles	0.00	0.78	0.78	0.00	0.59	0.69
22	Painted or Treated Wood	0.00	0.68	0.03	0.00	0.21	0.00
23	Other	0.00	1.13	1.44	0.00	1.00	2.00
	Total	**3.90**	**20.79**	**17.85**	**12.54**	**11.35**	**13.83**

Table F-3: Waste Composition Results for Zone 3

Category		Winter 2021			Fall 2022		
		Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)	Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)
01	Recyclable Paper	0.01	0.87	1.20	0.05	0.49	0.44
02	Non-Recyclable Paper	0.01	0.24	0.16	0.09	0.13	0.08
03	Food-Soiled Paper	0.07	1.10	0.74	0.39	0.65	0.66
04	Recyclable Glass	0.00	0.34	0.33	0.00	0.12	0.16
05	Other Glass	0.00	0.15	0.16	0.00	0.20	0.08
06	Recyclable Metal	0.00	0.30	0.17	0.01	0.12	0.10
07	Other Metal	0.00	0.15	0.15	0.00	0.12	0.12
08	Recyclable Plastic	0.00	0.76	0.77	0.02	0.41	0.38
09	Compostable and Biodegradable Bag	0.00	0.00	0.01	0.02	0.01	0.00
10	Non-Recyclable Plastic	0.00	1.32	0.82	0.01	1.23	0.57
11	Yard Waste in Compostable Bag	0.00	0.00	0.03	0.18	0.00	3.22
12	Yard Waste - Loose	0.47	0.07	0.01	1.88	0.66	0.09
13	Other Yard Waste	0.00	0.04	0.02	0.12	0.00	0.00
14	Food Waste in Compostable Bag	0.12	0.15	0.06	0.41	0.07	0.03
15	Food Waste in Unacceptable Bag	0.32	2.92	2.72	0.63	2.66	1.46
16	Food Waste - Loose	0.39	2.94	2.96	1.58	1.03	2.19
17	Clean Wood	0.00	0.01	0.01	0.00	0.07	0.05
18	Other Compostable Organics	0.00	0.00	0.01	0.01	0.05	0.01
19	Animal Waste	0.00	3.51	2.16	0.00	1.03	0.36
20	Diapers, Personal Hygiene, HHW	0.00	2.60	1.06	0.00	1.01	1.11
21	Textiles	0.00	1.01	0.45	0.00	1.40	0.09
22	Painted or Treated Wood	0.00	0.02	0.01	0.00	0.03	0.05
23	Other	0.00	1.61	0.62	0.00	0.68	0.72
	Total	**1.41**	**20.10**	**14.59**	**5.40**	**12.15**	**11.97**

Table F-4: Waste Composition Results for Zone 4

Category		Winter 2021			Fall 2022		
		Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)	Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)
01	Recyclable Paper	0.00	0.62	0.49	0.08	0.48	0.42
02	Non-Recyclable Paper	0.00	0.26	0.15	0.00	0.10	0.11
03	Food-Soiled Paper	0.21	0.80	0.78	0.22	0.65	0.86
04	Recyclable Glass	0.00	0.73	0.26	0.00	0.43	0.32
05	Other Glass	0.00	0.21	0.16	0.00	0.07	0.12
06	Recyclable Metal	0.00	0.23	0.17	0.00	0.08	0.11
07	Other Metal	0.00	0.26	0.01	0.00	0.30	0.03
08	Recyclable Plastic	0.00	0.65	0.55	0.00	0.54	0.46
09	Compostable and Biodegradable Bag	0.00	0.01	0.01	0.00	0.00	0.00
10	Non-Recyclable Plastic	0.01	1.70	0.84	0.00	0.91	0.90
11	Yard Waste in Compostable Bag	0.00	0.04	0.00	0.28	0.13	0.01
12	Yard Waste - Loose	0.24	0.02	0.02	4.95	0.14	0.05
13	Other Yard Waste	0.00	0.03	0.00	0.00	0.00	0.00
14	Food Waste in Compostable Bag	1.43	0.10	0.06	1.42	0.04	0.13
15	Food Waste in Unacceptable Bag	0.17	2.61	1.99	1.31	2.22	3.18
16	Food Waste - Loose	2.04	1.22	3.74	2.34	0.88	3.68
17	Clean Wood	0.00	0.03	0.01	0.00	0.01	0.01
18	Other Compostable Organics	0.00	0.02	0.02	0.00	0.04	0.03
19	Animal Waste	0.00	1.73	0.98	0.00	1.37	1.96
20	Diapers, Personal Hygiene, HHW	0.00	2.08	1.34	0.00	1.52	2.36
21	Textiles	0.00	0.99	0.19	0.00	0.87	0.83
22	Painted or Treated Wood	0.00	0.15	0.02	0.00	0.18	0.14
23	Other	0.00	0.96	1.22	0.00	0.33	0.33
	Total	**4.11**	**15.42**	**12.98**	**10.61**	**11.29**	**16.04**

Table F-5: Waste Composition Results for Zone 5

Category		Winter 2021			Fall 2022		
		Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)	Weekly Pilot Organics (kg/HH)	Every Other Week Pilot Garbage (kg/HH)	Weekly Control Garbage (kg/HH)
01	Recyclable Paper	0.07	0.80	0.46	0.08	0.44	0.35
02	Non-Recyclable Paper	0.00	0.27	0.13	0.05	0.16	0.07
03	Food-Soiled Paper	0.20	0.83	0.58	1.02	0.77	0.66
04	Recyclable Glass	0.00	0.28	0.18	0.00	0.29	0.17
05	Other Glass	0.00	0.11	0.25	0.00	0.43	0.06
06	Recyclable Metal	0.00	0.20	0.18	0.00	0.13	0.13
07	Other Metal	0.00	0.12	0.10	0.00	0.05	0.26
08	Recyclable Plastic	0.00	0.54	0.34	0.00	0.48	0.45
09	Compostable and Biodegradable Bag	0.00	0.00	0.01	0.00	0.01	0.00
10	Non-Recyclable Plastic	0.00	1.23	0.77	0.00	1.05	0.69
11	Yard Waste in Compostable Bag	0.00	0.00	0.61	1.31	0.12	0.10
12	Yard Waste - Loose	1.63	0.15	0.14	3.73	0.06	2.27
13	Other Yard Waste	0.00	0.00	1.08	0.00	0.00	0.00
14	Food Waste in Compostable Bag	0.37	0.01	0.01	0.66	0.15	0.01
15	Food Waste in Unacceptable Bag	0.23	2.53	1.69	1.87	2.55	2.56
16	Food Waste - Loose	1.28	1.13	1.85	4.33	1.47	1.19
17	Clean Wood	0.00	0.32	0.01	0.01	0.02	0.02
18	Other Compostable Organics	0.00	0.01	0.01	0.00	0.01	0.01
19	Animal Waste	0.00	2.35	0.97	0.00	1.01	1.48
20	Diapers, Personal Hygiene, HHW	0.01	2.71	1.29	0.01	3.07	0.97
21	Textiles	0.00	0.81	0.72	0.00	0.67	1.24
22	Painted or Treated Wood	0.00	0.92	0.06	0.00	0.01	0.01
23	Other	0.00	1.29	0.50	0.00	1.29	1.56
	Total	**3.78**	**16.62**	**11.93**	**13.06**	**14.22**	**14.28**