



City of Kamloops Organics Pilot 2021 Waste Composition Study



PRESENTED TO
City of Kamloops

FEBRUARY 7, 2022
ISSUED FOR REVIEW
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.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 METHODOLOGY	1
2.1 Sampling Plan – Selected Homes	1
2.2 Collection from Selected Homes	2
2.3 Material Categories	3
3.0 RESULTS	4
3.1 Set Outs and Collection	4
3.2 Waste Generation and Composition	4
3.2.1 Waste Generation	4
3.2.2 Pilot Organic Waste Composition	6
3.2.3 Comparison Pilot and Control Garbage Waste Composition	6
3.2.4 Organic Waste Diversion and Reduction Potential	8
3.3 Waste Generation by Zone	9
3.4 Organic Waste Diversion and Reduction Potential by Zone	10
3.5 SSO Truck Load	11
4.0 SUMMARY AND RECOMMENDATIONS	13
5.0 CLOSURE	15

LIST OF TABLES IN TEXT

Table 2-1: Summary of Homes Sampled	2
Table 3-1: Set Outs and Set Out Rates	4
Table 3-2: Weekly Waste Generated per Household (kg/HH/week)	5
Table 3-3: Overall Garbage Composition in Kg per Household (kg/hh)	7
Table 3-4: Organic Waste Diversion and Reduction Potential	8
Table 3-5: Pilot and Control Garbage Waste Generation per Zone	9
Table 3-6: Diversion Reduction Potential Across 5 Zones	11

LIST OF FIGURES IN TEXT

Figure 2-1: Sample Collection	3
Figure 3-1: Weekly Waste Generation Comparison	5
Figure 3-2: Overall Organic Waste Composition	6
Figure 3-3: Overall Pilot and Control Garbage Composition	8
Figure 3-4: Waste Generation Comparison Across 5 Zones	10
Figure 3-5: SSO Truck Load Contamination	12

APPENDIX SECTIONS

APPENDICES

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
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 organic waste composition study. This part of the study examined the organics composition in curbside residential garbage once the organics waste collection program has been implemented.

The City launched the Curbside Organic Waste Collection Pilot Program for a select number of homes in September 2021. The City provided a source separated organics (SSO) collection service 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 in the City).

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

2.0 METHODOLOGY

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

2.1 Sampling Plan – Selected Homes

Tetra Tech worked with City staff to select a total of 272 homes for the study (152 in the pilot area and 120 in the control area). The selected pilot homes were spread out across 5 pilot zones with different collection days, refer to Appendix D for details. To compare results with the pilot areas, a total of 120 control homes were selected that were in close proximity from 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. 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 organic collected.

Table 2-1: Summary of Homes Sampled

Collection Day	Zone	Pilot	Control	Total Number of Homes
Wednesday, Dec. 8	Zone 3	<ul style="list-style-type: none"> 14 homes in a row (one side) 17 homes in a row (backyards connected with a back alley lane) 	<ul style="list-style-type: none"> 10 homes in a row (one side) 13 homes in a row (backyards connected with a back alley lane) 	54
Thursday, Dec. 9	Zone 4	<ul style="list-style-type: none"> 17 homes in a row within a cul-de-sac 14 homes in a row (one side) 	<ul style="list-style-type: none"> 11 homes in a row (one side) 12 homes in a row (one side) 	54
Friday, Dec. 10	Zone 5	<ul style="list-style-type: none"> 13 homes in a row (one side) 13 homes in a row (one side) 	<ul style="list-style-type: none"> 10 homes in a row (one side) 14 homes in a row within a cul-de-sac 	50
Monday, Dec. 13	Zone 1	<ul style="list-style-type: none"> 15 homes in a row within a cul-de-sac 17 homes in a row within a cul-de-sac 	<ul style="list-style-type: none"> 12 homes in a row (one side) 14 homes in a row (one side) 	58
Tuesday, Dec. 14	Zone 2	<ul style="list-style-type: none"> 16 homes in a row (backyards connected with a back alley lane) 16 homes in a row (backyards connected with a back alley lane) 	<ul style="list-style-type: none"> 10 homes in a row (one side) 14 homes in a row (one side) 	56
Total		152	120	272

2.2 Collection from Selected Homes

Before any material is collected, Tetra Tech staff would conduct a safety tailgate meeting and then scan the area to identify potential safety hazards. Staff would then record 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 also 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 set out.

Tetra Tech staff would transfer the contents within each household's 120 to 360 litres garbage cart and 120 litres organics cart into large separate bags. Only materials that are placed inside the bag would be characterized (as shown on 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 remains anonymous and results were aggregated.

Once the samples were collected, Tetra Tech staff would check that all samples were secured before transporting the collected samples 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 are 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 and results are recorded. Each sample were hand sorted into its respective material category. After sorting each sample, the sorted material categories are weighted and the results are recorded. Photos are also taken before and after sorting to maintain a photo record. All of the sorted garbage and organics were discarded into its designated bin provided by the City.



Figure 2-1: Sample Collection

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-organic are not broken down further into secondary categories and generally consist of materials that are not compostable. The organics category consists of compostable materials and are 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 from the December 2021 sorting event. 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 out, calculating set out rates and recording number of homes where garbage and organics were collected.

Table 3-1 lists the number of set outs from the selected home and calculates set out rate (percent of households that set out their garbage and/or organics carts). Only carts that were placed along the curb or alleyway for easy access by the collection truck is 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 households that set out their garbage also use the SSO program.

Table 3-1: Set Outs and Set Out Rates

Zone	Pilot Area					Control Area		
	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%

3.2 Waste Generation and Composition

3.2.1 Waste Generation

Table 3-2 summarizes the calculated amount of waste generated on a weekly basis, in kilograms per household (HH) per week. The following discusses the results of each stream from their respective areas.

- For the organics stream, the average amount of material collected from households that set out organic carts was 3.37 kg/HH/week. The composition of the organics stream is 3.32 kg/HH compostable material and 0.05 kg/HH non-organic material.

- For garbage in the pilot areas, the average amount of garbage collected from households that set out garbage carts waste 17.1 kg/HH. This garbage is collected EOW in the pilot areas, the amount of garbage 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 calculated to be 3.04 kg/HH compostable materials and 5.51 kg 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 non-organic material.

Table 3-2: 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	14.86

¹ Calculated figure since garbage from the pilot area is collected EOW and consists of garbage that has accumulated over a 2 week period.

Figure 3-1 illustrates the average weekly collection on a per household basis for each stream collected. To provide a representative comparison of the average materials discarded per household, 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 combine compostable material in the pilot organics and pilot garbage streams.

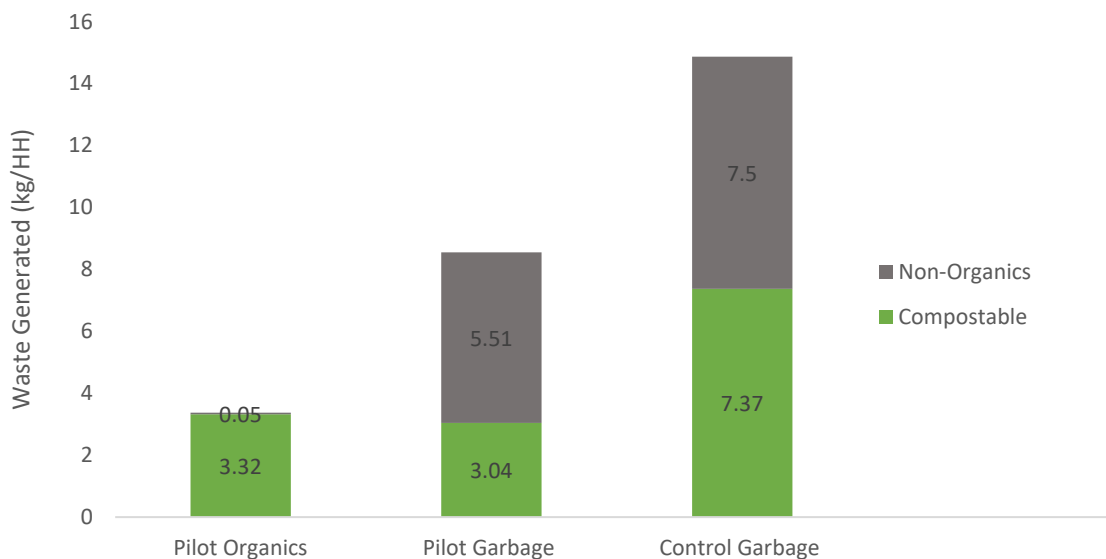


Figure 3-1: Weekly Waste Generation Comparison

3.2.2 Pilot Organic Waste Composition

Figure 3-2 shows the organic waste stream composition for all five zones. 98% of the organics stream is considered compostable. The majority of the compostable material is 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.

Contamination rate in the organics stream is 2%. Contaminants are non-organic materials (i.e., plastics, glass, and metal). It should also be noted that there were 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 the composting facility that the City contracts with. These items takes much longer to breakdown and leave microplastics behind reducing the quality of the compost product.

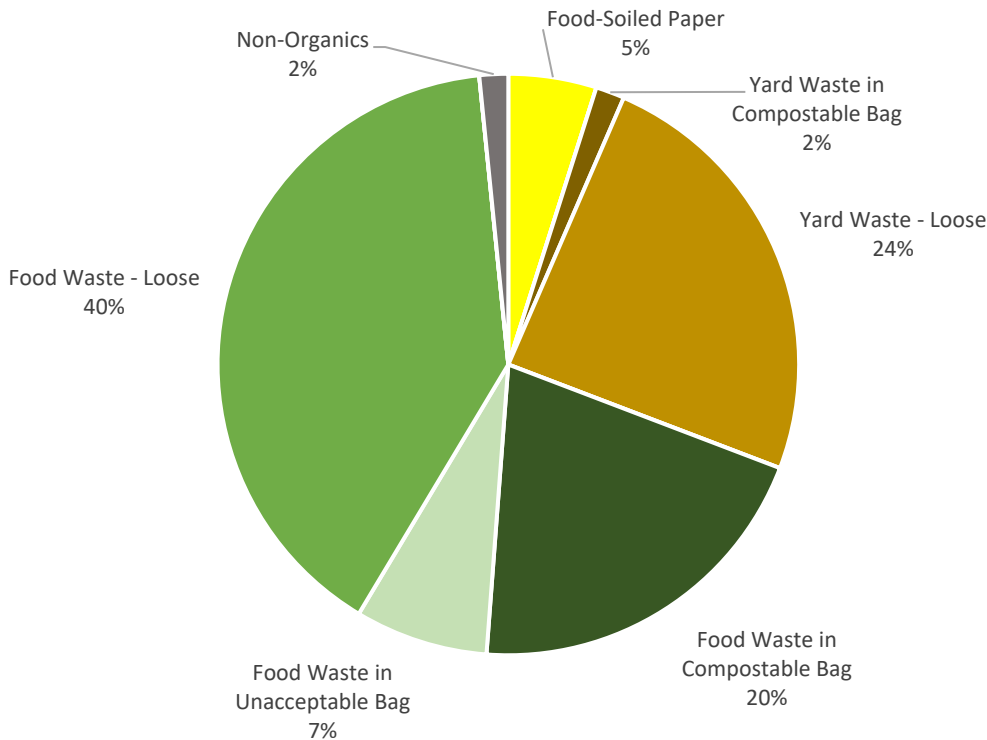


Figure 3-2: Overall Organic Waste Composition

3.2.3 Comparison Pilot and Control Garbage Waste Composition

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

Overall, the households in the control areas generated more garbage than the households in the pilot areas (8.55 kg/HH/week vs. 14.86 kg/HH/week). Households in the control areas have no organics collection service and

discarded more than twice the amount of compostables compared to household in the pilot areas (7.37 kg/HH vs. 3.04 kg/HH).

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

	Pilot Garbage (kg/HH)	Control Garbage (kg/HH)
Compostable	3.04	7.37
Food-Soiled Paper	0.42	0.74
Compostable or Biodegradable Bags	0.00	0.01
Yard Waste in Compostable Bag	0.19	0.13
Yard Waste - Loose	0.04	0.24
Other Yard Waste	0.01	0.22
Food Waste in Compostable Bag	0.05	0.11
Food Waste in Unacceptable Bag	1.32	2.52
Food Waste - Loose	0.96	3.38
Clean Wood	0.04	0.01
Other Compostable Organics	0.01	0.01
Non-Organics	5.51	7.50
Total	8.55	14.86

Figure 3-3 compares the composition of pilot and control garbage in percentage to demonstrate if there are difference between the two areas.

Non-organics make up the majority of the pilot area and control area garbage (pilot - 64% and control - 50%). Compostables in pilot garbage stream consists primarily of food waste in unacceptable bag (15%), food waste-loose (11%), and food-soiled paper (5%). Compostable in control garbage consist 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 shows that the most significant difference is on the amount of loose food waste (12% difference). The overall difference of compostable between pilot and control garbage is also 14%.

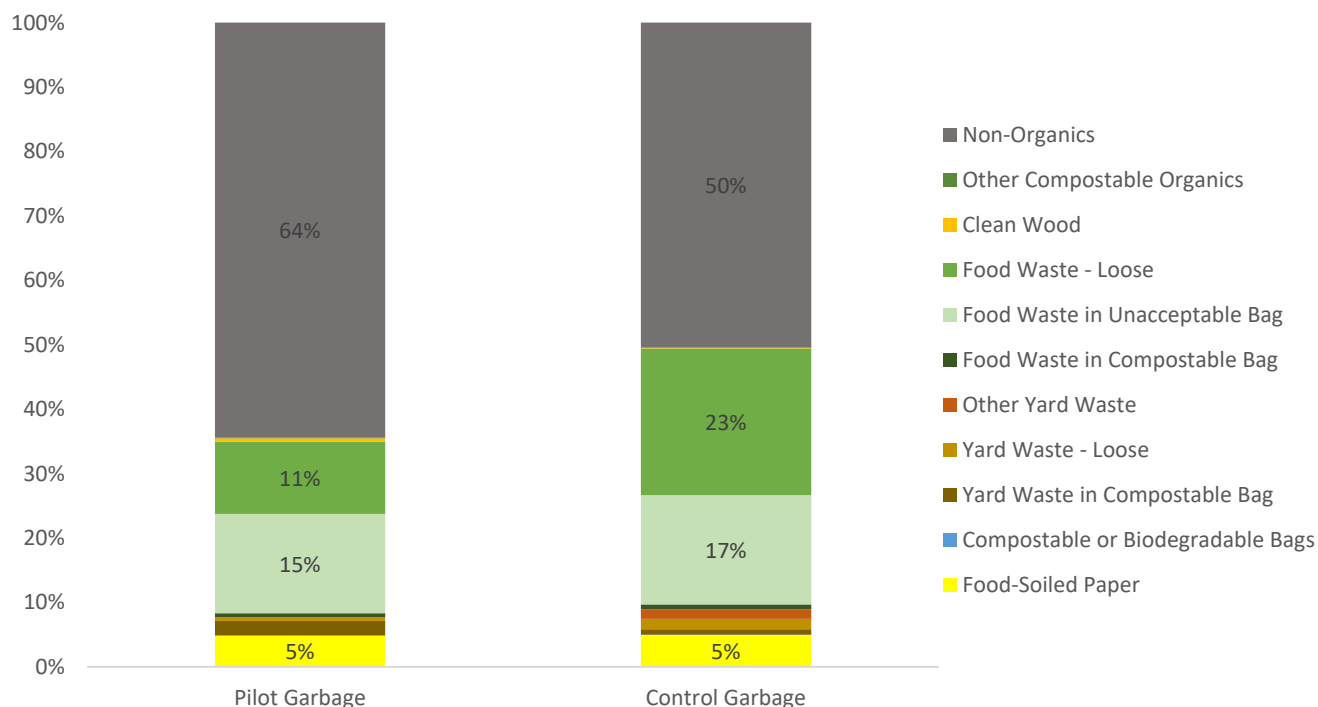


Figure 3-3: Overall Pilot and Control Garbage Composition

3.2.4 Organic Waste Diversion and Reduction Potential

This section summarizes the overall organic waste diversion and reduction potential as shown in Table 3-4. The average amount of waste (garbage + organics) discarded is 11.93 kg/HH. 3.37 kg/HH was diverted into the organics stream which is calculated to be 28% of the materials discarded. The amount of organic materials in pilot garbage stream is 3.04 kg/HH (35.6% of garbage). The percent capture rate is 53%, it was calculated by dividing the amount of organics diverted by the sum of the amount 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 is low which is at 1.6% of the amount of organic waste diverted.

Only households that use organics cart in pilot areas were collected and sorted. These households only represented 43% 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 household that used their organics cart. Pilot household that don't use organics cart would have a similar result with control household.

Table 3-4: Organic Waste Diversion and Reduction Potential

Parameter – Every-Other-Week	Values
Pilot - Organics diverted (kg/HH)	3.37
Pilot Garbage disposed (kg/HH)	8.55
Pilot - Total waste (garbage and organics) (kg/HH)	11.93
Control - Garbage (kg/HH)	14.86

Parameter – Every-Other-Week	Values
% diversion (excluding recyclables)	28%
% organics in pilot garbage	35.6%
Organic materials in garbage (kg/HH)	3.04
% capture or recovery rate	53%
% contamination (%)	1.6%

3.3 Waste Generation by Zone

Table 3-5 summarizes the amount of waste generated in kilograms per household 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.

Figure 3-4 compares the waste generated from the pilot and control areas across five zones. The overall average was shown in horizontal line to show the comparison between zones and the overall waste generated. Fluctuations could be observed when comparing zone by zone.

Table 3-5: Pilot and Control Garbage Waste Generation per Zone

Zone	Pilot Organics (kg/HH)	Pilot Garbage (kg/HH)	Control Garbage (kg/HH)
Zone 1	3.68	6.31	16.97
Zone 2	3.90	10.39	17.85
Zone 3	1.41	10.05	14.59
Zone 4	4.11	7.71	12.98
Zone 5	3.78	8.31	11.93
Overall Average	3.37	8.55	14.86

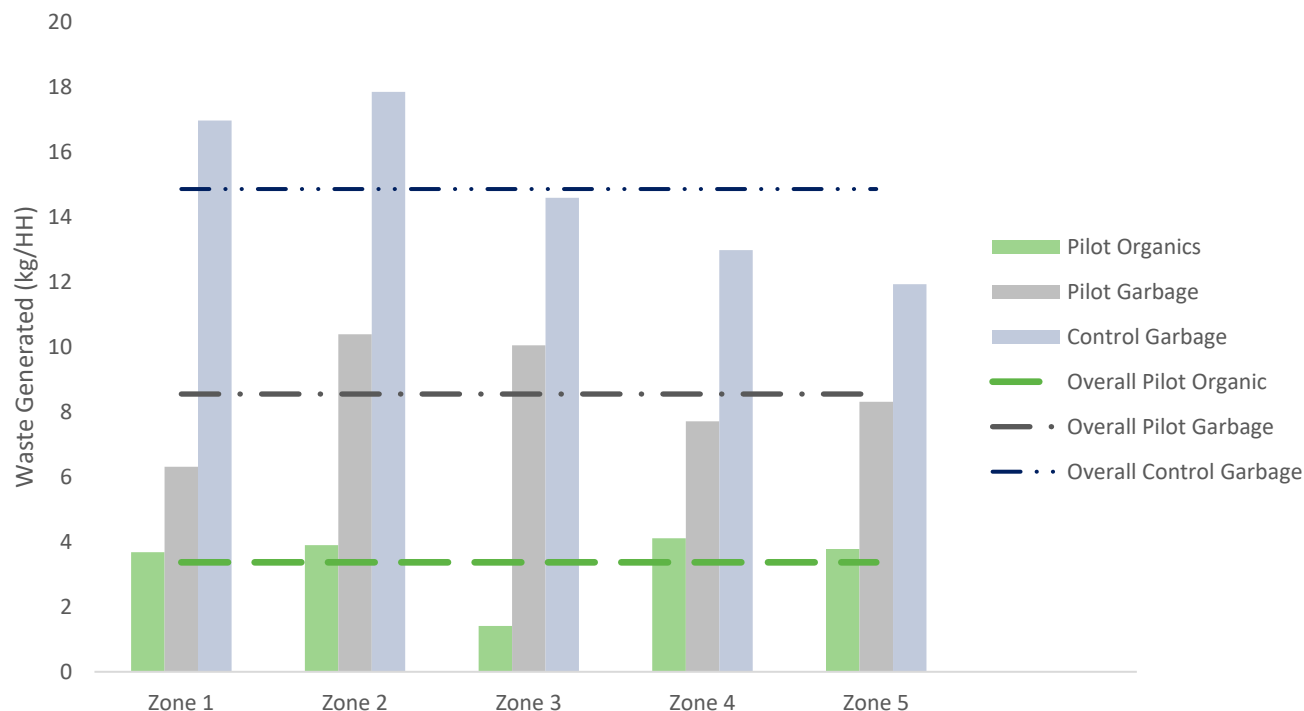


Figure 3-4: Waste Generation Comparison Across 5 Zones

3.4 Organic Waste Diversion and Reduction Potential by Zone

Table 3-6 summarizes the diversion and reduction potential across the five zones. Notable metrics are discussed below:

- The amount of organic waste diverted is within 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.
- Diversion rate is within 12% to 37% across 5 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 percent capture rate is within 28% to 72% range.
- Contamination rate is relatively low and ranges from 0.3% to 2.1% of the amount of organic waste diverted.

Only households that use organics cart in pilot areas across five zones were collected and sorted. These households represented 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 household that used their organics cart. Pilot household that don't use organics cart would have a similar result with control household.

Table 3-6: Diversion Reduction Potential Across 5 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%

3.5 SSO Truck Load

Figure 3-5 illustrates the composition of contaminants in the SSO truck load. 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 is primarily composed of organics (98.4%) and contaminants (1.6%). This load may not be as contaminated as compared to 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 on the photos below (Photos 1 to 6).

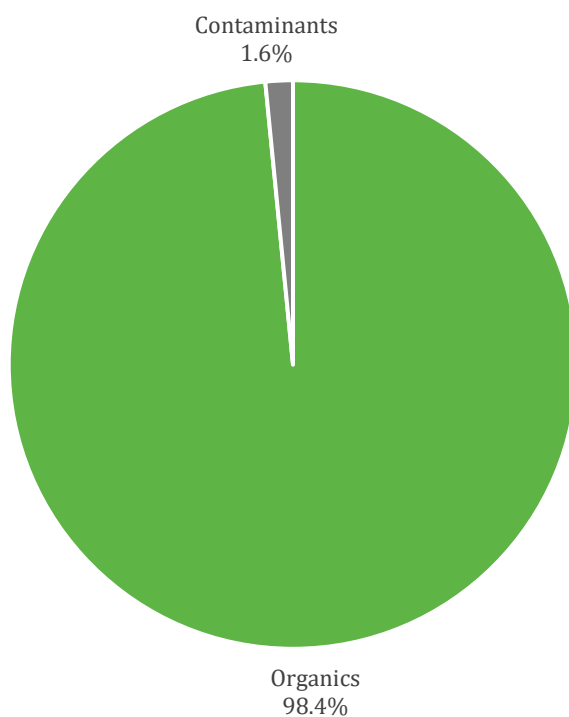


Figure 3-5: SSO Truck Load Contamination



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 are commentary for on-site observations and interpretation of the results obtained.

- Early indications suggest that residents in the Organics Pilot Study are using their green carts and diverting organic materials out of the garbage stream and into the SSO stream. Based on 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 households.

Tetra Tech has identified the following recommendations, including opportunities for education and communication to support the future roll out 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 your 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 impact of service 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.

ISSUED FOR REVIEW
FILE: 704-SWM.PLAN03216-02
FILE: 704-SWM.PLAN03216-02
FILE: 704-SWM.PLAN03216-02

ISSUED FOR REVIEW
FILE: 704-SWM.PLAN03216-02
FILE: 704-SWM.PLAN03216-02
FILE: 704-SWM.PLAN03216-02

Prepared by:
Francis Tantia
Project Technologist
Solid Waste Management Practice
Direct Line: 587.969.3352
Francis.Tantia@tetrattech.com

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

ISSUED FOR REVIEW
FILE: 704-SWM.PLAN03216-02
FILE: 704-SWM.PLAN03216-02
FILE: 704-SWM.PLAN03216-02

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

/lc

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

What Can Go In Your Organics Cart?

✓ All Food (Raw & Cooked):

- plate scrapings
- fruit and vegetables, including pits—remove stickers and put them in your garbage
- meat, poultry, and bones
- fish, seafood, shellfish, and shells
- bread, grains, pasta, rice, and cereal
- pastries, cookies, cakes, and muffins
- eggs and eggshells
- cheese, sour cream, and dairy products
- cooking oil, fats, and grease—soak liquids in paper towel or allow to solidify before adding to the cart
- condiments, sauces, gravy, and jams

✓ Food-Soiled Paper:

- used paper plates
- greasy/dirty pizza boxes (clean boxes can go into recycling)
- food-soiled paper packaging (e.g. paper take-out containers without wax or plastic lining)
- newspaper holding food scraps
- coffee grounds, filters, and tea bags
- food-soiled paper towels and napkins
- used tissue (e.g. Kleenex)
- used paper towel

✓ Yard Waste:


- leaves, cones, needles, and berries
- plants, tree fruits, and flowers
- small branches, twigs, and prunings no larger than 30 cm in length (1 foot) and 2 cm in diameter (~1 inch)
- grass clippings and weeds (**note:** no noxious weeds, such as knapweed, or invasive plants—take these to the landfill for free; for a list of noxious weeds and invasive plants, visit [Kamloops.ca/invasivespecies](https://kamloops.ca/invasivespecies))
- potting soil and untreated mulch
- hay, straw, and coconut planter liners

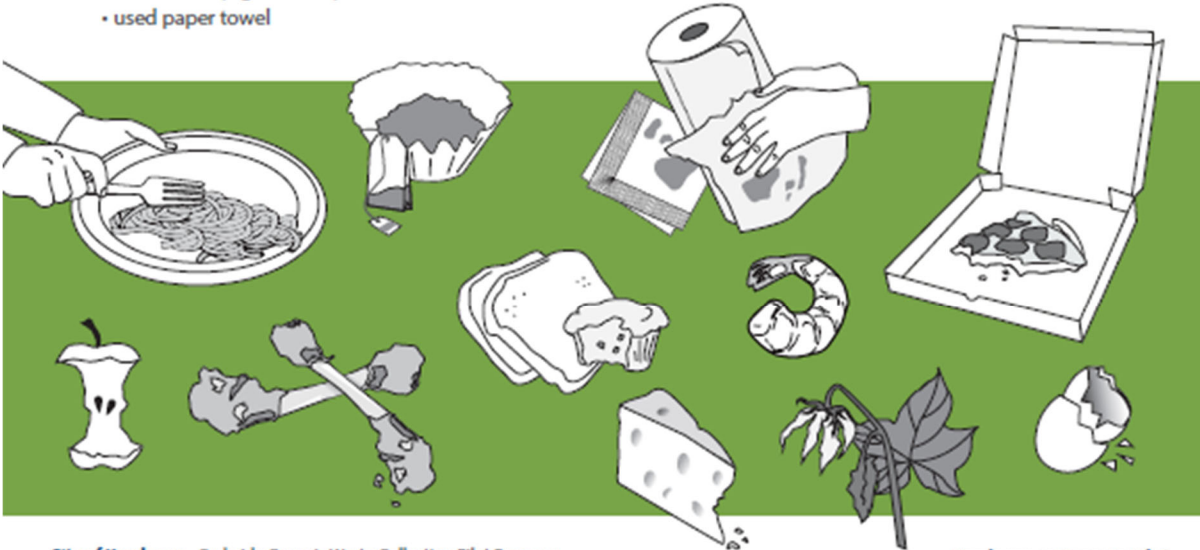
✓ Pet-Related Waste:

- animal bedding from pet cages (hamsters, guinea pigs, birds, etc.)
- pet fur, hair, and feathers
- pet food and treats

✓ Other Items:

- wood shavings—must be placed and secured in a paper bag
- wood popsicle sticks, chopsticks, skewers, and toothpicks





City of Kamloops - Curbside Organic Waste Collection Pilot Program

Kamloops.ca/OrganicsPilot

Figure B-2: Unacceptable Materials in Organics Cart

What Can't Go In Your Organics Cart?


 Canada's Tournament Capital

 <p>NO plastic bags or bin liners Plastic bags, packaging, and soft plastics can be taken to a Recycle BC depot.</p>	 <p>NO straws, twist ties, or elastic bands These items belong in the garbage.</p>
 <p>NO compostable or biodegradable plastics Compostable plastics go in the garbage. Even if the bag is labelled as compostable, it is NOT accepted in our program. Items marked as "compostable" or "biodegradable" do not fully break down in the composting facility and leave behind small pieces of plastic. Contamination reduces the quality of the finished compost.</p>	 <p>NO painted or treated wood These items can be recycled at City landfills. This includes pressure-treated wood, manufactured wood (plywood, particle board, oriented strand board [OSB], wood paneling, and furniture), wood, bamboo, and wicker.</p>
 <p>NO plastic plates or cutlery These items belong in the garbage. This includes plastic plates; plastic spoons, forks, and knives; and compostable plastic takeout containers (cups, plates, bowls, utensils, etc.).</p>	 <p>NO clothing, textiles, or fabrics These items can be donated in textile bins. This includes clothes, fabric, linens, cushions, and pillows.</p>
 <p>NO food or beverage packaging <i>(except food-soiled paper containers as noted in accepted items)</i> These can be rinsed and recycled in your recycling cart or at a depot. This includes coffee cups, meat trays, metal food cans, plastic containers and tubs, plastic bottles, and jars.</p>	 <p>NO diapers or personal hygiene items These items belong in the garbage. This includes cleaning wipes, cotton swabs/Q-tips, diapers, wipes (baby wipes, cosmetic wipes, etc.), tampons, applicators, sanitary napkins and menstrual pads, and cotton balls.</p>
 <p>NO styrofoam cups and containers Styrofoam cups, containers, plates, and packaging materials can be taken to a Recycle BC depot.</p>	 <p>NO rocks or dirt Rocks and dirt can be taken to City landfills. Loads must be free of any contaminants such as garbage, branches, and construction waste.</p>
 <p>NO animal waste Items such as pet feces and cat litter belong in the garbage.</p>	

City of Kamloops - Curbside Organic Waste Collection Pilot Program

[Kamloops.ca/OrganicsPilot](https://kamloops.ca/OrganicsPilot)

APPENDIX C

SELECTED PHOTOGRAPHS



Photo 1: Field staff sorting a sample at the sorting area



Photo 2: Field staff collecting materials from the curb



Photo 3: A typical pilot area garbage sample



Photo 4: A typical control area garbage sample



Photo 5: A typical pilot area organics sample



Photo 6: Source separated organics from a truck load sample



Photo 7: Example of contamination - food waste in unacceptable bags



Photo 8: Example of food-soiled paper



Photo 9: Example of yard waste in compostable bag



Photo 10: Example of yard waste in an unacceptable bag (plastic garbage bag)



Photo 11: Example of other compostable organics



Photo 12: Example of loose yard waste



Photo 13: Example of loose food waste



Photo 14: Example of food waste in compostable bag



Photo 15: Example of clean wood



Photo 16: Example of compostable or biodegradable bag



Photo 17: Example of other yard waste



Photo 18: Example of non-organics: non-recyclable plastic

APPENDIX D

MAPS

Figure D-1: City of Kamloops Zone Boundaries

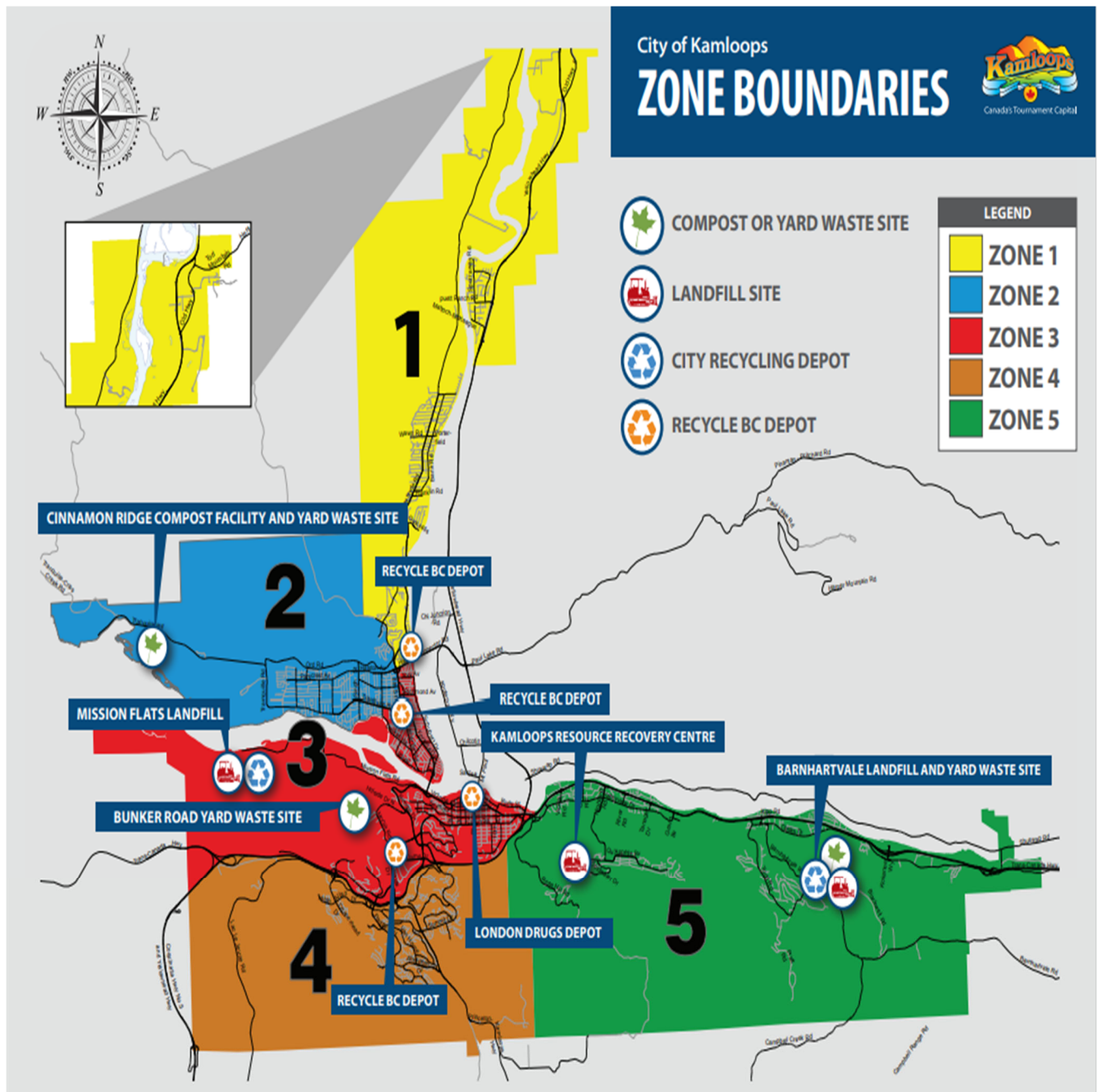


Figure D-2: Zone 1 Pilot Area

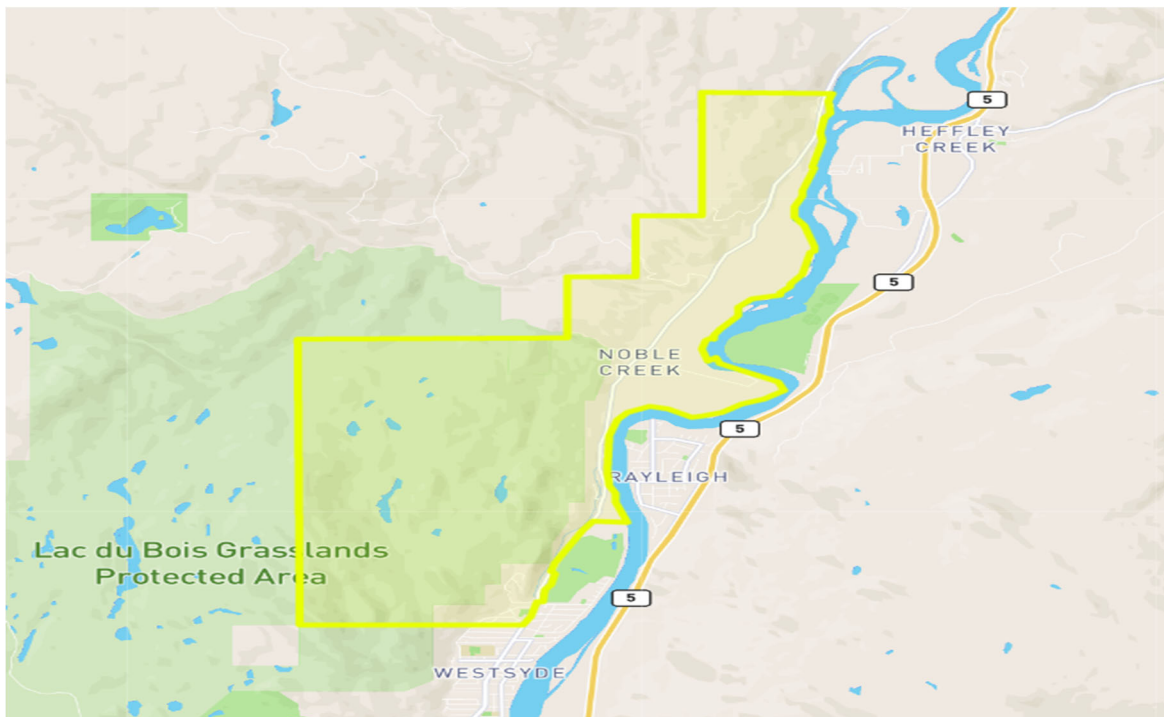


Figure D-3: Zone 2 and 3 Pilot Area



Figure D-4: Zone 4 Pilot Area

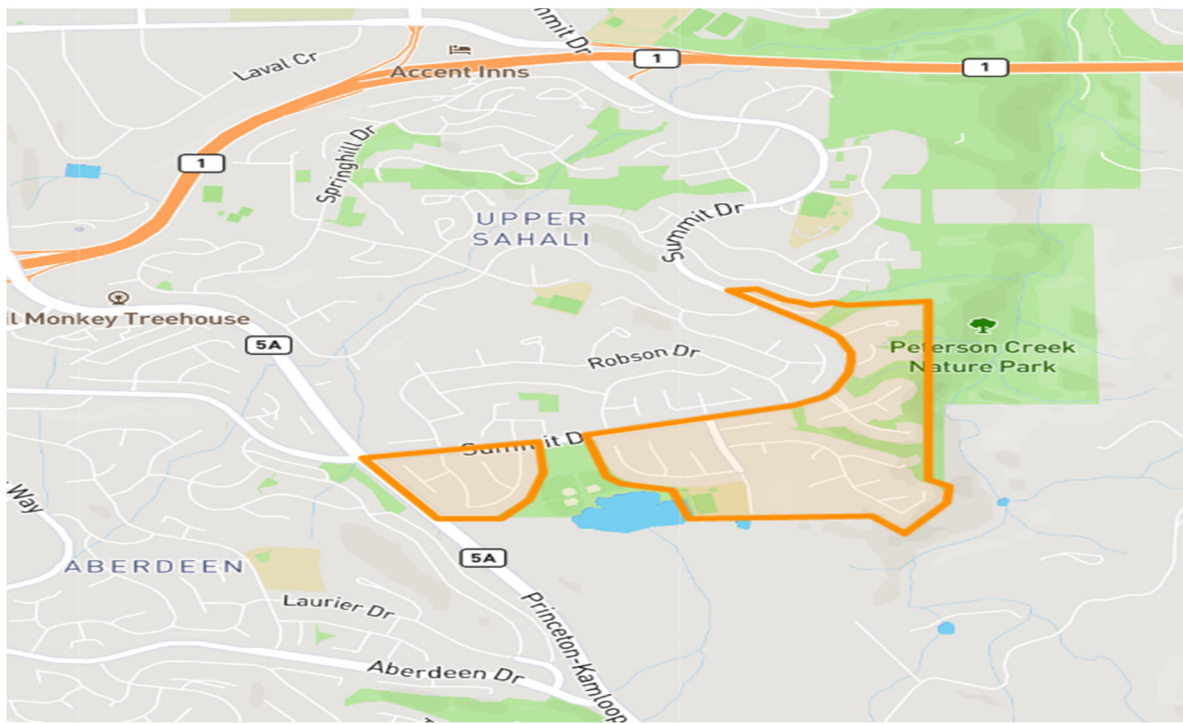
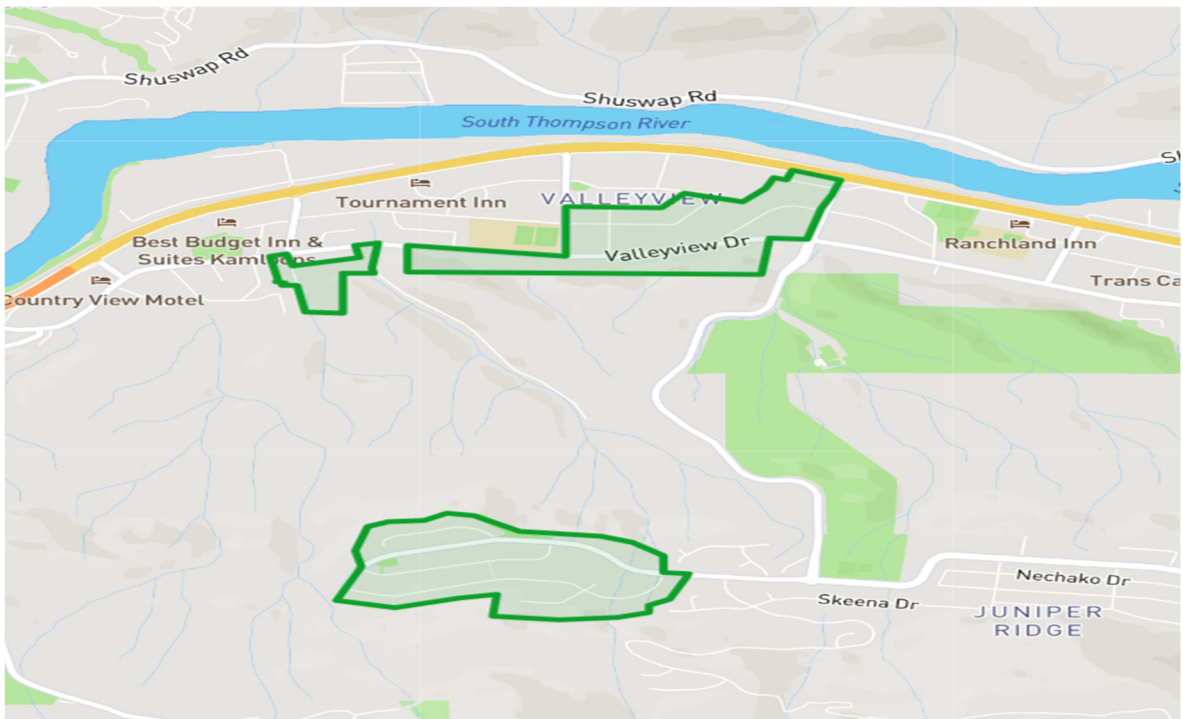


Figure D-5: Zone 5 Pilot Area



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		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
02	Non-Recyclable Paper	0.02	0.24	0.24
03	Food-Soiled Paper	0.22	0.47	0.70
04	Recyclable Glass	0.00	0.34	0.24
05	Other Glass	0.00	0.08	0.12
06	Recyclable Metal	0.00	0.13	0.21
07	Other Metal	0.00	0.06	0.15
08	Recyclable Plastic	0.00	0.35	0.44
09	Compostable and Biodegradable Bag	0.00	0.00	0.00
10	Non-Recyclable Plastic	0.01	1.33	1.13
11	Yard Waste in Compostable Bag	0.01	0.00	0.01
12	Yard Waste - Loose	0.91	0.03	0.55
13	Other Yard Waste	0.00	0.00	0.00
14	Food Waste in Compostable Bag	1.08	0.05	0.15
15	Food Waste in Unacceptable Bag	0.25	1.18	2.32
16	Food Waste - Loose	1.14	1.15	4.66
17	Clean Wood	0.00	0.01	0.01
18	Other Compostable Organics	0.00	0.04	0.02
19	Animal Waste	0.00	4.85	1.84
20	Diapers, Personal Hygiene, HHW	0.00	1.13	0.69
21	Textiles	0.00	0.29	0.46
22	Painted or Treated Wood	0.00	0.02	0.49
23	Other	0.00	0.36	1.92
	Total	3.68	12.62	16.97

Table F-2: Waste Composition Results for Zone 2

Category		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
02	Non-Recyclable Paper	0.01	0.29	0.19
03	Food-Soiled Paper	0.12	0.97	0.88
04	Recyclable Glass	0.00	0.67	0.21
05	Other Glass	0.00	0.16	0.02
06	Recyclable Metal	0.00	0.28	0.18
07	Other Metal	0.00	0.05	0.37
08	Recyclable Plastic	0.00	0.69	0.67
09	Compostable and Biodegradable Bag	0.00	0.00	0.00
10	Non-Recyclable Plastic	0.00	1.44	1.22
11	Yard Waste in Compostable Bag	0.26	1.89	0.00
12	Yard Waste - Loose	0.85	0.15	0.48
13	Other Yard Waste	0.00	0.00	0.00
14	Food Waste in Compostable Bag	0.44	0.23	0.29
15	Food Waste in Unacceptable Bag	0.29	3.95	3.89
16	Food Waste - Loose	1.87	3.15	3.70
17	Clean Wood	0.00	0.06	0.02
18	Other Compostable Organics	0.00	0.05	0.02
19	Animal Waste	0.00	1.11	1.25
20	Diapers, Personal Hygiene, HHW	0.00	2.05	1.02
21	Textiles	0.00	0.78	0.78
22	Painted or Treated Wood	0.00	0.68	0.03
23	Other	0.00	1.13	1.44
	Total	3.90	20.79	17.85

Table F-3: Waste Composition Results for Zone 3

Category		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
02	Non-Recyclable Paper	0.01	0.24	0.16
03	Food-Soiled Paper	0.07	1.10	0.74
04	Recyclable Glass	0.00	0.34	0.33
05	Other Glass	0.00	0.15	0.16
06	Recyclable Metal	0.00	0.30	0.17
07	Other Metal	0.00	0.15	0.15
08	Recyclable Plastic	0.00	0.76	0.77
09	Compostable and Biodegradable Bag	0.00	0.00	0.01
10	Non-Recyclable Plastic	0.00	1.32	0.82
11	Yard Waste in Compostable Bag	0.00	0.00	0.03
12	Yard Waste - Loose	0.47	0.07	0.01
13	Other Yard Waste	0.00	0.04	0.02
14	Food Waste in Compostable Bag	0.12	0.15	0.06
15	Food Waste in Unacceptable Bag	0.32	2.92	2.72
16	Food Waste - Loose	0.39	2.94	2.96
17	Clean Wood	0.00	0.01	0.01
18	Other Compostable Organics	0.00	0.00	0.01
19	Animal Waste	0.00	3.51	2.16
20	Diapers, Personal Hygiene, HHW	0.00	2.60	1.06
21	Textiles	0.00	1.01	0.45
22	Painted or Treated Wood	0.00	0.02	0.01
23	Other	0.00	1.61	0.62
	Total	1.41	20.10	14.59

Table F-4: Waste Composition Results for Zone 4

Category		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
02	Non-Recyclable Paper	0.00	0.26	0.15
03	Food-Soiled Paper	0.21	0.80	0.78
04	Recyclable Glass	0.00	0.73	0.26
05	Other Glass	0.00	0.21	0.16
06	Recyclable Metal	0.00	0.23	0.17
07	Other Metal	0.00	0.26	0.01
08	Recyclable Plastic	0.00	0.65	0.55
09	Compostable and Biodegradable Bag	0.00	0.01	0.01
10	Non-Recyclable Plastic	0.01	1.70	0.84
11	Yard Waste in Compostable Bag	0.00	0.04	0.00
12	Yard Waste - Loose	0.24	0.02	0.02
13	Other Yard Waste	0.00	0.03	0.00
14	Food Waste in Compostable Bag	1.43	0.10	0.06
15	Food Waste in Unacceptable Bag	0.17	2.61	1.99
16	Food Waste - Loose	2.04	1.22	3.74
17	Clean Wood	0.00	0.03	0.01
18	Other Compostable Organics	0.00	0.02	0.02
19	Animal Waste	0.00	1.73	0.98
20	Diapers, Personal Hygiene, HHW	0.00	2.08	1.34
21	Textiles	0.00	0.99	0.19
22	Painted or Treated Wood	0.00	0.15	0.02
23	Other	0.00	0.96	1.22
	Total	4.11	15.42	12.98

Table F-5: Waste Composition Results for Zone 5

Category		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
02	Non-Recyclable Paper	0.00	0.27	0.13
03	Food-Soiled Paper	0.20	0.83	0.58
04	Recyclable Glass	0.00	0.28	0.18
05	Other Glass	0.00	0.11	0.25
06	Recyclable Metal	0.00	0.20	0.18
07	Other Metal	0.00	0.12	0.10
08	Recyclable Plastic	0.00	0.54	0.34
09	Compostable and Biodegradable Bag	0.00	0.00	0.01
10	Non-Recyclable Plastic	0.00	1.23	0.77
11	Yard Waste in Compostable Bag	0.00	0.00	0.61
12	Yard Waste - Loose	1.63	0.15	0.14
13	Other Yard Waste	0.00	0.00	1.08
14	Food Waste in Compostable Bag	0.37	0.01	0.01
15	Food Waste in Unacceptable Bag	0.23	2.53	1.69
16	Food Waste - Loose	1.28	1.13	1.85
17	Clean Wood	0.00	0.32	0.01
18	Other Compostable Organics	0.00	0.01	0.01
19	Animal Waste	0.00	2.35	0.97
20	Diapers, Personal Hygiene, HHW	0.01	2.71	1.29
21	Textiles	0.00	0.81	0.72
22	Painted or Treated Wood	0.00	0.92	0.06
23	Other	0.00	1.29	0.50
	Total	3.78	16.62	11.93