



Maura Walker & Associates  
ENVIRONMENTAL CONSULTANTS

## City of Whitehorse

### 2017-18 Waste Composition Study



**Date:** October 16, 2018



**Maura Walker & Associates**  
ENVIRONMENTAL CONSULTANTS

October 16, 2018

Bryna Cable, Environmental Coordinator  
Planning & Sustainability Services  
City of Whitehorse  
2121 2nd Ave.  
Whitehorse, YT Y1A 1C2

Dear Bryna,

Re: 2017/2018 Waste Composition Study

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We are pleased to submit this report that presents the results of the winter and summer waste composition studies, provides an estimate of the current annualized waste composition, and compares this data to the results of the study conducted in November 2009 and July 2010.

The data presented in this report is intended to represent the estimated composition waste disposed by City of Whitehorse homes, businesses, institutions and construction/demolition projects. Other forms of waste received at the landfill and waste received from the outside communities (through the Yukon Government) were not included in this study.

We enjoyed working with your enthusiastic sorting crews on this project. Their professionalism combined with sense of humour were invaluable. We would also like to recognize the cooperation and assistance provided by staff and contractors at the landfill site and composting facility. We appreciate the significant effort made by all to make this project successful.

Thank you for the opportunity to undertake this study.

Yours truly,

**Maura Walker, President**  
MWA Environmental Consultants Ltd.  
d.b.a. Maura Walker and Associates



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- B. Summer Composition of the City of Whitehorse Landfilled Waste (July 2017)
- C. Annualized Waste Composition of the City of Whitehorse Landfilled Waste (2017/18)

## 1. Introduction

The City of Whitehorse undertook on a two-season waste composition study to provide them with information about the types of waste materials disposed in the Son of War Eagle Landfill and their relative quantities. A similar study was undertaken in 2009 and 2010, which allows us to see how the composition has changed. The information derived from this study can provide insight into the effectiveness of current programs and policies and assist in identifying potential opportunities to further increase diversion.

This report presents the following information:

1. Results of the November 2017 waste composition exercise, representing waste disposed during the winter/low tourism season
2. Results of the July 2018 waste composition exercise, representing waste disposed during the summer/high tourism season
3. Annualized data, representing the overall waste composition of the City of Whitehorse's landfilled waste
4. A comparison of the 2017/18 data with data from 2009/10.

The study provides an estimate of the material composition of the landfilled waste by the type of waste disposed (glass, paper, cardboard, food, etc.) based on weight. It also looks at the composition of each of the major sources of waste within the City of Whitehorse, including: the City's curbside residential program, industrial/commercial/institutional (ICI) waste and construction/demolition (CD) waste. Other forms of waste received at the landfill and waste received from the outside communities (through the Yukon Government) were not included in this study.

The resulting data provides a picture of the *proportion of each material type* being landfilled in comparison to the other material types landfilled at the same time. Because this report compares the results of this study to one done eight years ago (in Section 6), it's important to note that if the proportion of a specific material has increased or decreased since the previous study was completed, this does not mean that the actual quantity of that material increased or decreased, but rather that the percentage of "the landfill pie" it makes up changed only relative to the other material components.

The reader is cautioned that the estimate of composition provided in this report is based on a limited number of samples collected over two 5-day periods and, as such, reflects only a snapshot of the waste received at the facility. The data provided herein is most useful at a high level, such as the estimated winter and summer composition, and the annualized data (Figures 3-1, 3-5 and 4-1 respectively). The margin of error increases as the data gets more parsed, including the estimates of secondary material categories and the sector-specific data.

## 2. Methodology

The methodology employed for this study was based on the Canadian Council of Ministers of the Environment (CCME)'s *Recommended Waste Characterization Methodology for Direct Waste Analysis Studies in Canada* (1999) and the sorting categories were tailored to accommodate the data needs of the City.

### 2.1 Sorting Categories

The waste sorting categories for the waste composition study were developed in 2009 in consultation with City staff and Raven Recycling. For the 2017/18 study, the categories were reviewed and revised slightly in consultation with City staff to reflect changes in packaging and policy since 2009, particularly associated with product

stewardship initiatives, while ensuring that the resultant data would still be comparable to the 2009/10 study results. There were 57 sorting categories used in this study, as shown in Table 1.

**Table 2-1. Waste Categories**

CATEGORY	DEFINITION/EXAMPLES
<b>PAPER</b>	
1 office paper	white and coloured office paper, envelopes, junk mail
2 newsprint	newspapers and flyers
3 cardboard	un-waxed corrugated cardboard
4 waxed cardboard	corrugated cardboard coated with a material to render it moisture resistant
5 mixed waste paper	boxboard, construction paper, directories, paper tubes, paper bags
<b>GLASS</b>	
6 beverage	all containers of ready-to-drink beverages
7 glass packaging	jars and bottles
8 other glass	window, mirror, drinking glass
<b>METAL</b>	
9 beverage	all containers of ready-to-drink beverages
10 metal packaging	for food and other goods
11 other metal – magnetic (steel)	all metal (or mostly metal items) to which a magnet sticks- e.g. pipe, keys
12 other metal non-magnetic (aluminum, copper)	all metal (or mostly metal items) to which a magnet DOES NOT stick- e.g. siding
<b>PLASTIC</b>	
13 beverage container	all containers of ready-to-drink beverages
14 #1 packaging	containers and items labeled with #1
15 #2 – cloudy/translucent packaging	uncoloured containers and items labeled with #2
16 #2 – coloured/opaque packaging	coloured containers and items labeled with #2
17 polystyrene foam (e.g. Styrofoam)	foam packing materials, meat trays, etc.
18 other rigid plastic – holds a shape	all other rigid plastic containers and items
19 soft plastic (bags and wrap)	grocery bags, clean plastic wrap, dry cleaner bags, etc.
<b>ORGANICS</b>	
20 yard waste (leaves, grass)	leaves, grass, weeds, tree trimmings less than 5 cm diameter
21 food waste	vegetables, grains, meat, dairy, bones, baked goods
22 compostable paper (tissue, toweling)	tissues, paper towels, napkins, paper plates (no plastic coating)
<b>COMPOSITE (items made of more than one material)</b>	
23 gable-top beverage	ready-to-drink beverages in cartons
24 Tetrapak beverage	all Tetrapaks (drink boxes) of ready-to-drink beverages
25 multi-laminate rigid packaging	combinations of plastic / paper / foil e.g., soup boxes, frozen juice, ice cream carton
26 multi-laminate soft packaging	combinations of plastic / paper / foil, e.g. chip bags, zippered plastic pouches, dog food
27 durable goods	products made with more than one type of material; e.g, furniture, shoes, binders, etc.
<b>WOOD</b>	
28 clean structural wood waste	unpainted pallets, construction off-cuts
29 treated/coated wood waste	plywood, OSB, painted/stained wood, pressure treated lumber
30 landclearing (stumps, trees, branches)	stumps, trees, branches larger than 5 cm diameter

<b>INERT</b>		
31	soil, sand, concrete, brick,	rocks, brick, block, tiles, toilets, ceramics, dirt, clay pots, etc.
32	stove ash	ash from wood stoves and fireplaces
<b>GYPSUM WALLBOARD</b>		
33	drywall	painted or unpainted drywall (also referred to as Gyproc)
<b>TEXTILES</b>		
34	clothing/fabric	clothing, blankets, towels, etc.
35	industrial fabrics	dryer lint and dryer sheets
36	other	non-cloth textiles e.g. leather
<b>RUBBER</b>		
37	tires	vehicle and bike tires
38	other	any other item made of rubber, e.g. rubber hose, flip flops, rubber gloves
<b>CARPET AND UNDERLAY</b>		
39	carpet	
40	underlay	
<b>ELECTRONIC WASTE</b>		
41	audio-visual (TVs, stereos, DVD players)	all electrical AV equipment
42	CPUs and Computer-related items	all electrical computer-related items, e.g. monitor, processor, laptop, keyboard, mouse
43	other electronic	all other electronic goods that plug in or are battery operated
<b>PERSONAL HYGIENE</b>		
44	diapers, sanitary products, gauze	
<b>HAZARDOUS</b>		
45	paint	
46	paint containers (empty or dry)	
47	motor oil filters	
48	motor oil containers	
49	batteries - alkaline	AA, C, D, 9V, etc.
50	batteries- rechargeable	ni-cad, button-cell, lithium ion, etc.
51	other hazardous	has a toxic warning label/symbol on the container
<b>BIOMEDICAL</b>		
52	medicine	
53	other (syringes, tubing, needles)	
<b>PET WASTE</b>		
54	kitty litter and animal waste	
<b>FINES</b>		
55	items under 2 cm	
<b>FIBERGLASS INSULATION</b>		
56	fiberglass insulation	
<b>OTHER</b>		
57	miscellaneous	does not fit into one of the above categories

## 2.2 Sampling Strategy and Schedule

The sampling strategy, shown in Table 2, identifies how many samples of each waste stream type (residential, ICI, CD) was targeted for each sampling exercise, based on the relative proportion of each delivered to the landfill for disposal using scale data for the same month from the previous year.

The total number of samples targeted for each sorting exercise (35) was based on available budget and consistency with the study methodology from 2009/10.

**Table 2-2. Sampling Strategy**

Waste Source	Target # of Samples (November)	Target # of Samples (July)
<b>City Curbside Residential</b>	4	4
<b>Industrial, Commercial and Institutional</b>	17	13
<b>On-Site Transfer Bins (ICI)</b>	2	1
<b>Construction Demolition</b>	9	12
<b>On-Site Transfer Bins (CD)</b>	3	4
<b>TOTAL # OF SAMPLES</b>	<b>35</b>	<b>35</b>

A sampling schedule (Table 3) incorporating all of the business days of the week (i.e. Monday to Friday, with no statutory holidays) was then created based on the number of samples to be completed each day (seven), and with consideration of the City’s curbside collection schedule (every other week garbage collection).

For the July waste sorting exercise, the total number of samples obtained during the week was only 28 due to the limited number of ICI and CD waste loads received on Wednesday and Thursday. As a result, the sampling protocol was modified for the July exercise to allow for more than one ICI sample to be obtained from the same load, if the load came from a front-end loader and contained waste from several different customers. In this instance, each sample was taken from a separate quadrant of the load. This improved the team’s ability to obtain all of the target samples, as 34 of 35 samples were obtained in July. The lack of ICI loads arriving at the landfill on some of the sorting days was also a challenge during the summer sorting exercise.

**Table 2-3. November and July Sampling Schedules (number of samples to be sorted)**

November Sampling Schedule	Monday	Tuesday	Wednesday	Thursday	Friday	Week’s Target	Completed
<b>Curbside Residential</b>	1	1	1	1		4	<b>5</b>
<b>ICI - Commercially Hauled</b>	3	4	4	2	4	17	<b>13</b>
<b>Domestic Waste Transfer Bin</b>	1			1		2	<b>2</b>
<b>Construction &amp; Demolition</b>	2	1	2	2	2	9	<b>5</b>
<b>Construction &amp; Demo Transfer Bin</b>		1		1	1	3	<b>3</b>
<b>Total</b>	7	7	7	7	7	35	<b>28</b>



July Sampling Schedule	Monday	Tuesday	Wednesday	Thursday	Friday	Week's Target	Completed
Curbside Residential	1	1	1	1		4	4
ICI - Commercially Hauled	2	2	3	4	2	13	13
Domestic Waste Transfer Bin		1			1	2	2
Construction & Demolition	2	3	2	2	3	12	11
Construction & Demo Transfer Bin	1		1	1	1	4	4
<b>Total</b>	6	7	7	8	7	35	34

### 2.3 Sampling

A stratified random sampling method was used. The trucks arriving at the landfill were targeted based on each day's sampling strategy. Each selected truck tipped its load of waste near the active face of the landfill. The sample was removed from the target load using a front-end loader. The equipment operator applied a quartering methodology in order to achieve random sampling of waste from each load. The operator aimed to select a sample of 150 kg (larger than the desired sample size of 100-120 kg). The sample was then transferred using the front end loader to the sorting area, which was located inside the composting facility equipment building. The sorting crew (generally 5 people) removed waste from the front end loader into a wheeled cart until a sample weight of 120 kg was acquired, as shown in the photographs below. The target weight for each sample was 120 kg, however sample weights between 100 kg and 150 kg were considered acceptable.

Over the 5-day sampling period in November, over 3,300 kg of garbage was sorted and weighed. In July, over 3,900 kg was sorted.

After the sorting exercise, the sorted materials are weighed then emptied into a roll-off bin located at the sorting site, which was then emptied at the active face of the landfill when full.



*Removing the sample from the front-end loader*

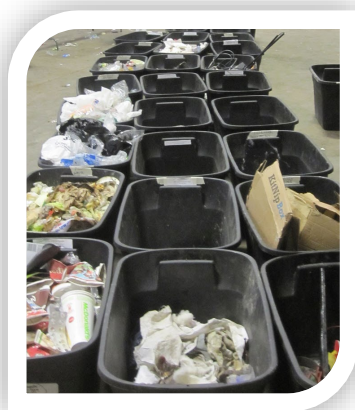
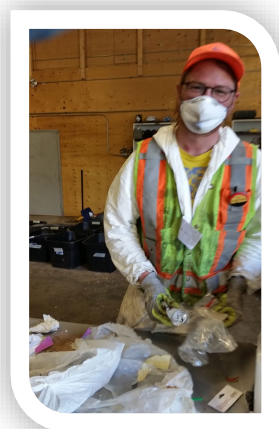
## 2.4 Waste Sorting

The sorting area was organized by primary categories (e.g., plastic, paper, metal) and each collected sample was sorted directly into secondary categories (e.g., #2 translucent, #2 opaque, etc.), as shown in the photographs below. Containers for the most popular categories (food, soft plastic, mixed waste paper, office paper, composite soft plastic and composite rigid plastic packaging) were kept beside or on top of each sorting station. The remaining sorting categories were placed on the floor around the two sorting stations, as shown in the photograph below.



*Set Up of the Sorting Area*

Each category of material was weighed and the data was recorded. The team leader was responsible for the field quality assurance and quality control program during the study. This person randomly checked sorted samples to make sure all materials had been sorted properly, ensured that the proposed sampling and sorting procedures were followed, provided recommendations on how to categorize unique items, and ensured that all bins were empty prior to starting a new sample.



*Sorting the Samples for Weighing*

### **3. Seasonal Results**

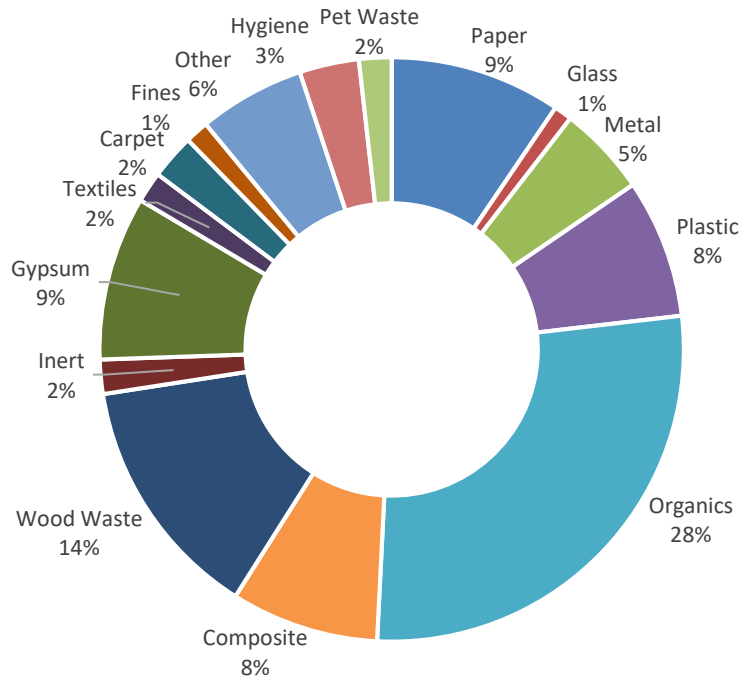
This section of the report summarizes the results from the winter (November 2017) and summer (July 2018) waste sorting exercises. An estimate is provided of the composition of the City of Whitehorse's landfilled waste, as well as estimated composition by sector (residential, ICI and CD). The results are presented as percent composition (by received weight). More detailed information, such as the proportion of each of the secondary categories for each waste stream is provided in Appendix A (winter data) and B (summer data).

#### **3.1 Winter Waste Sorting Exercise**

##### **3.1.1 Winter City of Whitehorse Winter Waste Composition**

Figure 1 illustrates the estimated winter composition of all of the waste disposed by the City of Whitehorse in November 2017. In order to develop the overall estimate for the winter, the data from each of the three sectors (curbside residential, ICI and CD) was applied proportionally, based on the actual scale data for November 2017. In November 2017, 12.6% of the waste disposed was City's curbside residential program, 54.7% was ICI, and 32.8 was CD.

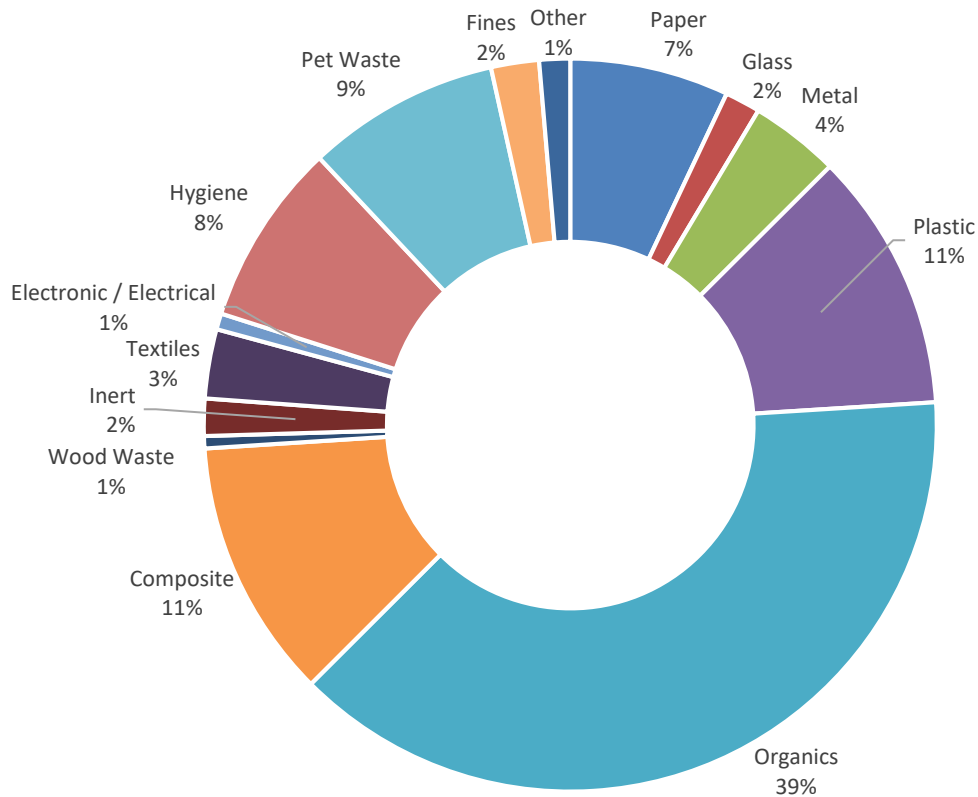
As shown in Figure 1, the data indicates that the largest components of the waste stream by weight in November 2017 was organics (28%), wood (14%), paper (9%), gypsum (9%), and plastic (8%). Of the organics in the waste stream, 86% was food waste and 14% was compostable paper. Of the wood in the waste stream, roughly half of it was clean structural wood, and half was coated/contaminated structural wood waste (painted or stained wood, plywood, laminates, etc.). Detailed composition data, showing the primary and secondary material categories is provided in Appendix A.



**Figure 3-1. Estimated Winter Composition of the City of Whitehorse Waste Landfilled, Based on Weight**

### 3.1.2 Winter Residential Curbside Waste Composition

Residential curbside waste represented 13% of the waste disposed by the City of Whitehorse in November 2017. Five samples from Whitehorse’s residential curbside collection program were sorted during the exercise. Figure 2 illustrates the estimated composition of the residential waste from these three samples. As shown, the primary components of the waste stream are: organic waste (39%), plastic and composite materials (11% each), pet waste (9%), personal hygiene (8%), and paper (7%).



**Figure 3-2. Winter Composition of Residential Waste Landfilled, Based on Weight**

In regard to the organic waste found in the samples, approximately 80% of it was food waste and 20% was compostable paper such as paper toweling, compostable take-out food packaging and tissues. It is worthwhile noting that much of the weight of the compostable paper comes from moisture absorbed from the food waste.

Of the items found in the plastic category, only one-quarter of them were considered readily recyclable (#1 and #2 rigid plastic containers). The remainder were plastics that are hard to recycle, with the largest portion being plastic film and bags (approximately 40% of the plastic category by weight). It should be noted that the relatively high weight of the plastic film is affected by moisture that clings to the bags, particularly if they had contained or were in contact with a moist food product.

The composite material category which represented 11% of the residential waste stream is made up of materials that are made of more than one type of material. Composite soft packaging (also referred to as multi-laminate

packaging), which includes plastic/foil bags and zippered pouches, are increasingly popular for retail food packaging and made up over half of the composite material category. At this time, composite packaging and goods with the exception of Tetrapaks, are considered hard-to recycle or non-recyclable.



*Composite Rigid Packaging*



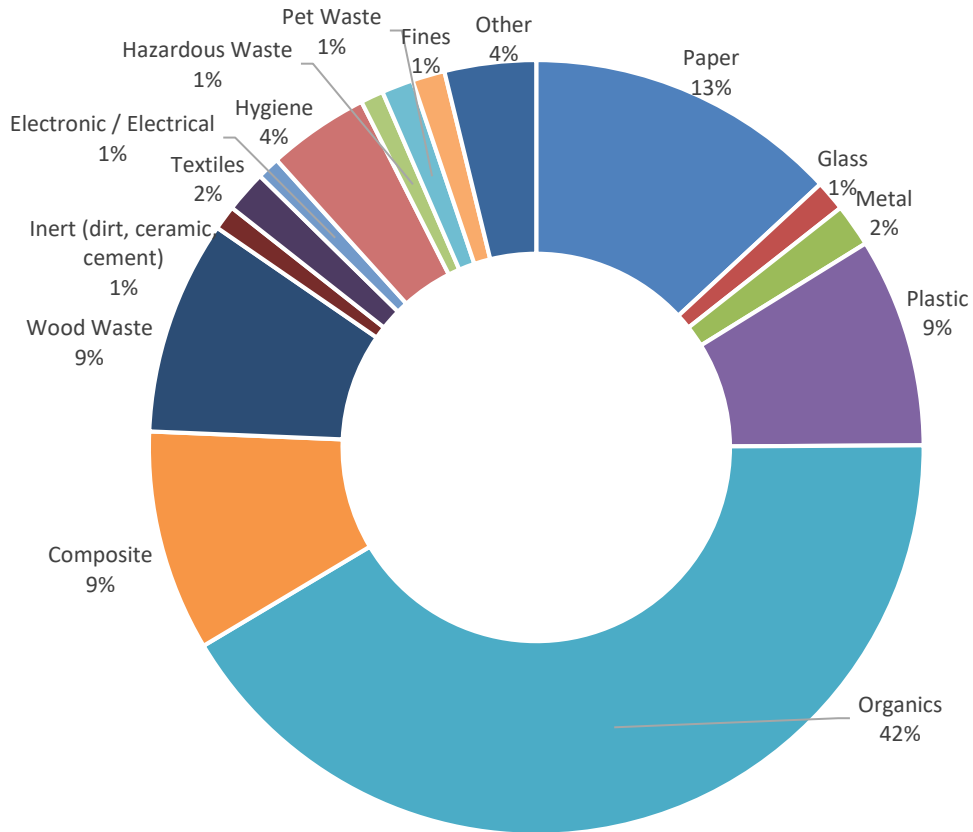
*Composite Soft Packaging*

The personal hygiene (8%) is primarily made up of diapers and incontinence products, however this category also includes disposable cloth wipes (a relatively new product type) and feminine hygiene products.

### **3.2 Winter ICI Waste Composition**

ICI waste includes waste from businesses, institutions, light manufacturing, the domestic transfer station at the landfill, multi-family residential buildings, and trailer parks in the City of Whitehorse. ICI waste represented 53% of the waste disposed by the City of Whitehorse in 2016.

Fifteen ICI samples were sorted. Figure 3 illustrates the estimated composition of this waste stream. As shown, the primary components of the ICI waste stream are: organic waste (42%), paper (13%), and plastic, composite and wood waste (9% each).



**Figure 3-3. Winter Composition of ICI Waste Landfilled, Based on Weight**

The organic waste category was composed largely of food waste (88% of the organic waste in the ICI waste stream), much of which was packaged food waste (food waste still enclosed in packaging), with the remaining 12% being compostable paper such as paper toweling.

The paper component was roughly 30% cardboard, 30% newsprint and 26% mixed waste paper, 8% office paper and 6% waxed cardboard.

The plastic category was made up of primarily of soft plastics (55%) and unnumbered rigid plastic (29%). The remaining types of plastic was polystyrene foam (6%), beverage containers (4%), #1 plastic containers (3%) and #2 plastic containers (3%).

Two-thirds of the composite category was made up of durable goods – products that are multiple materials such as footwear, toys and pens, with the remaining being composite beverage containers like Tetrapaks and cartons (3%) and composite packaging (30%).

Two-thirds of the wood waste category was made up clean (uncoated) structural wood waste and the other third being coated structural wood waste (wood that was painted or stained or made with adhesives).

### 3.3 Winter CD Waste Composition

Construction and demolition (CD) waste represented 35% of the waste disposed by the City of Whitehorse in 2016. Eight CD samples were sorted. Figure 4 illustrates the estimated composition of this waste stream. As shown, the primary components of the CD waste stream are: gypsum wallboard (27%), wood waste (26%), metal (11%) and carpet (8%). The wood category was comprised of 38% clean wood and 62% coated wood. The metal category was 97% ferrous metal, including off cuts of metal studs and pipe. The carpet category was 72% carpeting and 28% underlay.

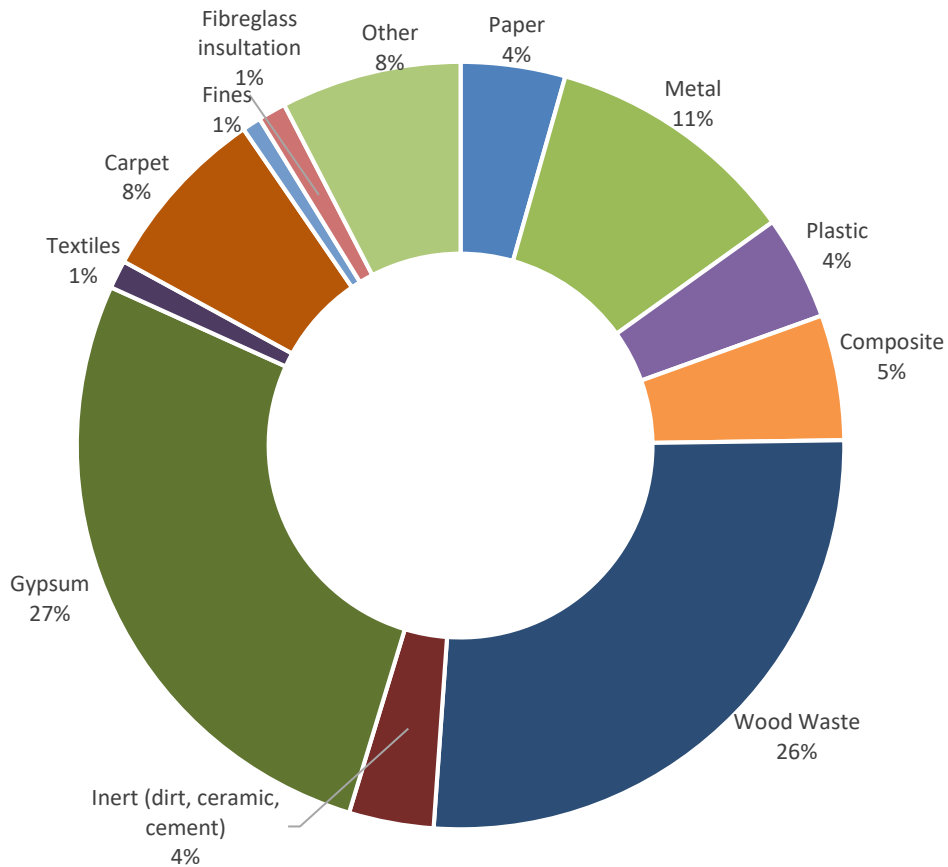


Figure 3-4. Winter Composition of CD Waste Landfilled, Based on Weight



### 3.4 Summer Waste Sorting Exercise

#### 3.4.1 Summer City of Whitehorse Waste Composition

Figure 5 illustrates the estimated composition of all of the waste disposed by the City of Whitehorse in July 2018. In order to develop the overall estimate for the City, the data from each of the three sectors (curbside residential, ICI and CD) was applied proportionally, based on the actual scale data for July 2018. In July, 9% of the waste disposed was City's curbside residential program, 43% was ICI, and 48% was CD.

The estimated composition of Whitehorse's waste in the summer is shown in Figure 5, with the detailed data provided in Appendix B. As shown, the data indicates that the largest components of the waste stream by weight in the summer was wood (28%), organics (16%), paper (11%), and plastic (9%). Of the wood in the waste stream, two-thirds of it was clean structural wood. Of the organics in the waste stream, 69% was food waste and 25% was compostable paper, and 6% was yard waste. Of the plastics sampled, only 12% were considered to be readily recyclable types of plastic (beverage containers, and #1 and #2 packaging).

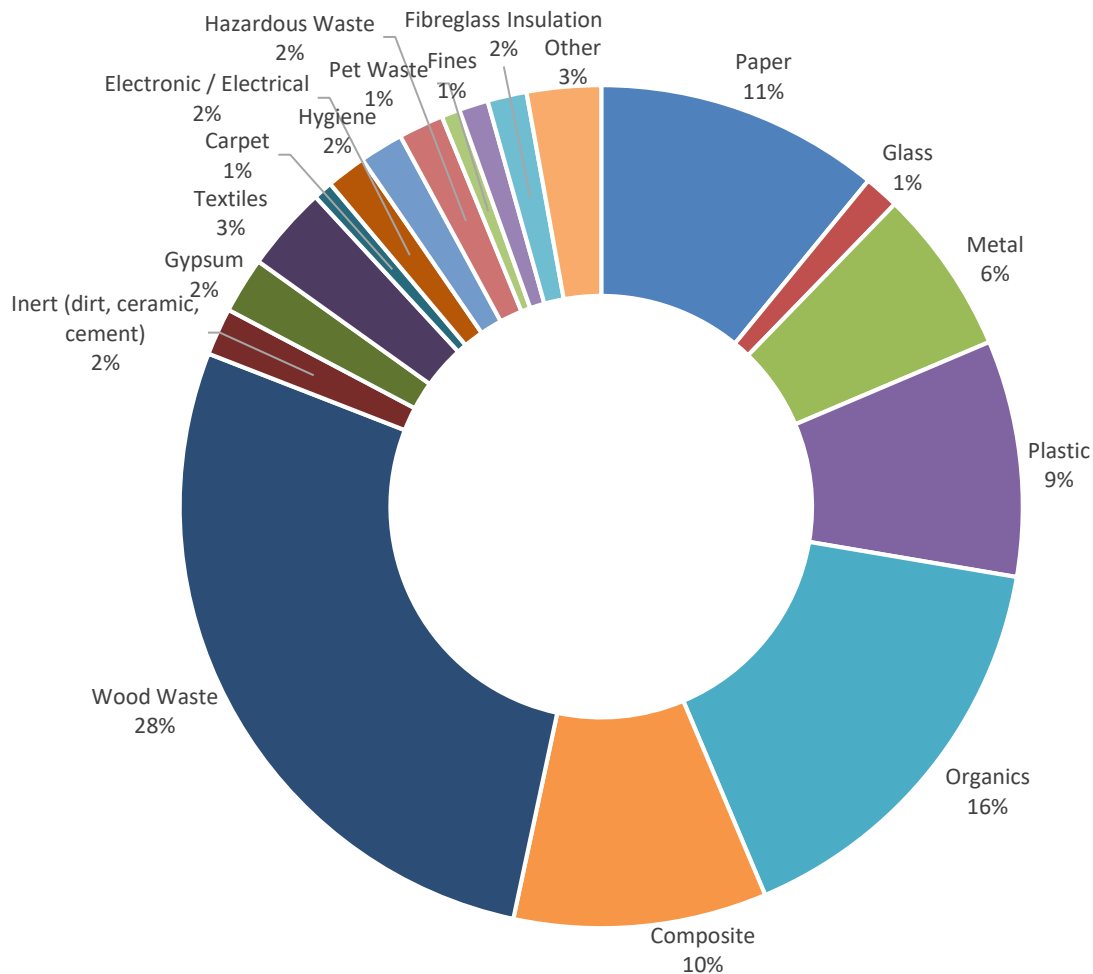
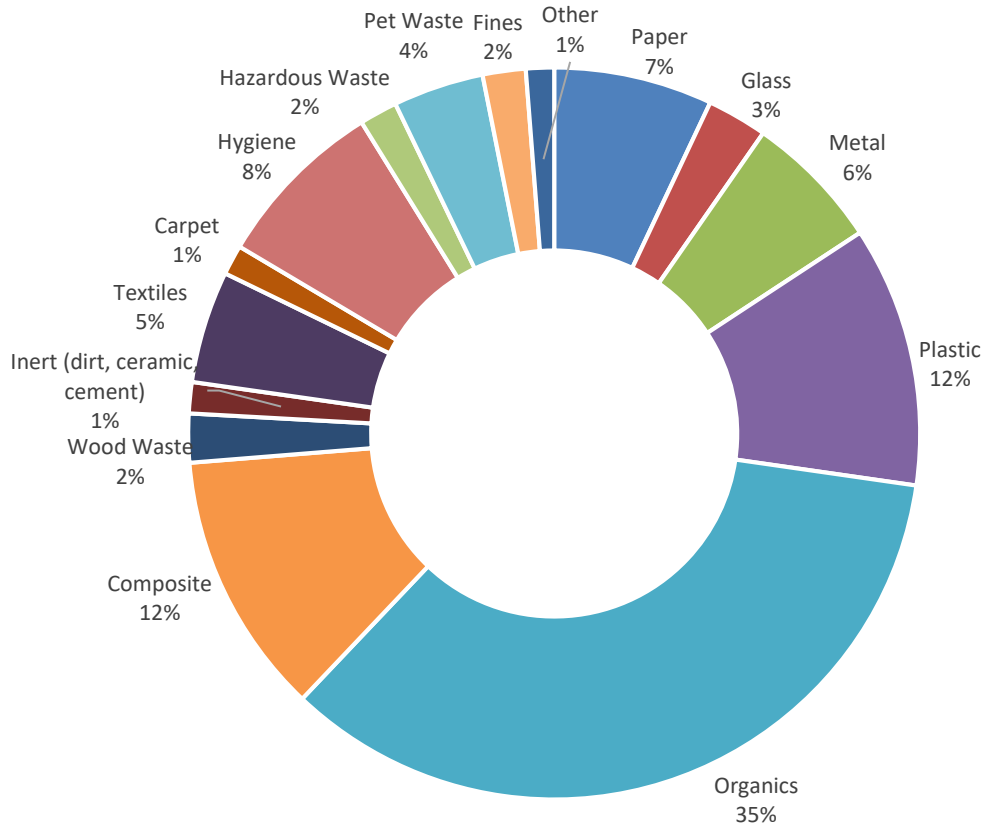


Figure 3-5. Estimated Summer Composition of the City of Whitehorse Waste Landfilled, Based on Weight

### 3.4.2 Summer Residential Curbside Waste Composition

Residential curbside waste represented 9% of the waste disposed by the City of Whitehorse in July 2018. Four samples from Whitehorse’s residential curbside collection program were sorted during the exercise. Figure 6 illustrates the estimated composition of the residential waste from these three samples. As shown, the primary components of the waste stream are: organic waste (35%), plastic and composite materials (12% each), personal hygiene (8%), and paper (7%).



**Figure 3-6. Summer Composition of Residential Waste Landfilled, Based on Weight**

In regard to the organic waste found in the samples, approximately two-thirds of it was food waste and one-third was compostable paper such as paper toweling, compostable take-out food packaging and tissues. No yard waste was observed in the residential waste samples. As was noted earlier in this report, much of the weight of the compostable paper comes from moisture absorbed from the food waste in the garbage.

Of the items found in the plastic category, roughly 10% of the plastic was considered readily recyclable (#1 and #2 rigid plastic containers). The remainder were plastics that are hard to recycle, with the largest portion being plastic film and bags (approximately 50% of the plastic category by weight). It should be noted that the relatively high weight of the plastic film is affected by moisture that clings to the bags, particularly if they had contained or were in contact with a moist food product.

The “composite material” category is made up of items that are composed of more than one material type, and includes packaging such as potato chip bags, Tetrapaks, as well as goods such as binders, upholstered furniture, and toys. “Durable goods” such as shoes, toys and handbags made up 57% of the composite materials, and “soft packaging” (e.g. foil bags, zippered pouches) made up 41%.

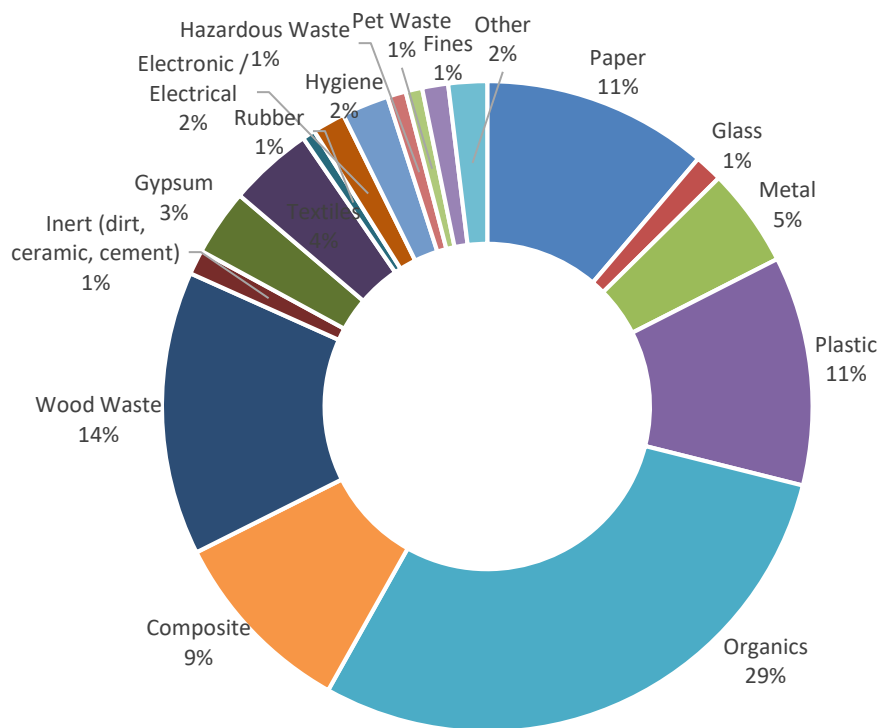
The personal hygiene category (8%) is primarily made up of diapers and incontinence products, however this category also includes disposable cloth wipes and feminine hygiene products.

Two-thirds of the paper category was mixed waste paper.

### 3.5 Summer ICI Waste Composition

ICI waste includes waste from businesses, institutions, light manufacturing, the domestic transfer station at the landfill, multi-family residential buildings, and trailer parks in the City of Whitehorse. ICI waste represented 43% of the waste disposed by the City of Whitehorse July 2018.

Fifteen ICI samples were sorted. Figure 7 illustrates the estimated composition of this waste stream. As shown, the primary components of the ICI waste stream in the summer were: organic waste (29%), wood waste (14%), and paper and plastic (11% each).



**Figure 3-7. Summer Composition of ICI Waste Landfilled, Based on Weight**

The organic waste category was composed largely of food waste (88% of the organic waste in the ICI waste stream), much of which was packaged food waste (food waste still enclosed in packaging), with the remaining 12% being compostable paper such as paper toweling.

The paper component was roughly 30% cardboard, 30% newsprint and 26% mixed waste paper, 8% office paper and 6% waxed cardboard.

The plastic category was made up of primarily of soft plastics (55%) and unnumbered rigid plastic (29%). The remaining types of plastic was polystyrene foam (6%), beverage containers (4%), #1 plastic containers (3%) and #2 plastic containers (3%).

Two-thirds of the composite category was made up of durable goods – products that are multiple materials such as footwear, toys and pens, with the remaining being composite beverage containers like Tetrapaks and cartons (3%) and composite packaging (30%).

Two-thirds of the wood waste category was made up clean (uncoated) structural wood waste and the other third being coated structural wood waste (wood that was painted or stained or made with adhesives).

### 3.6 Summer CD Waste Composition

Construction and demolition (CD) waste represented 48% of the waste disposed by the City of Whitehorse in July 2018. Fifteen CD samples were sorted. Figure 8 illustrates the estimated composition of this waste stream. As shown, the primary components of the CD waste stream are: wood waste (44%), paper (11%), composite materials (10%) and metal (8%). The paper category was almost exclusively cardboard. The wood category was comprised of two-thirds clean wood and one-third coated wood. The composite materials category was primarily durable goods from renovation projects plus some broken construction-related equipment.

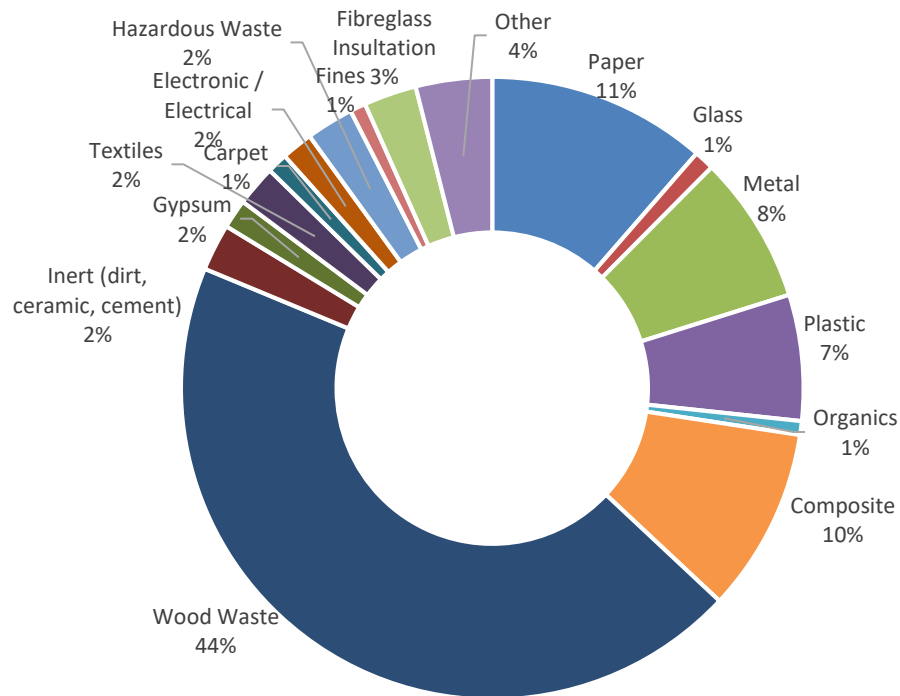


Figure 3-8. Summer Composition of CD Waste Landfilled, Based on Weight

The photos below show examples of some of the CD samples that were comprised solely of divertible materials (cardboard and clean wood waste, accordingly). These samples were representative of full loads of these materials.



Sample Consisting of Clean Cardboard



Sample Consisting of Clean Wood

### 3.7 Comparison of Winter and Summer Data

Table 3-1 provides a comparison of the winter and summer data for each of the sampling exercises. The most significant variations between seasons are noted in the CD waste sector, particularly for wood waste and gypsum wallboard. A significant difference between seasons can also be seen for ICI organic waste.

**Table 3-1 Comparison of Winter and Summer Data**

Material	Residential		ICI		CD	
	Winter	Summer	Winter	Summer	Winter	Summer
Paper	7.0%	7.0%	13.1%	11.1%	4.4%	11.4%
Glass	1.6%	2.6%	1.3%	1.4%	0.2%	1.0%
Metals	4.0%	6.0%	1.8%	4.9%	10.7%	7.7%
Plastic	11.5%	11.4%	8.7%	11.3%	4.4%	6.5%
Organics	38.5%	34.6%	41.5%	29.0%	0.4%	0.7%
Composite	11.5%	11.5%	9.2%	9.4%	5.3%	9.6%
Wood Waste	0.5%	2.1%	8.9%	14.0%	26.3%	44.3%
Inert Materials	1.6%	1.4%	1.0%	1.2%	3.6%	2.4%
Gypsum Wallboard	0.4%	0.1%	0.3%	3.3%	27.1%	1.5%
Textiles	3.1%	4.9%	1.7%	4.2%	1.2%	2.1%
Rubber	0.2%	0.1%	0.3%	0.6%	0.0%	0.1%
Carpet and Underlay	0.0%	1.3%	0.1%	0.3%	7.5%	1.1%
Electronic Waste	0.7%	0.5%	1.0%	1.6%	0.0%	1.6%
Personal Hygiene Products	8.1%	7.6%	4.2%	2.3%	0.0%	0.0%
Hazardous Waste	0.2%	1.7%	1.0%	0.9%	0.2%	2.5%
Biomedical Waste	0.2%	0.1%	0.0%	0.3%	0.0%	0.0%
Pet Waste	8.5%	4.0%	1.3%	0.8%	0.0%	0.0%
Fines	2.1%	1.9%	1.4%	1.3%	0.8%	0.8%
Fibreglass Insulation	0.0%	0.0%	0.5%	0.4%	1.2%	2.7%
Other	0.4%	1.2%	2.7%	1.9%	6.8%	4.0%
<b>Totals</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

### 3.8 Observations

This section highlights the key observations associated with the main material categories, as noted during the waste sorting exercise and verified by the data.

Paper:

- There was minimal printed paper (newspapers and magazines) found in the samples. This may be the result of the increasing use of on-line media as well recycling participation rates.
- In general, there was very little cardboard in the samples, which was surprising since cardboard generation has been increasingly significantly in recent years due to the advent of on-line shopping. Notable volumes of cardboard were found in the occasional ICI and CD samples.

Beverage Containers

- A very small amount of beverage containers were observed in the samples, regardless of material type (plastic, carton, aluminum, glass).
- The most frequent type of deposit-bearing containers found in the samples were single-serving yogurt drinks and coffee cream. This may be due to the newness of having these containers included under the deposit-system.

Plastic:

- Soft plastics (film, bags, overwrap) were the largest portion of the plastic waste stream. However, the weight of this material is skewed by food and moisture that clings to the plastic and is included in the total weight of the soft plastic category.

Organics:

- Food waste is by far the largest portion of the organic waste sampled and is the single largest waste type in the waste stream. Much of this material is food still in its original packaging. In an ICI context in particular, de-packaging unsold food products is generally considered cost-prohibitive, so that packaged goods are disposed of as garbage rather than diverted to composting.
- A surprising volume of edible food waste was found in most of the residential waste samples. Much of this was unopened, packaged food.

Composite:

- Composite packaging, particularly multi-laminate packaging and zippered plastic pouches, are becoming an increasingly popular method of food packaging, and this was evident in the samples, particularly in the residential waste samples. This material is not considered recyclable in the current marketplace.

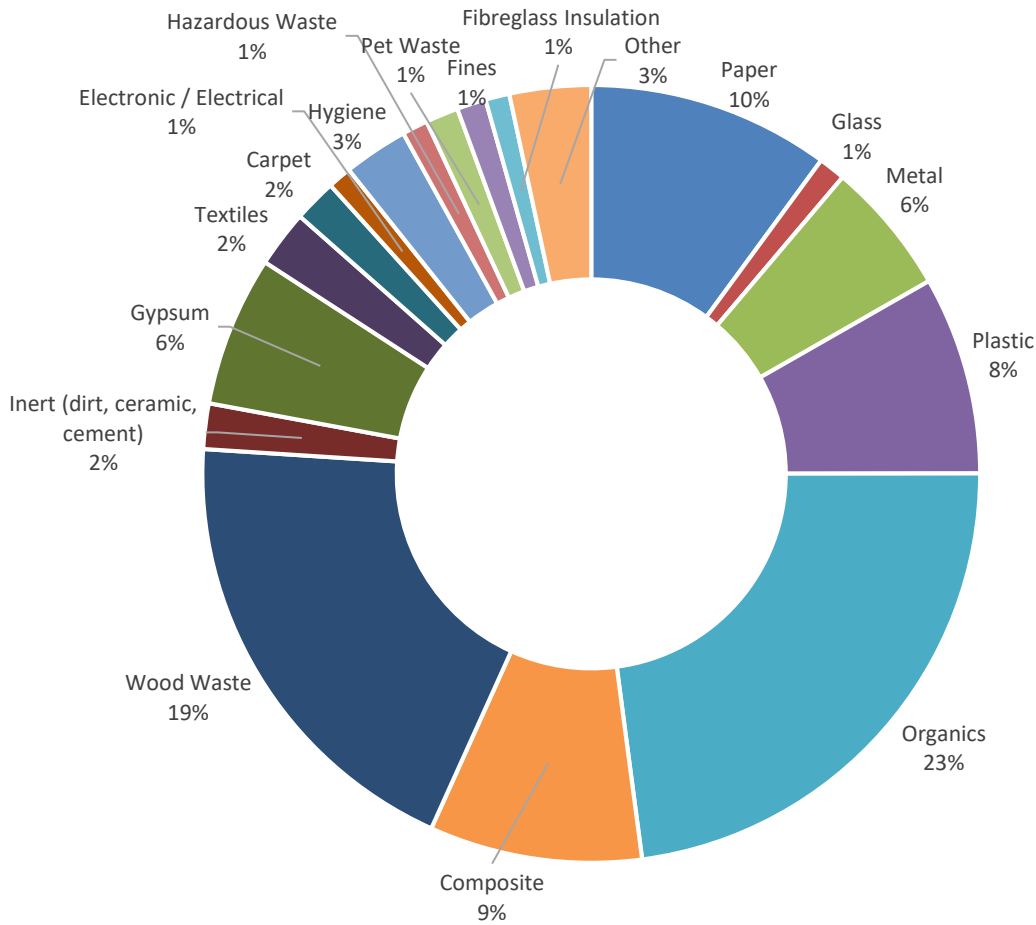
General Observations

- There was not a significant volume of durable goods such as furniture, appliances and clothing found in the samples. Most durable goods appeared to be at the end of their useful life.

#### 4. Annualized Data

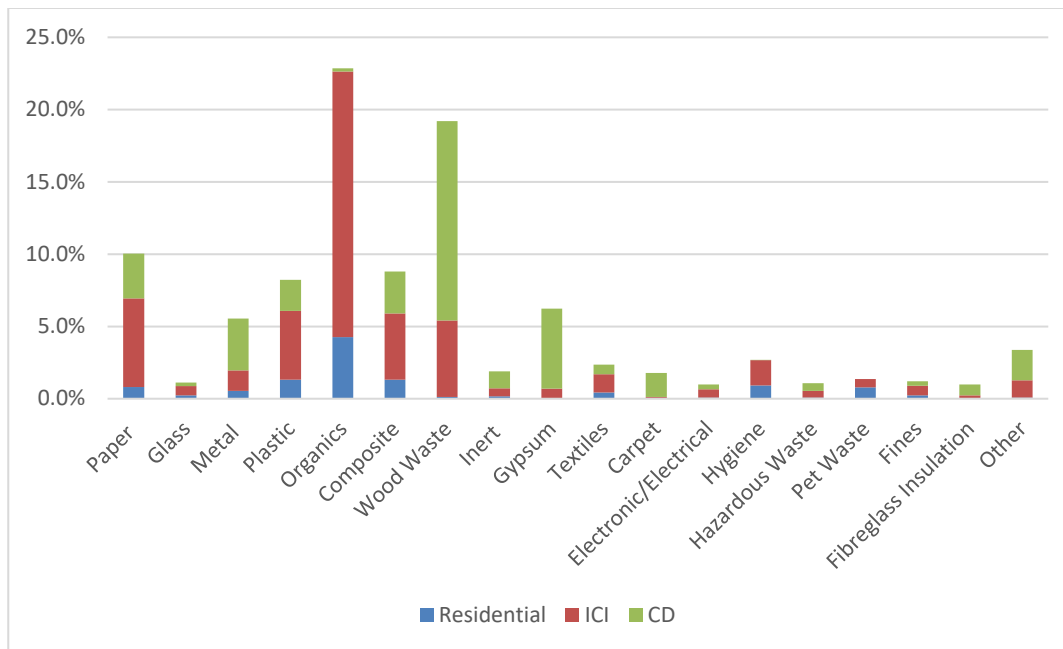
This section presents an estimate of the composition of the City of Whitehorse’s landfilled waste in 2017/18, based on aggregating the data from the winter and summer waste composition exercises in a proportional manner: Over the year, the winter months (October to March) accounted 41% of the waste landfilled and the summer months (April to September) accounted for 59%.

As noted in the Introduction, the estimated composition reflects only waste generated within the City of Whitehorse. Waste brought to the landfill from the outside communities was not included in this study.



**Figure 4-1 Estimated City of Whitehorse Waste Composition (By Weight) for 2017/18**

Figure 4-1 shows the composition (based on weight) by the primary material categories. Figure 4-2, on the next page, provides the same data, but shows how much of each material type comes from each of the sectors (curbside residential, ICI and CD). Detailed composition data showing the secondary material categories, can be found in Appendix C.



**Figure 4-2 Estimated Waste Composition, by Sector (2017/18)**

The following table provides the numerical information used to develop Figure 4-2, and includes the estimated tonnes of each material type from each of the contributing sectors.

**Table 4-1 Summary of Annualized Data (% and Tonnes)**

Material Type	Total Combined		Residential		ICI		CD	
	%	tonnes	%	tonnes	%	tonnes	%	tonnes
Paper	10.0%	1,996	7.0%	160	12.3%	1,090	7.3%	635
Glass	1.1%	221	2.0%	46	1.3%	117	0.5%	47
Metals	5.5%	1,101	4.8%	110	3.0%	271	9.5%	826
Plastic	8.2%	1,633	11.5%	261	9.8%	868	5.3%	460
Organics	22.9%	4,545	36.9%	841	36.3%	3,225	0.5%	47
Composite	8.8%	1,752	11.5%	262	9.3%	823	7.0%	614
Wood Waste	19.2%	3,820	1.2%	27	11.0%	976	33.7%	2,939
Inert Materials	1.9%	375	1.5%	35	1.1%	97	3.1%	271
Gypsum Wallboard	6.2%	1,239	0.2%	6	1.5%	137	16.6%	1,447
Textiles	2.4%	468	3.8%	87	2.7%	242	1.6%	137
Rubber	0.2%	46	0.1%	3	0.4%	38	0.0%	2
Carpet and Underlay	1.8%	353	0.5%	12	0.2%	14	4.8%	422
Electronic Waste	1.0%	195	0.6%	14	1.2%	109	0.7%	60
Personal Hygiene Products	2.7%	532	7.9%	180	3.4%	306	0.0%	0
Hazardous Waste	1.1%	211	0.8%	19	0.9%	83	1.1%	96
Biomedical Waste	0.1%	15	0.2%	4	0.1%	11	0.0%	-
Pet Waste	1.4%	271	6.7%	152	1.1%	99	0.0%	-
Fines	1.2%	240	2.0%	46	1.3%	118	0.8%	70
Fibreglass Insulation	1.0%	198	0.0%	0	0.5%	41	1.8%	159
Other	3.4%	671	0.7%	17	2.4%	210	5.6%	493
<b>Totals</b>	<b>100.0%</b>	<b>19,881</b>	<b>100.0%</b>	<b>2,280</b>	<b>100.0%</b>	<b>8,875</b>	<b>100.0%</b>	<b>8,726</b>



## 4.1 Estimating Volume

At the City’s Son of War Eagle Landfill site, garbage entering the site is assessed a tipping fee based on the weight of the load. Similarly, the methodology for waste composition studies is based on the weight of each material component. This is because weight can be readily and accurately measured by a scale. However, at the landfill, it is volume, or rather the air space in a landfill that is the resource being consumed by each load of garbage unloaded at the site. Consequently, to understand the impact of the composition on the life of a landfill, it’s worthwhile to estimate the volume of landfill space that each component of the garbage is consuming.

Table 4-2 provides an estimate of the volume consumed by each material type based on industry standard weight-to-volume conversions<sup>1</sup>. Because the density of waste received is highly variable depending on the method of collection (e.g. waste from a compactor or from an open-top roll-off container that has received no prior compaction), the reader is cautioned that these estimates are very high level and are intended to demonstrate the difference between assessing weight versus volume.

**Table 4-2 Estimated Annual Volumes**

Material Type	Estimated Weight		Estimated Volume	
	Tonnes	%	Cubic Metres	%
Paper	1,996	10.0%	10,394	4.4%
Glass	221	1.1%	980	0.4%
Metals	1,101	5.5%	8,228	3.5%
Plastic	1,633	8.2%	68,674	29.2%
Organics	4,545	22.9%	16,510	7.0%
Composite	1,752	8.8%	45,323	19.3%
Wood Waste	3,820	19.2%	38,019	16.2%
Inert Materials	375	1.9%	733	0.3%
Gypsum Wallboard	1,239	6.2%	4,463	1.9%
Textiles	468	2.4%	5,243	2.2%
Rubber	46	0.2%	1,141	0.5%
Carpet and Underlay	353	1.8%	5,945	2.5%
Electronic Waste	195	1.0%	939	0.4%
Personal Hygiene Products	532	2.7%	1,945	0.8%
Hazardous Waste	211	1.1%	2,736	1.2%
Biomedical Waste	15	0.1%	626	0.3%
Pet Waste	271	1.4%	1,138	0.5%
Fines	240	1.2%	1,009	0.4%
Fibreglass Insulation	198	1.0%	16,668	7.1%
Other	671	3.4%	4,103	1.7%
Totals	19,881	100.0%	234,814	100.0%

<sup>1</sup> U.S. Environmental Protection Agency Office of Resource Conservation and Recovery. Volume-to-Weight Conversion Factors, April 2016

## 5. Diversion Potential

Table 5-1 provides a rough estimate of the potential for additional diversion based on the estimated tonnes of each material disposed (as shown in Table 4-1 on the previous page). Experience in jurisdictions with aggressive and long-standing waste diversion programs and policies indicates that recyclable and compostable materials will continue to be found in the waste sent to landfill, and consequently it is not reasonable to expect to achieve 100% diversion of these materials. With this in mind, two factors have been applied to the waste composition data in order to develop a rough estimate of the potential for additional diversion:

- I. 50% additional diversion of recyclable and compostable materials *that currently have a mature and comprehensive diversion program in place* (i.e. collection service supported by policies and enforcement).
- II. 75% additional diversion of recyclable and compostable materials that do not currently have a mature and/or comprehensive diversion program in place.

As shown, a rough estimate of the diversion potential is an additional 6,500 tonnes, based on current disposal rates and including only those materials with locally available diversion options.

**Table 5-1 Diversion Potential**

Material Type	Residential (t)	ICI (t)	CD (t)	Total Tonnes
Paper	80	515	253	849
Glass	15	22	-	37
Metals	65	189	585	839
Plastic	36	95	-	133
Organics	473	2,416	-	2,892
Composite	5	9	-	14
Wood Waste	-	426	1,178	1,606
Inert Materials	-	-	-	-
Gypsum Wallboard	-	-	-	-
Textiles	40	120	-	160
Rubber	-	4	-	4
Carpet and Underlay	-	-	-	-
Electronic Waste	-	13	-	13
Personal Hygiene Products	-	-	-	-
Hazardous Waste	-	-	-	-
Biomedical Waste	-	-	-	-
Pet Waste	-	-	-	-
Fines	-	-	-	-
Fibreglass Insulation	-	-	-	-
Other	-	-	-	-
<b>Estimated Total Tonnes</b>	<b>714</b>	<b>3,809</b>	<b>2,016</b>	<b>6,547</b>

Table 5-1 was developed with input from City staff and incorporates the following assumptions:

1. Mature and/or comprehensive diversion programs are in place for the following materials/sectors:
  - Residential and ICI paper fibres
  - Beverage containers (all sectors)
  - Residential glass and metal containers (non-beverage)
  - Residential and ICI glass containers (non-beverage)

- Non-ferrous metals (all sectors)
- #1 and #2 plastic (residential and ICI sectors)
- Residential yard waste and food waste
- Clothing (residential and ICI sectors)
- Tires (all sectors).

2. There are programs and/or services in place for the following materials and sectors, but these are not as mature or as supported as the ones listed above, and therefore have greater diversion potential:
- Corrugated cardboard generated by the CD sector
  - Metal food containers by the ICI sector
  - Scrap steel by all sectors
  - Polystyrene foam (residential and ICI sectors)
  - ICI yard waste and food waste
  - Non-recyclable (i.e. compostable) paper (residential and ICI sectors)
  - Clean structural wood waste (ICI and CD sectors)
  - Electronic waste covered by a stewardship program (i.e. audio-visual and computer-related items).

## **6. Comparison of 2009/10 and 2017/18 Waste Composition Data**

A similar two-season waste composition study was undertaken in 2009 and 2010, affording the opportunity to compare data with the 2017/18 results to gain insights into how the composition has changed. In this final section of the report, the results of these two studies are compared.

The tables below compare the data for the City of Whitehorse, as well as separately for each of the sectors (curbside residential, ICI and CD). As shown, there generally is not a significant variation in the proportion of each material type between the two studies. The noted exception is an increase of 14% in the proportion of organic waste in the ICI waste samples and a 5% increase in the residential samples since the 2009/10 study.

Based on waste composition studies undertaken in other Canadian jurisdictions, it is not unusual to see limited change in waste composition even when efforts to increase diversion have been enhanced. Effective diversion programming and policies tend to reduce almost all components of the waste stream, resulting in a smaller quantity of waste being disposed per capita, while still maintaining a relatively consistent waste composition profile. Similarly, economic booms tend to increase the quantities of most materials being landfilled. Consequently, the proportion of materials (i.e. the composition) may not vary substantively.

In order to effectively ascertain the success of current diversion efforts, composition data should be observed in tandem with per capita disposal data and per household data for residential curbside garbage collection.

City of Whitehorse Data			
(Primary) material category	2009/10 data	2017/18 data	% change
Paper	14%	10%	-4%
Glass	1%	1%	0%
Metals	7%	6%	-1%
Plastic	9%	8%	-1%
Organics	17%	23%	6%
Composite	9%	9%	0%
Wood Waste	15%	19%	4%
Inert Materials	2%	2%	0%
Gypsum Wallboard	6%	6%	0%
Textiles	3%	2%	0%
Rubber	0%	0%	0%
Carpet and Underlay	2%	2%	0%
Electronic Waste	3%	1%	-2%
Personal Hygiene Products	3%	3%	0%
Hazardous Waste	2%	1%	-1%
Biomedical Waste	0%	0%	0%
Pet Waste	1%	1%	0%
Fines	0%	1%	1%
Fibreglass Insulation	1%	1%	0%
Other	4%	3%	0%
<b>Total</b>	100%	100%	

Curbside Residential Data			
(Primary) material category	2009/10 data	2017/18 data	% change
Paper	10%	7%	-3%
Glass	2%	2%	0%
Metals	5%	5%	0%
Plastic	14%	11%	-2%
Organics	32%	37%	5%
Composite	8%	12%	4%
Wood Waste	1%	1%	0%
Inert Materials	1%	2%	0%
Gypsum Wallboard	1%	0%	-1%
Textiles	6%	4%	-2%
Rubber	1%	0%	-1%
Carpet and Underlay	2%	1%	-1%
Electronic Waste	3%	1%	-2%
Personal Hygiene Products	8%	8%	0%
Hazardous Waste	1%	1%	-1%
Biomedical Waste	2%	0%	-2%
Pet Waste	2%	7%	4%
Fines	0%	2%	2%
Fibreglass Insulation	0%	0%	0%
Other	1%	1%	0%
<b>Total</b>	100%	100%	

ICI Data			
(Primary) material category	2009/10 data	2017/18 data	% change
Paper	19%	12%	-6%
Glass	2%	1%	-1%
Metals	6%	3%	-3%
Plastic	10%	10%	0%
Organics	22%	36%	14%
Composite	10%	9%	-1%
Wood Waste	9%	11%	2%
Inert Materials	1%	1%	0%
Gypsum Wallboard	2%	2%	-1%
Textiles	4%	3%	-1%
Rubber	1%	0%	0%
Carpet and Underlay	1%	0%	-1%
Electronic Waste	4%	1%	-3%
Personal Hygiene Products	3%	3%	0%
Hazardous Waste	2%	1%	-1%
Biomedical Waste	0%	0%	0%
Pet Waste	1%	1%	0%
Fines	0%	1%	1%
Fibreglass Insulation	0%	0%	0%
Other	2%	2%	1%
<b>Total</b>	100%	100%	

CD Data			
(Primary) material category	2009/10 data	2017/18 data	% change
Paper	2%	7%	5%
Glass	0%	1%	0%
Metals	10%	9%	-1%
Plastic	6%	5%	-1%
Organics	0%	1%	0%
Composite	9%	7%	-2%
Wood Waste	34%	34%	-1%
Inert Materials	5%	3%	-2%
Gypsum Wallboard	15%	17%	2%
Textiles	0%	2%	1%
Rubber	0%	0%	0%
Carpet and Underlay	4%	5%	1%
Electronic Waste	2%	1%	-1%
Personal Hygiene Products	0%	0%	0%
Hazardous Waste	1%	1%	0%
Biomedical Waste	0%	0%	0%
Pet Waste	0%	0%	0%
Fines	0%	1%	0%
Fibreglass Insulation	2%	2%	0%
Other	9%	6%	-3%
<b>Total</b>	100%	100%	

# APPENDICES



<b>Wood Waste</b>	<b>0.5%</b>	<b>0.1%</b>	<b>8.9%</b>	<b>4.9%</b>	<b>26.3%</b>	<b>8.6%</b>	<b>13.6%</b>
Clean structural wood	0.2%	0.0%	5.5%	3.0%	9.9%	3.2%	6.3%
Coated structural wood	0.3%	0.0%	3.5%	1.9%	16.2%	5.3%	7.2%
Branches, stumps (too large for composting)	0.0%	0.0%	0.0%	0.0%	0.2%	0.1%	0.1%
<b>Inert Materials</b>	<b>1.6%</b>	<b>0.2%</b>	<b>1.0%</b>	<b>0.6%</b>	<b>3.6%</b>	<b>1.2%</b>	<b>1.9%</b>
Tile, rock, dirt, asphalt, vacuum bags	1.1%	0.1%	0.7%	0.4%	3.6%	1.2%	1.7%
Stove ash	0.6%	0.1%	0.3%	0.2%	0.0%	0.0%	0.3%
<b>Gypsum Wallboard</b>	<b>0.4%</b>	<b>0.0%</b>	<b>0.3%</b>	<b>0.2%</b>	<b>27.1%</b>	<b>8.9%</b>	<b>9.1%</b>
Drywall / Wallboard	0.4%	0.0%	0.3%	0.2%	27.1%	8.9%	9.1%
<b>Textiles</b>	<b>3.1%</b>	<b>0.4%</b>	<b>1.7%</b>	<b>1.0%</b>	<b>1.2%</b>	<b>0.4%</b>	<b>1.7%</b>
Clothing	2.9%	0.4%	1.7%	0.9%	1.2%	0.4%	1.7%
Dryer Lint / Dryer Sheets	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Rubber</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.3%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.2%</b>
Tires (car, truck and bicycle)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other (flip flops)	0.2%	0.0%	0.3%	0.2%	0.0%	0.0%	0.2%
<b>Carpet and Underlay</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>7.5%</b>	<b>2.4%</b>	<b>2.5%</b>
Carpet	0.0%	0.0%	0.0%	0.0%	5.4%	1.8%	1.8%
Underlay	0.0%	0.0%	0.1%	0.0%	2.1%	0.7%	0.7%
<b>Electronic Waste (powered by cords or batteries)</b>	<b>0.7%</b>	<b>0.1%</b>	<b>1.0%</b>	<b>0.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.6%</b>
Audio-visual (TVs, stereos, DVD players)	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%
CPUs and Computer-related Items	0.0%	0.0%	0.2%	0.1%	0.0%	0.0%	0.1%
Other (toaster, blender, curling iron, battery charger)	0.7%	0.1%	0.7%	0.4%	0.0%	0.0%	0.5%
<b>Personal Hygiene Products</b>	<b>8.1%</b>	<b>1.0%</b>	<b>4.2%</b>	<b>2.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>3.3%</b>
Diapers, Sanitary, Gauze, Band-Aid	8.1%	1.0%	4.2%	2.3%	0.0%	0.0%	3.3%
<b>Hazardous Waste</b>	<b>0.2%</b>	<b>0.0%</b>	<b>1.0%</b>	<b>0.5%</b>	<b>0.2%</b>	<b>0.1%</b>	<b>0.6%</b>
Paint	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Paint Containers (empty or dry)	0.1%	0.0%	0.1%	0.1%	0.1%	0.0%	0.1%
Motor Oil Filters	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
Motor oil containers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Batteries – alkaline	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Batteries - rechargeable	0.0%	0.0%	0.4%	0.2%	0.0%	0.0%	0.2%
Other	0.0%	0.0%	0.4%	0.2%	0.0%	0.0%	0.2%
<b>Biomedical Waste</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>
Medicines	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other (syringes, tubing)	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Pet Waste</b>	<b>8.5%</b>	<b>1.1%</b>	<b>1.3%</b>	<b>0.7%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>1.8%</b>
Kitty Litter and Animal Waste	8.5%	1.1%	1.3%	0.7%	0.0%	0.0%	1.8%
<b>Fines</b>	<b>2.1%</b>	<b>0.3%</b>	<b>1.4%</b>	<b>0.7%</b>	<b>0.8%</b>	<b>0.3%</b>	<b>1.3%</b>
<b>Fiberglas insulation</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.5%</b>	<b>0.3%</b>	<b>1.2%</b>	<b>0.4%</b>	<b>0.7%</b>
<b>Other</b>	<b>0.4%</b>	<b>0.1%</b>	<b>2.7%</b>	<b>1.5%</b>	<b>6.8%</b>	<b>2.2%</b>	<b>3.8%</b>
<b>TOTALS</b>	<b>100.0%</b>	<b>12.6%</b>	<b>100.0%</b>	<b>54.7%</b>	<b>100.0%</b>	<b>32.8%</b>	<b>100.0%</b>





<b>Wood Waste</b>	<b>2.1%</b>	<b>0.2%</b>	<b>14.0%</b>	<b>6.0%</b>	<b>44.3%</b>	<b>21.2%</b>	<b>27.4%</b>
Clean structural wood	0.4%	0.0%	7.8%	3.3%	29.8%	14.3%	17.6%
Coated structural wood	1.8%	0.2%	6.2%	2.7%	14.5%	7.0%	9.8%
Branches, stumps (too large for composting)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Inert Materials</b>	<b>1.4%</b>	<b>0.1%</b>	<b>1.2%</b>	<b>0.5%</b>	<b>2.4%</b>	<b>1.2%</b>	<b>1.8%</b>
Tile, rock, dirt, asphalt, vacuum bags	1.4%	0.1%	1.2%	0.5%	2.4%	1.2%	1.8%
Stove ash	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
<b>Gypsum Wallboard</b>	<b>0.1%</b>	<b>0.0%</b>	<b>3.3%</b>	<b>1.4%</b>	<b>1.5%</b>	<b>0.7%</b>	<b>2.1%</b>
Drywall / Wallboard	0.1%	0.0%	3.3%	1.4%	1.5%	0.7%	2.1%
<b>Textiles</b>	<b>4.9%</b>	<b>0.4%</b>	<b>4.2%</b>	<b>1.8%</b>	<b>2.1%</b>	<b>1.0%</b>	<b>3.2%</b>
Clothing	4.3%	0.4%	3.5%	1.5%	0.5%	0.2%	2.1%
Dryer Lint / Dryer Sheets	0.2%	0.0%	0.4%	0.2%	1.5%	0.7%	0.9%
Other	0.4%	0.0%	0.3%	0.1%	0.2%	0.1%	0.2%
<b>Rubber</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.6%</b>	<b>0.3%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.3%</b>
Tires (car, truck and bicycle)	0.0%	0.0%	0.2%	0.1%	0.0%	0.0%	0.1%
Other (flip flops)	0.1%	0.0%	0.4%	0.2%	0.1%	0.0%	0.2%
<b>Carpet and Underlay</b>	<b>1.3%</b>	<b>0.1%</b>	<b>0.3%</b>	<b>0.1%</b>	<b>1.1%</b>	<b>0.5%</b>	<b>0.7%</b>
Carpet	1.3%	0.1%	0.3%	0.1%	1.0%	0.5%	0.7%
Underlay	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
<b>Electronic Waste (powered by cords or batteries)</b>	<b>0.5%</b>	<b>0.0%</b>	<b>1.6%</b>	<b>0.7%</b>	<b>1.6%</b>	<b>0.8%</b>	<b>1.5%</b>
Audio-visual (TVs, stereos, DVD players)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CPUs and Computer-related Items	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%
Other (toaster, blender, curling iron, battery charger)	0.5%	0.0%	1.5%	0.6%	1.6%	0.8%	1.5%
<b>Personal Hygiene Products</b>	<b>7.6%</b>	<b>0.7%</b>	<b>2.3%</b>	<b>1.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>1.7%</b>
Diapers, Sanitary, Gauze, Band-Aid	7.6%	0.7%	2.4%	1.0%	0.0%	0.0%	1.7%
<b>Hazardous Waste</b>	<b>1.7%</b>	<b>0.1%</b>	<b>0.9%</b>	<b>0.4%</b>	<b>2.5%</b>	<b>1.2%</b>	<b>1.7%</b>
Paint	0.9%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%
Paint Containers (empty or dry)	0.2%	0.0%	0.3%	0.1%	0.0%	0.0%	0.1%
Motor Oil Filters	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%
Motor oil containers	0.1%	0.0%	0.2%	0.1%	0.1%	0.0%	0.1%
Batteries – alkaline	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Batteries - rechargeable	0.0%	0.0%	0.0%	0.0%	2.4%	1.1%	1.1%
Other	0.2%	0.0%	0.2%	0.1%	0.0%	0.0%	0.1%
<b>Biomedical Waste</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.3%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1%</b>
Medicines	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other (syringes, tubing)	0.1%	0.0%	0.2%	0.1%	0.0%	0.0%	0.1%
<b>Pet Waste</b>	<b>4.0%</b>	<b>0.4%</b>	<b>0.8%</b>	<b>0.4%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.7%</b>
Kitty Litter and Animal Waste	4.0%	0.4%	0.8%	0.4%	0.0%	0.0%	0.7%
<b>Fines</b>	<b>1.9%</b>	<b>0.2%</b>	<b>1.3%</b>	<b>0.6%</b>	<b>0.8%</b>	<b>0.4%</b>	<b>1.1%</b>
<b>Fiberglas insulation</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.4%</b>	<b>0.2%</b>	<b>2.7%</b>	<b>1.3%</b>	<b>1.5%</b>
<b>Other</b>	<b>1.2%</b>	<b>0.1%</b>	<b>1.9%</b>	<b>0.8%</b>	<b>4.0%</b>	<b>1.9%</b>	<b>2.8%</b>
<b>TOTALS</b>	<b>100.0%</b>	<b>9.0%</b>	<b>100.0%</b>	<b>43.0%</b>	<b>100.0%</b>	<b>48.0%</b>	<b>100.0%</b>

## Appendix C. Annualized Waste Composition of the City of Whitehorse Landfilled Waste (2017/18)

Material	Total for Whitehorse	Curbside Residential	ICI	CD
<b>Paper</b>	<b>10.0%</b>	<b>7.0%</b>	<b>12.3%</b>	<b>7.3%</b>
Office Paper (white and coloured office paper)	0.8%	1.0%	1.0%	0.5%
Newsprint and Flyers	1.5%	0.8%	2.4%	0.2%
Corrugated Cardboard	5.0%	0.6%	5.0%	5.8%
Waxed Cardboard	0.3%	0.0%	0.6%	0.0%
Mixed Paper - boxboard, construction paper, directories	2.5%	4.6%	3.3%	0.8%
<b>Glass</b>	<b>1.1%</b>	<b>2.0%</b>	<b>1.3%</b>	<b>0.5%</b>
Beverage Containers	0.3%	0.2%	0.5%	0.0%
Food	0.7%	1.1%	0.6%	0.5%
Other (windows, mirrors, drinking glasses)	0.2%	0.7%	0.2%	0.0%
<b>Metals</b>	<b>5.5%</b>	<b>4.8%</b>	<b>3.0%</b>	<b>9.5%</b>
Beverage Containers	0.1%	0.2%	0.2%	0.0%
Food Containers	0.6%	1.7%	0.8%	0.2%
Other Metal – magnetic (steel)	3.9%	1.8%	1.5%	8.2%
Other Metal – non-magnetic (aluminum, brass, copper)	0.9%	1.1%	0.6%	1.1%
<b>Plastic</b>	<b>8.2%</b>	<b>11.5%</b>	<b>9.8%</b>	<b>5.3%</b>
Beverage Containers	0.3%	0.5%	0.5%	0.0%
#1	0.3%	0.6%	0.4%	0.1%
#2 – cloudy/translucent packaging	0.1%	0.2%	0.1%	0.0%
#2 – coloured/opaque	0.3%	0.4%	0.4%	0.1%
Polystyrene foam	0.8%	1.0%	0.5%	1.2%
Other Mixed Rigid – holds a shape	2.6%	3.2%	3.0%	1.8%
Soft Plastic (bags and wrap)	3.9%	5.6%	4.8%	2.1%
<b>Organics</b>	<b>22.9%</b>	<b>36.9%</b>	<b>36.3%</b>	<b>0.5%</b>
Yard Waste	0.4%	0.1%	0.8%	0.1%
Food Waste	18.6%	27.6%	29.9%	0.2%
Non-recyclable paper (e.g. towelling, tissue, paper with food)	3.9%	9.2%	5.6%	0.2%
<b>Composite</b>	<b>8.8%</b>	<b>11.5%</b>	<b>9.3%</b>	<b>7.0%</b>
Gable-top beverage (deposit)	0.1%	0.3%	0.1%	0.0%
Tetra-paks beverage (deposit)	0.0%	0.1%	0.1%	0.0%
Composite rigid packaging	0.9%	1.7%	1.2%	0.3%
Composite soft packaging (multi-laminate)	2.0%	3.7%	1.4%	2.4%
Durable goods (furniture, shoes, binders, suitcase, etc.)	5.8%	5.8%	6.4%	4.3%
Other (photographs)	0.0%	0.0%	0.0%	0.0%
<b>Wood Waste</b>	<b>19.2%</b>	<b>1.2%</b>	<b>11.0%</b>	<b>33.7%</b>
Clean structural wood	10.9%	0.3%	6.4%	18.0%
Coated structural wood	8.3%	0.9%	4.6%	15.5%
Branches, stumps (too large for composting)	0.0%	0.0%	0.0%	0.1%
<b>Inert Materials</b>	<b>1.9%</b>	<b>1.5%</b>	<b>1.1%</b>	<b>3.1%</b>
Tile, rock, dirt, asphalt, vacuum bags	1.7%	1.2%	0.9%	3.1%
Stove ash	0.1%	0.3%	0.2%	0.0%
<b>Gypsum Wallboard</b>	<b>6.2%</b>	<b>0.2%</b>	<b>1.5%</b>	<b>16.6%</b>
Drywall / Wallboard	6.2%	0.2%	1.5%	16.6%

Page 2/2 Material	Total for Whitehorse	Curbside Residential	ICI	CD
<b>Textiles</b>	<b>2.4%</b>	<b>3.8%</b>	<b>2.7%</b>	<b>1.6%</b>
Clothing	1.9%	3.5%	2.4%	0.9%
Dryer Lint / Dryer Sheets	0.4%	0.1%	0.2%	0.6%
Other	0.1%	0.2%	0.1%	0.1%
<b>Rubber</b>	<b>0.2%</b>	<b>0.1%</b>	<b>0.4%</b>	<b>0.0%</b>
Tires (car, truck and bicycle)	0.0%	0.0%	0.1%	0.0%
Other (flip flops)	0.2%	0.1%	0.4%	0.0%
<b>Carpet and Underlay</b>	<b>1.8%</b>	<b>0.5%</b>	<b>0.2%</b>	<b>4.8%</b>
Carpet	1.3%	0.5%	0.1%	3.6%
Underlay	0.4%	0.0%	0.1%	1.3%
<b>Electronic Waste (powered by cords or batteries)</b>	<b>1.0%</b>	<b>0.6%</b>	<b>1.2%</b>	<b>0.7%</b>
Audio-visual (TVs, stereos, DVD players)	0.0%	0.0%	0.1%	0.0%
CPUs and Computer-related Items	0.1%	0.0%	0.1%	0.0%
Other (toaster, blender, curling iron, battery charger)	0.9%	0.6%	1.0%	0.7%
<b>Personal Hygiene Products</b>	<b>2.7%</b>	<b>7.9%</b>	<b>3.4%</b>	<b>0.0%</b>
Diapers, Sanitary, Gauze, Band-Aid	2.7%	7.9%	3.5%	0.0%
<b>Hazardous Waste</b>	<b>1.1%</b>	<b>0.8%</b>	<b>0.9%</b>	<b>1.1%</b>
Paint	0.1%	0.4%	0.0%	0.0%
Paint Containers (empty or dry)	0.1%	0.1%	0.2%	0.0%
Motor Oil Filters	0.1%	0.1%	0.1%	0.1%
Motor oil containers	0.1%	0.0%	0.1%	0.0%
Batteries – alkaline	0.0%	0.1%	0.0%	0.0%
Batteries - rechargeable	0.6%	0.0%	0.2%	1.0%
Other	0.2%	0.1%	0.3%	0.0%
<b>Biomedical Waste</b>	<b>0.1%</b>	<b>0.2%</b>	<b>0.1%</b>	<b>0.0%</b>
Medicines	0.0%	0.0%	0.0%	0.0%
Other (syringes, tubing)	0.1%	0.1%	0.1%	0.0%
<b>Pet Waste</b>	<b>1.4%</b>	<b>6.7%</b>	<b>1.1%</b>	<b>0.0%</b>
Kitty Litter and Animal Waste	1.4%	6.7%	1.1%	0.0%
<b>Fines</b>	<b>1.2%</b>	<b>2.0%</b>	<b>1.3%</b>	<b>0.8%</b>
<b>Fibreglass Insulation</b>	<b>1.0%</b>	<b>0.0%</b>	<b>0.5%</b>	<b>1.8%</b>
<b>Other</b>	<b>3.4%</b>	<b>0.7%</b>	<b>2.4%</b>	<b>5.6%</b>
<b>Totals</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>