

# Yukon Industrial, Commercial and Institutional Packaging and Paper Products Baseline Report: Waste Flows Study

Submitted to Yukon Government  
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Submitted by: Policy Integrity Inc.

# Executive Summary

The Yukon Government is preparing to implement an extended producer responsibility (EPR) system for printed paper and packaging or what is more commonly referred to as packaging and paper products (PPP) as it better reflects the range of materials (e.g., unprinted paper) designated in policies across the country. The primary focus is to establish a financially stable system to recycle PPP in the Yukon.

As they make this transition, it is important to consider how inclusion or exclusion of all or some of PPP generated from the industrial, commercial, and institutional (ICI) sector would impact Yukon's EPR program for PPP and how that decision might impact the overall recycling of PPP in the territory. This is of particular concern for Yukon, given:

- the potential impacts of fragmenting the current unregulated recycling system, which services both the residential and part of the ICI sector given the relatively small amount of PPP waste generated across the territory;
- its significant distance to recycling markets (i.e., processing typically occurs in Alberta or British Columbia);
- the potential removal of existing government subsidies underpinning the current ICI and residential PPP recycling system; and
- increasing cost pressures related to labour, fuel, and inflation.

This purpose of this report is to provide the Yukon Government with:

- a baseline for current state of ICI PPP management, including the amount of PPP that is generated and then subsequently either disposed, reused, or collected for recycling in the Yukon; and
- an overview of opportunities and barriers that might exist to improving ICI PPP reuse or increase its recycling, including understanding how proposed changes (i.e., residential EPR for PPP, and the removal of the Yukon Government's Diversion Credit System) might impact future ICI PPP markets.

The project team built an ICI PPP baseline profile for the Yukon by drawing on both quantitative data sets and qualitative information from numerous existing sources. In total, over 300 waste audits of ICI entities in Canada were used to create a model to estimate the amount and types of PPP generated, disposed, and collected for recycling for the Yukon's ICI sector. This included aggregating all data and categorizing by two-digit NAICS codes. The number of FTEs per sub-sector was then used as a normalization factor to model the amount of PPP that is disposed or collected for recycling by each Yukon ICI sub-sector. The modelled data was then cross-checked with local data to determine whether the results were consistent with the few existing data sets available for the Yukon.



## ICI PPP Collected for Recycling

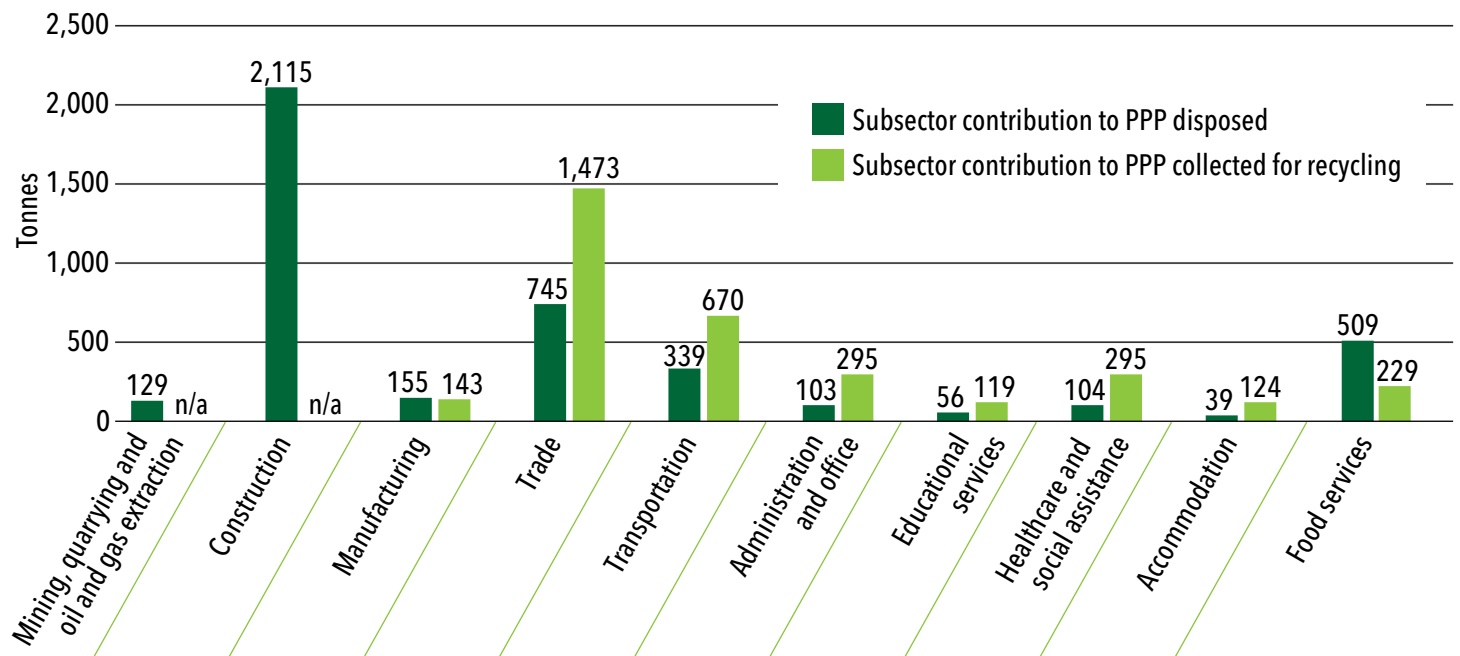
The assessment undertaken estimates that Yukon collects between 2,300 and 3,384 tonnes of ICI PPP for recycling. This is substantially higher than the estimated 1,270 tonnes of residential PPP currently recycled in the Yukon.<sup>1</sup> The ICI PPP collected consists of:

- 90%-96% fibre,
- 0-5% glass, and
- 2.5-5% plastic, and
- 0-2.5% metal.

Figure ES 1 provides the relative proportion of PPP disposed and collected for recycling by subsector. Note that the modelling for the construction sector may overestimate the contribution of PPP disposed due to the lack of data. Based on the data the largest contributors to PPP disposed are Construction, Trade, and Food Services, and the largest contributors to PPP collected for recycling are Trade and Transportation.



**Figure ES 1: PPP disposed and collected for recycling contribution, by sub-sector**



<sup>1</sup> Eunomia Research & Consulting, Economic/Financial Analysis of Development and Implementation of EPR in the Yukon, February 2023. Available at <https://yukon.ca/sites/yukon.ca/files/env/env-economic-analysis-development-implementation-epr-yukon.pdf>

## ICI PPP Disposed

The result of the data assessment undertaken shows that the Yukon is estimated to dispose between 4,294 – 5,661 tonnes of ICI PPP. This is substantially higher than the estimated that 2,810 tonnes of residential PPP is disposed annually in the Yukon.<sup>2</sup> The proportion of ICI PPP fibre, plastic, metal, and glass disposed that were modelled for the whole of the Yukon are consistent with what was observed through waste auditing at the Whitehorse landfill and support the finding that ICI PPP makes up 26% – 27% of the total landfilled material and consists of:

- 12% fibre,
- 12%-13% plastic,
- 1% glass, and
- 1% metal (*Table ES 1*).



**Table ES 1: Comparison of the estimated proportion of PPP disposed across the Yukon by data source.**

	Whitehorse ICI Waste Composition	Modelled ICI Waste Audit Data
<b>Total ICI PPP waste disposed (tonnes)</b>	5,661 (Extrapolated for the whole of the Yukon)	4,294
<b>Proportion ICI Disposed that is PPP</b>		
<b>Total % PPP</b>	27	26
<b>% PPP Fibre</b>	12	12
<b>% PPP Plastic</b>	13	12
<b>% PPP Metal</b>	1	1
<b>% PPP Glass</b>	1	1

There is significant variation in PPP content between ICI sub-sectors disposal streams ranging from 10% to 36%, with the highest rates in the food service (36%), transportation (34%), and administrative and office sub-sectors (30%).

<sup>2</sup> *Ibid.*

## Current ICI PPP Recycling Barriers

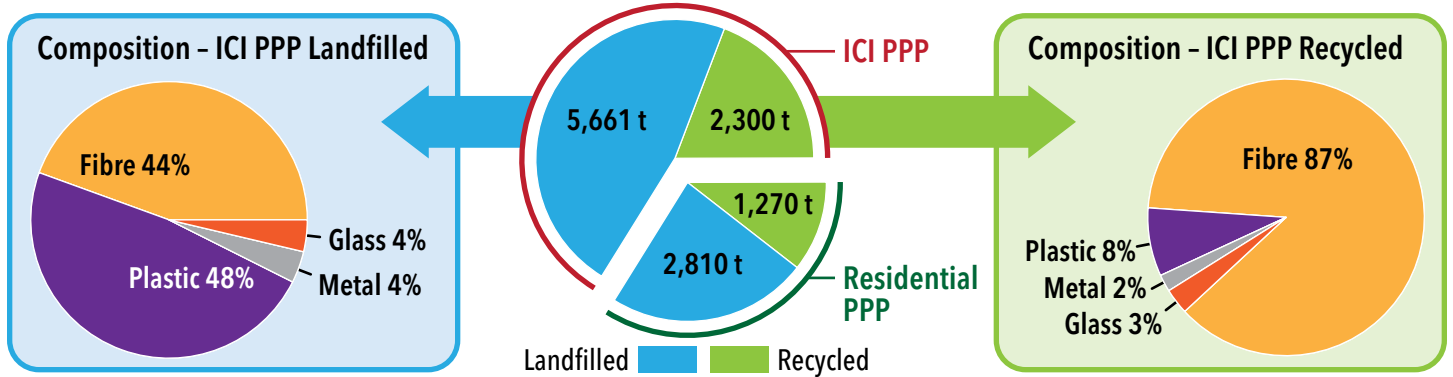
Factors to consider that can inhibit improvements in ICI PPP recycling were identified through key informant interviews with various waste generators across the ICI sub-sector and service providers (both private and public). These include:

- Economies of scale – The current ICI and residential recycling streams are fairly closely intertwined in the territory, which helps to create greater efficiencies given the relatively low generation rates of PPP. An EPR policy that leads to the need collect and manage PPP materials separately could jeopardize this economy of scale.
- Cost – which is relatively higher compared to Canadian provinces and is primarily driven by higher transportation costs. Other factors can include the costs of storage space, staff time, infrastructure, and risk management. These cost issues require the need for greater government intervention to drive recycling activities.
- Policy considerations – There is a reported lack of alignment of government (both municipal and provincial) policies targeting waste management (e.g., tipping fees, source separation requirements at landfills, cross subsidization of waste management streams). Greater alignment of these policies may help to improve recycling of ICI PPP.
- Information – existing data gaps can inhibit investments, evidence-based decision and policymaking. For waste generators and producers, a lack of feedback on performance also impacts the ability to drive improvements.
- Challenging investment condition for service providers – Challenging market conditions, a lack of new investment, and the challenge of making the economics of recycling make sense inhibit new investment. An EPR policy for at least residential PPP will help with these conditions but similar certainty will also be needed for ICI PPP whether that is through EPR, extension of the diversion credit system or some other intervention.
- Differences with ICI PPP – The types and amounts of PPP generated by ICI entities can vary significantly from the residential sector, between ICI sub-sectors, and even within an ICI sub-sector due to varying business models. This needs to be taken into consideration as it can have impacts on how materials are collected and managed.
- ICI producers' readiness for EPR – Some ICI producers do not sell to consumers, they only sell to other companies (e.g., a distributor, specialized manufacturer, brands). Including PPP from ICI sector in the Yukon EPR program would capture additional types of producers, such as those that only supply to the ICI market. So far, they have not been required to participate in the residential-only PPP programs in other Canadian jurisdictions (other than Quebec, which is implementing ICI requirements over the next seven years).

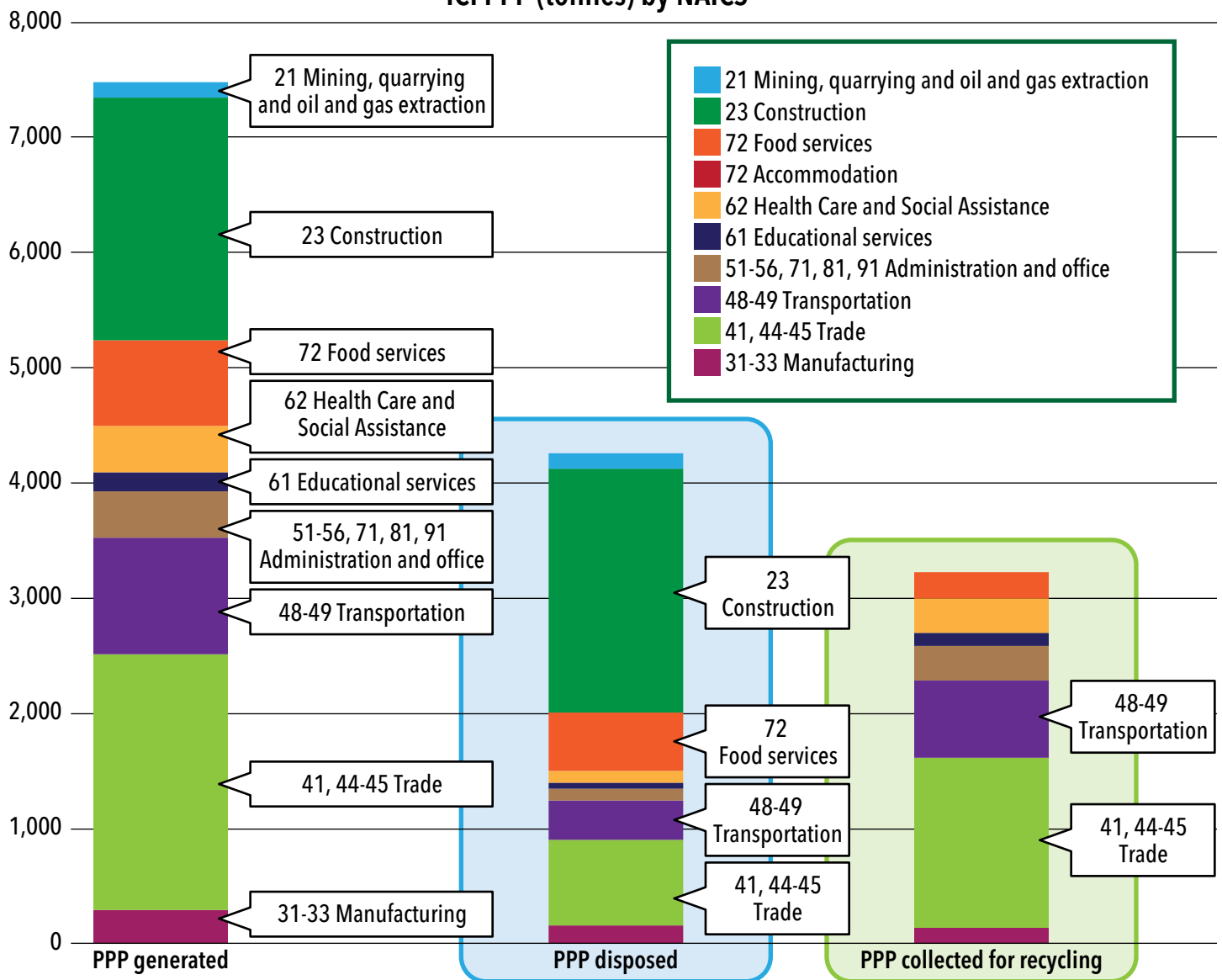


# Yukon Industrial, Commercial and Institutional Packaging and Paper Products Baseline Report: Waste Flows Study (2023)

## YUKON: Printed Paper and Packaging from Industrial, Commercial, and Institutional (ICI) Sectors



ICI PPP (tonnes) by NAICS



# Acknowledgements

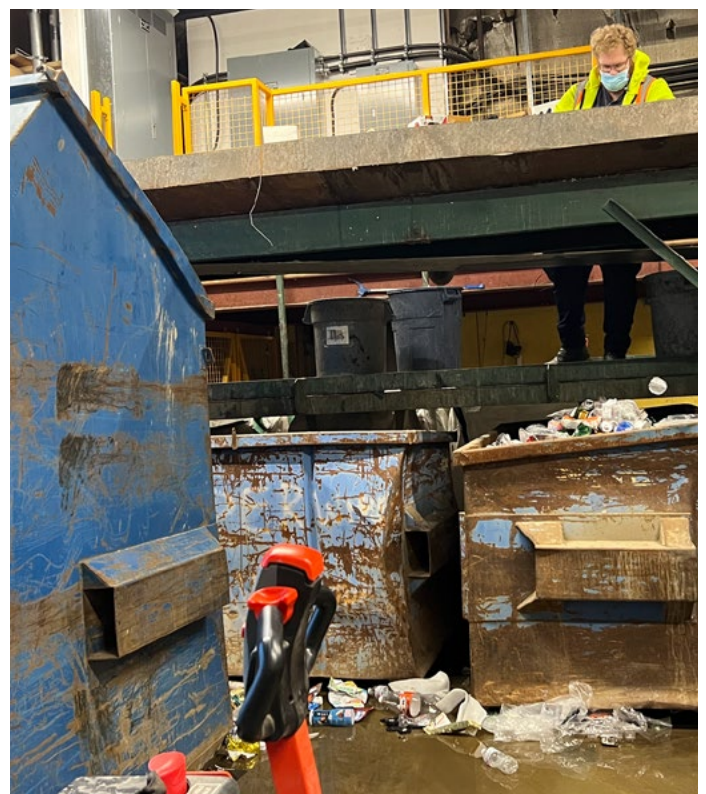
We thank all of the organizations that provided information to support the completion of this report. We are grateful to work in a sector with so many dedicated companies and individuals seeking to improve environmental and economic outcomes.

Finally, we thank and acknowledge the advice and guidance provided on data modelling and statistical analysis by Paul van der Werf, PhD, Adjunct Professor, Department of Geography and Ivey Business School, Western University.



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# Abbreviations

Terms	Definition
<b>C&amp;D</b>	Construction and demolition
<b>CPP</b>	Canada Plastics Pact
<b>EPR</b>	Extended Producer Responsibility
<b>EPS</b>	Expanded polystyrene, which is sometimes simply referred as 'foam'
<b>FTE</b>	Full time equivalent
<b>HDPE</b>	High-density polyethylene
<b>IBC</b>	Intermediate bulk container
<b>ICI</b>	Industrial, commercial, and institutional
<b>MRF</b>	Materials recovery facility
<b>MSW</b>	Municipal solid waste
<b>NAICS</b>	North American Industry Classification System
<b>n/a</b>	Not available
<b>n.d.</b>	No data
<b>LDPE</b>	Low-density polyethylene
<b>OCC</b>	Old corrugated cardboard or old corrugated carton. Both phrases refer to the same type of material.
<b>PET</b>	Polyethylene terephthalate
<b>PP</b>	Polypropylene
<b>PPP</b>	Packaging and paper products
<b>PS</b>	Polystyrene
<b>PVC</b>	Polyvinyl chloride
<b>SME</b>	Small or medium-sized enterprise

# 1.0 Background

The Yukon Government is preparing to implement an extended producer responsibility (EPR) system for printed paper and packaging or what is more commonly referred to as packaging and paper products (PPP) as it better reflects the range of materials (e.g., unprinted paper) designated in policies across the country. The primary focus is to establish a financially stable system to recycle PPP in the Yukon. As they make this transition it is important to consider how inclusion or exclusion of all or some of PPP generated from the industrial, commercial, and institutional (ICI) sector would impact Yukon's EPR program for PPP and how that decision might impact the overall recycling of PPP in the territory.

The effect that implementing a residential PPP recycling system could have on the availability and affordability of ICI PPP recycling is of particular concern for the Yukon given:

- the potential impacts of fragmenting the current recycling system, which services both the residential and part of the ICI sector given the relatively small amount of PPP waste generated across the territory;
- its significant distance to recycling markets (i.e., processing typically occurs in Alberta or British Columbia);
- the proposed removal of existing government subsidies underpinning the current ICI and residential PPP recycling system;
- the disposal ban on old corrugated cardboard (OCC) at the City of Whitehorse's landfill; as well as,
- increasing cost pressures related to labour, fuel, and inflation.

The Yukon Government wants to ensure the approach it takes reflects its overarching objective, as set out in its Our Clean Future Strategy:

- To reduce the amount of waste generated per person by 10% by 2030, compared to 2020, and to increase the amount of waste diverted from the landfill per person to 40% by 2025.<sup>3</sup>



<sup>3</sup> Government of Yukon, 2020. Our Clean Future: A Yukon strategy for climate change, energy and a green economy. Available at: <https://yukon.ca/sites/yukon.ca/files/env/env-our-clean-future.pdf>.

## 2.0 Objective and scope

### 2.1 Project objective

The objectives of this project are to:

- develop a baseline for the amount of PPP that is generated and then subsequently either disposed (whether in landfill or by waste-to-energy), reused, or collected for recycling by the ICI sector in the Yukon; and
- identify opportunities and barriers that might exist to better improve reuse or increase recycling of ICI PPP and understand how proposed changes (i.e., residential EPR for PPP, and the potential removal of the Yukon Government’s Diversion Credit System) might impact future ICI PPP markets.

### 2.2 Project scope

Similar to a project undertaken by the Canada Plastic Pact (CPP) in British Columbia<sup>4</sup>, this project targets key Yukon ICI sub-sectors that are generating PPP and for which data are available, either from the Yukon or other Canadian provinces and territories, to support an analysis. This includes pre-consumer PPP generated by manufacturing and retail sites, and post-consumer PPP generated in commercial, institutional, light industrial settings, and ‘workcamps’ that can service heavy industry (e.g., the mining sub-sector). Within each targeted sub-sector, effort was focused on businesses that are receiving ‘conventional’ waste disposal services from a waste management company (i.e., those that have bins or carts and are regularly serviced) and to account for where companies might be backhauling their own recyclables to recycling markets.

Table 1 lists those ICI sub-sectors, by North American Industry Classification System (NAICS) Code, that were analyzed as part of this study. It also includes the economic activity of each based on their percentage share of full-time equivalent employees (FTEs).

**Table 1: Key ICI sectors and sub-sectors reviewed in the Yukon and their economic activity based on percentage share of FTE<sup>5</sup>**

NAICS Codes	Category	Economic activity by share of FTEs (%)
21	Mining, quarrying and oil and gas extraction	2
23	Construction	11
31-33	Manufacturing	1
41, 44-45	Trade (e.g., retail and grocery stores, malls)	10
48-49	Transportation and warehousing (e.g., airports, ferry, transit)	4
51-56, 71, 81, 91	Administration and office	41
61	Educational services (e.g., elementary, secondary, and post-secondary schools)	9
62	Health care and social assistance (e.g., hospitals, care homes)	16
72	Accommodation (e.g., hotels, motels, resorts, campgrounds) and Food Services (e.g., restaurants and catering)	6

<sup>4</sup> Canada Plastic Pact, January 2023. British Columbia Industrial, Commercial and Institutional Sector Packaging and Paper Products Baseline Report: Waste Flow Study. Available at <https://plasticspact.ca/british-columbia-industrial-commercial-and-institutional-packaging-and-paper-products-baseline-report-waste-flows-study/>.

<sup>5</sup> Yukon Bureau of Statistics, December 2021. Yukon Employment. Available at <https://yukon.ca/sites/yukon.ca/files/ybs/fin-yukon-employment-december-2021.pdf>.

## 2.3 Approach and methodology

### 2.3.1 Overview and rationale for the approach

Unlike residential PPP waste, which has been a significant focus of study, scarce resources are available on ICI PPP generation and management. This is not unique to the Yukon. All Canadian jurisdictions face similar information and data gaps. Specific issues to obtaining reliable ICI PPP datasets include:

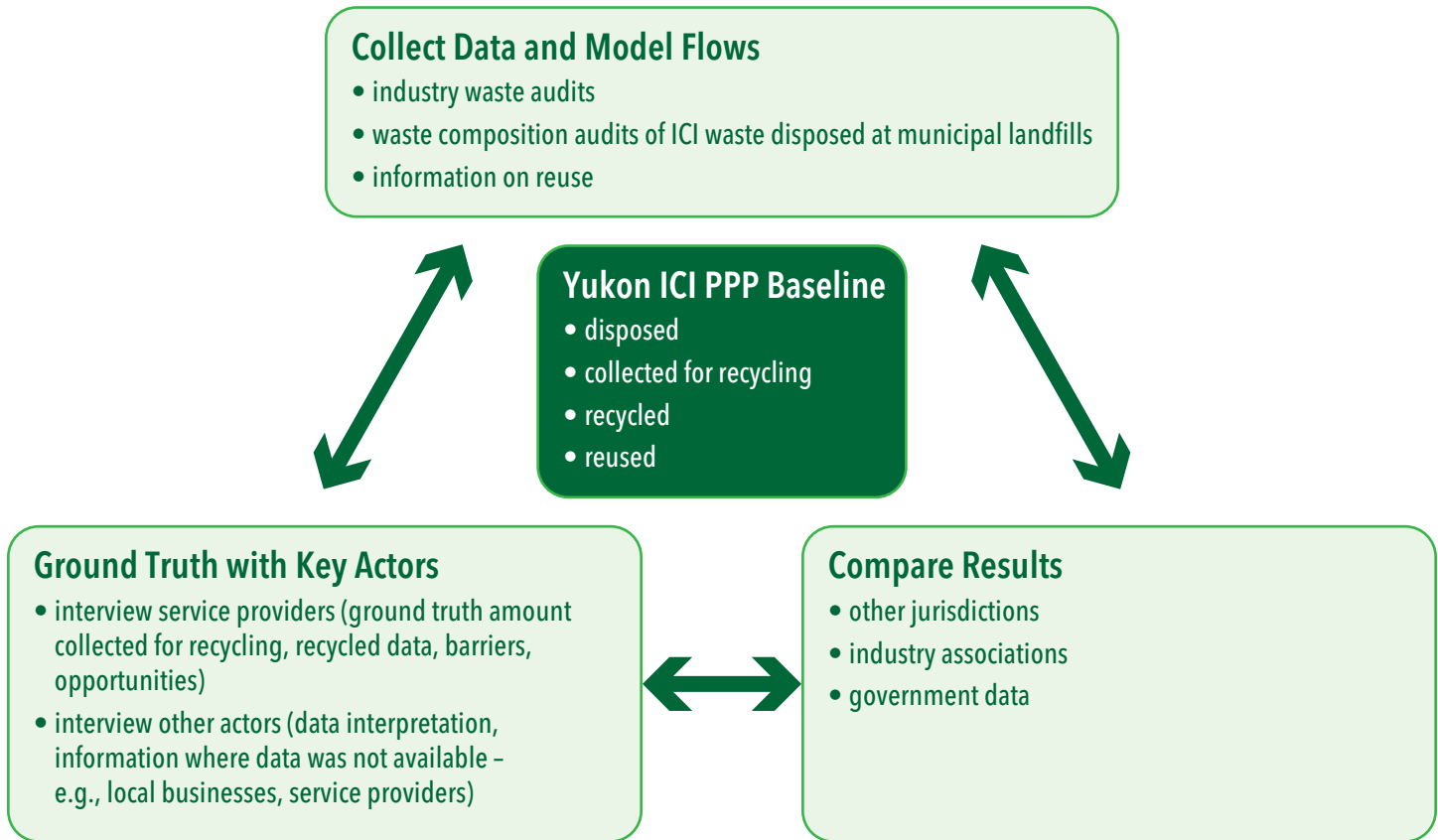
- ICI waste composition audits are not as prevalent as they are for residential waste, which are often undertaken by local governments.
- Where ICI waste composition audits are undertaken data tends to be much stronger for disposal than diversion. Further, the data are often considered proprietary and therefore difficult to obtain.
- The types and amounts of PPP generated in the waste stream can vary greatly between ICI subsectors, which include widely different types of businesses.
- The types and amounts of PPP generated in the waste stream can even vary greatly between similar types of businesses within a subsector due to wide variations in individual business models.
- Management of waste across waste streams (i.e., organic diversion, recycling, disposal) also varies greatly between ICI entities. Factors that might influence how a business chooses to manage its PPP waste stream include:
  - where an entity is located and how its distance from recycling market affects the cost of recycling;
  - the availability of staff to manage recyclables;
  - customer expectations about its environmental, social, and governance goals;
  - the types of services available from local waste management services;
  - its understanding about how to use local services effectively to enable source-separated materials to be ultimately recycled; and
  - the amount of physical space available to manage materials on each entity's property and whether that space is indoors or outside.

- Most EPR regulations across North America do not require producers of ICI PPP to report on the amount of materials they supply into the market. In 2022, Québec became the first jurisdiction in Canada to regulate ICI PPP under EPR, including reporting on progress. Its system will be implemented in stages with full implementation being reached in 2030.

To overcome the challenges of limited data sets and the diversity of ICI PPP waste stream composition varying across and within ICI sub-sectors, the project team built an ICI PPP baseline profile for the Yukon by drawing on both quantitative data sets and qualitative information from numerous existing sources. The profile and underlying data sets and information were then analyzed and cross-checked with local data to determine whether the results were consistent with the few existing data sets available for the Yukon. When multiple data sources trend towards the same results, this enables more confidence in the results found. This approach is called "triangulation" and is illustrated in *Figure 1*. The approach allowed the project team to ensure a continual feedback loop to test the validity of our findings. While some of the data and information sources might have been weaker on their own, this approach allowed the project team to gain more confidence in the overall assessment.



**Figure 1: Triangulation of the Yukon ICI PPP data**



### 2.3.2 Sources of data and information

The project team gathered quantitative data and qualitative information from the following sources:

- waste composition audits completed by local governments in the Yukon;
- waste and recycling audit data from individual businesses across all targeted ICI sub-sectors from other Canadian jurisdictions;
- territorial economic, housing, and waste-related data provided by the Yukon Government and Statistics Canada;
- territorial waste and recycling service provider data;
- solid waste permit data;
- information provided by local ICI entities;
- similar work undertaken in other jurisdictions; and
- key informant interviews.

Some of the ICI entities required the project team to sign confidentiality agreements to ensure they were not identified in this research nor were any datasets attributable to them. There is a significant amount of concern that ICI PPP data attributable to specific companies could provide an indicator of their market share and result in anti-competitive effects.



### 2.3.3 Industrial waste audit modelling

Over 300 waste audits of ICI entities in Canada were used to create a model to estimate the amount and types of PPP generated, disposed, and collected for recycling by in-scope NAICS subsectors.

Most of the data collected were from 2019-2021, however some audits were from years prior. All data were aggregated to ensure individual ICI generator anonymity and categorized by two-digit NAICS codes. The construction data obtained was modelled based on the waste composition audit data from the 2017-2018 Whitehorse landfill.

The mining, quarrying, and oil and gas extraction data was based on data from Yukon Government's solid waste permit application data.

It should be noted that many of the waste audits received included waste disposal data only. This is likely because waste composition audits are often undertaken to provide company operators with a better understanding of the amount of divertible wastes in the disposal stream (i.e., to inform opportunities to improve 'recycling'). Disposal data is also easier to collect because it is a single stream as opposed to 'divertible streams', which includes multiple recycling streams and the organics streams that need to be individually assessed.

As a result, there is more confidence associated with the waste disposal data. Most of the waste audit data collected did not include PPP that is reused (e.g., crates, pallets, skids totes, bins, trays).

Information on reusable PPP is provided in **Section 4.2**.

The ICI sub-sectors noted in *Table 1* were analyzed as part of this study in a similar manner to a study completed by the CPP for British Columbia. The number of FTEs provides a normalization factor by which to model the amount of PPP that is disposed or collected for recycling by each Yukon sub-sectors, though this can vary due to local conditions. The majority of FTEs in the Yukon are employed by the "administration and office" and "health care and social assistance" sub-sectors, which add up to over half of total FTEs employed. The construction sector is larger employer than in other jurisdictions like BC.

### 2.3.4 PPP material categorization

Consolidating data from waste composition audits can be challenging because of the variability in the data collection methodologies used across waste auditors. Some auditors collect sufficiently discrete categories of materials (e.g., various types of plastics) and while others only collect data on broad categories such as beverage containers, HDPE containers, tubs and lids, and 'other'. As a result, the PPP categories assessed for this project were streamlined from how they are reported in individual waste audits to allow for comparisons between data sources. This included grouping the discrete PPP categories reported into high-level groupings. *Table 2* provides the list of ICI PPP material categories and sub-categories that were assessed, and examples of materials in each sub-category.

**Table 2: Material categories and sub-categories reviewed.**

Categories	Sub- categories	Examples
<b>Paper (Fibre)</b>	OCC	cardboard, waxed OCC
	Mixed paper	marketing and advertising mail, newsprint and flyers, unaddressed mail, fine office paper, envelopes, newsprint, boxboard, construction paper, paper cups, plastic-lined paper cups, magazines, telephone books, gable top containers, drink boxes, aseptic containers, plastic-lined and unlined paper take-out containers, paper bags
	Non-PPP	paper towels, books
<b>Plastic</b>	PET	containers (PET), rigid cups
	HDPE	containers (HDPE), detergent bottles, pails, and buckets
	Film	film, plastic bags, sandwich bags, freezer bags, beverage pouches, soft plastics, composite soft packaging (multi-laminate)
	Other	packaging and single-use plastic products (e.g., utensils, straws, disposable tableware, foam cups, takeout containers, blister packs and tableware) made from PP, PVC, or compostable/biodegradable plastics, rigid LDPE and PS, rigid PVC, uncoded packaging.
	Non-PPP	synthetic textiles, durable plastics (e.g., laundry baskets)
<b>Metal</b>	Non-Ferrous	aluminum containers, foil trays, foil wrap
	Ferrous	steel food containers, spiral-wound containers
	Non-PPP	mixed metals, machine parts, construction metals, industrial metals, shelving
<b>Glass</b>	Glass	glass containers, food containers
	Non-PPP	other glass and ceramics (e.g., reusable dishware), windows

## 2.4 Data Limitations

Much of the data analyzed as part of this report were generously provided by Yukon municipalities, businesses, waste consultants, non-profit organizations, and trade associations. However, this data was supplemented by data from other Canadian jurisdictions. In addition, while every effort was taken to assure the integrity of the data used, they were collected using various methodologies, different material classifications, and were collected and verified by waste auditors with different levels of rigour.

Some of the information in this report is obtained from a small sub-sample of the businesses operating in other jurisdictions and should be taken as a general guide about relative proportions and types of waste that are generated for disposal / collected for recycling. The waste audits received might not be proportionally representative of the businesses operating in Yukon (e.g., there might be proportionally more large businesses relative to the actual number of small and medium-sized enterprises (SMEs); individual businesses within a specific sub-sector might generate and manage PPP differently than those reviewed), which could skew the results.



## 3.0 ICI PPP waste characterization based on waste composition audits at municipal landfills

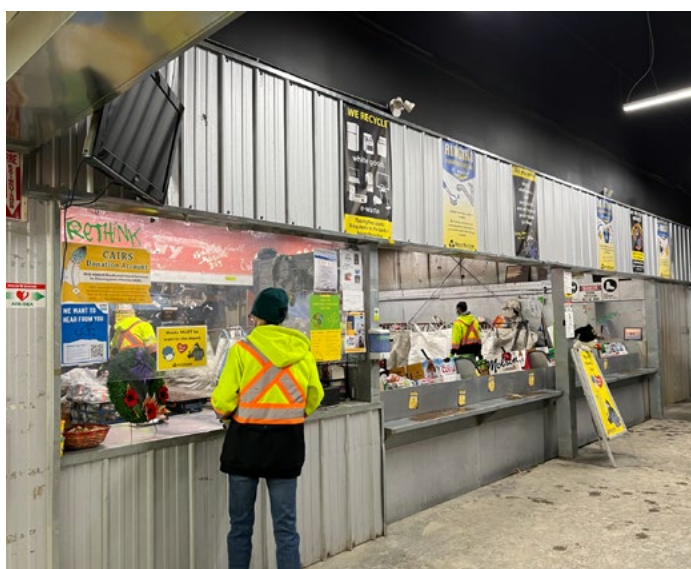
This section provides an overview of the Yukon’s ICI PPP waste characterization based on waste composition audits undertaken at the City of Whitehorse’s landfill, which included ICI and C&D waste samples. While data were not tracked per ICI sub-sector, it does help to provide an overall picture for the amount and types of ICI PPP waste disposed annually.

### 3.1 Overview

The Yukon has a population of 43,744 with almost 79% of the population residing in the Whitehorse area<sup>6</sup> (Table 3). The Whitehorse area population has grown by 25% over the last decade. The majority of waste generated in the Yukon is managed through municipal landfills, and of this over 60% is disposed in the Whitehorse landfill.

**Table 3: Population by community<sup>7</sup>**

Community	Population	% of Overall Population
Beaver Creek	107	0.2%
Burwash Landing	95	0.2%
Carcross	472	1.1%
Carmacks	584	1.3%
Dawson City	2,321	5.3%
Destruction Bay	59	0.1%
Faro	472	1.1%
Haines Junction	1,000	2.3%
Johnson's Crossing	57	0.1%
Mayo	457	1.0%
Mendenhall	138	0.3%
Old Crow	249	0.6%
Pelly Crossing	385	0.9%
Ross River	406	0.9%
Tagish	380	0.9%
Teslin	486	1.1%
Watson Lake	1,512	3.5%
Whitehorse Area	34,467	78.8%
Other	97	0.2%
<b>Total Yukon Population</b>	<b>43,744</b>	<b>100.0%</b>



<sup>6</sup> The Whitehorse area includes the subdivisions of Arkell/Ingram, Range Point, Copper Ridge, Raven’s Ridge/Eagle’s Eye, Cowley Creek, Riverdale, Crestview, Takhini/Yukon University, Downtown, Valleyview, Granger, Whistle Bend, Hidden Valley/MacPherson, Wolf Creek, Hillcrest, Kopper King, Lobird, Logan, Ibex Valley, MacRae/Whse Copper/McLean Lake/ Mt. Sima/Canyon Cres., Marsh Lake, Mount Lorne, Marwell, Outside City Limits-North, Mary Lake/Spruce Hill, Outside City Limits-South, McIntyre, Pineridge/Fox Haven, Porter Creek/Kulan/Taylor

<sup>7</sup> Yukon Bureau of Statistics, 2022. Population Report First Quarter, 2022. Available at: <https://yukon.ca/sites/yukon.ca/files/ybs/fin-population-report-q1-2022.pdf>.

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There are a number of industrial dumps (i.e., unlined and un-engineered disposal sites) or sites that burn or incinerate the waste generated exclusively from industrial operations (e.g., mining). For some of these industrial sites, the types of waste generated would include waste from work camps, which are established to house workers on the worksite in remote areas. There is no tracking of the amount of overall waste disposed from work camps at these sites but based on solid waste permit applications generate an estimated 350 tonnes total per year.

According to its 2017-2018 Waste Composition Audit, the City of Whitehorse disposed annually a total of 19,881 tonnes of waste of which 2,280 tonnes was residential waste, 8,875 tonnes was ICI waste (excluding C&D waste), and 8,726 tonnes was C&D waste. As a result of how the assessment was completed, there are a number of residential sources that were currently caught in this ICI waste dataset including multi-residential buildings and misallocated residential materials that were disposed at the transfer station. The project team estimates this residential proportion within the ICI waste stream is 5.5% of the overall waste stream.<sup>8</sup> There was also a major demolition project that occurred during the audit timeframe that might have resulted in an overrepresentation of the generation of C&D in this dataset. As a result, the project team used a four-year average of the waste disposed at the landfill site to more accurately reflect the waste received by sector (i.e., 2018-2021).

Table 4 provides a comparison of the amount of waste disposed by sector based on Statistics Canada's *Waste Management Industry Survey*<sup>9</sup> and using on a three-year average of waste disposed at the Whitehorse landfill. As data are not well-tracked by generation type in the Yukon, there is some concern that the current data might under-estimate the amount of residential waste disposed as compared to ICI (excluding C&D) and C&D waste disposed.

**Table 4: Comparison of the proportion of overall waste disposed in the Yukon by sector**

Waste Stream	Whitehorse Landfill Average Waste Disposed (2019-2021)	Statistics Canada - Yukon, Northwest Territories and Nunavut (2018)
Residential	19%*	36%
ICI (excluding C&D)	40%*	64%
C&D	41%	
<b>Total</b>	<b>100%</b>	<b>100%</b>

\*Adjusted to reallocate multi-residential and misappropriated sources at transfer stations.



<sup>8</sup> Estimated by multiplying the Statistics Canada's residential kg/capita waste disposal by the average number of individuals in a household by the number of multi-residential units (2,700 based on the 2021 Census data available at

<https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Yukon&DGUIDlist=2021A000260&GENDERlist=1&STATISTIClist=1&HEADERlist=>

<sup>9</sup> Environment and Climate Change Canada. Solid Waste Diversion and Disposal: Canadian Environmental Sustainability Indicators, 2022.

Available at <https://www.canada.ca/content/dam/eccc/documents/pdf/cesindicators/solid-waste/2022/solid-waste-diversion-disposal.pdf>.

## 3.2 ICI waste composition at municipal landfills

The City of Whitehorse 2017-2018 Waste Composition Audit was a two-season study to provide them with information about the types of waste materials disposed in the Son of War Eagle Landfill and their relative quantities.<sup>10</sup> The study included an assessment of the relative contribution of residential, ICI (excluding C&D), and C&D waste to the overall waste composition.

For ICI waste disposed, plastic and fibre make up the greatest proportion of PPP disposed in the Whitehorse landfill at approximately 12% each; metal and glass make up smaller proportions at 1% each (Table 5). The total amount of PPP disposed was about 27%.



**Table 5: Estimated PPP composition by weight in the ICI Whitehorse waste disposal stream (excluding C&D)**

PPP Material Categories	Summer 2018	Winter 2017	Average
<b>Fibre</b>			
% OCC	6.9	4.8	5.9
% Mixed Paper	4.4	8.6	6.5
<b>% Total Fibre</b>	<b>11.3</b>	<b>13.4</b>	<b>12.4</b>
<b>Plastic</b>			
% PET	1.1	0.6	0.9
% HDPE	1.0	0.3	0.7
% Film	6.3	6.3	6.3
% Other	5.3	4.4	4.9
<b>% Total Plastic</b>	<b>13.7</b>	<b>11.6</b>	<b>12.7</b>
<b>Metal</b>			
% Non-Ferrous	0.9	0.7	0.8
% Ferrous	0.2	0.2	0.2
<b>% Total Metal</b>	<b>1.1</b>	<b>0.9</b>	<b>1</b>
<b>Glass</b>			
% Glass containers	1.1	1.1	1.1
<b>% Total Glass</b>	<b>1.1</b>	<b>1.1</b>	<b>1.1</b>
<b>Total % PPP</b>	<b>27.2</b>	<b>27.0</b>	<b>27.1</b>

\*Rounded to the nearest 0.1%, so might not add up

The proportion of PPP assessed in Whitehorse's disposal stream was compared to assessments undertaken in other jurisdictions and was relatively consistent (Table 6). Note that few jurisdictions have undertaken similar assessments. While data comparisons of disposal streams between jurisdictions should be considered with caution as the recycling streams will impact the proportion of materials in the disposal streams, the results show a level of consistency, with the exception of the fibre stream, which is lower in both the Yukon and BC disposal streams.

<sup>10</sup>Maura Walker and Associates, 2018. City of Whitehorse 2017-2018 Waste Composition Study. Available at <https://www.engagewhitehorse.ca/29093/widgets/118439/documents/85115>. A similar study was also conducted in November 2009 and July 2010.

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**Table 6: Comparison of the Yukon's estimated percentage of ICI PPP (excluding C&D) disposed with other jurisdictions.**

	Yukon	British Columbia <sup>11</sup>	Québec <sup>12</sup>	California <sup>13</sup>	Australia <sup>14</sup>
Date completed	2017-2018	2019	2019-2020	2014	2010-2011
% Fibre	12	12	18	27	21
% Plastic	13	12	11	2	10
% Metal	1	1	1	1	3
% Glass	1	1	2	2	1
<b>Total % PPP*</b>	<b>27</b>	<b>26</b>	<b>32</b>	<b>31</b>	<b>35</b>

\*Rounded to the nearest 1%, so might not add up

For the C&D sub-sector, plastic and fibre also made up the greatest proportion of PPP by weight disposed in Whitehorse's landfill at approximately 8% each; metal and glass made up relatively smaller proportions between 0.1 - 0.2% each (Table 7). The average total amount of PPP disposed was 16%.



**Table 7: Estimated PPP composition by weight in the C&D Whitehorse waste disposal stream**

PPP Material Categories	Summer 2018	Winter 2017	Average
<b>Fibre</b>			
% OCC	10.4	2.6	6.5
% Mixed Paper	1.1	1.8	1.5
% Total Fibre	11.4	4.4	7.9
<b>Plastic</b>			
% PET	0.1	0.0	0.1
% HDPE	0.2	0.0	0.1
% Film	2.6	5.9	4.3
% Other	4.5	2.7	3.6
% Total Plastic	7.4	8.6	8.0
<b>Metal</b>			
% Non-Ferrous	0.0	0.1	0.1
% Ferrous	0.2	0.1	0.2
% Total Metal	0.2	0.2	0.2
<b>Glass</b>			
% Glass containers	0.0	0.2	0.1
% Total Glass	0.0	0.2	0.1
<b>Total PPP</b>	<b>19.0</b>	<b>13.4</b>	<b>16.2</b>

\*Rounded to the nearest 0.1%, so might not add up

<sup>11</sup> Canada Plastics Pact, 2023. British Columbia Industrial, Commercial and Institutional Sector Packaging and Paper Products Baseline Report: Waste Flow Study.

Available at <https://plasticspact.ca/british-columbia-industrial-commercial-and-institutional-packaging-and-paper-products-baseline-report-waste-flows-study/>.

<sup>12</sup> RECYC-QUÉBEC, 2021. Étude de caractérisation à l'élimination 2019-2020.

Available at: [https://www.recyc- Québec.gouv.qc.ca/sites/default/files/documents/caracterisation-elimination2019-2020.pdf](https://www.recyc-Québec.gouv.qc.ca/sites/default/files/documents/caracterisation-elimination2019-2020.pdf).

<sup>13</sup> CalRecycle, September 2015. 2014 Generator-Based Characterization of Commercial Sector Disposal and Diversion.

Available at <https://www2.calrecycle.ca.gov/WasteCharacterization/PubExtracts/2014/GenSummary.pdf>.

<sup>14</sup> Australian Government, 2013. A Study into Commercial and Industrial Waste and Recycling in Australia by Industry Division.

Available at <https://www.awe.gov.au/sites/default/files/documents/commercial-industrial-waste.pdf>.

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The amount of PPP identified in Whitehorse's C&D disposal stream appears high when compared to work undertaken recently in Québec (16% as compared to 3%). This might indicate that the sample undertaken in the Yukon is too small to accurately assess the overall composition, but it might also be the result of much different types of C&D activities occurring in the two jurisdictions. When comparing the overall material composition between the C&D waste streams (*Table 8*), there appears to be much different types of activities occurring (i.e., there are differences in the amount of inert materials, paper, and plastics generated). This difference in activities might have to do with Yukon's relatively high population growth and construction rate during the waste composition audit period and the predominance of construction activities as opposed to demolition. Between 2016 and 2021, the Yukon, and particularly Whitehorse, experienced Canada's highest rate of population growth.<sup>15</sup>

**Table 8: Comparison of Whitehorse's estimated percentage of C&D waste disposed by material type with Québec.**

Material Categories	Whitehorse 2018 % disposed by material type	Whitehorse 2017 % disposed by material type	Québec 2019 % disposed by material type
% Carpets	1	8	0
% Electronic / Electrical	2	0	2
% Fibreglass insulation	1	1	5
% Fines	3	1	1
% Glass	1	0	0
% Gypsum	2	27	10
% Hazardous waste	3	0	1
% Inert (dirt, ceramic, cement)	2	4	25
% Metal	8	11	6
% Other	4	7	10
% Paper	11	4	3
% Plastic	16	9	3
% Textiles	2	1	1
% Wood waste	44	26	33
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

\*Rounded to the nearest 1%, so might not add up

<sup>15</sup>Canada Mortgage and Housing Corporation, 2022. Housing Market Information: Northern Housing Report. Available at: <https://assets.cmhc-schl.gc.ca/sites/cmhc/professional/housing-markets-data-and-research/market-reports/northern-housing-report/northern-housing-report-2022-en.pdf?rev=48c601e2-31ad-4428-b4f4-0b90a26919e0>.

### 3.3 Total PPP disposed based on ICI waste audit composition at municipal landfills

Table 9 extrapolates the Whitehorse landfill data to estimate total ICI PPP disposed based on 32,446 tonnes of total waste disposed across the Yukon in 2021. As noted earlier, the proportion of ICI waste disposed, including C&D waste disposed, might be overestimated as compared to residential waste disposed.

*Table 9: 2021 Estimate of ICI waste disposed in the Yukon based on extrapolated Whitehorse landfill data*

	Total Waste disposed	Total PPP disposed
	tonnes	
ICI (excluding C&D)	12,978	3,506
C&D	13,303	2,155
<b>Total ICI</b>	<b>26,281</b>	<b>5,661</b>

*\*Rounded to the nearest one tonne, so might not add up and does not include residential waste*



## 4.0 Industrial waste audit data modelling

This section provides an overview of the Yukon’s ICI PPP waste characterization using industry waste audit data obtained from businesses across Canada and modelled based on the Yukon’s economic conditions. Data are assessed by management stream (i.e., disposal and collected for recycling) and by ICI sub-sector (based on NAICS codes). This section also provides a preliminary indication of which ICI sub-sectors generate the most PPP.

### 4.1 ICI PPP characterization by waste stream

#### 4.1.1 Disposal Stream

Table 10 provides a breakdown of the average amount of PPP for each material type in the disposal stream by sub-sector. There is significant variation in the percentage of PPP in each sub-sector’s disposal stream, with the highest rates in the food service, transportation, and administrative and office sub-sectors. However, the types of PPP in disposal stream across all sub-sectors consists of almost an even mix of:

- fibre and plastic, which together make up approximately 90% of the PPP disposed; and
- metal and glass, which together make up approximately 10% of the PPP disposed.

**Table 10: Overview of percentage of PPP, by material, in each sub-sector’s disposal stream based on industry waste audit data modelling.**

NAICS Code	ICI Sub-sectors	% Fibre	% Rigid plastic	% Flexible plastic	% Metal	% Glass	% Total
23	Construction	8	4	4	0	0	16
31-33	Manufacturing	14	5	7	1	1	27
41, 44-45	Trade (e.g., retail and grocery stores, malls)	10	5	6	1	1	23
48-49	Transportation	23	10	1	0	0	34
51-56, 71, 81, 91	Administration and office	16	8	5	1	1	30
61	Educational Services	12	8	6	1	0	28
62	Health Care and Social Assistance	5	3	1	1	1	10
72	Food services	14	5	7	1	1	36
	Accommodations	9	7	1	2	3	22

These results are consistent with the findings of the City of Whitehorse’s waste composition audits, i.e., proportion of each type of material (Table 11). Note mining, quarrying, and oil and gas extraction data was not detailed enough to be included in the table above, but PPP accounted for 39% of all waste generated in those sectors based on the waste audit data.

**Table 11: Comparison of the estimated proportion of PPP disposed by data source.**

PPP Material Categories	ICI PPP disposed(Estimated using industry waste audit data modelling)	ICI PPP disposed(Findings from Whitehorse waste audit data)
Fibre	12%	12%
Plastic	12%	13%
Metal	1%	1%
Glass	1%	1%
<b>Total</b>	<b>26%</b>	<b>27%</b>

\*Numbers rounded to the nearest 1%, so might not add up

#### 4.1.2 Collected for Recycling Stream

Table 12 provides a breakdown of the average proportion of PPP, per material type and by sub-sector in the recycling stream. As noted earlier, the confidence of the data associated with recycling is lower due to there being to fewer overall data sources.

The construction sub-sector and the mining, quarrying and oil and gas extraction sub-sector data were not included as there were not enough data available to model. Although based on feedback from interviews with mining representatives and service providers, the amount of PPP materials being recycled from these sectors is low consisting mainly of deposit bearing beverage containers that are donated to charities or taken home by staff members and metal oil drums, which are considered a special waste.

Across all sub-sectors, the most significant amount of PPP material collected for recycling is fibre. The modelled data for fibre-based PPP is consistent with the information reported by service providers. Based on feedback from service providers (**Section 5**), it appears the modelling overestimates the amount of other material types collected for recycling. While some plastics, metals, and glass might be backhauled by larger retailers for recycling, the Yukon service providers are generally only managing fibre-based PPP from ICI entities.



**Table 12: Proportion of PPP collected for recycling by material type based on industry waste audit data modelling**

NAICS Code	ICI sub-sectors	Fibre	Rigid plastic	Flexible plastic	Metal	Glass
21	Mining, quarrying and oil and gas extraction	n/a	n/a	n/a	n/a	n/a
23	Construction	n/a	n/a	n/a	n/a	n/a
31-33	Manufacturing	74%	10%	5%	3%	9%
41, 44-45	Trade (e.g., retail and grocery stores, malls)	93%	4%	1%	1%	1%
48-49	Transportation	96%	2%	3%	0%	0%
51-56, 71, 81, 91	Administration and office	85%	9%	1%	2%	3%
61	Educational services	79%	15%	1%	3%	2%
62	Health Care and Social Assistance	66%	17%	3%	12%	2%
72	Accommodations	69%	10%	0%	3%	18%
	Food services	79%	8%	1%	3%	9%
	<b>Weighted average</b>	<b>87%</b>	<b>6%</b>	<b>2%</b>	<b>2%</b>	<b>3%</b>

### 4.1.3 Total Waste Generated

An estimate of PPP disposed and collected for recycling, per sub-sector or NAICS code, was developed by:

- Calculating an average of the amount of PPP disposed and PPP collected for recycling per FTE based on the waste audit data received by sub-sector (kg/FTE/year). Trade kg/FTE/year were used as a proxy for Transportation and Warehousing, and Wholesale Trade because there was limited available data. For Education sub-sector (i.e., NAICS 61) waste audits regularly report on students rather than FTEs. As a result, the most up-to-date estimate of Yukon students was gathered and pro-rated against the number of FTEs for those facilities. A ratio was then created and applied to create a kgPPP/FTE/year estimate.
- The average kg/FTE/year of PPP disposed and PPP collected for recycling was multiplied by the 2021 FTE data from Statistics Canada<sup>16</sup> to generate an understanding of the total tonnes of PPP disposed and collected for recycling by sub-sector.

The model estimates that 7,642 tonnes of PPP are generated of which 4,294 tonnes is disposed and 3,384 tonnes is collected for recycling (Table 13). The model appears to:

- underestimate the total amount of total waste disposed (by 27%) and the total PPP disposed (by 31%) as compared to the estimates in **Section 3.3**; and
- overestimate the amount of PPP collected for recycling (by 41%) as compared to the estimate in **Section 5.2**.

The difference in the PPP disposed might be related to the overestimate in the amount of PPP that is collected for recycling by Yukon ICI entities as well as other recyclables (e.g., organic waste, non-PPP recyclables). The data are modelled from ICI entities in other provinces that generally have greater access to recycling markets and more access to economies of scale. This likely also explains the overestimate in the amount PPP collected for recycling.

<sup>16</sup>Employment by Industry, Annual <https://open.canada.ca/data/en/dataset/51490d9d-e071-4644-8b86-a351d1a48399>

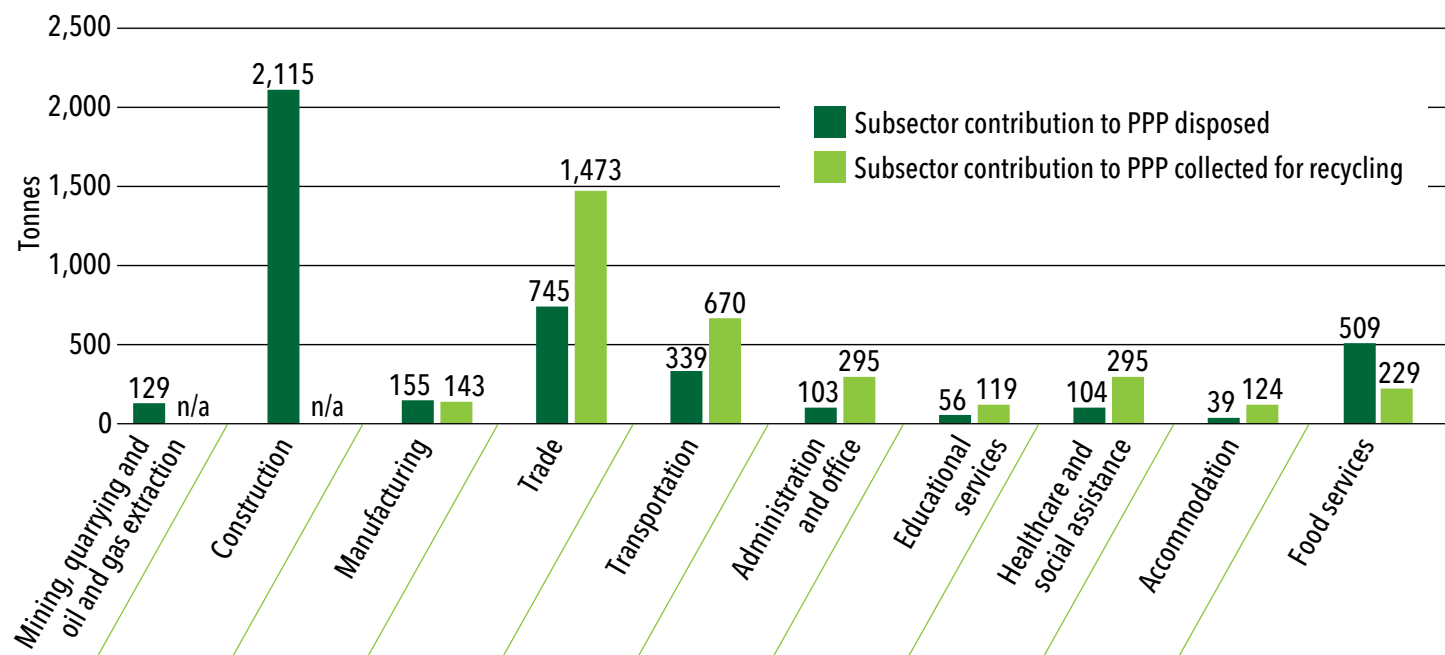
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**Table 13: Estimate of PPP generated, disposed, and collected for recycling by ICI sub-sector based on industry waste audit data modelling.**

NAICS Codes	ICI sub-sectors	Waste disposed	PPP generated	PPP disposed	PPP collected for recycling
		tonnes			
21	Mining, quarrying and oil and gas extraction	330	129	129	n/a
23	Construction <sup>17</sup>	13,303	2,115	2,115	n/a
31-33	Manufacturing	464	298	155	143
41, 44-45	Trade (e.g., retail and grocery stores, malls)	1,670	2,218	745	1,473
48-49	Transportation	759	1,009	339	670
51-56, 71, 81, 91	Administration and office	971	398	103	295
61	Educational services	213	175	56	119
62	Health Care and Social Assistance	1,169	399	104	295
72	Accommodation	318	163	39	124
	Food services	1,451	738	509	229
	<b>Total</b>	<b>20,648</b>	<b>7,642</b>	<b>4,294</b>	<b>3,384</b>

Figure 2 provides the relative proportion of PPP disposed and collected for recycling by subsector. Note that the modelling for the construction sector may overestimate the contribution of PPP disposed due to the lack of data. Based on the data the largest contributors to PPP disposed are Construction, Trade, and Food Services, and the largest contributors to PPP collected for recycling are Trade and Transportation.

**Figure 2: PPP disposed and collected for recycling contribution, by sub-sector**



<sup>17</sup>Results are reverse engineered based on Whitehorse landfill data.

## 4.2 Reuse in business-to-business packaging

The use of reusable packaging is common in ICI business-to-business interactions in the Yukon as it is in other provinces in Canada. This reusable packaging (e.g., totes, trays, bins, crates, drums, kegs, skids, and pallets) is made from durable items and intended for multiple uses. It is important to highlight reusable packaging given its prominence in use. Business-to-business interactions allow for a constant and structured relationship where trucks bring new products and packaging and can reload, backhaul, and reuse durable packaging again in a closed loop.

These closed loop systems can be more economical than alternative disposable systems, but this will depend on a number of factors like how logistics are arranged between the producer, distribution centre, and the retail store, frequency of interactions, scale efficiency (i.e., optimal size of operations), storage considerations, and the need for cleaning of packaging. While reuse is prevalent, very little information or data exists (e.g., number of trips or rotations, or how many disposable alternatives those items replaced). As a result, data on reusable packaging has not been included in the report on quantities of ICI reusable packaging. However, it is an important consideration to ensure any policy that might be brought forward related to ICI packaging amplifies rather than detracts from these systems.



## 5.0 Service provider waste characterization

### 5.1 Overview

There are two main ICI PPP recyclers in the Yukon (e.g., Raven Recycling and P&M Recycling), with a number of other private sector operators that are involved in the collection of materials (e.g., General Waste Management, Pacific Northwest). Contaminants in the fibre, metal and plastic PPP streams are removed manually, pushed onto a conveyor, and then baled. These facilities do not have advanced or mechanical sortation abilities. Baled materials are sent to processors typically in British Columbia and Alberta. Glass and polystyrene PPP is currently disposed of at the Whitehorse landfill.

Given the cost to transport materials, turbulent commodity markets, and the lack of scale efficiencies in the Yukon, government subsidies are provided by the City of Whitehorse and the Yukon Government to the recyclers and have underpinned non-beverage PPP collection and recycling in Whitehorse and across the Yukon.

The total amount of the Yukon Government subsidies has grown from just under \$800,000 in 2015 to almost \$1,000,000 in 2021. The subsidies provided by the City of Whitehorse are capped at \$150,000 and given each recycler's inability to control the flow of materials they receive, recyclers exceed the cap annually. The majority of diversion credits are used to assist with the costs of recycling OCC, a significant portion of which is generated by the ICI sector. This has caused ongoing issues for recyclers to maintain or increase the amount of materials recycled.

The City of Whitehorse provides waste and compost services only to residential dwellings under four units. The Waste Management Bylaw 2018-05<sup>18</sup> requires all larger multi-residential buildings and ICI entities to obtain private waste and recycling services. The Bylaw also requires that clean, uncontaminated OCC be collected separately for recycling. The landfill tipping fee for unsorted waste (i.e., includes OCC) is \$300 per tonne as compared a tipping fee of \$116.03 per tonne for sorted waste. This unsorted tipping fee is also lower than the cost to recycle the material, given transportation costs.

Commercial properties throughout Whitehorse collect OCC typically through front-end bin collection. Some plastics and metals are also collected through ICI waste servicing (e.g., beverage containers). Some smaller businesses will also self-haul and drop-off recyclables at Raven Recycling but the amount of generated through self-haul of small businesses versus residential dwellers (e.g., the un-serviced multi-residential sector) is not tracked. While most materials are managed at the two PPP recyclers, the project team confirmed some larger retail outlets backhaul OCC and plastics, including film and polystyrene, back to British Columbia and Alberta.

<sup>18</sup>City of Whitehorse, Waste Management Bylaw 2018-05.

Available at: <https://www.whitehorse.ca/wp-content/uploads/2022/06/2018-05-Waste-Management-Bylaw-2022-Schedule-G-Amended.pdf>.

## 5.2 ICI marketplace

Given the relatively small number of service providers in the Yukon and the current diversion credit system, there is relatively good data collected on the amount of PPP collected for recycling. Based on data from the diversion credit system, the Yukon collects an annual average of 10,585 tonnes of recyclables, which includes 3,754 tonnes of non-beverage PPP (Table 14). This does not include materials that were backhauled independently by ICI entities, which occurs with some larger retailers.

**Table 14: Estimated breakdown of collected for recycling in the Yukon based on diversion credit system**

Material categories	2020	2021	Average	%
	tonnes/year			
<b>Non-beverage PPP</b>	3,638	3,871	3,754	35%
<b>Metals</b>	2,258	2,913	2,586	24%
<b>Lead Acid Batteries</b>	152	220	186	2%
<b>Tires</b>	409	617	513	5%
<b>Electrical and Electronic Equipment</b>	183	192	187	2%
<b>Textiles</b>	41	59	50	0%
<b>Municipal Hazardous Special Waste</b>	119	209	164	2%
<b>Organics</b>	3,216	3,073	3,145	30%
<b>Total</b>	<b>10,015</b>	<b>11,154</b>	<b>10,585</b>	<b>100%</b>

The territory does not currently track whether materials that receive diversion credits are residential or ICI. As a result, the breakdown of ICI materials collected for recycling in Table 15 is based on information and feedback received by Yukon-based recyclers, processors in BC and Alberta, and ICI entities that are backhauling materials. In total, an estimated 2,100 tonnes of ICI PPP are collected for recycling annually. OCC accounts for over 80% of all the ICI PPP collected for recycling. In addition, 10% mixed paper and much smaller amounts of glass, plastic, and metal are also collected.

**Table 15: The estimated breakdown of ICI PPP collected for recycling, by material type based on service provider information and data.**

PPP Material Categories	Estimated Proportion of ICI PPP Collected for Recycling (%)	Estimated ICI tonnes*
<b>OCC</b>	>80	1,900
<b>Mixed Paper</b>	10	200
<b>Glass</b>	<5	100
<b>Plastic</b>	<2.5	>50
<b>Metal</b>	<2.5	>50
<b>Total</b>	<b>100</b>	<b>2,300</b>

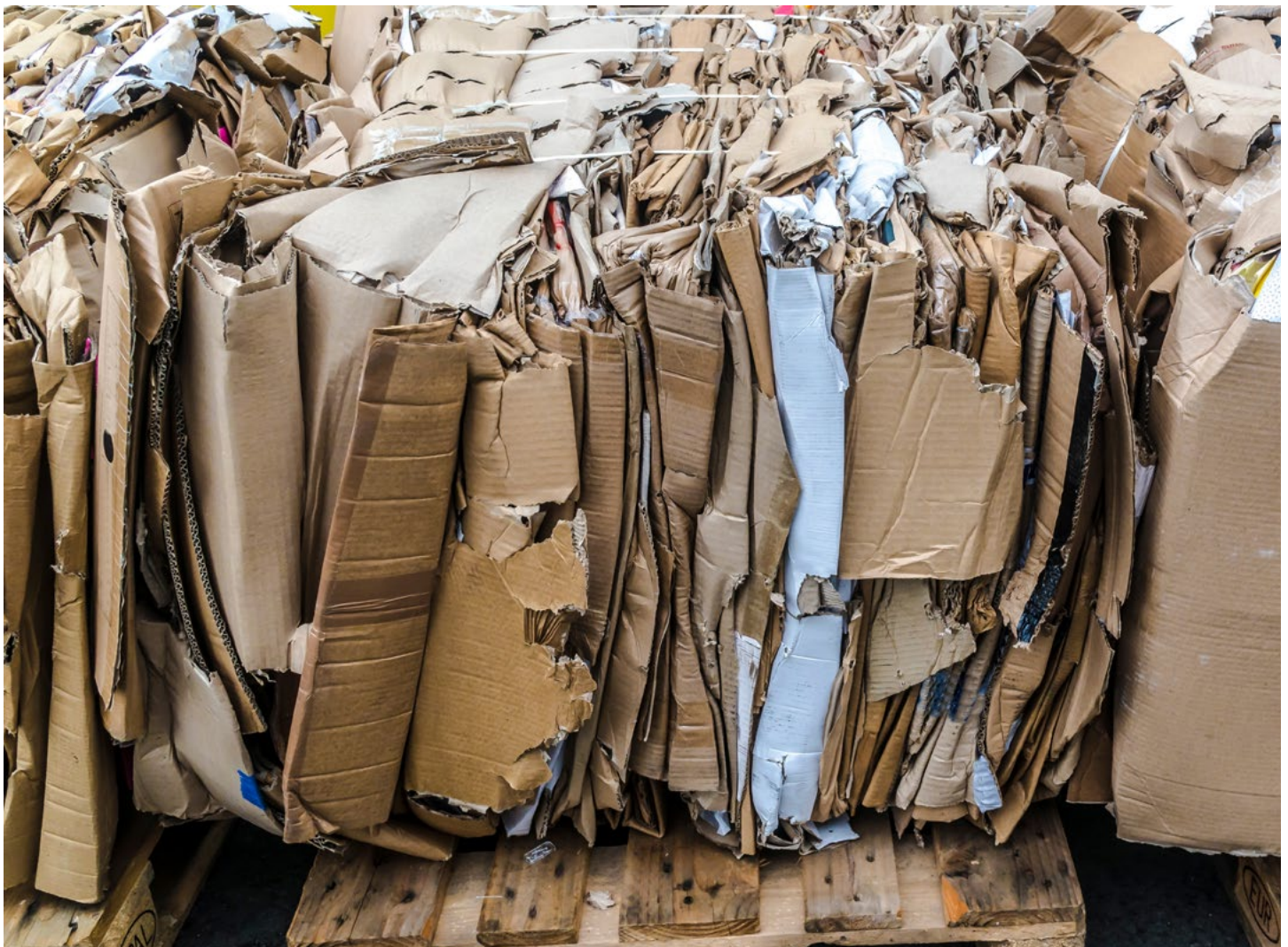
\*Rounded to the nearest 50 tonnes

The recycling data forwarded by service providers are lower than those estimated through modelling of industry waste audits (Table 16), which is not surprising as given the model includes data from outside the Yukon and ICI entities in other provinces would have greater economies of scale and closer access to markets. However, the proportion of the types of PPP collected for recycling are similar.

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**Table 16: Comparison of service provider collected for recycling data and information as compared to industry waste audit modelling**

	Service Provider Data <sup>19</sup> and Information Estimation	Industry Waste Audit Modelling Estimation
Total ICI PPP collected for recycling (tonnes)	2,300	3,384
<b>Proportion by Material Type</b>		
PPP Fibre	>90%	66 to 96% by sub-sector
PPP Glass <sup>20</sup>	<5%	0 to 18% by sub-sector
PPP Plastic	<2.5%	5 to 18% by sub-sector
PPP Metal	<2.5%	0 to 12% by sub-sector



<sup>19</sup>Including information from generators who backhaul PPP materials themselves to recycle.

<sup>20</sup>Note BCR glass is currently not recycled, it is landfilled given transportation costs.

## 6.0 Considerations

To better understand the current conditions related to the management of ICI PPP in the Yukon, interviews were undertaken with various waste generators across the ICI sub-sector and service providers (both private and public). The following section is a summary of considerations that were brought up in these interviews.

### 6.1 Cost

Given the Yukon's relatively low waste generation, the distance between communities, and the distance to commodity markets, the cost to manage all waste PPP (residential and ICI) is higher than in many other jurisdictions. This additional cost is primarily driven by transportation:

- For PPP materials collected on a route, costs are based on capital, equipment, and labour. The more efficiently materials can be picked up (i.e., the quicker you can fill the vehicle and get it to a consolidation point), the lower the costs. These efficiencies are more difficult in the territory given the distance between generation sites and the lower overall waste generation.
- Once PPP materials are collected, most are shipped to Whitehorse where they are consolidated for shipment to processors (e.g., Dawson City is a >500 km drive).
- Processors of PPP materials in Alberta and British Columbia are over >2,000 km from Whitehorse.

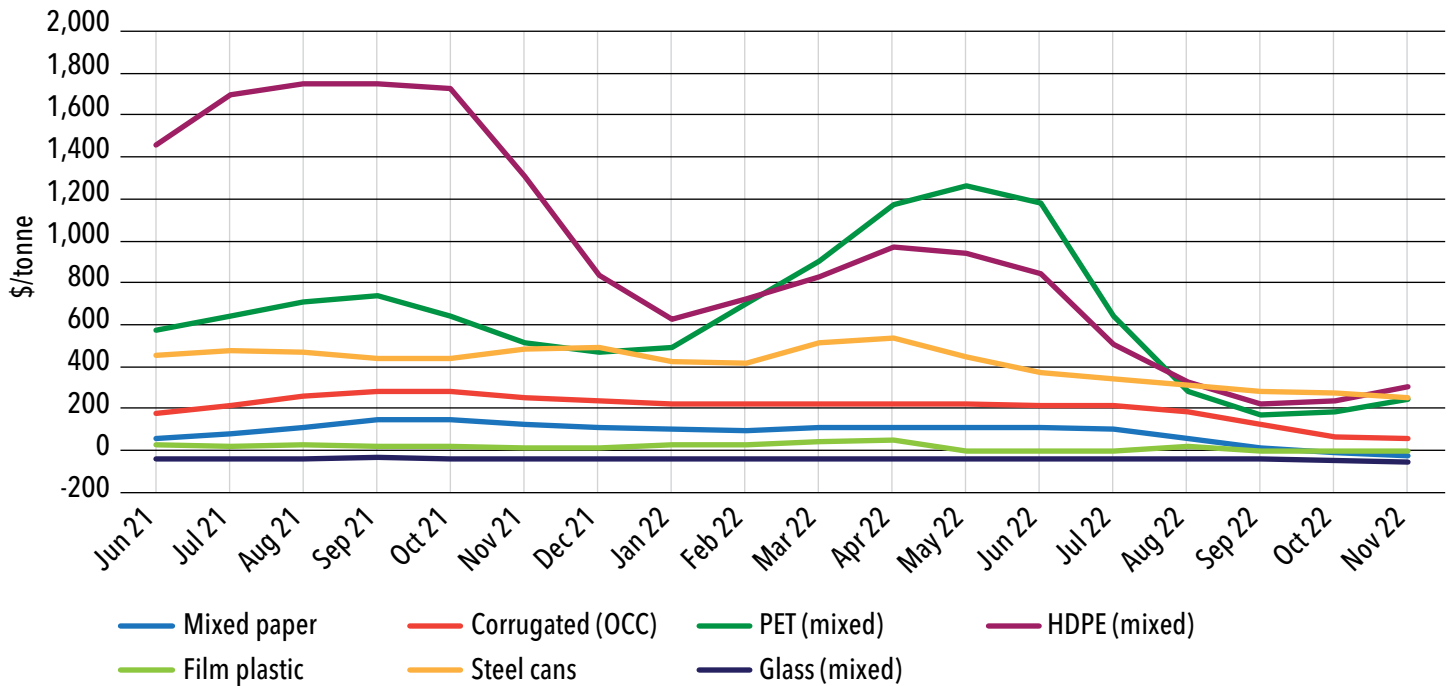
It is also important to note the cost of transportation of certain PPP materials might be more expensive due to its relative weight (e.g., glass), its relative volume (e.g., polystyrene), and even how its storage affects its weight and volume (e.g., wet fibre stored outdoors is heavier, dirtier materials).

These additional transportation costs pose a barrier across the communities in the northern territories and compound other recycling related costs that ICI entities face, including:

- Internal management costs, such as the need for additional infrastructure (e.g., recycling bins), training staff and/or educating consumers, and space to locate additional collection bins, which can detract from other business-related activities. Internal spatial limitations can also lead to higher costs as some businesses might require more frequent collection of recyclables.
- Sorting costs that are dependent on the effort needed to sort and process PPP materials. For service providers, it is more costly to sort mixed recyclables (e.g., different types of plastics, glass, and metals) than PPP materials that are already relatively source separated (e.g., OCC).
- Processing costs that are dependent on the PPP material type. For example, the cost of processing OCC is much cheaper than packaging with multiple layers (e.g., take-away cups with plastic liners, multi-laminate pouches).
- The lack of value for certain types of PPP on the commodity market and the instability of markets, in general can result in it being too expensive, unpredictable, or risky businesses to undertake voluntarily (*Figure 3*).

# Yukon Industrial, Commercial and Institutional Packaging and Paper Products Baseline Report: Waste Flows Study (2023)

Figure 3: 2021-2022 PPP commodity price trends in Ontario (\$/tonne)<sup>21</sup>



As a result, the current economics generally favour landfill over recycling for most PPP materials. Some larger ICI generators of PPP or ICI entities within close proximity to each other might be able to create economies of scale to lower their costs as the service provider can more efficiently collect their materials. There are a few ICI entities that are able to achieve this economy of scale on their own and are backhauling their recyclables (e.g., OCC and some types of plastic).

For most ICI entities, the current ICI PPP recycling system in the Yukon functions due to government interventions, including:

- mandatory source separation requirements for OCC in the City of Whitehorse and increased tipping fees for unsorted recyclables;
- diversion credits provided by the Yukon Government and City of Whitehorse; and
- the beverage container deposit return system profits cross-subsidizing operations at Raven Recycling.

Without these interventions, particularly diversion credits, there are concerns that the economics would not make sense for many ICI entities to continue to recycle PPP voluntarily.



<sup>21</sup>Continuous Improvement Fund, 2022. CIF Price Sheet, November 2022. Available at: <https://thecif.ca/centre-of-excellence/operations/cif-price-sheet/>.



## 6.2 Economies of Scale

At present, the residential and ICI recycling streams are fairly closely intertwined in the territory, which helps to create greater efficiencies given the relatively low generation rates of PPP. Depots collect both residential and ICI PPP. Depots do not generally differentiate the source of the materials being dropped off (and do not currently have the resources to do so). While many ICI entities receive collection separately, there are some smaller businesses that generate similar types and amounts of PPP that are collected together with residential materials (i.e., multi-family building or co-collected at depots).

Both of the Yukon's existing processing facilities manage both residential and ICI streams and commingle these materials for shipping to markets in British Columbia and Alberta. Based on experiences in other EPR jurisdictions like BC and Ontario, there is a concern that ICI PPP materials will need to be collected, hauled, and processed separately from residential PPP. This has the potential to substantially increase the costs of collecting and managing ICI PPP, if the materials needed to be collected and hauled to end markets separately.

## 6.3 Policy Considerations

There were some concerns raised by those interviewed about the lack of alignment at times of government (both municipal and territorial) policies, including:

- differing tipping fees and source separation requirements at landfills (e.g., source separation requirements in Whitehorse that are not mirrored by nearby disposal sites - transfer stations, landfills), which can provide incentive for recyclables being disposed at other sites<sup>22</sup>;
- a lack of enforcement of disposal bans or disposal surcharges where they do exist;
- a lack of focus on source separation of ICI PPP at construction sites; and
- inflationary considerations in policies like beverage container handling fees that help to take into account rising costs for fuel, equipment and labour (i.e., current fees have not been adjusted in a number of years).

This lack of alignment in policies could create issues if ICI PPP is not included in an EPR policy, the current diversion credit system is not extended, and/or other tools used to ensure these materials are recycled. The current diversion credit system seems to largely be underpinning ICI PPP recycling activities and without something replacing it likely much of the current material will be disposed of.

<sup>22</sup>Note that material disposed at other sites often leads to the Yukon government having to pay for the materials to be transported back to Whitehorse.

## 6.4 Information

As is previously noted, there are data gaps in the territory associated with the generation and ultimate management of ICI PPP. This is not unique to the Yukon and is a broad issue across the country. This creates a challenge for:

- service providers who might want to consider expanding ICI PPP service offerings in understanding opportunities and business planning;
- government in making evidence-based decision and policymaking; and
- generators and producers as a feedback loop to improve performance.

While cost is the major barrier, a lack of data does create a barrier for future improvement. Under an EPR approach better data would be available (i.e., both related to materials supplied and how they are managed) through annual reports.



## 6.5 Service Provider Considerations

All of the service providers that were interviewed discussed the challenging market conditions, including those specific to operating in the North, a lack of new investment, and the challenge of making the economics of recycling make sense. There has been an overall a lack of new investment in modern equipment and infrastructure; much of the existing infrastructure is very rudimentary. This lack of technology and even the lack of availability of covered storage spaces to keep recyclables clean and dry has created even more challenging conditions for service providers trying to recycle economically as the types of PPP being generated in the marketplace are rapidly changing<sup>23</sup> (requiring sophisticated sorting and processing techniques) and markets are increasingly demanding cleaner commodity streams. In addition, wet OCC is heavier and can create transportation issues (e.g., overloads).

An EPR policy for PPP will improve certainty and the investment opportunity for service providers. The inclusion of ICI PPP in this policy will increase investment opportunity but other mechanisms can also support these activities, such as extending the diversion credit system for ICI PPP and/or ensuring residential PPP can be collected and managed with ICI PPP.

<sup>23</sup>For example, increase in multi-material packaging, and different types of plastic packaging.

## 6.6 PPP Materials

The types and amounts of PPP generated by ICI entities can be significantly different to the residential sector. While some of the ICI PPP generated is similar to the residential sector (e.g., metal cans, cardboard boxes, paper and plastic cups), the size and format of PPP generated can often be significantly different (e.g., bucket as opposed to a jar; a drink bladder as opposed to a bottle; a crate as opposed to cardboard box; masses of pallet overwrap as compared to plastic bags). These differences can impact collection and processing considerations. If ICI PPP was included in the EPR policy, this would need to be considered.

As compared to the residential sector, ICI entities also significantly differ in the types and amount of PPP and other waste they generate (e.g., mining operation, hospital, clothing store, quick serve restaurant). Even across similar types of businesses within an ICI sub-sector, there can be great heterogeneity depending on their business model. Consequently, their PPP collection needs can differ significantly from the residential sector (e.g., frequency of servicing, size of containers, etc.).

## 6.7 ICI PPP Producers

Finally, the types of producers supplying PPP to the ICI sectors can often be much different than those that are already reporting into regulated residential PPP EPR systems across the country. Some ICI producers do not sell to consumers, they only sell to other companies (e.g., a distributor, specialized manufacturer, brands). As a result, extending EPR requirements to the ICI sector in the Yukon would result in capturing more producers in the EPR regime compared to other jurisdictions in Canada (except Québec, which is implementing ICI requirements over the next seven years) and would require producers that report into regulated residential EPR systems for PPP in other jurisdictions to report differently (i.e., calculations would need to include all materials not just residential).



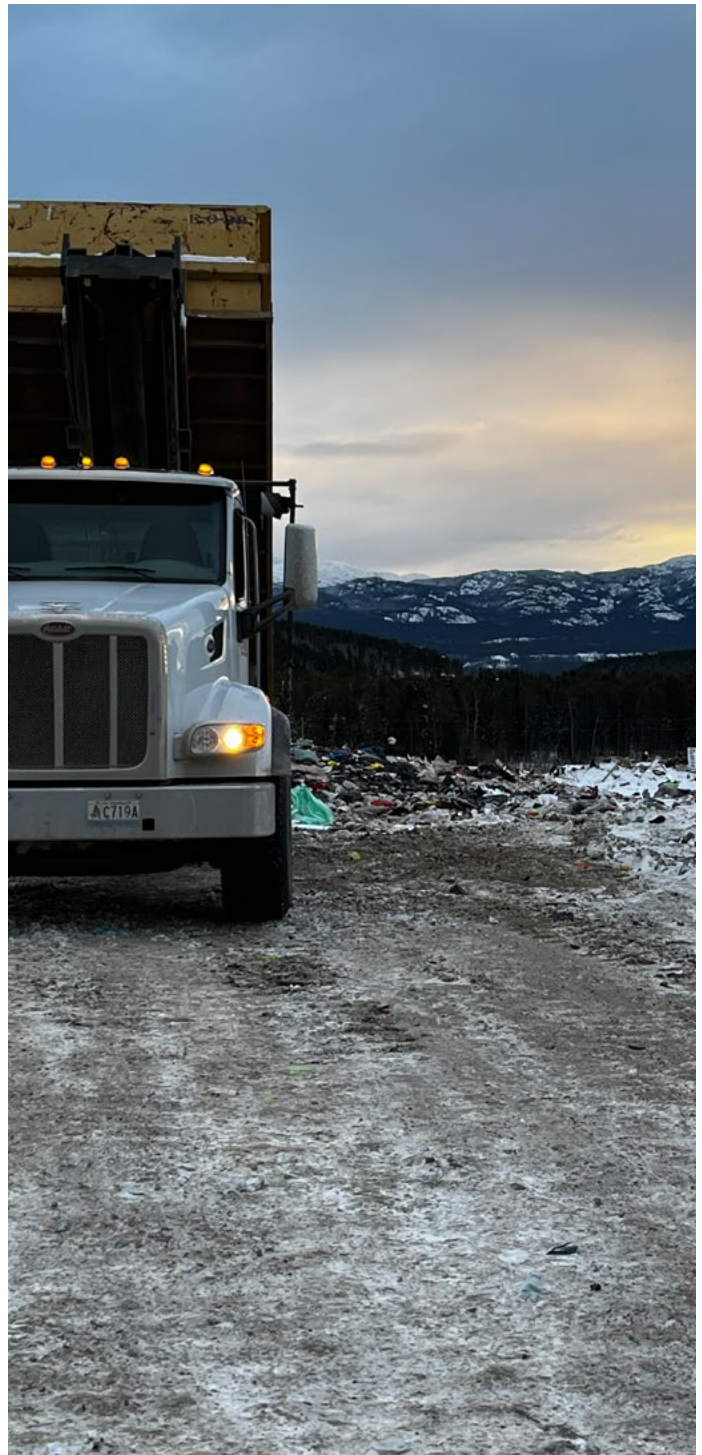
## 7.0 Summary – Yukon’s ICI PPP disposal and collected for recycling baseline

Neither the Government of Yukon nor the Government of Canada monitor or report on ICI PPP supply, generation, disposal, recycling, or reuse, and Yukon’s ICI sector is neither required to report on PPP supplied into the market nor to conduct waste audits on its onsite end-of-life management. As a result, there isn’t a readily available, comprehensive source of information that describes the amount of ICI PPP generated in the Yukon nor how it is managed at end-of-life. As a result, this report sought to assess Yukon’s ICI PPP baseline using the various incomplete sources of data that do exist (i.e., Whitehorse waste audit data, existing industry waste audits and industry intelligence, and service provider intelligence) that when assessed in tandem and compared provide a reasonable and defensible approach to estimating Yukon’s ICI PPP baseline.

All of these data sources have challenges and do not provide a complete picture of ICI PPP. However, when these sources are reviewed together, a clearer picture begins to emerge on ICI PPP disposal and collected for recycling. There was sufficient quantitative data available to support the development of quantitative estimates.

Two separate estimates were made of PPP disposal (e.g., Whitehorse waste audit data, industry waste audit data across all target sub-sectors) with a significant alignment. For PPP collected for recycling, multiple estimates were made (e.g., industry waste audit data across all targeted sub-sectors, government data, service provider data), which together resulted in an imperfect but reasonable level of agreement.

To develop a fuller and more comprehensive understanding of Yukon ICI PPP requires generating and acquiring additional data and using this to bolster the data used in this report.



## 7.1 Baseline for ICI PPP collected for recycling

Table 17 provides a comparison of the data related to PPP collected for recycling based on multiple sources. According to the calculations and analysis, it could vary from 2,300 tonnes and 3,384 tonnes. There are numerous reasons for this potential range:

- The high-end estimate based on industry waste audits (**Section 4**):
  - modelled using a less robust dataset than disposal;
  - all of the data came from ICI entities in other jurisdictions which have greater access to markets and whose data could have skewed the results; and
  - waste audits are more likely to be completed by ICI entities with more focus on recycling.
- The low-end estimate is based on service provider characterization (**Section 5**):
  - might be missing some materials backhauled by ICI entities; and
  - might overestimates weights given materials are stored outside and exposed to precipitation.

**Table 17: Comparison of service provider collected for recycling data and information as compared to industry waste audit modelling**

	Service Provider Data <sup>24</sup> and Information Estimation	Industry Waste Audit Modelling Estimation
<b>Total ICI PPP collected for recycling (tonnes)</b>	2,300	3,384
<b>Proportion by Material Type</b>		
<b>PPP Fibre</b>	>90%	66 to 96% by sub-sector
<b>PPP Glass<sup>25</sup></b>	<5%	0 to 18% by sub-sector
<b>PPP Plastic</b>	<2.5%	5 to 18% by sub-sector
<b>PPP Metal</b>	<2.5%	0 to 12% by sub-sector

It is likely that the amount of PPP collected for recycling lies closer to 2,300 tonnes based on extensive industry feedback with the vast majority being fibre-based PPP. Based on the assessment completed in **Section 4**, the main contributors to PPP collected for recycling are:

- Trade,
- Transportation and Warehousing,
- Administration and Office, and
- Health Care and Social Assistance.

<sup>24</sup> Including information from generators who backhaul PPP materials themselves to recycle.

<sup>25</sup> Note BCR glass is currently not recycled, it is landfilled given transportation costs.

## 7.2 Baseline for ICI PPP disposed

Table 18 provides a comparison of the data related to PPP disposed in the two datasets assessed. There is approximately a 32% difference for the total for ICI waste disposed and the total PPP disposed between the two datasets assessed. The differences in the data could be the result of a number of factors, including:

- The modelled ICI waste audit could overestimate of the amount of materials collected for recycling as this data is based on other jurisdictions; and
- Differences in what is disposed at other landfills in the Territory.

**Table 18: Comparison of the estimated proportion of PPP disposed across the Yukon by data source.**

	Whitehorse ICI Waste Composition	Modelled ICI Waste Audit Data
Total ICI PPP waste disposed (tonnes)	5,661 (Extrapolated for the whole of the Yukon)	4,294
<b>Proportion ICI Disposed that is PPP</b>		
Total % PPP	27	26
% PPP Fibre	12	12
% PPP Plastic	13	12
% PPP Metal	1	1
% PPP Glass	1	1

The percentage of overall PPP disposed from ICI entities appears to be in the range between 4,294 and 5,661 tonnes per year. Given the likelihood that the modelled ICI waste audit overestimates the collected for recycling, it is likely in the higher range. The PPP that is disposed consists mainly of fibre and plastic in a relatively even proportion at approximately 12%. Metal and glass PPP are found less often in the disposal stream, at approximately 1-2%.

Based on the assessment completed in **Section 4** the main contributors to disposed ICI PPP are:

- Construction,
- Trade, and
- Food services.

It is important to emphasize that parts of the retail sector also have some of the highest rates of ICI PPP collected for recycling.

