

WASTE & RECYCLING UTILITY

2022 Annual Report



TERRITORY ACKNOWLEDGEMENT

The City of Lethbridge acknowledges that the place we now call Lethbridge has for many generations had another name given to it by the Siksikaitsitapi, the Blackfoot Peoples. The name is Sikóóhkotok, a reference to the black rocks found in the area.

The City of Lethbridge is located in the traditional territory of the Blackfoot Peoples and within Treaty 7 lands. The City of Lethbridge is also home to the Métis Nation of Alberta, Region III.

We pay respect to all Indigenous Peoples past, present and future, by recognizing and respecting their cultural heritage, beliefs, inherent rights, and relationship to the land.



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CITY OF

Lethbridge



2022

YEAR IN REVIEW

During 2022, the Waste and Recycling Utility (WRU) advanced numerous projects and initiatives moving the community closer to our waste management and sustainability goals. Some notable achievements include:

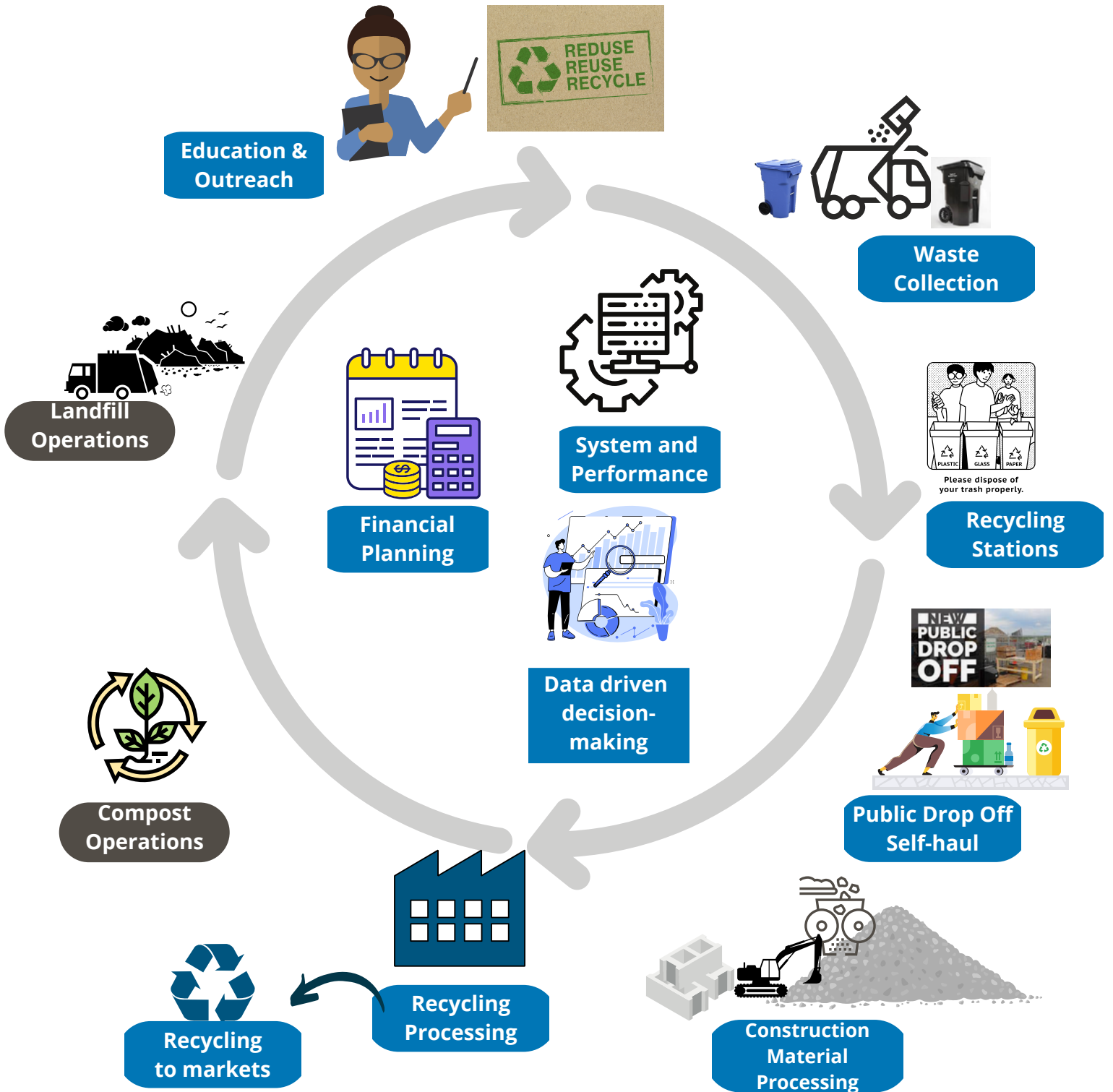
- The launch of phase 1 of the curbside organics program
- Construction of an organics processing facility, in preparation of Phase 2 roll-out in spring 2023
- The launch of the mandatory organics and mandatory recycling program for businesses
- Delivery of the the Love Food Hate Waste education campaign

All of this work will help to reduce waste in the community and reach the waste diversion targets set out in the City Council Waste Diversion Policy.

Commencement of operations of the landfill gas control facility is reducing greenhouse gas emissions (GHG) from the landfill site. This system is capable of removing methane from landfill gas emissions and improves environmental performance moving towards the City towards our GHG reduction goals. Other improvements include the optimization and expansion of services provided by the hydrovac waste facility, resulting in a 225% increase in customer use.

This work would not have been possible without the hard work and dedication of both our Waste and Recycling administration and operations team and the staff and contractors who operate the Waste and Recycling Centre.

WASTE & RECYCLING UTILITY



SERVICE LEVEL AREAS



OUR SERVICE LEVELS



Garbage (Black Cart):

- Bi-weekly garbage collection
- Two cart size choices:
 - 240 liter cart \$10.23/month
 - 360 liter cart \$11.94/month
- Fee includes up to two large item service pick ups per year
- Fee includes up to 250 Kg per load as a free saturday subsidy to encourage use of the landfill and reduce illegal dumping
- Extra cart fee is \$8.63/month
- Multi-family serviced through common collection



Recycling (Blue Cart):

- Bi-weekly recycling collection
- Two cart size choices:
 - 240 liter cart \$9.00/month
 - 360 liter cart \$9.00/month
- Multi-family serviced through common collection



Organics (Green Cart):

- Program approved by City Council in June 2021
- Phase 1 started in May 2022
- Weekly (Summer), bi-weekly (Winter) cart pickup
- Phase 2 citywide implementation Spring 2023
- One cart size:
 - 240 liter \$5.00/month
- Multi-family serviced through common collection implementation to begin in fall 2023



Recycling Stations & Yard Waste Sites:

- Three recycling stations North, South, and West locations for City Residents only
- Waste reduction fee covers for this service, \$3.60/month
- Includes yard waste sites drop-off available from April until November
- Fall leaf collection is included in the program fee
- Christmas tree collection is included in the program fee

Waste & Recycling Centre (Regional Landfill):

- The City owns the Waste & Recycling Centre
 - Landfill
 - Material Recovery Facility (MRF)
 - Composting site
 - Hydro-vac waste facility
- Garbage tipping fee is \$115/tonne other rates are available here: [Tipping Rates](#)
- Public drop-off area for residents includes household hazardous waste, battery recycling, tire recycling, garbage disposal, and more
- Commercial drop-off site to recycle, wood, concrete, shingles, drywall, and more



Business Recycling:

- Industrial, commercial and institutional and construction and demolition waste diversion support
- Mandatory recycling and organics program for businesses

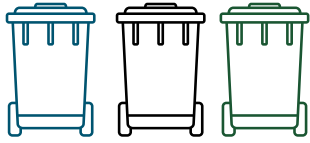


Sustainability:

- Land
- Air
- Water
- Energy
- Waste



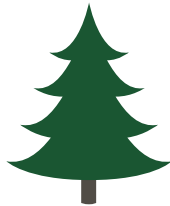
WASTE FACTS 2022



Waste Operations
picked up over
1.5 MILLION
recycling, organics,
and garbage carts



20%
of waste delivered to the
Waste & Recycling Centre was
diverted from the landfill



1,138
Christmas Tree
Pick-ups



The Waste & Recycling Centre
processed
138,210
tonnes of waste



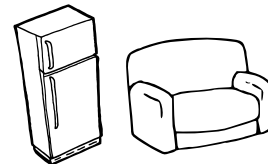
The MRF has shipped over
25,055
Tonnes of recyclables to
market since opening



Corporate Greenhouse Gas
emissions were reduced
12%
from 2018 baseline levels



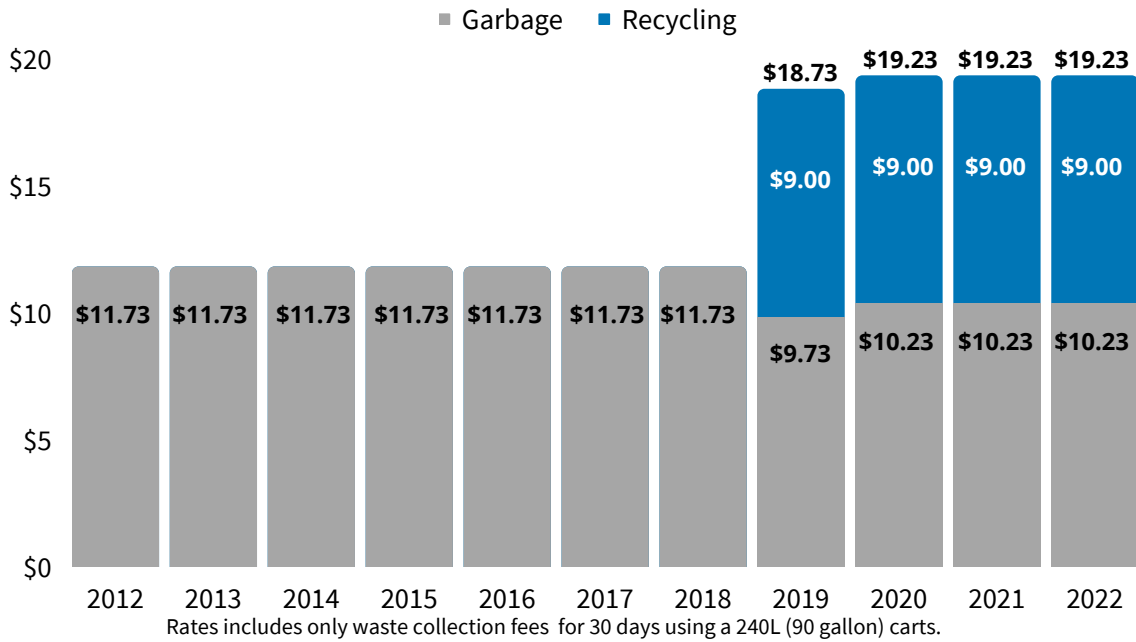
26,396
WASTE WIZARD
searches



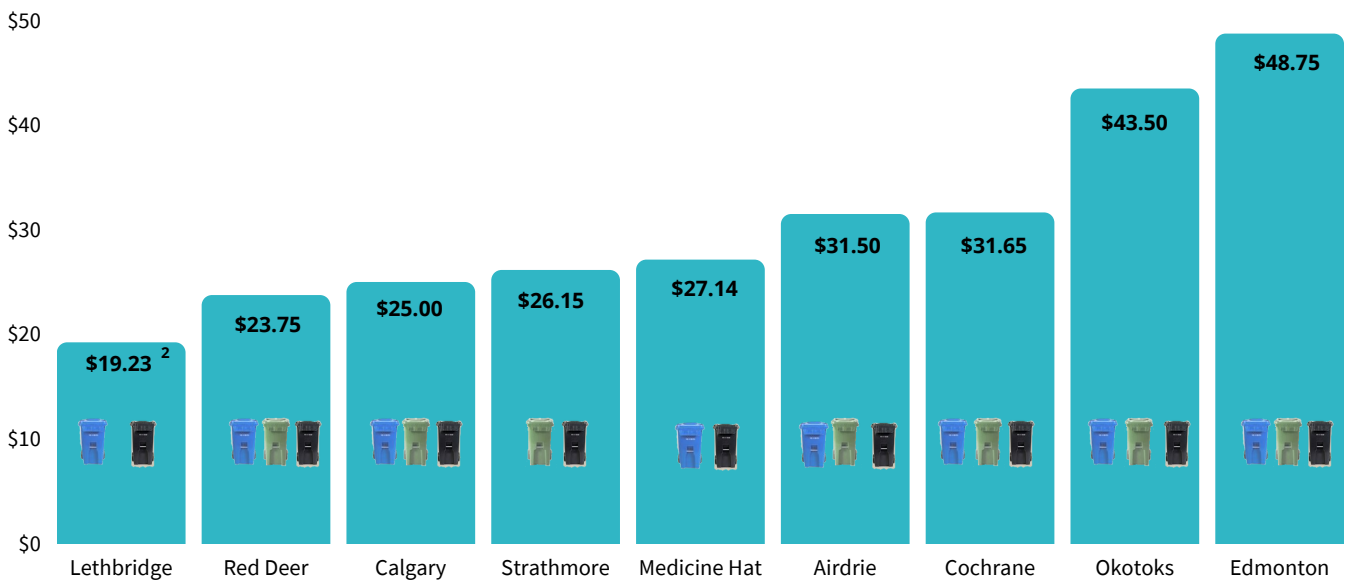
3,332
Large Item Service
pick-ups

UTILITY RATES

Utility Rates History in Lethbridge



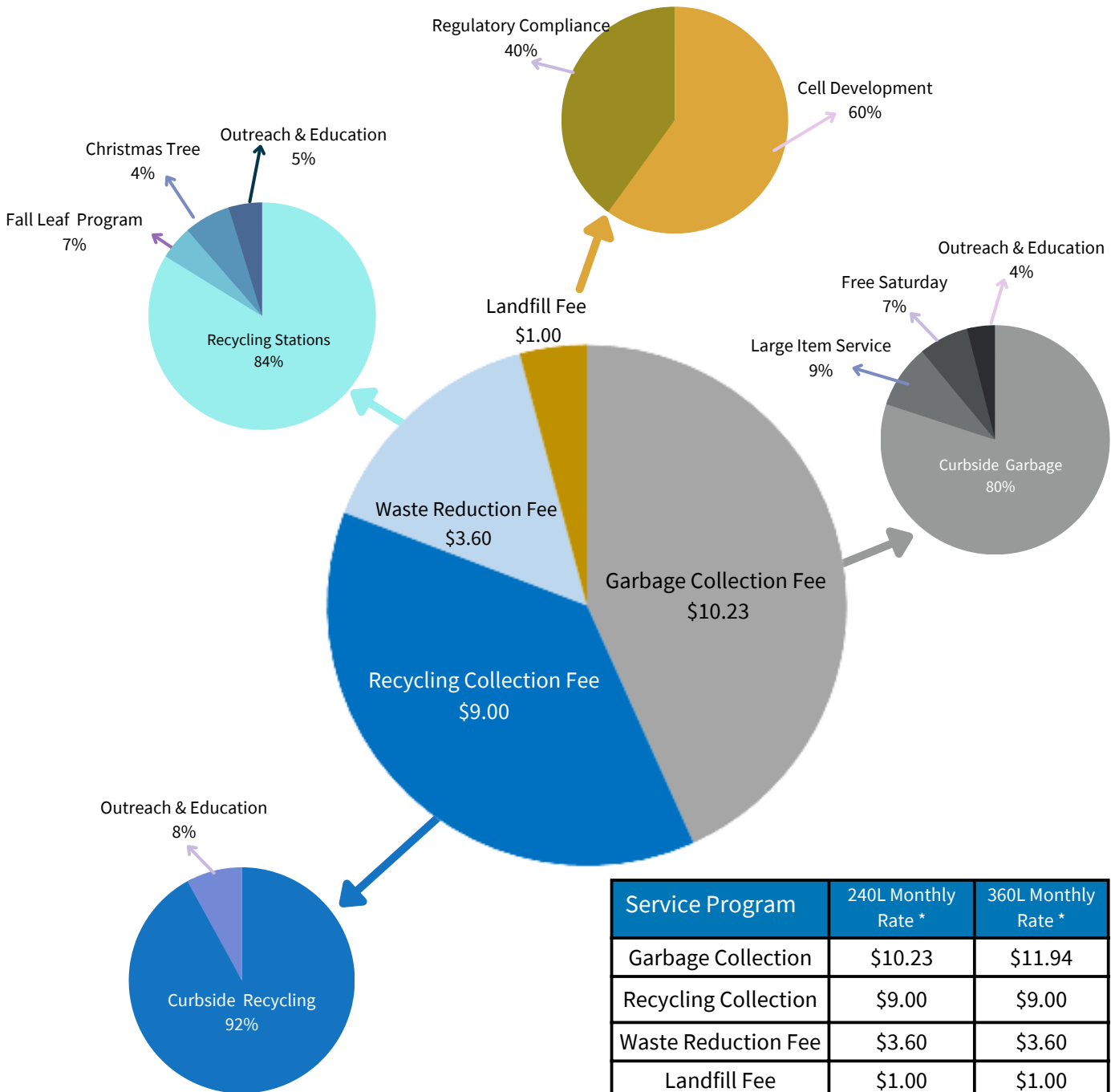
Utility Collection Rates Comparison in Alberta



1- Rates comparison includes only waste collection fees for 30 days using a 240L (90 gallon) carts.
 2- Lethbridge rates include Large Item Service and Free Saturday
 3- All rates are as January 2023

UTILITY RATES BREAKDOWN

Monthly Residential Rate for all Services



Service Program	240L Monthly Rate *	360L Monthly Rate *
Garbage Collection	\$10.23	\$11.94
Recycling Collection	\$9.00	\$9.00
Waste Reduction Fee	\$3.60	\$3.60
Landfill Fee	\$1.00	\$1.00
Total Utility Fee	\$23.83	\$25.54

* Rates calculated for 30 days

WASTE COLLECTION

2022



3,555

tonnes of
Curbside Recycling collected



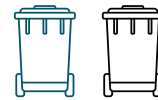
1.5 MILLION

recycling, organics, and garbage carts
collected from Lethbridge households



20,577

tonnes of
Curbside Garbage collected



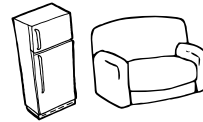
618

new carts delivered



258

tonnes of
Phase 1 Curbside Organics collected



3,332

Large Item Service
pick-ups



619

Fall Leaf
service requests



9,602

Service Requests



467

Demolition bins service requests



71,469

of Yard Waste Visits

1,058

Tonnes of recycling hauled to the
Recycling Stations

2,011

Tonnes of yard waste hauled to the Yard
Waste Sites

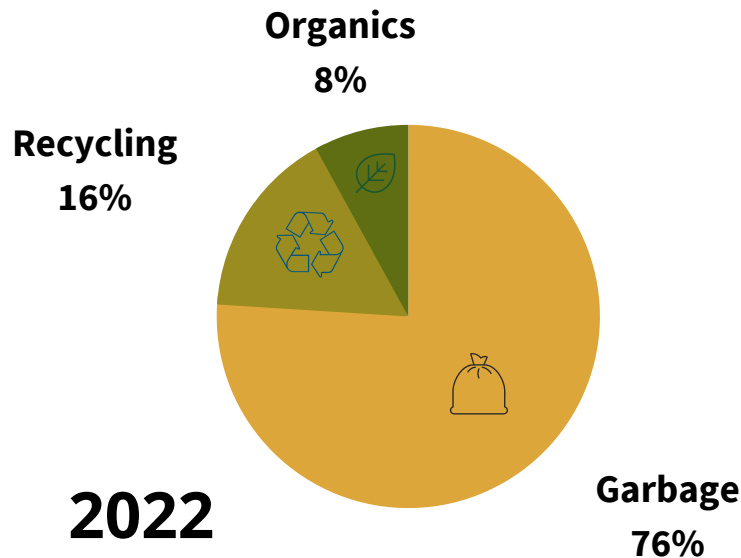
WASTE COLLECTION

Services & Programs

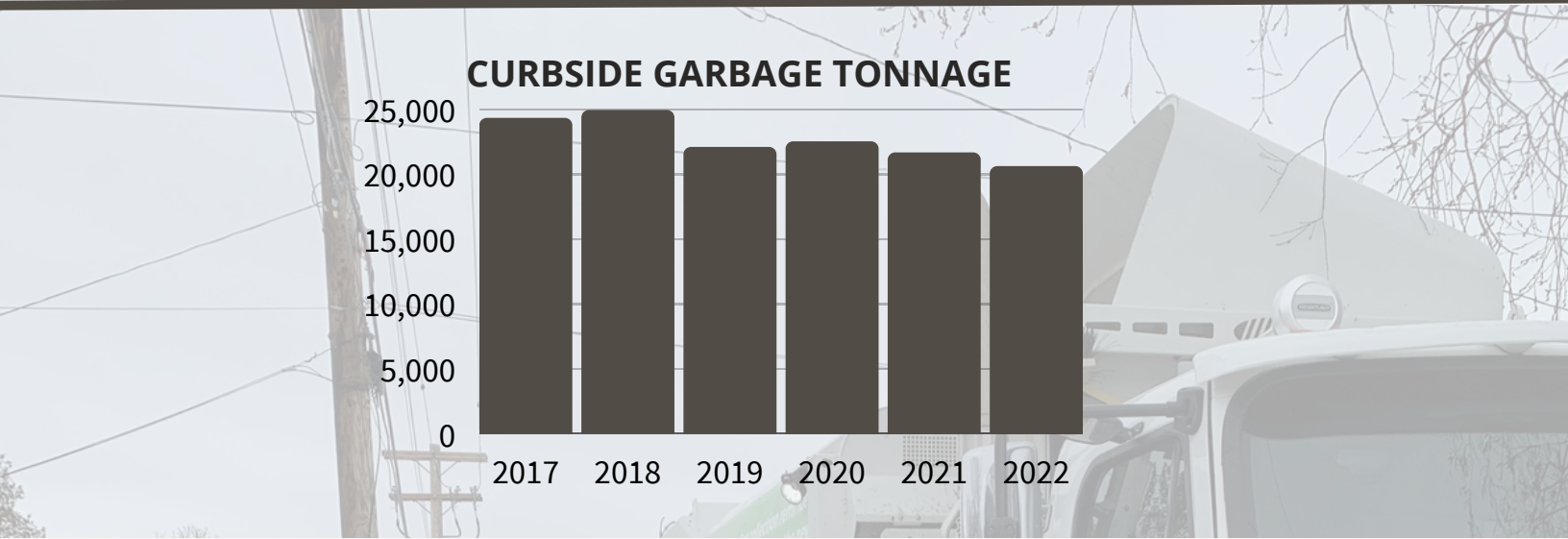
- Residential bi-weekly garbage collection
- Residential bi-weekly recycling collection
- Residential organics collection
- Multi-family recycling collection
- Corporate waste diversion program
- Commercial garbage collection
- Recycling Stations
- Seasonal fall leaf collection
- Seasonal yard waste sites
- Large item service
- Clean community program
- Christmas tree recycling
- Assisted collection program







Waste Collection Breakdown



Residential Bi-Weekly Garbage Collection Trend

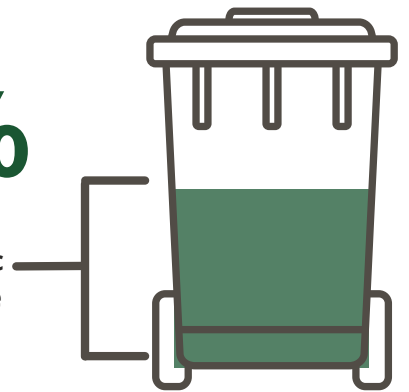


Black cart waste audit results (2019-2022)

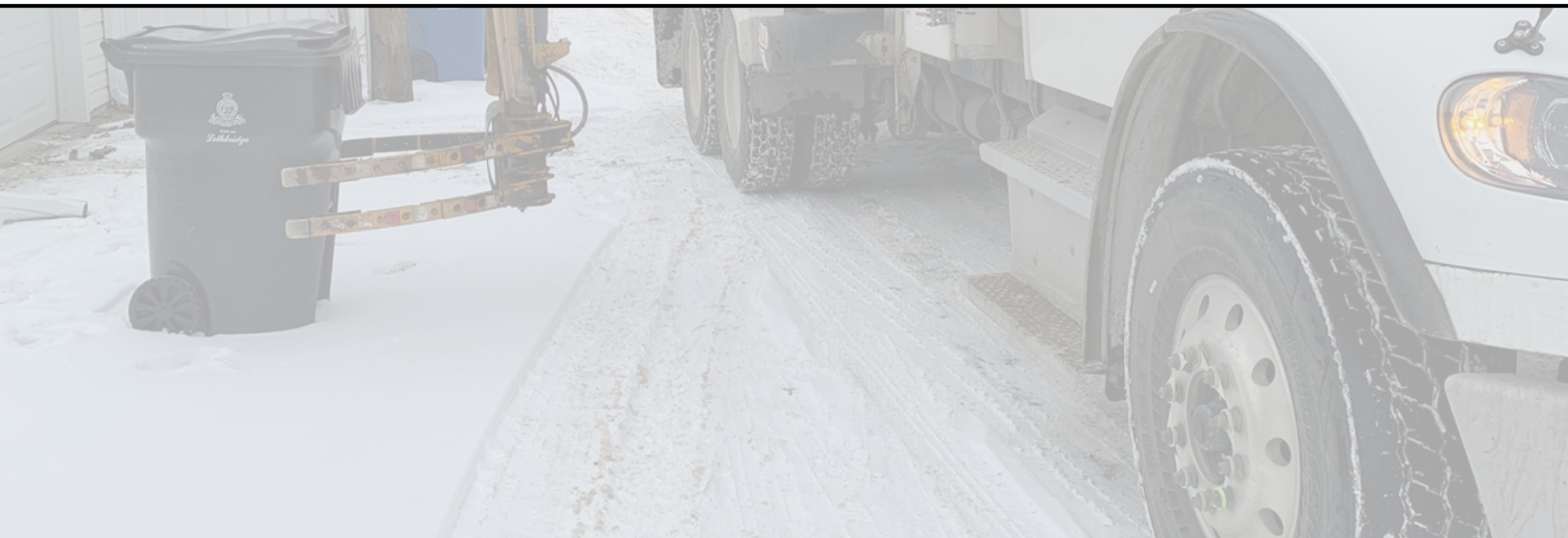
	Organics	51%
	Garbage	36%
	Recycling	11%
	Product Stewardship	2%

>50%

of materials in the black cart is organic waste that could be composted

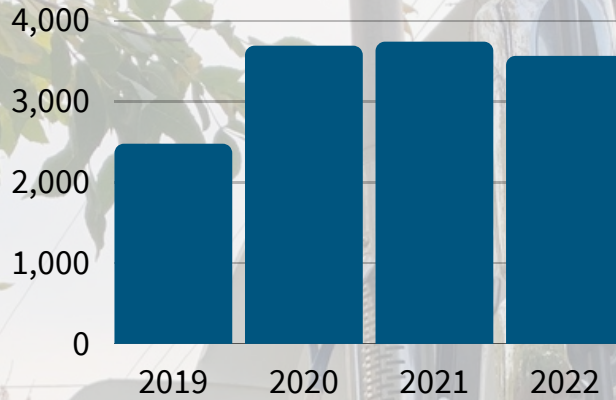


It is estimated that 11,000 tonnes of organic material could be diverted from the landfill







Residential Bi-Weekly Recycling Collection Trend

CURBSIDE RECYCLING TONNAGE

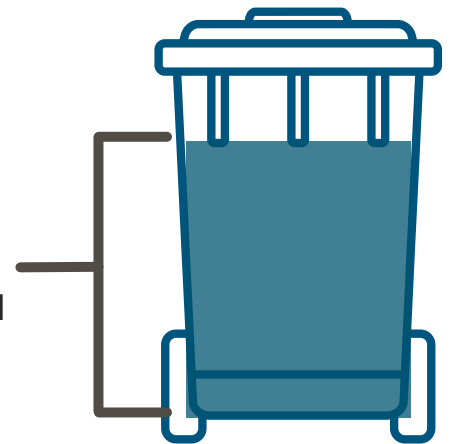


Blue cart waste audit results (2019-2022)

	Recycling	85%
	Garbage	9%
	Organics	5%
	Product Stewardship	1%

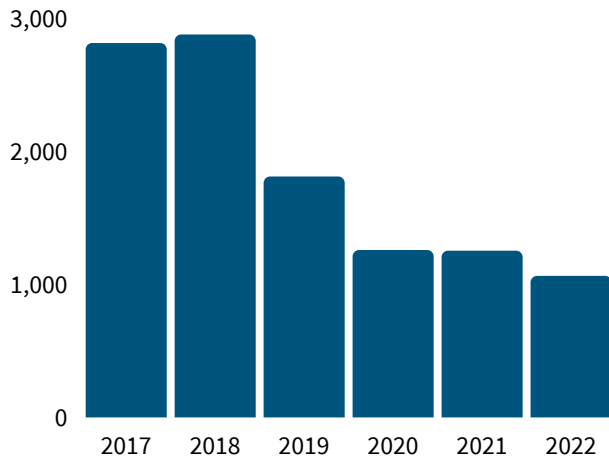
85%

of materials in the
blue carts is
recyclable material

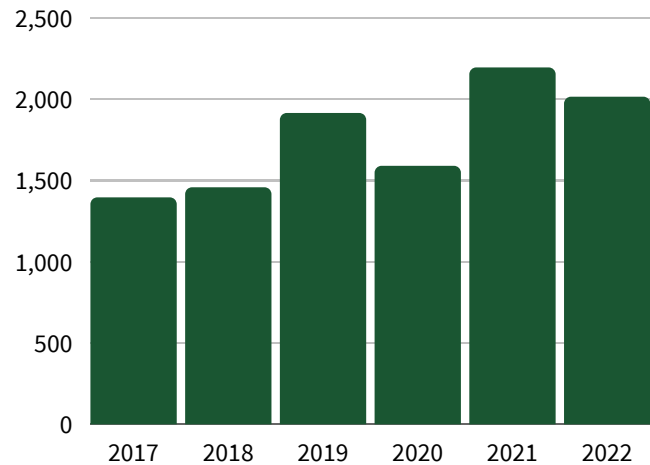


Recycling Station & Yard Waste Drop-Off

RECYCLING STATION TONNAGE



YARD WASTE SITES TONNAGE

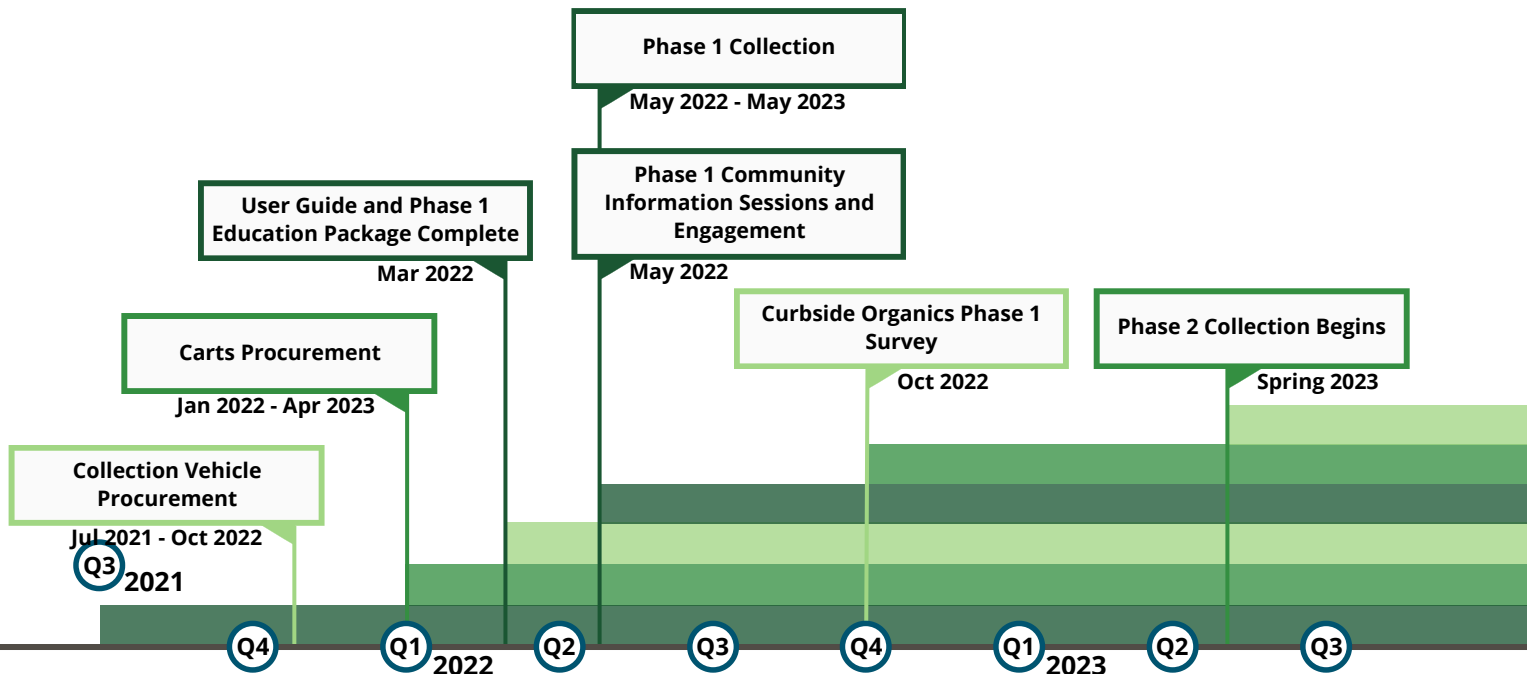


Residential Curbside Organics Collection

Lethbridge City Council approved the implementation of the curbside organics collection program (green cart) on June 1, 2021, fulfilling the last major step in the 2015 Waste Diversion Strategy.

Once fully implemented, the service will provide organics collection to 34,500 single-family residences, as well as 7,500 multi-family residences. This collection will supplement the existing three community yard waste sites, as well as the seasonal Fall Leaf and Christmas tree collection programs.

All existing curbside collection residences will have curbside organics collection by Spring 2023, with multi-unit dwelling residences set to begin receiving organics collection in Fall 2023 (rolling-out using a phased approach based on property size).



Waste Collection 2023 Projects

Activity

Description

Wind Mitigation Pilot

Focusing on areas with known wind issues, utilizing in-truck systems and resident feedback the number of households with wind mitigation solutions installed on their blue carts will be expanded.

Route Optimization

Collection data was used to complete an assessment of existing collection routes. In conjunction with the City's Asset Management team routes were adjusted to maximize the number of households per route based on specific material being collected.

The newly-optimized routes will be implemented for black and blue cart curbside collection in the spring of 2023.

Toxic and Electronic Waste Round Up Pilot

The first toxic and electronic waste round up event was held on November 19, 2022 at the City Hall parking lot. The event's goal was to provide an accessible collection point for residents to safely prevent household hazardous waste and electronic waste from ending up in the landfill.

Approximately 800 vehicles used the event and a total of 2,980 kg of e-waste, 25 totes of paint, 3 drums of paint aerosols, and 2,740 litres of oil were collected.

Two additional round-ups are planned for 2023.



WASTE PROCESSING

2022



Waste & Recycling Centre received



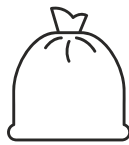
ratings on Google



The Waste & Recycling Centre processed

138,210

tonnes of waste



110,698

total tonnes of
garbage



18,423

total tonnes of
recycling



9,090

total tonnes of
organics



The Materials Recovery Facility processed

10,990

tonnes of recyclables

2,225,792

litres of leachate
managed



30,463

Free Saturday hauls



20%

of waste delivered to the Waste & Recycling
Centre was diverted from the landfill



45

wind closures (>70km/h)

WASTE PROCESSING

Services & Programs

Waste Processing

- Mixed solid waste landfill disposal
- Industrial soil landfill disposal
- Hydro-vac waste disposal
- Composting
- Materials Recovery Facility recycling
- Construction material recycling
- Landfill gas plant

Hazardous & Special Product Recycling

- Electronic waste
- Tires
- Used & cooking oil
- Household hazardous waste
- Paint

Special Disposal Programs

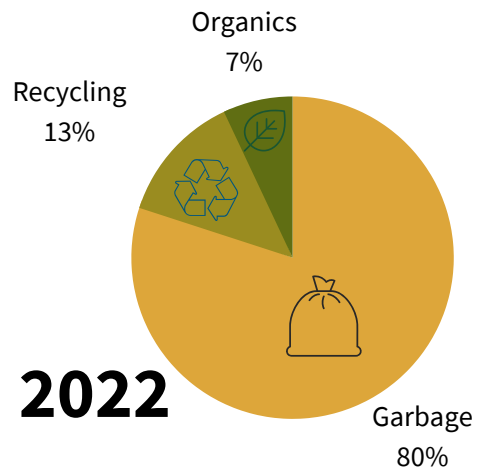
- Free Saturday Subsidy Program
- Coaldale Landfill Subsidy Program
- Lethbridge County Neighbours Disposal Program



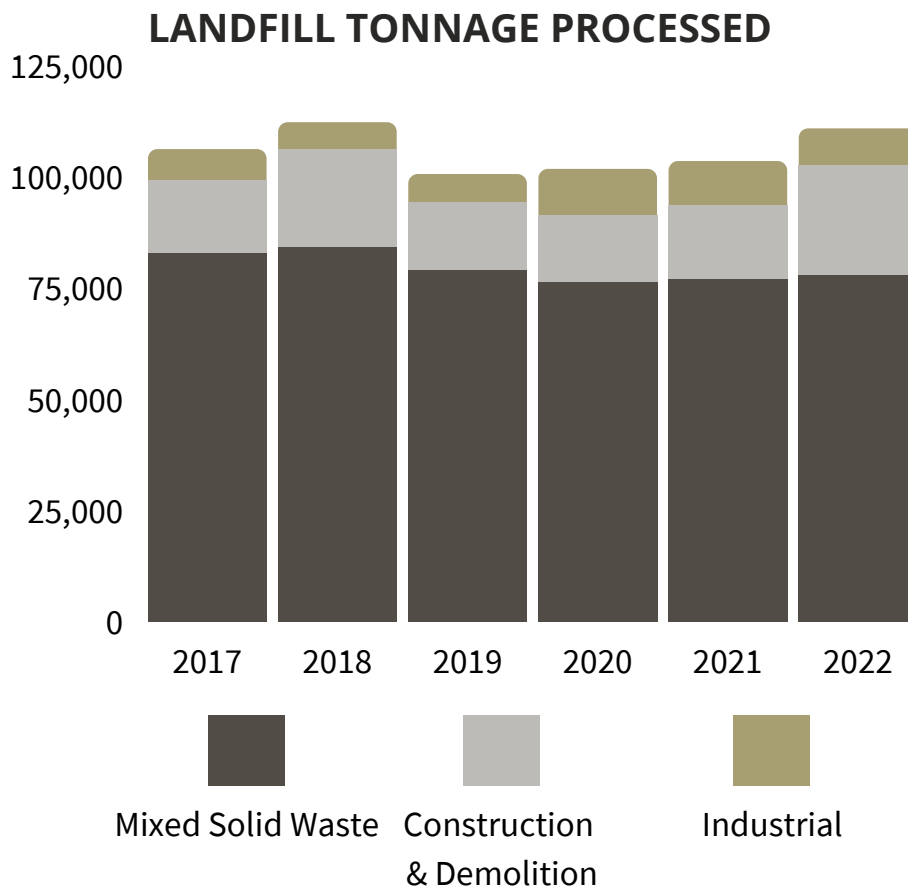
More than
95,000

total hauls to the
Waste & Recycling Centre in 2022

Waste Processing Breakdown



Waste & Recycling Centre Landfill



110,698
tonnes of garbage in 2022

=

the weight of
83,609
passenger vehicles

assumes each vehicle is 1,324 kgs

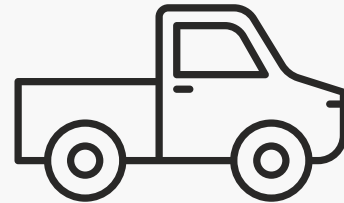
Waste & Recycling Centre Diversion

PUBLIC DROP-OFF - 2022

Material	Tonnes
Metal	307
Glass	125
Electronic waste	89
Tires	100
Mixed recyclables	55
Used oil	54
Household hazardous waste	34
Paint	29

4,216

**Total loads at the
Public Drop-Off (PDO)**



Waste & Recycling Centre Diversion

CONSTRUCTION DROP-OFF - 2022

Material	Tonnes
Recyclable shingles	2,994
Lumber & pallets	2,959
Concrete	2,577
Drywall	707
Asphalt pavement	91
Brick & block	101
Sand & gravel	190
Porcelain & stone	34

11,824

Total loads at the
Construction Drop-Off (CDO)



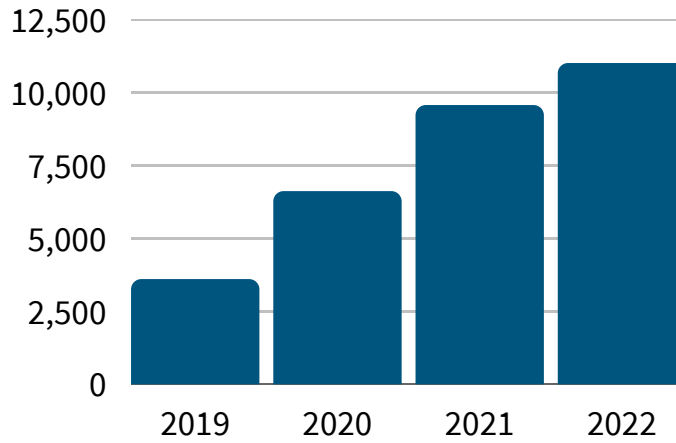
450

Tonnes of pallets processed
and shipped out in the last
four years



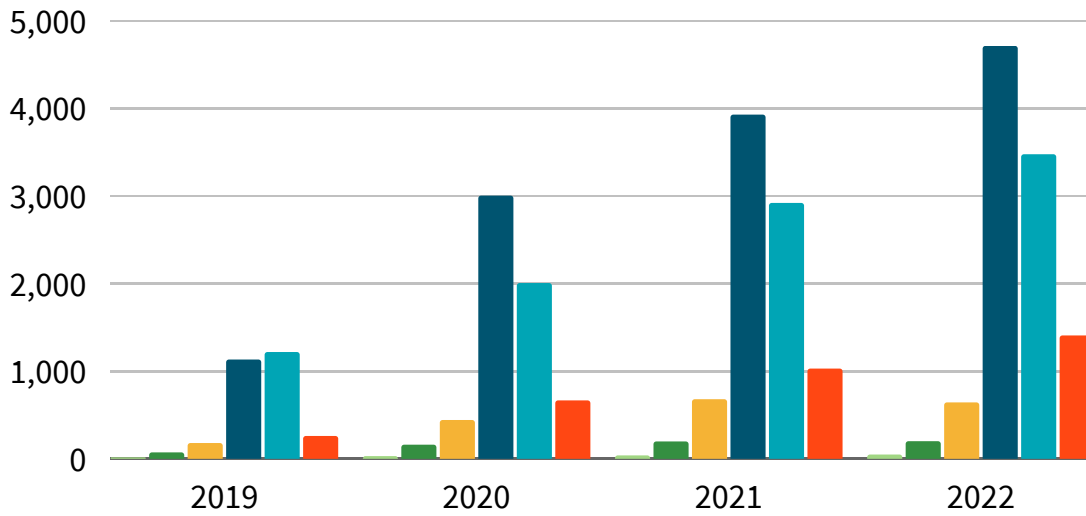
Materials Recovery Facility Processing

MRF RECYCLING INBOUND TONNAGE



MRF OUTBOUND TONNAGE

- Beverage Containers
- Metal
- Plastic
- Cardboard
- Paper
- Residuals

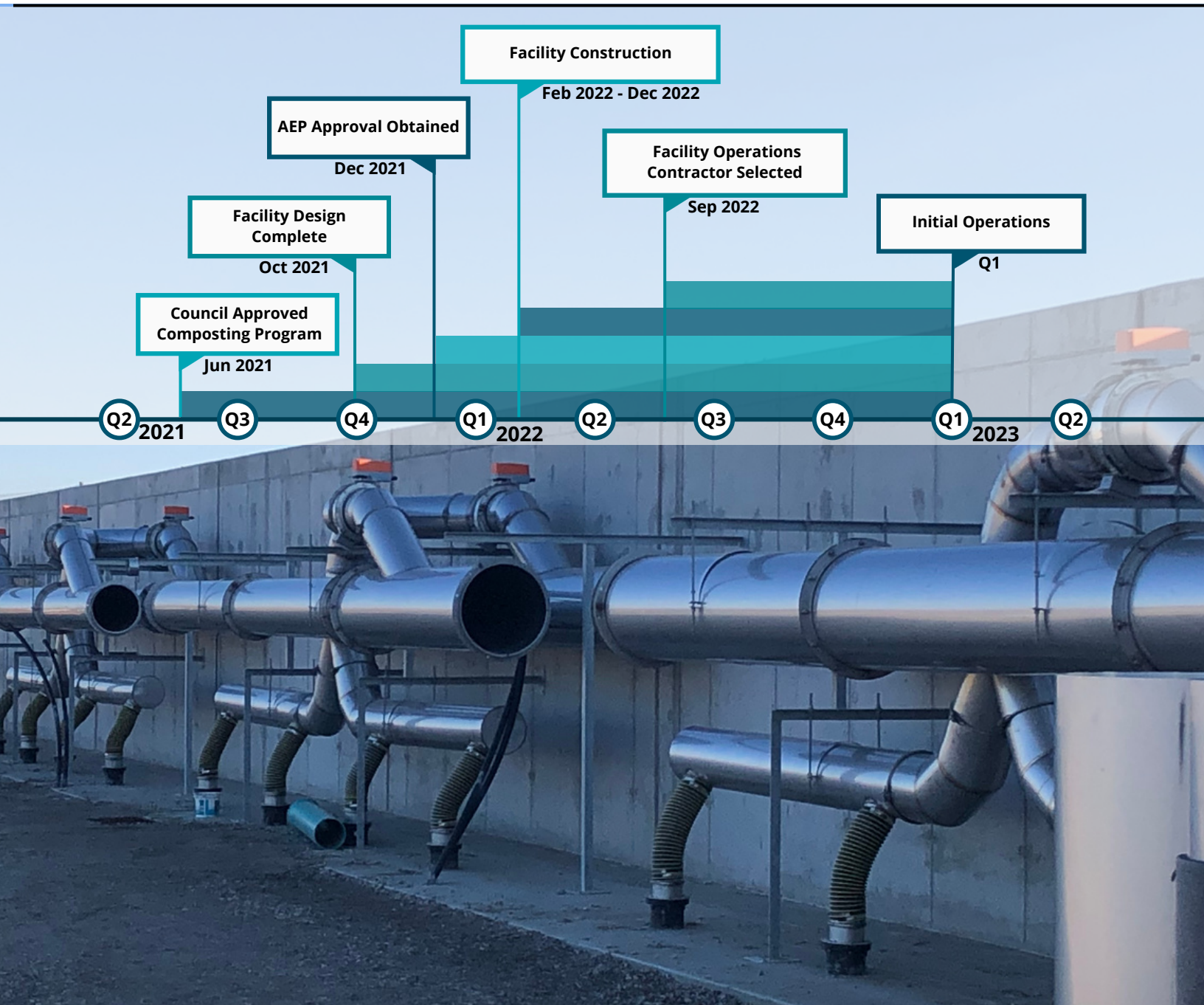


15%

MRF recyclables increase in 2022

Organics Processing Facility

The WRU has been working towards achieving a key objective of having a suitable processing facility for organics in the community. Sited at the WRC, a receiving building and covered aerated static pile (CASP) composting facility is being constructed to process organic material from the citywide green cart program in 2023. This composting facility will be able to process 20,000 tonnes per year of source separated organics from the green cart program and businesses as well as select packaged organics.



Landfill Gas Collection & Control System

The WRC has commenced operation of the landfill gas collection and control system. The landfill gas system will help to improve safety and environmental performance as well as reduce greenhouse gas emissions from the landfill site. The utility is working towards registering the site with the government to be eligible to collect carbon credits for the City of Lethbridge.

The landfill gas collection and control system is comprised of a control building and a wellfield

The control building houses:

- Two blowers
- An enclosed flare
- All associated electrical and instrumentation

The wellfield includes:

- 16 wells
- A header system that connects the wellfield to the control plant
- A sub header system that ties the wells into the header system

In 2022

5,255

tonnes of carbon dioxide equivalents (tCO₂e) have been destroyed

The landfill gas quality and composition will be monitored and the data collected will be used to guide expansion the gas collection system and potential uses for the gas.

Hydro-vac Waste Facility



The hydro-vac waste disposal facility was constructed to support industry in the region with safe disposal of hydro-vac slurry waste.

The facility has received more than 11,250 tonnes of material from 1,894 hauls. The number of customers using the facility increased by over 225% from 6 customers in 2021 to 20 in 2022. The material is dewatered at the facility and tested to confirm it falls within acceptable limits. To date 6,400 tonnes of dry solids have been used in the landfill. The WRC continues to optimize the facility to expand services and accepted material to increase usage from local and regional commercial customers.

WRC Frequently Asked Questions:

Q: What do I do with ___?

A: Check out the [Waste Wizard](#) or call 311

Q: Can I come get a ___?

A: No, the WRC does not permit scavenging. The items received from customers are collected for safe disposal and recycling only. Please visit one of several non-for-profit organizations located throughout the community.

Q: Can I have a tour of ___?

A: Yes, the WRC has [recorded tours](#) and can provide both virtual and in-person tours for most groups. Please contact 311 and they will put you in contact with our Waste & Recycling Education team.

CAPITAL PROJECTS

Completed in 2022

Organics Processing Facility (OPF):



Waste Transfer Station Expansion (Phase 1):



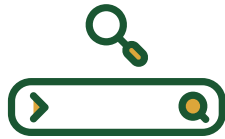
Capital Projects 2023 Plans

Activity	Description
Waste Transfer Station Expansion (Phase 2 – Bale Storage)	This expansion will increase the interior square footage for bale storage and enhance reliability and safety for staff in adverse weather.
Industrial Contaminated Soils (ICS) Waste Cell	The construction of an ICS waste cell will allow the WRC to continue to receive contaminated soils from the industrial and commercial sectors of the community and region.
Scale Replacement and Traffic Management Improvements	Design and construction of a new scale house with quad scales and traffic control measures. The amount of traffic from residents and customers at the WRC has increased contributing to long lineups at the facility entrance and traffic congestion on-site. This project will reduce wait times and improve safety.
WRU Sanitation Vehicle Storage Expansion	Design and construction of a 4 bay expansion to the existing sanitation vehicle storage facility at Public Operations. This expansion will provide indoor storage for heavy-duty trucks, extending asset useful life and mitigating excess maintenance costs.



EDUCATION & OUTREACH

2022



26,396

WASTE WIZARD
Searches



4,053

Survey responses



619

Fall leaf
service requests



170,476

Collection schedule reminders



212,810

Total website visits



1,138

Christmas tree pick-ups



186

Calls responded to



1,035

Participants in school tours,
engagements, etc

Services & Programs:

- Waste prevention programs
- Diversion education activities
- Waste Wizard
- Landfill tours
- Community surveys
- What We Heard reports
- Outreach events
- Christmas tree diversion program
- Fall leaf collection communication
- Oops tagging
- Customer service

Education & Outreach Updates

Activity

Description

Curbside Organics Education & Outreach



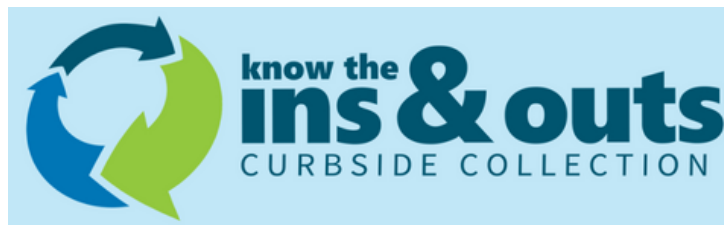
The education & outreach team is using the important feedback the phase 1 curbside organics residents provided to develop the education material and outreach for the city-wide single-family roll-out planned for spring 2023.

Phase 1 outreach included:

- Development of a website
- Updates to the Waste Wizard sorting tool
- Ins & Outs brochure and Erase Waste guide
- Information sessions with more than 100 participants
- Newsletters that included information on the green cart program as well as helpful tips and reminders
- Survey for phase 1 collecting feedback on education & outreach material, schedule frequency for winter, pest issues, and information session topics

Plans for phase 2 include:

- Feedback from phase 1 information sessions, 311, and survey results will be incorporated
- Information sessions, community, and school outreach
- Curbside organics launch program promotion



Don't want to miss another collection?

Sign up for collection reminders with [Lethbridge Loop](#).

Education & Outreach Updates

Activity	Description
<p>Blue Sky Centre</p> <p>Too Good to Waste School Tours</p>	<p>The Blue Sky Centre had updates in 2022 starting with installation of Indigenous displays. The Too Good to Waste School Tours also resumed in the fall of 2022 for grade 4 students with 324 students from 8 different schools. Both students and teachers enjoyed the opportunity to learn more about waste prevention and reduction by interacting with the new Blue Sky Centre displays.</p>

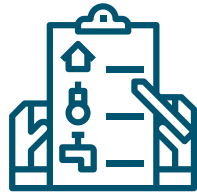


<p>Love Food Hate Waste</p>	<p>City of Lethbridge along with the Recycling Council of Alberta formed a partnership with the Love Food Hate Waste global initiative, to promote awareness in preventing household food waste. The outreach team was busy this summer and fall promoting the initiative and educating residents on meal planning, food storage and recipes to reduce and prevent food waste.</p>
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BUSINESS WASTE DIVERSION

2022



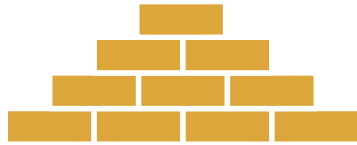
2,997

loads inspected at the
Waste & Recycling Centre



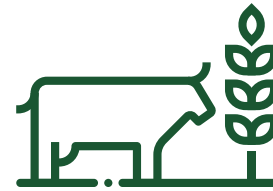
42

1:1 waste diversion interactions with
stakeholders



5,638

tonnes of
construction and demolition material
diverted from the landfill



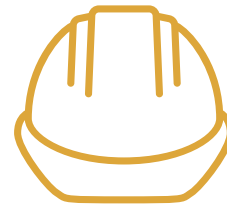
1,914

tonnes of drywall repurposed
for animal bedding & fertilizer



22%

decrease of ICI kilograms per capita from
the 2013 baseline level



45%

decrease of C&D kilograms per capita
from the 2013 baseline level

Services & Programs:

- Industrial, commercial and institutional (ICI) and construction & demolition (C&D) diversion programs focused on diverting waste from the landfill
- Provide education and outreach to support the business community
- Mandatory recycling and organics programs
- Designated material and inspection program design and monitoring

BUSINESS WASTE DIVERSION

2022 Highlights

In the business waste diversion area the focus in 2022 was to prepare for the launch of mandatory recycling (paused in 2020 due to COVID-19) and mandatory organics programs. One-on-one interactions with businesses and institutions increased, with more than 40 meetings completed during 2022. A session with local haulers was held in September to inform them about the Waste Bylaw requirements and help them prepare to offer expanded recycling and organic collection services in 2023.

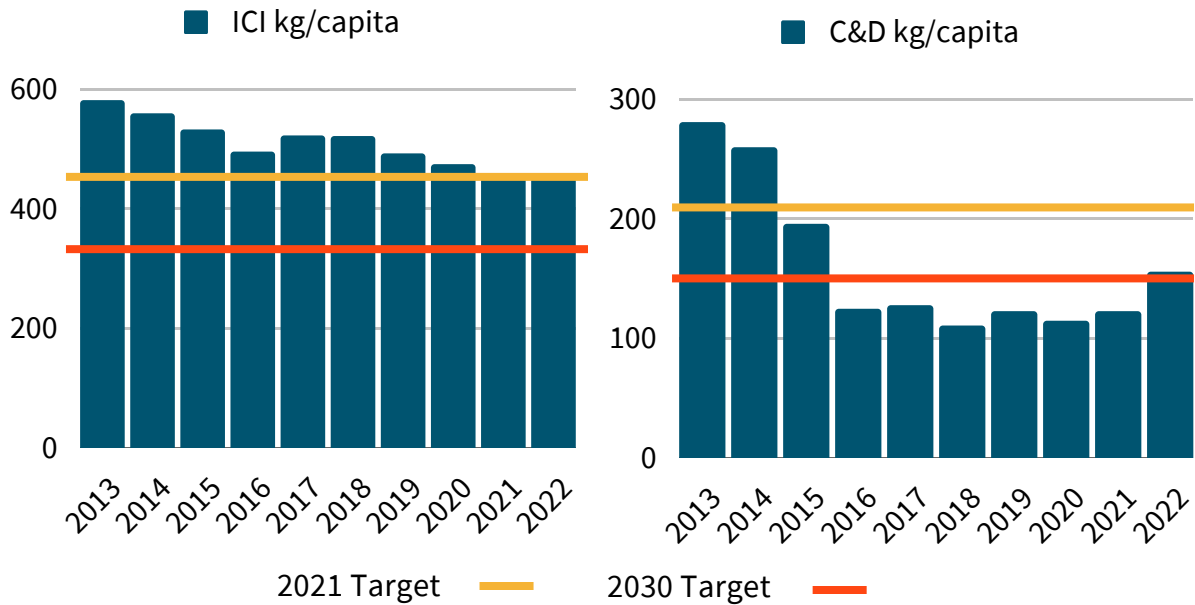
In 2022, the WRU developed tools like a waste bin sign maker tool to reduce barriers for businesses and organizations to implement their recycling and organics collections program. This tool allows businesses to create custom waste diversion signs. In addition a [training video](#) was produced and is hosted on the city website so businesses and organizations can use it for free. In early 2023, a guide was mailed out to all businesses and institutions with information on mandatory recycling and organics.

The WRU partnered with the University of Alberta to start research for alternative recycling options for asphalt shingles. More work is required in this area but initial laboratory results indicate it may be possible to use processed shingles in the base layer of roads.

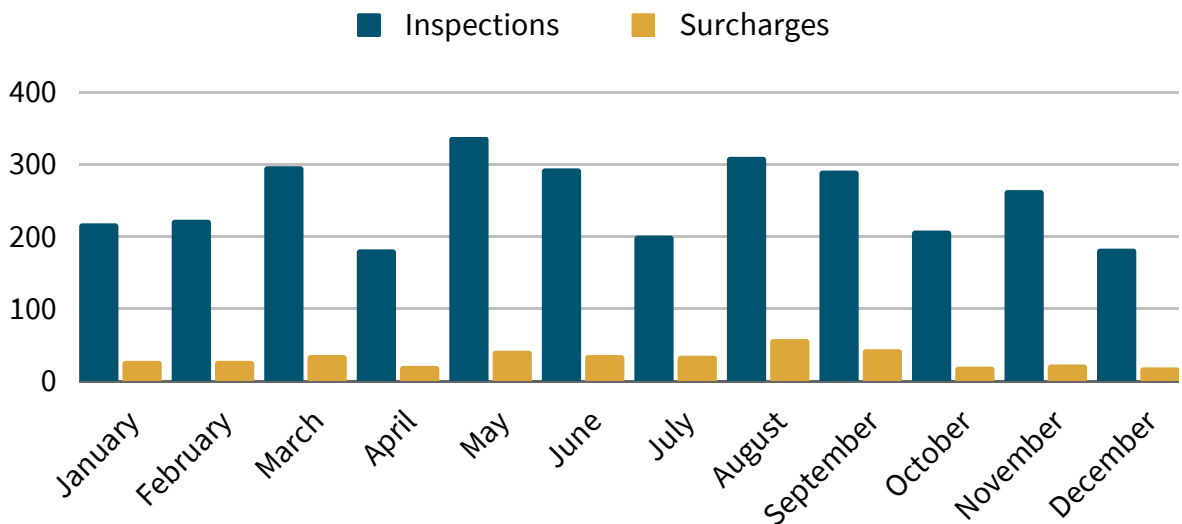


Business Sector Waste Generation

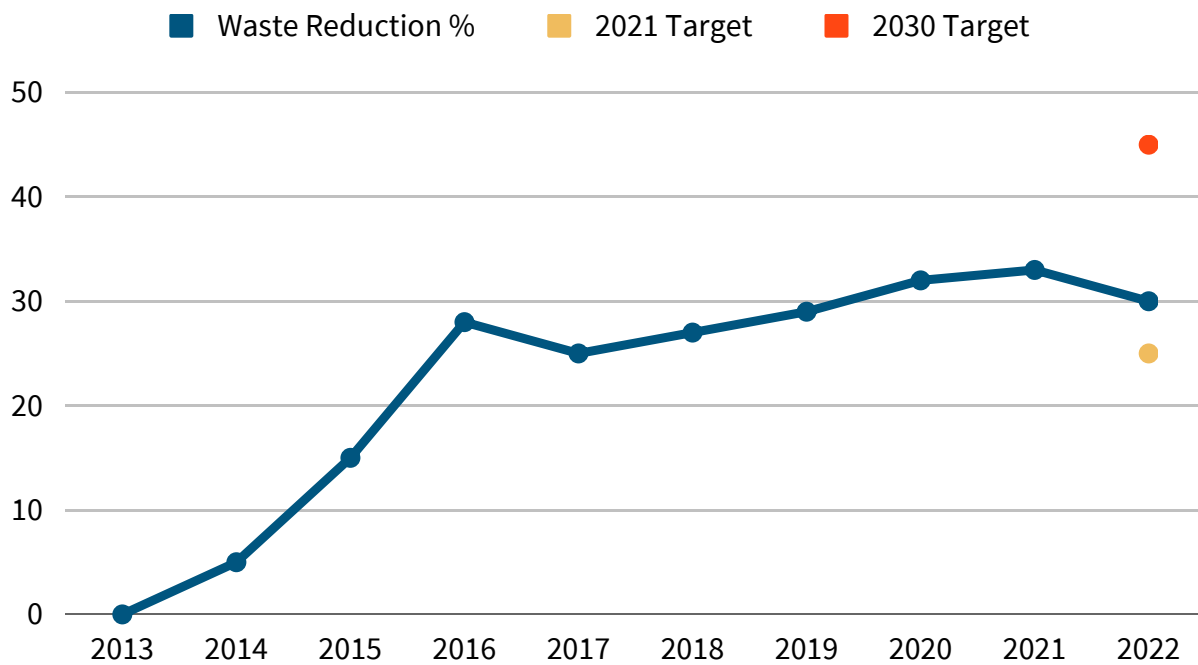
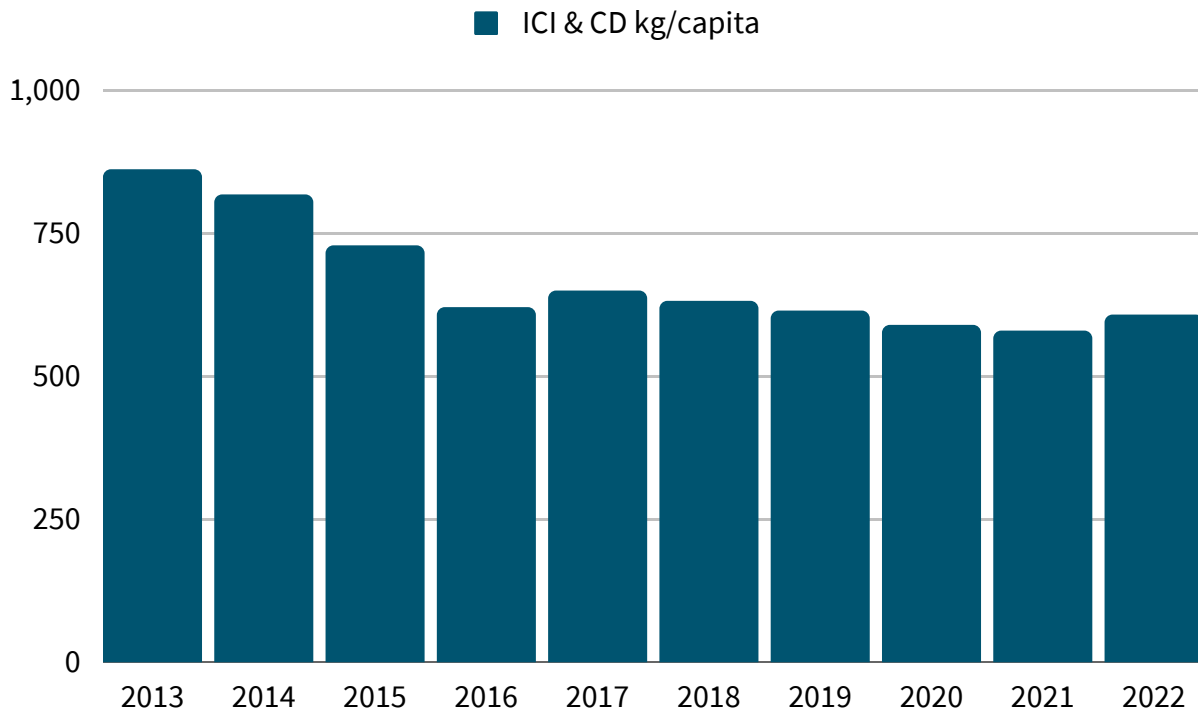
Overall, 49,013 tonnes and 16,846 tonnes of garbage was received at the landfill during 2022 from Lethbridge ICI and C&D sources, respectively. In 2022, ICI Waste was 451 kg/capita, while C&D was 155 kg/capita. Waste shingles tonnage in 2022 decreased 17% from 2021 levels and 97% from 2013 baseline levels.



A total of 2,997 loads were inspected for designated materials at the WRC in 2022 for an average of 250 inspections per month. The number of loads over the acceptable tolerance (25% designated materials present in the load) was 390 for a rate of just under 33 surcharges per month.



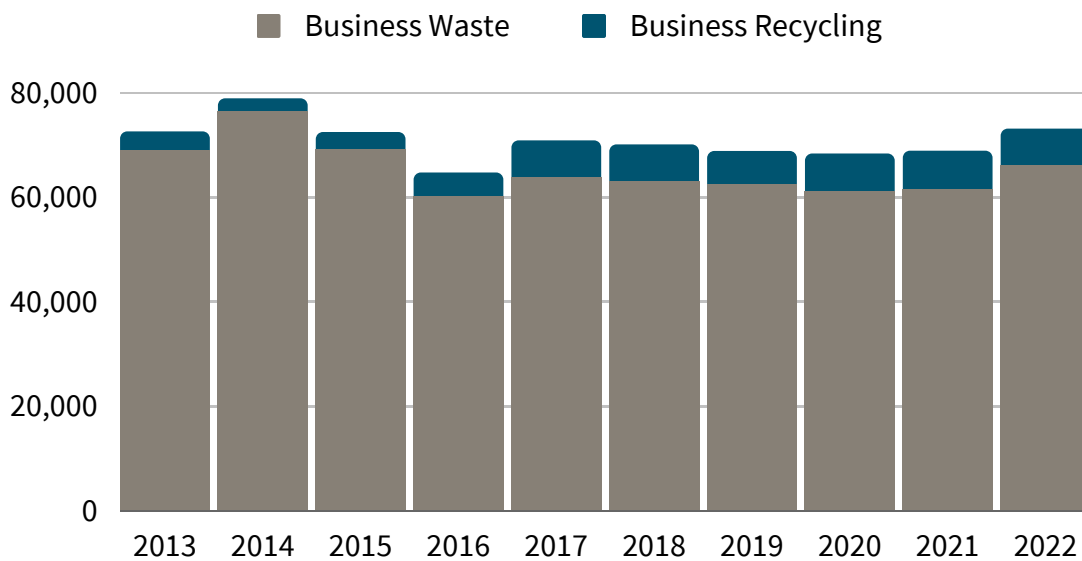
Business Waste Generation



Business Waste Generation

Waste from the C&D and ICI sectors combined is 30% below the 2013 baseline, non-residential waste still increased in 2022.

More than 7,000 tonnes of recyclables were received in 2022, which is similar to business diversion in previous years. This demonstrates an endurance of the businesses' behaviour change throughout the last years. The recent updates in the Waste Bylaw requiring all businesses to provide access for their staff and visitors to recycling and organics containers should contribute to further reduction of garbage and increased diversion from businesses in the coming years.



Mandatory Recycling & Organics

 <p>cardboard & paper newspaper, catalogues, magazines, mixed paper, boxboard, corrugated cardboard</p>	 <p>drywall clean gypsum wall board from new construction suitable for recycling</p>
 <p>recyclable wood dimensional lumber, pallets, tree pruning, and other items that are made of raw and un-processed wood</p>	 <p>concrete concrete foundations, sidewalks, brick, rubble, gravel & sand suitable for recycling</p>
 <p>asphalt shingles asphalt shingles from new construction or re-roofing</p>	 <p>brick & masonry block structural or decorative, with or without mortar, crushed or whole</p>
 <p>scrap metal general scrap metal including appliances and structural or decorative metal and metal items suitable for recycling</p>	 <p>asphalt pavement road asphalt</p>
	
 <p>organics food waste, yard waste, food-soiled paper products and other wood/paper products (e.g. popsicle sticks, shredded paper)</p>	

SUSTAINABILITY

2022



146,841

total corporate greenhouse gas emissions (tCO2e)



Corporate Greenhouse Gas emissions were reduced

12%

from 2018 baseline levels



45

City Facilities participating in recycling & organics programs



3

ECO Plans submitted on 15 construction projects



26

Environmental Property search requests



67

new pollinator gardens planted



Services & Programs:

- [Environment reports database](#)
- [Environmental property searches](#)
- Corporate organics & recycling launch
- [Partners for Climate Protection](#)
- Compliance/due diligence monitoring
- Energy acquisition
- Policy implementation support
- [Energy Conservation Masterplan & Strategy implementation](#)
- Environmental program corporate support

Sustainability Projects & Plans

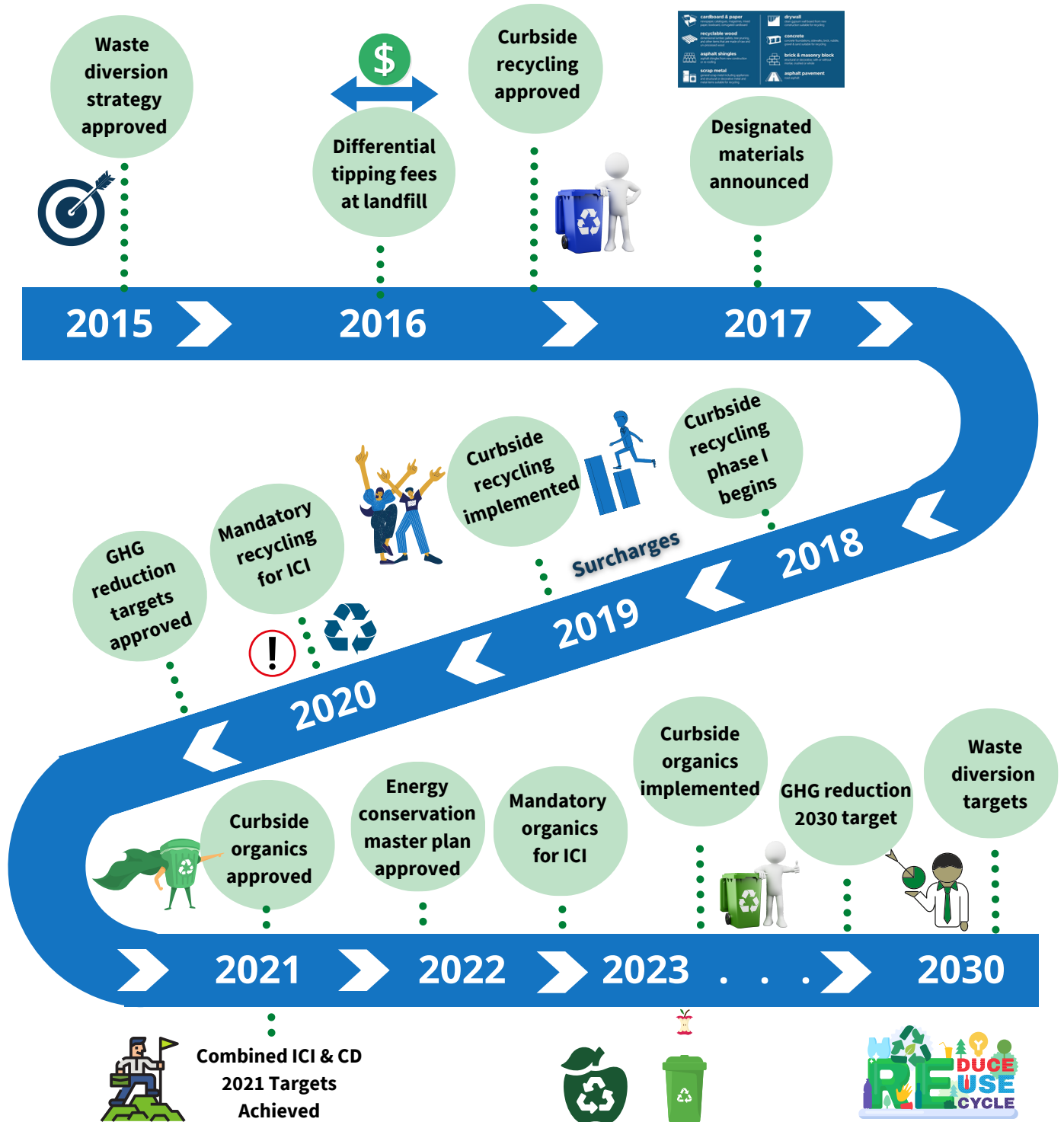
Activity	Description
2022 Projects	<ul style="list-style-type: none">• Sustainability Enhancement projects including MRF energy audit completed• City facility recycling and organics centralized collection expansion
2023 Plans & Projects	<ul style="list-style-type: none">• Electric vehicles and charging stations• Solar carport project• Energy Conservation Masterplan & Strategy implementation• Partners for Climate Protection Milestone 3 – implementation plan• Climate Adaptation Plan / Climate Action Plan



Find out more!

Visit the [Sustainability website](#) to learn more about sustainability projects and environmental impact reduction efforts.

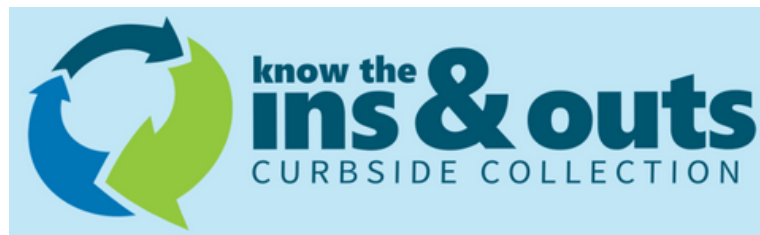
WASTE & RECYCLING ROADMAP



LETHBRIDGE WASTE GENERATION

Waste Disposal Targets												
	2013 Policy	2014	2015	2016	2017	2018	2019	2020	2021	2021 Target	2022	2030 Target
Residential	330	337	319	312	301	304	271	280	265	180	247	140
Waste Diversion %	20%	15%	16%	18%	17%	18%	24%	25%	28%	50%	28%	65%
Industrial Commercial Institutional	580	558	531	494	521	520	491	473	456	430	451	320
Construction & Demolition	280	259	195	124	127	110	122	114	122	210	155	150
Waste Reduction %	0%	5%	15%	28%	25%	27%	29%	32%	33%	25%	30%	45%
Total	1190	1153	1,045	931	949	934	884	868	843	820	853	610
Waste Reduction %	0%	3%	12%	22%	20%	21%	26%	27%	29%	30%	28%	50%
	2013 Baseline Year									2021 Target		2030 Target

2030 Waste Disposal and Waste Reduction % targets based on Waste Diversion Policy CC54



ACKNOWLEDGEMENTS

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Waste & Recycling collection operations team

Waste & Recycling Centre contractors & staff



THANK YOU TO OUR PARTNERS



311

- Asset Management
- Cart & Bin Suppliers
- Condominium Boards
- Corporate Communications
- Financial Services
- Fleet Services
- Executive Leadership Team
- Information Technology
- Integrated Risk Management
- Lethbridge City Council
- M&B Scaling
- Parks
- Procurement
- Property Managers
- Regional WRC Customers
- Regulatory Services
- Transportation
- Utilities
- Waste & Wastewater
- WRC Neighbours
- WRC Facility Staff
- YQL Neighbourhoods



WARD BROS. CONSTRUCTION LTD.



FOR MORE INFORMATION

Waste & Recycling Utility:

- Please visit [our website](#)
- Read our [Waste Bylaw](#)
- [Waste & Recycling Centre website](#)
- [Designated Material List](#)
- [Sustainability website](#)
- [Blue Cart Recycling Sorting It Out](#)
- [Blue & Green Cart Curbside website](#)

Curbside Collection:

- Please visit our [Curbside website](#)
- Ask the [Waste Wizard](#) what's In and Out
- [Sign up for collection reminders](#)
- [Report a problem](#) like missed collection or mess in lane

Phone: 311 or 403-320-3111 (if outside Lethbridge)

Policies:

- [Environment Policy CC51](#)
- [Waste Diversion Policy CC54](#)
- [Green Fleet Policy E2](#)

Plans & Reports:

- [City of Lethbridge Comprehensive Waste Diversion/Waste Master Plan](#)
- [Stack'd Consulting - 2019 Organics Residential Collection Review](#)
- [City of Lethbridge - 2019 Food and Yard Waste Survey](#)



WASTE & RECYCLING UTILITY 2022 ANNUAL REPORT

Appendix A

City of Lethbridge: Multi-Season Multi-Sector Waste Composition Study



2019
—
2023

FINAL REPORT

City of Lethbridge Multi-Season Multi-Sector Waste Composition Study

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APPENDIX SECTIONS

Appendix A	Tetra Tech's Limitations on the Use of this Document
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Appendix C	Maps

ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
ABCRC	Alberta Beverage Container Recycling Corporation
ARMA	Alberta Recycling Management Authority
CCME	Canadian Council of Ministers of the Environment
City	City of Lethbridge
ICI	(Light) Industrial, Commercial, and Institutional
kg/HH	Kilograms of material generated per household
LWRC	Lethbridge Waste and Recycling Centre
MRF	Material Recovery Facility
Tetra Tech	Tetra Tech Canada Inc.

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the City of Lethbridge and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the City of Lethbridge, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix A or Contractual Terms and Conditions executed by both parties.

NOTE TO THE READER

The samples collected and characterized for this study are “snapshots” in time, meaning the reported quantities are estimates and only represent the conditions for the period of time in which they were collected. Annual variability, weather, and other factors can affect the amount and composition of waste and recyclables generated by the various sectors at any given time. Even with combined educational, regulatory, and financial initiatives the reader should not assume that it is necessarily easy, practical, or economical to recover a substantial portion of a disposed material from a mixed waste stream or at its source.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by The City of Lethbridge (City) to conduct multi-sector, multi-season waste composition studies to quantify and characterize the waste received at the Lethbridge Waste and Recycling Centre (LWRC). This is an important step in developing an effective and efficient zero waste system and will help the City understand the amount and types of materials being disposed. Waste characterization studies, also known as a waste audit or waste accounting, are also used to determine and identify how much waste and the type of waste that is collected, diverted, and disposed over a specified period of time. It has been shown that those waste management programs which are based on characterization studies tend to be more successful than programs which are not. Benefits of conducting waste composition studies include the following:

- Monitor progress and design of diversion programs.
- Use sound data to make adjustments for further waste diversion.
- Develop a clear understanding of collection, handling, and processing needs.
- Understand waste management tendencies by those who use the waste management system.
- Inform other activities (such as cost benefit analysis).
- Inform and educate users about amounts and types of materials generated, how programs are being used, and contamination/clarification issues.

The purpose of this study was:

1. To quantify and characterize the materials present in various waste streams from residential and commercial sources received at the LWRC.
2. To establish a baseline that is also comparable to previous waste composition studies prior to implementation of the curbside recycling program in May 2019, and curbside source separated organics program in April 2022.
3. To identify the change in waste streams from Phase 1 and Non-Phase 1 groups that participate in the Green Cart Collection Program.

This report summarizes results from nine waste sorting events from April 2019 to August 2022.

2.0 PROJECT OVERVIEW

Sampling and sorting were conducted in accordance with the methodology set out in the Provincial Waste Characterization Framework that was prepared by the Canadian Council of Ministers of the Environment (CCME)¹.

Tetra Tech's field supervisor worked closely with City staff to identify and select loads to be characterized as the waste and recycling streams arrived at the LWRC. In some cases, waste from selected residential areas (e.g., specific neighbourhoods) was collected by the City collection staff and dropped off at the LWRC. A City loader operator would take a sample (e.g., a scoop or two) once a collection truck empties its contents at the landfill tip face, recycling tipping area at the material recovery facility (MRF), and organic waste transfer station. A loader operator then transported the sample to the sorting area (Figure 2-1). At the sorting area, Tetra Tech staff characterized the samples by manually collecting, sorting, and weighing items.

¹ Alberta Environment, Government of Canada, Recycling Council of Alberta. (October 2005). Provincial Waste Characterization Framework. Retrieved from <https://recycle.ab.ca/wp-content/uploads/2016/01/WasteCharFinalReport.pdf>.



Figure 2-1: Loader Operator Transporting a Residential Garbage Sample to the Sorting Area

The garbage, recycling, and organic samples were sorted into 13 primary sorting categories (as summarized in Table 2-1) and 60+ subcategories (refer to Appendix B for detailed description). The primary categories included paper, plastic, compostable organics, non-compostable organics, textiles, metal, glass, building materials, electronics, household hazardous waste, household hygiene, bulky objects, and fines. These sorting categories were selected and approved by the City.

Table 2-1: Primary Sorting Categories

Primary Sorting Category	Description/Examples
Paper	Paper deposit beverage containers, newsprint, printed paper, books, corrugated cardboard, boxboard, craft paper, polycoat liquid cups and containers, cartons and containers, paper towels, paper plates, wax paper, dog food bags, and laminated paper.
Plastic	Plastic deposit beverage containers, recyclable rigid plastic packaging (#1 to #7), plant pots and other, Styrofoam, grocery bags, bread bags, chip bags, pasta bags, plastic cutlery, laundry baskets, garden hoses, and compostable plastics.
Compostable Organics	Yard and garden waste, avoidable food waste (e.g., whole fruits and vegetables, meat, bread, and prepared meals), unavoidable backyard compostable food waste (e.g., fruits and vegetables trimmings and peels, coffee grounds, and eggshells), unavoidable non-backyard compostable food waste (bones and fats), and clean wood.
Non-Compostable Organics	Treated wood, painted, and finished wood, rubber, candles, wax, soap, and wicker baskets.
Textiles	Clothing, sheets, towels, blankets, footwear, purses, backpacks, suitcases, cloth filters, wipes, sponges, and drop sheets.
Metal	Metal deposit beverage containers, metal food containers, aluminium foil, and aluminium pie plates.
Glass	Glass beverage containers, glass jars, mirrors, ceramics, and dishware.
Building Materials	Gypsum/drywall, concrete, bricks, asphalt shingles, carpet and carpet underlay, insulation, vinyl siding, ceiling tiles, and plumbing pipes.

Primary Sorting Category	Description/Examples
Electronic Waste	Computers and computer accessories, TV and audio/video equipment, telephones, cellphones and accessories, light fixtures, lamps, smoke alarms, electronic toys, microwaves, toasters, vacuum cleaners, power tools, extension cords, and outdoor power equipment.
Household Hazardous	Batteries, lightbulbs, oil, antifreeze, paint, pesticides, medications, sunscreen, nail polish, drain cleaner, fertilizers, glues, and caulking.
Household Hygiene	Diapers, pet waste, sanitary napkins, bandages, and needles.
Bulky Objects	Refrigerators, washing machines, upholstered furniture, mattresses.
Fines	Items too small to classify (e.g., bread tabs, twist ties, typically <1"), soot, and ash.

2.1 Summary of Waste Composition Study Sorting Events

Waste streams were sorted during certain seasons to understand how waste management practices change over the course of the year. Table 2-2 summarizes the dates when sorting events occurred.

Table 2-2: List of Sorting Events

Sorting Event #	Season	Dates
1	Spring 2019	April 8, 2019 to April 13, 2019
2	Summer 2019	June 17, 2019 to June 29, 2019
3	Fall 2019	October 2, 2019 to October 12, 2019
4	Winter 2020	February 18, 2020 to February 29, 2020
5	Summer 2020	July 20, 2020 to July 31, 2020
6	Fall 2020	November 16, 2020 to November 20, 2020
7	Summer 2021	July 19, 2021 to July 21, 2021
8	Spring 2022	April 25, 2022 to April 29, 2022
9	Summer 2022	August 15, 2022 to August 26, 2022

2.2 Sectors Examined

Sampling plans were developed with the City to characterize the garbage, recycling, and organic composition for the residential sector (from both single family cart and multi-family bin collection) and the light industrial, commercial, and institutional (ICI) sectors, as well as materials from pilot communities. The sectors characterized per season and number of samples per sector are summarized in Table 2-3. Each collected sample weighs approximately 100 kg.

Waste materials from the following sectors were characterized:

- **Single-family Carts / Non-Phase 1**, typically serving single family residential (one dwelling unit) and multi-family residential premises (two to six dwelling units). These properties only receive a 2-stream (garbage and recycling) curbside collection.
- **Multi-family**, typically serving apartments (more than six dwelling units).

- **ICI**, non-residential sources that include businesses, offices, retail stores, restaurants, hotels, schools, hospitals, group homes, buildings used for religious worship, manufacturers, warehouses, etc. In some cases, specific geographical areas were targeted such as in the downtown core.
- **Phase 1 Carts**, single-family properties that receive a 3-stream (garbage, recycling, and organics) curbside collection. These properties were selected to participate and pilot the newly source separated organics collection stream. Note currently, there are only two communities (A9 and C3) that receive green cart collection.

Table 2-3: Number of Samples Examined Per Sector During Each Event

Season	Garbage			Recycling		Organics
	Carts	Multi-Family	ICI	Carts	Multi-Family	Carts
Spring 2019	8 samples	5 samples	0 samples	8 samples	0 samples	0 samples
Summer 2019	13 samples	0 samples	17 samples	12 samples	0 samples	0 samples
Fall 2019	18 samples	2 samples	0 samples	18 samples	2 samples	0 samples
Winter 2020	17 samples	3 samples	0 samples	12 samples	1 sample	0 samples
Summer 2020	18 samples	9 samples	0 samples	16 samples	4 samples	0 samples
Fall 2020	0 samples	0 samples	0 samples	0 samples	2 samples	0 samples
Summer 2021	12 samples	3 samples	10 samples	12 samples	4 samples	0 samples
Spring 2022	10 samples	0 samples	0 samples	4 samples	0 samples	0 samples
Summer 2022	13 samples	0 samples	13 samples	4 samples	0 samples	8 samples
Total	109 samples	22 samples	40 samples	86 samples	13 samples	8 samples

2.3 Green Cart Phase 1 Study

This section summarizes the number of samples collected from garbage, recycling, and organic streams in pilot and non-pilot areas before and after implementation of green cart curbside collection. The City had selected two pilot communities, A9 (north) and C3 (west), for the green cart curbside collection program. These communities spread across three areas, Varsity Village in the west side, and Legacy Ridge and Hardyville in north side (see Appendix C for neighborhood maps). Approximately 1,900 household received 240 litre green carts as part of the Phase 1 of the Curbside Organics Program.

Spring 2022 waste sorting event was conducted prior to the implementation of Phase 1 green cart curbside collection. Summer 2022 event was conducted after implementation of green cart curbside collection in Phase 1 communities. Garbage samples were also collected on Non-Phase 1 communities for comparison. Table 2-4 summarizes the number of samples collected from pilot and non-pilot communities during the Spring and Summer 2022 waste sorting event.

Table 2-4: Total Number of Samples Characterized from Pilot and Non-Pilot Areas

Season	Phase 1 - A9			Phase 1 - C3			Non-Phase 1
	Garbage	Recycling	Organics	Garbage	Recycling	Organics	Garbage
Spring 2022	5 samples	2 samples	0 samples	5 samples	2 samples	0 samples	0 samples
Summer 2022	4 samples	2 samples	4 samples	4 samples	2 samples	4 Samples	5 samples
Total	9 samples	4 samples	4 samples	9 samples	4 samples	4 samples	5 samples

3.0 WASTE COMPOSITION RESULTS – GARBAGE

The following subsections summarize the waste composition results for residential cart, multi-family, and Industrial, Commercial, and Institutional (ICI) garbage. Results are presented by primary category. Primary category percentages were calculated by averaging all sample data for each sector. Each figure provides a snapshot of the types and relative quantities of materials that were discarded during that time of the year.

3.1 Residential Single Family Cart Garbage Results

The following summarizes the composition of City’s residential curbside garbage across the waste composition events from Spring 2019 to Summer 2022. Figure 3-1 compares the average waste composition from residential single family cart garbage, these homes have no green cart service. Note that Spring 2022 data was taken from A9 and C3 areas prior to implementation of green carts Phase 1 study. These areas were included as they were not receiving green cart collection at that time.

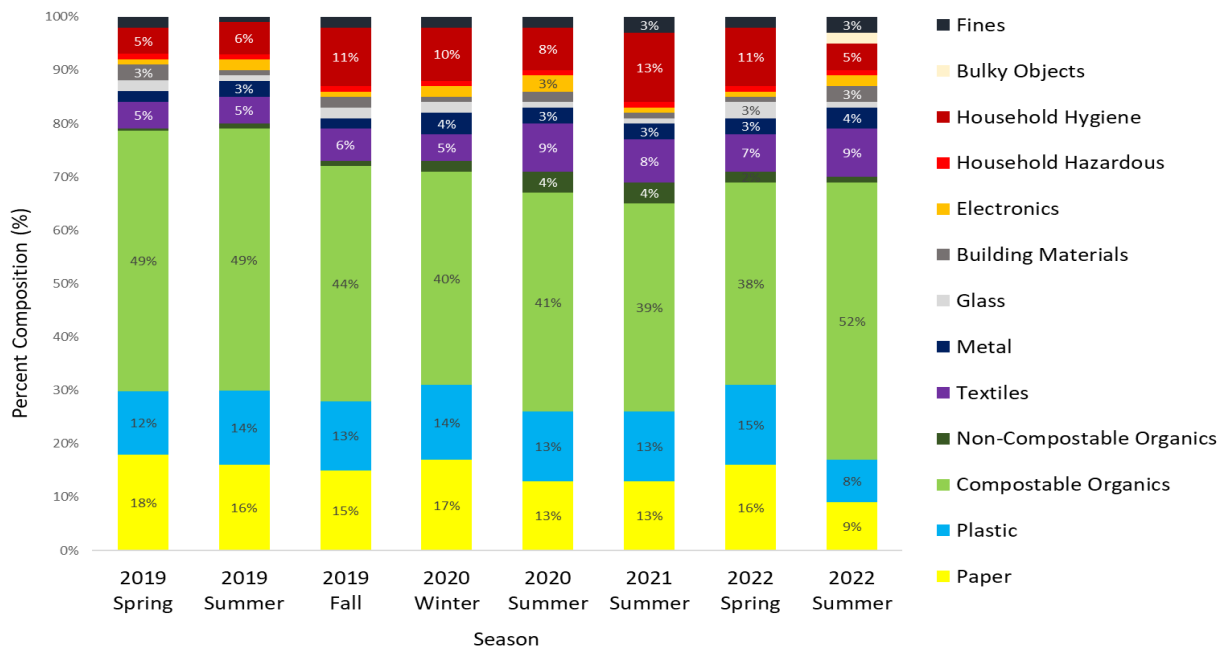


Figure 3-1: Comparison of Residential Curbside Garbage Composition Across the Sorting Events

The following were observations and findings:

- More compostable organics were disposed in the Summer 2022 (52%) compared to the previous sorting events. 33% of this material are yard and garden waste, 12% avoidable food waste, 7% unavoidable food waste. Summer tends to have more organics which was mostly yard and garden waste while Winter tends to have less organics. Residents usually do more yard work during the Summer season rather than Winter. Yard and garden waste also had the most variability between seasons – 33% in the Summer 2022, 26% in Summer 2020, 22% in Summer 2021, 21.5% in Summer 2019, 16.1% in the Fall, 10.4% in the Spring and 1.9% in the Winter. The Spring and Summer 2019 season had the second highest percentage of compostable organics (49%), mostly consisting of avoidable food waste and yard and garden waste.
- The amount of paper materials in the garbage stream decreased overtime. Spring 2019 saw the highest amount of paper material at 18%, by Summer 2022 that amount decreased to 9%.

Figure 3-2 compares the estimated residential single-family material composition in the garbage stream on a per household (kg/HH) basis from Spring 2019 to Summer 2022. The results from each season represents the amount of materials generated over a 3-month period.

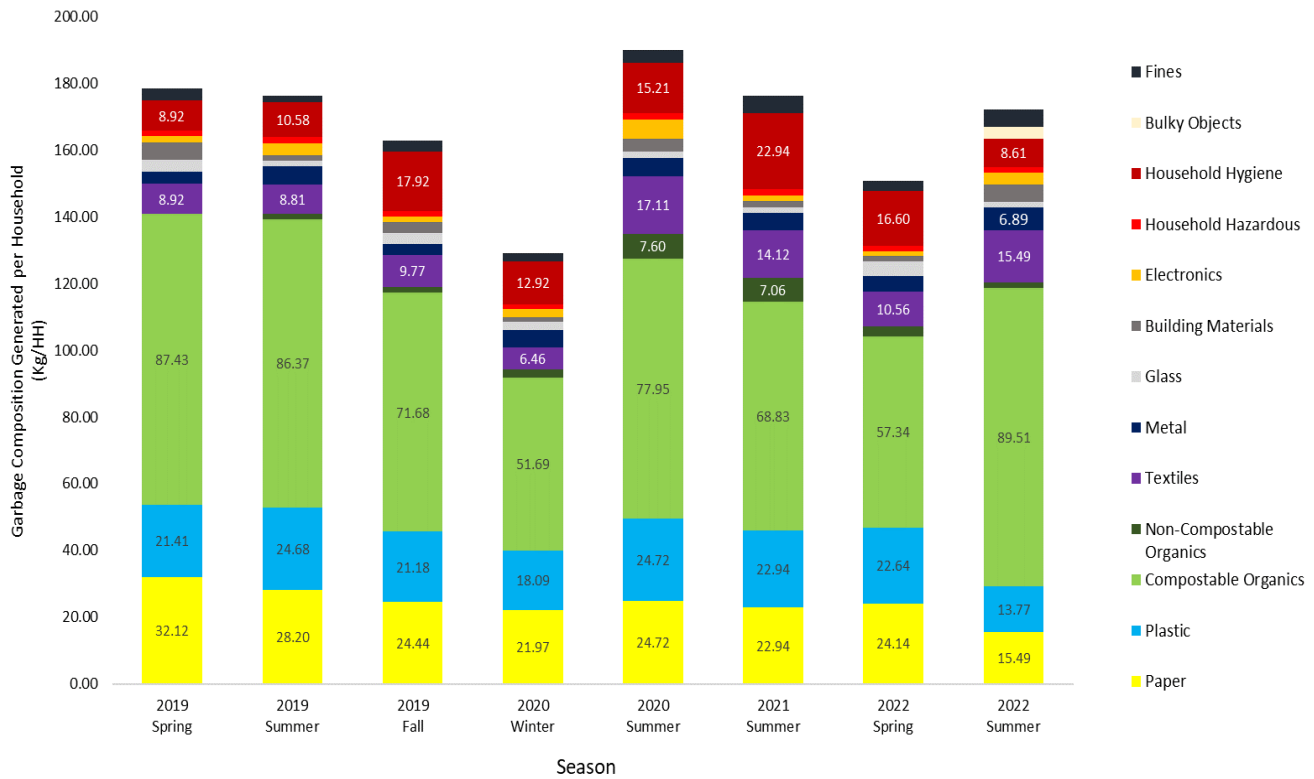


Figure 3-2: Single-Family Garbage Composition Generated per Household

The following were observations and findings:

- The compostable organics in 2022 Summer was higher than the compostable organics levels in 2020 and 2021 Summers and more comparable to 2019 Summer. This could be a result of behaviour changes during the COVID-19 pandemic.

3.2 Residential Multi-family Bin Garbage Results

The following summarizes the composition of City’s multi-family garbage across the sorting events from Spring 2019 to Summer 2021. Figure 3-3 compares the average waste composition from residential multi-family bin garbage.

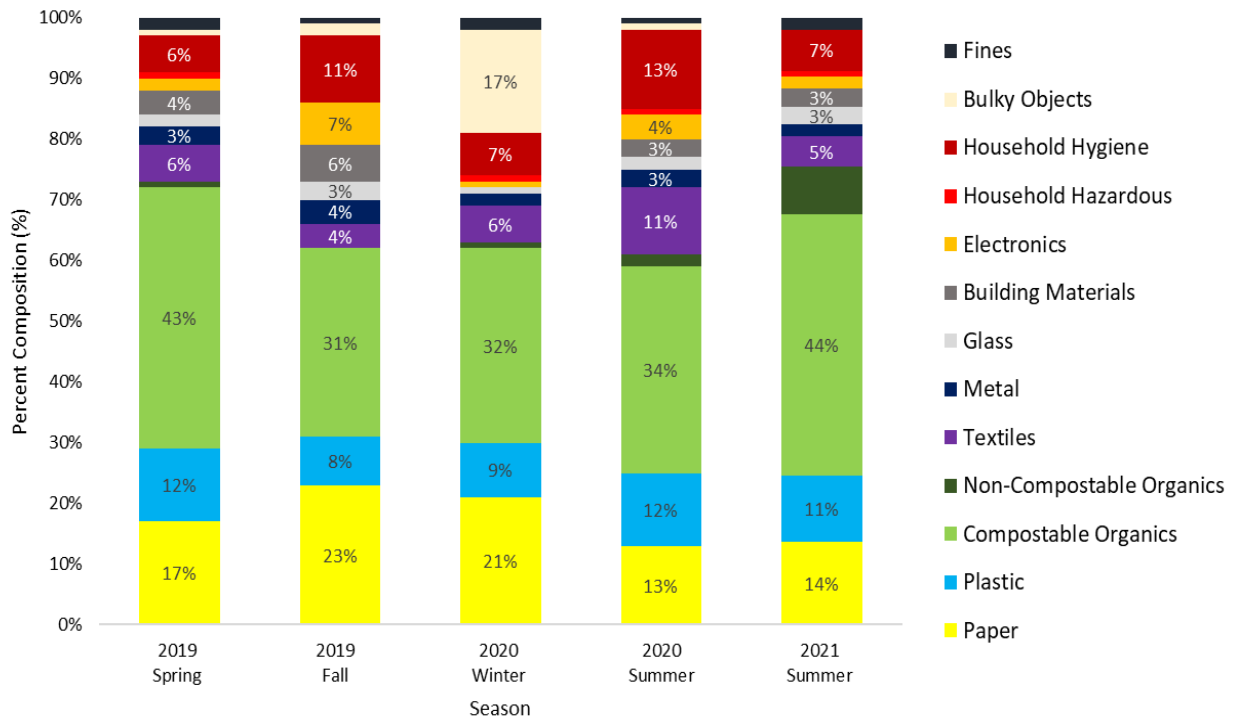


Figure 3-3: Comparison of Multi-family Bin Garbage Composition Across the Sorting Events

The following were observations and findings:

- The variability across seasons in multi-family residential garbage was high and may be attributed to the small sample sizes.
- The composition of compostable organics was very similar across the Fall 2019, Winter 2020, and Summer 2020 events. The Summer 2021 event had the highest percentage of compostable organic material, consisting of mostly avoidable food waste (24.5%) and yard and garden waste (14.7%).
- More bulky objects were found during the Winter of 2020 event (17%) compared to other season which has less than 2% of bulky objects. Only three samples were sorted during this event from two truckloads. The truck contained a couch, a dresser, and a mattress.

3.3 Industrial, Commercial, and Institutional Garbage Results

The following summarizes the composition from various businesses in the ICI sector where the garbage is collected from private hauler and the City in the downtown core. Figure 3-4 compares the average private hauler ICI and the City downtown commercial garbage.

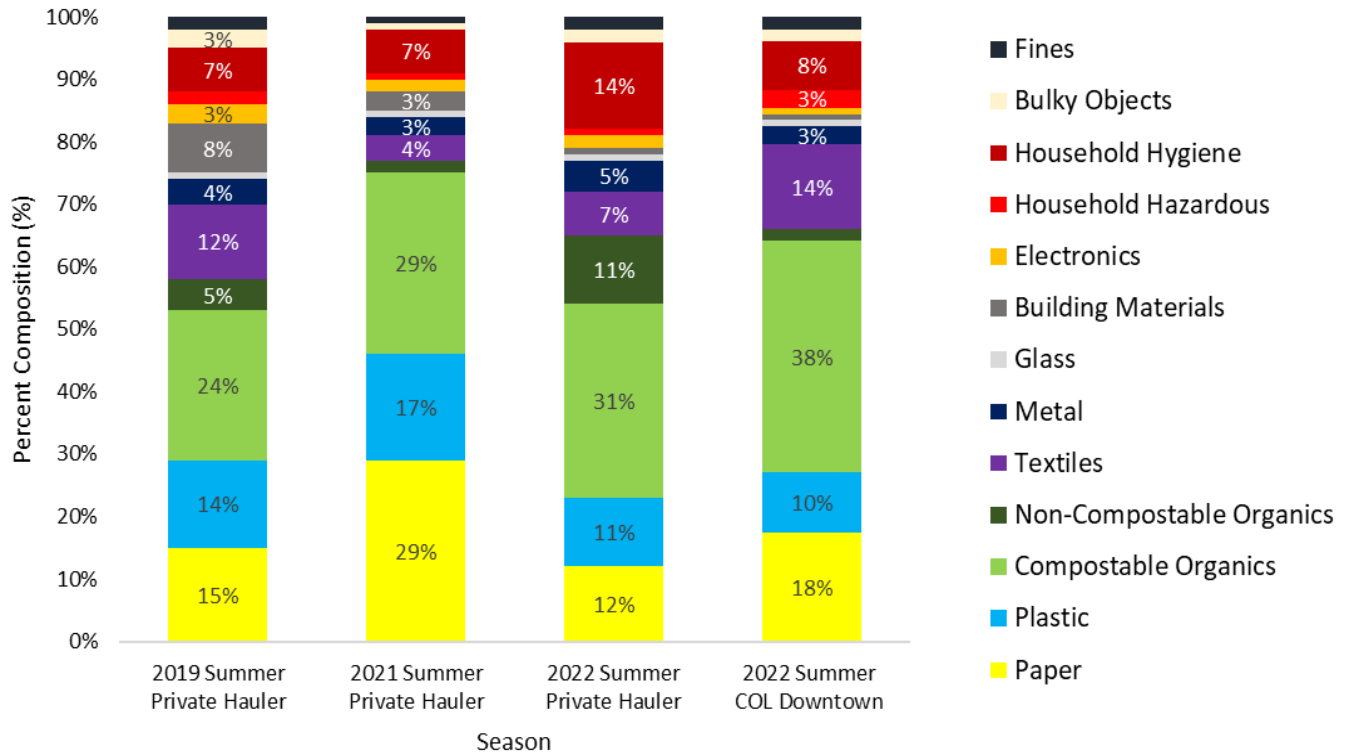


Figure 3-4: Comparison of Private Hauler ICI and City Downtown Commercial Garbage from Three Waste Sorting Events

The following were observations and findings:

- The ICI sector had the most variability out of all sectors examined.
- The City downtown commercial garbage has the most compostable organics (38%), this is primarily composed of avoidable food waste (24%), mostly restaurant leftovers.
- Compostable organics was the most abundant primary category from the garbage samples that were collected by private haulers. Summer 2019 (24%), Summer 2021 (29%), and Summer 2022 (31%).

4.0 WASTE COMPOSITION RESULTS – RECYCLING

The following subsections summarize the waste composition results for residential cart and multi-family recycling examined during the waste composition study. Results are presented by primary category. Primary category percentages were calculated by combining all sample data for each sector.

4.1 Residential Single Family Cart Recycling Results

The following summarizes the composition of City’s residential cart recycling over six waste composition events from Summer 2019 to Summer 2021. Figure 4-1 compares the average composition from residential single family cart recycling, these homes have no green cart service. Note that Spring 2022 data was taken from A9 and C3 areas prior to implementation of green carts Phase 1 study. These areas were included as they were not receiving green cart collection at that time.

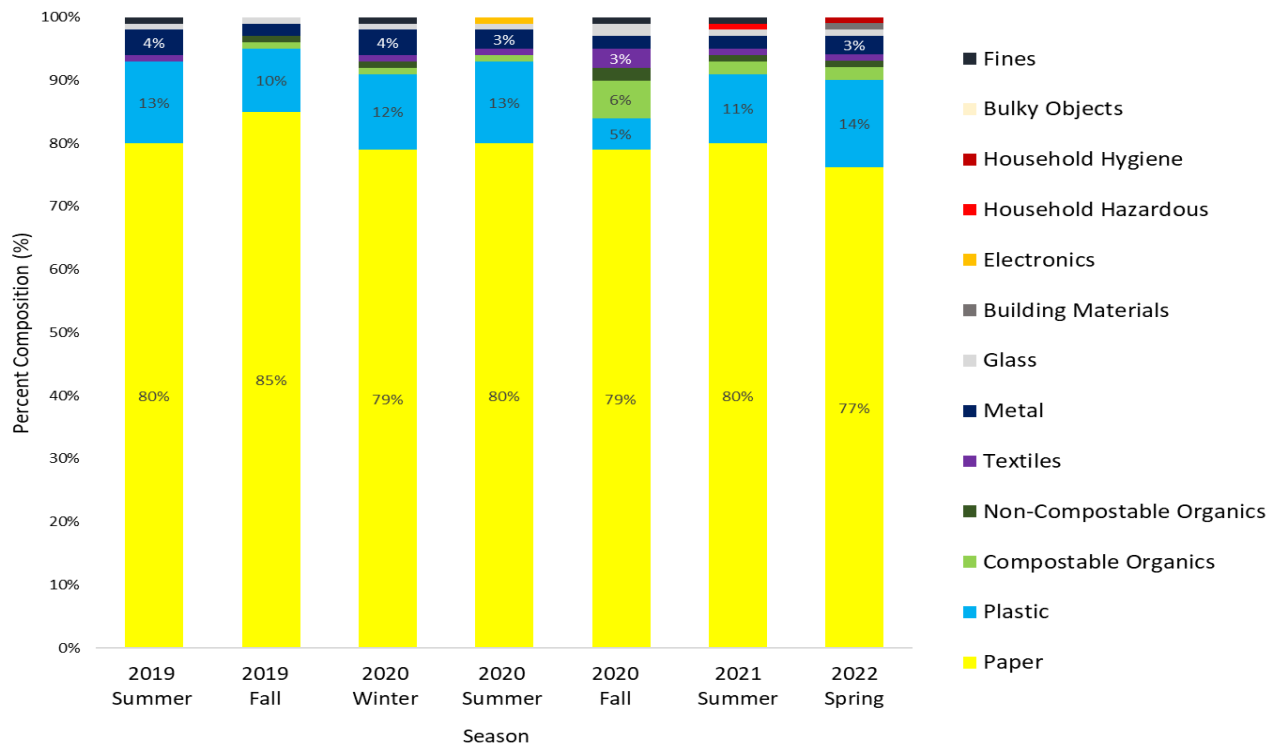


Figure 4-1: Comparison of Residential Single Family Cart Recycling Composition from Six Waste Sorting Event

The following were the observations and findings from the residential cart recycling stream:

- In general, the majority of the materials found in cart recycling was paper products (79% to 84%) and that consist mostly of cardboard and boxboard.

- The percentage of cardboard found in residential cart recycling increased during each Summer monitoring event with Summer 2021 having the highest percentage (43.8%), followed by Summer 2020 (36.39%), and Summer 2019 (30.48%).
 - This increase in generation may have been related to COVID-19 behaviour changes, where residents shifted their behaviour to online shopping as opposed to in-store shopping. Online shopping tends to have more packaging materials such as cardboard than in-store shopping, and therefore this may have caused the percentage of cardboard to be greater in each Summer monitoring event.
- The contamination rates ranged between 12% and 15%. This suggests similar contamination trends/habits.

Figure 4-2 compares the estimated residential single-family material composition in the recycling stream on a per household (kg/HH) basis from Summer 2019 to Spring 2022. The results from each season represents the amount of material generated over a 3-month period. households serviced.

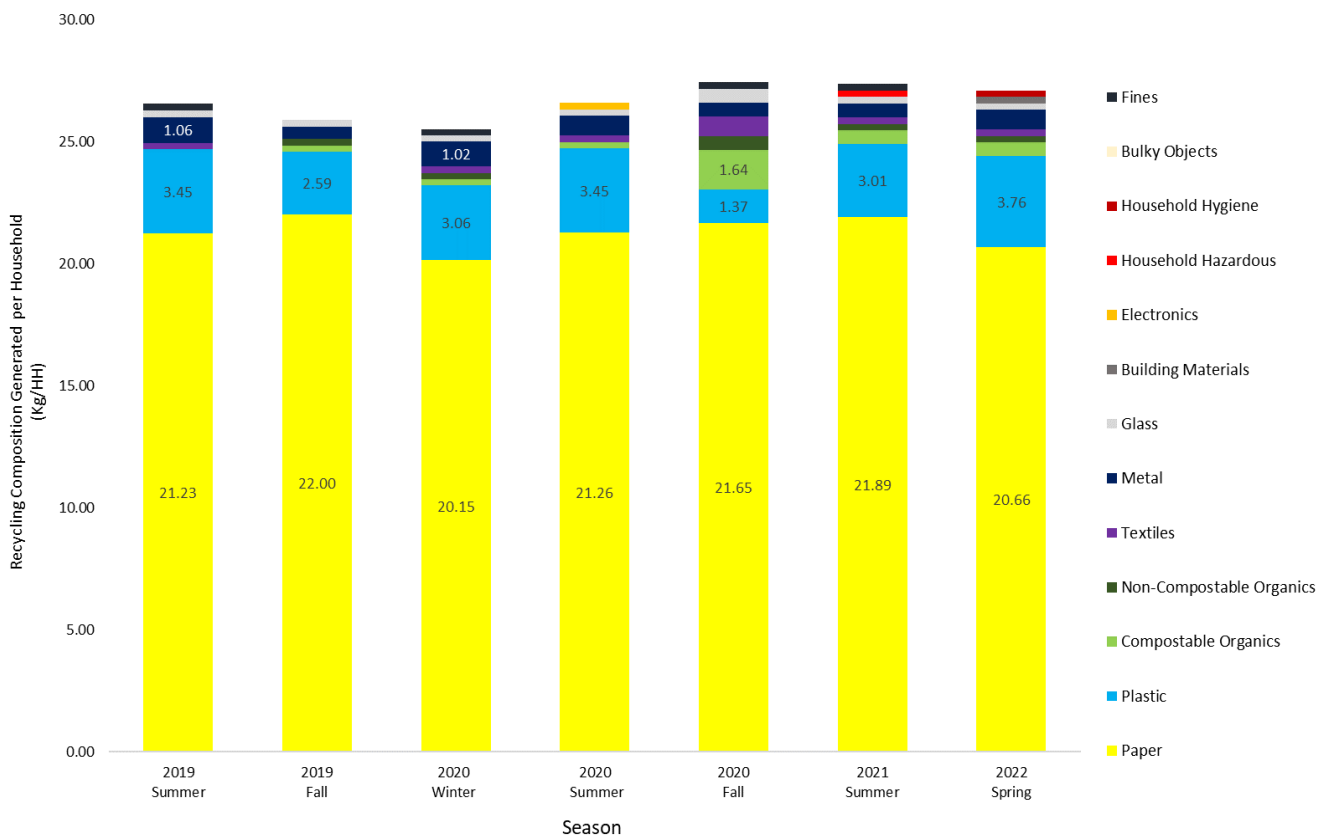


Figure 4-2: Residential Single-Family Cart Recycling Generated per Household

The following were observations and findings:

- Paper products was the predominant material in the residential single-family recycling cart. This is then followed by plastic products.

4.2 Residential Multi-family Bin Recycling Results

The following summarizes the composition of the City’s multi-family recycling stream based on five sorting events from Fall 2019 to Summer 2021. Figure 4-3 compares the average waste composition from residential multi-family recycling.

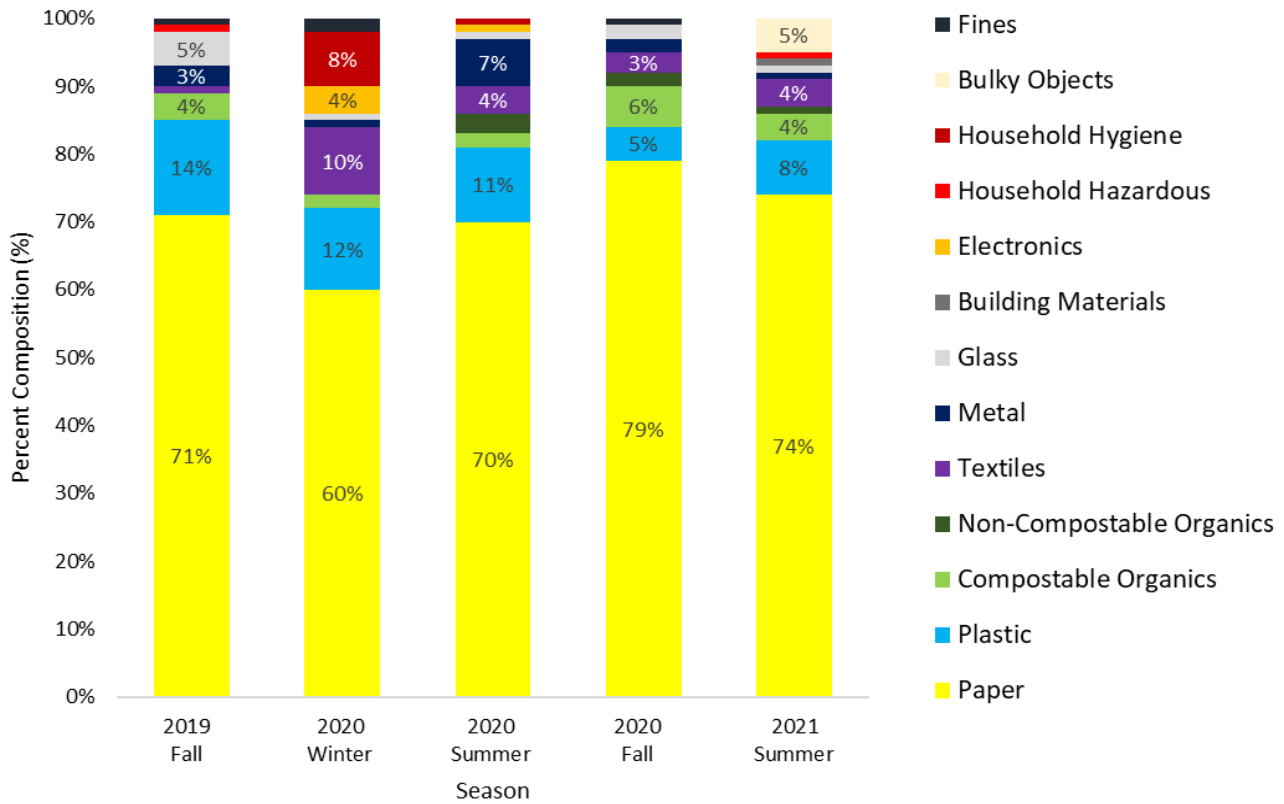


Figure 4-3: Comparison of Residential Multi-family Recycling Composition from Five Waste Sorting Events

The following were observations and findings:

- Although less than single family residential recycling, paper products make up the majority of the multi-family recycling stream (60% to 79%).
- The multi-family recycling stream showed higher seasonal variability in composition compared to the single-family recycling stream.
- The contamination rates for the multi-family recycling stream ranged between 21% in Summer 2020 to 39% in Winter 2020. This suggests that more public education and outreach is required for residents living in multi-family complexes.

5.0 PHASE 1 WASTE COMPOSITION RESULTS

The following subsection summarizes the waste composition results from A9 and C3 areas. Garbage and recycling waste stream were examined during the Spring 2022 event prior to the implementation of Phase 1 green carts curbside collection. Garbage, recycling, and green carts (organics) waste streams were examined during the Summer 2022 event after the Phase 1 green cart curbside collection was implemented in A9 and C3 areas. Garbage and recycling were collected on bi-weekly basis and green cart during the summer was collected on weekly. For comparison, garbage from single family carts that have no green cart collection (non-Phase 1 homes) were also examined during the Summer 2022 event. Results were presented by primary category. Primary category percentages were calculated by combining all sample data for each sector.

5.1 A9 Phase 1 Garbage Results

Figure 5-1 compares the average garbage composition from A9 Phase 1 area during Spring 2022 and Summer 2022 events.

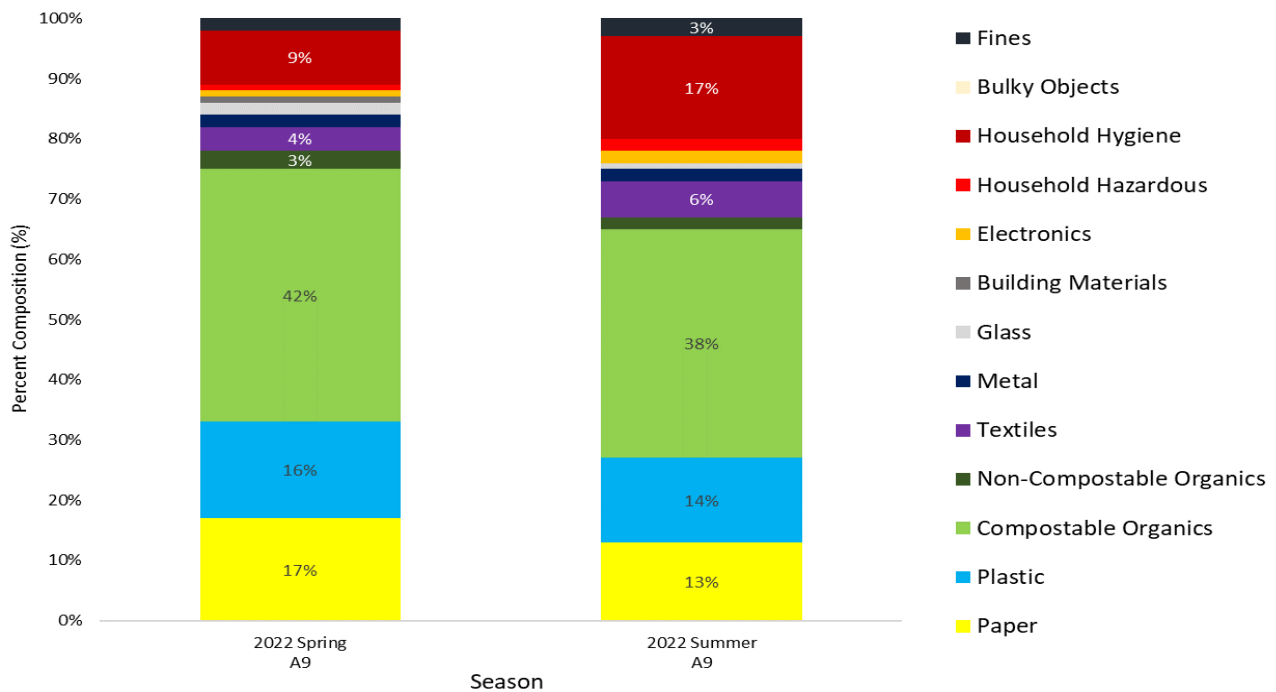


Figure 5-1: Comparison of A9 Garbage Composition Results

The following were observations and findings:

- The average amount of compostable organics decreased after the implementation of Phase 1 green cart curbside collection. A9 Spring 2022 compostable organics was at 42%, it decreased to 38% in Summer 2022. This is an early indication that the green cart is being used.

- Household Hygiene increased during the summer waste sorting event from 9% to 17%. With the increase of household hygiene material this will compress the percentages of other categories therefore having lower percentages compared to Spring season.

Figure 5-2 compares the estimated A9 residential single-family material composition in the green cart (organics) stream on a per household (kg/HH) basis from Spring 2022 to Summer 2022. The results from each season represents the amount of materials generated **over a 2-week period**.

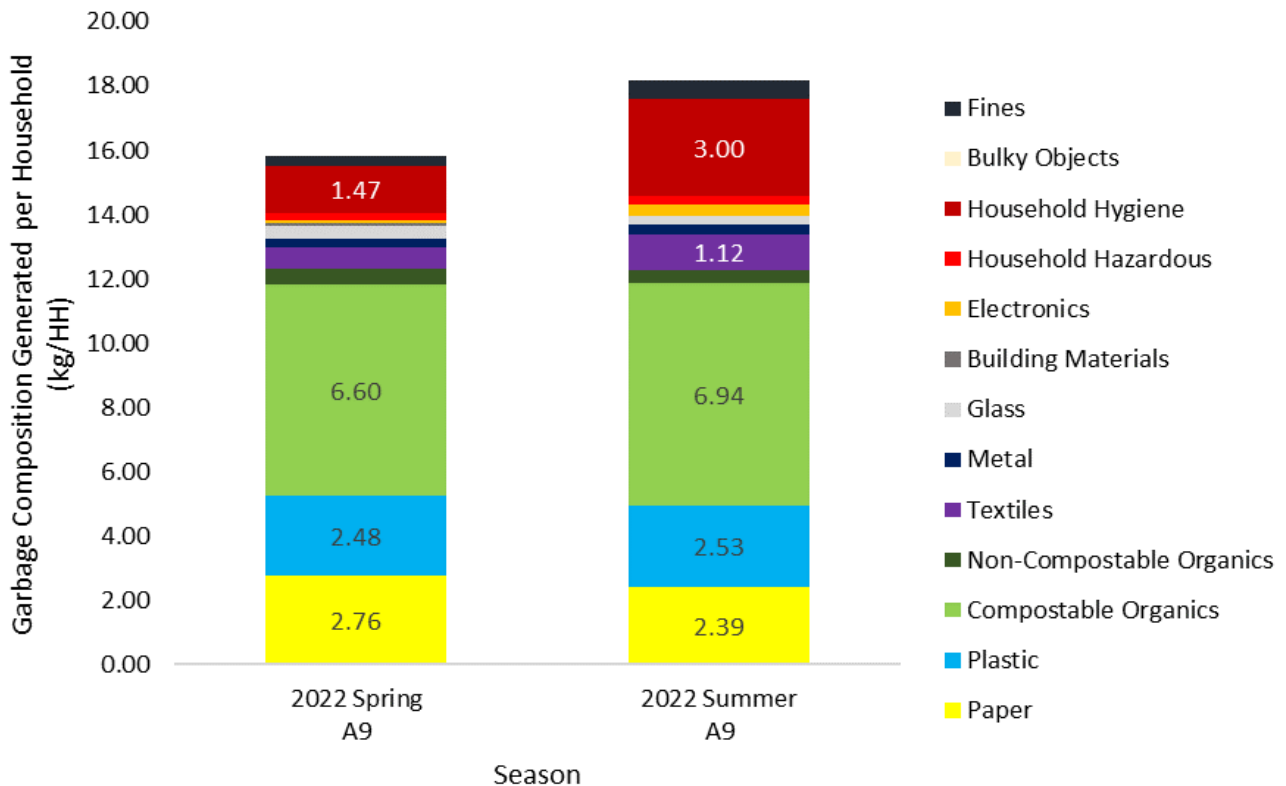


Figure 5-2: A9 Garbage Composition Generated per Household over a 2-Week Period

The following were observations and findings:

- Comparing the Spring 2022 and Summer 2022 results, more household hygiene materials were found. This resulted in the percentage of organics to be lower. However, the amount of materials generated in the Summer 2022 (18.19 kg/HH) was higher than the amount of materials generated in the Spring 2022 (15.84 kg/HH), this resulted in the total of organics generated on a kg/HH basis to be relatively the same in Spring 2022 (6.60 kg organics/HH) and in the Summer 2022 (6.94 kg organics/HH).

5.2 C3 Phase 1 Garbage Results

Figure 5-3 compares the average garbage composition from C3 Phase 1 area during Spring 2022 and Summer 2022 events.

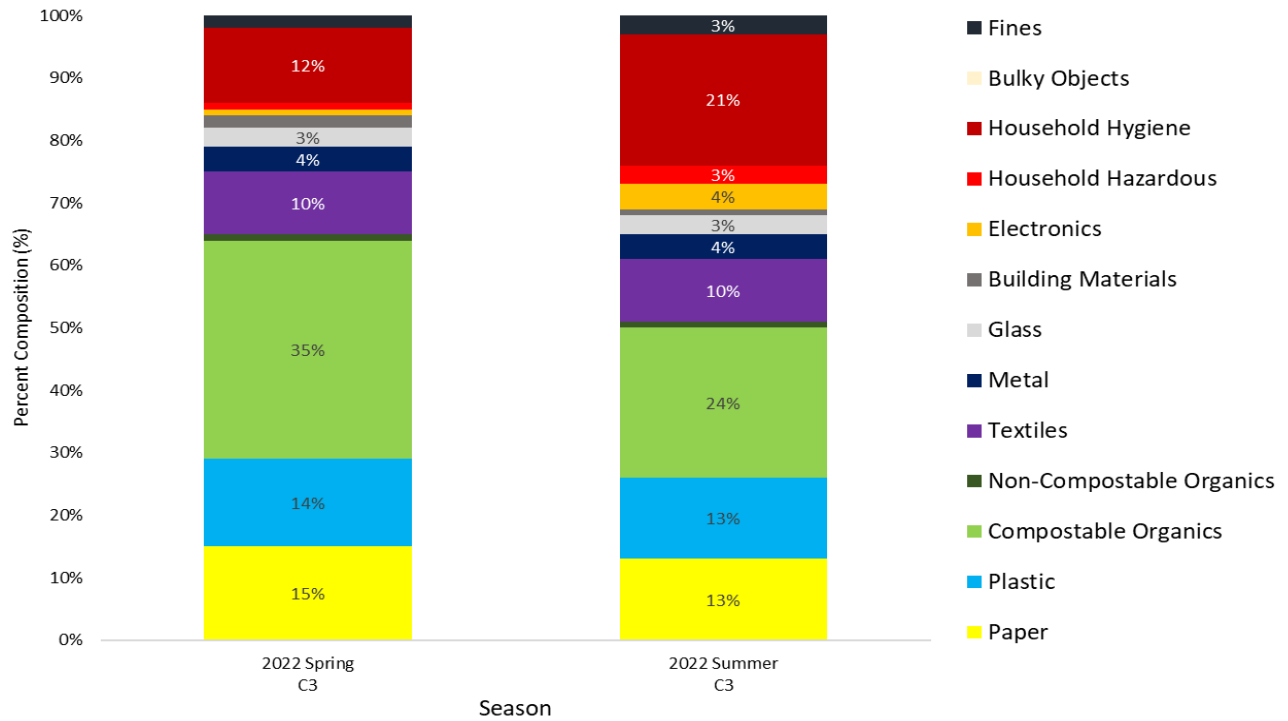


Figure 5-3: Comparison of C3 Garbage Composition Result

The following were observations and findings:

- The average amount of compostable organics decreased after the implementation of Phase 1 green cart curbside collection. C3 Spring 2022 compostable organics is at 35%, it decreased to 24% in Summer 2022. This is an early indication that the green cart is being used.
- Household Hygiene increased during the Summer waste sorting event from 12% to 21%.

Figure 5-4 compares the estimated C3 residential single-family material composition in the garbage stream on a per household (kg/HH) basis from Spring 2022 to Summer 2022. The results from each season represents the amount of material generated **over a 2-week period**.

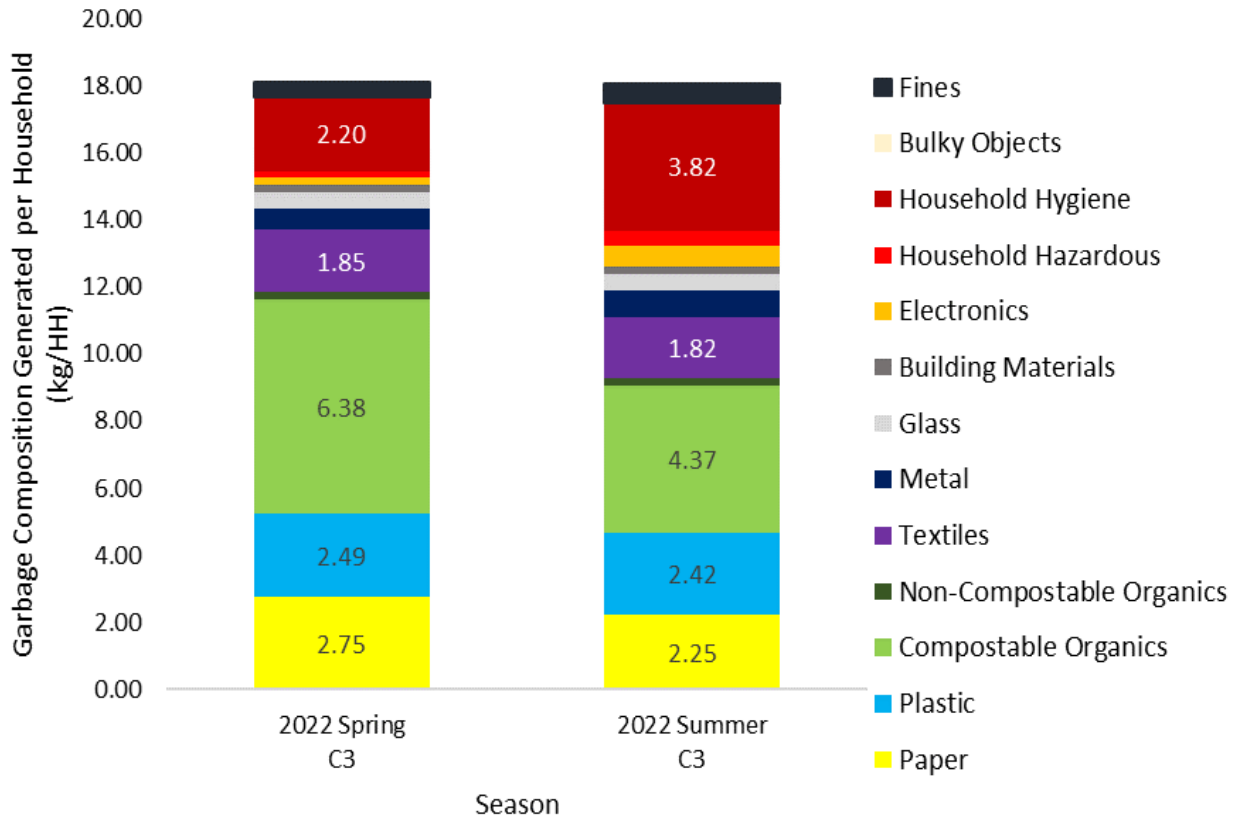


Figure 5-4: C3 Garbage Composition Generated per Household over a 2-Week Period

The following were observations and findings:

- The amount of household hygiene generated per household increased from 2.20 kg/HH in Spring 2022 to 3.82 kg/HH in Summer 2022.
- The amount of compostable organics generated per household decreased from 6.38 kg/HH in Spring 2022 to 4.37 kg/HH in Summer 2022.

5.3 A9 Phase 1 Recycling Results

Figure 5-5 compares the average recycling composition from A9 area during Spring 2022 and Summer 2022 waste sorting events.

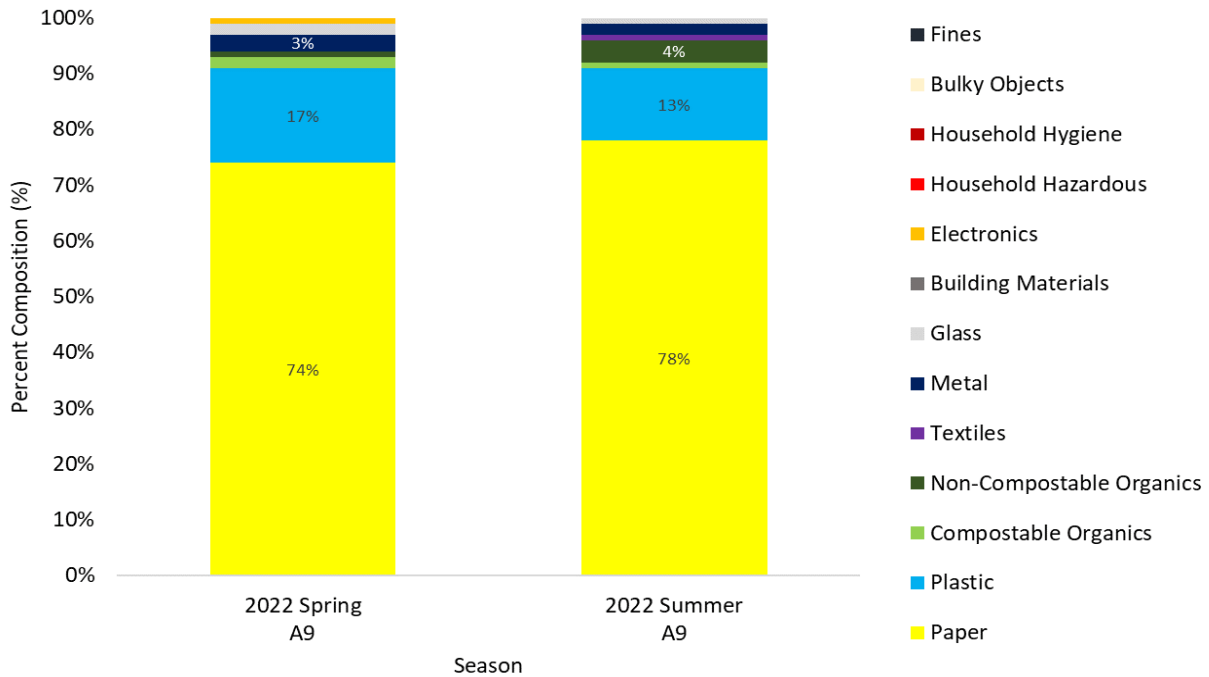


Figure 5-5: Comparison of A9 Recycling Composition

The following were observations and findings:

- Paper products was the primary composition recycling stream 74% in Spring and 78% in Summer. This is followed by plastic products 17% in Spring and 13% in Summer.

Figure 5-6 compares amount and composition of recycling generated per household (Kg/HH) during Spring 2022 and Summer 2022 waste sorting events in A9 area. Each season represents recycling generated on per household basis over a 2-week period. The recycling rate per household was calculated by taking the amount of recyclables collected over a 2-week period and dividing that by the number of households serviced.

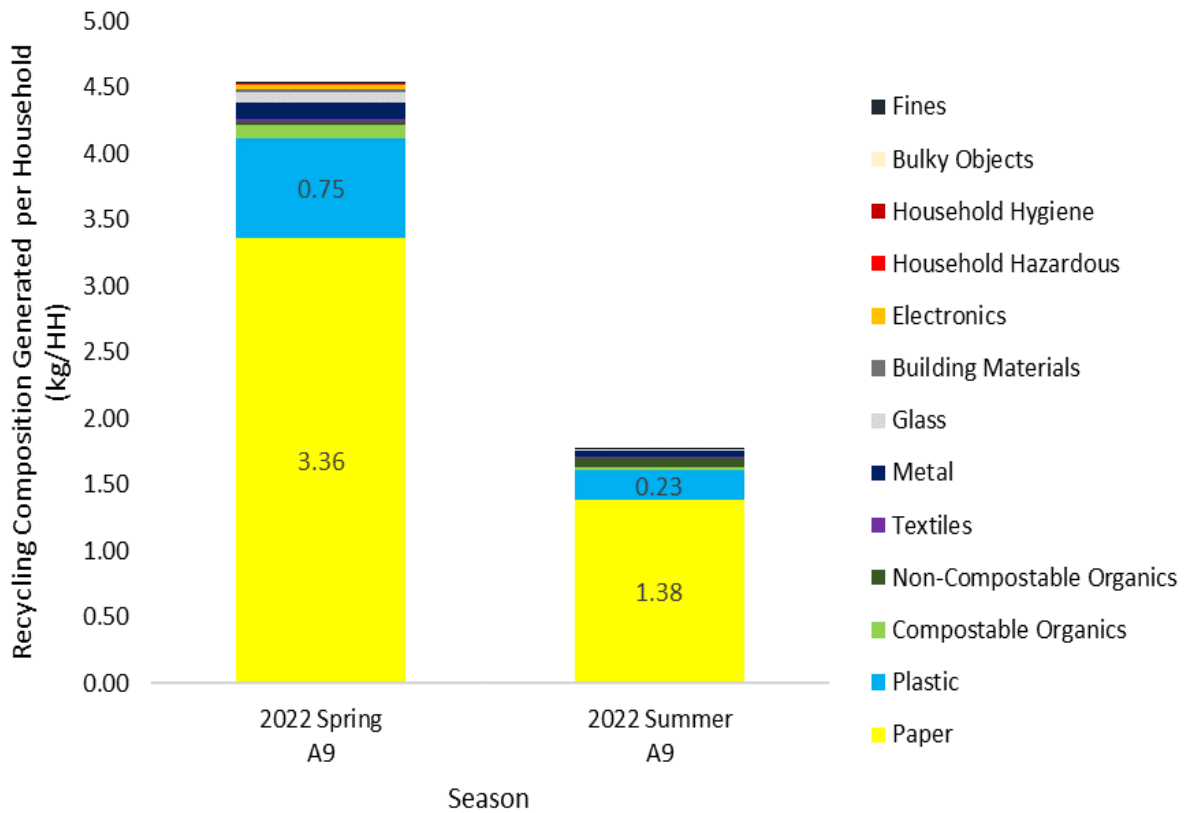


Figure 5-6: A9 Recycling Composition Generated per Household

The following were observations and findings:

- Less recycling was generated during Summer 2022 compared to Spring 2022. The truck load net weight in the Summer sorting event only weighs 1,860 kg compared to 4,770 kg during the Spring sorting event.
- Paper product made up most of the recycling stream generated per household followed by plastic.

5.4 C3 Phase 1 Recycling Results

Figure 5-7 compares the average recycling composition from C3 area during Spring 2022 and Summer 2022 waste sorting events.

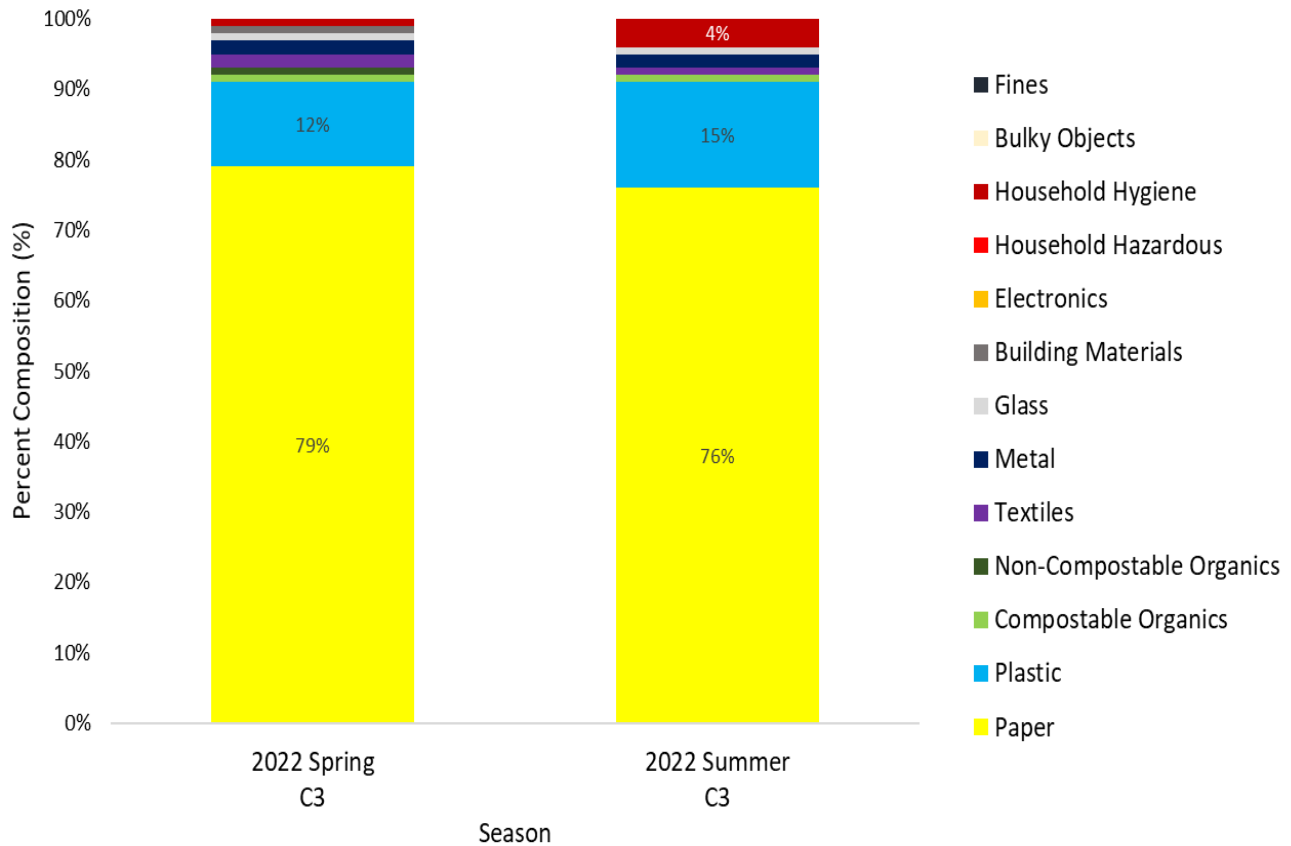


Figure 5-7: Comparison of C3 Recycling Composition

The following were observations and findings:

- Paper products was the primary composition recycling stream 79% in Spring and 76% in Summer. This is followed by plastic products 12% in Spring and 15% in Summer.
- House hygiene in the recycling stream increased from 1% in the Spring to 4% in the Summer.

Figure 5-8 compares the estimated C3 residential single-family material composition in the recycling stream on a per household (kg/HH) basis from Spring 2022 to Summer 2022. The results from each season represents the amount of materials generated over a 2-week period.

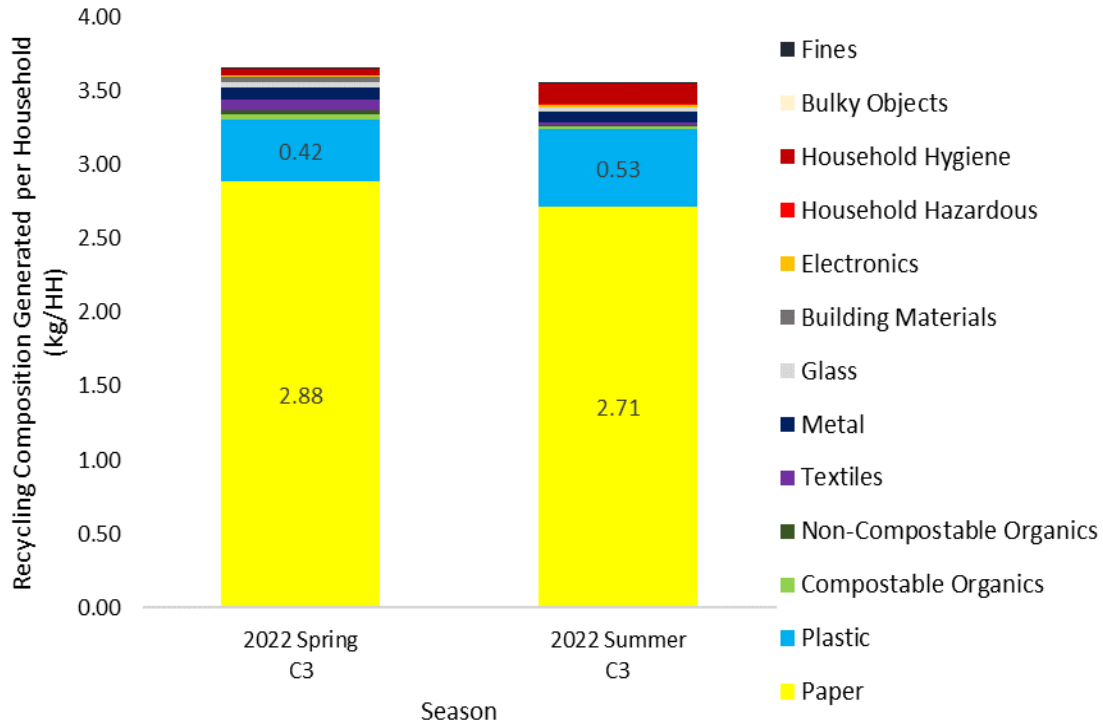


Figure 5-8: C3 Recycling Composition Generated per Household

The following were observations and findings:

- Paper product made up most of the recycling generated per household followed by plastic.

5.5 A9 Phase 1 Green Cart Results

Figure 5-9 summarizes the average green cart composition from A9 area during the Summer 2022 waste sorting event.

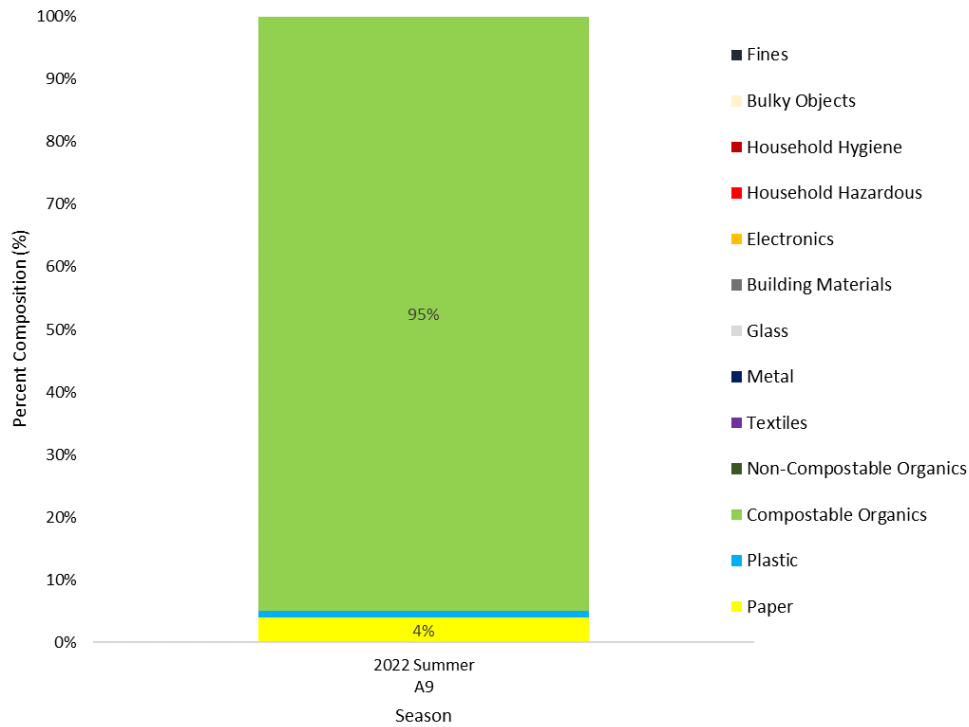


Figure 5-9: A9 Green Cart Composition

The following were observations and findings:

- A9 green cart is primarily composed of compostable organics (95%) and followed by paper (4%). Compostable organics in the green cart was primarily composed of yard and garden waste such as grass cuttings and plant trimmings.

Figure 5-10 shows the estimated A9 residential single-family material composition in the green cart stream on a per household (kg/HH) basis during the Summer 2022 sorting event. The results represent the amount of materials generated **over a 2-week period**.

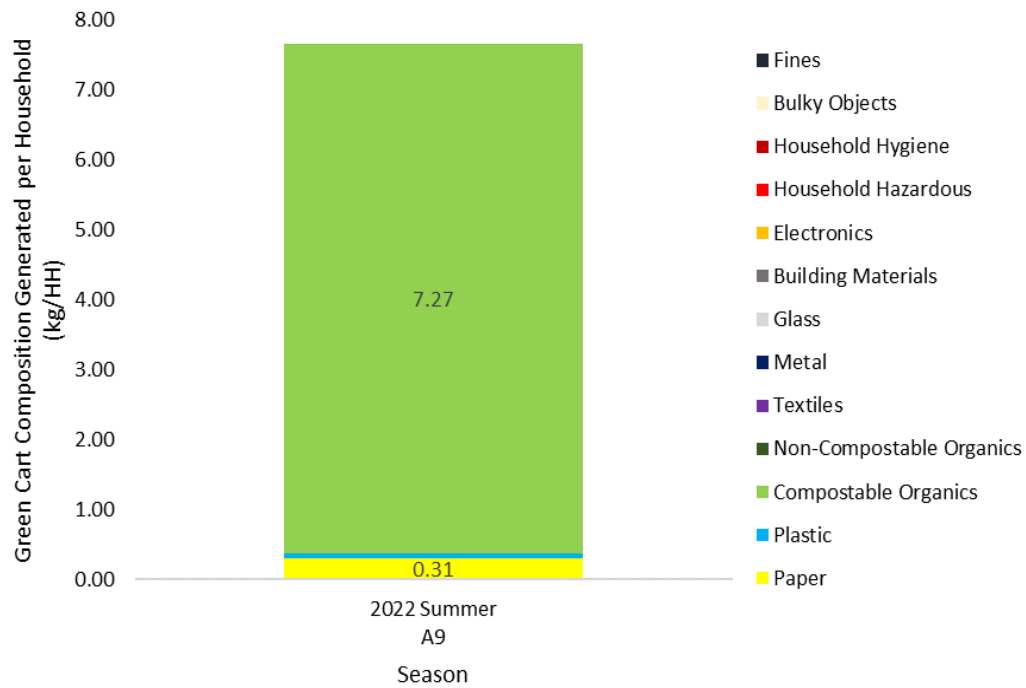


Figure 5-10: A9 Green Cart Composition Generated per Household

The following were observations and findings:

- A9 green cart generated per household within 2-week period is primarily composed of compostable organics (7.27 kg/HH).

5.6 C3 Phase 1 Green Cart Results

Figure 5-11 summarizes the average green cart composition from C3 area during the Summer 2022 waste sorting event.

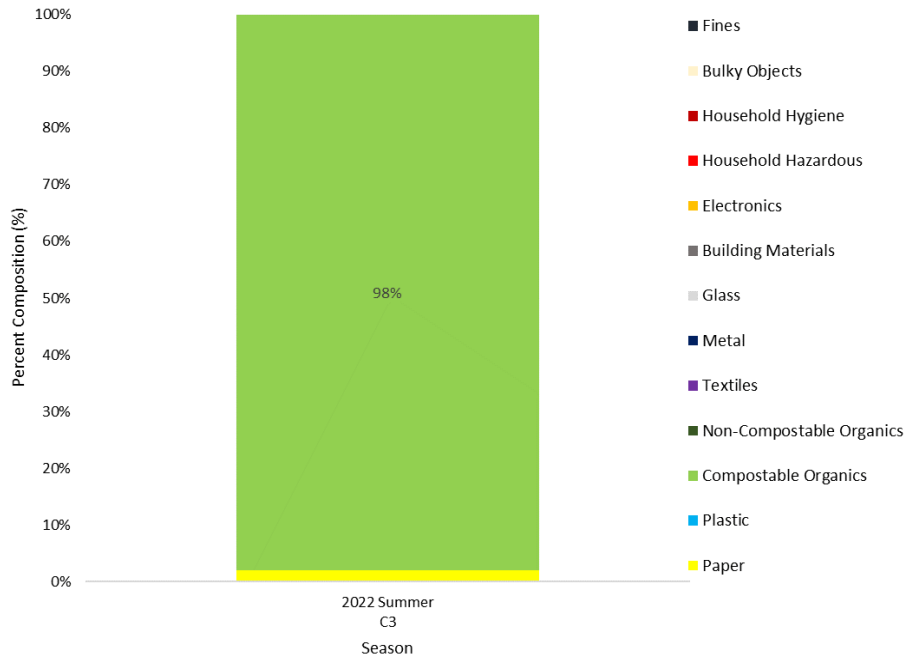


Figure 5-11: C3 Green Cart Waste Composition

The following were observations and findings:

- C3 green cart is primarily composed of compostable organics (98%). Compostable organics in the green cart was primarily composed of yard and garden waste such as grass cuttings and plant trimmings.

Figure 5-12 shows the C3 residential single-family material composition in the green cart stream on a per household (kg/HH) basis during the Summer 2022 sorting event. The results represent the amount of materials generated over a 2-week period.

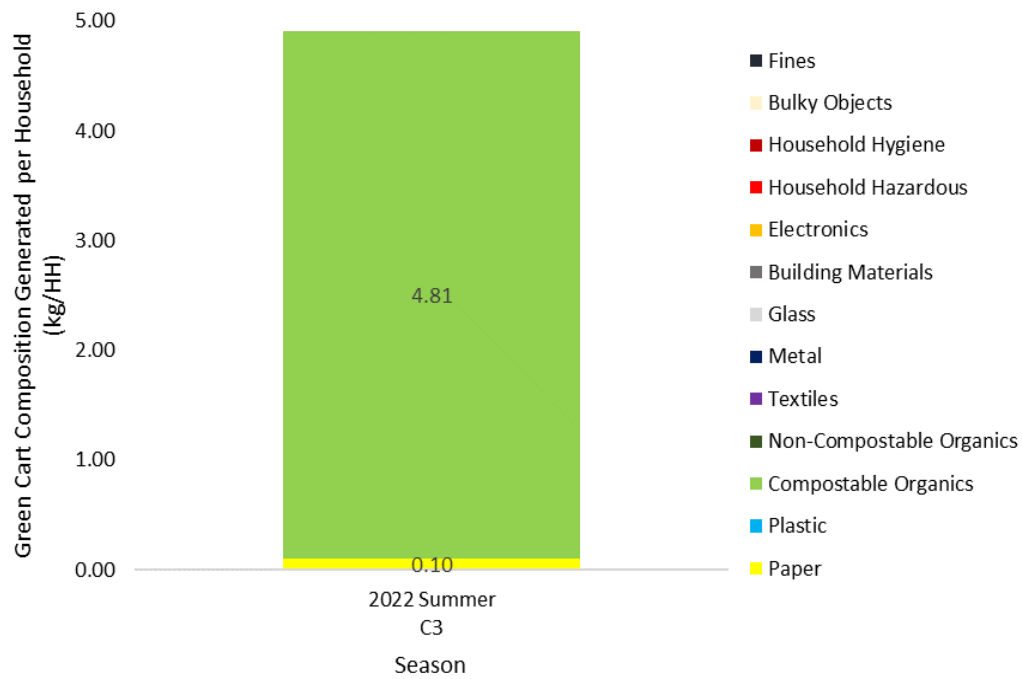


Figure 5-12: C3 Green Cart Composition Generated per Household

The following were observations and findings:

- C3 green cart generated per household within 2-week period is primarily composed of compostable organics (4.81 kg/HH).

5.7 Phase 1 Vs. Non-Phase 1

The following summarizes the garbage waste composition from Phase 1 and Non-Phase 1 areas during the Summer 2022 sorting event. A9 and C3 waste composition results were combined for this comparison. Figure 5-13 compares the average garbage composition from Phase 1 and Non-Phase 1 areas.

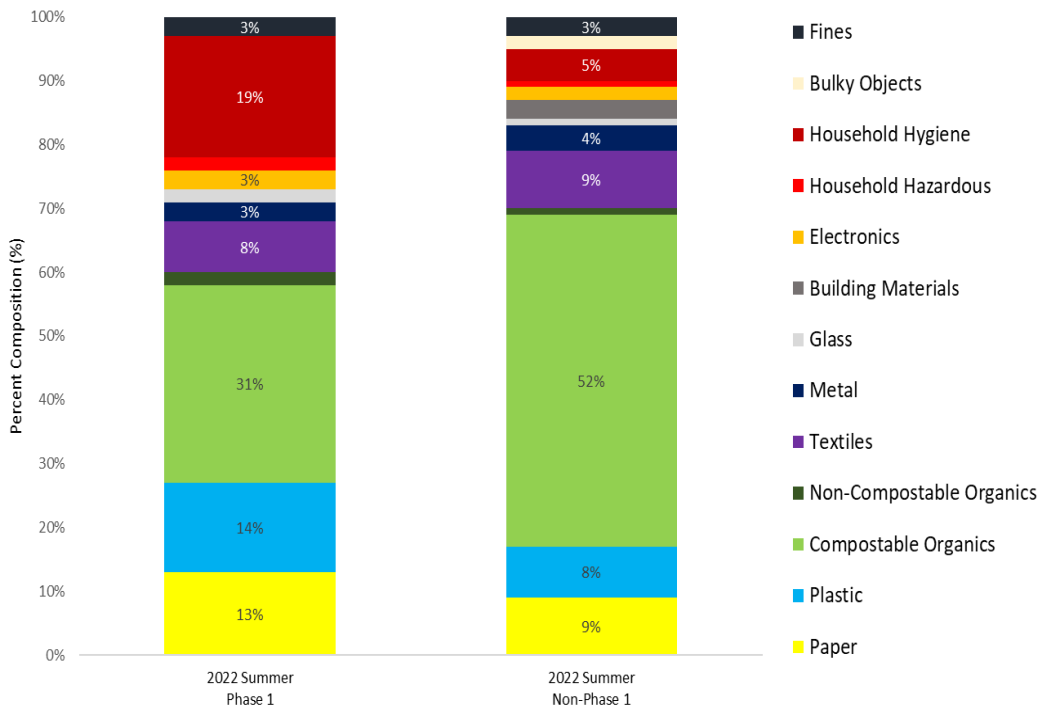


Figure 5-13: Phase 1 Vs. Non-Phase 1 Garbage Waste Composition

The following were observations and findings:

- The average amount of compostable organics is lower in Phase 1 areas (31%) compared to Non-Phase 1 areas (52%).
- The average amount of household hygiene material in Phase 1 areas is higher (19%) compared to Non-Phase 1 areas (5%).

6.0 DIVERSION POTENTIAL

Section 6.0 examines the diversion potential in residential cart, multi-family, and ICI garbage. Diversion potential represents the percentage of materials that could be diverted through composting, recycling, and other product stewardship programs. These other programs are referred to as diversion options readily available in the City that include current product stewardship programs such as Alberta Recycling Management Authority (ARMA) as well as deposit beverage containers that have monetary value under the Alberta Beverage Container Recycling Corporation (ABCRC).

6.1 Residential Single Family Garbage Cart Diversion Potential

Figure 6-1 illustrates the diversion potential for residential cart garbage through eight waste sorting events, from Spring 2019 to Summer 2022. Note that Spring 2022 data was taken from A9 and C3 areas prior to implementation of green carts Phase 1 study. These areas were included as they were not receiving green cart collection at that time.

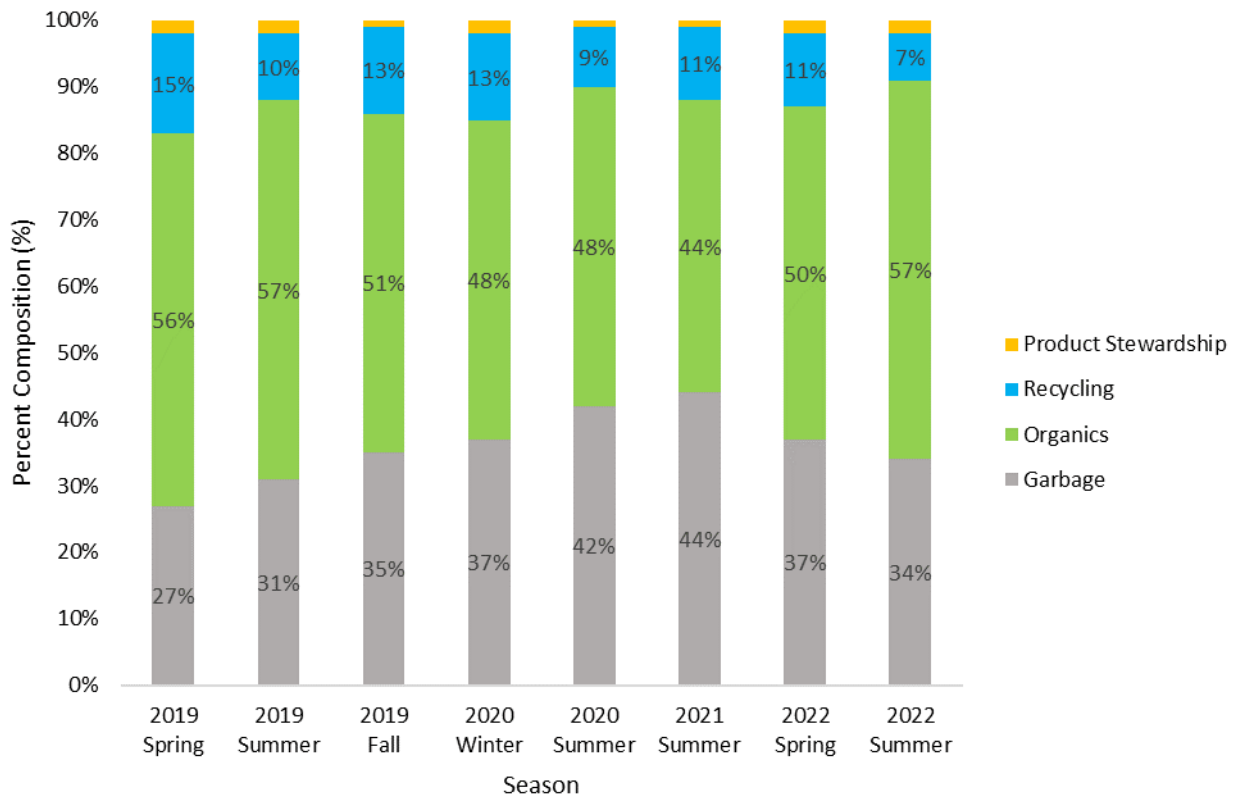


Figure 6-1: Residential Single Family Garbage Cart Diversion Potential

The following were observations and findings:

- Compostable organics in the residential cart garbage stream represent the greatest opportunity for waste diversion (i.e., greater than 44%).
- Recyclable material was consistent and ranged between 9% and 15%. This suggests residents are using their recycling programs.

6.2 Residential Multi-Family Garbage Bin Diversion Potential

Figure 6-2 illustrates the diversion potential in multi-family garbage through the five seasons that it was examined.

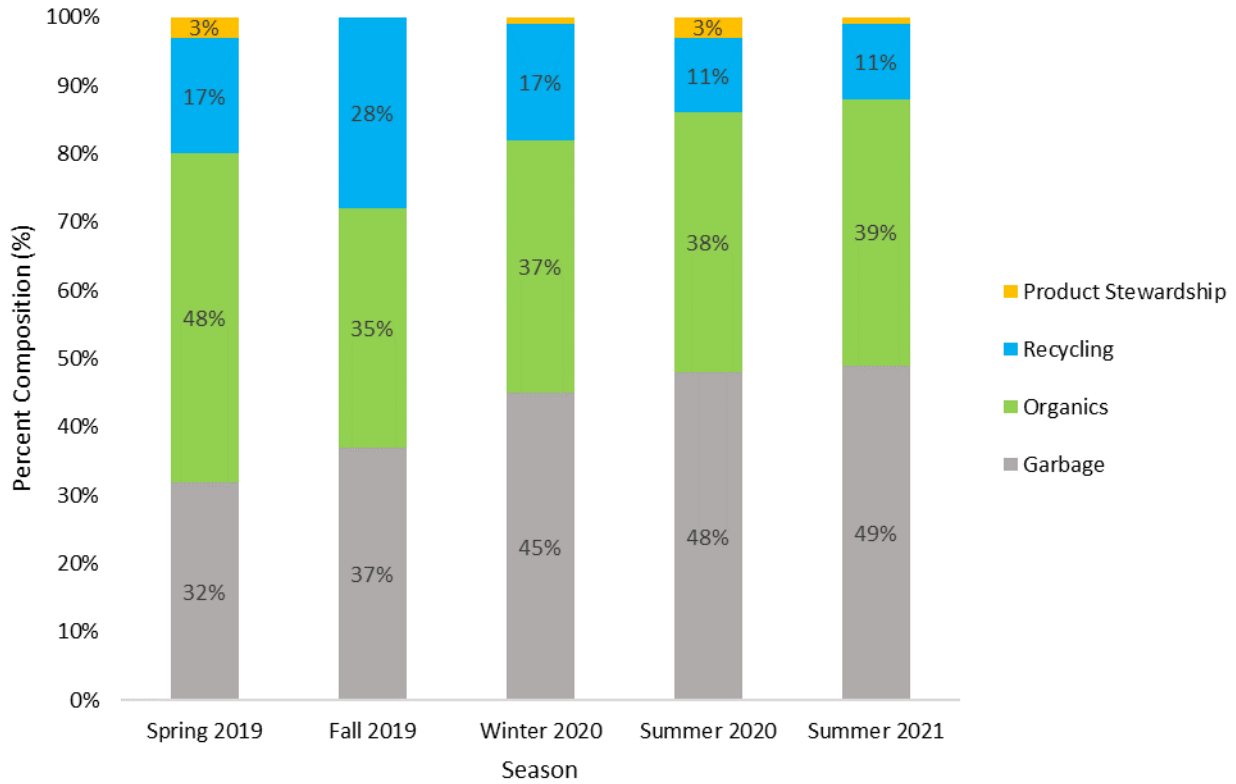


Figure 6-2: Residential Multi-family Garbage Diversion Potential

The following were observations and findings:

- The largest opportunity for diversion is organics (i.e., 35% organics or greater during all sorting events).
- Recyclable material in the multi-family garbage stream ranged from 11% to 27% and is trending to be less at 11%.

6.3 Industrial, Commercial, and Institutional Garbage Bin Diversion Potential

Figure 6-3 summarizes the diversion potential for private hauler ICI garbage and the City downtown commercial garbage.

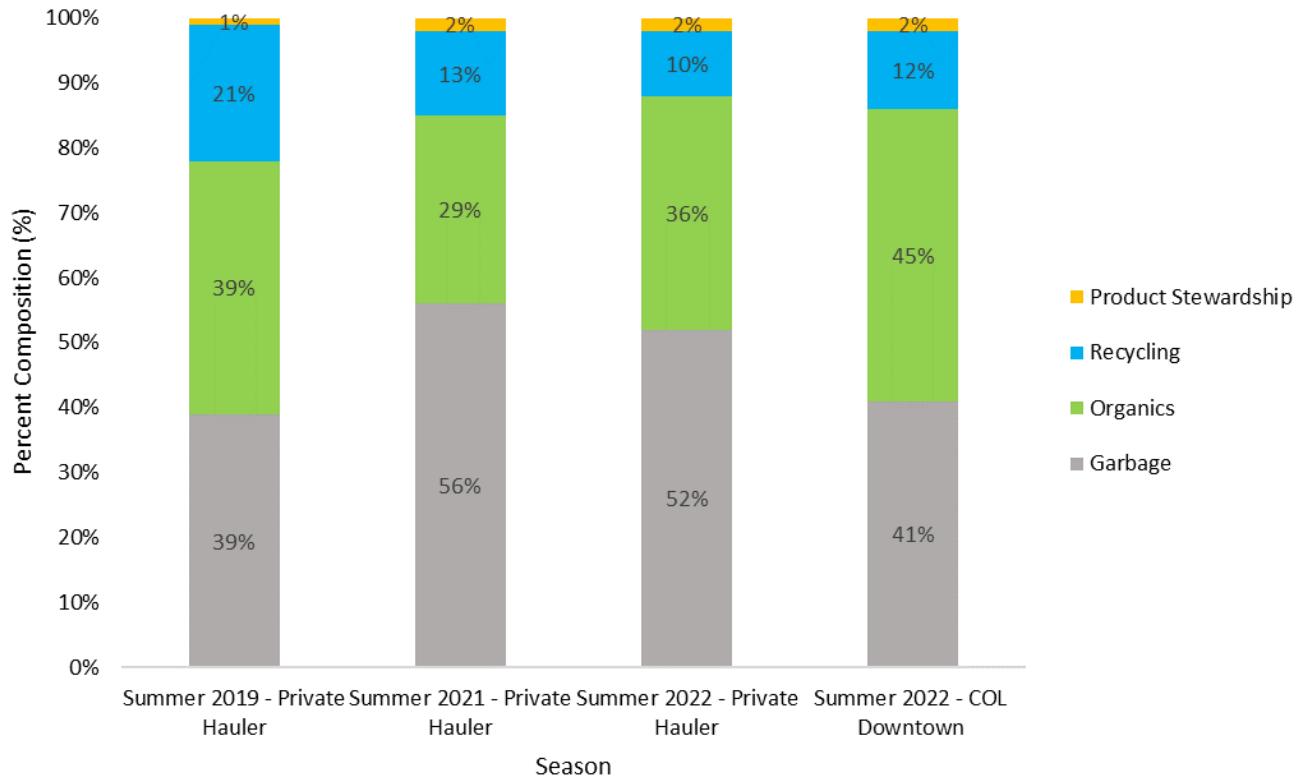


Figure 6-3: Private Hauler ICI and City Downtown Commercial Diversion Potential

The following were observations and findings:

- The percentage of compostable organics has fluctuated and ranged between 29% and 39% for the garbage that were collected by private haulers.
- The percentage of recyclable material in the ICI garbage stream ranges from 12% to 21%.
- Summer 2022 City – Downtown has the highest divertible organics (45%), these were primarily food waste generated by restaurants in the downtown area.

6.4 Phase 1 A9 Garbage Diversion Potential

Figure 6-4 illustrates the garbage diversion potential of A9 area during Spring 2022 and Summer 2022 waste sorting events.

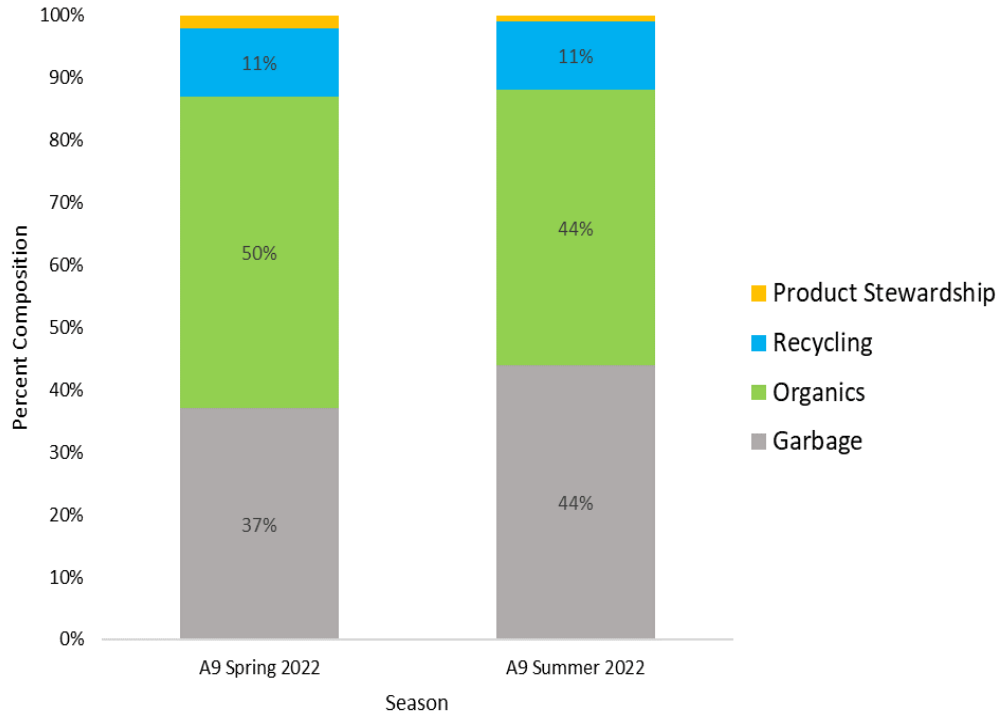


Figure 6-4: Phase 1 A9 Garbage Diversion Potential

The following were observations and findings:

- The percentage of organic waste that could be diverted through composting decreased after the curbside organics collection was implemented on A9 area. Also, during the Summer event, the amount of organic waste collected increases showing a decrease for organics in the garbage stream. This is an early indication that the green carts were being used.
- The percentage of recycling, product stewardship, and drop-off diversion potential were consistent from Spring 2022 and Summer 2022 from A9 and C3 pilot areas.

6.5 Phase 1 C3 Garbage Diversion Potential

Figure 6-5 illustrates the garbage diversion potential of A9 area during Spring 2022 and Summer 2022 waste sorting events.

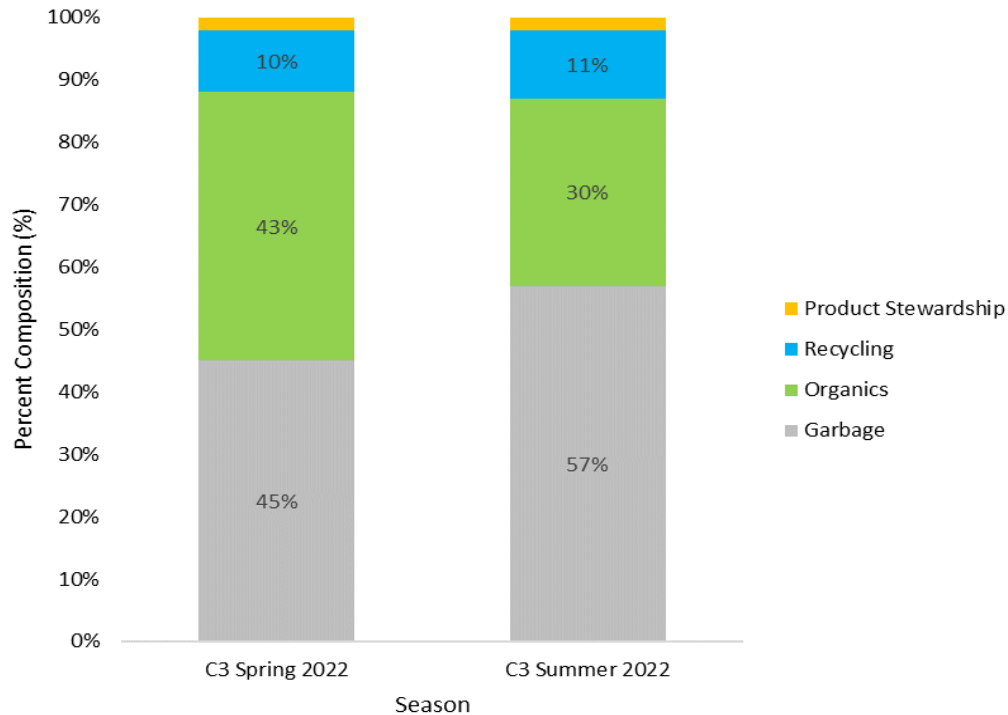


Figure 6-5: Phase 1 C3 Garbage Diversion Potential

The following were observations and findings:

- The percentage of organic waste that could be diverted through composting decreased after the curbside organics collection was implemented on C3 area. Also, during the Summer event, the amount of organic waste collected increases showing a decrease in the garbage stream. This is an early indication that residents are using the green carts.

7.0 RECYCLING CONTAMINATION RATES

Section 7.0 examines the contamination levels in residential cart and multi-family recycling. The contamination in the recycling stream represents the percentage of non-recyclable materials that would be disposed such as garbage, contaminated organics, and other product stewardship materials.

7.1 Residential Single Family Recycling Cart Contamination

Figure 7-1 compares the contamination levels in residential cart recycling through the seven seasons. Note that Spring 2022 data was taken from A9 and C3 areas prior to implementation of green carts Phase 1 study. These areas were included as they were not receiving green cart collection at that time.

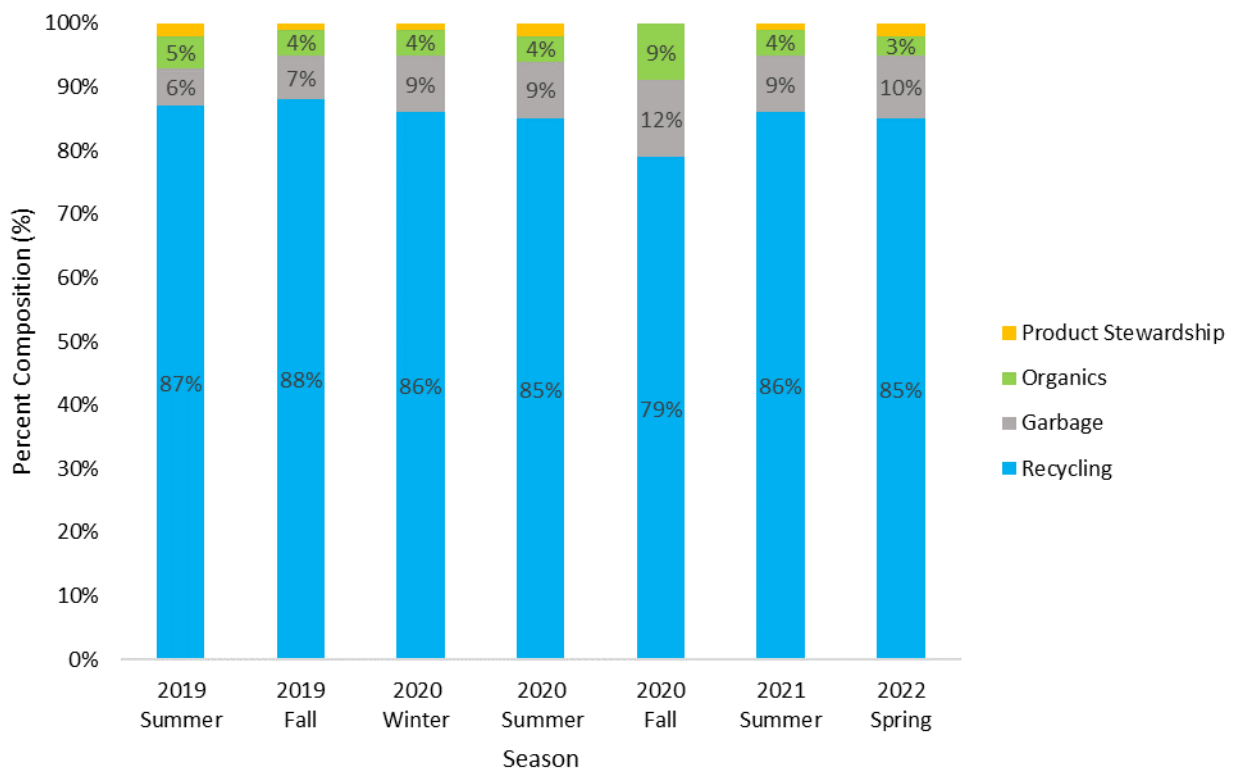


Figure 7-1: Residential Single Family Recycling Cart Contamination

The following were observations and findings:

- The contamination in residential cart recycling was consistent throughout the seven seasons, it ranged from 12% to 21%.
- Fall 2020 has the highest contamination rate (21%).

7.2 Residential Multi-family Recycling Bin Contamination

Figure 7-2 shows and compares the contamination in multi-family recycling. Compared to single family recycling, there is considerably contamination in multi-family recycling bins.

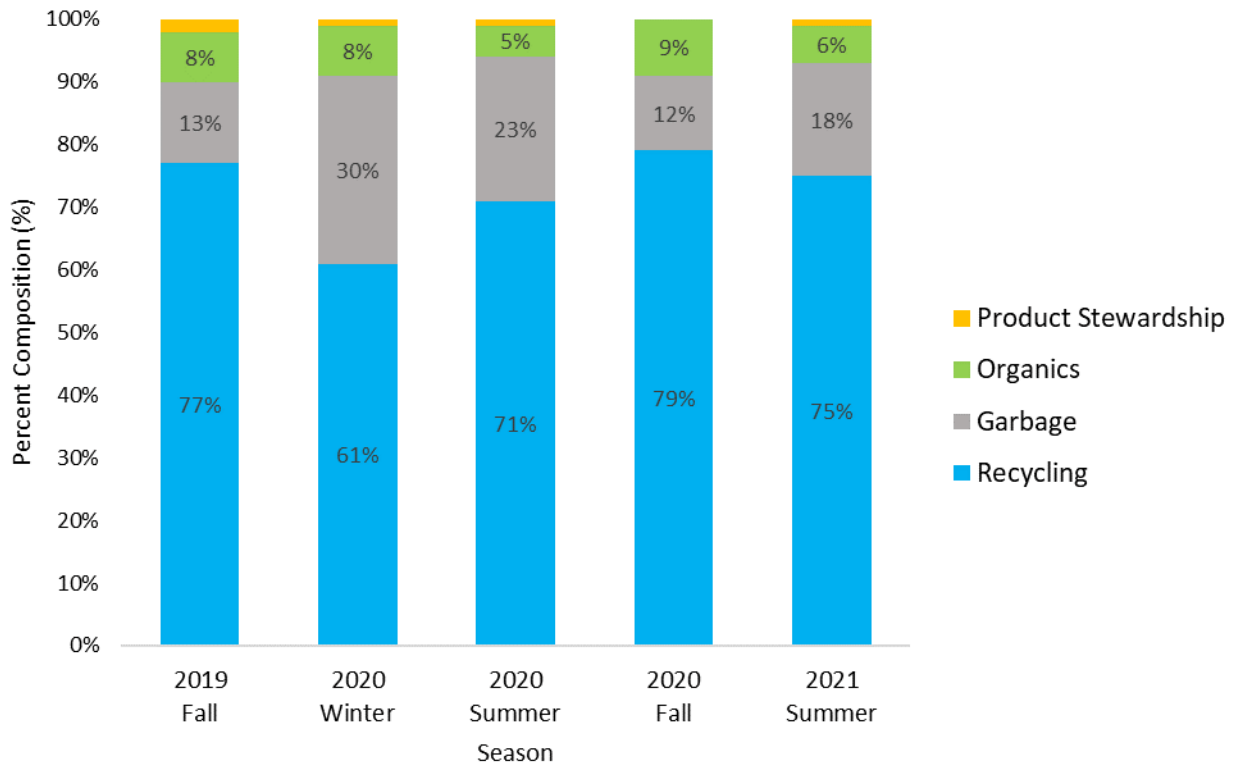


Figure 7-2: Residential Multi-family Recycling Bin Contamination

The following were observations and findings:

- The contamination rate was higher for multi-family recycling than single family residential recycling and it ranged from 21% in Summer 2020 to 39% in Winter 2020. This might suggest that better public education and outreach is required for residents living in multi-family complexes.

7.3 Phase 1 A9 Recycling Contamination

Figure 7-3 illustrates the recycling contamination rate of A9 area during Spring 2022 and Summer 2022 waste sorting events.

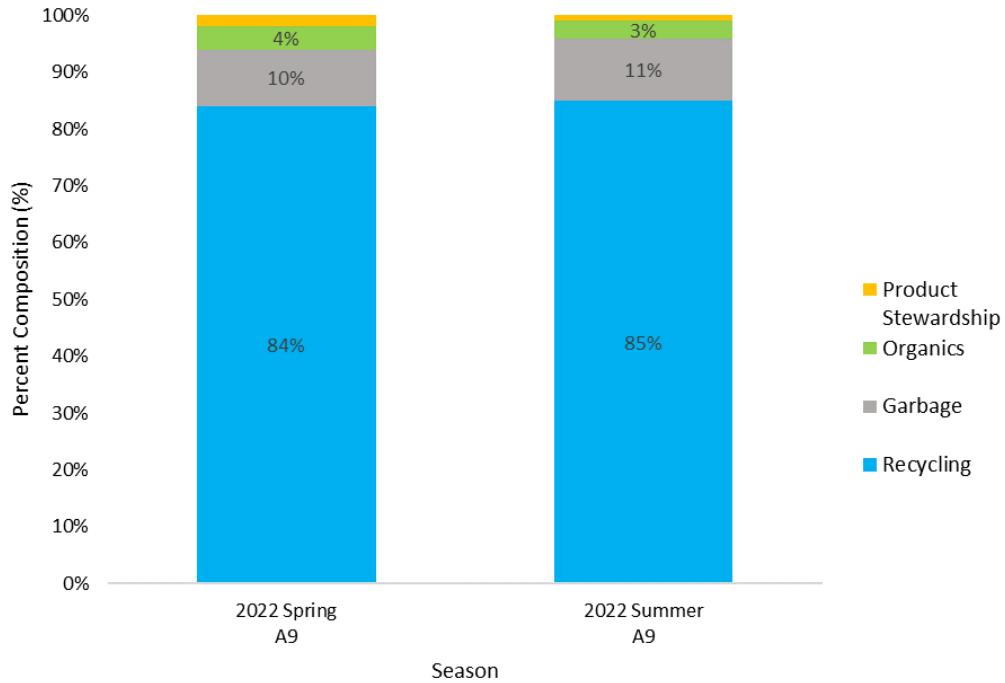


Figure 7-3: A9 Recycling Contamination

The following were observations and findings:

- The percentage of recycling during the Spring and Summer events were consistent.

7.4 Phase 1 C3 Recycling Contamination

Figure 7-4 illustrates the recycling contamination of C3 area during Spring 2022 and Summer 2022 waste sorting events.

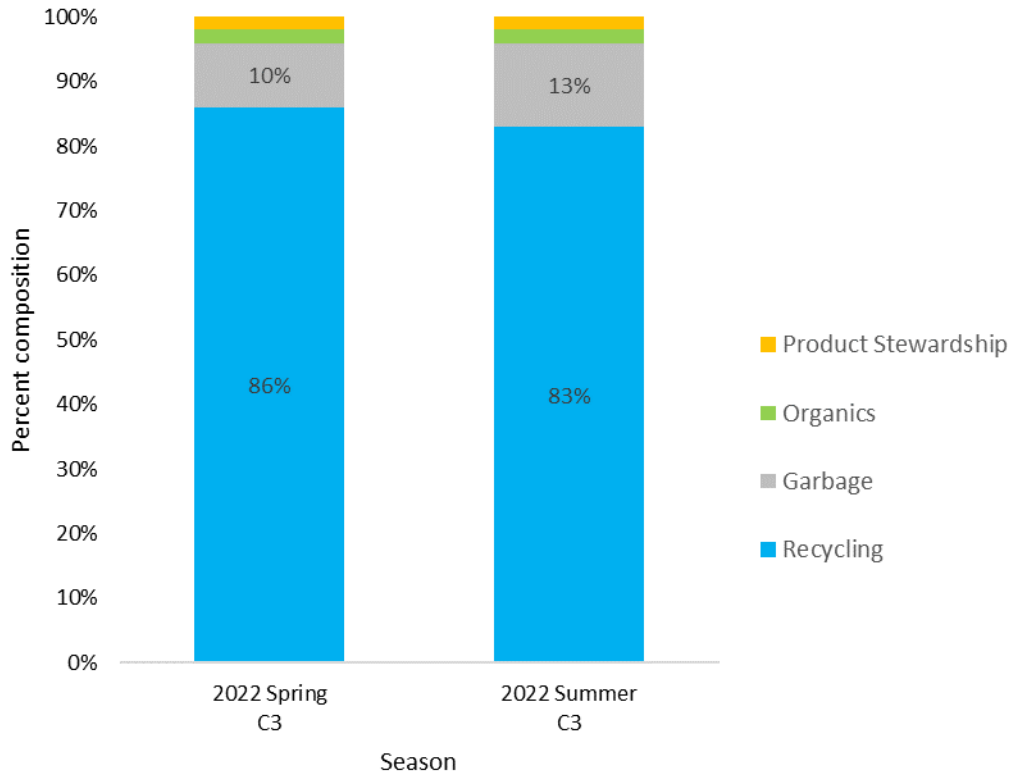


Figure 7-4: C3 Recycling Contamination

The following were observations and findings:

- The percentage of recycling during the Spring and Summer events were consistent.

8.0 GREEN CART CONTAMINATION RATES

Section 8.0 examines the contamination levels in residential organics cart. The contamination in the organics stream represents the percentage of non-compostable materials that would be disposed such as garbage, recycling, and other product stewardship materials.

8.1 Phase 1 A9 Green Cart Contamination

Figure 8-1 illustrates the green cart contamination of A9 area during summer 2022 waste sorting event.

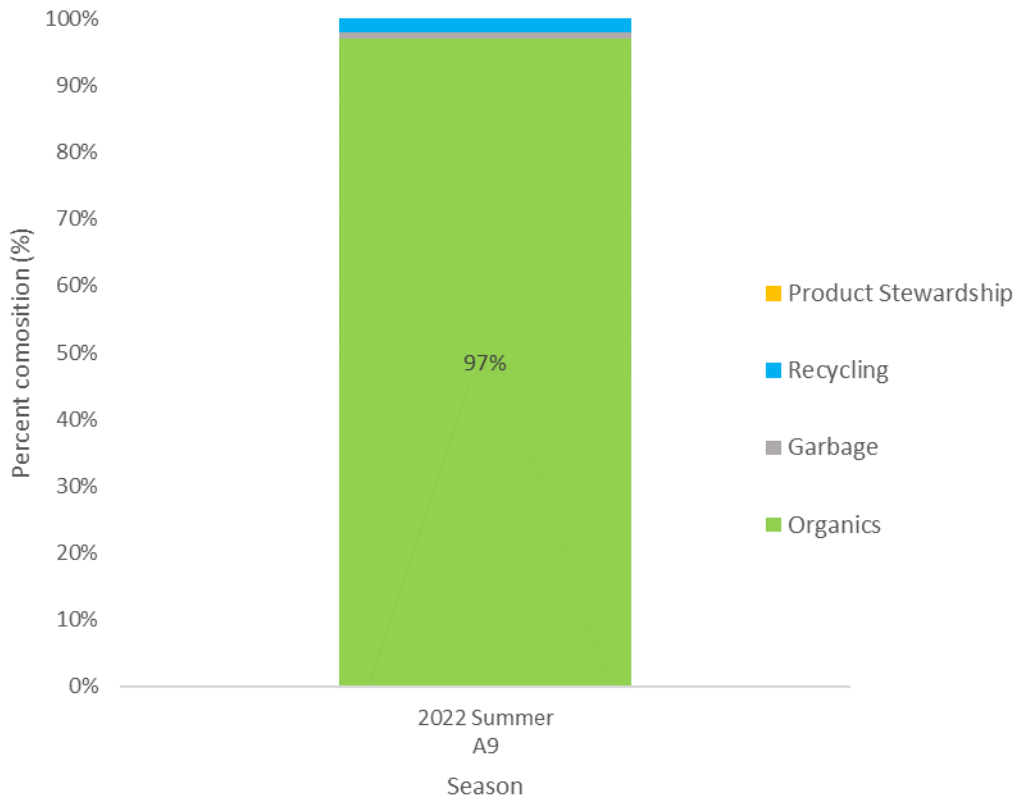


Figure 8-1: A9 Green Cart Contamination

The following were observations and findings:

- Contamination for A9 is at 3%. A9 area contamination was primarily composed of corrugated cardboard, printed paper, and recyclable film packaging. C3 pilot area contamination was primarily composed of corrugated cardboard, and clean wood.

8.2 Phase 1 C3 Green Cart Contamination

Figure 8-2 illustrates the green cart contamination of C3 area during Summer 2022 waste sorting event.

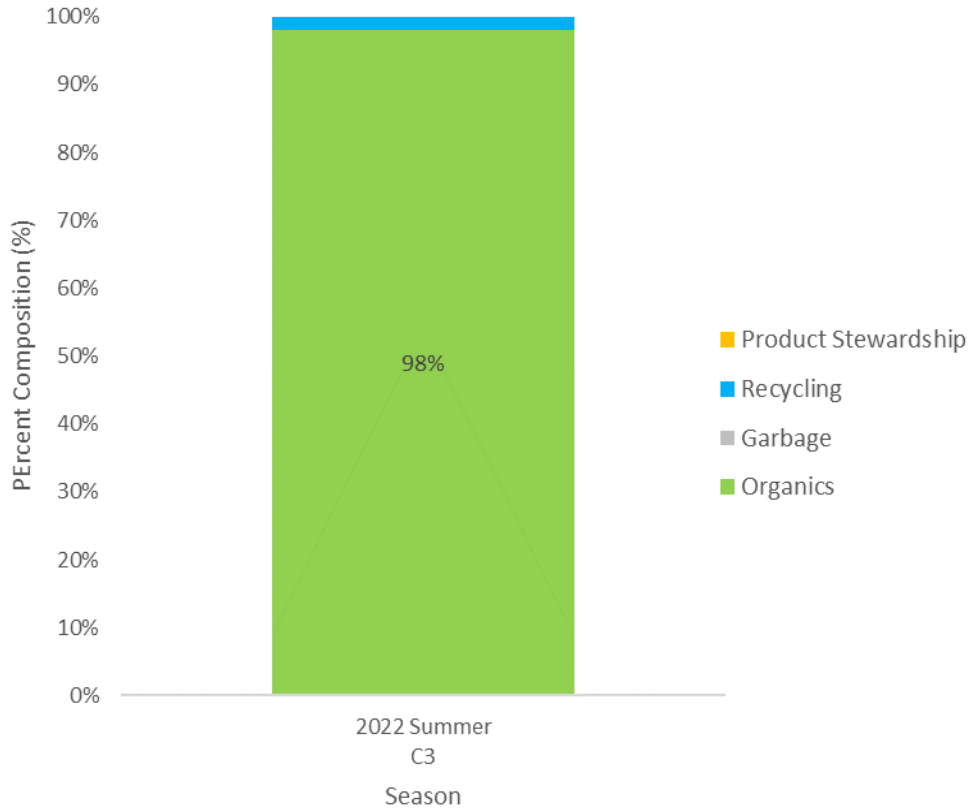


Figure 8-2: C3 Green Cart Contamination

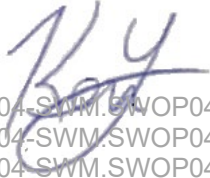
The following were observations and findings:

- Green Cart contamination for C3 is at 2%. C3 area contamination was primarily composed of corrugated cardboard.

9.0 CLOSURE

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

Respectfully submitted,
Tetra Tech Canada Inc.



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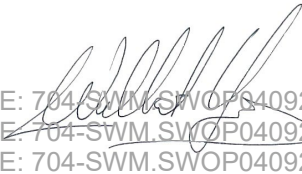
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APPENDIX A

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LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

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

1.4 DISCLOSURE OF INFORMATION BY CLIENT

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

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

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

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

1.6 GENERAL LIMITATIONS OF DOCUMENT

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

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

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

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

1.7 NOTIFICATION OF AUTHORITIES

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

APPENDIX B

SORTING CATEGORY DESCRIPTION

Category		Description and/or Examples	Stream
Paper			
1	Deposit beverage containers	Juice boxes and tetra paks under Alberta Beverage Container Recycling Corporation (ABCRC)	Product Stewardship
2	Newsprint	Includes flyers and advertising on newsprint	Recycling
3	Printed paper	Office paper, fine paper, magazines, catalogs, telephone books, calendars, office paper, envelopes, bills, gift cards, cash register receipts, gift wrap, shredded paper	Recycling
4	Books	Hardcover and softcover books, academic journals	Recycling
5	Corrugated cardboard	Cardboard boxes, pizza boxes (no waxed cardboard such as produce boxes)	Recycling
5b	Greasy pizza box and greasy boxboard ¹	Pizza boxes, doughnut boxes, and any other greasy boxboard	Organics
6	Packaging – dry goods	Boxboard, moulded pulp, craft paper – cereal boxes, egg cartons, takeout food containers (clean), paper bags including multiple paper layers (some pet food, flour, sugar)	Recycling
7	Paper packaging – polycoat liquid cups and containers	Hot and cold drink cups, frozen juice containers, ice cream paper containers	Garbage
8	Paper packaging – cartons and containers	Gable-top, aseptic, soup, broth, spiral round containers (chips, hot chocolate, nuts, tea)	Garbage
9	Compostable and food soiled paper	Paper towels, tissues, paper plates, paper takeout food containers contaminated with food, waxed paper	Organics
10	Other non-recyclable paper	Multi-layer packaging and waxed corrugated cardboard – paper with aluminum foil, paper with plastic, multi-layered paper – Includes microwave popcorn bags, some cookie bags, dog food bags, paper granola bar wrappers, laminated paper carry out bags, bags with bonded plastic or foil liners/layers/coatings and waxed corrugated cardboard, photographs, sandpaper, laminated paper, foiled gift wrap, padded mailing envelopes	Garbage
Plastic			
11	Deposit beverage containers	All plastic deposit beverage containers	Product Stewardship
11a	Deposit beverage containers – natural	All natural plastic deposit beverage containers	Product Stewardship
11b	Deposit beverage containers – coloured	All coloured plastic deposit beverage containers	Product Stewardship
12	Recyclable rigid plastic packaging (#1 to #7), plant pots, and other	Containers, milk jugs, clamshells, bakery trays, shampoo bottles, yoghurt tubs, laundry soap, garden pots and trays, rigid plastic packaging for toys, toothbrushes, batteries, housewares, and hardware such as screws (remove paper backing and recycle separately)	Recycling

¹ Categories highlighted in light orange are additional categories used only when sorting recycling.

Category		Description and/or Examples	Stream
12a	Plastics #1 PET	Containers, milk jugs, clamshells, bakery trays, shampoo bottles, yoghurt tubs, laundry soap, garden pots and trays, rigid plastic packaging for toys, toothbrushes, batteries, housewares, and hardware such as screws (remove paper backing and recycle separately)	Recycling
12b	Plastics #2 (HDPE) – natural	Other bottles, jugs, pails, and tubs (laundry soap, shampoo) that are natural/clear	Recycling
12c	Plastics #2 HDPE – coloured	Other bottles, jugs, pails, and tubs (laundry soap, shampoo) that are coloured	Recycling
12d	Plastics #5, PP	Wide mouth tubs (e.g., margarine, yoghurt containers) and pails	Recycling
12e	Plastics #3, #4, #6, #7	Other rigid recyclable plastics (e.g., coffee cup lids)	Recycling
13	Styrofoam (#6 PS foam)	Take-out containers, cups, meat trays, egg cartons, package cushioning	Garbage
14	Film packaging – #2 HDPE and #4 LDPE	# 2 HDPE and # 4 LDPE film, dry cleaning bags, bread bags, frozen food bags, milk bags, toilet paper and paper towel over-wrap, lawn seed bags, grocery, and retail carry-out bags	Garbage
15	Other film and packaging	PET, PVC, LDPE Stretch and PP Films, Multi-laminated plastic packaging – garbage bags, Ziploc bags, kitchen catchers, laminated plastic film and bags including chip bags, vacuum sealed bags, cereal liners, candy wraps, pasta bags, boil in a bag, plastic based food pouches, liquid-absorbing pads, e.g., in trays of meat, plastic wrap and shrink wrap, blister packs (chewing gum and pills)	Garbage
16	Other rigid plastics and products	Plastic products, plastic cutlery, straws, CD or DVD's, garden hose, toys, laundry baskets, Tupperware, toothpaste tubes, tubes for pharmaceutical and health care/cosmetic products	Garbage
17	Compostable plastics	Plastics labeled "biodegradable" or "compostable"	Garbage
Compostable Organics			
18	Yard and garden	Branches, plants, lawn clippings, leaves	Organics
19	Food waste – backyard compostable (unavoidable)	Fruits and vegetables trimmings and peels, coffee grounds, eggshells	Organics
20	Food waste – non-backyard compostable (unavoidable)	Bones, fats	Organics
21	Food waste – avoidable	Whole fruits and vegetables, meat, bread, prepared meals	Organics
22	Clean wood	Dimensional lumber, pallets, chopsticks	Organics
Non-Compostable Organics			
23	Treated wood	Pressure treated lumber, shingles	Garbage
24	Painted and finished wood	Painted and stained wood, plywood, particle board, fibreboard, flake board	Garbage
25	Rubber	Tires, rubber gloves	Garbage
26	Other	Candles, wax, soap, wicker baskets	Garbage
Textiles			
27	Clothing and household	Shirts, towels, sheets, blankets, jackets	Garbage

Category		Description and/or Examples	Stream
28	Composites and Items	Footwear, leather, purses, backpacks, suitcases, stuffed toys	Garbage
29	Other	Cloth filters, wipes, sponges, drop sheets	Garbage
Metal			
30	Deposit beverage containers	Alcohol and non-alcohol	Product Stewardship
31	Other packaging	Food containers including aerosol, aluminum foil, trays, wrapping	Recycling
31a	Other containers (ferrous)	Ferrous metal packaging – steel food cans (most)	Recycling
31b	Other containers (non-ferrous)	Non-ferrous metal packaging – aluminum food cans and food can lids (most)	Recycling
32	Other metal	Non-ferrous metal packaging – aluminum pie plates, trays, some cans	Garbage
Glass			
33	Deposit beverage containers	Alcohol and non-alcohol	Product Stewardship
34	Other containers	Bottles and jars	Garbage
35	Other glass	Mirrors, ceramics, dishware	Garbage
Building Material			
36	Gypsum/drywall, plaster	New only (used material treated as hazard and not sorted)	Garbage
37	Masonry and rubble	Concrete, bricks, rocks, dirt, ceramics (toilet and tiling)	Garbage
38	Asphalt products	Asphalt shingles and tarpaper	Garbage
39	Carpet	Carpet and underlay	Garbage
40	Other flooring	All flooring other than carpet	Garbage
41	Insulation	Cellulose, foam, fibreglass	Garbage
42	Other building material	Vinyl siding, misc. conduits, ceiling tiles, plumbing pipes	Garbage
Electronic Waste			
43	Computers and peripherals	Desktops, notebooks, monitors, printers, scanners, mouse, keyboard, cables, routers, modems	Product Stewardship
44	TV and audio/video equipment	Televisions, speakers, add more	Product Stewardship
45	Telephones and telecommunications equipment	Phones, mobile phones and accessories	Product Stewardship
46	Lighting equipment	All fixtures and lamps	Product Stewardship
47	Smoke/carbon monoxide alarms/thermostats	Smoke alarms, carbon monoxide alarms and thermostats	Garbage
48	Electronic toys	Any toy that takes any batteries or has a power cord	Garbage
49	Small appliances and power tools	Microwaves, toasters, vacuum cleaners, coffee makers, corded and cordless, drill, power saw	Garbage

Category		Description and/or Examples	Stream
50	Other electronics	Outdoor power equipment, air conditioners, power cords	Garbage
Household Hazardous			
51	Batteries	Lead acid and all other rechargeable and non-rechargeable batteries	Product Stewardship
52	Light bulbs	Light bulbs, compact fluorescent lights, tubes, and ballasts	Garbage
53	Oil and antifreeze	Includes empty containers, oil filters, oily rags	Product Stewardship
54	Paint	Paint and empty paint containers	Product Stewardship
55	Pesticides	Pesticides that have both the poisonous (skull and cross bones) symbol and pest control product number	Product Stewardship
56	Medications	Pharmaceutical products, includes over the counter medications and natural health products	Garbage
57	Other non-hazardous waste	Container with product remaining – cosmetics, nail polish, health and beauty aids, sunscreen, bug spray	Garbage
58	Other hazardous waste	Old mercury switches, drain cleaner, car cleaner, fertilizers, other relatively benign household cleaners or products with skull and cross bones symbol, glues, caulking	Product Stewardship
Household Hygiene			
59	Diapers	Child, adult	Garbage
60	Pet waste	Dog, animal bedding, kitty litter	Garbage
61	Medical waste and other	Medical waste (bandages, sharps, IV bags, etc.), sanitary napkins, tampons, condoms, needles	Garbage
Bulky Objects			
62	White goods, furniture	White goods, upholstered furniture, mattresses	Garbage
Fines			
63	Items <1"	Items too small to classify efficiently (e.g., bread tabs, twist ties, typically <1") soot and ash	Garbage

HDPE – High Density Polyethylene.
 LDPE – Low Density Polyethylene.
 PET – Polyethylene Terephthalate.
 PP – Polypropylene.
 PS – Polystyrene.

APPENDIX C

MAPS

Figure C-1: C3 Westside – Varsity Village Neighborhood Map

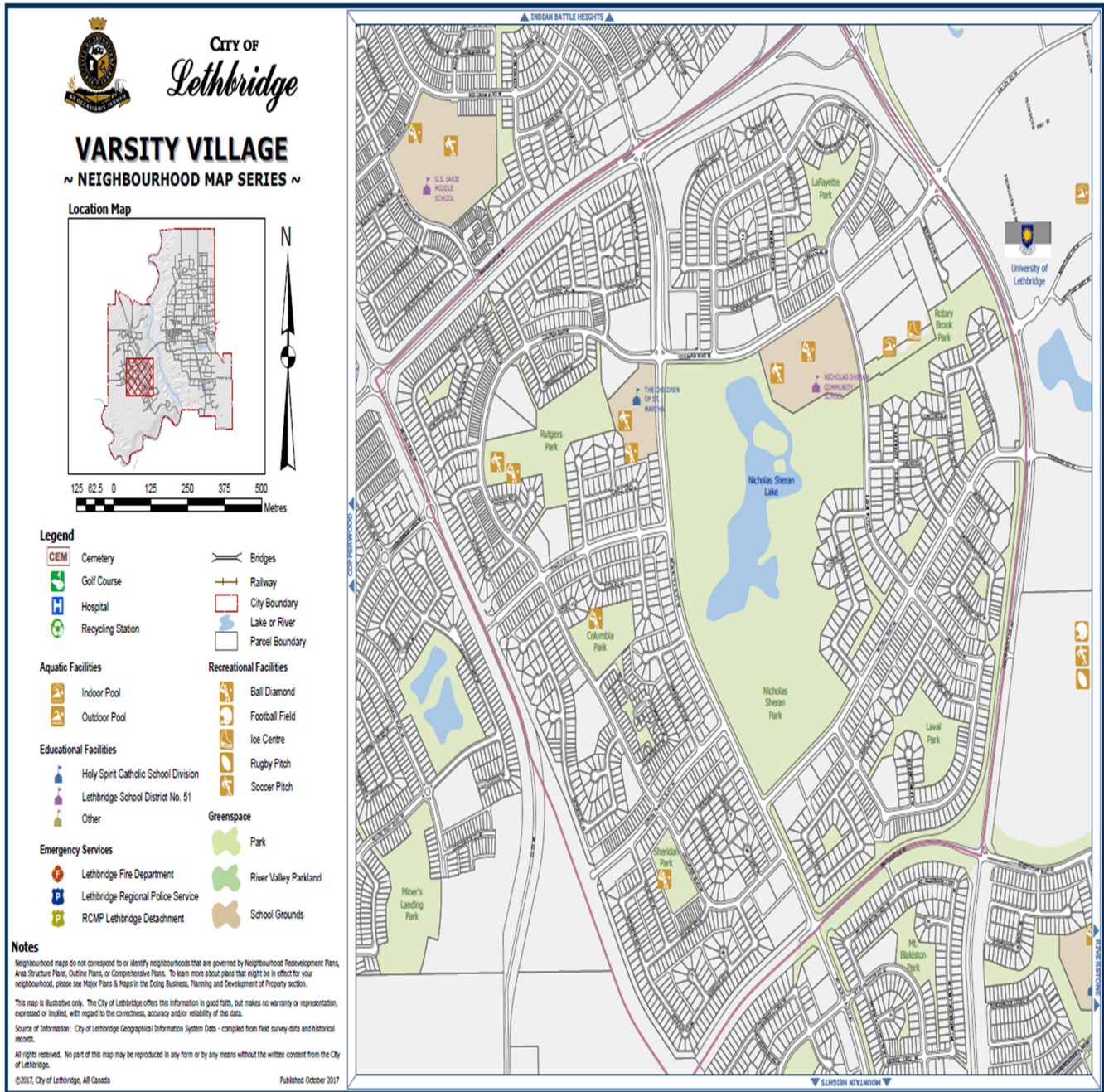


Figure C-2: A9 Northside – Legacy Ridge Neighborhood Map

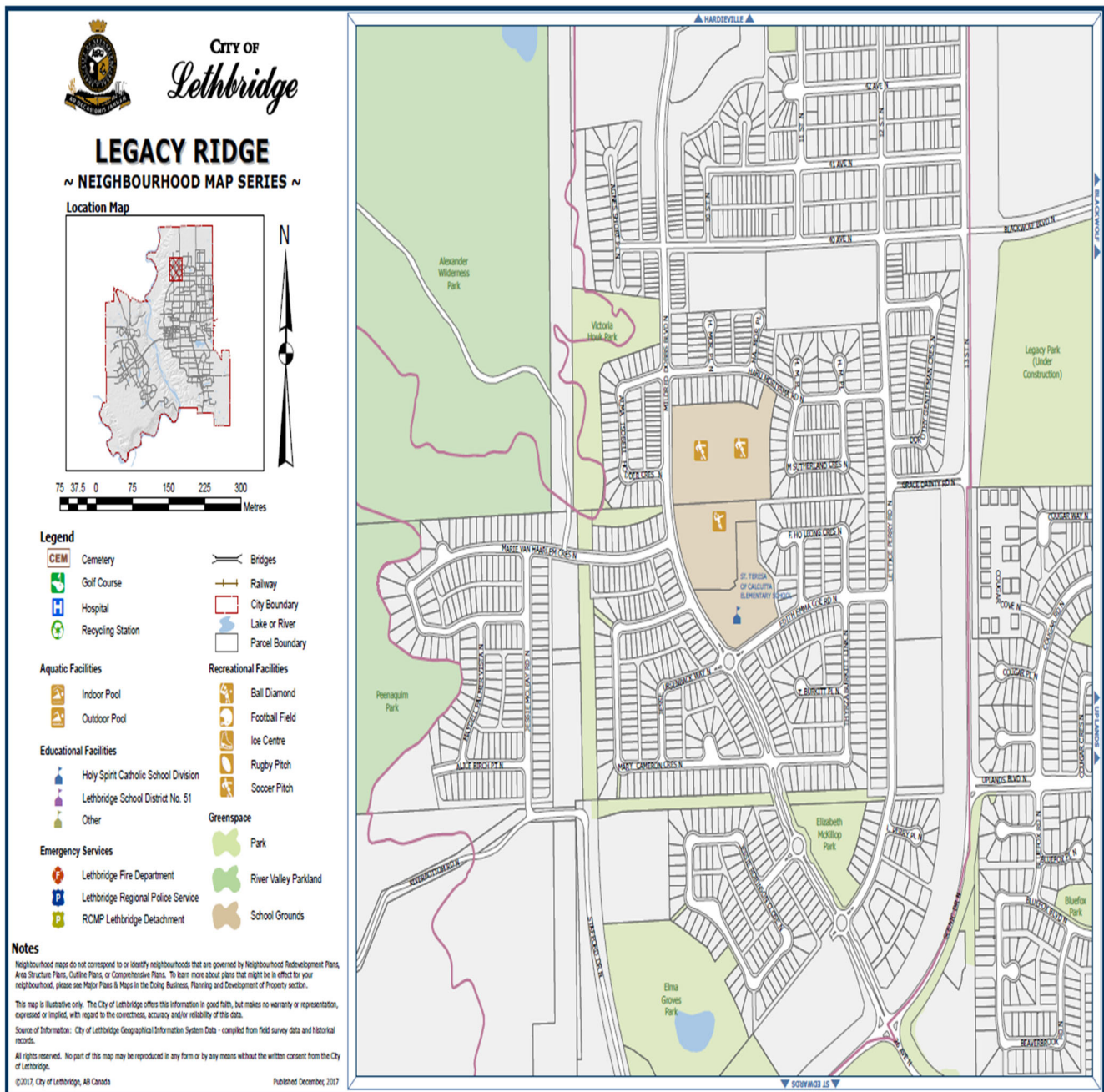
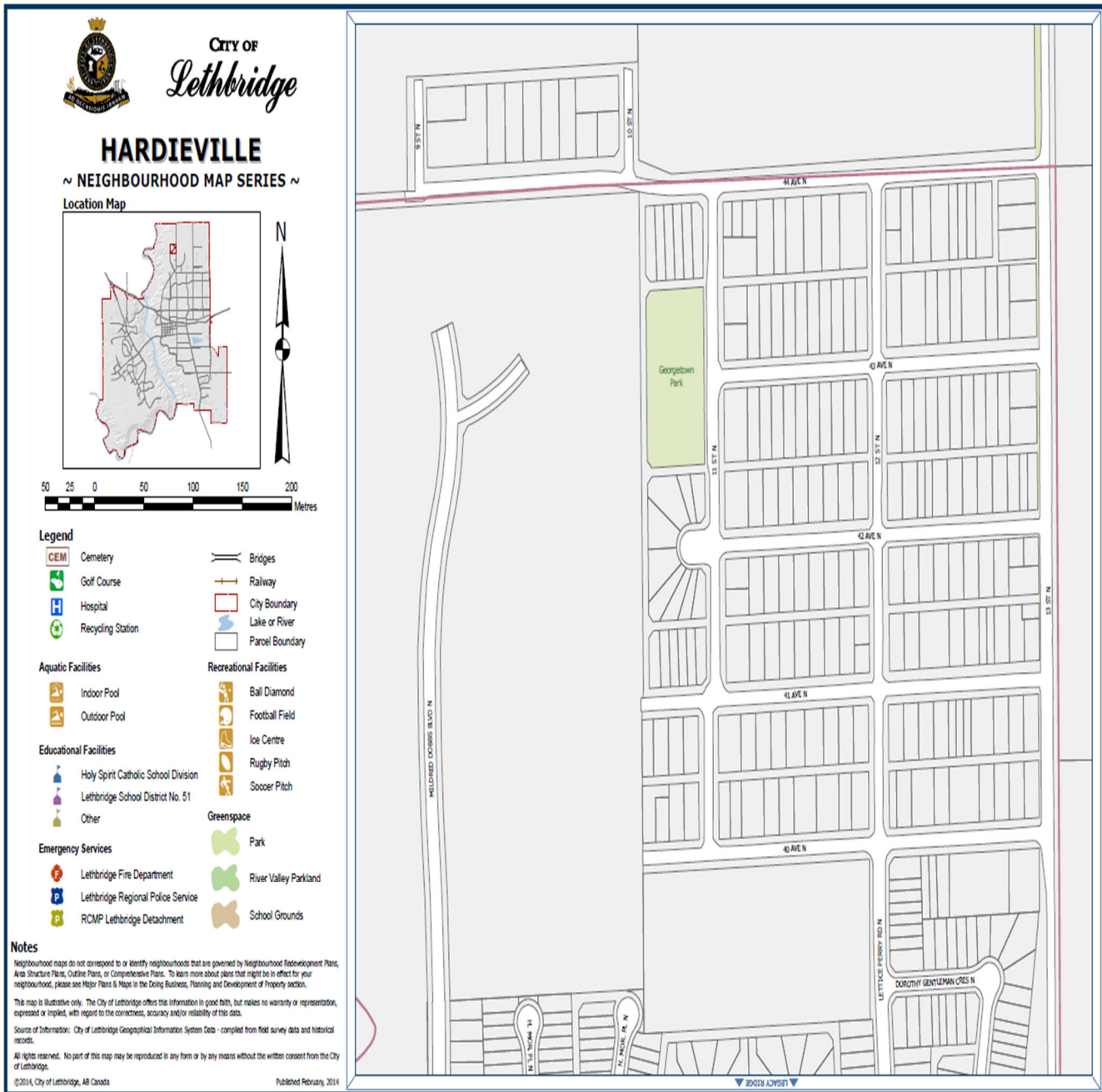


Figure C-3: A9 Northside – Hardieville Neighborhood Map





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