Regional District of Central Kootenay

JOINT RESOURCE RECOVERY COMMITTEE

Open Meeting Addenda

Date: Wednesday, December 11, 2024

Time: 1:00 pm

Location: Hybrid Model - In-person and Remote

Directors will have the opportunity to participate in the meeting electronically. Proceedings are open to the public.

Pages

1. ZOOM REMOTE MEETING INFO

To promote openness, transparency and provide accessibility to the public we provide the ability to attend all RDCK meetings in-person or remote.

Meeting Time:

1:00 pm PST

2:00 pm MST

Join by Zoom:

https://rdck-bc-ca.zoom.us/j/96757636881?pwd=63UFCdJfC3hEbPKxRaSaaJdHQJ5P7s.1&from=addon

Join by Phone:

- +1 778 907 2071 Canada
- 833 955 1088 Canada Toll-free

Meeting ID: 967 5763 6881
Meeting Passcode: 562073

2. CALL TO ORDER & WELCOME

Chair Jackman to call the meeting to order at _____p.m.

2.1 TRADITIONAL LANDS ACKNOWLEDGEMENT STATEMENT

We acknowledge and respect the Indigenous peoples within whose

traditional lands we are meeting today.

2.2 ADOPTION OF THE AGENDA

RECOMMENDATION:
The agenda for the December 11, 2024 Joint Resource Recovery meeting be adopted as circulated.

2.3 RECEIPT OF MINUTES

The November 13, 2024 Joint Resource Recovery minutes, have been received.

2.4 DELEGATION *4 - 205*

City of Nelson, Organics Program

Mary Tress, Climate Programs Coordinator

Note - The following documents have been received in the Addendum for information:

- *City of Nelson Pre-treated Organics Pilot Project Description & Evaluation, October 2024*
- *City of Nelson 2025 Utility Rates (Water, Wastewater & Resource Recovery), December 3, 2024*

Note - Delegate presentation to be distributed following the meeting.

3. CHANGES TO MATERIAL MANAGEMENT AND TIPPING FEES [All Areas] 206 - 234

The November 25, 2024 Committee Report from Heidi Bench, Projects Advisor outlining material management and tipping fee updates proposed for 2025 as a result of the System Efficiency Study, as well as proposing options to address the inequities in the current cost recovery structure, has been received.

RECOMMENDATION:
That the Board authorize Staff to draft an amendment to Bylaw No. 2905 to incorporate rubble and wood waste under the definition and fee schedule for mixed waste.

RECOMMENDATION:
That the Board authorize Staff to draft an amendment to Bylaw No. 2905 updating tipping fees to align with the proposed Tipping Fee Cost Recovery Objectives.

4. S188 WEST WASTE FINANCIAL PLAN AMENDMENT - OOTISCHENIA TIPPING WALL BINS [West Subregion] 235 - 236

The December 3, 2024 Committee Report from Amy Wilson, Resource Recovery

Manager requesting an amendment of the 2024 Financial Plan to account for the purchase of bins for the Ootischenia Landfill, has been received.

RECOMMENDATION:
That the Board approve an amendment to the 2024 Financial Plan for S188 West Waste to decrease the Repairs and Maintenance Account 55010 by $18,170 and increase the Capital Expense Account 60000 by $18,170 for the Ootischenia Landfill Tipping Wall Bins.

5. S187 CENTRAL WASTE MFA EQUIPMENT FINANCING AUTHORIZATION - CENTRAL LOADER 237 - 242
[Central Subregion]

The December 3, 2024 Committee Report from Amy Wilson, Resource Recovery Manager requesting an authorization for a Municipal Finance Authority equipment financing for the 2024 Central Loader, has been received.

RECOMMENDATION:
That the Board approve an amendment to the 2024 Financial Plan for S187 Central Waste to decrease the Proceeds from Equipment Financing Account 43200 by $284,395 and increase the Transfer from Regular Reserves Account 45000 by $284,395 for the Central Loader.

6. S187 CENTRAL WASTE / A120 FINANCIAL AMENDMENT - 2023 INTERNAL TRANSFER 243 - 246
[Central & West Subregions]

The December 3, 2024 Committee Report from Amy Wilson, Resource Recovery Manager requesting an amendment of the 2024 Financial Plan to account for an error in the 2023 internal transfers from Service S187 Central Waste to Service A120 Central-West Compost, has been received.

RECOMMENDATION:
That the Board approve an amendment to the 2024 Financial Plan for S187 Central Waste to increase the Transfer to Other Services Account 59500 by $257,493 and increase the Transfer from Other Services Account 45500 by $257,493 for the missed 2023 transfer for support of the Central Compost Facility.

7. PUBLIC TIME
The Chair will call for questions from the public and members of the media at _____ p.m.

8. ADJOURNMENT

RECOMMENDATION:
The Joint Resource Recovery Committee meeting adjourn at _____ p.m.

CITY OF NELSON

Pre-treated Organics: Program Evaluation and Extension

The City of Nelson's Pre-treated Organics Program is an innovative waste management program designed to divert organic waste from the landfill. The program provides residents with FoodCyclers—countertop appliances that reduce the weight and volume of food waste. This program is the first of its kind at a municipal scale and aligns with the City's climate action goals outlined in *Nelson Next*.

The City engaged a third-party waste management consultant to assess the technical, social, and environmental aspects of this program. Unlike a traditional curbside green bin program, it is not possible to directly measure the weight of wet organics diverted through the Pre-treated Organics Program. Additionally, residents using a FoodCycler can either drop off the pre-treated food waste for collection or apply it in a home garden. As a result, evaluating the Pre-treated Organics Program required a different approach to measurement.

The evaluation made use of curbside waste composition data, garbage tonnages, and organics drop-off bin weights to calculate the amount of food waste diverted from landfills. While this diversion rate per household is a useful metric, it may not fully capture the program's overall impact. Further data is needed to more accurately measure the total amount of food waste diverted through this program.

The evaluation found a decrease in the proportion of food waste in the garbage among participating households, and identified an opportunity for further reductions through the use of the FoodCycler. Initial calculations show a reduction in greenhouse gas emissions due to the decrease in organic waste in the curbside waste stream. Data collected for the evaluation process also allowed staff to identify additional opportunities for further diversion of curbside-recyclable materials.

Informed by the report findings, the City is finalizing plans for further data collection and educational outreach, focusing on reducing the portion of organic waste still present in the waste stream. The City will also examine the broader impact of self-hauling on the local waste management system.

For more information or to sign up for the Pre-treated Organics Program, please visit nelson.ca/organics.

City of Nelson Pre-treated Organics Pilot Project Description & Evaluation

October 2024

Submitted by

Shannon Ripley, Yarrow Environmental

John Paul, Transform Compost Systems

Executive Summary

The Nelson Pre-treated Organics Pilot Project took place over 13 months in 2023-2024. The purpose of the project was to investigate whether use of household pre-treatment appliances is an appropriate approach to maximize organic waste diversion, reduce GHG emissions associated with organic waste, reduce human-wildlife conflict, and respond to community desires for a 'made-in-Nelson' organics diversion program that keeps resources circulating locally.

The purpose of this report was to describe the pilot project, and to evaluate the social, environmental, and technical aspects of a pre-treated organics program in comparison with a more traditional weekly curbside green cart organics collection model.

The City of Nelson selected the FoodCycler Eco 5 as the pre-treatment appliance that would be used in the pilot project. The FoodCycler Eco 5 can grind and dehydrate most food scraps, and some food-soiled paper in 5-litre batches. Each cycle takes four to nine hours, and the appliance uses on average approximately 1.36 kilowatt-hour (kWh) of electricity for every 1 kilogram of materials processed. The pre-treated material that exits the appliance can be incorporated directly into soil, composted in a backyard composter, or transported to a community collection site, from where it is transferred to the RDCK Central Compost Facility in Salmo for composting.

City of Nelson staff did an outstanding job of planning and implementing the pre-treated organics pilot project, including using a wide variety of high-quality public communication and education approaches to promote participation in the pilot project, and to educate residents about how to successfully participate. The Fairview neighbourhood was selected as the pilot neighbourhood, and 76% of households signed up for and received a FoodCycler appliance in the Fairview neighbourhood.

The following table summarizes household participation rates in the pilot project (Fairview) and the proportion of households outside Fairview that signed up for FoodCycler appliances.

Participant Category	Number of Participating Households	Total Households with Curbside Waste Collection	% of Households
Fairview Neighbourhood – Pilot Project	710	930	76%
Households Outside Fairview	1,257	3,302	38%
Total – Across Entire City	1,967	4,232	46%

There was a very high level of satisfaction among pilot project participants who responded to a spring 2024 survey. Of survey respondents, 87% had enjoyed using the FoodCycler in their home. Participants were very likely (77%) or likely (14%) to recommend the FoodCycler to others. Ninety-one percent of participants stated they plan to continue to use the FoodCycler in

the long-term. These metrics indicated an extremely high approval rating for the pilot project from participants.

A number of pilot project participants indicated their strong appreciation for the project, while noting that some aspects of the FoodCycler system may pose barriers to widespread community-wide adoption and use of the appliance as an organics diversion solution.

The most common challenges that pilot project participants had experienced with their FoodCycler were a jammed bucket / mechanical issues (34%), odour (21%), noise (18%), and unprocessed food waste (16%). Numerous respondents indicated that the weight, size and/or environmental requirements for the FoodCycler were challenging for their household.

The pilot project reduced the proportion of organics in the garbage. In August 2023, prior to the pilot project, 52% of the Fairview curbside garbage consisted of compostable materials. In July 2024, after pilot project implementation, 40% of the Fairview residential curbside garbage was compostable materials. In July 2024, for households with FoodCyclers, 37% of the garbage consisted of compostable materials, while for households without FoodCyclers, 50% of the garbage was compostable materials.

We estimate that the pilot project diverted 32 kilograms of food waste per household per year in Fairview. Green cart programs from neighbouring communities have achieved higher rates of organics diversion: The Regional District of Kootenay Boundary diverted 54 kilograms of food waste per household per year with its green cart program that began in October 2023. The Town of Creston diverted 84 kilograms of food waste per household per year through its green cart program that started in 2022. The Regional District of Nanaimo diverted 109 kilograms of food waste per household per year across the first 10 years of its green cart program. The City of Peterborough diverted 222 kilograms of food waste and pet waste per household per year through its green cart program that started in 2023.

The use of FoodCyclers may be leading to a lower rate of food waste diversion in comparison with green cart programs due to a few potential factors:

- Effort required: more steps and effort required to manage food waste with the FoodCycler than through a green cart program;
- Limitations for food-soiled paper: some types of food-soiled paper cannot be processed in the FoodCycler;
- Barriers: residents are experiencing barriers mentioned by survey respondents; and,
- Limited processing capacity: the FoodCycler can process about 1 kg of food waste at a time, which some households have found limiting.

The implementation of the pilot project in Fairview reduced GHG emissions by 1,633 tonnes, measured over a 30-year time period. Transportation emissions are an extremely small portion of emissions. The quantity of GHG emissions avoided through implementation of an organics diversion program is closely correlated with the quantity of organics the program diverts from the landfill: The Fairview FoodCycler pilot resulted in an estimated 1.76 tonnes of GHG emissions reductions/household/year, the RDKB green cart program reduced an estimated 2.11

tonnes GHGs/household/year and the Creston green cart program reduced an estimated 3.31 tonnes GHGs/household/year.

It was not possible to quantitatively measure the impact of the pilot project on human-wildlife dynamics over the length of the pilot project. WildSafe BC staff are supportive of efforts to reduce the quantity of food waste present in the curbside residential garbage. Both the collection of organics in green carts and the direct use of pre-treated material in yards and gardens pose the potential to attract wildlife and cause human-wildlife conflict. There remain unknowns regarding the level of wildlife attraction the pre-treated material poses when present in a backyard composting bin and incorporated directly into garden soil.

From a program delivery perspective, the most significant logistical issues during the pilot project were the storage and distribution of the FoodCyclers in winter, given that the appliances must be kept in above-freezing temperatures. City staff also found that it took more time than they had expected to unpack FoodCyclers and prepare them for distribution to residents. The most notable technical challenge was managing and carrying out the FoodCycler repair program. Throughout the pilot project, there was an overall repair rate of 11%.

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Appendix II. Transform Compost – Report on Composting Pre-treated Material

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Appendix IV. City of Peterborough Green Cart Presentation

Appendix V. Nelson Fairview Waste Characterization Study Summary Report

Appendix VI. ECCC GHG Calculator – Assumptions and Data

Appendix VII. FoodCycler Carbon Footprint Report

List of Acronyms

BC	British Columbia
CCME	Canadian Council of Ministers of the Environment
CO_2-e	carbon dioxide equivalent (measure of greenhouse gas emissions)
CNG	compressed natural gas
CVRD	Cowichan Valley Regional District
ECCC	Environment and Climate Change Canada
EPR	extended producer responsibility
FCS	Food Cycle Science Corporation
GHG	greenhouse gas
HH	household
LFG	landfill gas
RDCK	Regional District of Central Kootenay
RDKB	Regional District of Kootenay Boundary
RDN	Regional District of Nanaimo
RNG	renewable natural gas

Acknowledgements

The Nelson Pre-treated Organics Pilot Project and this evaluation report are the culmination of the hard work and collaboration among many individuals and organizations. A deep thank you to Emily Mask, Climate & Energy Strategist with the City of Nelson for her role leading the pilot project– it has been such a pleasure working with you! Special thanks to Mary Tress, Organics Coordinator with the City of Nelson, for her hard work collecting and organizing data, and distributing appliances. Many thanks to other City of Nelson staff for their supporting and leadership roles, and in particular Carmen Proctor and Cecilia Jaques. We are very grateful to staff from a variety of municipalities, regional districts and organizations who so generously shared their time, valuable knowledge and perspectives:

- BA Belton, Environmental Communications & Programs Coordinator, Regional District of Kootenay Boundary
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- Ben Routledge, Manager, Solid Waste Services, Regional District of Nanaimo
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- Lisa Thomson, WildSafe BC Nelson Coordinator
- Matt Morrison, Organics Coordinator, Regional District of Central Kootenay
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- Sonam Bajwa, Solid Waste Planner, Regional District of Nanaimo
- Travis Tanner, Senior Environmental Technologist, Cowichan Valley Regional District

Special thank you to Dr. Sally Brown, Research Professor in the College of the Environment at the University of Washington for making time to complete an external review of this report.

1 Background

The City of Nelson is a community of approximately 12,000 residents, located in the Regional District of Central Kootenay, in south-central British Columbia. Nelson prides itself in its history of environmental leadership and innovation.

In 2020, the City of Nelson approved a comprehensive climate change action plan entitled *Nelson Next*. The City set a target of a 75% reduction in community-wide greenhouse gas (GHG) emissions by 2030, and net zero GHGs by 2040. A key priority action within Nelson Next was to "deliver an efficient, cost-effective, city-wide organics diversion program."[1]

In 2019, the Regional District of Central Kootenay (RDCK) presented its Regional Organic Waste Diversion Strategy to the City of Nelson, and requested that the City partner with the RDCK to implement the strategy. The City passed a resolution to partner with the RDCK. At the same time, some City of Nelson councillors brought forward the idea of operating a pilot project to explore the use of household pre-treatment appliances to grind and dry food scraps, as an alternative to traditional curbside collection of wet organics.

The main drivers cited as rationale to explore alternative methods for managing organics were a desire to minimize greenhouse gas emissions associated with the transportation of organics to a processing facility, interest in fostering local use of organic resources, prioritization of a 'Made in Nelson' solution, and the goal of minimizing human – wildlife conflict and pest attraction.

In 2020, the City conducted a preliminary pilot project in which 151 pre-treatment appliances were purchased by City of Nelson staff members, residents who were selected due to their participation in Nelson's Energy Retrofits Program, EcoSave, and other community members who had expressed interest in the pilot project. Participants who completed a pre- and post-pilot project survey, and tracked how much food waste they diverted over the three-month pilot were given a financial rebate for their pre-treatment appliance. In 2021, a second pilot project was carried out with 31 randomized households. These initial pilot projects yielded favourable results, and prompted the City to plan and seek funding to conduct a larger-scale pilot project.

In 2022, the City of Nelson received grant funding to conduct an expanded residential pre-treated organics pilot project targeting 20% of Nelson households. Nelson is the first community in Canada to test the use of pre-treatment appliances at this community scale.

As part of the City of Nelson Pre-treated Organics Pilot Project, the City engaged Yarrow Environmental and Transform Compost to conduct an evaluation of the social, environmental, and technical aspects of a pre-treated organics program in comparison with a more traditional weekly curbside green cart organics collection model. This report describes and evaluates the Pre-treated Organics Pilot Project, and describes the findings of the comparative analysis.

[1] City of Nelson. 2020. Nelson next: A bold and agile climate plan for a healthier and safer city.

1.1 City of Nelson Waste Management

The City of Nelson collects garbage and recycling bi-weekly from the single-family sector, including dwellings with up to eight units (not including condominiums).

Garbage must be placed curbside in bags up to 20 kilograms (44 pounds) in weight. A garbage bag tag must be affixed to each bag. Garbage tags cost $1.75 each, and are available at many local stores. Garbage bags can be placed inside a bin to minimize the opportunity for wildlife to access the bags.

Recycling is collected curbside in a blue recycling bin, which must not weigh more than 20 kilograms (44 pounds). There is an extensive list of items accepted in the curbside blue bin, as outlined in the Blue Bin Recycling Guide. There are additional items that can be recycled (e.g. foam packaging, plastic bags, glass, flexible plastic packaging) if they are transported to a RDCK Recycling Depot – located at 70 Lakeside Drive or the Grohman Narrows Transfer Station.

There is no curbside collection of yard and garden materials in Nelson. During the months of May and October, residents can drop off yard and garden materials for free at the Grohman Narrows Transfer Station.

The Nelson Leafs Recycling Centre is open year-round and accepts household hazardous waste (HHW) that is currently not covered by other programs including electronics, paint, batteries, used oil, and antifreeze, as well as refundable beverage containers.

One factor in Nelson that makes measurement of single-family residential waste generation complex is that there is a culture of residents self-hauling waste materials to the RDCK Grohman Narrows (Nelson) Transfer Station – including materials that could have been disposed of through curbside collection. RDCK staff reported that a user survey conducted at Grohman Transfer Station from June to August 2023 showed that 43% of 16,000 users were Nelson residents with access to curbside collection[2]. This indicated that a rather significant portion of the waste collected at Grohman Transfer Station is likely generated by Nelson residents with access to curbside collection. No information is available on the quantity or composition of waste Nelson residents are depositing at the Grohman Transfer Station.

[2] 2023. E-mail communication from Heidi Bench, Resource Recovery Projects Advisor, RDCK. December 8, 2023.

2 Purpose of Pilot Project

The purpose of the Pre-treated Organics Pilot Project was to expand on previous smaller-scale pilot projects exploring the use of pre-treatment appliances as a tool to facilitate community-scale diversion of food waste in Nelson. The City's over-arching goals for the pilot project were to investigate whether a Pre-treated Organics Program is the best approach to maximize organic waste diversion, reduce GHG emissions associated with organic waste and transportation, reduce human-wildlife conflict associated with waste, and respond to community desires for a 'made-in-Nelson' organics diversion program that keeps resources circulating locally.

3 Project Funders

In addition to funding from the City of Nelson, the Pre-treated Organics Pilot Project has received financial support from the following funders:

- Federation of Canadian Municipalities;
- Columbia Basin Trust;
- Regional District of Central Kootenay;
- EcoCanada;
- Environment and Climate Change Canada; and,
- Local Government Climate Action Program.

4 Methodology for Evaluation of Pilot Project

This report describes the evaluation of the Pre-treated Organics Pilot Project and comparative analysis with curbside green cart collection of food waste. This evaluation and comparative analysis included the following:

- October 2022 to September 2024: Regular video and phone meetings with City of Nelson staff as they planned and implemented the Pre-treated Organics Pilot Project. Yarrow Environmental and Transform Compost provided guidance in pilot project design and implementation to ensure the pilot project was structured to answer the research questions.
- November 2022: Pre-pilot project online community survey about organic waste diversion practices.
- August 2023: Pre-pilot project waste characterization study in Fairview neighbourhood.
- April 2024: Online survey of pilot project participants, seeking feedback on their experience in the pilot project.
- April and July 2024: Follow-up (mid- and post-pilot project implementation) waste characterization studies in Fairview neighbourhood.
- December 2023 to October 2024: Interviews and e-mail correspondence with staff who planned and implemented curbside green cart programs in the region, and who operate the RDCK Central Compost Facility in Salmo.

5 Science of Pre-treatment Appliances and Composting

A pre-treatment appliance such as the FoodCycler is an electrical device that grinds and dehydrates food scraps into a substance we refer to as 'pre-treated material'. The pre-treatment process reduces the mass of the food scraps by approximately 70 to 75% on average, and reduces the volume by up to 90%. The pre-treated material is very dry, lightweight, and has minimal odour.

A pre-treatment appliance takes food waste, an organic material which decomposes very easily, and stabilizes it by drying it. This concentrates the nutrients in the dehydrated material. The pre-treated material exiting an appliance such as the FoodCycler has reduced biological activity (and odour) because it has become too dry for microorganisms to thrive. The material is considered stable. However, pre-treated material is not mature, nor can it be called compost, because decomposition of the organic material has not occurred. As soon as water is added to the pre-treated material, it is recolonized by microorganisms, and the decomposition process begins. As a result, when re-wetted, the pre-treated material can develop odour and mold, unless properly managed in a compost system.

The pre-treated material that exits a pre-treatment appliance is not compost. Composting is a process in which organic materials are collected and managed to control microbial decomposition by optimizing the conditions for composting (combination of input materials, aeration, etc.) to create compost, which can be added to soil to improve productivity and fertility. The composting process is carried out by billions of microorganisms – usually over a period of a few weeks or months.

The British Columbia (BC) *Organic Matter Recycling Regulation* requires that Category A compost be treated in an aerobic process for 14 days or longer, and be cured for at least 21 days[3]. The Canadian Council of Ministers of the Environment (CCME) *Guidelines for Compost Quality* state that compost should be cured for at least 21 days to meet requirements for maturity and create a high-quality compost[4]. Compost maturity is a measure of the degree of completion of the composting process.

Often the compost curing process takes up to several months. It is biologically impossible to create stable and mature compost in several hours through a device such as a pre-treatment appliance. The decomposition of organic matter by microorganisms takes time.

[3] Province of British Columbia. 2024. Organic matter recycling regulation.
[4] CCME. 2024. Guidelines for compost quality.

6 Pilot Project Design and Implementation

6.1 Timeline of Pilot Project

The Pre-treated Organics Pilot Project was implemented in four main phases between June 1, 2023 and June 30, 2024 (13 months), as outlined in Table 1.

Table 1. Pre-treated Organics Pilot Project phases, priorities and activities.

Pilot Project Phase	Timing of Phase	Priorities and Activities
Phase I – Early Adopters	June – Aug 2023	• Promote the distribution of FoodCyclers to residents keen on the project and to City of Nelson staff. • Support and encourage early adopters to act as project champions, in preparation for full pilot project rollout. • Use Early Adopter phase to test communication, distribution and education approaches.
Phase II – Full Pilot Project Rollout in Fairview	Sept – Dec 2023	• Intensive engagement with Fairview neighbourhood residents to encourage all households to sign up for and receive a FoodCycler.
Phase III – Pilot Project Late Adopters & Broader Community Rollout	Jan – Apr 2024	• Focused effort on communicating with Fairview residents that had not yet signed up for and received a FoodCycler. • Distribution of remaining FoodCyclers to interested residents in all neighbourhoods.
Phase IV – Continued Community Rollout	May – June 2024	• Continued distribution of FoodCyclers to interested residents in all neighbourhoods.

6.2 Selection of a Pre-Treatment Appliance for Pilot Project

The City of Nelson conducted a public request for proposal process in January and February 2022, seeking submissions from companies interested in providing pre-treatment appliances for the City's Pre-treated Organics Pilot Project. There are a variety of residential pre-treatment appliances in the Canadian marketplace. The City evaluated submissions during spring 2022, and during summer 2022 entered into negotiations with the successful bidder. In September 2022, Food Cycle Science Corporation (FCS) was awarded the contract to provide pre-treatment appliances for the Nelson Pre-treated Organics Pilot Project.

The City of Nelson entered into a purchase and sale agreement with FCS, which included provisions on items such as cost of the appliance, minimum purchasing obligations, educational assistance, appliance warranty and repair.

The FoodCycler – Eco 5 model was the pre-treatment appliance used for the pilot project. The FoodCycler – Eco5 model has an expected lifespan of seven years. Food Cycle Science provided a product warranty of seven years for appliances purchased by the City.

6.3 FoodCycler Eco 5 – Product Description and Use

The FoodCycler™ – Eco 5™ model pre-treatment appliance (herein after referred to as the 'FoodCycler') is intended for household use and is classified as a 'household electric appliance'. A detailed description of product specifications and instructions for use of the FoodCycler – Eco 5 can be found in the FoodCycler Eco5 User Manual in Appendix I.

6.3.1 Dimensions and Weight

The FoodCycler Eco 5 has the following out-of-box dimensions: 34.2 cm (13.5") wide x 27.6 cm (10.9") deep x 35 cm (13.8") high. The unit has a weight of 13.6 kg (30 lbs) out of the box.

6.3.2 Capacity and Processing Time

The Eco5 has a capacity of 5.0 litres. According to the FoodCycler Eco 5 manual, the stated processing time is approximately 4 to 9 hours per cycle, depending on the quantity of materials to be processed, and the moisture content of the organic materials being processed. In trials using the FoodCycler Eco5, one of the authors, Dr. John Paul of Transform Compost found that the unit could consistently process up to 1 kg of food scraps in a cycle (Appendix II).

6.3.3 Environmental Conditions for Use

The FoodCycler Eco 5 manual indicates the unit should not be operated outdoors, and that the unit should not be operated or stored in below-freezing temperatures. City of Nelson staff took care to ensure the units were not being stored in hot or below-freezing temperatures during the storage and distribution of the units, as further described in Section 10.1.1.

The FoodCycler Eco 5 manual recommends operating the unit at temperatures between 20°C to 28°C (68°F to 82.4°F). The manual also states that the unit should not be located next to heaters or kitchen appliances that generate significant heat, and should not be in a location where it can get wet. Adequate space around the unit is required to ensure ventilation while in use.

6.3.4 Organic Materials That Can Be Processed in the FoodCycler Eco5

The FoodCycler Eco 5 can process most food scraps, and some food-soiled paper, as indicated in the instructions from the FoodCycler Eco5 manual (Figure 1).

Figure 1. Materials that can be processed in FoodCycler Eco 5 (Image courtesy of FoodCycler™ Eco5™ User Manual).

In the FoodCycler Eco5 user manual, the following general instructions are provided:

- ideal results are achieved if the batch of materials to be processed contains a variety of food scraps;
- large items such as corn husks and melons should be cut up into pieces smaller than about 10 cm x 10 cm x 10 cm (~4 x 4 x 4”);
- ideal results are achieved if food items are cut up into pieces smaller than 5 cm x 5 cm x 5 cm (~2 x 2 x 2”);
- it is best to disperse heavier foods with lighter, dryer foods in the bucket;
- food scraps with a high moisture content can result in moist pre-treated material, and may need to be re-processed with a second cycle; and,
- avoid high concentrations of the following foods: starches (bread, cake, rice, pasta, mashed potatoes, stuffing) and high-sugar fruits (grapes, cherries, melon, oranges, bananas, etc.).

The City of Nelson used the following graphic to educate residents on what materials could be processed in the FoodCycler and how to prepare these materials for best results (Figure 2).

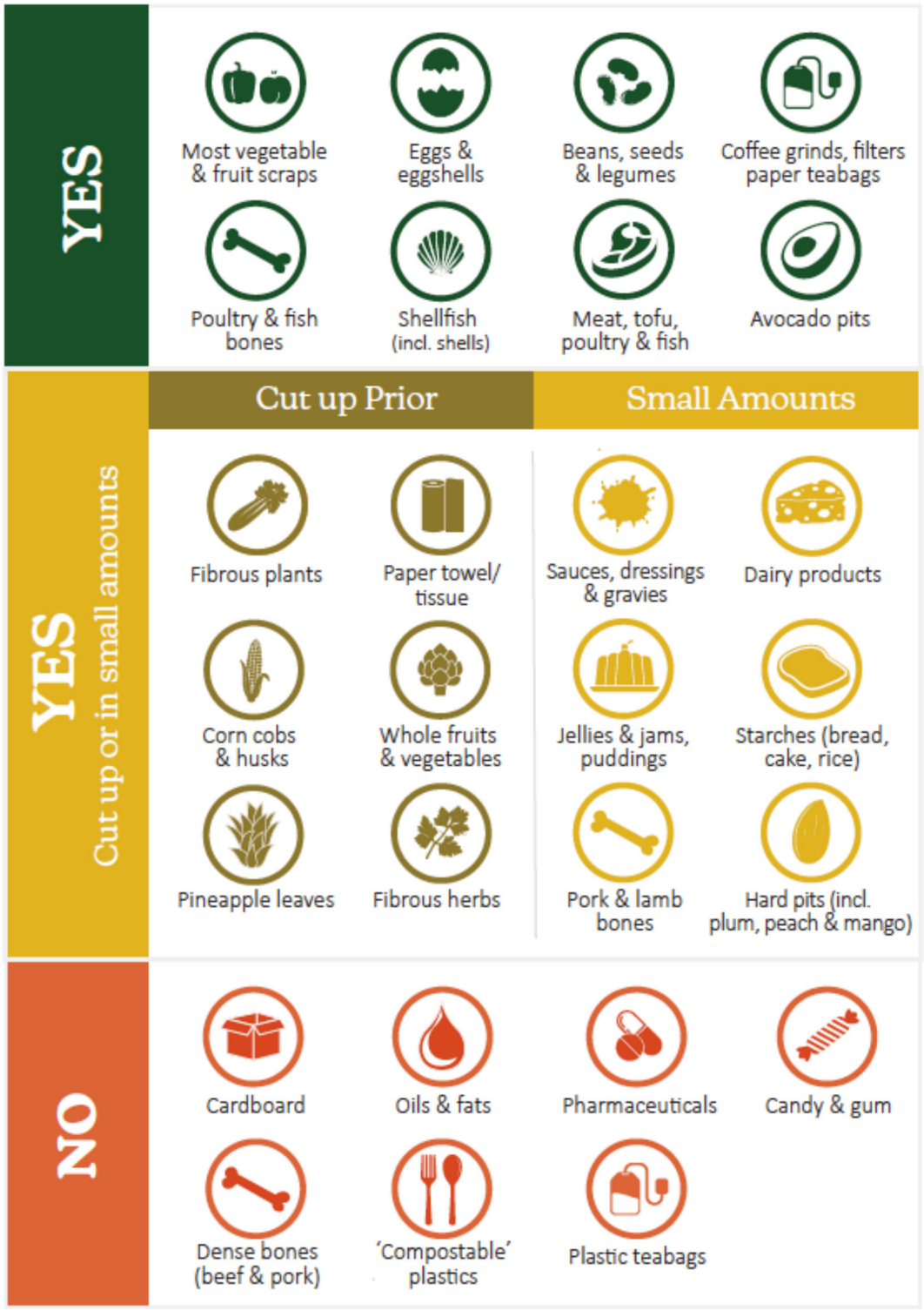

Figure 2. City of Nelson graphic showing materials that can be processed in the FoodCycler.

6.3.5 Volume and Mass Reduction of Organic Materials

The FoodCycler Eco5 User Manual states that when food scraps are processed in the FoodCycler the volume of the materials is reduced by up to 90%. The manual clarifies that: “weight reduction is significantly dependent on the food (e.g. coffee grinds will have little volume reduction)".

In processing many batches of organic materials (including a mixture of food scraps, meat products, coffee grinds, and food-soiled paper), the authors of this report concur that weight reduction can be variable, according to the materials being processed. We found that on average there was a 70 to 75% weight reduction for the mixtures of organic materials we processed. Staff at FCS confirmed that this reflected their experience testing the units[5].

6.3.6 Energy Use

The FoodCycler™ – Eco 5™ user manual states that the unit uses “< 1.5 kWh per cycle on average. The user manual states that the unit uses 0.5 kWh per month in standby mode (on average). The unit shuts itself off once a cycle is complete.

The authors of this report both used the FoodCycler™ – Eco 5™ to process many batches of food scraps, with varying types of food scraps and food-soiled paper, and monitored energy use with a Kill A Watt™ electricity usage monitor. In trials using the FoodCycler, Transform Compost Systems found that the FoodCycler Eco 5 used on average 1.36 kilo-watt hour (kWh) of electricity for every 1 kilogram of materials processed, and that the unit worked best when approximately 1 kg of material was processed in a cycle (see Appendix II).

6.4 Bylaw to Support Pilot Project Implementation

In May 2023, the City of Nelson revised its Waste Management and Wildlife Attractant Bylaw to include provisions related to the use of pre-treatment appliances as a tool to manage food scraps as part of the Pre-treated Organics Pilot Project. These bylaw changes were enacted prior to the distribution of FoodCyclers as part of the pilot project.

Bylaw provisions were added to address the following topics:

- indicating that pre-treatment appliances distributed as part of the Pre-treated Organics Pilot Project are the property of the City of Nelson, and must remain at the address to which they are delivered, unless alternative arrangements have been approved;
- pre-treatment appliances must be cared for and used according to the directions provided;
- residents (not the City) are responsible for the electricity costs associated with using the pre-treatment appliances;
- residents must notify the City if the pre-treatment appliance stops working; and,
- if a pre-treatment appliance is damaged through misuse, or removed from a designated address, the resident is responsible for the cost of replacing the appliance.

[5] 2024. Personal communication with Brittany Clarke, Food Cycle Science Corporation, June 28, 2024.

6.5 Resident Surveys

The City of Nelson conducted online resident surveys prior to and following implementation of the Pre-treated Organics Pilot Project. These surveys were valuable tools to better understand the waste management practices and perspectives of residents, and to plan for and evaluate the pilot project.

6.5.1 Pre-Pilot Project Resident Survey

In fall 2022, prior to the Pre-treated Organics Pilot Project, the City of Nelson conducted an online survey of residents to gather information on organic diversion practices, and human-wildlife challenges and conflict related to waste management. The City also used the survey to gauge resident interest in participating in the pilot project.

The resident survey was open for participation between November 1 and December 15, 2022. The City promoted participation in the survey through online advertising, Facebook, Instagram and on the City's webpage. There were 356 residents who completed the online survey from 343 separate dwellings. Therefore, there were survey responses from occupants of approximately 7% of dwellings in Nelson.

Given that survey participation was voluntary, there was likely some bias in responses in that those individuals who were already interested in organics diversion were more likely to complete the survey than those who were not interested in this topic.

Of the residents who completed the survey, 33% stated that their household diverted all of their organics, 37% stated that their household diverted some of their organics, and 30% stated that their household did not divert organics.

Of those who answered that they diverted 'all' or 'some' of their organics, 56% reported using a backyard composter, 8% used a countertop pre-treatment appliance, 5% hauled materials off-site for composting, 3% used vermicomposting and 3% used a bokashi system.

When asked whether residents had ever had any issues with wildlife disrupting their garbage or composter, 82% responded yes. Of those residents who had wildlife get into their garbage or compost, 68% had issues with bears, 44% with raccoons, 43% with rats, 43% with skunks, and 14% with birds.

In the comments section of the survey, 19 residents reported that they used to use a backyard composter to divert their food scraps, but stopped to avoid attracting bears to their yard. A few of the comments residents made were the following:

- "We used to have a backyard compost, but had to get rid of it due to wildlife (bears)."
- "Had a compost bin demolished this year and several times knocked over. Got to the point that we stopped using the compost bins, so more food waste in the garbage."
- "I stopped backyard composting two years ago because of bears and rats."
- "We have not had issues until the past couple of years and stopped composting this summer because of a bear. We hate to put organics in our garbage, but had no choice."

6.5.2 Post-Pilot Project Resident Survey

In spring 2024, the City of Nelson conducted an online survey to gather feedback and information from residents who were participating in the Pre-treated Organics Pilot Project.

The online survey was open from April 19th to May 6th, 2024. City staff emailed a survey link to all pilot project participants, and phoned those participants who had indicated they preferred to be contacted via phone, rather than email.

There was a high level of participation in the survey by pilot project participants. Of Fairview pilot project participants, 38% of participants completed the survey. Of households outside the Fairview neighbourhood who had a FoodCycler, 32% of households completed the survey. Across both Fairview and Non-Fairview households with a FoodCycler, about one third (34%) of households with a FoodCycler completed the spring 2024 survey. (Figure 3)

Feedback gathered from pilot project participants in the spring 2024 survey is found throughout the remainder of this report in sections on specific topics.

The overall theme from the post-pilot project survey was that pilot project participants who responded to the survey were very happy with the FoodCycler and the opportunity to divert their food waste.

Figure 3. Many Nelson residents were eager participants in the pilot project, and shared feedback through resident surveys.

6.6 Pilot Project Participants

6.6.1 Fairview Pilot Project Participants

The City of Nelson selected the Fairview neighbourhood as its pilot neighbourhood for the Pre-treated Organics Pilot Project. This is the neighbourhood where FoodCycler distribution, education, research and monitoring efforts were focused to evaluate the use of the pre-treatment appliances as a tool in organic waste diversion and management. FoodCyclers were distributed to single-family homes, and one targeted multi-family building.

For the purpose of data tracking, and waste audit data gathering, single-detached, semi-detached and row houses with Friday garbage collection were defined as being in the Fairview neighbourhood. Figure 4 shows a map of the Friday garbage collection area in the Fairview neighbourhood. There are 48 dwellings in the Fairview neighbourhood that do not receive Friday garbage collection due to geographical constraints (driveways that are too steep, etc.) and these were not included in the pilot project group.

In 2024, the Fairview neighbourhood had a total of 930 dwellings that receive Friday garbage collection. This represents 22% of the 4,232 occupied private dwellings that receive curbside garbage collection in Nelson[6].

The Fairview neighbourhood was selected for the pilot project for the following reasons:

- mostly single-family, semi-detached and row housing;
- the total number of neighbourhood dwellings fit the number of households the city wanted to target for the study;
- the proportion of home owners and renters in Fairview was representative for the City;
- this neighbourhood had experienced a lot of human-wildlife challenges with bears and rats in 2022 – more than in previous years; and,
- there was a good location for a public drop-off site for pre-treated material near the neighbourhood.

During the pilot project, between June 1, 2023 and June 30, 2024, the City distributed 710 FoodCyclers to Fairview neighbourhood households that receive Friday garbage collection. Therefore, 76% of eligible dwellings in the Fairview pilot neighbourhood signed up to participate in the pilot project by receiving a FoodCycler to divert food scraps.

The City piloted promotion and distribution of FoodCyclers in one multi-family building in the Fairview neighbourhood: Alpine Lake Suites on Gordon Road. This multi-family building has 49 dwelling units. There were 29 households that registered for and received a FoodCycler in this building, which represented 59% of dwellings in the building.

[6] City of Nelson internal data.

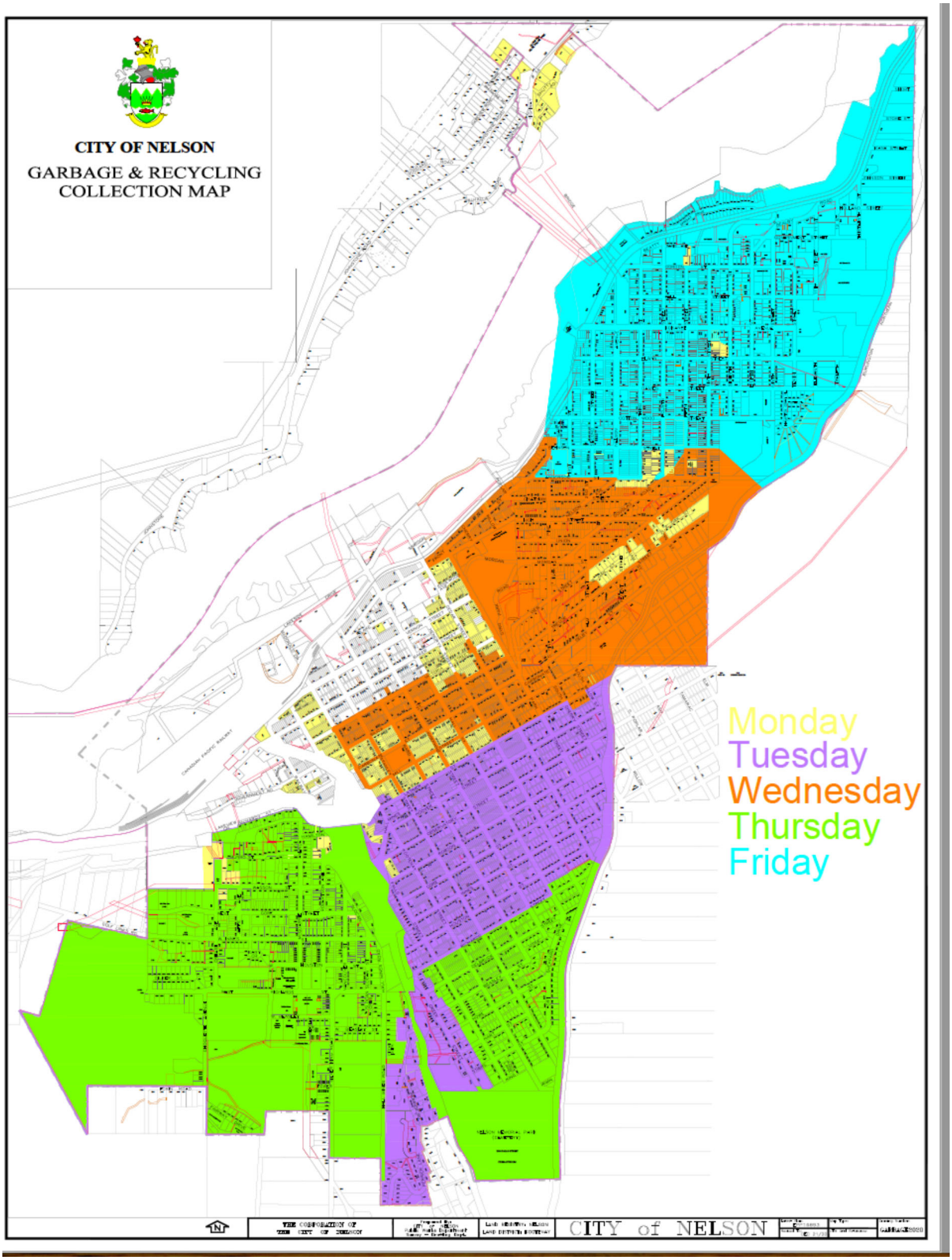

Figure 4. City of Nelson garbage and recycling collection map.

Below are some reasons Alpine Lake Suites was chosen as the multi-family building to participate in the pilot project, and more information on the demographics of households in the building:

- the building owner expressed interest in participating in the pilot project, and there was active support from both the building owner and the on-site property manager;
- the building had previously tried other organics diversion options, but to date they hadn't found a good program fit that worked well for the building;
- the building has a mix of bachelor, 1-bedroom, 2-bedroom and 3-bedroom layouts;
- rent for units in the building ranged from $700 to $1,300 per month, which is relatively affordable in the Nelson rental market;
- residents living in the building are in a mix of social circumstances and life stages: there are residents who receive rent subsidies, residents working in the service industry, students at Selkirk College, retirees who have lived in the building for more than 20 years, and some people living with disabilities; and,
- many residents in the building are new Canadians – most residents speak English; however, it is not the first language for many residents.

Figure 5 shows residents from Alpine Lake Suites picking up their FoodCycler.

Figure 5. Residents from Alpine Lake Suites picking up their FoodCycler.

6.6.2 Households Outside Fairview

In addition to Fairview pilot project participants, the City distributed 1,257 FoodCyclers to households outside the Fairview neighbourhood who expressed interest in having a FoodCycler, and lived in dwellings that receive City garbage collection (single-detached, semi-detached, and row houses). Thus, across the entire city, including Fairview and non-Fairview households, a total of 46% of Nelson households received a FoodCycler to divert food scraps in 2023 – 2024.

6.6.3 Phasing and Timing of Distribution of FoodCyclers

Table 2 shows the phasing and timing of distribution of FoodCyclers to households in the Fairview pilot neighbourhood, and non-Fairview households.

Table 2. Phasing of distribution of FoodCyclers.

Pilot Project Phase	Timing of Phase	# Units Distributed in Fairview	# Units Distributed City-Wide (Outside Fairview)	Total Units Distributed
Phase I – Early Adopters	June – Aug 2023	148	334	482
Phase II – Full Pilot Project Rollout in Fairview	Sept – Dec 2023	503	182	685
Phase III – Pilot Project Late Adopters & Broader Community Rollout	Jan – Apr 2024	47	584	631
Phase IV – Continued Community Rollout	May – June 2024	12	157	169
Totals		**710**	**1257**	**1967**

6.7 FoodCycler Promotion, Distribution and Education

The City of Nelson used a wide array of communication tools and approaches to promote the Pre-treated Organics Pilot Project and to invite residents in Fairview and the broader community to sign up for, receive and use a FoodCycler (Figure 6).

Figure 6. Graphic in the 2024 waste collection calendar promoting the use of FoodCyclers.

Appendix III shows a selection of communication tools that were used by the City of Nelson to promote the Pre-treated Organics Pilot Project and educate residents in how to use the FoodCycler, including the Pre-treated Organics Program Guide, and City webpage that hosts numerous educational resources and answers to frequently asked questions.

The distribution of FoodCyclers was organized to ensure that all residents were educated on how to properly use the FoodCycler and to foster the creation and support of community champions who would help other community members to join in and participate in the pilot project.

From a program review perspective, the breadth of communication and educational tools and level of active public engagement used by the City of Nelson to roll out the Pre-treated Organics Pilot Project was outstanding.

6.7.1 FoodCycler Promotion

Table 3 describes the communication tools and approaches that were used to inform residents about the Pre-treated Organics Pilot Project and to encourage participation during the various pilot project phases.

Table 3. Promotion approaches used in phases of the Pre-treated Organics Pilot Project.

Phase I – Early Adopters (June – Aug 2023) **Promotion Approach**
• Residents who were a part of the initial pilot project in 2020 were invited to participate in Phase I by upgrading their FoodCyclers to the Eco 5 model. • In 2021-22, during preliminary piloting of the FoodCycler, the City collected names of people who expressed interest in diverting organics and/or testing a pre-treatment appliance. This list was built over time through networking, and used to reach out to residents during Phase I of this pilot project. • The City set up an online registration form to enable residents to sign up for a FoodCycler, and began using a customer relations software to manage contact information for interested residents. • City of Nelson staff were invited via internal social media to participate in the pilot project as early adopters. • Articles about the pilot project appeared in the local newspaper. • Pilot project was promoted at municipal and community events. • A display was set up at the City library. • Once distribution of FoodCyclers began in June 2023, there was a large increase in registrations for the appliances, with minimal City promotion and outreach. • Word-of-mouth was the largest tool during this phase.
Phase II – Full Pilot Project Rollout in Fairview (Sept – Dec 2023) **Promotion Approach**
• This phase focused on direct engagement with residents in the Fairview neighbourhood. • City Hall marquee featured a message inviting Fairview residents to sign-up to get a FoodCycler. • Paid radio advertising. • Advertising at the local theatre. • Social media campaign, including sponsored ads for a few months. • Fall back-page ads in the City's newspaper explaining the benefits of the project and how to sign up. • Direct mailer sent to all Fairview households. The mailer was sent with a customized FoodCycler graphic on the envelope to attract interest. • In-person FoodCycler sign-up sheets set up at the City Hall customer service desk. • In October 2023, a pilot project launch event was held and included speakers, a panel discussion, a demonstration of the FoodCycler, and program display materials. • In October and November 2023, City staff went door-to-door in the Fairview neighbourhood to encourage participation in the pilot project by those residents that had not signed up for a FoodCycler. If residents were not home, a door hanger was left on the

door with instructions on how to sign up for a FoodCycler. Every household that didn't have a FoodCycler was visited at least twice. Approximately 65 hours of door-to-door canvassing in the Fairview neighbourhood was conducted by three City of Nelson staff members.

- While canvassing, City staff took time to engage with residents, answer questions and provide information. If a resident declined to participate in the pilot project, staff took time to ensure the resident was heard, and to record their reasons for not participating.
- In late November 2023, City staff left information stickers on the garbage bins of households that had not yet signed up for a FoodCycler, with information on how to sign up for a FoodCycler, and reasons to participate in the pilot project.
- Word-of-mouth continued to be an important communication channel throughout this period.
- Pilot project promotion for the multi-family building involved collaborating closely with the building manager to encourage residents to sign up, distribute surveys, and conduct door-to door- visits to offer the FoodCycler to occupants.

Phase III – Pilot Project Late Adopters & Broader Community Rollout (Jan – April 2024)
Promotion Approach

- Direct mail campaign to Fairview households that had not signed up for a FoodCycler, asking again for people to sign up, and informing them that time was running out to participate in the pilot project.
- Significant time was invested in reaching out to Fairview residents who had signed up for a FoodCycler, but hadn't picked up their unit. City staff called residents weekly and left messages. After leaving four voicemails, City staff would deactivate the resident's registration.
- City of Nelson staff followed up with residents who had not registered for or picked up a FoodCycler, aiming to understand their reasons for not participating and to offer solutions that might encourage them to participate.
- A CBC news article about the pilot project during this phase led to an uptick in registrations for FoodCyclers.

Phase IV – Continued Community Rollout (May– June 2024)
Promotion Approach

- Medium-scale communication effort during this phase.
- Word-of-mouth continued to be an important communication tool.
- Ongoing social media campaign.
- Every six months, the City sends a direct mailer to residents with a calendar schedule of collection services for waste and recycling – throughout the pilot project, this mailer included information encouraging residents to sign up for a FoodCycler.

6.7.2 FoodCycler Distribution and Education

Throughout the pilot project, a number of different approaches were used to distribute FoodCyclers and educate residents in how to use them. Table 4 summarizes the approaches used, and the number of FoodCyclers distributed to Fairview pilot project households and non-Fairview households.

Table 4. Number of FoodCyclers distributed through various distribution approaches.

Distribution & Education Approach	Approx. # Units Distributed to Fairview Pilot Project Participants	Approx. # Units Distributed to Non-Fairview Households	Total Units Distributed
Group Orientation Sessions – Early Adopter Phase	209	332	541
Drop-In Events	305	925	1,230
Door-to-Door Canvassing	67	0	67
Direct Delivery to Households	75	0	75
Distribution from City Hall	25	0	25
Multi-family Distribution	29	0	29
Totals	**710**	**1,257**	**1,967**

6.7.2.1 Group Orientation Sessions

During the Early Adopter Phase (June to August 2023), group orientation sessions were used to distribute FoodCyclers and educate residents in how to use them. One of the goals in holding group orientation sessions was to create community champions for the project, who could help others understand and troubleshoot their appliances due to their in-depth training. Over a period of nine weeks, 12 group orientation sessions per week were held at the curling club. Residents signed up in advance for the sessions, and received calendar reminders and missed appointment notifications. Group size for the sessions was capped at 20. Sessions lasted approximately 30 minutes, sometimes longer if there were many questions. The sessions consisted of watching a short video tutorial on how to use the FoodCycler, followed by facilitated discussion, and a question and answer session. FoodCyclers were then distributed to the participants.

6.7.2.2 Drop-In Events

Following the Early Adopter Phase, City staff transitioned to using quicker drop-in events as the main approach to distribute FoodCyclers and educate residents (Figure 7). Forty-one drop-in sessions were held at the curling club between September 2023 and June 2024. Between March and June 2024, the City held three drop-in sessions per month. Drop-in sessions were typically held from 2:00 to 6:00 pm, with some sessions going as late as 7:30 pm, to increase convenience for residents.

Prior to coming to a drop-in session, the City asked residents via email to watch the FoodCycler video tutorial. If a resident arrived to pick up their FoodCycler, and hadn't watched the tutorial video yet, City staff offered and arranged for them to watch it on-the-spot. At drop-in sessions, residents were educated in how to use the FoodCycler through one-on-one conversations with City staff, and were informed about the FoodCycler Program Guide, numerical code to use at the drop-off site for pre-treated material, and where to find further educational resources.

Figure 7. Residents picking up FoodCyclers.

6.7.2.3 Door-to-Door Canvassing

During Phase II (full pilot project rollout in Fairview), City staff conducted door-to-door canvassing in the Fairview neighbourhood and distributed 67 appliances directly to households in this neighbourhood. City staff educated residents about how to use the FoodCycler when distributing the appliance.

6.7.2.4 Direct Delivery to Households

During the later phases of the pilot project rollout in Fairview (Phase III and Phase IV), City staff dropped off FoodCyclers directly to residents a few days per week (Figure 8). City staff contacted residents, determined when residents would be home, and then coordinated a drop-off time, according to resident availability, staff availability, and weather. City staff educated residents about how to use the FoodCycler when distributing the appliance. Approximately 75 FoodCyclers were distributed in the Fairview neighbourhood via direct delivery.

Figure 8. Organics Coordinator Emily Mask delivering FoodCyclers to Nelson residents.

6.7.2.5 FoodCycler Distribution from City Hall

Some pilot project residents requested to pick up their FoodCycler from City Hall. These residents were asked to watch the tutorial video either prior to or at the time when the FoodCycler was picked up, and City staff provided educational materials and answered questions when the unit was distributed. Approximately 25 Fairview residents picked up their FoodCycler via this distribution method.

6.7.2.6 Accessibility

For Nelson residents with accessibility needs, the City offered direct delivery of FoodCyclers to households on a monthly basis throughout the pilot project.

6.7.2.7 Multi-Family Distribution

To distribute FoodCyclers to dwellings in the multi-family building that was part of the pilot project, City staff set up an information and distribution table in the lobby of the building two days per week for two weeks in February, 2024. Distribution sessions occurred in the mornings and evenings for approximately six hours in total.

For multi-family units that had not come to pick up a FoodCycler, City staff went door-to-door to directly offer the FoodCycler to residents. When staff were not able to speak with a household member, they left door hangers indicating the time of the next distribution event at the building.

Following the two-week distribution period, five extra FoodCyclers were left with the building manager, to distribute to any households that expressed interest in having a FoodCycler after the initial distribution period.

A total of 29 FoodCyclers were distributed to households at the multi-family building.

6.8 Distribution of Carbon Filter Material for Appliances

The FoodCycler Eco 5 is equipped with a refillable carbon filter to reduce the intensity of odours emanating from the appliance (Figure 9). The FoodCycler Eco 5 Manual recommends that the carbon filter pellets be replaced every 500 cycle hours or 3 – 6 months (depending on frequency of use). The manual explains that the best indicator of the need to replace the carbon filter material is odour.

Figure 9. Carbon filter pellets (Photo courtesy of Titan Clean Energy Projects Corporation).

When individual FoodCycler units are sold, consumers need to purchase carbon filter replacement units. The City of Nelson wanted to minimize the cost and packaging associated with carbon filter replacements. The City came to an agreement with FCS and a local grocery retailer to set up a bulk carbon filter refill station in the entryway of the Safeway grocery store located at 211 Anderson Street, near the Fairview pilot neighbourhood.

The local Safeway store agreed to have the carbon filter refill station in the grocery store at no cost to the City, as they supported this sustainability initiative, and the potential for increased customers.

The City and FCS designed the bulk carbon filter kiosk together (Figure 10). The kiosk has four refill bins with fill spouts. Each refill bin can hold 9 kg of pellets, so when filled, the kiosk holds 36 kg of carbon filter pellets. FCS was responsible for all costs associated with the refill station and continues to be responsible for the delivery of carbon filter pellets to the store as needed. Grocery store staff refill the kiosk approximately once per week.

Figure 10. Carbon filter pellet refill station.

The pelletized activated carbon filter pellets being used in Nelson are sourced from a business in Craik, Saskatchewan, Titan Clean Energy Projects Corporation. The activated carbon pellets are produced from biochar, which is generated from construction, renovation and demolition waste wood.

Between June 1 2023 and June 30 2024 (13 months), 700 kilograms of carbon pellets were distributed from the bulk kiosk. Each refill of the carbon filter in one FoodCycler unit takes 0.38 kg of carbon filter material, so the amount of carbon filter material distributed has been enough for 1842 FoodCycler refills. The spent carbon filter material cannot be reused or recycled at this time, and goes to the landfill.

In the spring 2024 survey of pilot project participants, 40% of survey respondents reported they had used the carbon refill station. Residents reported using the carbon refill station between one and 10 times.

City staff report that an additional carbon filter pellet refill station may be required in the future, depending on how many residents are using a FoodCycler, and other factors. This additional kiosk and associated costs may be the responsibility of the City.

6.9 Repair Program for Pre-Treatment Appliances

6.9.1 FoodCycler Repair Program

The City of Nelson initiated a repair program for FoodCyclers at the outset of the pilot project. If a pilot project participant experienced a technical issue with their FoodCycler, they contacted City of Nelson staff. In many cases, residents provided a photo or video of the problem with their FoodCycler. City staff completed a thorough investigation of the issue and determined if the appliance needed repair or if the resident needed troubleshooting assistance. If a repair was needed, residents were invited to bring the appliance to City Hall for inspection, troubleshooting and/or repair. For residents with mobility issues, City of Nelson staff would help the resident bring the FoodCycler to City Hall for inspection and repair. In some circumstances, City staff needed to go to residents' homes to pick up the FoodCycler for repair, if the resident was not able to physically move the appliance themselves.

At the start of the pilot project, residents were given a loaner FoodCycler to use while their initial unit was undergoing repairs. However, due to the inconvenience of requiring residents to come to City Hall twice under this model, the City changed its approach to instead issue residents a new FoodCycler when a broken unit was brought in for repair. The City then repaired the old unit, and then added it to its stock of FoodCyclers.

Between June and November 2023, City of Nelson staff carried out FoodCycler repairs. In December 2023, this repair work was contracted to SK Electronics Ltd, a local electronics repair business. SK Electronics staff came to City Hall on a regular basis, carried out repairs, and completed final diagnostics for challenging repair issues. City of Nelson staff continued to complete some repair diagnostics, and monitored the inventory of appliances coming in for repair, repaired appliances, and appliances that were warrantied (and sent for electronics recycling, if they were unrepairable).

In May 2024, customer service related to the repair program was transitioned to being handled by the FCS Customer Support team. Since this time, FCS conducts troubleshooting with City

residents and coordinates appliance repairs and replacement with SK Electronics directly. This has reduced the time City of Nelson staff spend liaising with residents on appliance repair and troubleshooting. In July 2024, SK Electronics Ltd. began accepting FoodCyclers directly at its business location for repair, still under the City of Nelson – FCS repair program.

FCS has paid for FoodCycler repairs and replacement parts to date, as the incidence of repairs needed exceeded the established repair threshold within the contract agreement with the City of Nelson.

6.9.2 FoodCycler Repair Rate

City of Nelson staff carefully tracked the quantity and type of repairs that were required for the FoodCycler units that were distributed to residents. Throughout the pilot project, 11% of appliances (219 units) required repair, part replacement or full appliance replacement, out of the total 1,967 appliances distributed. The most common replacement parts were fans and drive trains. In most cases, units were able to be repaired. There were 12 instances in which the entire unit was replaced under warranty, as it could not be repaired.

In the spring 2024 survey of pilot project participants, 13% of survey respondents reported accessing the repair program for FoodCyclers. This number is likely slightly higher than the repair rate of 11% reported by the City, as the repair rate only included units which required a new part or unit replacement, not units that were brought in for troubleshooting and were returned to residents without a new part.

City of Nelson staff estimate that throughout the pilot project they spent approximately 56 hours troubleshooting repair issues and dealing with FoodCycler repairs. Staff indicated that this is likely one quarter of the total time they have spent troubleshooting mechanical issues with residents, as it was challenging to track all phone calls and drop-in visits from residents who sought troubleshooting support.

City of Nelson staff have noted that the newest batch of FoodCyclers, delivered in January 2024, have had much fewer repair issues than the initial batch of FoodCyclers used at the start of the pilot project. According to FCS, the low rate of component failure in the batch of FoodCyclers delivered in January 2024 is expected to be maintained for any future batches.[7]

6.10 Characteristics of Pre-Treated Material

When a FoodCycler is used to grind and dehydrate food waste, we have referred to the material exiting the machine as ‘pre-treated material’. Pre-treated material has a very fine particle size and is very light-weight. On average, there is a 70 to 75% mass reduction and up to a 90% volume reduction for food waste that is processed in the FoodCycler.

Dr. John Paul (Transform Compost) has conducted a variety of tests on pre-treated material. He found that pre-treated material is dry, stable, pathogen-free, and can be easily stored with

[7] Taylor, J. 2024. Communication with Jessica Taylor, Municipal Program Manager, FCS, Sept. 6, 2024.

minimal to no odour, if kept dry.[8] The pre-treated material contains a similar amount of nutrients to composted food waste.

When dry, the pre-treated material tends to have very minimal odour. However, upon re-wetting, it generates odour and becomes moldy.[9] When pre-treated material becomes wet, it will once again allow pathogenic organisms to thrive if they are in contact with the material.[10]

In the spring 2024 survey of pilot project participants, numerous participants (12%) described how they had observed dogs, cats and wildlife (bears, skunks, raccoons, rats) being attracted to pre-treated material that had been stored outside and/or incorporated into garden soil.

6.11 Management Options for Pre-Treated Organics

Once a resident has used the FoodCycler to grind and dehydrate food waste into pre-treated material, there are three pathways the resident can choose to manage the pre-treated material (Figure 11). The resident can store the pre-treated material, and then dig it directly into their home garden. The resident can compost the pre-treated material in a backyard composter, and then use the compost created from the pre-treated material. Alternatively, the resident can store the pre-treated material, and then transport it to the community collection site, where it is then either taken to the RDCK compost facility or composted by the City Parks department.

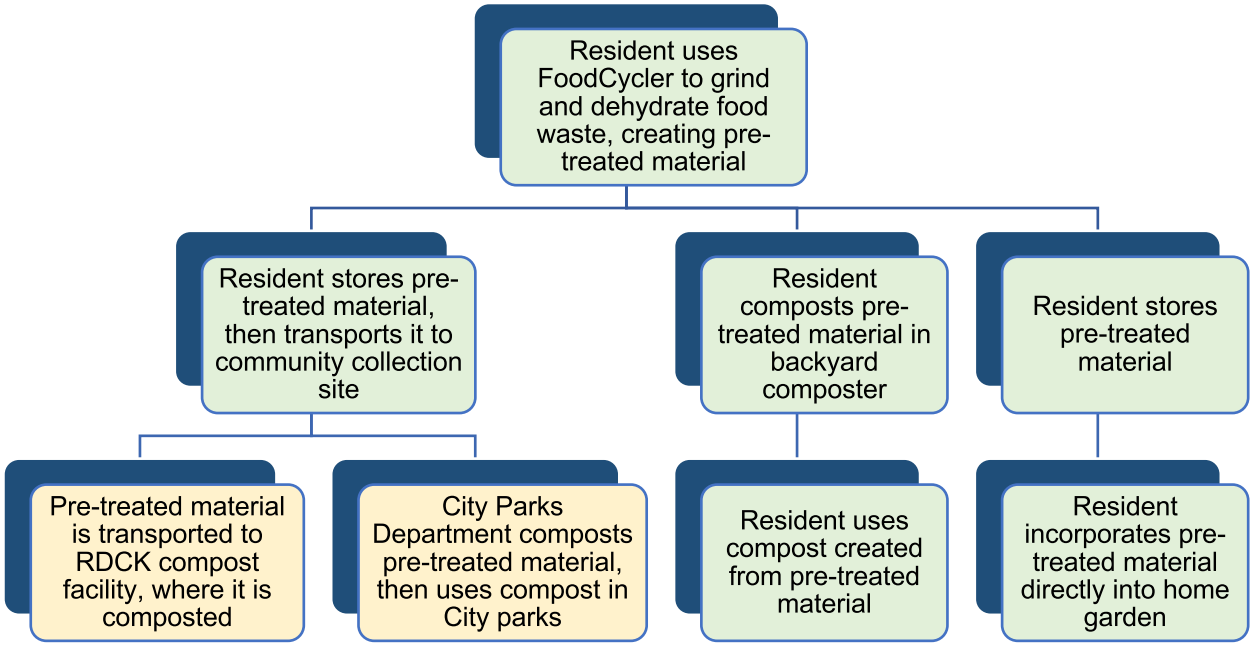

Figure 11. Management options for pre-treated organics generated by Nelson households. Green boxes denote resident actions; yellow boxes denote City of Nelson and/or RDCK actions.

[8] Paul, J. 2022. Evaluation of the FoodCycler for communities in the Northwest Territories. (unpublished)
[9] *Ibid.*
[10] *Ibid.*

6.11.1 At-Home Use of Pre-Treated Organics

FoodCycler promotes the ability to use pre-treated material as a soil amendment. The Nelson Pre-treated Organics Program Guide recommends that for best results the pre-treated material should be mixed into garden soil approximately six weeks prior to planting seeds or transplanting plants in the spring. Alternatively, it suggests mixing the pre-treated material into soil as the garden is closed up for the winter season. The program guide suggests that residents may want to consider only adding pre-treated material to garden beds when bears are not active, which in Nelson would generally be between December and March. However, this timing can vary from year to year depending on seasonal influences, natural food availability, wildfires, and deforestation.[11]

The Nelson Pre-treated Organics Program Guide recommends that the pre-treated material be mixed with soil at a rate of 1 part pre-treated material to 10 parts soil if only vegetable matter has been processed, or 1 part pre-treated material to 20 parts soil if the by-product contains meat or dairy products (Figure 12). It states that the pre-treated material must be thoroughly mixed into the soil and should not be left on the surface of the soil or lawn.

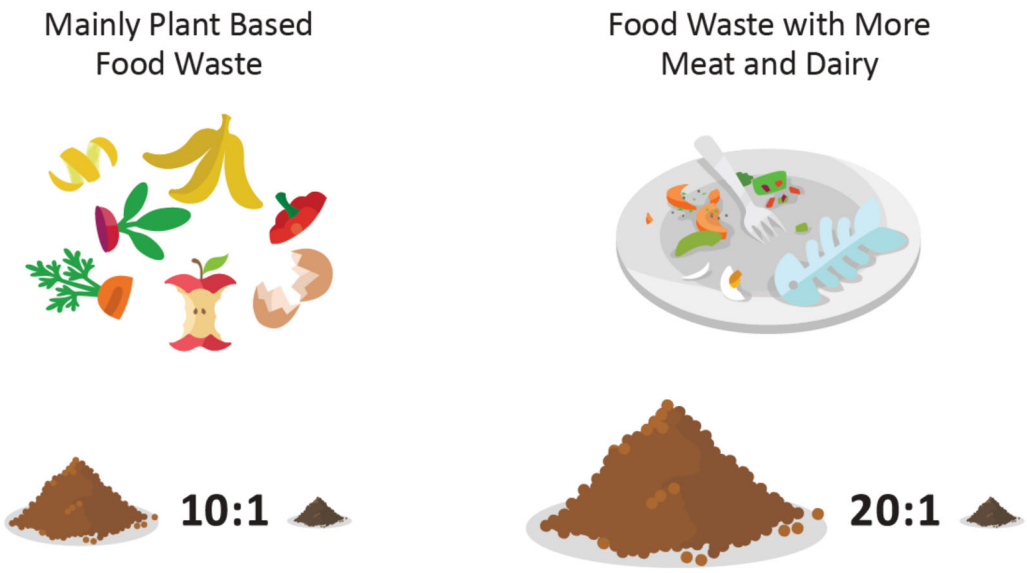

Figure 12. Instructions on how to mix pre-treated material with soil (City of Nelson Pre-treated Organics Program Guide.)

Residents with backyard composters may choose to compost the pre-treated material, and then use the compost in their yard and garden. Section 9.6 describes the advantages of composting the pre-treated material prior to use.

[11] Thomson, L. 2024. Email communication from Lisa Thomson, WildSafeBC Nelson / RDCK Area E and F Coordinator, August 13, 2024.

In the spring 2024 survey of Nelson households with FoodCyclers, 65% of respondents stated that they have added or plan to add the pre-treated material directly to their garden soil or green space, while 38% stated that they plan to compost the pre-treated material in their backyard composter.

6.11.2 Collection of Pre-Treated Organics at Community Collection Sites

The City established two community collection sites where residents could drop off pre-treated material at no cost. Each collection site had two collection bins, and inside each collection bin were three 12-gallon containers used to collect the pre-treated material (Figure 13).

Figure 13. Community collection site for pre-treated material, and view of the containers inside each bin (photos by Steve Ogle).

Figure 14 shows the location of the two community collection sites. One collection site was designated for Fairview residents, and was located near Fairview. The other collection site was for residents from outside the Fairview neighbourhood.

The collection bins for pre-treated material were locked, and residents who participated in the FoodCycler pilot project were given a numerical code they could use to unlock the bins. The purpose in locking the bins was to prevent unauthorized dumping of garbage and other items into the collection bins. The City created a short educational video showing residents how to open and use the collection bins located at the drop-off sites.

In the spring 2024 survey of households with FoodCyclers, 23% of respondents indicated that they had dropped off pre-treated material at a community collection site. Of survey respondents who indicated that they had dropped off pre-treated material at a community collection site, 90% found the site ‘easy’ or ‘somewhat easy’ to use. The most common comments from residents who had experienced challenges with the community collection site were that people found it inconvenient to need to transport their pre-treated organics to the community collection site (especially when people do not own a vehicle or drive), people found it difficult to open the bins at the collection site, the locks were sticky, the locks became frozen in winter, and some

indicated that they had lost the code to access the bin. A few respondents noted that due to the size of the hole where material is to be deposited, it is easy to spill the pre-treated material, and the area becomes messy and muddy.

Figure 14. Map of community collection sites for pre-treated material.

On September 1, 2024, the City of Nelson removed the locks on the community drop-off bins for pre-treated material. City staff report that since the locks were removed, there has been consistent contamination in the bins. The most common problem materials in the bins were unprocessed food scraps, food scraps that have been partially processed in a FoodCycler, cat litter, sawdust and garbage.

Throughout the pilot project, City operations and parks staff collected all pre-treated material from the community collection sites. On average, City staff checked and emptied the collection bins four times per week. City staff transported the pre-treated material to the Parks department compost site, or to the Grohman Transfer Site for transport to the RDCK Central Compost

Facility in Salmo. See Section 10.2.2 for a discussion of some challenges that were experienced related to the pre-treated material re-wetting in the storage bins.

6.11.3 Quantity of Pre-treated Organics Collected

During the six-month period from April 1 to September 30, 2024, at the Fairview collection site (Safeway drop-off location), 2.2 tonnes (4.9 cubic metres) of pre-treated material was collected. During the same time period, 2.8 tonnes (6.3 cubic metres) was collected at the Non-Fairview drop-off location (Public Works building). These figures do not take contaminants deposited at the drop-off location into account. Extrapolated to an annual basis, this represents 10 tonnes of pre-treated material dropped off by residents per year.

Given that on average there is 75% moisture loss when food scraps are processed in the FoodCycler[12], this quantity of pre-treated material collected represents 40 tonnes of food scraps that were processed using FoodCyclers. This represents 20 kilograms of food scraps processed and delivered to the drop-off site per household that had a FoodCycler, as 1,967 of Nelson households had FoodCyclers. This quantity of food scraps processed in FoodCyclers and dropped off at the community collection sites represents 9.5 kg per household with curbside collection in Nelson.

Because many residents plan to use the pre-treated material as a soil amendment in their own yards and gardens, the quantity of pre-treated material collected and handled by the City of Nelson is not an indicator of the full weight and volume of organics being diverted through use of the FoodCyclers.

6.11.4 Composting and Use of Pre-treated Organics by City Parks Department

Between June 2023 and April 2024, City of Nelson operations and parks staff collected the pre-treated material dropped off by pilot project participants in the neighbourhood collection bins. This was an interim approach while the RDCK Central Compost Facility was being commissioned, and to enable the City to determine operational requirements and effort required to transport the pre-treated material.

The pre-treated material was transported to a secure City site for composting with leaves collected during fall and winter parks maintenance. The parks' compost piles were turned and monitored. Once the composting process was complete, the finished compost was used in garden beds throughout the city. Parks staff reported that the pre-treated material was easy to integrate into their pre-existing composting operations, and helped to create an excellent finished product which they were satisfied with when used in flower beds and with bedding plants. Parks staff reported cost savings due to needing to purchase fewer soil amendments. They did not observe any issues with pests or wildlife attraction.

[12] Paul, J. 2024. Composting dried and ground food scraps from FoodCycler (Appendix II)

6.11.5 Processing of Pre-Treated Organics at RDCK Compost Facility

The City of Nelson plans to transport a significant amount of the pre-treated material it collects to the Grohman transfer site (
Figure **15**), from where the material will be transported to the Central Compost Facility to be composted. The pre-treated material is placed in a 30-cubic yard bin at the Grohman transfer site, and is co-mingled with food waste and yard and garden materials that are dropped off at the site from residential and commercial sources.

Since April 2024, the City has been transporting pre-treated material to the Grohman transfer site, to be sent to the RDCK Central Compost Facility.

Figure 15. Transporting pre-treated material to transfer site.

6.12 FoodCycler End-of-Life Management

The City of Nelson emphasized its commitment to circular economy principles and waste diversion in its contract with FCS. The City of Nelson required FCS to provide and/or facilitate the recycling of FoodCyclers that were deemed unrepairable through the course of the pilot project.

FCS set up an agreement with ElectroRecycle, which is a program that collects and recycles small appliances and power tools across BC, managed by the producer responsibility organization Canadian Electrical Stewardship Association. ElectroRecycle collects small appliances at the Nelson Leafs Recycling Centre. Throughout the pilot project, the City of Nelson has dropped off 12 FoodCycler units and various components at the Nelson Leafs Recycling Centre, when they are deemed to be non-repairable.

ElectroRecycle communicated to the City of Nelson that electronics they collect are shipped to the BC Lower Mainland, where they are disassembled and processed for recycling.

6.13 City of Nelson Staff Resources to Implement Pilot Project

The planning and implementation of a municipal program such as the Pre-treated Organics Pilot Project requires staff time (Figure 16). Table 5 summarizes the City of Nelson staff positions involved in the pilot project, along with a description of the portion of the individual's job that was dedicated to the pilot project. The City shares this information to help other communities that may be contemplating a similar program understand what human resources they should plan to dedicate to their program to facilitate its success.

Figure 16. City of Nelson staff participate in open house panel discussion on pilot project (photo by Steve Ogle).

Table 5. City of Nelson staff positions and time dedicated to implementing the Pre-treated Organics Pilot Project.

City of Nelson Staff Position	Portion of Job Involved in Pilot Project	Description of Role
Climate Programs Coordinator	Full-time - permanent	• Developed project design and timelines • Coordinated program implementation • Program management • Staff supervision • Program evaluation
Organics Program Assistant(s)	Full-time – temporary Part-time - temporary	• Supported program delivery • Distributed FoodCyclers • Temporary roles: one full-time for over a year and one part-time for a few months; continued support will be on an as-needed basis
Public Works	Varied staff time to collect and manage pre-treated material and bins	• Planning and coordination with Climate & Energy staff • Monitor and collect pre-treated material from bins (1 hour per day, 4 days per week) • Clean collection bins for pre-treated material (1 hour per month) • Transport pre-treated material to the transfer station (3 hours every 3 weeks)
Climate and Energy Manager	Varied hours, ranging from high volume during program development to lower volume once program was implemented	• High-level project oversight and strategic direction • Budget management • Worked closely with the Coordinator to ensure project timelines and objectives were met
Climate and Energy Strategist	Varied hours, mostly during project development phase	• Provided support for research and reports • Supported grant applications and procurement processes, etc.
Communications Coordinator	Varied	• Supported the creation, review and finalization of public-facing educational materials • Sharing pilot project information on City communication channels
City Manager	Varied	• Lead authority and overall project oversight

7 Comparing the Nelson Pre-treated Organics Pilot Project to Curbside Green Cart Programs

This section is a description of curbside green cart programs used as a comparison to the Nelson Pre-treated Organics Pilot Project. One of the main objectives in evaluating the Pre-treated Organics Pilot Project was to compare the use of FoodCyclers with more traditional curbside green cart organics collection programs in the local region and other locations.

7.1 Town of Creston

The Town of Creston Food Waste Collection Program was one of the green cart programs used as a comparison. Creston is located in the Regional District of Central Kootenay, approximately 125 km southeast of Nelson. Data on the Town of Creston Food Waste Collection Program is found in various sections of this report.

The Town of Creston started offering curbside food waste collection and curbside recycling collection in late June 2022 to approximately 2,535 Creston households – mainly single-family, but also some secondary suites and some residential units in apartment buildings[13]. Food scraps are collected in 45-litre green carts. These carts, along with 7-litre kitchen catchers, were supplied to Creston households.

Residents can divert food scraps, and food-soiled paper through this program. Food waste collection occurs every week, and garbage and recycling are collected every other week. Food waste is collected manually using a split-packer truck, and is transported to the Creston landfill for composting by the RDCK.

Yard waste is not collected in the Creston green cart. The Town of Creston provides three curbside yard waste collection events each year – one in the spring, and two in the fall. During April and October, the Creston Landfill accepts garden and garden materials for free. Yard waste can be taken to the RDCK landfill for composting year-round (for a charge).

The Town of Creston has used a variety of tools and approaches to communicate with residents about their new food waste collection program, including information on their website, use of the ReCollect App, providing educational materials to all households, and employing two ‘curbside ambassadors’ in 2022 and one in 2023 to go door-to-door to educate residents.[14]

In 2023, the Town of Creston collected 225 tonnes of organics through its curbside Food Waste Collection Program. The organics stream represented 26% of the materials collected through curbside programs (garbage, organics and recycling) by the Town of Creston in 2023.[15]

[13] Farynowski, C. 2023. Personal communication with Colin Farynowski, Manager of Engineering, Town of Creston, Dec. 12, 2023.
[14] *Ibid.*
[15] *Ibid.*

7.2 Regional District of Kootenay Boundary

The Regional District of Kootenay Boundary (RDKB) started a Green Bin Curbside Collection program in October 2023. In August and September 2023, the RDKB distributed 80-litre green bins, kitchen catchers and educational materials to 8,418 households in Rossland, Warfield, Trail, Montrose, Fruitvale, Area A and Area B[16]. This included all single-family households and multi-family households with four units or less. Weekly curbside collection of the green carts using semi-automated collection began on October 1, 2023. Residents can divert food scraps, food-soiled paper and garden refuse through this program; grass clippings, leaves and scrub / brush materials are not accepted in the green bin. Organics and garbage are collected weekly with a split-packer truck. Organics are delivered to the Salmo Compost Facility. The RDKB has a bag-tag garbage system, where residents purchase garbage tags to place garbage curbside. There is no direct charge for using the green cart.

In rolling out its green cart collection program, the RDKB chose to set up its program to address some of the initial contamination challenges that had been experienced in the Town of Creston green cart program. RDKB staff closely monitor green carts for contamination, and do not pick up a green cart if it has visible contamination – instead an educational sticker is left on the cart, with information about what items do not belong in the green cart. This vigilance regarding monitoring and addressing contamination from the start of the program has been successful: staff operating the RDCK Central Compost Facility report very low rates of contaminants for organics coming from the RDKB program.[17]

The RDKB collected 234 tonnes of organics during the first six months of operating its Green Bin Curbside Collection Program. With an estimated 2% contamination rate, 229 tonnes of food waste and food-soiled paper were diverted. This was an average of 27 kilograms collected per household. On a yearly basis, this equates to 54 kilograms of organics collected per household. This rate of organics collection is below the diversion goals set by RDKB, and it intends to continue educational outreach to support residents to divert organics.

7.3 City of Castlegar

The City of Castlegar started curbside green cart collection on August 18, 2023. In the Castlegar program, food waste, yard and garden materials can all be placed in the 240-litre carts that have been provided to residential households with curbside collection service. Organics are transported to the RDCK Central Compost Facility in Salmo. Since the start of the green cart program, curbside garbage is collected bi-weekly.

In its first year of operation, the Castlegar green cart program collected 889 tonnes of organic materials – with this figure adjusted down to 871 tonnes when contaminants are removed[18]. The

[16] Belton, BA. 2024. Personal communication with BA Belton, Environmental Programs and Communications Coordinator, Regional District of Kootenay Boundary, May 28, 2024.
[17] *Ibid.*
[18] Bazar, C. 2024. Email communication with Crystal Bazar, Assistant Manager of Operations, City of Castlegar. Oct 21, 2024.

green cart program diverted 261 kilograms per household per year of source-separated organics (with contaminants removed) – including food waste, food-soiled paper, and yard and garden materials. This has led to a 46% decline in the quantity of garbage collected curbside[19].

There were many issues with contamination at the start of the Castlegar green cart program; however, these have improved substantially over time[20].

7.4 Regional District of Nanaimo

The Regional District of Nanaimo (RDN) has offered curbside green cart collection of food and food-soiled paper since 2011[21], and is considered a leader in waste diversion in Canada. The RDN has used a variety of policy, education and enforcement tools to achieve its waste diversion success[22].

The Regional District of Nanaimo collects green carts on a weekly basis, and garbage on a bi-weekly basis.

In its 2000-2020 Organics Diversion Strategy Summary Report, the Regional District indicates it collected on average 115 kilograms of food waste per household per year in the initial 10 years of green cart collection[23].

The Regional District noted that prior to green cart program roll-out, a survey of residents showed that 64% of residents reported composting in their backyard[24]. Prior to green cart program roll-out, 50% of the residential waste stream consisted of organics.

In March 2023, the Regional District of Nanaimo expanded its curbside collection program to include yard and garden materials. The purpose of this program expansion was to provide residents with a convenient and cost-effective way to dispose of yard and garden materials, increase organics diversion, and reduce greenhouse gas emissions.[25]

7.5 Cowichan Valley Regional District

The Cowichan Valley Regional District (CVRD) has had a weekly green cart collection program for food scraps and food-soiled paper (but not yard and garden materials) in the City of Duncan, District of North Cowichan, Town of Lake Cowichan, and Town of Ladysmith for at least 10 years. Residents are required to provide their own collection container that has a latched lid, is

[19] Bazar, C. 2024. Email communication with Crystal Bazar, Assistant Manager of Operations, City of Castlegar. Oct 21, 2024.
[20] *Ibid.*
[21] Regional District of Nanaimo. 2017. RDN Solid Waste Management Plan.
[22] *Ibid.*
[23] Regional District of Nanaimo. 2020. Organics diversion strategy 2000-2020.
[24] *Ibid.*
[25] Regional District of Nanaimo. 2024. RDN news release – RDN expanding curbside organics program. https://www.rdn.bc.ca/notice-2023-02-28

marked ‘Organics’ and weighs 50 lbs or less when full at the curb[26]. In 2025, the CVRD will start offering weekly curbside organics collection service for food waste, and yard and garden materials, using CVRD-provided 120-litre wheeled green carts[27].

7.6 City of Peterborough

Some comparisons have been made in this report with the new green cart program in the City of Peterborough, Ontario. This program was chosen as a comparison as it is a recent program (green cart collection began on October 31, 2023), the program has focused on food scraps and food-soiled paper, and detailed data on the quantity of source-separated organics and curbside garbage collected since the inception of the green cart program were available (see Appendix IV).

On October 31, 2023, the City of Peterborough implemented weekly curbside green cart collection using a 100-litre cart for food waste, food-soiled paper and pet waste. At the same time, the City changed curbside garbage collection to once every two weeks, and began requiring the use of clear bags for garbage. Yard and garden materials previously were and continue to be collected curbside weekly as a separate stream on a seasonal basis, between April and November.

During the first nine months of the Peterborough green cart program, the weight of garbage collected curbside declined by 64%[28]. The green cart program has collected 133 tonnes per week of food scraps and food-soiled paper from 28,000 households. Adjusted down to account for contamination, and pro-rated on an annual basis, the green cart program has collected 222 kilograms per household per year of food scraps and food-soiled paper[29].

[26] City of Duncan. 2024. Garbage, recycling, organics, yard waste and glass.
[27] CVRD. 2024. CVRD engagement for three-stream curbside collection.
[28] Burke, S. 2024. Email and phone communication with Shivaan Burke, Coordinator, Circular Economy & Waste Management, City of Peterborough, October 21, 2024.
[29] Campbell, B. 2024. Personal communication with Barry Campbell, Manager, Organic Waste Operations, City of Peterborough, October 11, 2024.

8 Evaluation of Social Parameters

When evaluating an organics collection and diversion program, it is valuable to understand the level of participation in the program, the perception residents have of the program, and the barriers or challenges people face when participating in the program.

8.1 Quantity of Households Using Pre-Treatment Appliance

As described in detail in Section 6.6, 76% of households in Fairview that receive curbside waste collection signed up for and received a FoodCycler as part of the pilot project. In the Fairview neighbourhood, the City invested extensive and varied efforts to educate households about the pilot project and invite households to sign up for and use a FoodCycler to divert food waste.

Across the entire City, 46% of Nelson households with curbside collection acquired a FoodCycler in 2023 – 2024. There remains a waitlist of eligible households interested in participating in the project. Outside the Fairview neighbourhood pilot area, the City of Nelson promoted the pilot project, and encouraged households to participate through a variety of communication channels. However, the City did not undertake door-to-door education and distribution of information about FoodCyclers the way it did in Fairview neighbourhood.

As a comparison, the Town of Creston Curbside Ambassador reported that 75 to 80% of Creston residents actively used their green cart.[30] This is a similar rate to the proportion of Nelson Fairview residents who signed up for and received a FoodCycler.

8.2 Resident Satisfaction With FoodCyclers

Pilot project participants expressed an extremely high level of satisfaction with the Pre-treated Organics Pilot Project, and the FoodCyclers they used to pre-treat their food waste. In the spring 2024 survey of Nelson households with a FoodCycler, of the 670 residents who completed the survey, 87% had enjoyed using the FoodCycler in their home, 11% somewhat enjoyed using it, and 2% did not enjoy using it. Residents were very likely (77%) or likely (14%) to recommend the FoodCycler to others. Ninety-one percent of survey respondents stated they plan to continue to use the FoodCycler in the long-term. All of these metrics indicate an extremely high approval rating for the pilot project from participants.

Some comments that residents shared associated with this very high level of satisfaction were:

- “ The Pre-Treated Organics Program has been very successful in my household. We have noticeably less garbage, less odour in our garbage and outdoor compost, and it's now very easy to "do the right thing". I'm so glad the City has invested and took the gamble to try this pilot. I hope it continues!! Great work by the staff.”
- “ Love it! I never suspected how much of a difference in my garbage output this would make.”

[30] Farynowski, C. 2023. Personal communication with Colin Farynowski, Manager of Engineering, Town of Creston, Dec. 12, 2023.

- " The pre-treated organics process has been tremendous. I can use it all winter when I normally wouldn't compost, my composter is now for leaves and lawn only so not attracting unwanted critters, the garbage has less scent and weighs less, and the unit itself has proven solid and reliable."
- "I love the FoodCycler. I was sceptical at first, but not having heavy, smelly, garbage bags is worth the counter space."
- "easy to use, convenient and a great way to reduce waste"
- " I love that I get to choose between adding the pre-treated waste to my garden (if I need it), or dropping it off knowing that it will be useful for the city. Either way, the reduction in waste feels great!"

Two strong themes that emerged from the spring 2024 survey of pilot project participants were:

- pilot project participants were very motivated to divert organics from the garbage, and were very excited for a program that would enable them to do so; and,
- many pilot project participants have had challenges with wildlife disrupting their garbage and/or backyard composting, and desire an organics diversion solution that reduces human-wildlife conflict.

Another clear theme that emerged from the spring 2024 results was that many of those who participated in the pilot project had experience managing a backyard compost, and with managing residential organics in general. A number of pilot project participants indicated their strong appreciation for the program, while at the same time mentioning that some aspects of the FoodCycler system may pose barriers to widespread community-wide adoption and use of the appliance as an organics diversion solution.

8.3 Barriers to Organics Diversion Using the Pre-Treatment Appliance

In any organics diversion program implemented by a municipality, there are barriers which can prevent or constrain the ability of some residents to participate. Anticipating, seeking feedback on, and addressing barriers to participation are important components of implementing a successful organics diversion program.

This section outlines and describes the main barriers and/or challenges that were most frequently cited by survey respondents.

City of Nelson staff made a concerted effort to respond to the barriers identified by pilot project participants through education and troubleshooting. However, some of the issues outlined below remained prevalent throughout the pilot project. City of Nelson staff observed that there have been far fewer repair and troubleshooting needs associated with the newest batch of 300 FoodCycler Eco 5 units distributed in spring 2024, in comparison with the previous batch of appliances distributed. In particular, there have been fewer residents contacting the City about noise, jammed buckets and repair issues.

8.3.1 Odour

The FoodCycler Eco 5 manual states: “Carbon filtration systems are not designed to change odours, rather they are used to reduce the intensity of odours. Processing particularly odorous foods may cause the unit to emit odours during operation and may shorten the lifespan of the filter.”[31]

In the spring 2024 survey of Nelson households with FoodCyclers, 21% of survey respondents reported having issues with the FoodCycler emitting odour. A few resident comments related to odour were:

- “ it does smell a little when processing, but not an issue for me because I keep it in the garage”
- “Smell of the composter is bad!! Even with brand new filter. Can’t keep it inside”
- “the smells when the machine is running are quite strong. It’s okay for the garage, but it would be very challenging for living indoor spaces”
- “No issues for me because we have a heated garage where we keep the unit but I don’t think I would want to run the food processor in my house. Noise and smell could be an issue for folk in apartments, etc.”
- “I live in a small house and sometimes the smell is off-putting, it's mild but smells up the entire house”
- “Running the FoodCycler during the winter has been more challenging due to the smell, and not having a space to put it that is above freezing, but away from our living spaces.”
- “Smell – changed the carbon filter and that fixed it.”

Given that replacing the carbon filter is likely the most effective way to address odour issues, there may be a need for more ongoing education of residents about how to do this, and where to source the replacement carbon filter material (i.e. at the carbon refill station).

8.3.2 Noise

On its website, Food Cycle Science states that the FoodCycler Eco5 “runs quietly and odorlessly”.

Of the 670 residents with FoodCyclers who completed the spring 2024 survey, 18% indicated that they had experienced noise challenges with their FoodCycler. This was the second most frequently cited issue people had experienced with the FoodCycler. A few resident comments related to noise were:

- “ my place is small, and it’s a bit noisy”
- “ very loud squeaky noise”
- “ if the scraps are too dry, the FoodCycler will get noisy and jam”
- “ can’t run it overnight, too loud”

[31] Food Cycle Science Corporation. no date. FoodCycler Eco 5™ user manual.

- “ noisy and smelly, so I have put it to use in a secure outbuilding away from our main living space. Works well this way.”

City of Nelson staff noted that many noise issues can be mitigated through troubleshooting and repair, and have been done so through the appliance repair program. City staff also noted that it is likely that not all residents with FoodCyclers are aware that they can access the repair program to address some noise issues with the appliance.

8.3.3 Jammed Bucket and Mechanical Issues

The most commonly-cited issue with the FoodCycler was a jammed FoodCycler bucket (34% of 670 survey respondents), and challenges getting the bucket to engage properly in the appliance. One survey respondent requested “better info on troubleshooting common issues; most not covered in handbook, especially the jammed bucket issue”.

Some survey respondents noted that they were already on their second or third FoodCycler, due to mechanical issues with the first one or two appliances. These participants generally expressed appreciation for the manner in which City staff had run an effective and efficient repair / replacement program for FoodCyclers with mechanical issues.

8.3.4 Unprocessed Food Waste

As noted in the FoodCycler Eco 5 manual, “food scraps with a high moisture content can result in moist pre-treated material, and may need to be re-processed with a second cycle”. Of the survey respondents, 16% had experienced issues with unprocessed food waste. Some comments shared by respondents related to this issue were:

- “ cycle finishes, but waste is still damp, unfinished”
- “ sometimes still moist at the end of the cycle”
- “only very small amounts of unprocessed food waste, and only occasionally”
- “issue with unprocessed food waste due to fibrous items. This has been rectified in later uses.”

8.3.5 Weight, Size and Environmental Constraints for FoodCycler

A number of survey respondents communicated that the weight (13.6 kg (30 lbs)) and size of the FoodCycler had posed some challenges for them. For others, the requirement that the FoodCycler not be located outdoors, or in any place where it is likely to get wet or be subjected to temperatures below freezing was a constraint.

A few comments from residents who completed the spring 2024 survey were:

- “It is quite a large and heavy appliance that I don't have room to store on my counter so I have to move it whenever I use it. This might be a barrier to older folks or people with mobility issues.”
- “I couldn’t use it due to its weight and inability to keep in an unheated garage.”

- “the only barriers have been having a small kitchen/house, where the cycler and bucket for it are a bit bulky to fit anywhere nicely.”
- “I have already returned my Food Cycler. I hadn't realized it couldn't be operated in the unheated garage and I didn't have any counter space that could accommodate it.”
- “Finding a suitable space for the unit in our home. We don’t have a lot of extra space and the unit can’t just go anywhere (needs power, to be on a solid and stable surface, etc). We did manage to find a space eventually but am not sure how this issue could be solved. Definitely a challenge for people with smaller spaces.”
- “We have ours in the workshop basement. It’s too big, no counter room.”
- “Hard to find a location in my home as it’s small and I have no garage with power.
- “The unit is difficult for my elderly friends to use - The bucket can be heavy and sometimes gets stuck when placing it in the machine.”
- “Unit is heavy, not easy to pick up as no handles. Only use outside on my deck. Worried about using it during the winter as I don't want to use it inside, and too cold to use it outside.”

8.3.6 Other Barriers

Some other challenges or barriers that numerous residents cited in their comments in the spring 2024 survey were:

- concerns that running the FoodCycler was leading to excessive moisture and heat in their home;
- concerns about the impact of running the FoodCycler indoors on indoor air quality; and,
- challenges with the FoodCycler not being big enough to process the food waste from larger families.

8.3.7 Learning Curve and Complexity of Operating the FoodCycler

A number of survey respondents noted that although they enjoyed using the FoodCycler, they felt there was a substantial learning curve and/or effort to get the most out of the appliance. Residents reflected that this may pose a barrier to widespread adoption of the FoodCycler. Some survey respondent comments on this topic included the following:

- “ Using the [FoodCycler] has its challenges. There's a learning curve there.”
- “Somehow its really hard to use if you are a first timer but if you figured it out, then all the desired things might happen, like for example is the less of mess, less of odour and many more.”
- “I had trouble getting the routine down of what contents worked best for the unit. How much wet and how much dry, what greens needed cutting up, ie long flower stems or sizes of things”
- “Unit does take up space, and requires more effort to manage than composting or a green bin.”

- “the appliances require a good deal of orientation and perseverance to make them work for one's life, something I don't see the majority of city residents being able or willing to do”
- “Great alternative to backyard composting. Easy solution for me but I know it’s not the perfect solution for everyone.”
- “When the bucket is jammed, it can be tricky to dislodge and fix. Maybe a specific video/resource for unclogging blades/auger safely? Develop a cleaning tool to scrape out stuck material? Otherwise, it's amazing. For less patient people, dealing with jammed cycles may pose as a barrier to long-term participation/proper use.”
- “I think it’s a good step. I suspect not everyone will have the wherewithal to use a FoodCycler correctly long-term. But it’s nice for those who do. Thanks.”
- “It's a great fit for our household as we have a manageable kitchen scrap load and we have a garden that can use the end product. And we like gardening! But, it that was different, I could see some challenges with smell, storage, and overall benefit...”

8.3.8 Comparative Analysis – Barriers to Organics Diversion for Green Cart Programs

8.3.8.1 Contamination

One of the most significant challenges for most green cart programs is residents placing incorrect materials in the green cart. This leads to contamination of the organics stream, and is often one of the biggest challenges for compost facility operators processing materials from green cart programs. In some circumstances, highly contaminated loads end up being disposed of in the garbage, if the level of contamination is so high that facility staff and equipment cannot properly process the organics present in the load.

The green cart programs used as comparators to the Pre-treated Organics Pilot Project reported contamination levels ranging from 2% to 10% by weight. Even a small proportion of contamination can cause expensive and difficult challenges for compost facility operators.

Colin Farynowski, Manager of Engineering for the Town of Creston, noted that in the early stages of Creston’s Food Waste Collection Program, there were major issues with contamination in the green carts[32]. It appeared in some cases that residents had placed inappropriate items in the green cart because they did not agree with the new green cart program. This challenge was also experienced by the City of Castlegar at the outset of their green cart program[33]. For both communities, this issue of apparent intentional contamination resolved after a number of months; however, challenges with people not placing the correct items in the green cart due to misunderstanding the program remain.

[32] Farynowski, C. 2023. Personal communication with Colin Farynowski, Manager of Engineering, Town of Creston, Dec. 12, 2023.
[33] Belton, BA. 2024. Personal communication with BA Belton, Environmental Programs and Communications Coordinator, Regional District of Kootenay Boundary, May 28, 2024.

BA Belton, Environmental Programs and Communications Coordinator for the Regional District of Kootenay Boundary reported that with the RDKB green cart program, they have had zero tolerance for contaminants in green carts since the program started. If a green cart has visible contamination, the RDKB does not collect it, and staff place a sticker on the green cart indicating why the cart was not collected. This has resulted in minimal contamination in the organics stream for this program. The RDKB has found it challenging to educate residents that certified compostable bags are not allowed in its green cart program.

These contamination issues experienced with green cart programs were a very minimal challenge in the Pre-treated Organics Pilot Project, given that people are required to process their own food waste using the FoodCycler, and therefore are far less likely to place contaminants like plastic into the FoodCycler. The only contamination challenge experienced with the Pre-treated Organics Pilot Project was people placing improper items in the community collection bins for pre-treated organics once the locks were removed in September 2024.

8.3.8.2 Odour

Smell is a commonly-cited barrier for residents using green cart programs. Some residents find the food waste becomes smelly in their kitchen catcher. Others find that the food waste placed into their green cart becomes smelly, particularly during periods of hot weather. Many green cart programs share tips with residents on how to reduce odour challenges with their green cart, such as the Town of Creston tips on 'Yuck! How do I deal with insects and odours?'[34]

8.3.8.3 Insects and Pests

Another commonly-cited barrier to participation in green cart programs is insects and other pests. Some residents find their indoor kitchen catcher harbours insects such as fruit flies. Outdoor green carts can be breeding grounds for fly larvae (maggots), especially in hot summer weather, and if carts are not placed out for collection weekly. The discovery of insect larva such as maggots in the green cart can be repulsive for some people, and may cause them to stop using their green cart. Many curbside green cart programs offer tips to residents on how to reduce issues with insects and pests, such as the RDKB's 'Tips to Reduce the "Yuck" Factor'.[35]

8.3.8.4 Weight and Size of Green Cart

For residents with mobility challenges and the elderly, moving a green cart into position for collection can be a challenge and barrier, with this challenge increasing with increased collection cart size. Elderly residents in the RDKB have indicated that they find it difficult to move the 80-litre green cart. In the first few months of its program, the RDKB had a challenge with some residents placing kitchen catchers at the curb, instead of the green carts.[36]

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[34] Town of Creston. 2024. Organics / food waste – FAQs. https://www.creston.ca/organicsfood-waste
[35] RDKB. 2024. Garbage, organics and recycling - Tips to reduce the "yuck" factor. https://rdkb.com/Utilities-Waste/Garbage-Organics-and-Recycling/Organics
[36] Belton, BA. 2024. Personal communication with BA Belton, Environmental Programs and Communications Coordinator, Regional District of Kootenay Boundary, May 28, 2024.

9 Evaluation of Environmental Parameters

9.1 Waste Characterization

The City conducted a waste characterization study in the Fairview neighbourhood prior to and following implementation of the Pre-Treated Organics Pilot Project, to determine how the composition of the garbage stream changed through use of the FoodCyclers. Both waste characterization studies were completed following the *Recommended Waste Characterization Methodology for Direct Waste Analysis Studies in Canada.*[37]

9.1.1 Nelson Fairview Waste Composition – Pre-Pilot Project

The RDCK retained Tetra Tech to conduct a multi-sector waste composition study in the summer of 2023. The City of Nelson worked closely with the RDCK to have the RDCK study include collection of waste composition data for the Nelson Fairview neighbourhood in August 2023.

Figure 17 shows the composition of the residential curbside garbage stream for the Fairview neighbourhood in August 2023, prior to implementation of the FoodCycler pilot project. Although the main distribution of FoodCyclers had not yet occurred at the time of this waste composition study, there were more than 100 'early adopter' households with FoodCyclers in the neighbourhood at this time. Four of the 66 households where waste was sampled as part of the waste composition study had FoodCyclers (6% of households sampled). In August 2023, 52% of the garbage in the Fairview neighbourhood consisted of organics, with the majority of the organics being food scraps (41%), with smaller proportions of food-soiled paper (8%) and yard and garden materials (3%).

Results from the August 2023 RDCK Comprehensive Waste Composition Study showed that the Nelson Fairview residential curbside garbage had a higher proportion of compostable materials in the garbage (52%) than single-family households sampled in Castlegar and Salmo. For the combined households sampled from Castlegar, Salmo, and Nelson, 37% of the garbage consisted of compostable materials[38]. At the time of sampling, none of these communities had implemented community organics collection programs.

City of Nelson staff believed that the Fairview neighbourhood likely had a higher proportion of compostable materials in the garbage than neighbouring communities, as in recent years there has been increasing human-wildlife conflict (and in particular human-bear interactions) occurring in Nelson, which has prompted many Nelson residents to stop backyard composting. This trend was also reflected in community survey results. In the post-pilot project survey in spring 2024, 20% of pilot project participants indicated that they had stopped backyard composting due to wildlife concerns or issues.

[37] CCME. 1999. Recommended waste characterization methodology for direct waste analysis studies in Canada. PN 1497.
[38] Tetra Tech. 2023. RDCK 2023 Comprehensive waste composition study.

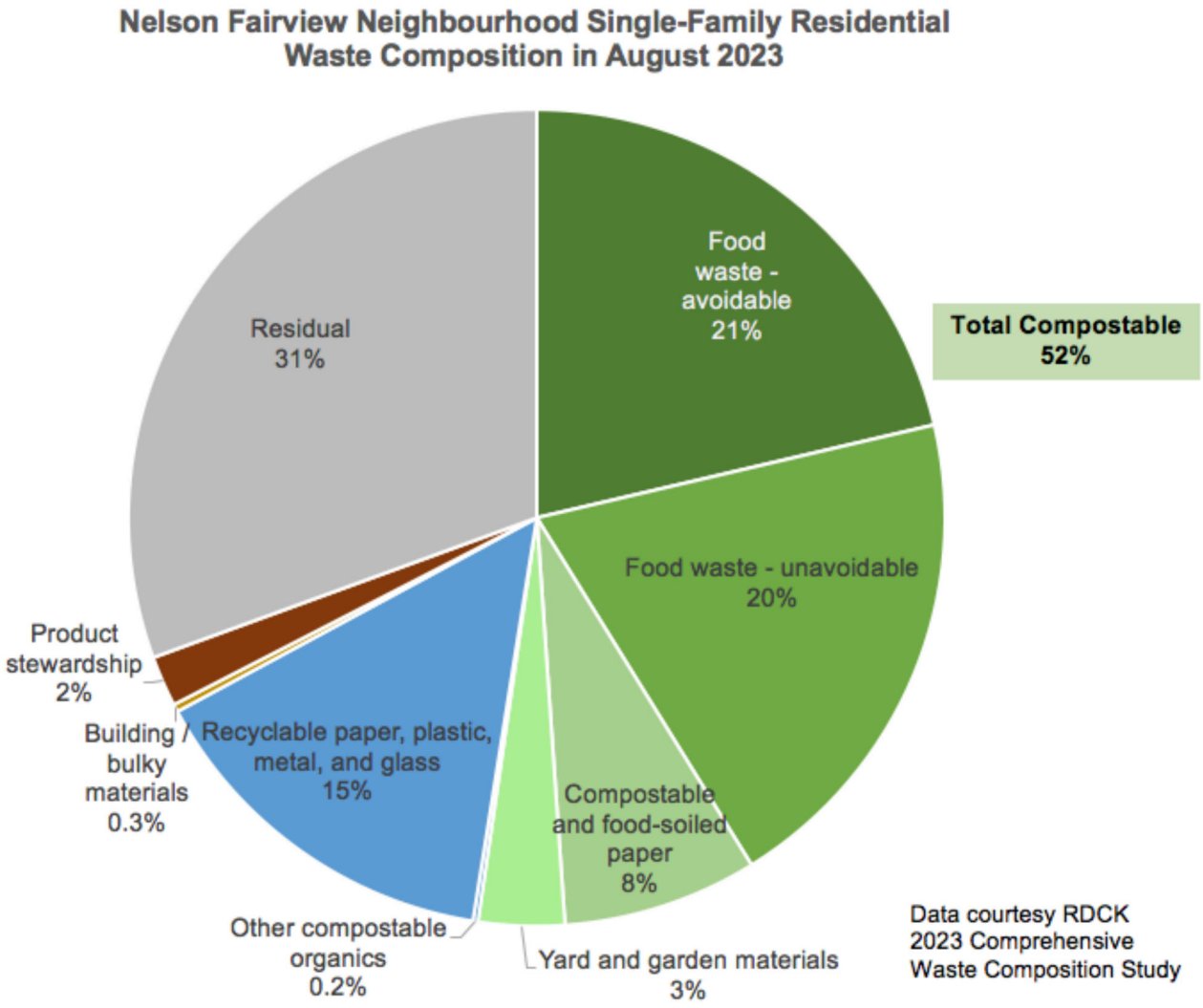

Figure 17. Composition of the Nelson Fairview residential curbside garbage prior to the Pre-treated Organics Pilot Project, August 2023.

The term ‘avoidable food waste’ in waste composition studies refers to food that could have been eaten by a person (e.g. slice of pizza, loaf of bread, whole apple). ‘Unavoidable food waste’ is food scraps that are not generally eaten by a person (e.g. fruit and vegetable peels, egg shells, and coffee grounds).

In this study, the ‘product stewardship’ category included electronics managed by extended producer responsibility (EPR) programs, beverage containers eligible for a deposit return, and household hazardous waste managed by EPR programs.

9.1.2 Nelson Fairview Waste Composition – Mid-Pilot Project April 2024

The City of Nelson retained S-Cubed Environmental to conduct follow-up waste composition studies in the Fairview neighbourhood in April and July 2024. The report for the April and July 2024 Fairview Waste Characterization Study is found in Appendix V.

Figure 18 shows the composition of the Fairview curbside residential garbage in April 2024, mid-way through the FoodCycler pilot project. Only curbside data is included in this figure (no multi-family data), to enable a comparison of the same area and dwelling type in the Fairview neighbourhood, pre- and post-pilot project. In April 2024, 46% of the garbage for single-family dwellings sampled consisted of organics, with the majority of the organics being food scraps (37%), with smaller proportions of food-soiled paper (4%) and yard and garden materials (4%).

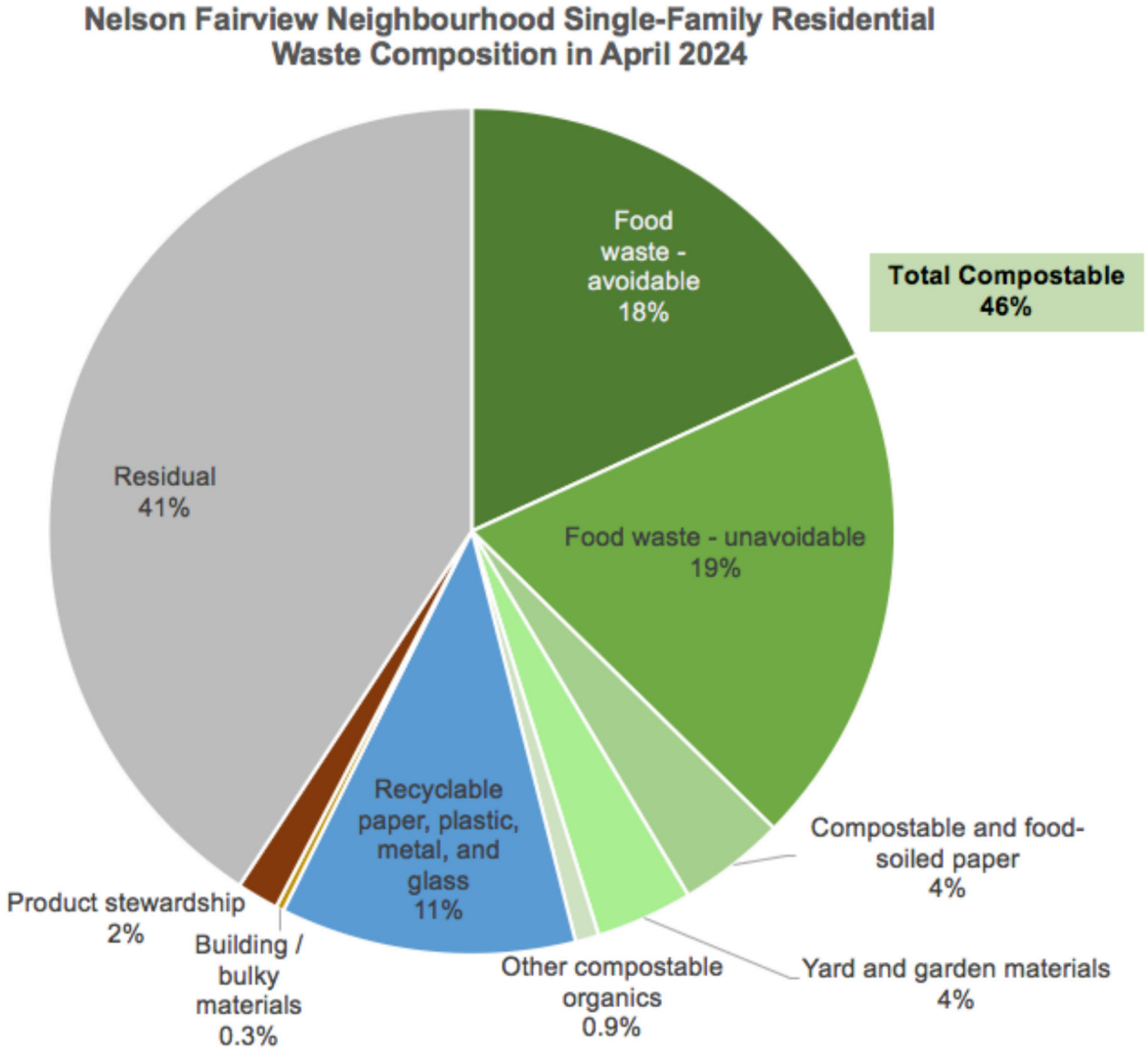

Figure 18. Composition of Nelson Fairview curbside garbage, mid-way through the pilot project, April 2024.

9.1.3 Nelson Fairview Waste Composition – Post-Pilot Project July 2024

Figure 19 shows the composition of the Fairview curbside residential garbage stream in July 2024, following implementation of the FoodCycler pilot project. Given that the waste composition for households with FoodCyclers and without FoodCyclers were assessed separately in the July 2024 waste characterization study, data for Figure 19 have been normalized to reflect that 76% of households in Fairview had a FoodCycler and 24% of households did not have a FoodCycler. This figure depicts the overall waste composition for the entire neighbourhood, including households that do and do not have a FoodCycler.

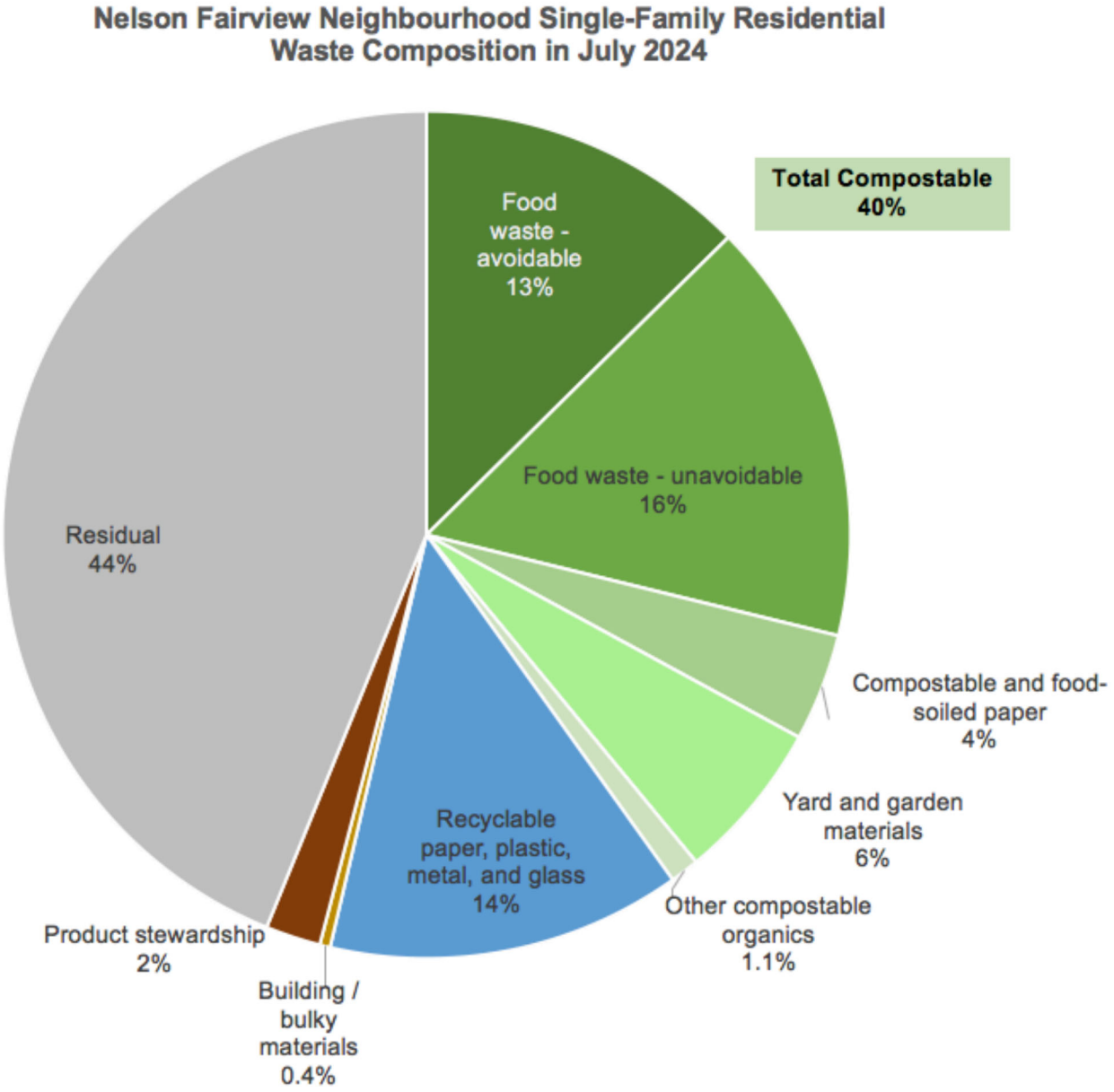

Figure 19. Nelson Fairview curbside garbage composition following pilot project implementation, July 2024.

In July 2024, 40% of the Fairview curbside garbage sampled consisted of organics, with the majority of the organics being food scraps (29%), with smaller proportions of food-soiled paper (4%) and yard and garden materials (6%).

Results from the July 2024 waste composition study in Fairview showed that 10.6% of the garbage stream consisted of organic materials that are compostable, but could not have been processed by the FoodCycler, including 3.5% food and food-soiled paper that cannot be handled by the FoodCycler (i.e. pizza boxes, large amounts of food-soiled paper), 1.1% foods that cannot be processed in the FoodCycler (i.e. large bones), and 6.1% yard and garden materials.

9.1.4 Comparison of Waste Composition for Fairview Households With and Without a FoodCycler

As part of the July 2024 waste characterization study, separate garbage samples were collected from households that had signed up for and received a FoodCycler, and households which did not have a FoodCycler.

Figure 20 shows the waste composition for Fairview households sampled that had a FoodCycler, while Figure 21 shows the waste composition for Fairview households that did not have a FoodCycler.

There was a greater proportion of compostable materials in the garbage of households that did not have a FoodCycler. The garbage of households without a FoodCycler had on average 50% compostable material, while the garbage of households with a Foodcycler had on average 37% compostable material.

The non-FoodCycler households had a garbage composition similar to that measured across the Fairview neighbourhood prior to the implementation of the pilot project. During the pre-pilot project waste characterization study in August 2023, 52% of the Fairview residential garbage stream consisted of compostable materials.

These data indicated that the Pre-treated Organics Pilot Project had reduced the proportion of organics in the garbage stream for those residents who participated.

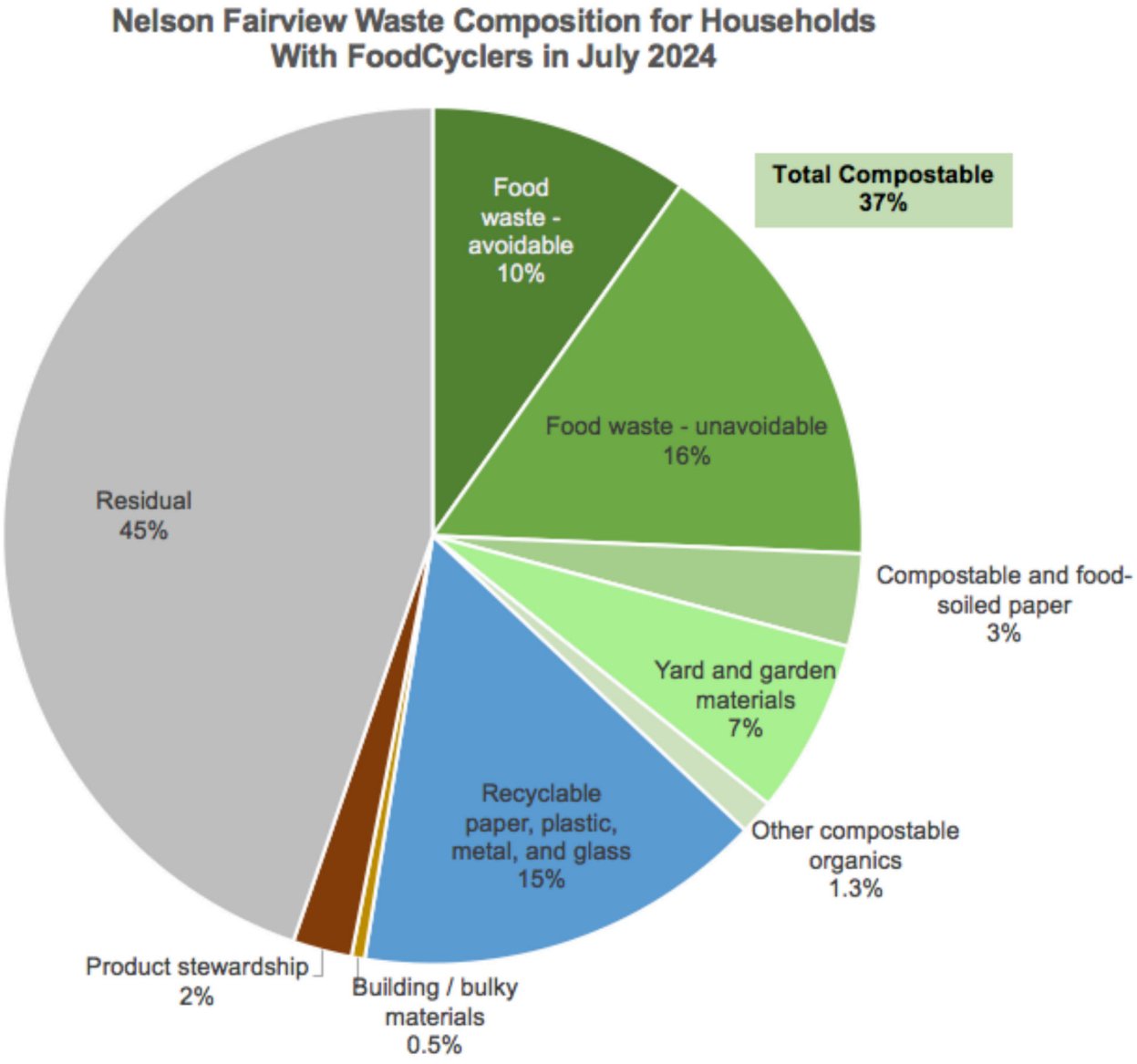

Figure 20. Waste composition for Nelson Fairview households with FoodCyclers in July 2024.

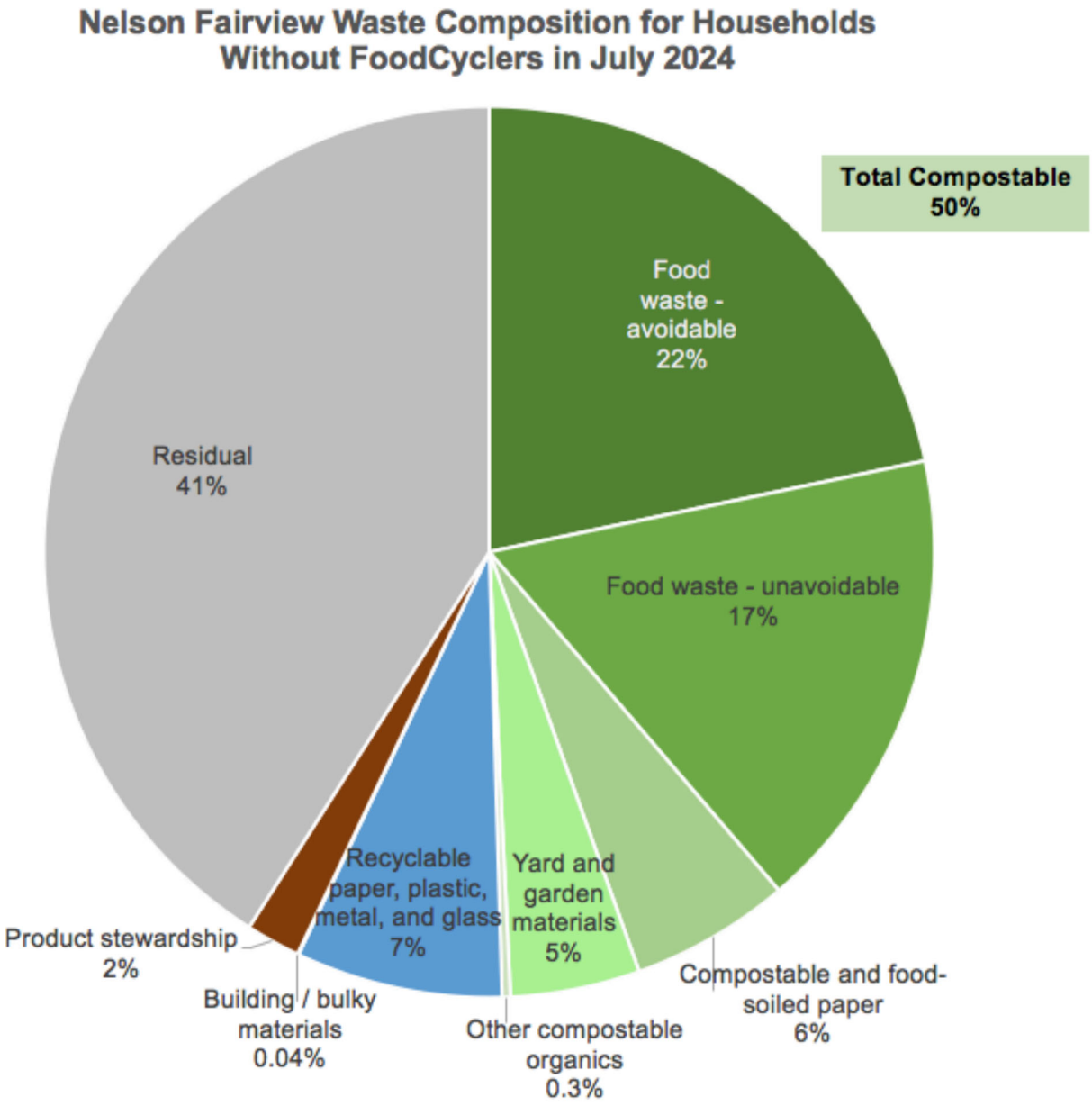

Figure 21. Waste composition for Nelson Fairview households without FoodCyclers in July 2024.

9.1.5 Comparative Analysis – Waste Composition in Communities with Green Cart Programs

As outlined in Section 7, the Town of Creston implemented a green cart collection program for food scraps and food-soiled paper in July 2022. Figure 22 shows the residential curbside garbage composition in Creston in August 2023, measured as part of the RDCK Comprehensive Waste Composition Study.

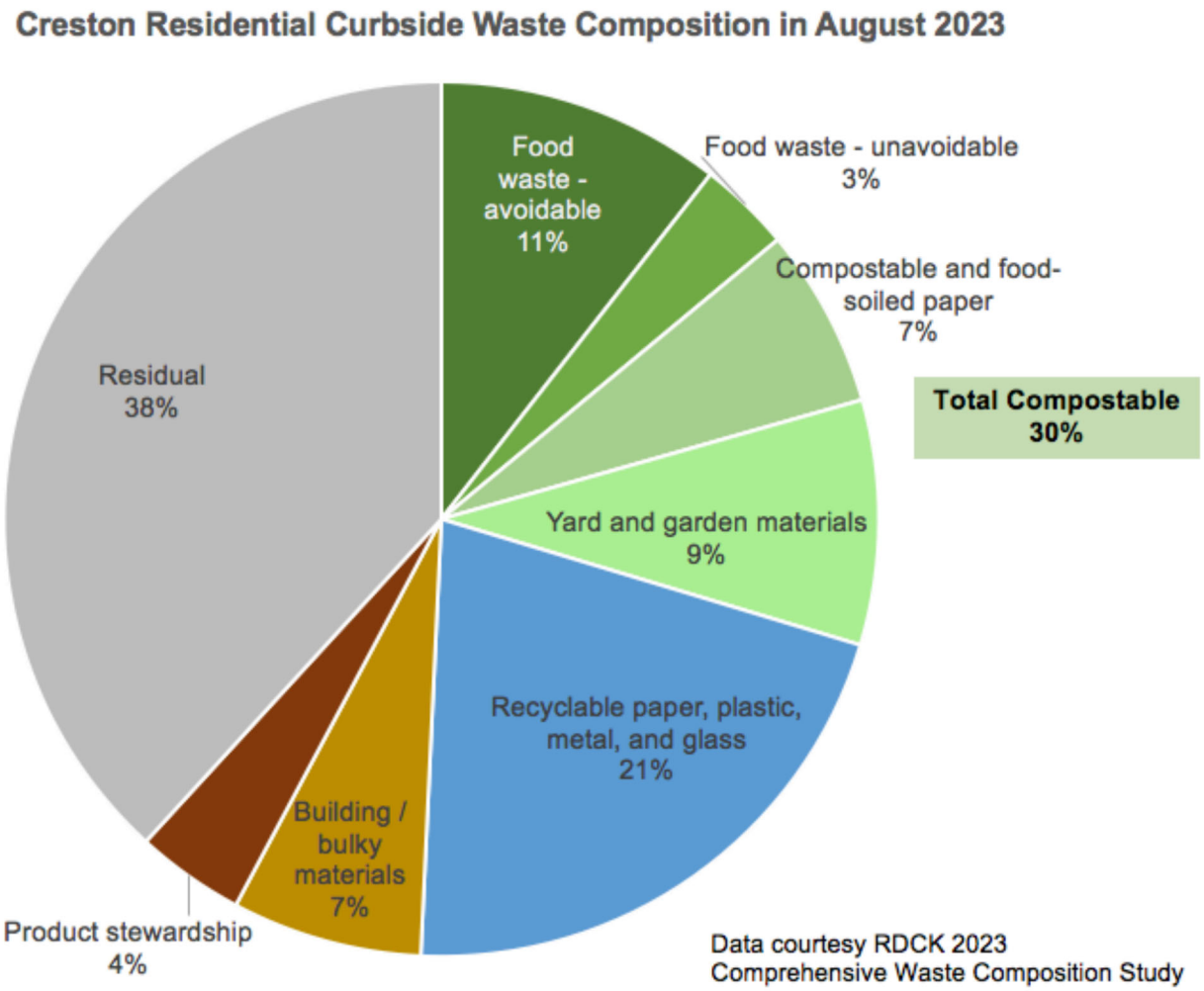

Figure 22. Town of Creston residential curbside waste composition in August 2023.

Following implementation of the Creston green cart program, the Creston residential curbside garbage stream contained 30% compostable items.

The proportion of compostable items in the Creston residential garbage was lower than for the overall Fairview neighbourhood in July 2024 (40%) and lower than for Fairview residents that had FoodCyclers in July 2024 (37%).

The Cowichan Valley Regional District has had a weekly green cart collection program for food scraps and food-soiled paper (but not yard and garden materials) in the City of Duncan, District of North Cowichan, Town of Lake Cowichan, and Town of Ladysmith for at least 10 years. Waste composition studies were carried out in these communities in 2015 and 2017, and the combined results reported in a 2017 Waste Composition Study report. These data showed the residential curbside garbage for these communities contained 31% compostable materials (Figure 23)[39].

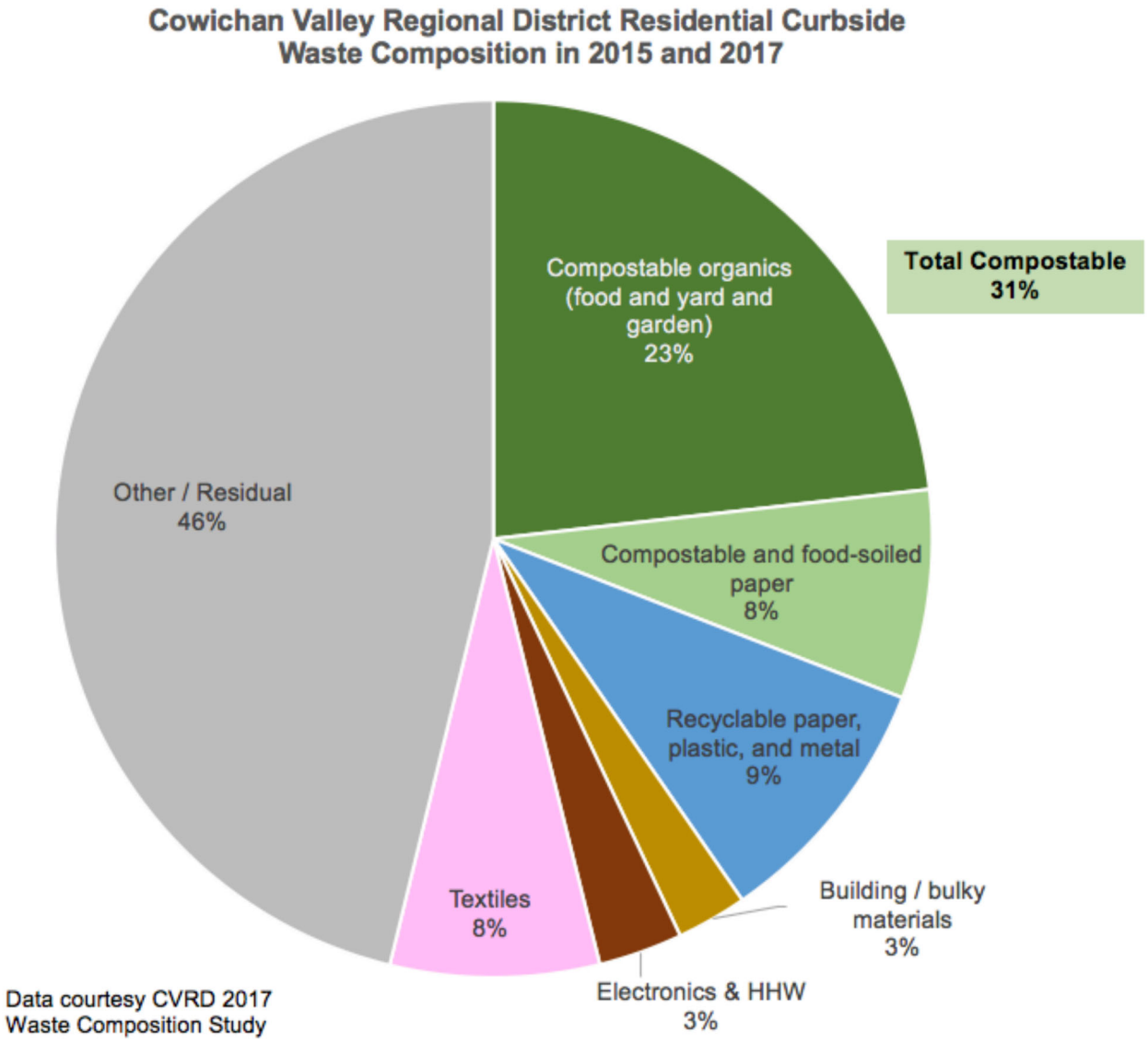

Figure 23. Cowichan Valley Regional District residential curbside waste composition in 2015 and 2017.

[39] 2017. Tetra Tech. Cowichan Valley Regional District waste composition study.

The Regional District of Nanaimo has offered curbside green cart collection of food-scraps and food-soiled paper since 2011. A 2022 waste composition study found that the Nanaimo residential curbside garbage consisted of 29% compostable items (Figure 24)[40]. At the time of this study, City of Nanaimo households were able to place yard and garden materials in their green carts. Prior to implementation of its curbside green cart program, the Nanaimo residential garbage consisted of 50% organic materials – very similar to the residential curbside garbage composition of Nelson prior to the Pre-treated Organics Pilot Project[41].

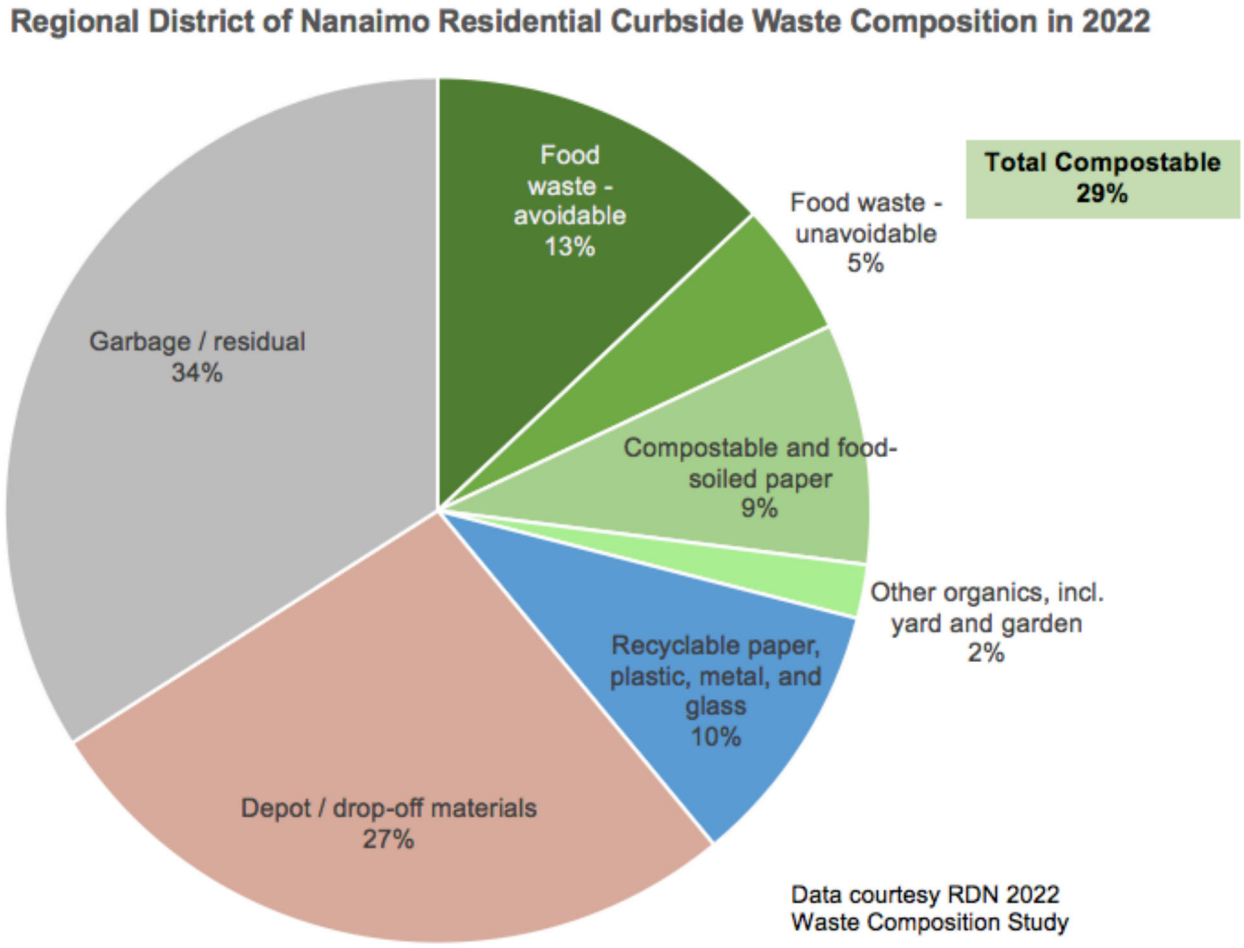

Figure 24. Regional District of Nanaimo residential curbside waste composition in 2022.

Waste composition data from BC communities with curbside green cart programs that focus on food waste show residential curbside garbage streams with approximately 30% compostable materials. This is lower than the 40% compostable materials found in the Fairview residential garbage in July 2024. These data indicate that BC green cart programs focusing on food waste have resulted in a lower proportion of compostable materials in the garbage than the FoodCycler pilot project in the Nelson Fairview neighbourhood.

[40] Tetra Tech. 2023. Regional District of Nanaimo 2022 waste composition study.
[41] Regional District of Nanaimo. 2020. Organics diversion strategy 2000-2020.

It is interesting to note that there are relatively significant quantities of avoidable food waste in the residential garbage for the Fairview neighbourhood with the Pre-treated Organics Pilot Project, and in the comparative communities with green cart programs. The Fairview curbside residential garbage had 13% avoidable food waste in July 2024, which was the same as for the Regional District of Nanaimo curbside residential garbage in 2022. The Town of Creston curbside residential garbage had 11% avoidable food waste in 2023. There is notable opportunity in all of these communities to encourage and support residents to reduce avoidable food waste. The City of Nelson has initiated some of this work through efforts such as providing tips on reducing food waste, and food storage and preservation on its FoodCycler program guide and website.

9.2 Quantity of Organics Diverted

A primary goal of the Nelson Pre-treated Organics Pilot Project was to divert food scraps from the garbage so they can be used in a beneficial manner.

In the spring 2024 survey of households with FoodCyclers, 65% of respondents stated that they have added or plan to add the pre-treated material directly to their garden soil or green space, while 38% stated that they plan to compost the pre-treated material in their backyard composter. Given this, it was not possible to directly measure the quantity of food waste diverted through the pilot project in the same way that a green cart program can be evaluated by measuring the quantity of organics collected in green carts.

Key metrics which were used to indicate the quantity of food scraps diverted from the garbage through use of the FoodCyclers were the weight of garbage being collected in bi-weekly garbage collection, and the proportion of the garbage that consisted of food scraps and food-soiled paper.

One factor in Nelson that makes measurement of single-family residential waste generation complex is that there is a culture of residents self-hauling waste materials to the RDCK Grohman Narrows (Nelson) Transfer Station – including materials that could have been disposed of through curbside collection. RDCK staff reported that a user survey conducted at Grohman Transfer Station from June to August 2023 showed that 43% of 16,000 users were Nelson residents with access to curbside collection[42]. This indicated that a rather significant portion of the waste collected at Grohman Transfer Station is likely generated by Nelson residents with access to curbside collection. No information is available on the quantity or composition of waste Nelson residents are depositing at the Grohman Transfer Station.

9.2.1 Estimated Quantity of Organics to be Diverted – Fairview and City-Wide

When planning and implementing an organics diversion program, it is valuable to quantify the potential size of the organic resource that can be diverted.

[42] 2023. E-mail communication from Heidi Bench, Resource Recovery Projects Advisor, RDCK. December 8, 2023.

Table 6 shows the estimated quantity of compostable materials present in the curbside garbage for Fairview and the entire Nelson residential sector receiving curbside collection, prior to implementation of the Pre-treated Organics Pilot Project. The estimates in Table 6 were calculated by combining the Fairview waste composition data pre-pilot project (August 2023) with the 2022 Fairview and City-wide garbage tonnage data.

The estimates of potential organics to be diverted are very likely under-estimates (potentially substantial underestimates), given the prevalence with which Nelson residents self-haul garbage to the Grohman Transfer Station, and the fact that only residential curbside garbage tonnage was used in the calculations for these estimates.

Table 6. Estimated quantity of compostable materials in the Fairview and City-wide residential curbside garbage stream prior to the Pre-treated Organics Pilot Project.

Compostable Material Category	% of Residential Garbage (Aug 2023)	Estimated Quantity in Fairview Residential Curbside Garbage (tonnes/year)	Estimated Quantity in Total Nelson Residential Curbside Garbage (tonnes/year)
Food waste - avoidable	21%	33	140
Food waste - unavoidable	20%	31	130
Compostable and food-soiled paper	7.7%	12	51
Yard and garden materials	3.4%	5.2	22
Other compostable organics	0.2%	0.3	1.3
Total Compostable	**52%**	**81 tonnes/year**	**344 tonnes/year**
		89 kg/household/year	82 kg/household/year

The waste composition and tonnage data indicated that in Fairview, there were 89 kilograms of organics per household per year available to be diverted from curbside garbage. Total Nelson residential tonnage data indicated 82 kilograms organics per household per year are available to be diverted from curbside garbage. These potential tonnages include all of the compostable material categories listed in Table 6, including those that cannot be processed in the FoodCycler.

A total of 41% of the curbside residential garbage stream consisted of food waste in the August 2023 Fairview waste composition study. We have specified the proportions of avoidable food waste (21%) and unavoidable food waste (20%) separately, as the large prevalence of avoidable food waste shows the opportunity to support residents to reduce the loss of edible food at home – which would result in cost savings for residents and the City, reduced quantities of organics to manage, and environmental benefits.

The figures for potential quantities of organics to be diverted as presented in Table 6 are lower than expected, and very likely underestimates due to the prevalence of self-hauling of residential garbage to the transfer station. As a comparison, the Regional District of Nanaimo (RDN) collected on average 115 kilograms of food waste per household per year between 2011 and 2020 with its green cart program[43], and the City of Peterborough has collected 222 kilograms per year of food waste, food-soiled paper and pet waste in its green cart program which began in November 2023[44]. Peterborough does not have data on what proportion of green cart organics is pet waste; however, prior to implementing its green cart program, 11% of the curbside garbage consisted of pet waste, and 41% consisted of food waste (Appendix IV).

In its 2019 Solid Waste Summary Report, the City of Nanaimo noted that as it has increased curbside collection services through green cart collection, and later automated curbside 3-stream collection service, there has been a decline in residential self-haul trips to its waste disposal facilities, accompanied by an increase in the quantity of materials collected curbside, with organics having the largest increase.[45] The curbside waste diversion rate for the City of Nanaimo has increased to 66%.[46]

9.2.2 Nelson Fairview Neighbourhood – Before and After Pilot Project

9.2.2.1 Fairview Garbage Tonnage Data

Prior to the start of the pilot project, in 2022, the City collected 154 tonnes of residential curbside garbage in Fairview from 910 dwellings. This was 170 kilograms of garbage per household per year. Extrapolation of data from the first six months of 2024 indicates that the City will collect 144 tonnes of curbside residential garbage in 2024 (from 930 dwellings), which is 155 kilograms of garbage per household per year – a decline of 15 kilograms per year per household.

Given that no other waste diversion programs were implemented in Fairview neighbourhood during the FoodCycler pilot project, we assumed that the decline in curbside garbage generation is due to the diversion of food waste using the FoodCycler. The curbside waste tonnage data suggest that 15 kilograms of food waste was diverted per household per year using the FoodCycler.

9.2.2.2 Fairview Combined Waste Composition and Garbage Tonnage Data

As shown in Section 9.1, the proportion of food scraps and food-soiled paper in the Fairview garbage stream declined from 49% in August 2023 to 33% in July 2024.

When we combine the Fairview curbside garbage tonnage data with the waste composition change for food scraps and food-soiled paper from before the pilot project to after the implementation of the pilot project, these combined data suggest that there was a 32 kilogram

[43] Regional District of Nanaimo. 2020. Organics diversion strategy 2000-2020.
[44] Briand, D. and B. Campbell. 2024. City of Peterborough Journey to Maximum Waste Diversion, Presentation at Compost Council of Canada conference, Niagara Falls, Oct. 4, 2024.
[45] City of Nanaimo. 2020. 2019 Solid waste summary report.
[46] *Ibid.*

per household per year decline in food scraps and food-soiled paper in the Fairview garbage stream through implementation of the Pre-treated Organics Pilot Project.

A question that emerges with this estimate of a 32 kilogram per household per year decline in food waste is why this decline in food waste was not observed in the Fairview garbage tonnage data – which showed a decrease of 15 kg/hh/year.

A potential reason for this discrepancy is that as people began using their FoodCyclers, they reduced the frequency with which they self-hauled residential garbage to the RDCK Grohman transfer station, and placed some of the materials they would have previously self-hauled into their curbside garbage. This would have therefore displaced some of the decline in tonnage that we would have expected to see if 32 kilograms per household per year of food waste was being diverted through use of the FoodCyclers. As described in Section 9.2.1 above, the City of Nanaimo has found that as it has increased curbside waste collection services, the quantity of materials it collects curbside has increased, and the quantity of people self-hauling materials to its waste disposal facility has decreased.

9.2.2.3 Fairview Estimated Food Waste Diversion Rate

Based on the discussion presented above in Section 9.2.2.2, we have chosen to use the 32 kilograms per household per year as the estimate of the quantity of food waste diverted through use of the FoodCyclers.

9.2.3 Nelson City-Wide

Although the Pre-treated Organics Pilot Project was carried out in the Fairview neighbourhood, remaining FoodCyclers were distributed to residents throughout the city. By June 2024, a total of 46% of Nelson households with curbside collection had a FoodCycler (in comparison, 76% of of Fairview households with curbside collection had a FoodCycler).

9.2.3.1 Nelson City-Wide Curbside Garbage Tonnage Data

Prior to the start of the pilot project, in 2022, the City of Nelson collected 657 tonnes of residential curbside garbage from 4,212 dwellings across the City. This was 156 kilograms of garbage per household per year.

Data for the first six months of 2024 suggest that the City will collect 657 tonnes of curbside residential garbage in 2024 – which is the exact same quantity of garbage collected in 2022. The total number of households with curbside garbage collection has increased by 20 over this two-year timespan, so the quantity of curbside garbage disposed per household declined 1 kilogram per household per year to 155 kilograms per household per year.

The lack of change in curbside garbage tonnage data for the City was also reflected in a relatively constant level of garbage tag revenue over the past two and a half years, as tracked by City of Nelson staff.

9.2.3.2 Nelson City-Wide Estimated Food Waste Diversion Rate

As shown in Section 9.2.1, prior to the pilot project we estimate that there were 344 tonnes/year organics in the City-wide residential curbside garbage (82 kilograms/household/year), with 321 tonnes/year consisting of food waste and compostable paper, and the remaining items consisting of yard and garden materials, and other compostable organics.

Curbside garbage tonnage data suggest that across the entire City of Nelson, the quantity of organics in the garbage stream decreased by 1 kilogram per household per year, with 46% of households having a FoodCycler.

No waste characterization studies were carried out City-wide for Nelson as part of this pilot project evaluation. However, if we assume that the demographics of the Fairview neighbourhood are relatively representative of the broader Nelson residential sector that receives curbside waste collection, we can apply waste composition results from Fairview to the broader Nelson community to estimate the quantity of food waste and compostable paper that may have been diverted, based on the proportion of households City-wide with (46%) and without (54%) FoodCyclers.

By applying the waste composition results from Fairview to the proportion of City-wide households with and without FoodCyclers, we estimate that there would have been a 75 tonne decline in food waste and compostable paper in the curbside garbage stream, which is 18 kilograms per household per year, and that the City-wide garbage stream would comprise of 44% total compostable organics.

The fact that the curbside garbage data only show a decline of 1 kilogram per household per year suggests that either (a) City-wide, when Nelson households divert organics from their curbside garbage, they place some of the materials they previously self-hauled to Grohman transfer site into their residential garbage, or (b) the Fairview data are not a good estimator of the level of organics diversion occurring through the use of FoodCyclers across the City, and the level of diversion is actually lower.

9.2.4 Comparative Analysis – Organics Diverted in Communities with Green Cart Programs

The British Columbia *Best Management Practices for Curbside Collection of Residential Organic Waste* states that typical organics capture rates for existing green cart programs in BC range from 120 to 140 kilograms of food waste per household per year[47].

Figure 25 shows a comparison of the estimated quantity of food waste diverted per household per year for the Pre-treated Organics Pilot Project in Fairview neighbourhood and four comparison green cart programs – three in BC and one in Ontario. The green cart programs chosen as comparisons all focused on collection of food scraps and food-soiled paper (not yard and garden materials). We note that the data for green cart programs are from curbside green

[47] British Columbia Ministry of Environment and Climate Change Strategy. no date. Best management practices for curbside collection of residential organic waste.

cart collection data provided by municipalities, while the estimate for the quantity of food waste diverted for the Pre-treated Organics Pilot Project in Fairview is based on the change in the proportion of food scraps and food-soiled paper in the garbage stream measured through two waste composition studies, combined with City of Nelson curbside garbage collection tonnage data.

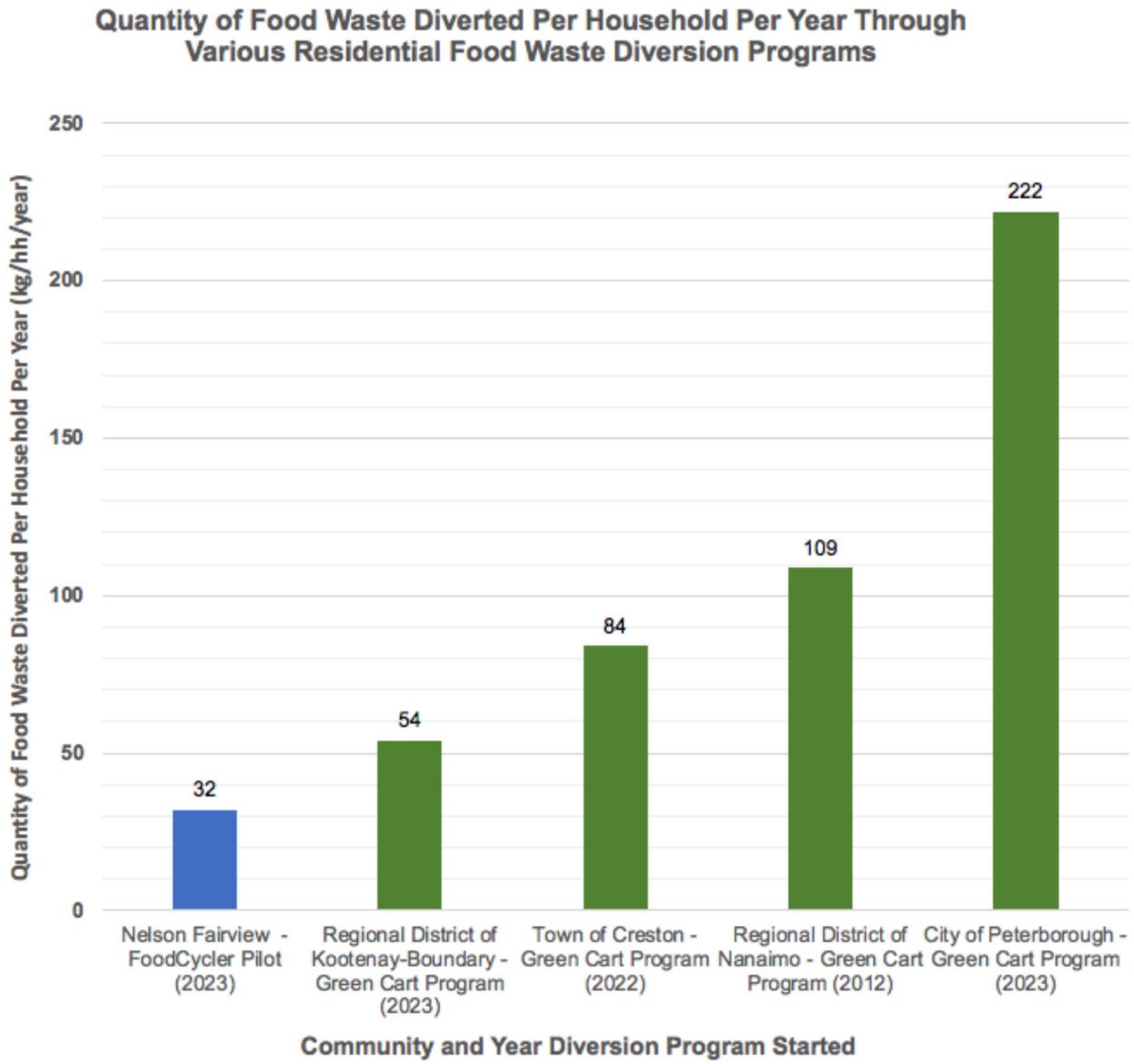

Figure 25. Quantity of food waste diverted per household per year through various residential food waste diversion programs.

The quantities of food waste diverted per household per year for the green cart programs have been adjusted for the quantity of contaminants present in the organics stream, as these contaminants were removed and taken to landfill, and therefore not diverted.

The City of Castlegar was not included in Figure 25, as Castlegar's green cart program also accepts yard and garden materials. However, given Castlegar's proximity to Nelson and similarity in organics program timing, it was of interest to Nelson that Castlegar had an organics diversion rate of 261 kilograms per household per year (after adjusting for 2% contamination).[48]

Figure 26 shows the annual quantity of food waste diverted in relation to the quantity of curbside garbage collected for the municipalities for which these combined data were available.

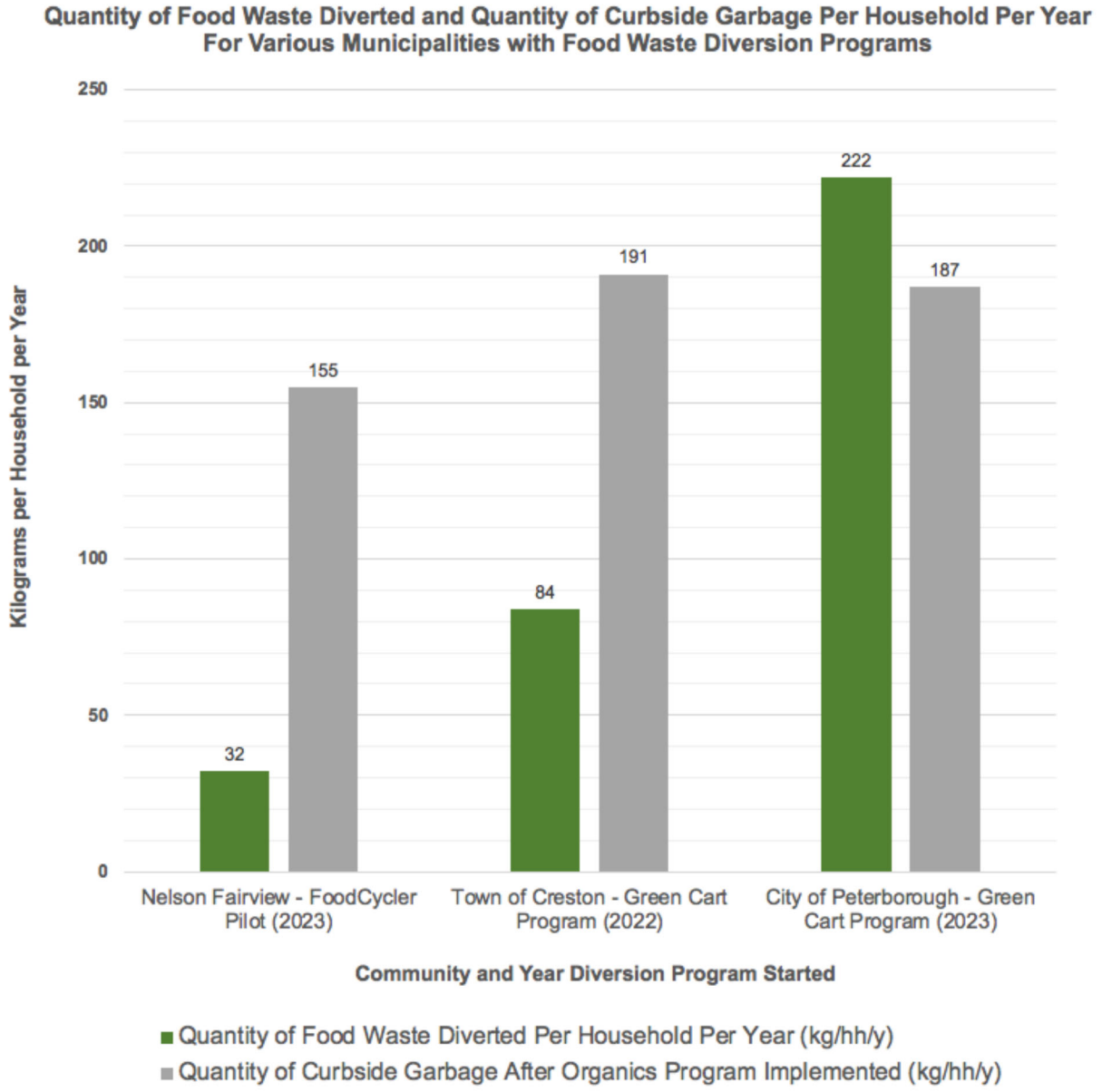

Figure 26. Quantity of food waste diverted and quantity of curbside garbage per household per year for various municipalities with food waste diversion programs.

[48] Bazar, C. 2024. Email communication with Crystal Bazar, Assistant Manager of Operations, City of Castlegar. October 21, 2024.

All communities depicted in Figure 26 have bi-weekly garbage collection. Staff at the City of Nelson and Town of Creston noted that self-hauling of residential waste is common in both Nelson and Creston[49]. Staff at the City of Peterborough indicated that there is very minimal self-hauling of residential garbage in Peterborough[50].

The Nelson Fairview Pre-treated Organics Pilot Project diverted less food waste per household per year than the green cart programs in the Town of Creston, Regional District of Kootenay Boundary, Regional District of Nanaimo and City of Peterborough.

There are a few potential reasons why the use of FoodCyclers is leading to a lower rate of food waste diversion in the Nelson Fairview neighbourhood than for green cart food waste collection programs in other communities. These include:

- there are more steps and effort involved in processing and managing food waste through use of the pre-treatment appliance (FoodCycler) in comparison with placing food scraps and food-soiled paper in a green cart (chopping large and/or fibrous items, ensuring that a batch of food waste to be cycled has a variety of materials in it, excluding items that cannot be processed (i.e. large bones), re-running cycles for wet materials, etc.) – see Section 6.3.4;
- some types of food-soiled paper cannot be processed in the FoodCycler, such as pizza boxes and large quantities of food-soiled paper;
- residents are experiencing some of the barriers noted by survey respondents (Section 8.3), which limit their ability to use the FoodCycler to divert food waste; and,
- the FoodCycler processes approximately 1 kilogram of food waste at a time – larger quantities of food waste need to be processed over multiple cycles, which could be a barrier in moments when large quantities of food waste are generated in a household (see Section 8.3).

[49] Farynowski, C. 2023. Personal communication with Colin Farynowski, Manager of Engineering, Town of Creston, Sept 27, 2024.
[50] Campbell, B. 2024. Personal communication with Barry Campbell, Manager of Organics Operations, City of Peterborough, October 11, 2024.

9.3 Greenhouse Gas Emissions – ECCC Calculator

One of the primary motivators for the City of Nelson to establish an organics diversion program was to reduce GHG emissions. Therefore, measuring the impact of the Pre-treated Organics Pilot Project on GHG emissions was a key parameter in the evaluation of the pilot project.

9.3.1 Environment and Climate Change Canada GHG Calculator

In 2022, Environment and Climate Change Canada (ECCC) created a greenhouse gas (GHG) Calculator for Organic Waste Management to help municipalities, project developers, waste generators, and others calculate the GHG impact of different organic waste management approaches[51]. The calculator can be used to compare composting, anaerobic digestion, incineration, and landfilling of mixed municipal solid waste, source-separated organic waste, and single-stream organics (such as yard waste or food scraps).

Although the ECCC calculator has not been designed to measure GHG emissions associated with use of the FoodCycler specifically, we were able to use the calculator to estimate the GHG emissions savings associated with the Pre-treated Organics Pilot Project. All assumptions and adjustments made to use the calculator for the purpose of measuring GHG emissions reductions associated with use of the FoodCyclers have been noted in Appendix VI.

As described in the *Methodology Report for the GHG Calculator for Organic Waste Management*, the full GHG impact of placing organics in a landfill occurs over several decades following the actual disposal of the organics[52]. As the organics slowly decompose in the absence of oxygen in the landfill, they generate methane. The majority of the methane is released over a period of 20 years, with decreasing quantities of methane continuing to be released in further years[53]. As a result, it is valuable to measure the cumulative GHG emissions associated with organic waste management options over an extended time period – we used a 30-year time period in the GHG calculator.

Appendix VI shows all assumptions and data used to calculate emissions reductions associated with the pilot project using the ECCC GHG Calculator.

[51] Environment and Climate Change Canada. 2023. Greenhouse gas calculator for organic waste management.
[52] ECCC. 2022. Greenhouse gas calculator for organic waste management: Methodology report. p.34.
[53] *Ibid.*

9.3.2 GHG Emissions Reductions Associated with Fairview Pilot Project

Figure 27 graphically depicts the cumulative emissions generated over a 30-year timeframe for baseline and Pre-treated Organics Pilot Project scenarios in the Fairview neighbourhood.

Baseline scenario: Total GHG emissions emitted over a 30-year time period from the municipal solid waste (MSW) generated in Fairview in the year 2022 – prior to the Pre-treated Organics Pilot Project.

Alternative scenario #1: Total GHG emissions emitted over a 30-year time period from the MSW and pre-treated organics generated and processed from the Fairview neighbourhood in the year 2024 – after implementation of the Pre-treated Organics Pilot Project.

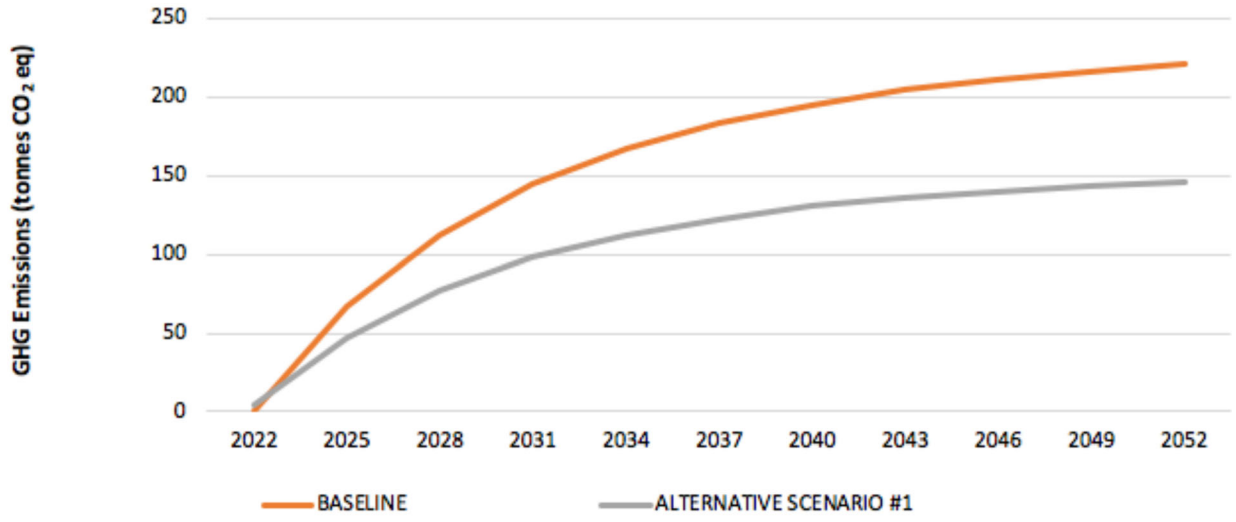

Figure 27. Annual and cumulative GHG emissions for baseline and Pre-treated Organics Pilot Project scenario (alternative scenario #1) on an annual basis for Nelson Fairview neighbourhood, as measured by ECCC GHG calculator.

When MSW is disposed of in a landfill, methane and other GHGs are generated over many years. As shown in Figure 27, annual emissions are high during the first few years, and then gradually decline.

Figure 28 shows the GHG emissions reductions associated with implementation of the Pre-treated Organics Pilot Project in the Fairview neighbourhood.

It is important to emphasize that the values in this graph represent the 30-year cumulative GHG emission impact from one year's generation of garbage (and pre-treated material) (not 30 years).

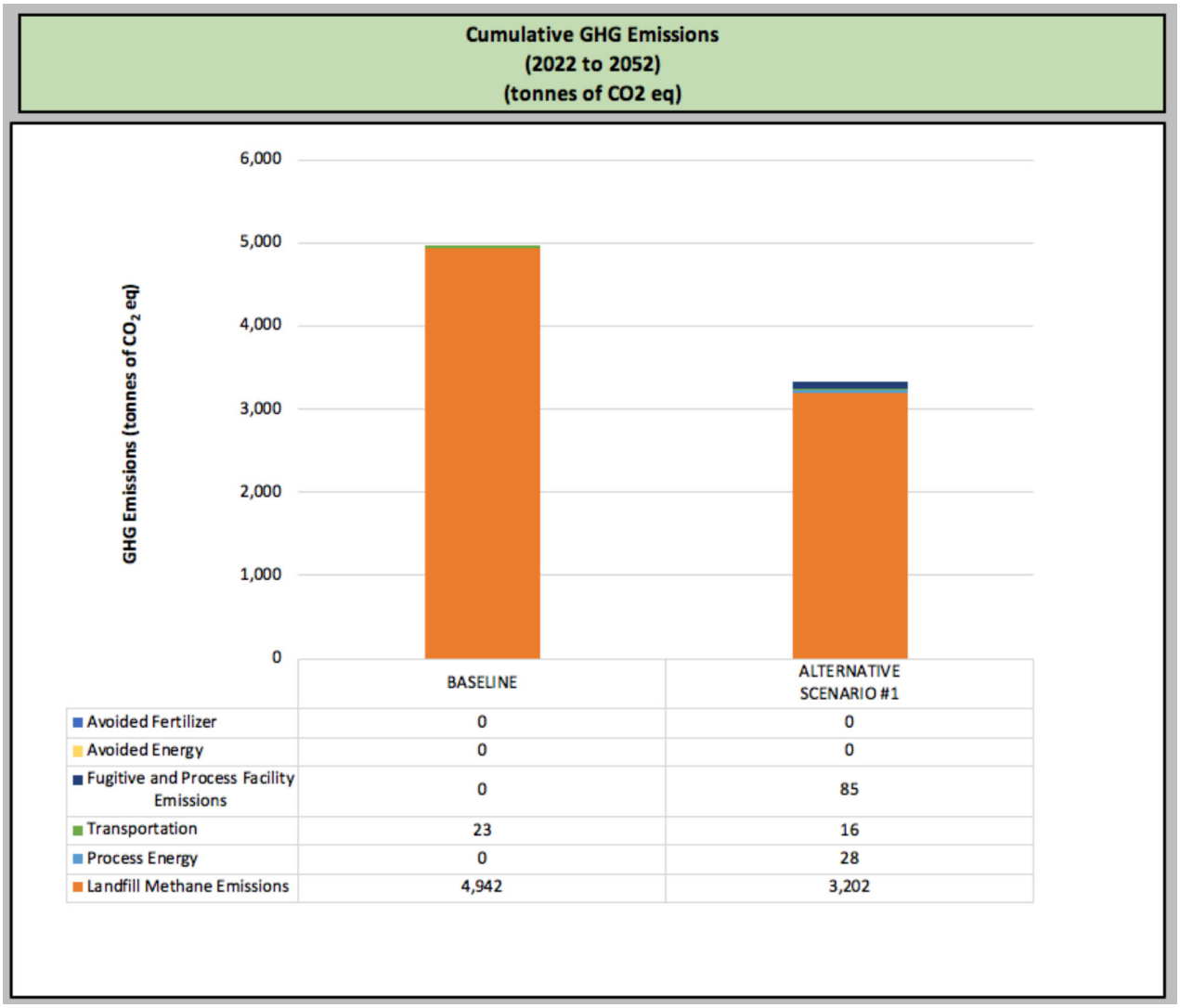

Figure 28. Cumulative GHG emissions associated with annual curbside MSW and pre-treated organics for before (baseline) and after (alternative scenario #1) implementation of the Pre-treated Organics Pilot Project in Nelson Fairview (ECCC GHG calculator).

The orange portions of the bars show methane emissions generated by organic materials disposed of in the landfill. The green portions of the bars show emissions associated with the transportation of pre-treated material to the compost facility, and compost from the compost facility to the location where it will be used. Landfill methane emissions make up the vast majority of GHG emissions associated with organic materials. Transportation emissions are an extremely small portion of emissions.

The reason for the large GHG impact associated with the disposal of organic materials in a landfill is that when organic materials such as food scraps decompose in the anaerobic (no oxygen) environment in a landfill, methane gas is produced. Methane gas has 86 times more

global warming potential than carbon dioxide over a 20-year period[54]. Municipal solid waste landfills generate about 16% of Canada's methane emissions[55].

Table 7 summarizes the GHG emissions reductions that will be achieved through implementation of the Pre-treated Organics Pilot Project, as calculated by the ECCC GHG calculator.

Table 7. GHG emissions reduction through implementation of Pre-treated Organics Pilot Project in Fairview neighbourhood (ECCC GHG calculator).

Cumulative GHG Emissions, By Source and Management Endpoint (2022 to 2052) (tonnes of CO2 eq)		
	BASELINE	**ALTERNATIVE SCENARIO #1**
LANDFILL		
Distance (km)	48 km	48 km
LFG recovery (option)	No LFG Recovery	No LFG Recovery
LFG collection efficiency (%)	0%	0%
Energy displacement (option)	None: Flare only	None: Flare only
Landfill Methane Emissions (Fugitive & Flaring) (CH_4)	4,942	3,202
Emissions from LFG Combustion for Energy Production (CH_4 and N_2O)	0	0
Emissions from LFG Upgrading for RNG/CNG (CH_4)	0	0
Process Energy (CO_2)	0	0
Transportation (CO_2)	23	15
Avoided Energy (CO_2)	0	0
COMPOSTING AND LAND APPLICATION		
Total distance (km)	N/A	10 km
Fugitive Methane (CH4) and Nitrous Oxide (N_2O) Emissions	0	85
Transportation (CO_2)	0	1
Process Energy (CO_2)	0	28
Avoided Fertilizer Production (CO_2)	0	0
SUMMARY		
Direct GHG Emissions	**4,965**	**3,332**
Avoided Energy GHG Emissions	**0**	**0**
Avoided Fertilizer Production GHG Emissions	**0**	**0**
Total Avoided GHG Emissions	**0**	**0**
NET GHG EMISSIONS	**4,965**	**3,332**
DIRECT GHG EMISSIONS REDUCTION FROM BASELINE		**-1,633**

Note: LFG = landfill gas; RNG = renewable natural gas; CNG = compressed natural gas

[54] Environment and Climate Change Canada. 2022. Reducing methane emissions from Canada's municipal solid waste landfills.
[55] Environment and Climate Change Canada. 2024. National inventory report: GHG sources and sinks in Canada (2022).

According to the ECCC GHG Calculator, implementation of the Pre-treated Organics Pilot Project in the Fairview neighbourhood in 2024 resulted in the reduction of 1,633 tonnes CO_2-equivalent GHG emissions, measured over a 30-year time period. This GHG emissions reduction would be realized each year the Pre-treated Organics Pilot Project continues in Fairview with the same level of participation as in 2024.

It is important to note that this estimate of GHG emissions reductions is based on the curbside garbage tonnage data for Fairview, and the results from the August 2023 and July 2024 waste composition studies. There is inherent variability in the results from one-day waste characterization studies, as they represent a snapshot in time.

There are 930 single-family households that receive curbside waste collection in the Fairview neighbourhood. Therefore, the estimated per household reduction in GHG emissions through implementation of the pilot project was 1.8 tonnes CO_2-equivalent (measured over a 30-year time period).

9.3.3 Diverting Organics From Landfill Is Greatest Opportunity for Nelson to Reduce GHG Emissions Associated with Waste

As shown in Figure 28 above, landfill methane emissions make up the vast majority of GHG emissions associated with organic materials. Transportation emissions are an extremely small portion of emissions.

Generally, the two greatest opportunities to reduce the GHG emissions associated with municipal solid waste are to divert compostable and recyclable materials from the garbage, and to send waste to a landfill that has a landfill gas recovery system. In the case of Nelson's food waste, for every 1 tonne of food waste diverted from the garbage and processed in a pre-treatment appliance and/or composted, there are 38 tonnes of GHG emissions avoided, as calculated with the ECCC GHG calculator (Figure 29).

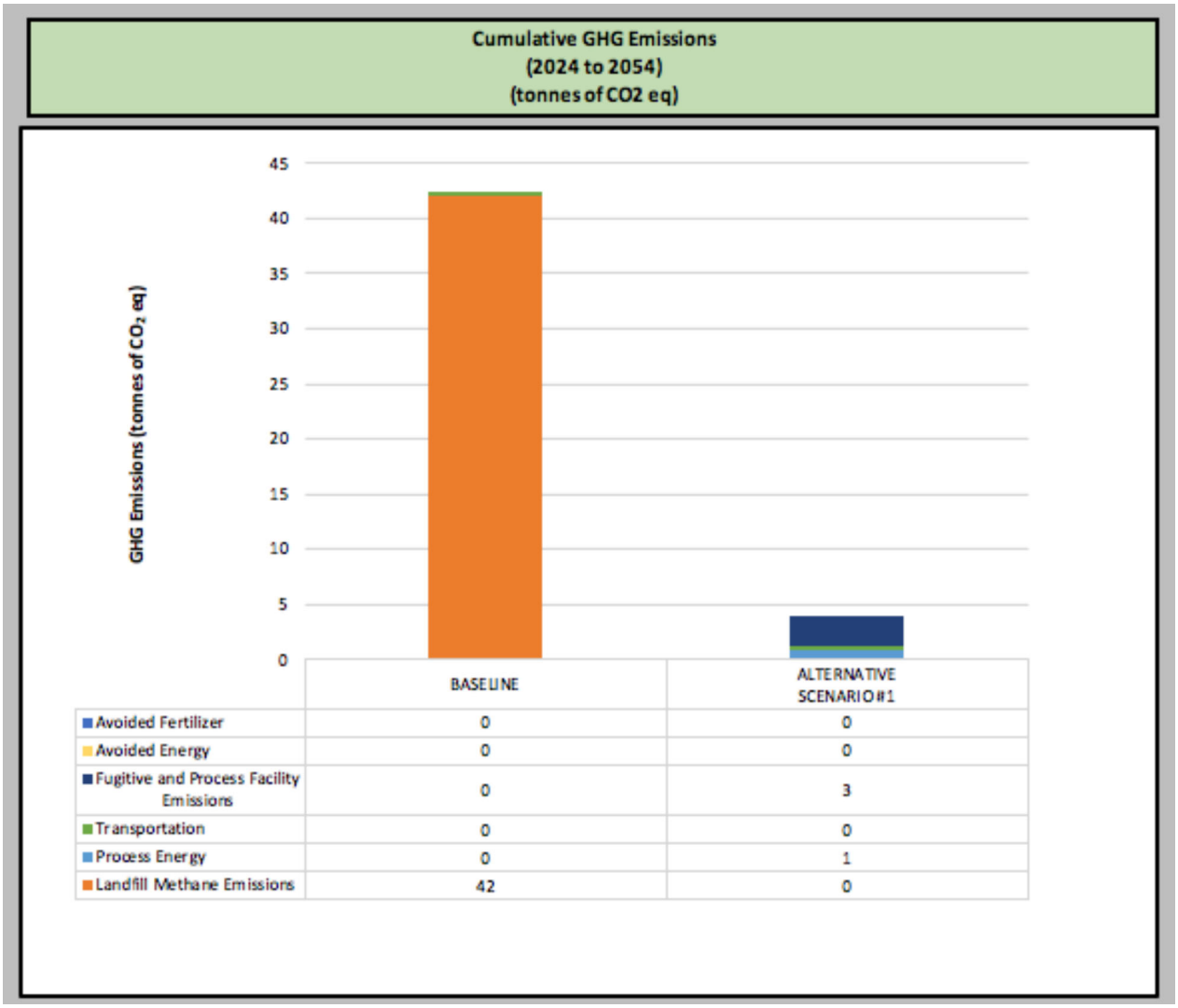

Figure 29. Cumulative GHG emissions associated with 1 tonne Nelson food waste going to landfill (baseline) and 1 tonne Nelson food scraps being diverted and composted at RDCK compost facility in Salmo, BC (alternative scenario).

Although Figure 29 shows zero transportation emissions, these emissions are not zero, but are so small that when rounded they appear as 0 in the emissions chart for the ECCC GHG calculator when only one tonne of food waste is being analyzed.

9.3.4 Comparative Analysis – GHG Emissions Reductions from Green Cart Programs

Figure 30 shows the cumulative GHG emissions reductions for the Fairview Pre-treated Organics Pilot Project in comparison with two regional curbside green cart programs.

It should be noted that these emissions reductions are measured over a 30-year time period, but represent the emissions savings associated with one year of program operation.

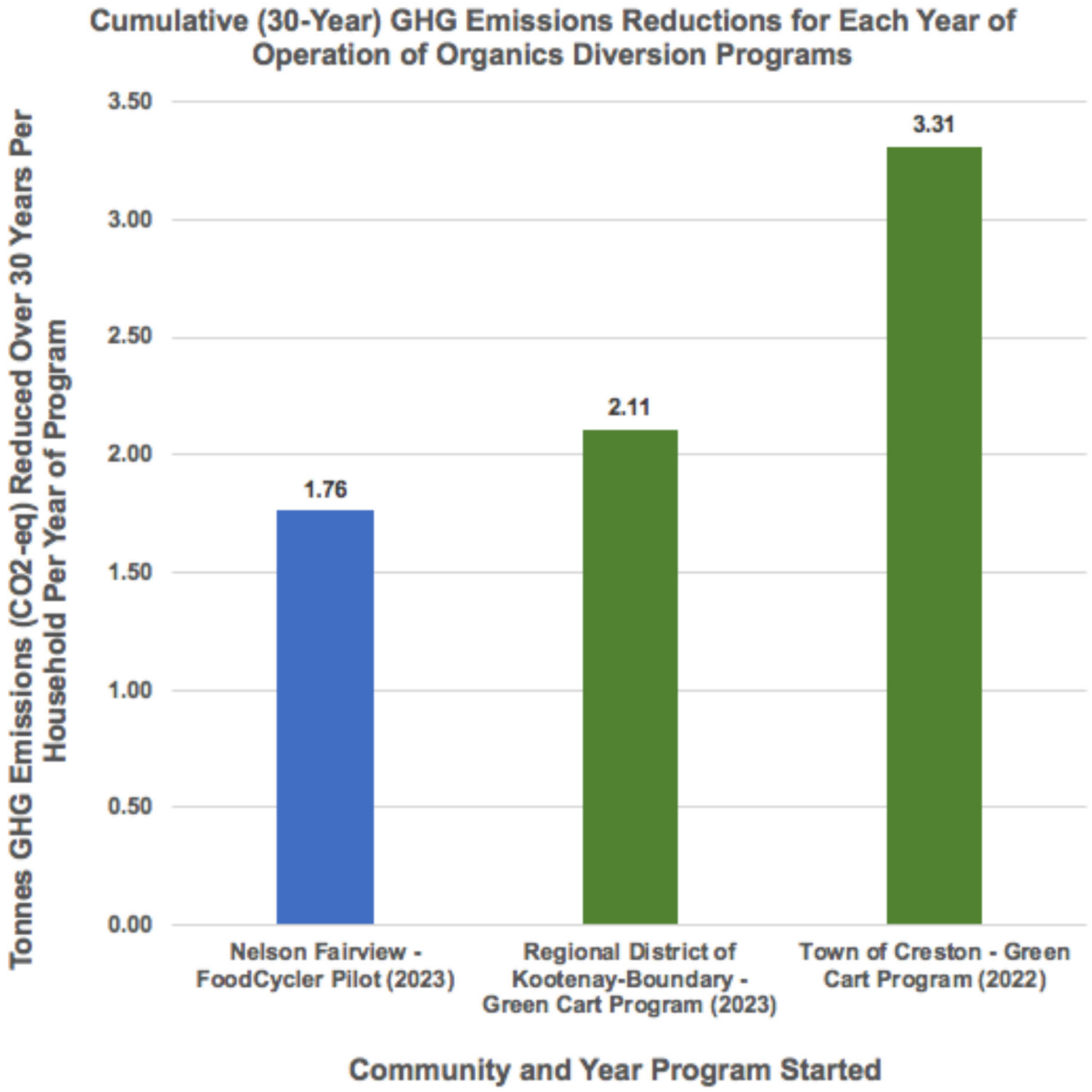

Figure 30. Cumulative (30-year) GHG emissions reductions for organics diversion programs.

The quantity of GHG emissions avoided through implementation of an organics diversion program is closely correlated with the quantity of organics the program diverts from the landfill, provided all landfills are similar with respect to the presence or absence of landfill gas recovery.

The Town of Creston green cart program had the highest GHG emissions reductions and quantity of food waste diverted from the landfill per household (84 kg/household/year). The Nelson Fairview FoodCycler Pilot had the lowest GHG emissions reductions and quantity of food waste diverted from the landfill per household (32 kg/household/year) (See Section 9.2).

We note that the GHG emissions reductions presented in Figure 30 assume no landfill gas capture at the landfill where the organics are disposed. Greenhouse gas emissions data for the Regional District of Nanaimo were not presented in this graph, as the landfill where Nanaimo's waste is deposited has landfill gas capture, which significantly reduces the GHG emissions associated with the deposit of waste.

9.3.5 FoodCycler Carbon Footprint Report

As part of the agreement with FCS, the City of Nelson required FCS to provide a report on the carbon footprint of the FoodCycler. FCS contracted third-party company, ClimatePartner, to complete a product carbon footprint for the FoodCycler, which describes the GHG emissions required to produce a FoodCycler (including acquisition and pre-processing of raw materials), distribute it, and manage it at end-of-life, using a 'cradle-to-customer plus waste' approach. The approach focused on emissions that can be monitored by the producer of the item (FCS). See Appendix VII for the product carbon footprint report.

The product carbon footprint for the FoodCycler indicated that there are 155 kilograms of carbon dioxide emitted through the production and end-of-life management for each FoodCycler Eco 5 unit[56]. This calculation does not include the use of the FoodCycler, which is in the domain of the user, not FCS as a company.

[56] ClimatePartner. 2024. Product carbon footprint – FoodCycler (2024 Re-calculation).

9.4 Documented Incidents of Wildlife Attraction or Human – Wildlife Conflict

Reducing wildlife attraction and human-wildlife conflict is a priority for the City of Nelson and Nelson residents. Over the past few years, there has been increasing concern in Nelson regarding human-wildlife conflict.

WildSafe BC is a program run by the British Columbia Conservation Foundation to keep wildlife wild and communities safe throughout BC. Through the WildsafeBC Community Program, local coordinators deliver education and outreach to residents on how to live safely with wildlife, through activities including door-to-door education, garbage tagging, and educational booths at community events[57]. Local WildSafe BC coordinators have a strong understanding of the human-wildlife dynamics and challenges going on in the communities in which they work.

Figure 31 shows that garbage is by far the most common attractant identified in incidents of human-wildlife conflict involving black bears in BC.

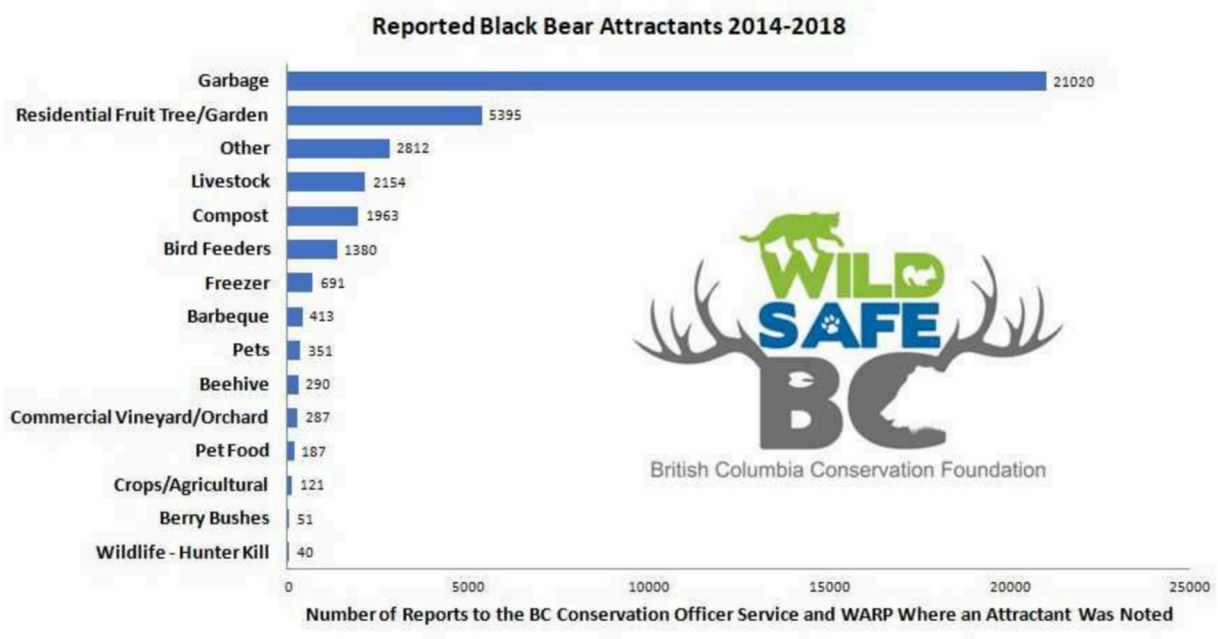

Figure 31. Reported black bear attractants in BC from 2014 – 2018 (Courtesy of WildSafe BC[58])

WildSafe BC coordinator for Nelson, Lisa Thomson, noted that "many residents, predominantly in the Fairview neighbourhood, have discontinued backyard composting, for fear of attracting bears and other smaller wildlife[59]."

[57] WildSafe BC. 2024. WildSafe BC Community Program. https://wildsafebc.com/programs/wildsafebc-community/
[58] WildSafe BC. 2024. WildSafe BC Bin Tagging Program. https://wildsafebc.com/programs/bin-tagging/
[59] Thomson, L. 2024. Email communication from Lisa Thomson, WildSafeBC Nelson / RDCK Area E and F Coordinator, July 28, 2024.

9.4.1 City of Nelson Pre-treated Organics Pilot Project

There are many factors which contribute to wildlife attraction and the potential for human-wildlife conflict in a neighbourhood, as there are many reasons why wildlife are attracted to human-use areas. As described in Figure 31 above, the manner in which residential garbage, recycling and organics are collected and managed is a very important factor in human-wildlife conflict.

During both the April and July 2024 waste characterization sampling days, City staff found garbage bags that had been ripped open and scattered by ravens (Figure 32).

It was not possible to quantitatively measure the impact of the Pre-treated Organics Pilot Project on human-wildlife dynamics in Fairview neighbourhood over the pilot project, due to the length and seasonality of pilot project implementation, combined with the fact that many different factors lead to human-wildlife conflict.

Figure 32. Garbage strewn by a raven that tore into a garbage bag set out for collection in Fairview, July 2024.

Food scraps are a known wildlife attractant. In many jurisdictions, research and community experience have indicated that measures to reduce the availability of human food to wildlife can help reduce the potential for human-wildlife conflict. The pre-treated material from the FoodCycler is dry and has less odour than fresh food scraps. The following quote from WildSafe BC indicated their support for the Pre-treated Organics Pilot Project:

"WildSafeBC is a proud supporter of the City of Nelson's organic waste diversion program. The FoodCycler units reduce the amount of solid food waste in residential garbage for curbside collection. When managed according to the program guide, the FoodCycler can help minimize food rewards gained by local wildlife. Therefore, we can reduce the probability of wildlife becoming food-conditioned. A step forward to keeping our wildlife wild, and our community safe!"

-Lisa Thomson, WildSafeBC Nelson Coordinator, British Columbia Conservation Foundation

Prior to the start of the Pre-treated Organics Pilot Project, 82% of respondents to the fall 2022 community survey on organic diversion practices indicated that they had experienced issues with wildlife disrupting their garbage or composter. Of those who reported such issues, the most common wildlife species reported were bears (68% of respondents), raccoons (44%), rats (43%), skunks (43%) and birds (14%).

In the post-pilot project survey, 20% of respondents indicated that they used to use a backyard composter, but had stopped due to wildlife concerns or issues.

When asked whether they felt that using the FoodCycler had led to a decrease in wildlife attraction related to composting or waste in their home or yard, numerous respondents indicated that it was too early to tell, as they had just started using the FoodCycler and/or they hadn't yet used the pre-treated material in their yard or garden.

Pilot project participants were asked if they had noticed wildlife, pets or other animals attracted to the pre-treated material from the FoodCycler. 88% of respondents indicated 'no'; some of whom specified that they were keeping the material inside and/or hadn't added it to their gardens yet.

Of the 12% of respondents who indicated yes, the most commonly identified animals that had been attracted to the pre-treated material were dogs, racoons, skunks, and rats. Nine respondents indicated that a bear had been attracted to the pre-treated material in their garden or yard. Some comments shared by respondents regarding animals being attracted to the pre-treated material were:

"no moreso [wildlife attraction] than before I was using; lots of racoons in this neighbourhood"

"dog is obsessed, so we use the drop-off more than burying"

"the first time I used it, a bear dug up my plants."

"the 1st time when added to my garden animals dug it out!"

"not sure, but when we kept it in a Rubbermaid container outside it would get knocked over by animals."

"not sure but something dug up my garden and ate the first amount I buried. My dogs are very interested as well."

A key advantage of the City of Nelson community collection sites for pre-treated material was that the collection bins were made of metal and not able to be accessed by wildlife.

9.4.2 Comparative Analysis – Wildlife Attraction and Human-Wildlife Conflict with Green Cart Programs

Human-wildlife conflict related to how people manage garbage, organics and recycling is a common challenge throughout British Columbia. A key message shared by WildSafe BC is the importance of keeping garbage, compost and recyclables stored in a secure indoor location at all times, except on the day and time of collection (Figure 33).

Figure 33. WildSafe BC bear tips for garbage, compost and recyclables collection (Courtesy WildSafe BC).

WildSafe BC operates 'bin tagging' educational programs to remind residents not to place garbage, compost or recyclables at the curbside too early, to minimize the potential for wildlife such as bears to access the materials and receive a food reward. WildSafe BC invites residents to consider purchasing a certified bear-resistant container for garbage, organics and recycling.[60]

9.4.2.1 Regional District of Kootenay Boundary

The Regional District of Kootenay Boundary (RDKB) notes that minimizing human-bear conflict and keeping bears from accessing waste materials is a challenge throughout its region. When the RDKB rolled out its green cart program, households were automatically given a 80-litre "critter resistant" cart, which is designed to be difficult for birds, small mammals and rodents to access[61]. The RDKB did not purchase certified bear-resistant green carts for all households, as they were approximately six times more expensive as the non-bear-resistant carts.[62]

RDKB households were able to swap the RDKB-provided green cart for a 100-litre bear-resistant cart (as certified by the Inter-Agency Grizzly Bear Committee) for a $200 charge, which is still subsidized by the Regional District. To date, there has been relatively minimal household uptake on the bear-resistant carts – primarily due to cost. Approximately 90 households have accessed the bear-resistant cart; the RDKB has approximately 1,200 more available.[63]

There have been anecdotal reports of bears tampering with and accessing food scraps from the 80-litre non-bear-resistant carts. The RDKB continues to communicate to residents about the

[60] WildSafe BC. 2024. WildSafe BC Bin Tagging Program. https://wildsafebc.com/programs/bin-tagging/
[61] RDKB. 2024. Garbage, organics and recycling – Be bear aware. https://rdkb.com/Utilities-Waste/Garbage-Organics-and-Recycling/Organics
[62] Belton, BA. 2024. Personal communication with BA Belton, Regional District of Kootenay Boundary, May 28, 2024.
[63] *ibid.*

availability of the bear-resistant carts and the importance of only placing the green cart out for collection on the morning of collection (not the night before).[64]

9.4.2.2 Town of Creston

When implementing its Food Waste Collection Program, the Town of Creston purchased 45-litre carts. The green carts purchased had clasps to minimize the ability for wildlife to access materials in the bin, but were not certified as bear-proof. Some Town of Creston staff were concerned at the start of their green cart program that they may have issues with wildlife such as bears, rats and racoons being attracted to and accessing food waste from the green carts; however, this has not been a problem to date.[65]

Town of Creston staff feel that one reason that black and grizzly bears may not be coming into Creston to disrupt waste collection containers may be that bears in the region are tending to remain in agricultural areas where there are other food sources such as fruit and vegetables from orchards and fields.[66] We also note that Creston is located in a broad, open valley – which is quite different from the narrow valley where Nelson is located.

9.4.2.3 Comparative Analysis and Need for Further Research

Living safely with wildlife and minimizing human-wildlife conflict are core values for many Nelson residents, and residents throughout the Kootenay region. Both the collection of organics in green carts and the direct use of pre-treated material in yards and gardens pose the potential to attract wildlife and cause human-wildlife conflict.

Garbage is by far the most common attractant identified in incidents of human-wildlife conflict involving black bears in BC, and one of the main reasons that garbage attracts wildlife is due to the presence of organics such as food waste.

It was not possible to quantitatively measure the impact of the Pre-treated Organics Pilot Project on human-wildlife dynamics in the Fairview neighbourhood over the length of the pilot project. However, WildSafe BC staff have indicated their support for the pilot project as a way to reduce the quantity of food waste present in the curbside residential garbage stream.

There remain some unknowns regarding the level of wildlife attraction the pre-treated material poses when present in a backyard composting bin and incorporated directly into garden soil. As the use of FoodCyclers in Nelson continues, and an increasing number of pilot project participants use the pre-treated material in their yards and gardens, there would be value in the City considering partnering with a local organization such as WildSafe BC to explore the level of wildlife attraction posed by the pre-treated material, and to develop recommendations for its use based on this research.

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[64] Belton, BA. 2024. Personal communication with BA Belton, Regional District of Kootenay Boundary, May 28, 2024.
[65] Farynowski, C. 2024. Personal communication with Colin Farynowski, Manager of Engineering, Town of Creston, Dec. 12, 2023.
[66] *ibid.*

9.5 Benefits and Challenges of Adding Pre-Treated Organics Directly to Garden Soil

9.5.1 Benefits

FoodCycler promotes the use pre-treated material as a soil amendment. One of the benefits of using pre-treated material directly as a soil amendment is that no time or effort is required to further process the material. Secondly, pre-treated material contains valuable plant nutrients and can be used in home gardens to support plant growth.[67]

9.5.2 Challenges

Although adding pre-treated material directly to garden soil can be a quick way to incorporate a nutrient-rich material back into the garden, there are some challenges with this approach.

9.5.2.1 Timing

Pre-treated material is not a mature decomposed product. As a result, if it is added too close to the time of planting, or too much is added, it has the potential to reduce plant germination and growth. The City of Nelson Pre-treated Organics Program Manual recommends adding pre-treated material six weeks prior to planting seeds or transplanting plants in the spring, or to add it to soil in the fall when putting the garden away for the season. The program manual also suggests that residents consider adding the pre-treated material to soil either before or after bear season, which is generally from April to November[68]. This leaves the ideal window for adding pre-treated material between December and March (see Section 6.11.1), which is a relatively short period of the year, and is during the winter season when few people are gardening.

9.5.2.2 Characteristics of Pre-treated Material

Once re-wet, pre-treated material is no longer stable, and will develop odour and moulds[69]. Although pre-treated material that exits the FoodCycler does not have potential pathogens, pre-treated material contains readily-available carbon, and will allow potentially pathogenic organisms to thrive if they are in contact with the product.[70]

9.5.2.3 Potential Wildlife Attraction

When re-wet, the pre-treated material starts to decompose, and can generate odours. These odours can attract wildlife and pets, which may dig in the garden soil to try to access the pre-treated material. Numerous pilot project survey respondents gave examples of wildlife and pets being attracted to pre-treated material (Section 9.5.1).

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[67] Paul, J. 2022. Evaluation of the FoodCycler for communities in the Northwest Territories (unpublished).
[68] Thomson, L. 2024. Email communication from Lisa Thomson, WildSafeBC Nelson / RDCK Area E and F Coordinator, August 13, 2024.
[69] Paul, J. 2022. Evaluation of the FoodCycler for communities in the Northwest Territories (unpublished).
[70] *Ibid.*

9.5.2.4 Regulatory Restrictions

The British Columbia *Organic Matter Recycling Regulation* states that compostable materials are considered waste until they have been composted according to the Regulation.[71] The BC *Environmental Management Act* prohibits the introduction of waste into the environment without a valid permit or approval.[72] Under BC legislation, pre-treated material is considered a 'waste' and cannot be distributed for use off-site from where it is produced or introduced into the environment.

9.5.2.5 More Research and Follow-up is Needed

There has been no published research on the experience of growers using pre-treated material as a source of nutrients and organic matter for crops. It would be valuable for such research to be conducted, to be able to provide more specific and research-informed recommendations to gardeners and farmers on the use of pre-treated material as a direct soil amendment. In September 2024, FCS communicated that it is undertaking experiments with third-party researchers on the use of pre-treated material as a source of nutrients for plants and this data will be shared with the City and residents when it becomes available.[73]

In the spring 2024 survey of pilot project participants, 65% of respondents stated that they have added or plan to add the pre-treated material directly to their garden soil or green space (Figure 34). It would be helpful to follow-up with participants over time to learn about their experiences in using the pre-treated material as a soil amendment.

Figure 34. Gardener incorporating pre-treated material directly into garden soil.

9.6 Benefits and Challenges of Composting Pre-treated Material

There are many benefits to composting pre-treated material, and then using the compost that is produced as a soil amendment, rather than using the pre-treated material directly. Some benefits of composting the pre-treated material are the following:

- composting results in the decomposition of the pre-treated material, and the stabilization of the organic matter in the material, making it an easier to manage, use and store without risk of heating, molding or producing unpleasant odour;

[71] Province of British Columbia. 2024. Organic matter recycling regulation.
[72] Province of British Columbia. 2024. Environmental management act.
[73] Taylor, J. 2024. Communication with Jessica Taylor, Municipal Program Manager, FCS. Sept. 6, 2024.

- once composted, pre-treated material will no longer produce odour when wet, and therefore is unlikely to attract wildlife or other animals; and,
- test results have shown that compost produced from pre-treated material had higher concentrations of nitrogen, phosphorus and potassium, than uncomposted pre-treated material – this is likely due to the removal of carbon in the composting process[74];

There are also specific benefits to using pre-treated material as a compost feedstock – whether in a backyard composter or a community-scale compost facility.

9.6.1 Benefits of Pre-treated Material as a Compost Feedstock

There are numerous benefits to using pre-treated material as a compost feedstock.

9.6.1.1 Minimal Contamination

Given the level of care and attention required to process food waste in the FoodCycler, those using the unit to process food waste are very unlikely to place contaminants in the unit, such as plastics or other non-compostable materials. As a result, the pre-treated material tends to have virtually no contamination.

Although there is little risk of contamination with the use of the FoodCycler, there is the risk of contamination at the public drop-off locations for pre-treated material. Since September 2024, when the City of Nelson removed locks on the community drop-off bins for pre-treated material, there has been a small and consistent amount of contamination in the bins (see Section 6.11.2).

The relatively low levels of contamination in the pre-treated material stream contrasts sharply with curbside green cart collection programs, in which contaminated organics are one of the top challenges experienced by compost facility operators that process green cart materials. Even a small proportion of contamination by weight can cause expensive and technically difficult challenges for compost facility operators.

9.6.1.2 Pre-treated Material Composts Quickly

Pre-treated material tends to compost very quickly, due in part to its small particle size and the relatively high-energy content of the material, given that it is produced primarily from food scraps. It is best to compost the pre-treated material with bulking agents that provide porosity, such as wood chips, as the pre-treated material contains a lot of energy, and decomposes quickly and easily (resulting in high rates of oxygen consumption from microorganisms).

Dr. John Paul of Transform Compost acquired some samples of pre-treated material that had been collected in the community collection bins in Nelson. Dr. Paul transported the pre-treated material to his research facility in Abbotsford, BC, and conducted a variety of tests and experiments with the pre-treated material. Results of his trials are presented in Appendix II.

[74] Paul, J. 2022. Evaluation of the FoodCycler for communities in the Northwest Territories (unpublished).

Dr. Paul found that the pre-treated material composts very quickly. He also found that when composted, the compost created from the pre-treated material achieved stability and maturity relatively quickly in comparison with other feedstocks he has composted.

9.6.2 Challenges of Pre-treated Material as a Compost Feedstock

9.6.2.1 Pre-treated Material Can be Challenging to Manage When Re-Wet

One challenge that was experienced by City of Nelson staff at neighbourhood pre-treatment collection bins and RDCK staff at the compost facility is that when the pre-treated material is re-wet it can become extremely hard, almost like concrete – especially when the re-wet material freezes.

Given that high-humidity conditions can cause pre-treated material to mold, RDCK staff identified that proper handling, storage and humidity regulation between pre-treated material collection and disposal was important, as well as having staff wear proper respiratory personal protective equipment.[75]

9.6.2.2 Guidance on Backyard Composting Pre-treated Material

Pre-treated material has different characteristics than the food waste, yard trimmings and garden materials that residents are more experienced in composting. As a result, there is a need to provide tips and guidance to residents who plan to place the pre-treated material in their backyard composter.

FCS has been conducting research to develop backyard compost recipes and guidance for residents in how to incorporate pre-treated material into backyard compost systems. FCS was in the process of developing written guidance on this topic during implementation of the Pre-treated Organics Pilot Project, and the information has not yet been distributed to Nelson residents.

When the City of Nelson distributes guidance on how to compost pre-treated material in backyard compost systems, it would be valuable to also include specific tips on how to minimize wildlife attraction when composting the pre-treated material.

9.6.2.3 Unknowns Can Make Compost Facility Operators Wary

One challenge the City of Nelson experienced in its implementation of the Pre-treated Organics Pilot Project was wariness expressed by compost facility managers regarding what it would be like to handle and compost the pre-treated material. In particular, RDCK compost facility operators were concerned about dust due to the fine particle size of the material, and about whether they would need to re-wet the material when it was added to the compost windrows.[76]

[75] Morrison, M. 2024. E-mail communication with Matt Morrison, Organics Coordinator, RDCK, August 12, 2024.
[76] Morrison, M. 2024. Personal communication with Matt Morrison, Organics Coordinator, RDCK. May 15, 2024.

After the first few loads of pre-treated material were dropped off at the RDCK transfer site and transported to the compost facility, RDCK staff noted that the amount of airborne material associated with the pre-treated material was very manageable, and staff were well-protected through use of N95 masks, or by keeping a safe distance during management of the pre-treated material .[77]

Because the pre-treated material had not been handled on such a large scale previously in Canada, the compost facility managers felt some concern that there would be unknown challenges in composting the material. Water availability is a constraint at the compost site, and rehydration requirements for large amounts pre-treated material are not well defined for composting in commercial facilities.[78]

As a result, the RDCK charged the City of Nelson a higher rate for pre-treated material delivered to the Central Compost Facility than organics delivered from regional green cart programs, or self-hauled loads. The RDCK charged the City of Nelson a specific tipping fee to dispose of pre-treated material at its facilities ($151.25 per tonne), in comparison with its usual rate for organics ($96.75/tonne). This premium charge may be reduced in time, once compost facility managers are more confident that there will be no unknown additional costs to process the material.[79]

During implementation of the Pre-treated Organics Pilot Project, Food Cycle Science contracted the company Regenerative Waste Labs to work collaboratively with RDCK staff to develop recommendations and best practices for how to incorporate pre-treated material into municipal compost systems, based on the experience at the RDCK Central Compost Facility.

As of October 2024, incorporation of pre-treated material into the feedstock mix at the RDCK Central Compost Facility has not negatively affected the composting process.[80]

[77] Morrison, M. 2024. Personal communication with Matt Morrison, Organics Coordinator, RDCK. August 12, 2024.
[78] *Ibid.*
[79] *Ibid.*
[80] Morrison, M. 2024. Email communication with Matt Morrison, Organics Coordinator, RDCK. October 15, 2024.

10 Evaluation of Logistical and Technical Parameters

10.1 Logistical Challenges

10.1.1 Storage and Distribution of Appliances

The storage and distribution of the pre-treatment appliances provided some unexpected logistical challenges for City staff. As per the FoodCycler Eco5 manual, the appliances must be kept in temperatures above freezing. The first shipment of FoodCyclers arrived in Nelson in the middle of winter, and so the combination of the size and number of the appliances in the shipment, combined with the need for indoor (or at least above 0°C temperatures) posed some challenges for staff – which were able to be overcome (Figure 35).

Figure 35. Arrival of FoodCyclers in winter (left) and indoor storage for FoodCyclers (right).

City staff also found that it took more time than they had expected to unpack FoodCyclers out of their boxes and to prepare them for distribution to residents (Figure 36).

Figure 36. Youth Climate Corps helping prepare FoodCyclers for distribution to residents.

10.1.2 Comparative Analysis – Logistical Challenges with Green Cart Programs

10.1.2.1 Distribution of Green Carts and Educational Materials

There is a lot of initial effort involved in distributing green carts to residential households. The Town of Creston distributed approximately 2,535 green carts to Creston households over a two-month period in May and June 2022[81]. The City of Castlegar hired a contractor to assemble and deliver 3,170 green carts to Castlegar households over a period of three weeks in July and August 2023[82]. The Regional District of Kootenay Boundary delivered green carts to 8,418 households over 1.5 months in August and September 2023. Delivery was completed by the company that won the bid to provide green carts for the program. The company completing distribution of green carts used two separate trucks at the same time, with three people per truck.[83]

BA Belton, Environmental Programs and Communications Coordinator for the RDKB indicated that one of the challenging and time-consuming components of green cart rollout was creating and assembling a variety of public education handouts related to the green carts in a short time frame, so they could be distributed with the green carts. The RDKB distributed a green bin user guide, bear bin trade-in form, a few different sizes of paper bag bin liner samples and gathered these together with an elastic band around them. BA Belton noted that for a few weeks prior to

[81] Farynowski, C. 2024. Email communication with Colin Farynowski, Manager of Engineering, Town of Creston, April 30, 2024.
[82] Bazar, C. 2024. Personal communication with Crystal Bazar, Assistant Manager of Operations, City of Castlegar. May 8, 2024.
[83] Belton, BA. 2024. Email communication with BA Belton, Environmental Programs and Communications Coordinator, Regional District of Kootenay Boundary, September 5, 2024.

green cart rollout, there were one to three landfill staff working on assembling all of these educational materials, so they could be distributed with green carts. It felt cumbersome at the time, and cardboard boxes had to be purchased to store the educational handout packages prior to delivery, and facilitate delivery of the packages to the company distributing green carts.[84]

As a comparison, distribution of 1,967 FoodCyclers to pilot project participants in Nelson took place over approximately one year and was orchestrated through a combination of group orientation sessions, drop-in events, direct delivery to households and distribution from City Hall. This distribution was implemented by one to two staff members, with additional support creating educational materials from communications staff.

10.1.2.2 Questions from Residents

A common logistical challenge for green cart programs is that there are many calls from residents during the first few months of program operation, as residents have questions and confirm information about the program.

Crystal Bazar, Assistant Manager of Operations for the City of Castlegar reported that when their green cart program began in August 2023, there was a huge volume of calls from residents. Managing the incoming calls became almost a full-time job for the four front-desk staff for about two months. Initial program roll-out was very busy and stressful; however, the volume of calls quickly dropped off about two months after program roll-out.[85]

When the Regional District of Nanaimo first rolled its green cart program out in 2011, it established a temporary call centre with additional temporary staff to meet this need.[86]

The City of Nelson employed two full-time staff throughout program implementation and FoodCycler distribution to answer residents' questions.

10.2 Technical Challenges

10.2.1 Appliance Repairs and Mechanical Challenges

Section 6.9 describes the repair program that the City of Nelson implemented for FoodCycler appliances. Throughout the pilot project, there was an overall repair rate of 11%. Of the pilot project participants that completed the spring 2024 survey, 13% reported accessing the City's repair program. The repair rate for the FoodCycler appliances was higher than expected.

The quantity and nature of repairs required for the first batch of FoodCyclers issued to the City of Nelson led to more staff time being spent troubleshooting and repairing FoodCyclers than

[84] Belton, BA. 2024. Email communication with BA Belton, Environmental Programs and Communications Coordinator, Regional District of Kootenay Boundary, September 5, 2024.
[85] Bazar, C. 2024. E-mail communication with Crystal Bazar, Assistant Manager of Operations for the City of Castlegar, May 13, 2024.
[86] Regional District of Nanaimo. 2020. Organics diversion strategy 2000-2020.

had initially been contemplated. Once a local appliance repair company was hired to complete repairs, City staff spent time communicating with residents about repairs, and coordinating reception of appliances needing repair, and re-distribution of repaired appliances. In May 2024, the FCS customer service team began communicating directly with residents to troubleshoot and coordinate appliance repairs, thus further reducing this workload for City staff.

10.2.2 Keeping Pre-treated Material Dry in Neighbourhood Collection Bins

One technical issue that City of Nelson encountered in the roll-out of the pilot project was that it was initially challenging to keep the pre-treated material dry in the neighbourhood collection bins. This was quite problematic for staff collecting the pre-treated material, as the pre-treated material became like concrete when it re-wet and then froze around the openings of the bin. Even after an initial attempt to re-seal the neighbourhood collection bins, humidity and some leaks were still encountered. Eventually, through some troubleshooting and persistence, staff were able to re-caulk all of the seals in the bin, and since there have been minimal challenges with the material re-wetting. This experience underlines for other communities that it is important to consider and plan how pre-treated material will be kept dry during transportation and storage.

10.2.3 Comparative Analysis – Technical Challenges With Green Cart Programs

In the Town of Creston Food Waste Collection Program, a challenge the Town encountered in the first six months of their green cart program was that the wheels had fallen off a few of the green carts. Colin Farynowski, Manager of Engineering with the Town of Creston reported that fewer than 20 green carts had this issue, of the 2,535 carts distributed (less than 0.8% of carts). Because it was such a small proportion of carts affected by this issue, the Town did not investigate whether this issue was covered under warranty. Following the first six months of the program, this has no longer been an issue.[87]

There have also been issues with some hinged lids on carts breaking, especially during periods of cold weather; 75% of lid issues were able to be repaired by Town of Creston staff, and have continued to be used in the program.[88]

When there were issues with green cart components breaking, Town of Creston would pick up the broken green cart and replace it with a new one.

One point of frustration for the Town of Creston has been that green carts are not recyclable under the Recycle BC Program, because they are not packaging. The Town is interested in seeing the broken green carts recycled; however they have not had an opportunity to set up a contract to do this, and have limited space to stockpile broken green carts.[89]

[87] Farynowski, C. 2023. Personal communication with Colin Farynowski, Manager of Engineering, Town of Creston, December 12, 2023 and September 5, 2024.
[88] *Ibid*.
[89] *Ibid.*

11 Financial Analysis

The City of Nelson is currently completing a detailed financial comparison of three potential residential waste management options to be implemented City-wide. Current financial analysis indicates that expanding the Pre-treated Organics Pilot Project city-wide, implementing a curbside green cart program and implementing three-stream curbside collection service would cost approximately the same (including capital and operational costs).

12 Conclusions

The purpose of this report was to describe the City of Nelson Pre-treated Organics Pilot Project, and to conduct an evaluation of the social, environmental, and technical aspects of a pre-treated organics program in comparison with a more traditional weekly curbside green cart organics collection model.

The City's over-arching goals for the pilot project were to investigate whether a Pre-treated Organics Program is the best approach to maximize organic waste diversion, reduce GHG emissions from organic waste transportation and management, reduce human-wildlife conflict associated with waste, and respond to community desires for a 'made-in-Nelson' organics diversion program that keeps resources circulating locally.

Program Implementation

City of Nelson staff did an outstanding job of planning and implementing the pre-treated organics pilot project, which was the first-of-its-kind on this scale in Canada. Some program implementation highlights included the following:

- City staff used a wide variety of public communication approaches including open houses, direct mail-outs, advertising, social media, and extensive in-person communication and training to promote the pilot project, distribute FoodCyclers and educate residents about how to successfully participate.
- City staff skillfully created and managed a successful FoodCycler repair program; 11% of FoodCyclers were brought in for repair during the pilot project.
- Adequate staff resources were invested in the pilot project to foster program success.

Resident Participation, Satisfaction & Experience

In the Fairview neighbourhood, 76% of households with curbside waste collection participated in the pilot project. Across the entire City, 46% of Nelson households with curbside waste collection signed up for and received a FoodCycler.

There was a very high level of satisfaction among residents with FoodCyclers who responded to the spring 2024 survey. Of 670 survey respondents, 87% had enjoyed using the FoodCycler in their home. Survey respondents were very likely (77%) or likely (14%) to recommend the FoodCycler to others. Ninety-one percent of survey respondents stated they plan to continue to use the FoodCycler in the long-term. All of these metrics indicate an extremely high approval rating for the pilot project from participants.

Many of those who participated in the pilot project had experience managing a backyard compost. A number of pilot project participants indicated their strong appreciation for the program, while at the same time mentioning that some aspects of the FoodCycler system may pose barriers to widespread community-wide adoption and use of the appliance as an organics diversion solution.

The most common challenges that residents had experienced with their FoodCycler were a jammed bucket / mechanical issues (34%), odour (21%), noise (18%), unprocessed food waste (16%). Numerous survey respondents also indicated that the weight, size and/or environmental requirements for the FoodCycler were challenging for their household.

Waste Characterization

The Pre-treated Organics Pilot Project reduced the proportion of organics in the garbage stream for those residents who participated. In August 2023, prior to implementation of the pilot project, 52% of the curbside garbage in Fairview consisted of compostable materials. In July 2024, after implementation of the pilot project, 40% of the Fairview residential curbside garbage consisted of compostable materials. In July 2024, for households with FoodCyclers, 37% of the garbage consisted of compostable materials, while for households without FoodCyclers, 50% of the garbage consisted of compostable materials.

Waste composition data from BC communities with curbside green cart programs that focus on food waste show residential curbside garbage with approximately 30% compostable materials. This is lower than the 40% compostable materials found in the Fairview residential garbage in July 2024. These data indicate that BC green cart programs focusing on food waste have resulted in a lower proportion of compostable materials in the garbage than the FoodCycler pilot project in the Nelson Fairview neighbourhood.

Quantity of Organics Diverted - Fairview

Curbside garbage tonnage data suggested that in Fairview, the pilot project lowered the quantity of curbside garbage generated by 15 kilograms per household per year.

When we combine the Fairview curbside garbage tonnage data with the waste composition change due to the pilot project, these combined data suggest that there was a 32 kilogram per household per year decline in food waste in the Fairview garbage stream due to the pilot project. We have used the 32 kilogram per household per year decline in food waste as our estimated value for calculation of other parameters, such as GHG emissions.

A potential reason for the discrepancy between the 15 and 32 kilograms per household per year is that as people began using their FoodCyclers, they may have reduced the frequency with which they self-hauled residential garbage to the RDCK Grohman transfer station, and placed some of the materials they would have previously self-hauled into their curbside garbage.

Quantity of Organics Diverted – City-Wide

Curbside garbage tonnage data suggest that City-wide the use of FoodCyclers has lowered the quantity of organics in the garbage by 1 kilogram per household per year.

By applying the waste composition results from Fairview to the proportion of City-wide households with and without FoodCyclers, we estimate that there would have been a 75 tonne decline in the quantity of food waste in the City-wide curbside garbage stream, which is 18

kilograms per household per year, and that the City-wide garbage stream would contain 44% compostable organics.

Quantity of Organics Diverted – Comparison with Green Cart Programs

The Pre-treated Organics Pilot Project diverted 32 kilograms of food waste per household per year in the Fairview neighbourhood. Green cart programs from neighbouring communities have achieved significantly higher rates of organics diversion. The Regional District of Kootenay Boundary has diverted 54 kilograms of food waste per household per year with its green cart program that began in October 2023. The Town of Creston has diverted 84 kilograms of food waste per year through its green cart program that started in 2022. A bit farther afield, the Regional District of Nanaimo diverted 109 kilograms of food waste per household per year across the first 10 years of its green cart program. The City of Peterborough has diverted 222 kilograms of food waste and pet waste per year through its green cart program that began in October 2023.

The use of FoodCyclers may be leading to a lower rate of food waste diversion in comparison with green cart programs due to a few potential factors:

- more steps and effort involved in managing food waste with the FoodCycler than through a green cart program;
- some types of food-soiled paper cannot be processed in the FoodCycler;
- residents using the FoodCyclers are experiencing some of the barriers mentioned by survey respondents; and,
- the limited quantity of food waste that the FoodCycler can process at a time (about 1 kg).

In all types of organics diversion programs, policies such as banning organics from the garbage and enforcing this ban are important tools that increase diversion.

Greenhouse Gas Emissions

The implementation of the Nelson Pre-treated Organics Pilot Project in the Fairview neighbourhood resulted in a reduction of 1,633 tonnes of CO_2-equivalent GHG emissions, measured over a 30-year time period (ECCC GHG calculator). Landfill methane emissions make up the vast majority of GHG emissions associated with organic materials. Transportation emissions are an extremely small portion of emissions.

The quantity of GHG emissions avoided through implementation of an organics diversion program is closely correlated with the quantity of organics the program diverts from the landfill. Following are the levels of GHG emissions reductions achieved by the Nelson Pre-treated Organics Pilot Project and neighbouring green cart programs, all on a per year basis, measured over 30 years:

- Fairview FoodCycler pilot: reduction of 1.76 tonnes GHG emissions/household/year
- RDKB green cart program: reduction of 2.11 tonnes GHG emissions/household/year
- Creston green cart program: reduction of 3.31 tonnes GHG emissions/household/year

Wildlife Attraction and Human-Wildlife Conflict

It was not possible to quantitatively measure the impact of the Pre-treated Organics Pilot Project on human-wildlife dynamics in the Fairview neighbourhood over the length of the pilot project. WildSafe BC staff have indicated their support for the pilot project as a way to reduce the quantity of food waste present in the curbside residential garbage stream.

Both the collection of organics in green carts and the direct use of pre-treated material in yards and gardens pose the potential to attract wildlife and cause human-wildlife conflict.

There remain some unknowns regarding the level of wildlife attraction the pre-treated material poses when present in a backyard composting bin and dug directly into garden soil. An advantage of the community collection sites for pre-treated material was that the collection bins were made of metal and not accessible to wildlife.

Logistical and Technical Parameters

The most significant unforeseen logistical issues associated with the pilot project were storing and distributing the FoodCyclers in winter, given that the appliances must be kept in above-freezing temperatures. City staff also found that it took more time than they had expected to unpack FoodCyclers out of their boxes and to prepare them for distribution to residents.

The most notable technical challenge was managing and carrying out the FoodCycler repair program. Throughout the pilot project, there was an overall repair rate of 11%.

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Appendix I.

FoodCycler Eco5 User Manual

FOODCYCLER

Eco 5™

USER MANUAL

Welcome to the Future of Food Waste™.

The FoodCycler™ is an energy-efficient food recycler which transforms your leftovers and food scraps into soil amendment. The digestion process reduces food waste volume by up to 90%*, leaving a by-product which can be safely used in the garden.

This guide will familiarize you with your FoodCycler™, introduce you to its features and functions, while also showing you how to use and care for your unit.

To ensure that you are using your unit safely and effectively, please read this guide thoroughly prior to operating your new unit. Please be advised that this unit is designed for home and office use only.

*Weight reduction is significantly dependent on the food (e.g.: coffee grinds will have little volume reduction).

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Important Safeguards

- This appliance is intended for household use.
- The FoodCycler™ is a Household Electric Appliances product.
- Basic safety instructions should always be followed when handling electrical appliances. This includes the following:
- Read all instructions in the manual.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they are closely supervised and instructed concerning use of the appliance by a person responsible for their safety. Close supervision is necessary when any appliance is used by or near children. Children should be supervised to ensure that they do not play with the appliance.
- To avoid electrical shocks, keep cords, plugs and portable electrical appliances away from water and other liquids.
- Turn the unit off, then unplug the unit from outlet when not in use, prior to servicing and adding/removing parts, and before cleaning the unit. To unplug the unit, grasp the plug and pull at the outlet. Never pull from the power cord.
- Allow unit to cool before assembling or disassembling parts and before cleaning the appliance.
- Do not operate any appliance with a damaged cord or plug, a unit showing signs of malfunction, or any product that has been dropped or damaged in any way.
- The use of attachments not recommended or sold by the manufacturer may cause fire, electric shock, or injury.
- Do not operate the machine outdoors
- Do not operate at or store in below freezing temperatures.
- Keep cord away from heat and sharp edges.
- Unit must only be plugged into properly grounded outlets.
- Do not touch any hot surfaces. Use the handles or knobs provided for safe handling.
- Do not place the unit on or near a hot gas or electric burner.
- Do not use appliance for any purpose other than its intended use.
- Do not dismantle, reconfigure, alter or adapt the unit in any way.
- Do not immerse the unit in water or liquids of any kind.
- Keep the appliance and power cords out of reach of children.
- Ensure that the surface of the unit is clear when closing the lid.
- Do not tamper the electrical outlet at the rear of the unit.
- Blades are sharp. Be cautious if/when reaching inside the removable Bucket.
- Be cautious when handling the Bucket mid-cycle or immediately after cycling as the bucket may be hot.
- Refrain from removing the bucket from the unit midcycle as the internal surfaces may be hot.
- Keep fingers away from hinges to avoid pinching.
- Avoid contacting moving parts. Do not attempt to defeat any safety interlock mechanisms
- Notes on the Power Cord:
- a) A short power-supply cord (or short detachable power-supply cord) is provided to reduce the risks resulting from becoming entangled in or tripping over a longer cord.
- b) Extension cords (or longer detachable power-supply cords) are available and may be used if care is exercised in their use.
- c) If an extension cord (or a long detachable power-supply cord) is used:
- The marked electrical rating of the detachable power-supply cord or extension cord should greater than the electrical rating of the appliance;
- If the appliance is of the grounded type, the extension cord should be a grounding type 3-wire cord; and
- The longer cord should be arranged so that it will not drape over the countertop or tabletop where it can be tripped over, snagged, or pulled on unintentionally (especially by children).
- SAVE THESE INSTRUCTIONS

Specifications

Product Name		FoodCycler™ Eco 5™
Model Number		FC-100 | FC-100E
Processing Mode(s)		Drying, Grinding, Cooling
Max Wattage		500W
Power Input	FC-100	110-120V 60 Hz
	FC-100E	220-240V 50/60Hz
Energy Usage	Running	<1.5 kWh per cycle (average)
	Standby	0.5 kWh per month (average)
Processing Time		~ 4-9 hours
Capacity		5.0L (1.32 Gal)
Waste Volume Reduction		Up to 90%
Weight (out of box)		13.6 kg (30 lbs)
Dimensions (out of box)		(W) 342 mm x (D) 276 mm x (H) 350 mm (W) 13.5" x (D) 10.9" x (H) 13.8"

Parts

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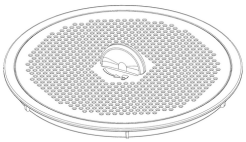
2 

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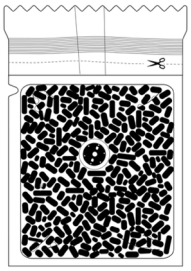
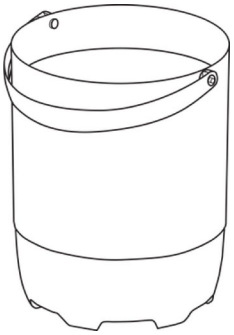
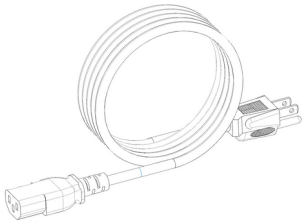
4 

5 

6 

Each one of these parts forms the complete FoodCycler™ system. Your FoodCycler™ will be shipped with the waste Bucket, Refillable Carbon Filter and Bucket Lid in their correct placement inside the unit.

1	Eco 5™ FoodCycler™
2	Removable Bucket Lid with deodorizing Carbon Foam Liner (*pre-installed)
3	Refillable Carbon Filter
4	Carbon Refill Pack
5	Removable Bucket
6	Power cord

Please Note:
The Bucket handle is purposely offset to provide space for you to grip onto the handle to pour out the by-product.

Getting to Know Your Unit

POWER BUTTON

Press once to start the cycle.
Open lid to pause cycle.
Press and hold for 3 seconds to turn the unit off.

Indicator solid: Unit running
Indicator breathing: Unit paused

LED PROGRESS TRACK

Cycle Indicator

CARBON FILTER REPLACEMENT INDICATOR

Replace Carbon Filter Pellets (See page 8 for instructions on how to replace the Carbon Filter Pellets in your Refillable Carbon Filter.)

Unit Setup

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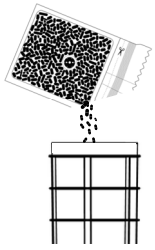

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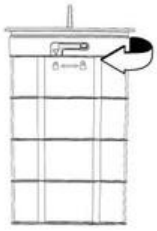

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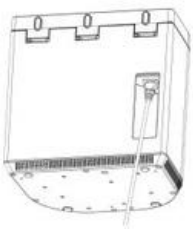

1. Open unit lid.
2. Remove the Carbon Refill Pack and power cord from Bucket.
3. Remove the empty Refillable Carbon Filter Cartridge from the unit.
4. Open the Refillable Carbon Filter cartridge by twisting the lid counter-clockwise.
5. Cut open the Carbon Refill Pack, following the cut-line guide along the top of the pack.
6. Empty the contents of the Carbon Refill Pack into the open Refillable Carbon Filter Cartridge. (We recommend doing this over a sink or towel, to avoid spillage).
7. Place the lid back on the Refillable Carbon Filter cartridge by aligning the notches on the cartridge with the arrows on the lid. Twist the lid clockwise to lock it in place. A slight click will indicate that the lid is properly seated.
8. Slide the filled Refillable Carbon Filter back into the unit cavity.
9. Close the unit lid, ensuring that the lid latch is in the proper locked position.
10. Insert the socket end of the power cord into the back of the unit. When ready to run a cycle, plug the three-pronged plug into a wall outlet.

Running A Cycle

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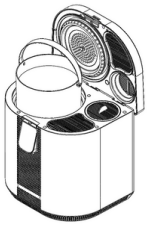

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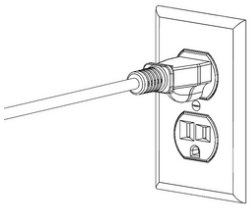

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1. Remove the Bucket from the unit.*
2. Add food waste to the Bucket.**
3. When you are ready to run a cycle, insert the Bucket into the unit, seating it so that it sits flush within the unit cavity. If the Bucket does not seem to sit flush in the unit, twist the Bucket slightly in small rotations of up to 60° in each direction until it seats correctly.***
4. Close the unit lid and lock it into place by rotating the lid latch downwards
5. Plug the unit into an outlet if not already plugged in.
6. Press the Power button once to start a cycle. Once the cycle has begun, the LED Progress Track will illuminate (blue).

Please Note: The cycle will last approximately 4-9 hours, depending on the amount of waste and the moisture content of the food being processed. We recommend running your unit in temperatures between 20°C to 28°C (68°F to 82.4°F). Once complete, the unit will beep once and shut itself off.

*While you can add food waste to your Bucket while it is seated inside the FoodCycler™, we recommend removing your Bucket from the unit prior to adding food waste to the Bucket. Food waste which falls outside of the Bucket and into the unit may cause damage to internal components.

**For a detailed list of the items which can be processed by the FoodCycler™, see page 10.

***Remove internal Bucket stickers before running a cycle. Remove Bucket Lid before running a cycle.

ADDITIONAL NOTES ON RUNNING A CYCLE

1. Always ensure that no food waste falls outside of the Bucket and into the unit. This may cause damage to the motor and other internal components. We recommend removing the Bucket from the unit prior to adding food waste to the Bucket. Keep your Bucket on your counter or kitchen table and add food waste throughout the day/week until you are ready to start a cycle.
2. Do not overload your Bucket. The Bucket has a fill-line around the interior circumference of the Bucket. Do not add food waste above this line. Do not press down on food waste within the Bucket. Overloading the Bucket may cause the unit to jam.
3. If you would like to add more waste to your cycle while the unit is still running, you may pause the cycle during Phase 1 to 3 by simply opening the lid. Adding food waste beyond Phase 3 will affect the quality of the by-product. You may need to run another cycle to ensure the by-product is dry.
4. The unit will run more efficiently if the Bucket is filled up to the fill line rather than running it half-full.
5. The lid filter should be cleaned every 3 to 4 months or when the lid grille filter is blocked. Periodically remove the lid grill filter and rinse under water to clean off dust. Dry the filter prior to reinstalling. (See page 9)
6. Carbon filtration systems are not designed to change odors, rather they are used reduce the intensity of odors. Processing particularly odorous foods may cause the unit to emit odors during operation and may shorten the lifespan of the filter.
7. Processing particularly hard foods and excessively packing down food waste in the bucket may result in increased noise levels during operation and reduce the longevity of the unit.
8. Processing overly moist foods may result in moist by-product. If the by-product is moist, we recommend running another cycle to ensure a dry by-product.
9. The bucket may still be hot after running a cycle. We recommend waiting for the bucket to cool before opening the lid and removing the bucket.

Maintaining Your Unit

- To keep your FoodCycler™ clean, first ensure that the unit is unplugged. Then, using a damp, wrung-out cloth, wipe down the outside surface of the unit, around the Bucket compartment of the unit, and along the outside of the Bucket. Do not manually clean the inside of the Bucket as there are sharp blades. Please refer to the Important Safeguards (see page 1) when cleaning your FoodCycler™. Do not pour water or any liquids over the unit.
- The bucket is intended to self-clean. Do not manually clean the inside of the Bucket. It is normal to have by-product residue left over on the base of the Bucket and should not impact the unit's ability to cycle your food waste.
- We do not recommend using any household cleaners when cleaning the unit. Mild soap is acceptable for soaking.

Replacing Your Carbon Filter Pellets

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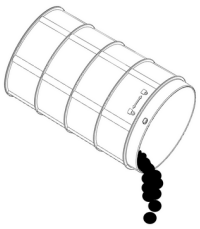

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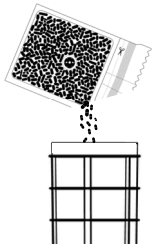

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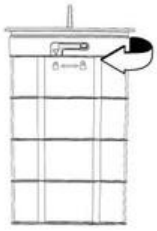

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1. Open the unit lid by lifting the lid latch.
2. Remove the Refillable Carbon Filter Cartridge from unit by pulling the tab.
3. Open the Refillable Carbon Filter Cartridge by twisting the lid counter-clockwise.
4. Carbon Filter Pellets are safe to handle. Dispose of your used Carbon Filter Pellets according to local regulations.
5. Cut open your new Carbon Refill Pack, following the cut-line guide along the top of the pack.
6. Empty the contents of the Carbon Refill Pack into the open Refillable Carbon Filter Cartridge. (We recommend doing this over a sink or towel, to avoid spillage).
7. Place the lid back on the Refillable Carbon Filter cartridge by aligning the notches on the cartridge with the arrows on the lid. Twist the lid clockwise to lock it in place. A slight click will indicate that the lid is properly seated.
8. Slide the filled Refillable Carbon Filter back into the unit cavity.
9. Close the unit lid, ensuring that the lid latch is in the proper locked position.
10. Press and hold the Carbon Filter Replacement Indicator for 3 seconds or until the unit beeps to reset the Carbon Filter Replacement reminder.

Cleaning Unit Lid Filter

The unit lid contains a lid filter, located behind the grille on the underside of the unit lid. This lid filter should be cleaned every 3 to 4 months or when the lid grille filter is blocked.

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1. Open the unit lid by lifting the lid latch.
2. Lift the lid grille from the retaining pin. If the lid grille is dirty, you may clean it by wiping the grille with a damp, wrung-out cloth.
3. Remove the lid filter situated behind the lid grille.
4. Rinse lid filter with water or wipe clean with a damp, wrung-out cloth
5. Insert the dry lid filter back into the lid cavity.
6. Add the lid grille onto the retaining pin and press into place to ensure the lid grille is properly seated. You will know the lid grille is properly seated if it remains in place when the unit lid is closed.

What Can Be Cycled?

Please Note:

- You will achieve ideal cycle results if your cycle contains a variety of food wastes.
- Large items such as corn husks and melons should be cut up into pieces no larger than ~10 x 10 x 10 cm (~4 x 4 x 4 in)
- Moisture-rich foods may result in moist by-product. If this is the case, we recommend running another cycle.

Yes

- ✓ VEGGIE & FRUIT SCRAPS
- ✓ MEAT, FISH, POULTRY
- ✓ POULTRY & FISH BONES
- ✓ COFFEE GRINDS & TEA LEAVES
  Including coffee filters & tea bags
- ✓ BEANS, SEEDS & LEGUMES
- ✓ EGGS & EGGSHELLS
- ✓ SHELLFISH
  Including shells

Small Amounts

- SAUCES, DRESSINGS & GRAVIES
- DAIRY PRODUCTS
- JELLIES, JAMS & PUDDINGS
- STARCHES
  Including bread, rice, cake, etc.
- PORK & LAMB BONES
- HARD PITS
  Including peach, apricot, lychee & mango

Cut Up Prior

- PAPER TOWEL/TISSUE
- CORN COBS & HUSKS
- WHOLE VEGETABLES
- PINEAPPLE LEAVES
- FIBROUS PLANTS
  Including celery, asparagus, parsley, etc.

No

- CARDBOARD
- OILS & FATS
- CANDY & GUM
- MOST "COMPOSTABLE" PLASTICS
- BEEF BONES

Using Your Homemade Soil Amendment In the Garden

Using an intuitive cycle sensor, the FoodCycler™ pulverizes and aerates nearly all types of food waste. Agitators quietly turn inside the Bucket, reducing food waste volume by up to 90%. Simultaneously, the unit aerates and heats the Bucket contents, leaving only a small amount of dry biomass.
While the by-product does not have the same microbial or bacterial qualities as traditional compost, it is still rich in the important nutrients your garden soil requires to thrive. FoodCycler™ is a convenient, compact and energy efficient compost alternative. Traditional compost, and composting alternatives (such as vermicompost systems, bokashi and compost tumblers) can take weeks, if not months, to transform food waste into a garden-ready supplement that is high in various micro and macro nutrients, as well as crucial organic biomatter. Because of the intense aeration, heating and pulverization of the unit's full cycle, this process is accelerated to complete within approximately 4-9 hours. Cycling also ensures that meat, dairy and even some bones and processed foods can be added to the cycle. The level of heat emitted by the unit during the cycle is sufficient to eliminate most bacteria and potential pathogens - even weed seeds - allowing the by-product to be used safely and stored indefinitely. The resulting biomass can also be used in the garden as a fertilizer or soil conditioner, effectively decreasing household food waste to practically nothing.

FOR BEST RESULTS

- Add your homemade soil amendment to your garden 1-4 weeks prior to planting or transplanting. This allows your by-product to break down in the soil, and nourish your soil's existing microbes.
- Mix the by-product in with your soil at a ratio of 1 part soil amendment to 10 parts soil (1:15 if your by-product contains meat or dairy products.) Ensure that the by-product is thoroughly mixed into the soil. Do not leave by-product on surface of soil or lawn.

FAQ

WHERE SHOULD I STORE MY UNIT?

The FoodCycler™ can be run in just about any area indoors that has a power outlet and sufficient space. We recommend running your unit in temperatures between 20°C to 28°C (68°F to 82.4°F).
Ensure that the unit is sitting on a flat, dry surface.
Do not store the unit next to heaters and kitchen appliances which generate significant heat.
Do not store the FoodCycler™ outdoors, or in any place where it is likely to get wet or subjected to below freezing temperatures.
Ensure the unit has adequate space surrounding the unit for proper ventilation. Do not block any vents on the unit or place any objects on top of the lid during operation.

WHAT CAN I PROCESS IN THE FOODCYCLER™?

Like any healthy diet, the FoodCycler™ performs best when fed a wide variety of foods. To ensure optimal food waste breakdown, add multiple different types of food waste to every cycle, with heavier foods interspersed with lighter, dryer foods. Avoid high concentrations of the following foods:

- starches (bread, cake, rice, pasta, mashed potatoes, stuffing)
- condiments, dressings, sauces & soups
- nut butters
- jam, jellies, marmalades
- high sugar fruits (grapes, cherries, melon, oranges, bananas, etc.)

The dense, starchy and/or moisture-rich composition of these foods make them difficult to process in large quantities. Moisture-rich foods such as watermelons may still be moist at the end of the cycle. For best results, we recommend running another cycle if it is still moist. For a complete guide on what you can and cannot process, please see page 10.
Prior to cycling, chop up items with a high fibre content, such as parsley and asparagus, as these items can easily wrap around the Bucket's grinding arm and cause a jam. The ideal size of each food item should be less than 5cm x 5 cm x 5cm (~2 x 2 x 2 in) .
If a jam occurs, the unit will stop processing and switch to self-protection mode (jam error code). The items causing the jam will need to be removed from the Bucket prior to restarting the cycle (see page 15 for additional information about error codes).

WHAT CANNOT BE PROCESSED IN THE FOODCYCLER™?

Do not attempt to cycle anything other than organic wastes in your FoodCycler™ (such as glass, metal, or wood). Likewise, do not cycle beef bones, candy, or gum: these materials may cause serious damage to the Bucket, and/or cause a motor overload. Do not add oil, flammable materials, or compounds to the unit. Small concentrations of pork and lamb bones, as well as hard pits are permitted.
Note: If a unit or Bucket is damaged from cycling, or coming into contact with the materials listed above, the associated warranties will be considered void, as the inclusion of these materials goes beyond the reasonable use of the unit.

CAN I STORE UNPROCESSED FOOD WASTE IN THE UNIT?

We do not recommend leaving unprocessed food waste in the unit for long periods of time. The Carbon Filters are only able to wick away odors during processing. Leaving decomposing organic matter in the enclosed unit will generate odors, methane gas and may attract fruit flies and/or other pests. Cycling odorous foods may result in some odors bypassing the carbon filtration system. Carbon filtration systems are not designed to change odors, rather they are used reduce the intensity of odors.

WHAT DO I DO WITH MY BY-PRODUCT?

If you process particularly moist foods, the by-product may still be moist at the end of the cycle. For best results, we recommend running another cycle if it is still moist.
The unit's by-product can be used as a soil amendment, or homemade fertilizer. For best results, we recommend adding the by-product to the soil at a ratio of 1 part fertilizer to 10 parts soil. For cycles with an abundance of animal protein (meat, dairy, etc.), we recommend increasing that ratio to 1:15. We recommend waiting a minimum one week (4 weeks for best results) following soil application before planting seeds or transplanting plants to the newly fertilized soil. The healthier your food waste, the healthier your garden! Foods high in fat, oil, or sodium may not produce optimal results.
Do not add the by-product directly to the soil surface. This will not feed the soil sufficiently, and the by-product will absorb moisture, which will increase the likelihood that your soil amendment will mold and/or attract unwanted critters to your yard or garden.
You can also throw it into your green bin or garbage can. Adding the by-product to your household trash is still preferable to throwing in unprocessed food waste, as the by-product will take up less space in landfills and will generate fewer transport emissions once collected (being reduced in weight and volume).

HOW DO I EXTEND THE LIFE OF MY FILTERS?

The Carbon Filter Replacement Indicator is to remind you to replace your Carbon Filter Pellets every 3-6 months (depending on use) or approximately 500 cycle hours (whichever comes first). The Carbon Filter Replacement Indicator is merely a recommendation, however, the best indicator of your unit filters is cycle odor. The Carbon Filter Pellet life depends on the quality and quantity of the use of the unit.
Running a cycle with only citrus rinds (lemons, orange, etc.), will help mitigate filter odors.
We recommend shutting the FoodCycler™ off before leaving your home for an extended period of time. You may also unplug the unit from the wall prior to any trips away from home. Leaving the unit in Active mode (Start button lit up) will also consume the life of the Filter.
Including coffee grounds in your regular cycles can help mitigate odors and can also help to keep your Bucket clean.

HOW DO I KEEP MY BUCKET CLEAN?

The FoodCycler™ Bucket is designed to self-clean with every cycle. It is normal to have a residue in the base and sides of the Bucket after some cycles. Simply empty the contents of the finished cycle, ensuring the internal grinding arm can fully rotate, and fill the Bucket for the next cycle.

If a jam occurs and you are not able to rotate the internal grinding arm, remove contents and manually soak the Bucket with boiling water and mild soap overnight, to loosen the blockage.

I'M HEARING "CLUNKING"/SQUEAKING SOUNDS DURING MY CYCLE - IS THIS NORMAL?

Noises during the cycle are perfectly normal. While the majority of cycles are quiet, particularly dense, fibrous or moisture-rich food wastes in a cycle can cause the Bucket to make sounds as it processes food waste. Processing particularly hard foods and excessively packing down food waste in the bucket may result in increased noise levels during operation and reduce the longevity of the unit.

WHAT HAPPENS IF THE UNIT IS UNPLUGGED, OR A CIRCUIT IS TRIPPED DURING THE CYCLE?

The FoodCycler™ Eco 5™ is designed to continue running from the point in the cycle at which it was operating prior to the loss of power (including events such as unplugging the power cord or a tripped circuit). If 1-2 hours have passed since the unit lost power mid-cycle, we suggest you reset the cycle by turning the unit off (by pressing and holding the Power button for upwards of 3 seconds) and pressing the Power button again to start a new cycle.

Error Codes

ABNORMAL AIR TEMPERATURE

The unit has detected abnormal external air temperature. The unit will not proceed until the warning indicator is cleared.
1. Move the unit to a warmer or colder room.
2. Open and close the lid.
3. Press the Power button once.

Note: If the warning indicator persists, please contact regional customer support.

MOTOR OVERLOAD

The unit has detected a motor overload. The unit will not proceed until the blockage and warning indicator are cleared.
1. Open unit lid.
2. Remove the Bucket from the unit.
3. Carefully remove obstruction from the Bucket grinding teeth. DO NOT attempt to remove the obstruction if the Bucket is still installed in the unit. DO NOT put your hand in the Bucket if the Bucket is engaged (gears turning). Please note that the Bucket's grinding teeth are extremely sharp. Handle with caution.
4. Once obstruction is removed, slide the Bucket back into place inside the unit.
5. Close unit lid.
6. Press the Power button.

Note: If the warning indicator persists, please visit contact regional customer support.

ADDITIONAL NOTES

If your FoodCycler™ unit displays any other error indicator, please contact regional customer support.
Please note that any product servicing should be performed by an authorized service representative. Tampering with the unit by unauthorized parties will void the warranty.

Appendix II.

Transform Compost – Report on Composting Pre-treated Material

Transform Compost Systems

turning waste into an opportunity

Composting Dried and Ground Food Scraps from Food Cycler

August 22, 2024

Introduction

The Food cycler is a kitchen appliance that dries and grinds food scraps. It promises to:

> *"reduce the global warming impact of food waste without dealing with the mess and smell of conventional disposal methods."*[1] *"It uses high heat to pulverize and dehydrate food waste, resulting in a by-product we call Foodlizer™"*[2]

An assessment report in 2020 concluded:[3]

> *"Food waste dehydration provides a unique food waste management solution that should be considered as a viable alternative to the established pathways of direct composting and anaerobic digestion. In addition to providing a compact and simple to use on-site solution, it mitigates concerns of storing raw food waste, which can be of concern, especially in urban or vermin-prone environments. This also allows for the flexibility of less frequent pick-ups. Thus, producing a product from organic waste that can be sold and utilized in a more beneficial way than pure landfilling is an outcome that more institutions can strive for by utilizing food waste dehydration technologies."*

The dried and ground product has been described as follows:

> *"Foodilizer is not compost, but it is a nutrient-rich soil amendment that can be added at appropriate ratios to soil as a fertilizer, composted in backyards or processed in centralized composting facilities."*[1]

Although the dried and ground food scraps contain nutrients, this product is much different than compost in that the organic matter is not stable. If the dried and ground food scraps are added directly to soil, it is recommended to incorporate it into the soil rather than being left on the soil surface. In many areas, this may limit the application of this material to certain times of the year, such as spring or fall.

Figure 1. Dried and ground food scraps contain active organic matter and are best incorporated into the soil rather than placed on the soil surface.

Composting the dried and ground food scraps is suggested as an option for recycling this product[1,3].

One recommendation for composting suggests up to 10 parts fresh yard trimmings, 20 parts dry yard trimmings, 6 parts inoculant (finished

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compost or soil) and 1 part dried and ground food scraps[2]. The challenge with this ratio for many homeowners is that the volume of yard waste to process the food scraps produced requires a larger volume of compost than many residents may expect to have.

Figure 2. Central collection area allowing residents to drop off their dried and ground food scraps.

The City of Nelson BC has distributed Foodcyclers in their community as a strategy to divert food scraps from landfill[4]. Two options for the resulting dried and ground food scraps include residents using it in their own gardens or dropping it off at a central location where the product will be sent to the Regional District of Central Kootenay's aerated windrow compost facility.

Previous Work with Composting the Dried and Ground Food Scraps

Transform used the Foodcycler Maestro at home for processing food scraps and found an average 75% weight reduction following the drying and grinding, with an energy requirement of 1.36 kw per kg of fresh food scraps.

Transform had previously composted a smaller volume of dried and ground food scraps in a 200 L insulated composting bin with a suspended aerated floor. The food scraps composted easily but the mix dried out quickly because of the high airflow resulting from the readily available energy in the food scraps.

In the previous composting trial, the mix ratio was 16.7 kg of dried and ground food scraps and 34 kg screened "overs" (>1/2" composted woody material) adjusted to 53% moisture. The approximate volume ratio was 35 L of dried food scraps to 115 L of the "overs". This blend of material composted very well, however, the moisture decreased from 53% to 35% moisture in 9 days.

Composting the City of Nelson's Dried and Ground Food Scraps

Transform received 67.4 kg of dried and ground food scraps from the City of Nelson for composting. The food scraps were composted in a 1 m^3 insulated bin with a suspended floor allowing passive aeration. Screened yard waste overs (> 9.5 mm or 3/8") was used as the bulking agent.

Figure 3. 25 kg of dried and ground food scraps with the 294 kg bulking agent.

The mix ratio of the food scraps to bulking agent was based on the potential energy in the food scraps and creating adequate air-filled porosity.

The recommendation for fresh food scraps is normally a maximum of 1 kg bulking agent to 1 kg food scraps (3-4 parts bulking agent to 1 part fresh food scraps on a

volume basis). Given that the drying and grinding of the fresh food scraps resulted in a weight loss of 75%, the equivalent fresh weight of the 67.4 kg dried and ground food scraps was 270 kg.

The food scraps/bulking agent mix ratio for this trial was approximately 10% (25 kg dried food scraps to 294 kg of bulking agent), which is equivalent to approximately 30% fresh food scraps in the mix. A lower food waste/bulking agent ratio was chosen because of the large amount of surface area in the food scraps that were readily available for the microbes.

Water was added to the food scraps/bulking agent mix to achieve a moisture content of 70%, and an air-filled porosity of 43%. Although the moisture content was higher than normally recommended (60%), previous experience with this insulated composting bin and the rapid drying with high energy wastes gave confidence in the success of this mix. The total weight of the mix was 431 kg at the start of the composting trial.

Figure 4. The one cubic meter insulated bin containing the blended food scraps/bulking agent mix.

The oxygen concentration in the composting bin dropped to 1% after 24 hours of composting and increased to 16% or higher after 48 hours (Figure 7). The average temperature in the bin at 48 hours was 63 ^{o}C. After one week of composting, the moisture content of the mix had decreased to 60% due primarily to a water loss of 70 kg. An additional 25 kg of dried and ground food waste was added, along with 107 kg water to obtain a moisture content of 67%.

Figure 5. Photo showing the steam filled air rising from the passively aerated composting bin.

The composting mix was weighed and blended weekly. The remaining 17.4 kg of dried and ground food scraps and a further 68 kg of water were added after three weeks of composting.

The composting trial was terminated after five weeks of composting (2 weeks after the remaining dried and ground food scraps were added), primarily because the temperatures cooled dramatically.

A total of 383 kg of compost was screened through a 13 mm (½”) screen. The fines collected was 158 kg at a moisture content of 60%. The Solvita index was 6, with negligible ammonia present.

The fines were stored in a non-insulated bin for an additional three weeks before sending a sample to the laboratory for a full analysis.

Figure 6. Dried food scraps/bulking agent blend after 1 week of composting.

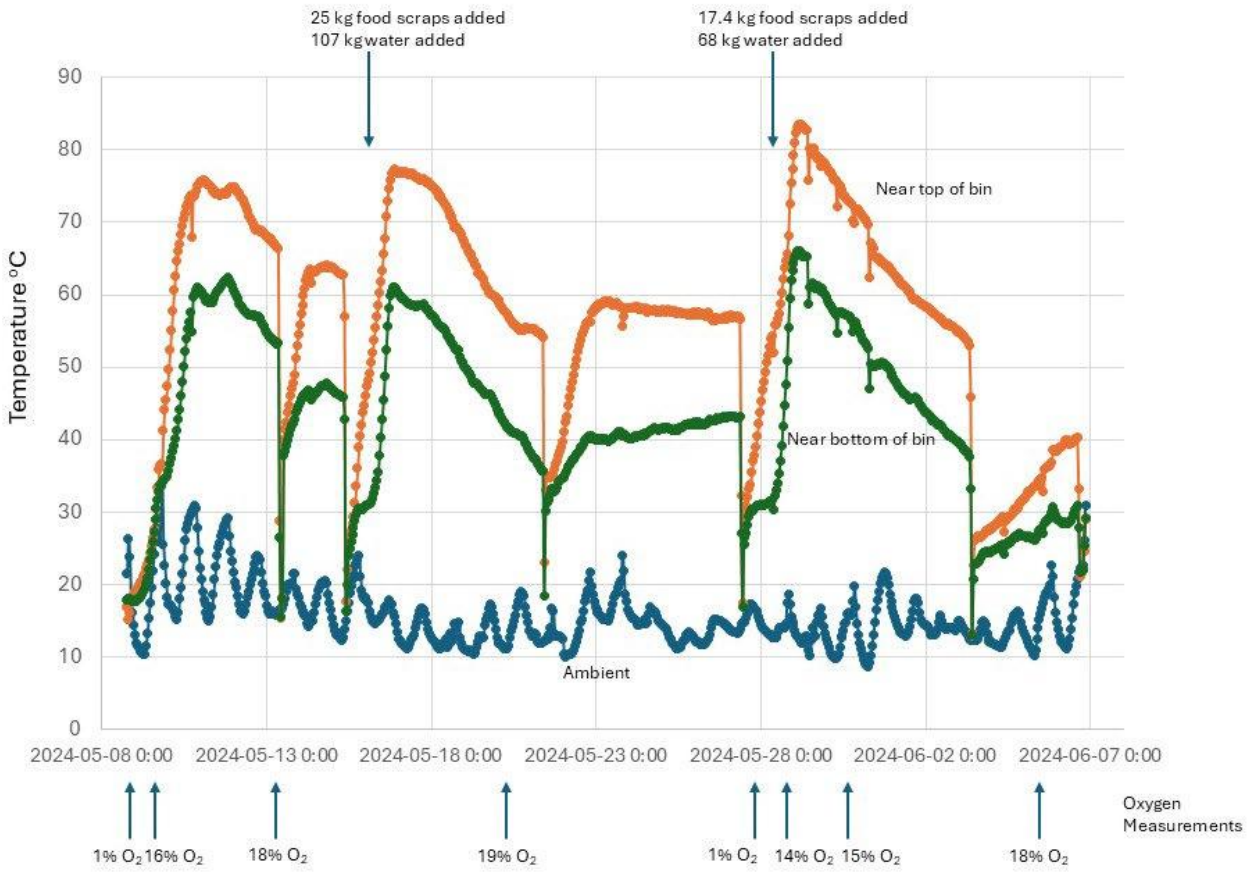

Figure 7. Temperatures and oxygen in the insulated bin during composting of dried and ground food scraps and bulking agent.

As shown in Figure 7, the temperature at the bottom of the bin was significantly lower than the temperature near the top of the bin. This is most likely due to the substantial influx of cooler air into the bottom of the bin and up through the suspended grated floor. At one point, the flow of air through the exhaust port at the top of the bin as 18.7 m^3/h (11 cubic feet per minute). The airflow results from the hot moist air rising and exiting the insulated bin at the top, creating a vacuum that draws cooler ambient air from the bottom. This passive airflow confirms that the air-filled porosity of 43% and the initial moisture content of 70% was not a limitation to the composting process.

The high airflow rates also resulted in substantial moisture removal and drying the material, particularly at the bottom of the bin. The material in the bin was mixed weekly, and moisture added twice during the five-week composting process to maintain optimal moisture content throughout the material.

The compost was screened after five weeks of composting, and the fines were cured for an additional three weeks. Two reasons for this were to determine the maturity after the curing process, and whether the fecal coliform counts would decrease during this period.

It is common to have elevated fecal coliform counts after short and intense composting processes even though the process met the temperature requirements for potential pathogen reduction. It is common to measure a resurgence of fecal coliform when the temperature decreases to below 45-50 °C, until such time that all the readily available carbon available for the fecal coliform bacteria are

utilized and the other beneficial microbes outcompete the fecal coliform. As shown in Figure 8, the fecal coliform remained elevated after the three weeks of curing even though the compost was very mature and stable.

	Dried and Ground Food Scrap Compost	Limits
General		OMRR*
pH	7.6	
Total Nitrogen (%)	2.63	
C/N Ratio	14:1	
Organic Matter (%)	68.8	
Moisture (%)	55.7	
Conductivity (ms/cm)	3.8	
Microbiology		
Fecal Coliform	>1000	<1000
E. coli	97	
Salmonella	Negative	
Stability/Maturity		
Respiration (mg CO2-C/g OM/day)	0.6	
Solvita	8	
Trace Elements		
Arsenic (ug/g)	BDL	13
Cadmium (ug/g)	BDL	3
Cobalt (ug/g)	2.59	34
Chromium (ug/g)	27.25	100
Copper (ug/g)	248.79	400
Mercury (ug/g)	BDL	2
Molybdenum (ug/g)	1.7	5
Nickel (ug/g)	6.03	62
Lead (ug/g)	2.59	150
Selenium (ug/g)	BDL	2
Zinc (ug/g)	98.8	500
Available nutrients		
Phosphorus (ppm)	584	
Potassium (ppm)	2212	
Magnesium (ppm)	677	
Calcium (ppm)	3312	
CEC (meq/100 g)	32.8	
*OMRR - British Columbia Organic Matter Recycling Regulation		

Figure 8. Analysis of the dried and ground food waste composting following five weeks of composting and three weeks of curing (Appendix A).

The elevated fecal coliform may have been unexpected because the food scraps are dried at high temperatures, thus inactivating all the microbes as was confirmed in previous testing. The bulking agent consisted of yard waste “overs”, which are not expected to contain fecal coliform because there was no material containing fecal matter and the yard waste had already been composted and met the temperatures required for potential pathogen kill. The presence of fecal coliform during composting

when the temperatures are below 45-50 °C and the compost still retains some available carbon is a more common occurrence.

respiration rate of 0.6 mg CO_2-C/g OM/day of the compost was much lower than the limit of 4.0 mg CO_2-C/g OM/day) in the CCME Compost Quality Guidelines[5], and was described as *"inactive, highly matured compost, very well aged, possibly over-aged, like soil, no limitations for usage"* (Appendix A).

With an electrical conductivity of 3.8 ms/cm, the composted product is not a soil, but a soil conditioner because it contains a significant amount of soluble nutrients.

The trace elements are all within the limits of British Columbia's Organic Matter Recycling Regulation[6] as well as the CCME Compost Quality Guidelines for Class A compost.

The total nitrogen content of 2.63% is characteristic for composts containing food scraps.

Summary

Dried and ground food scraps were very easily composted together with yard waste (bulking agent) at bulking agent/food scraps ratios between three and ten times. The very small particle size of the food waste makes the energy in the food scraps very available for the microbes when they are coated on the woody particles of the yard waste. The yard waste is important to provide the microbes for composting and create adequate air-filled porosity in the compost mix. The moisture should be adjusted to 55-65% to provide adequate moisture for the microbes and to help "stick" the food scraps to the woody particles.

The composting material should be mixed and may require additional moisture during the composting process.

The compost process removes the readily available carbon contained in the food scraps, thus stabilizing it to minimize the molds that occur when the dried and ground food scraps are applied directly on the soil surface. In addition, composted food scraps is more visually appealing than dried and ground food scraps placed directly on the soil surface as shown in Figure 9.

Figure 9. The composted food scraps (left side of photo) are much more visually appealing than the dried and ground food scraps shown on the right side of the photograph.

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This report was prepared by John Paul, PhD PAg

Appendix III.

Communication and Education Materials

Pre-Treated Organics Program

Program Guide

NELSON.CA/ORGANICS

FOODCYCLE SCIENCE

City of NELSON

FOODCYCLER

Thank You For Joining The City of Nelson's Pre-treated Organics Program!

This program provides you with a handy kitchen appliance called the FoodCycler™, which helps you pre-treat your household food waste. In this guide, you will find instructions on how to use and take care of the appliance, as well as how to manage the end product.

In 2020, the City of Nelson ran a successful pilot program to learn more about the benefits of a pre-treated organics diversion program and is now implementing a larger pilot to see if the outstanding results can be replicated at a larger scale.

An external consultant will compare this program to a traditional weekly curbside collection program to better understand the differences between the two models and make sure we have the best possible information ahead of a City-wide Rollout.

Nelson is the first community in Canada to test pre-treating household food waste at a community level. We value your feedback and we look forward to learning alongside you.

This Program has been developed in partnership with Food Cycle Science Corporation (FCS), which developed the food waste countertop recycler, the FoodCycler™.

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Your Foodcycler™ is the Property of the City of Nelson

The appliance you received through this program belongs to the City and is registered to your civic address. This means that if you plan to move, it's your responsibility to inform us and leave the appliance at the property for the next occupant unless other arrangements have been approved. Misusing or failing to leave the appliance when you move may result in replacement costs, as stated in the Waste Management and Wildlife Attractant Bylaw No. 3198 (2011).

What Should I Do If I'm Moving?

If you're moving in or out, you must let us know by filling out a Move In/Move Out Form on the Resources Page at nelson.ca/OrganicsResources. Alternatively, you can contact us at organics@nelson.ca or 250-352-TALK (8255). For more information, visit our program page at nelson.ca/organics.

Why Should We Divert Food Waste?

Organic waste diversion refers to separating organic waste, such as food waste, yard waste, and even some food soiled paper products from your garbage to make sure they don't go to the landfill.

When food waste ends up in the landfill, it decomposes and creates harmful pollutants. By diverting food waste, we can increase the lifespan of our landfills, lower the cost of our waste, and help keep our water and environment safe for future generations.

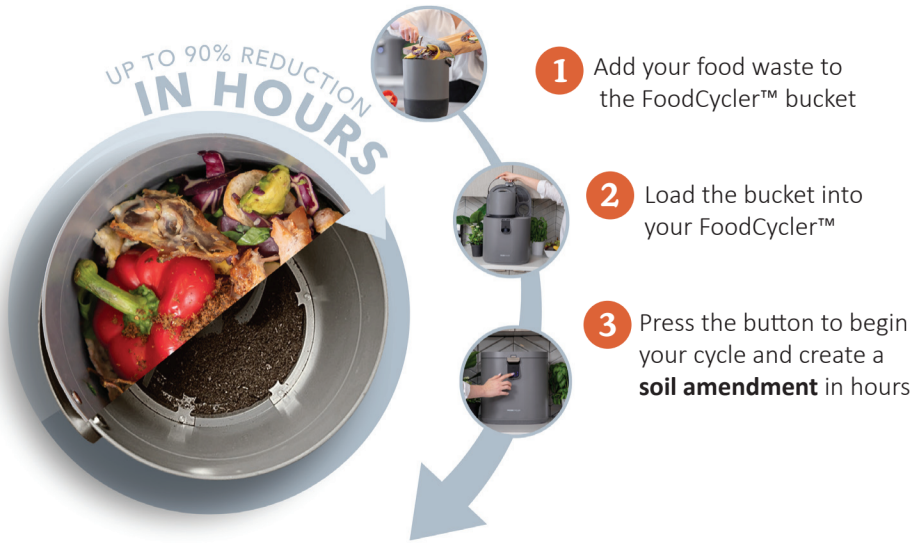
We think this program is a great fit for Nelson as we prepare for the future. Pre-treating smelly food waste helps to reduce animal attractants and keep wildlife safe. Reducing the transportation and noise associated with waste collection are also benefits of this new and innovative program.

With the help of the FoodCycler™ food waste can also be transformed into a valuable, nutrient-rich soil amendment that can be used in your yard or garden or be collected to be turned into compost. This helps return nutrients to the soil, providing benefits to the environment and promoting healthy green spaces.

Meet the FoodCycler™

The FoodCycler™ is a household appliance that's easy to use, convenient, and energy-efficient. By grinding and dehydrating the material, the FoodCycler™ reduces the volume and weight of food waste by up to 90%. After using the device, you'll be left with a dry, low-odour, and easy-to-store soil amendment. The product manual that comes with the appliance will be helpful as you use the device.

The FoodCycler™ process at a glance:



1. Add your food waste to the FoodCycler™ bucket
2. Load the bucket into your FoodCycler™
3. Press the button to begin your cycle and create a **soil amendment** in hours

To learn more about what can go in your FoodCycler™ and for detailed instructions on how to use your appliance effectively and safely, see page 6 in the FoodCycler™ User Manual.

Cost Savings and Sustainability

The City is powered by clean, hydro-electric power generated from Nelson Hydro's Bonnington Dam power plant. The FoodCycler™ uses less than 1.5-kilowatt hours per cycle, which will cost approximately $2/month to run the appliance. You will likely recover these costs by needing fewer garbage tags.

Managing Your Soil Amendment

Storing the Soil Amendment Produced By the FoodCycler™ is Simple!

The best place to store it is in a sealed container inside your home, like an enclosed garage, closet, cupboard or basement. Keeping it dry will reduce odour and allow for extended storage. It's not recommended to store it outside as it may be an animal attractant, and this would also be in violation of both the City Bylaws and the Wildlife Act.

You're responsible for finding a container or bucket to store and transport your soil amendment.

Check out the following pages to learn how to use your soil amendment at home or deliver it to a designated Drop-Off Location. From there, it will be collected and transported to the regional compost facility to create Class A compost.

QUICK TIP

To store your soil amendment daily, use a small bucket with an air-tight lid and place it under your sink. When the bucket is full, empty it into a larger storage bin. You can then transport the soil amendment to a Drop-Off Location or use it on-site.

Keeping Wildlife Safe

Pre-treating our food waste is a helpful step in making it less attractive to animals, but it's also crucial to ensure that we store and manage our soil amendment correctly, as outlined in this guide.

No one wants to see wildlife such as bears become a risk to public safety. By making sure we keep our soil amendment dry and indoors, we can do our part to keep wildlife away from our garbage. Bears that linger in our community because of food waste stored outside may be euthanized. We all need to do our part to keep wildlife safe.

It's important to keep in mind that animals may still be interested in the soil amendment until it's fully composted, so we must remain vigilant in how we handle and store it. Please follow the instructions on how to add the soil amendment to your garden to avoid attracting animals.

This program will help you manage your food waste; however, other animal attractants (such as fruit trees, bird feeders and BBQs) need to be carefully managed to reduce wildlife conflict in our community.

For tips on how to best manage your attractants, visit wildsafebc.com.

Glossary

Pre-treatment is when household food waste is processed in an appliance that grinds and dehydrates it, reducing its weight and volume by up to 90%.

Soil Amendment is the final product of the pre-treatment process, which comes out of the FoodCycler™. This nutrient-rich substance can be used in home gardens or dropped off for collection.

FoodCycler™ is the appliance designed to process your household food waste.

Food Cycle Science (FCS) is a Canadian clean technology company that created the FoodCycler™ household food waste appliance.

Soil Amendment: Drop It Off

If you are not using your soil amendment on-site you can bring it to a designated Drop-Off Location. You can access the Drop-Off bins year-round, 24/7 with the lock combination. For the pilot phase, the following Drop-Off locations have been set up.

Nelson Drop-Off Locations

1 For Early Adopters
(outside of the Fairview neighborhood):

Nelson Public Works Complex
80 Lakeside Drive
(before the RDCK Recycling depot)

2 For all Fairview Residents
(including Early Adopters residing in Fairview):

1st & Behnsen Street
(behind Safeway)

Please visit **nelson.ca/organics** for updates.

Only pre-treated organics (soil amendment) will be collected at the Drop-Off Locations. To avoid contaminating the soil amendment, all other items should be disposed of properly.

If you are at one of our Drop-Off Locations and all bins are full, there is an issue with the lock, or you have questions regarding collections call 250-352-TALK (8255) or email organics@nelson.ca.

If you see someone vandalizing or contaminating the Drop-Off bins, please contact Nelson Police at 250-354-3919.

NOTE: *This Pre-treated Organics Program will* ***not affect your bi-weekly garbage collection****; regular garbage and recycling collection will continue as scheduled. Visit nelson.ca/waste for details on collection.*

What About Other Organic Waste?

The Regional District of Central Kootenay will accept most organic waste, including regular food waste, food soiled paper, yard and garden waste. Visit rdck.ca/organics for a list of accepted materials, drop-off locations, and the cost for disposal.

QUICK TIP

A 5-gallon bucket is ideal, and you can re-use something you already have at home. Alternatively, you can purchase one at a hardware store. This size can store about three months' worth of household pre-treated food waste, based on a two-person household.

Soil Amendment: Use It At Home

One of the many benefits of this program is the access it gives residents to a nutrient-rich soil amendment. It is important to note that although the soil amendment is in the early stages of decomposition, it still needs to mature and it does not have the same characteristics as finished compost. You can either add it directly to your soil before planting or further process it in a home composter. Here are some tips to use your soil amendment at home.

Fertilize Your Garden Soil

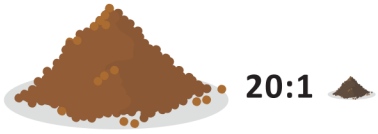
Food Cycle Science (FCS) recommends that the soil amendment is mixed into the soil in your garden or potted plants like a fertilizer.

How much soil amendment should I mix into my garden soil?

To ensure optimal results, mix the soil amendment with soil at a minimum ratio of 10:1 (10 parts soil to 1 part soil amendment). If your soil amendment contains a significant amount of meat or dairy products, it is advisable to increase the ratio to 20:1 (20 parts soil to 1 part soil amendment) to avoid any potential issues.

Mainly Plant Based Food Waste

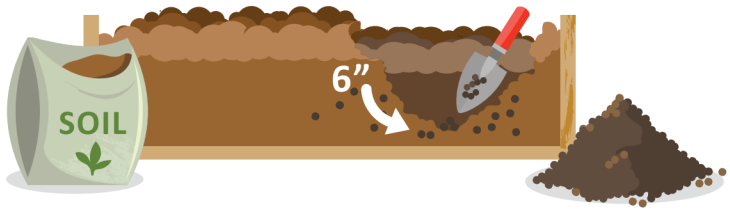
Food Waste with More Meat and Dairy



To keep wildlife and pets out of your garden, always mix your amendment well into your existing soil. To mix properly, dig into the soil deeply and turn thoroughly so that you get an even and well-distributed blend.

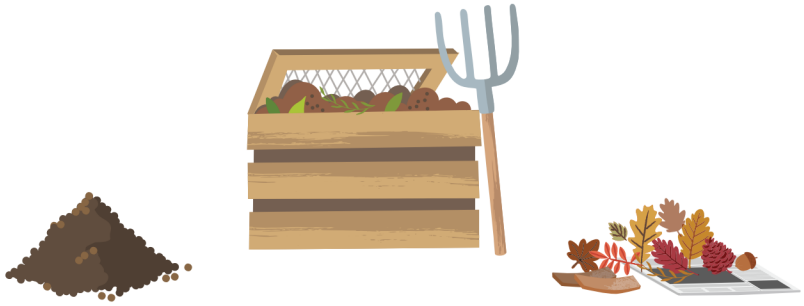
When should I add the soil amendment into my garden?

For best results, mix the soil amendment in with your garden soil approximately six weeks prior to planting seeds or transplanting plants in the spring or wait until fall to mix it in as you put your garden away for the season. This will allow the pre-treated material to further break down, mature and properly nourish the soil. You may also wish to add your amendment before or after bear season.



Add It To Your Composter: Here’s How

You can mix the soil amendment into your existing backyard composter. For best results always mix your soil amendment equally with brown materials, and mix regularly.



The soil amendment should be considered a **“green”** (nitrogen-rich) compost material.

Your **“brown”** or carbon compost material can include items such as paper products or dead leaves.

Please note that using the Drop-Off Location and using your soil amendment in your garden are the best method to deal with your soil amendment.

The composting process can attract animals even with pre-treated organics. One of the best ways to keep animals out of your compost bin is to actively manage it by mixing regularly and blending your “greens” and “browns” properly.

Caring for your FoodCycler™

Proper Maintenance and Placement of Your FoodCycler™

The location of your FoodCycler™ appliance is crucial for maintaining its energy efficiency and avoiding warranty and wildlife issues.

To ensure your Foodcycler™ continues to work as it should, you must keep it indoors at a temperature above 0 degrees Celsius. While the appliance is primarily designed for countertops, other suitable options are available if you don't have enough counter space. Here are some examples:

- Heated garage
- Laundry room
- Basement
- Storage area

QUICK TIP

Ensure good air circulation around your appliance to protect your cabinets from any steam that comes out of the filtration system.

What Maintenance is Needed?

The FoodCycler™ is relatively maintenance free! Replacing the carbon in your filter is the only regular maintenance required. Pay attention to how your appliance is processing your food waste, and if there are concerns refer to the troubleshooting section of the User Manual. The User Manual is also available at nelson.ca/organics

Refilling Your Carbon Filters

The FoodCycler™ uses refillable carbon filters to neutralize odours while processing food waste. If your appliance notifies you that a filter change is needed or if you begin to notice odour, follow the instructions on page 8 in the FoodCycler™ Manual or watch the Program Tutorial to learn more.

- Carbon pellets are available, free of charge, for residents of Nelson at Safeway, 211 Anderson St. Nelson.
- At the refill station, take only what you need. Carbon pellets must be used in your FoodCycler™ immediately to work effectively.
- ***Used pellets*** - at this time, this cannot not be added to the soil amendment and must be discarded into the garbage. We hope to find a biodegradable solution shortly. Please check nelson.ca/organics for updates.

Repairs

The new FoodCycler™ unit has a modular design which means that most repairs can be done locally.

If you find an issue with your appliance, here's what to do:

1. Refer to page 16 in your FoodCycler™ Manual or foodcycler.com for troubleshooting information. These resources can help you diagnose and potentially resolve the issue on your own;
2. If you cannot solve the issue using the manual or the FoodCycler™ website, submit a Troubleshooting and Repair request through the Form at nelson.ca/OrganicsResources or contact the Pre-treated Organics Team at organics@nelson.ca to notify us about your concern;
3. If your appliance needs a repair an appointment will be booked and staff will contact you to coordinate a drop off. Upon availability, you may be issued a replacement unit while your appliance is being repaired;
4. Your appliance will be repaired and you will be contacted when it is ready to be picked up.

End of Life

The FoodCycler™ has a long-expected lifespan. If you suspect that your appliance has reached the end of its life, please get in touch with the Program Coordinator at organics@nelson.ca. An assessment of the appliance will be conducted and may result in maintenance or a replacement. If a replacement is required, the expired unit is fully recyclable and will be brought to a recycling facility.

Additional Program Support

Check out our Resident Resource Page at **nelson.ca/OrganicsResources** for more information such as our Video Tutorial, Move In/Move Out Forms, Troubleshooting and Repair Forms and other materials.

Scan this QR code to go directly to our Resident Resource Page.

Go to **foodcycler.com** for more about the appliance, troubleshooting information and more.

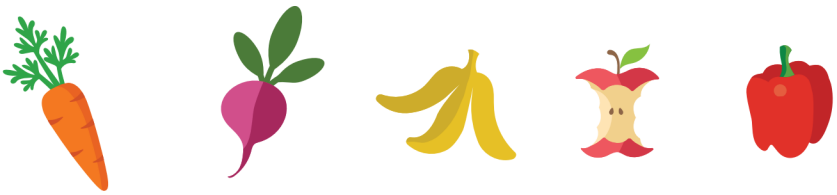
For community support on the use of your appliance check the 'FoodCycler™ Pilot-Program Champions' Group on Facebook or contact an Early Adopter in your friend group, workplace or neighbourhood.

Reducing Your Food Waste

Some food waste is unavoidable – this is the food that can't generally be used or eaten, such as bones, vegetable peelings, egg shells, tea bags, and coffee grounds. But did you know that 63% of food waste is avoidable? Avoidable food waste is the edible food that ends up in the compost or in the garbage, like leftovers or spoiled food.

Unfortunately, we often waste good food because we buy too much, cook too much, or don't store it correctly. We encourage you to follow the tips below to help prevent avoidable food loss, and then to use the pre-treatment device to manage your unavoidable food waste. ***This may also help you reduce your food costs.***

This Program will help you produce less waste (and the unpleasant odours associated with it) and make it easier to store and handle your waste. Some pilot participants have reported a reduction in food costs as they become more aware of their food waste habits through the use of the appliance.



Keep It Fresh

- Organize your fridge – store produce items in a visible part of the fridge so they aren't forgotten about and put leftovers to one side and within sight so you can use them first;
- Use your freezer—it's the easiest way to preserve fresh food and leftovers;
- Empty the fridge before your next trip to the grocery store;
- Know the shelf life of the products you purchase - plenty of food can be kept safely past the best-before date!

Plan It Out

- Plan your meals in advance (preferably a week at a time);
- Make a shopping list - check your fridge and cupboards beforehand to see what you have;
- Only buy what you need each week, buying fresh items in bulk can lead to more waste;
- Don't make too much food - only make what you know you will eat or can manage as leftovers during the week.

Use It Up

- Dedicate one day a week to making meals from leftovers and older produce;
- Get and use quality storage containers for portion-ready lunches;
- Try reworking leftovers into another recipe before FoodCycling.

For more tips on preventing food waste, including creative recipes and food storage guides, visit **LoveFoodHateWaste.ca**

LOVE FOOD hate waste

Funded by

In Partnership with

British Columbia Conservation Foundation

wildsafebc.com

NELSON.CA/ORGANICS

What Can I Put In My FoodCycler™?

The following graphic shows you what you can and cannot process with the FoodCycler™. The best cycle is one with a lot of variety.

Please ensure that you remove all stickers, elastic bands, and other packaging. It's important to note that some tea bags are made of plastic, while others are made of paper that shreds easily by hand. Paper tea bags can be processed along with your organics, but plastic tea bags should be disposed of in the garbage.

Program Information

Nelson Drop-Off Locations

1 For Early Adopters
(outside of the Fairview neighborhood):

Nelson Public Works Complex
80 Lakeside Drive
(before the RDCK Recycling depot)

2 For all Fairview Residents
(including Early Adopters residing in Fairview):

1st & Behnsen Street
(behind Safeway)

Carbon Refill Locations: Safeway, 211 Anderson St. (for all residents)

Your Foodcycler™ is the Property of the City of Nelson

The appliance you received through this program belongs to the City and is registered to your civic address. This means that if you plan to move, it's your responsibility to inform us and leave the appliance at the property for the next occupant unless other arrangements have been approved. Misusing or failing to leave the appliance when you move may result in replacement costs, as stated in the Waste Management and Wildlife Attractant Bylaw No. 3198 (2011).

What Should I Do If I'm Moving?

If you're moving in or out, you must let us know by filling out a Move In/Move Out Form on the Resources Page at nelson.ca/OrganicsResources. Alternatively, you can contact us using the email and phone number listed below. For more information, visit our program page at nelson.ca/organics.

Scan here for our Resource Page

Program Support

Contact: organics@nelson.ca | 250-352-TALK (8255)

Claim Your FoodCycler
Don't miss out, register now!

1. REGISTER ONLINE OR AT CITY HALL
2. WE WILL CONTACT YOU WITH PICK-UP INFO
3. GET YOUR FOODCYCLER AND START DIVERTING YOUR FOOD WASTE!

Fairview Residents

Is Friday your waste collection day?

If so, your appliance is ready for pick-up. Register to get yours now!

SEE REVERSE SIDE FOR REGISTRATION INFORMATION

Why divert food waste?

When food waste ends up in the landfill, it decomposes and creates harmful pollutants.

By diverting food waste, we can increase the lifespan of our landfills, lower the cost of our waste, and help keep our water and environment safe for future generations.

Emily welcomes residents Linda and Reid Henderson, who received their new FoodCycler at our pick-up sessions!

What are the Program benefits?

- Cost-effective waste management
- Makes for easy waste handling and reduces odours
- Saves space in your home and our landfill
- Produces soil amendment for gardens and greenspaces
- Reduces wildlife encounters & pests
- Promotes research in innovative waste solutions
- Creates green job opportunities

@TheCityOfNelson

@City.Nelson

For more information, visit www.nelson.ca/organics

For questions or assistance, contact:
(250) 352-TALK (8255) or organics@nelson.ca

City of NELSON

Dear Resident,

We're thrilled to announce the Official Launch of the City's Pre-Treated Organics Program! As an initial step, Fairview has been chosen as the pilot neighbourhood for this groundbreaking initiative that has the potential to make a significant impact on our community.

Through this Program, the City provides households with a FoodCycler™ (foodcycler.com) that efficiently and quietly transforms food waste into a nutrient-rich soil amendment.

Nelson is the first community in Canada to test pre-treating household food waste at a community level. We value your feedback and look forward to learning alongside you.

If you have any questions or need assistance with the registration process, please contact us at (250) 352-TALK (8255) or organics@nelson.ca. For more information on the program, visit nelson.ca/organics.

Thank you for being a vital part of this exciting initiative!

Sincerely,

City of Nelson's Climate & Energy Team

Your Participation Matters.

Please register to pick up your FoodCycler™ at nelson.ca/OrganicsRegistration

HALL PRINTING
NELSON

Phone: 250-352-6900
Toll Free: 1-877-354-1700
Fax: 250-354-1666

PROOF

Magenta line indicates the die cutline. Qty. 1000

SORRY WE MISSED YOU...

City of
NELSON

Your home has been selected for the City's Pre-treated Organics Program.

This Program provides residents with an in-home appliance called the FoodCycler™. The FoodCycler™ is designed to grind and dehydrate your household food waste. This transforms it into a dry and odorless soil amendment for your garden or drop it off for City collection.

NELSON.CA/ORGANICS

We want to help get you started.

Your FoodCycler™ is Ready for Pick-Up

Don't miss out, join the solution.
Register today at
nelson.ca/OrganicsRegistration

Did you know,
by using the FoodCycler™ you can divert more of your household food waste?

Need Help?
Call (250) 352-TALK (8255)

RELEASE OF LIABILITY:
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157 _____ Signature _____ Date

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NELSON

Phone: 250-352-6900
Toll Free: 1-877-354-1700
Fax: 250-354-1666

PROOF

Qty. 250 each.

City of
NELSON

2022 GARBAGE & RECYCLING COLLECTION SCHEDULE

- Lower Uphill (Latimer St. to Richards St., Creek St., Perrier Road & Perrier Lane)
- Downtown and Gyro/View St. areas (Anderson St.to Mill St.and Front St.to the Rails-to-Trails)
- Upper Uphill and Rosemont
- Fairview
- All other residential pick-up
- Statutory Holiday/Holiday day observed in lieu of stat

Not sure which day is your collection day?
Go to nelson.ca/waste for a map

JANUARY

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
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30	31					

FEBRUARY

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27	28					

MARCH

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MAY

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JUNE

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26	27	28	29	30		

Garbage bins & cans ARE allowed at the curb. Garbage must be contained in correctly sized and tagged bags.

Clearly display entire tag on EACH bag. Do not tag bin.

Visit nelson.ca/waste to find out your pick-up day & what you can recycle.

Coming in 2022...

Organic Waste Diversion

The City of Nelson will be the first municipality in Canada to launch a city-wide pre-treated organics diversion program. “Pre-treatment” mashes and dehydrates food scraps, transforming them into a soil amendment that can be used to enhance your garden or be collected by the City. For more information on organic waste diversion visit **nelson.ca/programs**.

New Garbage Tags!

Early in 2022, the City will be updating our garbage collection tags. The orange tags will remain valid and can continue to be used by residents, even after the new tags have been issued.

Learn More...

For information on upcoming programs and to learn about other City initiatives visit **nelson.ca/programs**.

City of NELSON

RECYCLING 101

RECYCLEBC

ITEMS THAT GO IN YOUR BLUE BIN:

Operated by the City of Nelson

For your garbage and recycling schedule visit: nelson.ca/waste


Newspapers, inserts, and flyers


Magazines, catalogues, and phone books

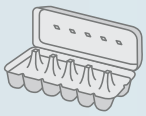

Boxboard boxes


Plastic bottles, jars, and jugs


Plastic trays and clam shells


Plastic garden pots and seedling trays

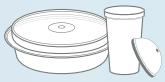

Foil wrap and take out containers


Paper egg cartons


Household paper

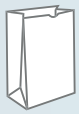

Envelopes


Caps, tops, lids, and pumps


Plastic or paper take-out cups, bowls, and lids

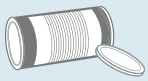
Cartons for soup, milk, etc.

Aerosol cans (empty)


Paper bags


Cardboard boxes

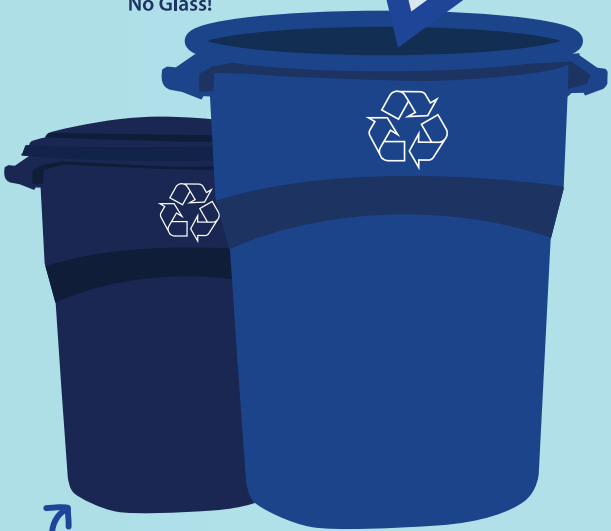
Spiral wound cans and lids for juice concentrate


Metal cans

Remember to empty and rinse ALL containers.

Soiled containers are not accepted. Remove any caps or lids and place them loose in your bin.


No Glass!



IS YOUR BIN LOST OR STOLEN?

Additional bins can be purchased for $35.
Questions? Call Public Works at 250-352-8238.

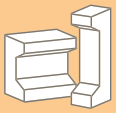
DROP OFF ITEMS AT LAKESIDE DR. DEPOT:

Operated by the Regional District of Central Kootenay

FOAM PACKAGING


Foam meat trays (remove absorbent liner)


Foam take-out containers and cups


Foam packaging used to protect electronics, etc.

PLASTIC BAGS AND OVERWRAP

Plastic bags


Overwrap


Flexible packaging with plastic seal (e.g. sandwich meat packaging)


Stand-up and zipper lock pouches

Woven and net plastic bags


Non-food protective packaging

GLASS


Glass bottles and jars (clear and coloured)

OTHER FLEXIBLE PLASTIC PACKAGING

Crinkly wrappers and chip bags

Need more info?

City of Nelson
250-352-5511
nelson.ca

NotifyMe®
NELSON EMERGENCY ALERTS
nelson.ca/notifications

EMERGENCY
160
911

NELSON HYDRO
HYDRO POWER OUTAGES
24 Hour Toll Free Number
1-877-324-9376

City Service Request?

City of NELSON

We're making a difference together!

HELP SHAPE NELSON'S FUTURE!

OCP

OFFICIAL COMMUNITY PLAN

Nelson 2050
Leading the way, together.

HAVE YOUR SAY!

Visit Nelson2050.ca

WHAT IS AN OCP?

The Official Community Plan (OCP) is Nelson's compass for growth and change. It is our highest level policy tool and informs all decisions at the City.

WHAT IS AN OCP UPDATE?

The OCP Update is not a complete rewrite of the Official Community Plan. Instead, it's about shaping a collective vision for 2050 and ensuring we're moving in the right direction to achieve it.

VOYENT ALERT!

NELSON'S EMERGENCY NOTIFICATION SYSTEM

Sign-up to receive critical information in the event of an emergency.
nelson.ca/notifications

CLIMATE PROGRAMS

Find out how you can participate!

nelson.ca/programs

CITY NEWS

nelson.ca/citynews

Sign-up to recieve City News!

CONTACT US

EMERGENCY
911

HYDRO POWER OUTAGES
24 Hour Toll Free Number
1-877-324-9376
nelson.ca/hydroalerts

City of NELSON

City of Nelson
250-352-5511
nelson.ca

@city.nelson
@thecityofnelson

City of
NELSON

Let's talk Garbage

BAG it! 20kg max

TAG it! Clearly display tag on bag

BIN it!

Visit **nelson.ca/waste**

Let's talk Recycling

Don't Contaminate... Participate!

- NO GLASS
- NO SOFT PLASTICS
- NO FOAM PACKAGING
- NO PAPER TOWELS
- RINSE CONTAINERS!
- PUT A LID ON IT!

Don't let **YOUR** recycling go to waste!

Need to purchase a second bin? Call 250.352.8238 or visit **nelson.ca/recycling**

Let's talk Pick-Up

- **Lower Uphill** (Latimer St. to Richards St., Creek St., Perrier Road & Perrier Lane)
- **Downtown and Gyro/View St. areas** (Anderson St.to Mill St.and Front St.to the Rails-to-Trails)
- **Upper Uphill and Rosemont**
- **Fairview**
- **All other residential pick-up**
- **Statutory Holiday/Holiday day observed in lieu of stat**

JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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22	23	24	25	26	27	28
29	30	31	1	2	3	

↖ JANUARY

Visit **nelson.ca/waste**

Let's talk Food Waste

Get YOUR FoodCycler™ Sign up at nelson.ca/organics

If your waste is collected by the City, you are eligible! This includes homeowners and renters (while supplies last).

Open to all Nelson neighbourhoods!

Visit **nelson.ca/organics**

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NELSON

Phone: 250-352-6900
Toll Free: 1-877-354-1700
Fax: 250-354-1666

PROOF

Qty. 300

Proof Date_____ ❑ Approved as is ❑ Changes/New Proof

❑ Proof #1 ❑ Proof #_____ ❑ Proof OK with Changes

_____ Signature

_____ Date

Appendix IV.

City of Peterborough Green Cart Presentation (Excerpt)

City of Peterborough

Journey to Maximum Waste Diversion

Presented by: Don Briand
Manager, Waste Operations
& Barry Campbell
Manager, Organic Waste Operations
City of Peterborough

AGENDA

- Baseline Diversion Programs
- 2022 Waste Management Master Pl
- 2023 Diversion Program Roll-out
- Compost Facility Build and Commiss
- Lessons Learned
- Next Steps
- Questions

BASELINE WA PROGRAMS

Weekly collections

- Blue box (two stream- container & fibre)
- Garbage

Depot oper

- HHW- Sat 8a
- Landfil centre

Scheduled Collections

- Leaf & yard waste
- Large item collection
- Batteries

Baseline diversion rat

WASTE MANAGEMENT MASTER PLAN (2022)

- Minimize waste generation
- Maintain fiscal responsibility
- Maximize waste diversion- target 76%+

WASTE MANAGEMENT MASTER PLAN (202

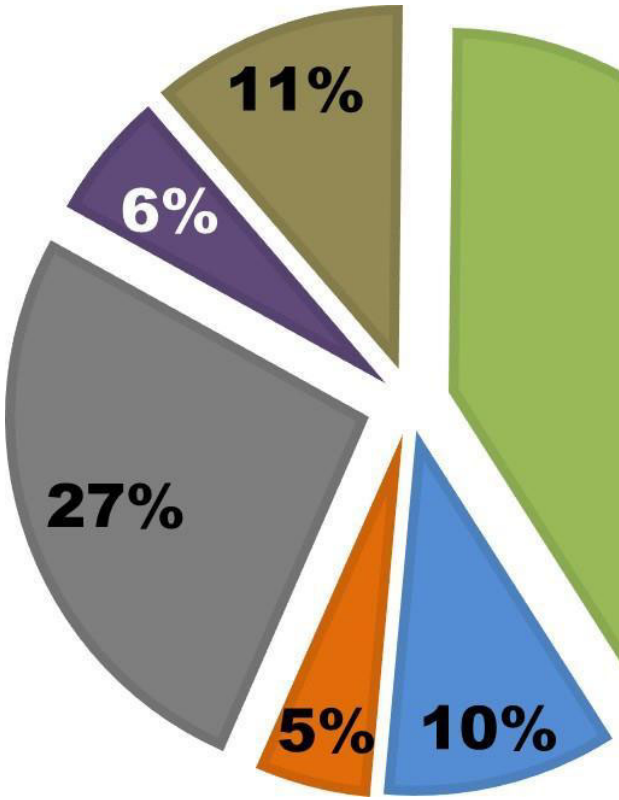
2022 WMMP update identified potential to divert 51% of existing garbage stream throu

Divertible Waste:

- **41% - Kitchen/Food Waste (organics)**
- **10% - Blue Box Materials**
- **5% - Other Divertible Material** (Textiles,

Remaining Waste:

- **27% - Other Waste**
- **11% - Pet Waste**
- **6% - Diapers & Sanitary Products**



WASTE MANAGEMENT MASTER PLAN (202

2022 WMMP update identified potential to divert 51% of existing garbage stream throu

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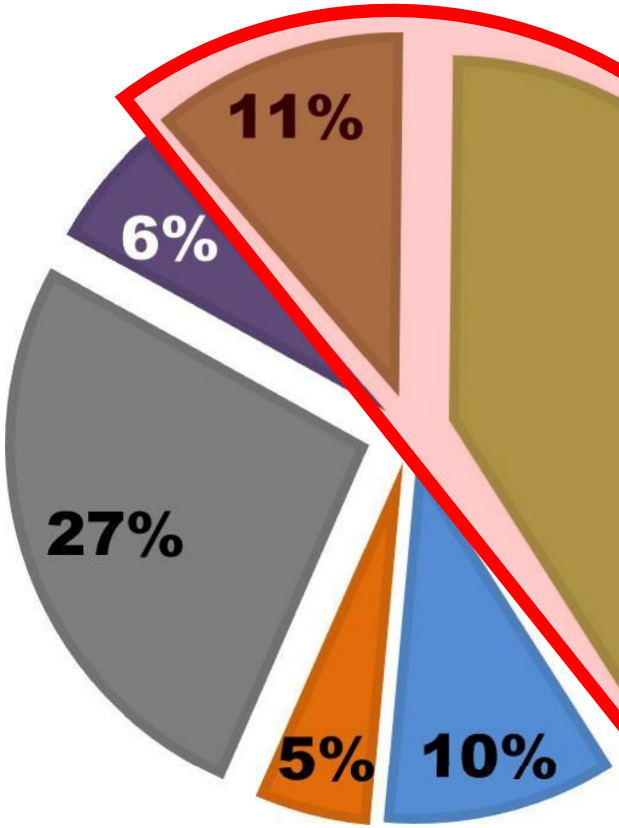
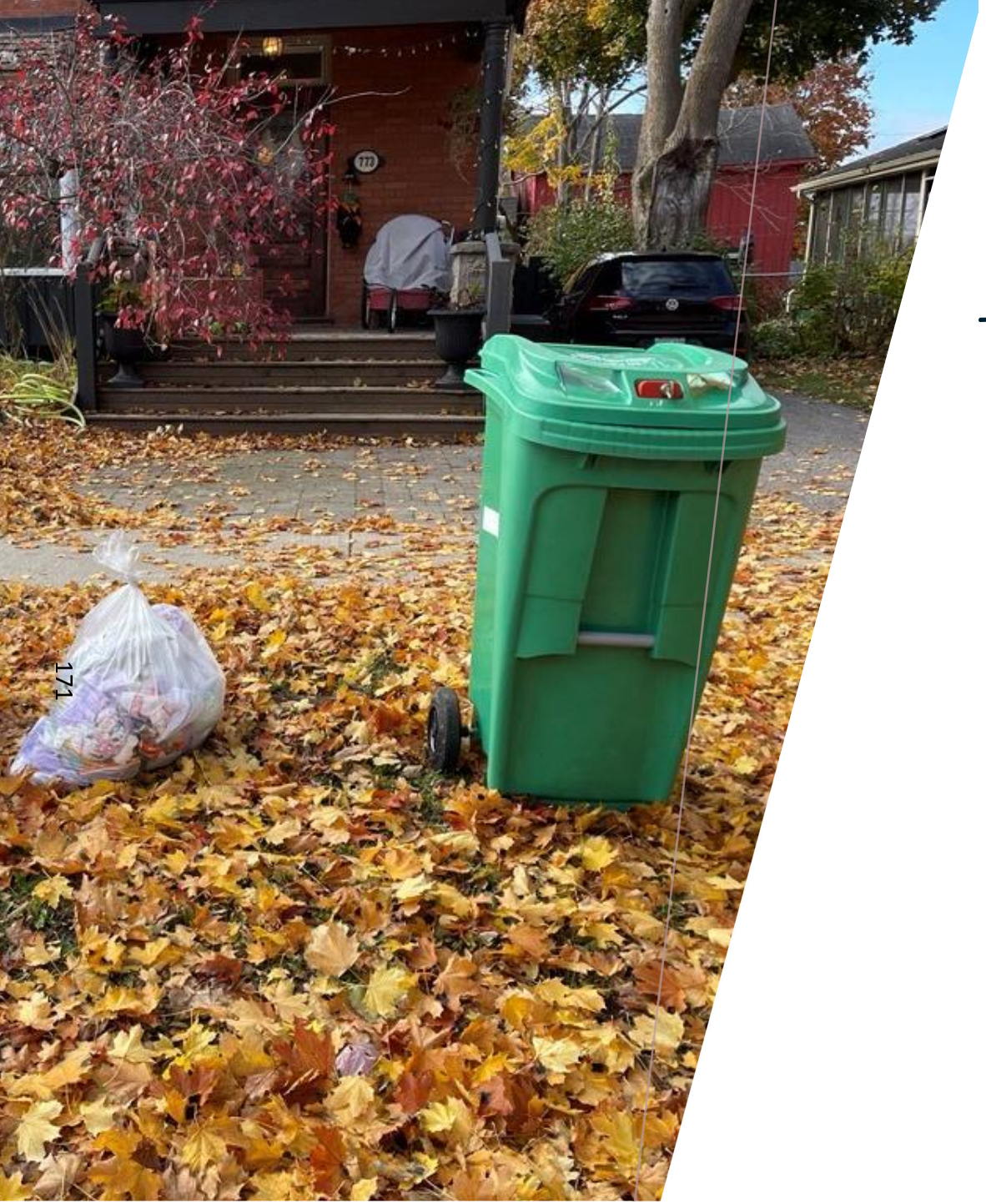




OCT. 31, 2023 WAS
PROGRAM CHAN

GARBAGE

- Clear bag garbage
- Every other week collection – 4 bag limit (max. 30 lbs.)
- No cans/vessels at the curb

SSO GREE

- 28,000 res household
- 100 L curb 7 L kitcher

GETTING THE MESSAGE OU

GETTING THE MESSAGE OU

CLEAR BAG GARI

- Every other week collec
- 4 bags/EOW collection (residential)
- No cans/vessels at the c

KEY MESSAGE: **worker s**

SSO (FOOD)-GREEN BIN

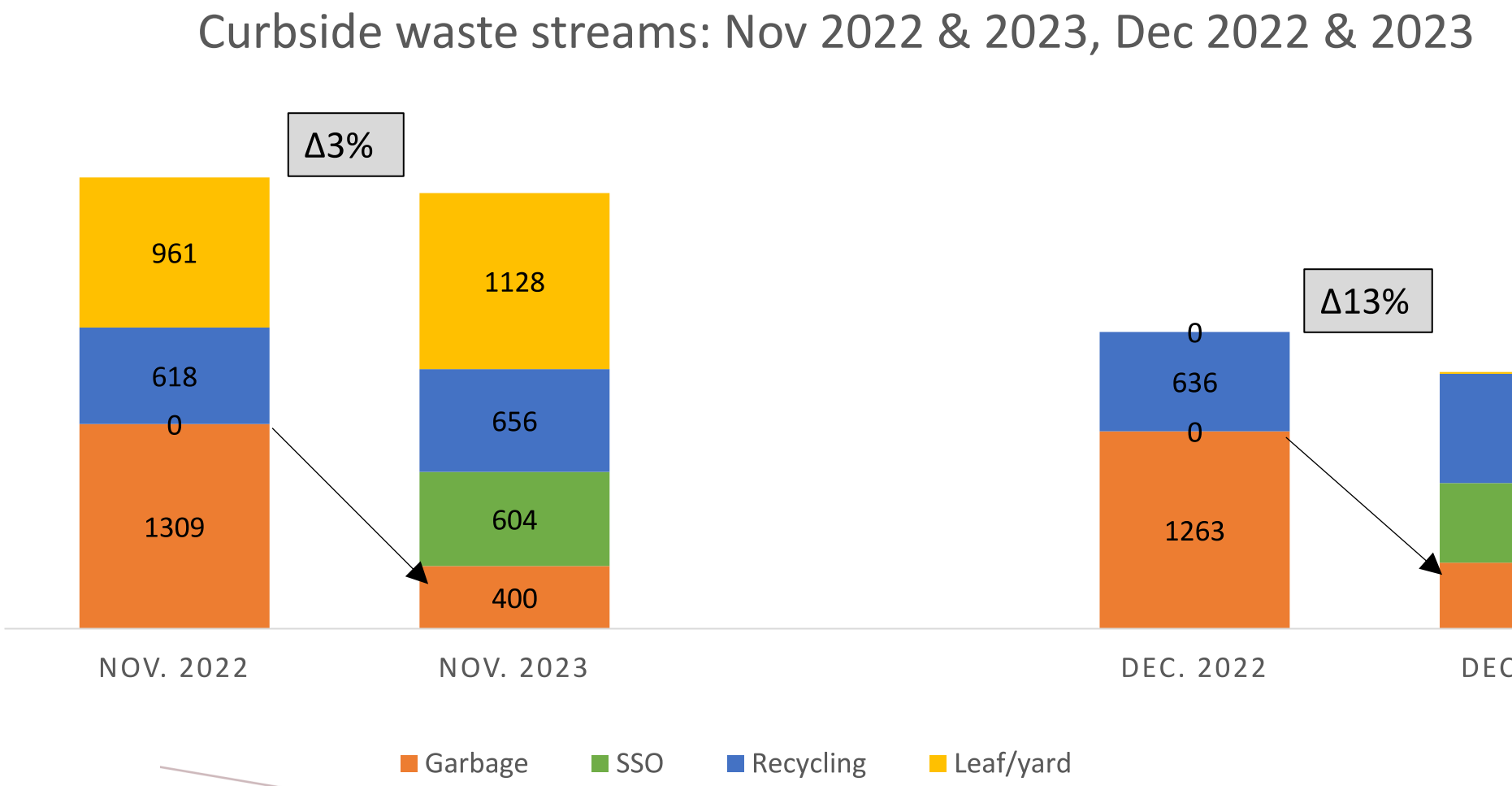
- Rolled out to 28,000 households
- Door dropped to residences by contractor
- Resident uptake has been greater than expected

GREEN BIN COMMUNICATION MATE

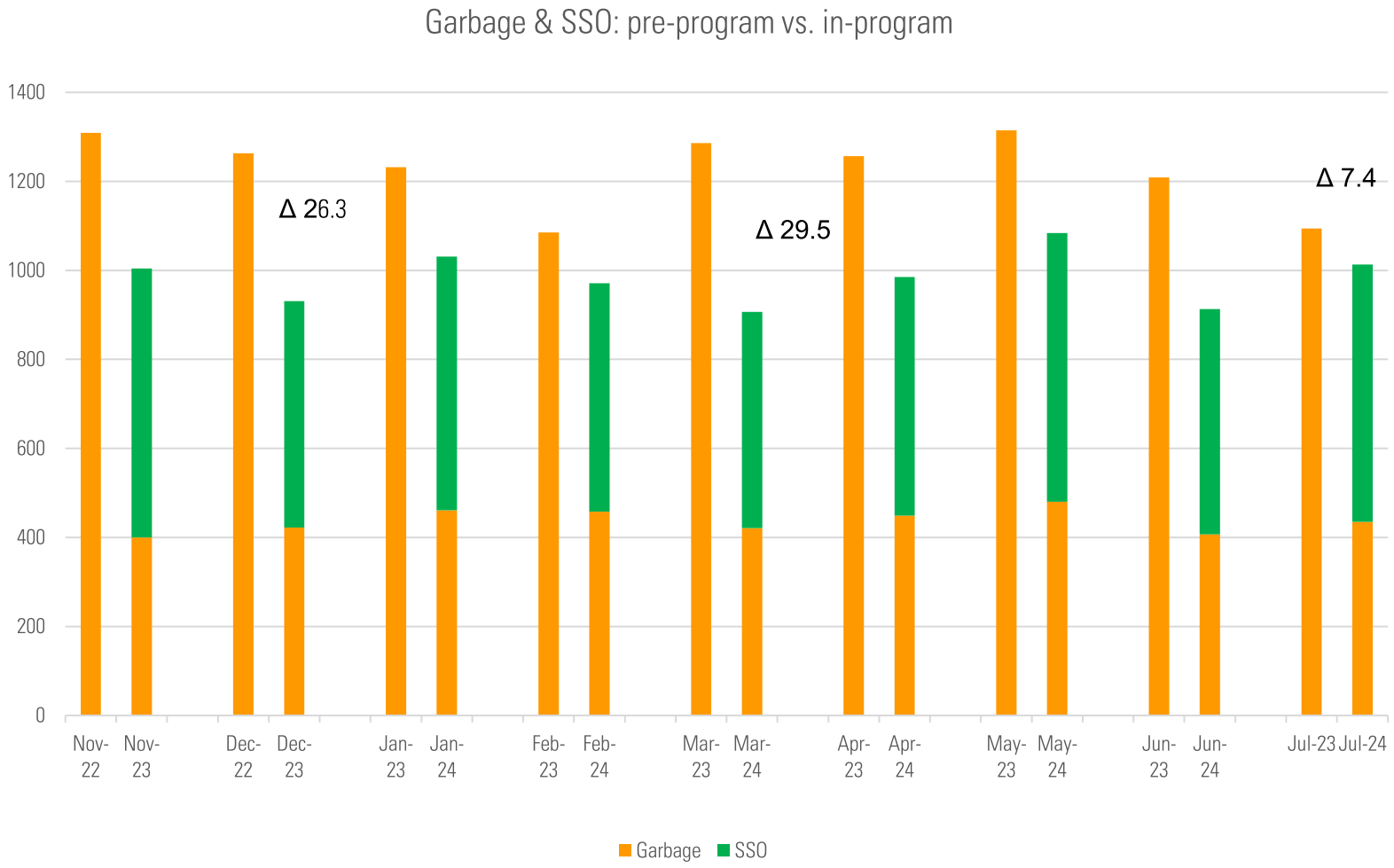
- Waste calendar- November 2023-December 2024
- Peterborough collection zone map
- What goes where
- QR codes for Recollect/Routeware app & City website
- GLAD bag samples- compostable bin liners & clear garbage bag

COLLECTION VEHICLES & BI

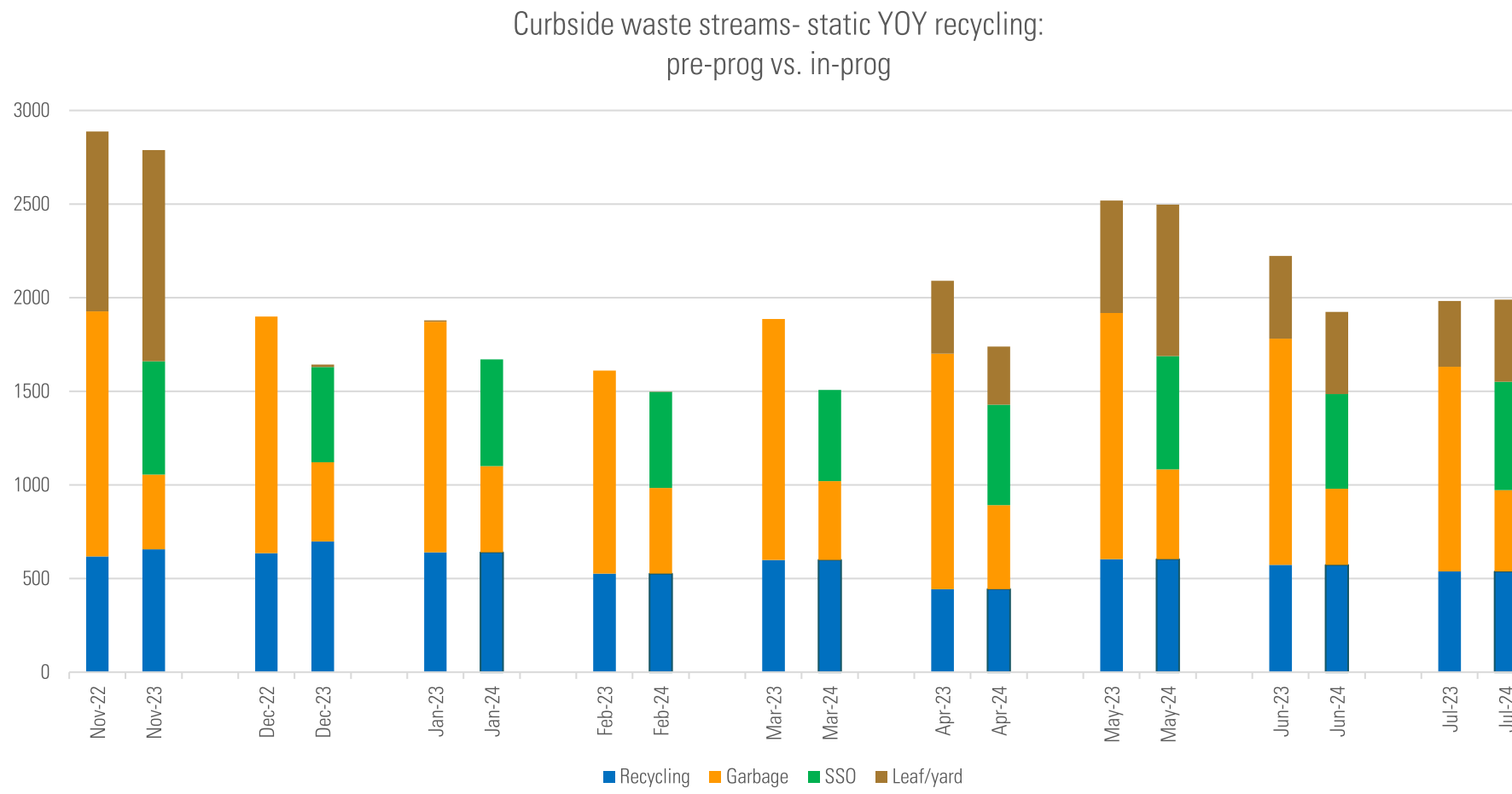
Diversion figures



Diversion figures



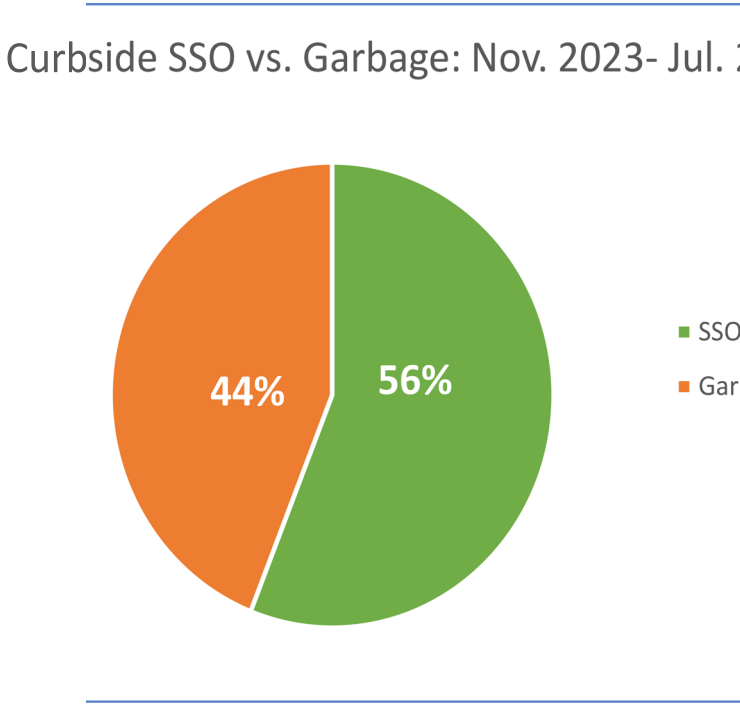
Diversion figures



SSO capture rate in first 9 month

- ~133 tonnes/week
- or 33 tonnes/day (4-day collection week)

– 28,000 single households
  - No multi-residential units greater than 6.
  - No commercial establishments included in City collection program



Week one of program collection saw diversion rate hit 7

THANK YOU

Don Briand

Manager, Waste Operations

dbriand@peterborough.ca

Barry Campbell

Manager, Organic Waste Operations

bcampbell@peterborough.ca

Appendix V.

Nelson Fairview Waste Characterization Study Summary Report

City of Nelson

Final Report: Fairview Residential Waste Characterization Study, April and July 2024

July 2024

Submitted by: Stacey Schaub-Szabo

S-Cubed Environmental

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Report

1 Introduction and Background 2
2 Waste Characterization Study Methodology 2
2.1 Fairview Waste Sampling Pre-Pilot Project – August 2023 2
2.2 Fairview Waste Sampling Post-Pilot Project – April and July 2024 2
2.2.1 April 2024 2
2.2.2 July 2024 3
2.3 Waste Sorting Methodology 3
2.4 Waste Characterization Study Categories 3
3 Results 4
4 S-Cubed Corporate Profile 4
Appendix A: Waste Sort Categories and Sub-Categories 5

1 Introduction and Background

The City of Nelson is conducting a pilot project to explore the use of in-home pre-treatment appliances (the FoodCycler) to divert organics, maximize resource circularity and reduce GHG emissions. As part of the pilot project, the City is conducting a comparative analysis of the social, environmental, and technical aspects of a pre-treated organics program in comparison to a traditional weekly curbside organics diversion model.

The Regional District of Central Kootenay (RDCK) retained Tetra Tech to conduct a multi-sector waste characterization study in the summer of 2023. The City of Nelson worked closely with the RDCK to have the RDCK study include collection of waste characterization data for the Fairview neighbourhood of Nelson, prior to implementation of the Pre-treated Organics Pilot Project.

The City of Nelson retained S-Cubed Environmental to conduct a follow-up waste characterization study in the Fairview neighbourhood in April and July 2024, following implementation of the pilot project. This report summarizes the methodology and results from the waste characterization studies conducted in the Fairview neighbourhood prior to and following implementation of the Pre-treated Organics Pilot Project.

2 Waste Characterization Study Methodology

City of Nelson staff carry out curbside collection of garbage bi-weekly (every two weeks), with collection in the Fairview neighbourhood occurring every second Friday.

2.1 Fairview Waste Sampling Pre-Pilot Project – August 2023

City of Nelson staff collected residential waste samples from the Fairview neighbourhood on Friday, August 18, 2023, and two 105-kg samples were sorted and analyzed by Tetra Tech.

2.2 Fairview Waste Sampling Post-Pilot Project – April and July 2024

S-Cubed follows the waste sampling and characterization methodology outlined in the *CCME Recommended Waste Characterization Methodology*[1], which states that a sample weighing 90 to 135 kilograms is generally a sufficient sample size to capture material variability.

2.2.1 April 2024

City of Nelson staff collected residential waste samples from the same zone of the Fairview neighbourhood (as for the pre-implementation audit) on April 12th and 13th, 2024. Many, but not all

[1] CCME. 1999. Recommended waste characterization methodology for direct waste analysis studies in Canada. PN 1497.

of the same single-family households were sampled in April as had been sampled in August 2023. Four samples, each with a mass of approximately 100 kilograms, were sorted and analyzed for the single-family sector (weighing between 108-kg and 122-kg) and one sample (85 kg) was sorted and analyzed for the multi-family sector.

2.2.2 July 2024

City of Nelson staff collected residential waste samples from the Fairview neighbourhood on July 19, 2024. During the July 2024 waste characterization study, three samples were collected from Fairview households that had a FoodCycler appliance, and three samples were collected from Fairview households that did not have a FoodCycler appliance. The goal was for all samples to be approximately 100-kg in weight. The samples sorted and analyzed ranged from 72 kg to 129 kg. No multi-family samples were collected during the July 2024 study.

2.3 Waste Sorting Methodology

For the April and July 2024 waste composition study, garbage samples were collected by City of Nelson staff and transported to the Public Works garbage bay, where sorting occurred. Waste sorting was carried out by Stacey Schaub-Szabo (S-Cubed Environmental), and Emily Nelson and Mary Tress (City of Nelson). In July 2024, one additional City of Nelson staff member assisted with waste sorting.

Digital photographs of garbage samples were taken before sorting. Garbage was hand-sorted by a team of three to five people into bins and buckets lined with black garbage bags (Figure 1) labelled with the subcategories described below in Section 2.4. During each waste composition study period, the sorting team included two to three Town of Nelson staff members. The S-Cubed Team Lead carefully trains all waste sorters and checks the sort bins often to ensure quality control and that items are consistently classified among team members. Materials were weighed using a floor scale accurate to five grams, and results have been rounded to the tenth decimal. Notes about unexpected and unusual materials were documented. Data were recorded in a spreadsheet for data analysis.

Figure 1. Waste sorting set-up.

2.4 Waste Characterization Study Categories

The waste characterization categories were the following: compostable organics that could be processed by the FoodCycler, compostable organics that could not be processed by the FoodCycler,

non-compostable organics, paper, plastic, metal, glass, electronics, building materials, household hazardous waste (HHW), household hygiene, and landfill. Sort categories and sub-categories are listed in Appendix B, with a description of the types of materials sorted into each subcategory.

As listed in Appendix A, organic materials were sorted into a number of different sub-categories to assist in better understanding what types of materials were being placed in the garbage. 'Food waste – avoidable' consisted of food that could have been eaten by a person. An example is a slice of pizza. 'Food waste – unavoidable' consisted of food scraps that are not eaten by people, such as fruit and vegetable peels, egg shells, and coffee grounds.

3 Results

Detailed Excel data tables with results from the April and July Fairview waste characterization studies have been provided to the City of Nelson.

4 S-Cubed Corporate Profile

S-Cubed Environmental (https://s-cubed.ca) was established 18 years ago by Stacey Schaub-Szabo, who has over 20 years of diverse experience in the waste audit sector. Stacey is the Principal of S-Cubed Environmental, and collaborates with other waste management professionals on various projects. S-Cubed Environmental provides services in waste management system review, waste characterization in the residential, industrial, commercial and institutional sectors, and stakeholder engagement. The company has experience launching and implementing municipal curbside collection programs and reviewing waste management programs. On average, S-Cubed conducts between three and six municipal waste audits annually. S-Cubed also has extensive experience conducting construction, renovation and demolition (CRD) stream audits. The success of S-Cubed Environmental comes from our positive approach and desire to develop effective working relationships with clients, facility managers and waste haulers. S-Cubed develops positive long-term relationships and has been asked to conduct annual waste audits for municipal clients such as the City of Spruce Grove, City of Airdrie, and Town of Okotoks. S-Cubed has a SECOR Certification (Environmental and Occupational Health and Safety Management System) and a Waste Auditor Certificate and is a Waste Audit Trainer with the Circular Innovation Council. Stacey holds a M.Sc. degree and is a Professional Biologist.

Appendix A: Waste Sort Categories and Sub-Categories

Category		Description and/or Examples	July 2024 changes
1 - Paper			
1.1	Recyclable Paper and Cardboard	Fine paper, clean old, (OCC), boxboard, recyclable paper packaging, bound paper products	
1.2	NR Paper	Other non-recyclable paper	Moved this to Fines & Misc. Garbage Category
1.3	Refundable	Paper deposit beverage containers	
2 - Plastic			
2.1	Recyclable Plastics	Plastic film and flexible packaging, Plastic deposit beverage containers, rigid plastic packaging (#1 – #7) plant pots and others	
2.2	Foam/Soft Plastic	Foam take-out cushioning, containers, cups, meat trays, egg cartons, packaging, bread bags,	
2.3	NR Plastics	CD, DVDs, milk crate, PVC Pipe, toys, laundry baskets	Moved this to Fines & Misc. Garbage Category
2.4	Refundable	Refundable plastic beverage containers	
3A - Compostable Organics (accepted by FoodCyclerTM)			
3A.1	Food waste – unavoidable	Fruits and vegetable trimmings and peels, coffee grounds, eggshells, small bones, tea bags, shellfish, meat, tofu, poultry fish scraps	
3A.2	Food waste – avoidable	Whole fruits and vegetables, meat, bread, prepared meals, leftovers	
3A.3	Compost paper	Tissues.	

3B - Compostable (not acceptable in FoodCycler)			
3B.1	Compostable and food- soiled paper	Paper towels, tissues, paper plates, compostable paper take-out containers, paper straws, pizza boxes	
3B.2	Clean wood	Compostable, pallets, dimensional lumber (no paint, no treatment), Clean (off-cuts, plywood)	
3B.3	Yard and garden	Branches, plants, lawn clippings, leaves	
3B.4	Other compostable organics	Animal carcasses, etc.	
3B.5	Other compostable organics	**not accepted in FoodCycler** Large bones (esp. beef and pork), candy, oil (trace) – PLA containing items	
4 - Non-Compostable Organics			
4.1	Treated wood	Treated, heavily painted or stained, composites, or contains large amounts of other materials. Dirty wood (preserved, with glue, bonded, painted wood)	
4.2	Textiles	Clothing (natural fibres, blends, polyester, Gore-Tex, fleece, nylon, etc.), bedding, shoes, soft toys	
4.3	Other non-compostable organics	Candles, wax, soap, wicker baskets, rubber, fats (large volumes), PLA products	
5 - Metal			
5.1	Metal Recyclables	Metal container, other metal	
5.2	Refundables	Metal refundable containers	

6 – Glass			
6.1	Glass general	Containers, other glass	
6.2	Refundables	Refundable containers	
7 - Building Materials			
		Gypsum/drywall plaster, masonry and bricks, rock, sand, dirt, ceramic, porcelain, asphalt products, carpet, Other building material	
8 – Electronics			
		Computers and Peripherals, TV & audio / video equipment, telephones & telecommunications equipment, cell phones and accessories, small appliances and floor care appliances, electronic toys, outdoor power equipment, smoke/CO alarms, lighting equipment and light bulbs, other e-waste	
9 - Household Hazardous			
		Batteries, paint, fertilizers/ pesticides, automotive oil and antifreeze, pharmaceuticals , solvents, other hazardous wastes	
10 - Household Hygiene			
		Personal hygiene, pet waste	
11 - Other			
11.1	Bulky objects	Mattresses, furniture, white goods	
11.2	Fines / Misc. garbage	Fines and misc. garbage >1"	
11.3	Garbage Bags		

Note: NR = non-recyclable

Appendix VI.

ECCC GHG Calculator – Assumptions and Data

Appendix IV. ECCC Organic Waste GHG Calculator Details

The ECCC Organic Waste GHG Calculator (v.1 February 2023) was used to calculate the GHG emissions associated with the baseline and pilot project scenarios.

ECCC Calculator – Fairview Neighbourhood Results

Input Data and Assumptions for ECCC Calculator

Input data		Notes, data sources and assumptions
Baseline year	2022	
Location for model analysis	BC	
# years for model analysis	30	
Global warming potential (GWP) for methane used	28	
Baseline MSW tonnage	2022	Tonnage data from City of Nelson for 2022
Baseline waste composition		August 2023 Waste Composition Study
Alternative scenario #1 - Food waste diverted using FoodCycler		2024 Fairview waste tonnage data and July 2024 waste characterization data were combined. The difference in the quantity of food waste and food-soiled paper in the garbage between 2022 and July 2024 was assumed to be diverted through use of FoodCyclers.
Distance from Fairview neighbourhood to Ootischenia landfill (km)	48 km	
LFG recovery at landfill?	no	
If LFG recovery, % collection efficiency	n/a	
Energy type displaced by LFG utilization	None - flare only	

Distance from Fairview neighbourhood to Central Compost Facility in Salmo (km)	5 km	The distance from Fairview to the compost facility in Salmo is 50 km. However, an adjustment was made here to recognize that only about 14% of the estimated weight of organics diverted was sent for composting (due to mass reduction through drying in the FoodCycler and people using pre-treated material in their own yards and gardens). Therefore, a distance of 5 km was used for this input -- recognizing that fewer trips were required to transport the pre-treated material than for wet organics.
Distance from compost facility to final destination of compost (km) - assuming compost is used in Nelson	5 km	Same adjustment and assumption as previous cell.
Type of composting process	windrow	Aerated windrow composting is used at the Central Compost Facility. Active aeration reduces the GHG emissions associated with composting, so the emissions associated with the composting process are likely a bit lower than estimated in the calculator.
Include fertilizer offset	no	

Appendix VII.

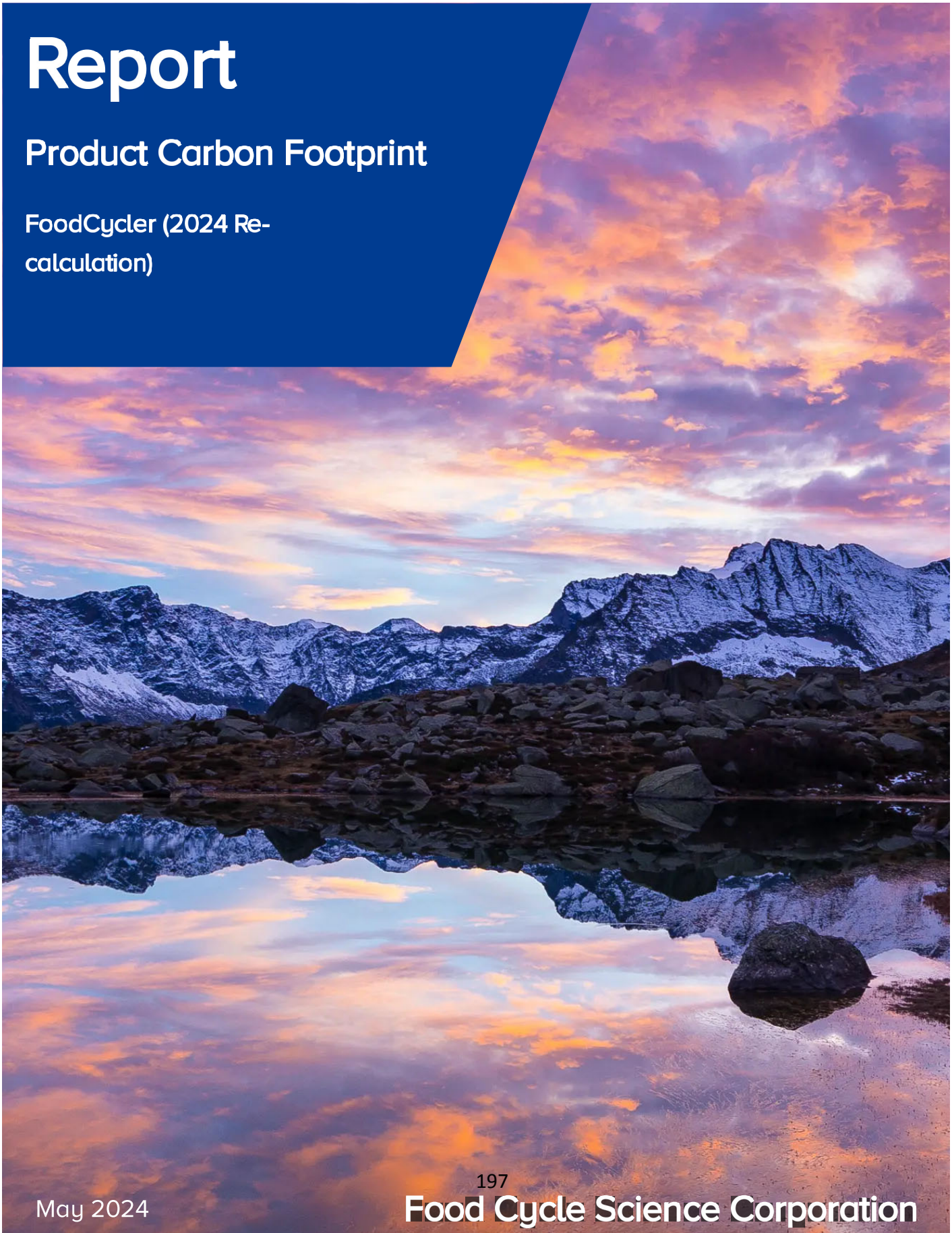
FoodCycler Carbon Footprint Report

ClimatePartner

Report

Product Carbon Footprint

FoodCycler (2024 Re-calculation)



May 2024

Food Cycle Science Corporation

Introduction

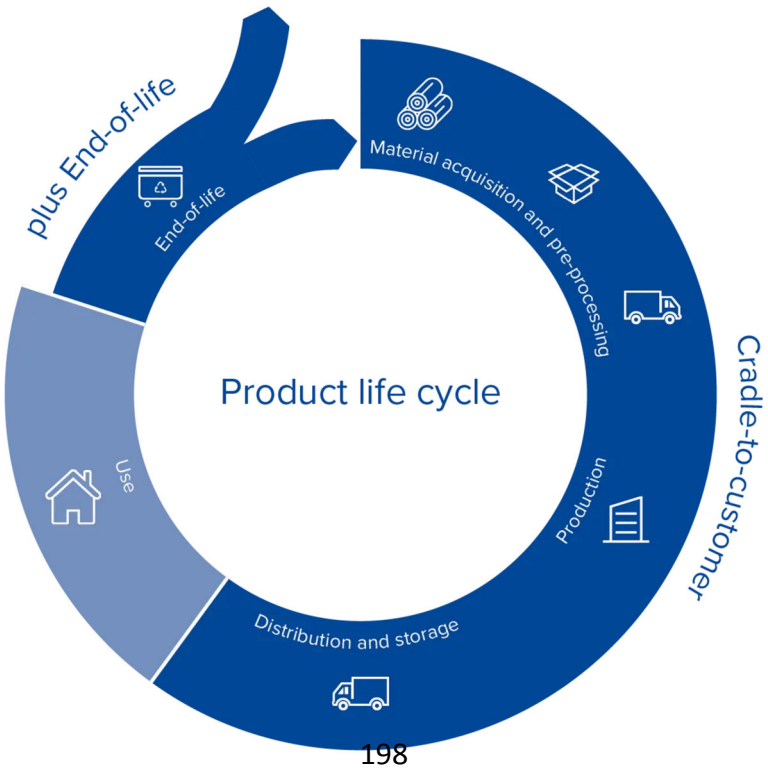
On behalf of **Food Cycle Science Corporation**, ClimatePartner has calculated the carbon emissions for the product **FoodCycler (2024 Re-calculation)**, in line with the Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard (GHG Protocol).

The study's boundary follows a “cradle-to-customer plus waste” approach. Here, emissions were taken into account according to the following lifecycle stages: Extraction and pre-processing of raw materials and packaging, production, supply of the product up to the customer’s factory gates as well as any relevant disposal emissions for the product and its packaging.

In this approach, the calculation focuses on the processes that can be monitored by the producer. The emissions from the service life or 'use' stage cannot generally be controlled and are subject to assumptions and estimates in the application. As such, they were not taken into account throughout the calculation.

Where possible, primary data was used. Where this was not possible, secondary data was gathered from recognised sources. The underlying emission factors are derived from international databases, such as ecoinvent or GEMIS. All greenhouse gases were taken into account for the calculation and are represented in carbon dioxide equivalents (CO_2e) for improved legibility and comparability.

Emissions that could not be directly attributed to the product but were required for production, such as employee commuting or business travel, were also included in the calculation as “general emissions”.



Table

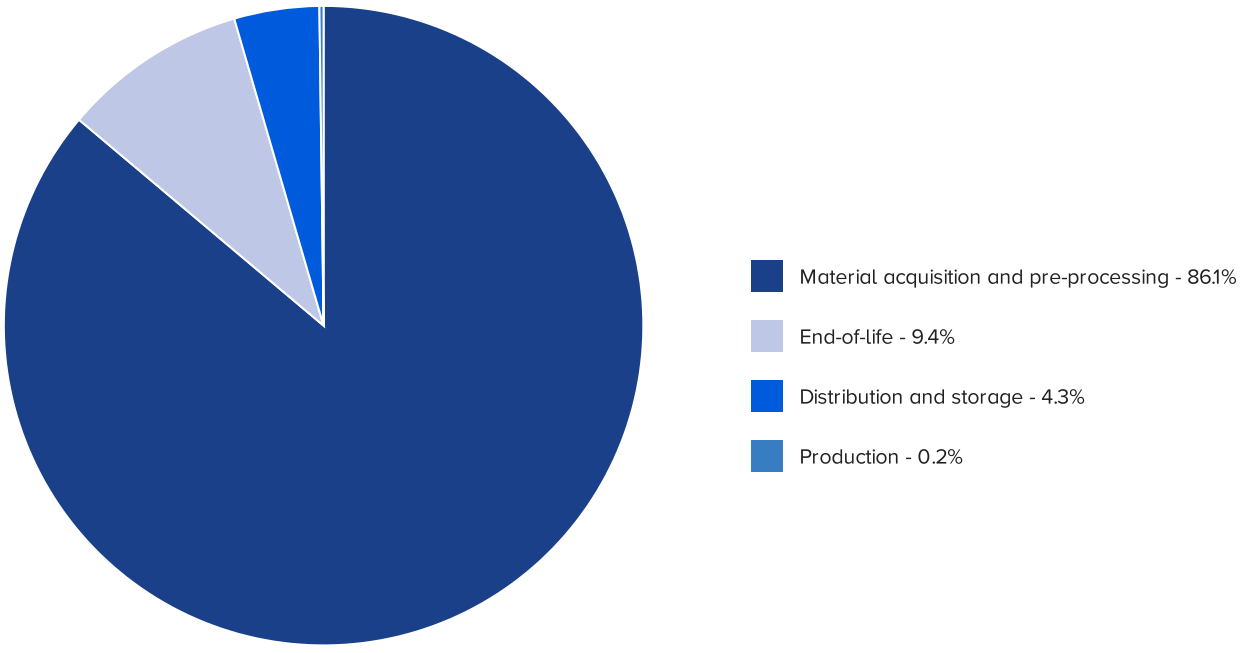
Carbon emissions: FoodCycler (2024 Re-calculation)

Total result for: product 1 pc. cradle-to-customer plus end-of-life

Emission sources	kg CO_2	%
Material acquisition and pre-processing	**133.40**	**86.1**
Raw materials	109.45	70.7
Inbound logistics	20.20	13.0
Packaging	3.75	2.4
Production	**0.32**	**0.2**
Electricity	0.32	0.2
Distribution and storage	**6.66**	**4.3**
Outbound logistics	6.66	4.3
End-of-life	**14.49**	**9.4**
End-of-life	14.49	9.4
Overall results	**154.87**	**100.0**

Figure

Breakdown according to lifecycle stages



Next steps

Comprehensive climate action follows the principle: Mitigate unnecessary emissions, reduce existing emissions and offset unavoidable emissions. By calculating the product carbon footprint, it is possible to identify the potential for mitigating and reducing emissions and on this basis offset any unavoidable emissions. As a result, the product can become carbon neutral and designated as such.

Mitigate and reduce

In general, there are two possible courses of action to mitigate and reduce emissions.

1. Good product design and its associated reduction in materials, improved energy efficiency in production, and regional procurement of raw materials and packaging to mitigate emissions before they actually arise.
2. Conscious decision-making to procure low-emission raw materials and packaging, energy sources or transport can further reduce the product's emissions.

Carbon neutrality

Carbon reduction measures are implemented step by step over a longer timeframe. It is recommended that simultaneously with these reduction measures, previously unavoidable emissions are offset using internationally recognised carbon offset projects. Carbon offset projects have been shown to reduce carbon emissions, for example, through reforestation efforts or expanding the use of renewable energies. Independent organisations monitor to what extent these contribute to carbon reductions, after which the quantified savings can be sold in the form of certified emission reductions to finance the project. More information can be found at https://www.climatepartner.com/en/carbon-offset-projects.

The product **FoodCycler (2024 Re-calculation)** will become carbon neutral by offsetting the product related emissions. Responsibility is thus assumed immediately for emissions that cannot be currently mitigated.

A safety margin of 10 % is added to the total to ensure that all ensuing emissions are offset within the system boundaries. As a result, any potential doubts that inherently arise regarding the underlying data are offset, e.g., through the use of database values, assumptions or estimates.

	kg CO_2
Overall results	**154.87**
Already carbon neutral	0.00
Not yet carbon neutral	154.87
CO_2 emissions to be offset incl. 10% safety margin	**170.36**

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THE CORPORATION OF THE CITY OF NELSON
REQUEST FOR COUNCIL DECISION

DATE: December 3, 2024 Regular
TOPIC: **2025 Utility Rates (Water, Wastewater & Resource Recovery)**
PROPOSAL: Review of 2025 Resource Recovery Budget and direction to proceed with preparing fee bylaws for the utilities
PROPOSED BY: **Staff**

ANALYSIS SUMMARY:

During the November 8, 2024 budget meeting, staff provided an update on the Pre-Treated Organics Pilot Program, including the evaluation results gathered so far. Staff recommended extending the pilot program until September 30, 2025, focusing on further data collection and education. Council requested that the 2025 Resource Recovery budget be presented at the next available meeting.

BACKGROUND:

The 2025 Resource Recovery Budget addresses the following objectives:

1. **Further data collection and analysis**
   The 2025 budget reflects the recommendation from staff to continue collecting and analyzing data related to the pre-treated organics pilot program, to better assess the effectiveness of the program on overall organics diversion. The team will also focus efforts on education, to ensure participants maximize diversion. Additional findings from the data collected will be used for further education efforts around other aspects of waste management, such as recycling. A report will be provided in the Fall of 2025, prior to any decisions on the 2026 budget.
   Impact to budget: slight decrease in expenses in Zero Waste, for organics and recycling education and study.
2. **Establish a sustainable resource recovery program**
   Initially, the organics pilot program was funded through grants received from FCM, CBT and other sources, along with internally funded through the Legacy Reserve. To facilitate a sustainable program for waste collection, recycling, and organics diversion (whether through the current program or a green cart solution), fees will need to be increased to fund operations and allow for capital replacement over time. The 2025 rates are required in order to fund operations of the service and generate a positive surplus to fund capital replacement.
   Impact to budget: generate net revenue from operations to fund capital reserves.
3. **Modernization of waste collection fleet**
   The cost of replacing vehicles and equipment has risen substantially over the past three years, as reflected in Statistics Canada Machinery and Equipment price index for medium and heavy-duty trucks, which has increased 25% in three years. At existing charge-out rates, we are falling behind in our ability to fund the replacement of our waste collection equipment. Additionally, the current process of manually lifting residential garbage and recycling into vehicles during collection is outdated and presents a potential safety risk to workers. Staff will assess the operational and financial requirements of a two-stream modernization program in 2025. However, the cost of these more modern pieces of equipment is generally higher than replacing our current fleet with like-for-like.
   Impact to budget: increase of equipment charges from $80,000 in 2024 to $125,000;

collection modernization study in 2025.

4. Address other inflationary factors

The 2025 budget considers other inflationary cost increases, including negotiated wage increases for collection and administration (5%), increased tipping fees per RDCK guidance (10%), and other projected increases in materials and supplies.

Impact to budget: inflationary increase to Collection and Other expenses

Conclusion

To meet these objectives, staff recommend increasing the annual resource recovery fee by $25 (from $125 to $150 per year). At this time, staff are not recommending an increase to the tag fee, however, staff will research and report back on the potential to adjust or eliminate the tag fee for next year, as requested by Council.

Additional considerations

Along with the modernization of equipment, staff will explore options in 2025 to present to Council regarding green cart or other neighborhood drop-off solutions for organics. Considerations are the cost of acquiring green bins for each home, which, depending on size and whether they are bear-proof, can range from $300 to $400 each (approximately $1.4M city-wide). Furthermore, a move to weekly collection, which at approximately $12,000 per week for labour and equipment, would equate to an additional $312,000 per year. Further analysis on equipment modernization may lead to efficiencies in the number of staff required for collections but could result in a higher capital cost for equipment. This will be provided as part of the analysis.

BENEFITS OR DISADVANTAGES AND NEGATIVE IMPACTS:

The increase in resource recovery fees will cover projected cost increases in the service and build the necessary reserves to fund a sustainable organics diversion program, whether through a pre-treatment model or a green cart program.

LEGISLATIVE IMPACTS, PRECEDENTS, POLICIES:

It is within Council's authority to set the rates for the resource recovery, and water and wastewater utilities.

COSTS AND BUDGET IMPACT - REVENUE GENERATION:

Resource Recovery

The increase in resource recovery fees will cover projected cost increases in the service, as well as start building the necessary reserves to fund an organics diversion program, whether that be through a pre-treatment model or a green cart program.

For reference, staff have prepared a comparison of resource recovery fees across similar sized municipalities in BC:

Municipality	Annual Fee	Notes
Nelson	$195.50	Annual fee + 1 tag per pickup
Castlegar	$322.20	Bi-weekly garbage & recycling, weekly organics, yard waste drop off
Cranbrook	$222.00	Curbside garbage & recycling
Creston	$140.00	Weekly 3 stream collection
Revelstoke	$142.00	Curbside garbage & recycling

Water and Wastewater
To recap the direction Council provided during the October 8th Water and Wastewater budget workshop, staff recommend a 4% general increase to the annual Water utility rates plus an additional capital levy of 3% for a total increase of 7% for water rates. A 3.5% general increase to the Wastewater rates to fund operations plus an additional capital levy of 3% for a total increase of 6.5%. The additional capital levy is necessary in these utilities in 2025 to fund capital replacement, given the significant generational asset renewals scheduled for the next 10 years: which includes the Five Mile Pipeline Replacement and the Wastewater Forcemain and Treatment Plant Upgrades.

IMPACT ON SUSTAINABILITY OBJECTIVES AND STAFF RESOURCES:
There are significant capital projects that are required in both water and wastewater utilities. Adding an organics program and creating behavioral change requires an investment of staff resources.

COMMUNICATION:
Once direction is received by Council regarding utility fees for 2025, staff will prepare a presentation summarizing the updated utility fees and budgets for Water, Wastewater, and Resource Recovery, along with an amending bylaw for first three readings. Accompanying communication will be prepared for the public as well. Final adoption of the bylaws will then be brough to Council before invoices with the new utility rates are sent out to residents in early February 2025.

OPTIONS AND ALTERNATIVES:
1. Direct staff to prepare amendments to the Fees and Charges Bylaw to reflect the 2025 rates for Water, Wastewater, and Resource Recovery.
2. Refer the matter back to staff for further review.

ATTACHMENTS:
- 2025 budget for Resource Recovery
- November 8 Resource Recovery presentation to Council
- October 8 Water and Wastewater budget presentation to Council

RECOMMENDATION:
That Council direct staff to prepare the Fees and Charges Amendment Bylaw to reflect the 2025 rates for Water, Wastewater, and Resource Recovery, as per the budget discussions of October 8 and November 8, 2024.

AUTHOR:	**REVIEWED BY:**
CHIEF FINANCIAL OFFICER	CITY MANAGER

Resource Recovery Budget (2025)

			2024 Budget	2024 Projected	2025 Budget
2	RATES	Tag fee	$ 1.75	$ 1.75	$ 1.75
3		Annual fee	$ 125.00	$ 125.00	$ 150.00
4					
5	REVENUE	Tag Revenues	(145,000)	(151,000)	(145,000)
6		Resource Recovery Fees	(514,606)	(520,500)	(624,600)
7		Operating Grants	(25,000)	(8,165)	(15,000)
8		Recycle BC	(175,000)	(175,000)	(180,000)
9		**Total Revenue**	**(859,606)**	**(854,665)**	**(964,600)**
10					
11	EXPENSES	**Expenses - Collection**			
12		Labour	215,000	230,000	235,750
13		Equipment	80,000	82,750	125,000
14		Materials	16,000	10,000	10,000
15		Tipping Fees	98,010	95,000	104,500
16		Yard waste pick-up			
17		**Total Collection**	**409,010**	**417,750**	**475,250**
18					
19		**Expenses - Zero Waste**			
20		Labour	160,826	152,000	157,274
21		Evaluation	32,000	30,000	21,900
22		Education	10,000	7,000	15,000
23		**Total Zero Waste**	**202,826**	**189,000**	**194,174**
24					
25		**Expenses - Other**			
26		Billing, Collection, and Admin	124,399	124,399	126,938
27		Other fixed costs	50,160	50,160	51,184
28		**Total Other**	**174,559**	**174,559**	**178,121**
29					
30		**Total Expenses**	**786,395**	**781,309**	847,545
31					
32	NET	**Net Revenue**	**(73,211)**	**(73,356)**	(117,055)
33					
34	CAPITAL PLAN	Pre-treatment devices	918,770	-	-
35		Collection modernization study			75,000
36		Bins	28,000	15,000	-
37		**Total Capital**	**946,770**	**15,000**	**75,000**
38					
39	RESERVE	**Opening balance**	**-**	**-**	(49,917)
40		Operating surplus	(73,211)	(73,356)	(117,055)
41		Capital purchases	946,770	15,000	75,000
42		Transfer to (from) Other Reserves	(873,559)	8,439	-
43		**Closing balance**	**-**	**(49,917)**	**(91,972)**

Committee Report

Date of Report:	November 25, 2024
Date & Type of Meeting:	December 11, 2024; Joint Resource Recovery Committee (JRRC)
Author:	Heidi Bench, Projects Advisor
Subject:	CHANGES TO MATERIAL MANAGEMENT AND TIPPING FEES
File:	12-6300-20
Electoral Area/Municipality	Entire RDCK

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to outline material management and tipping fee updates proposed for 2025 as a result of the System Efficiency Study, as well as to propose options to address the inequities in the current cost recovery structure.

SECTION 2: BACKGROUND/ANALYSIS

The 2021 Resource Recovery Plan (RRP), approved by the Ministry in 2023, established the 10-year strategic plan for the RDCK Resource Recovery System. One of the primary focusses of this plan was "*establishing a cost recovery system that is fair and sustainable, while also incentivizing waste minimization and diversion*." It was recognized that there would be cost implications to the strategies and actions outlined in the RRP, as these represented significant changes and improvements to the existing Resource Recovery system. Two actions were recommended to address financial implications of increasing costs associated with the strategic direction adopted with the RRP:

1) Consider an alternative administrative model for the Resource Recovery System; and,
2) Undertake a Resource Recovery system efficiency study and identify options to improve its cost effectiveness and equitability.

The System Efficiency Study, (the study) presented at the JRRC Open Meeting on November 13, 2024, was completed to satisfy the latter of these recommendations. The conclusions of this study reaffirmed the RRP recommendation to consider an alternative administrative model in recommending regionalization of the Resource Recovery system. The tipping fee cost recovery assessment portion of the study indicated that the RDCK's cost to manage materials varies significantly across sub-regions and exceeds what is being recovered by current tipping fees for most materials. As a result of this assessment and the RDCK's goal of for a user pay system, GHD Limited (GHD) recommended changing the management and tipping fees for specific materials. GHD's detailed recommendations were provided as Table 3 of the November 13 JRRC report, which is included as Attachment A for reference.

Recommended Changes in Material Management

GHD recommended changes in material management for the following materials:

Wood

Clean wood and wood waste are currently accepted at a lower tipping fee than mixed waste to incentivize diversion, but the RDCK does not currently have an end market for the wood being received. Wood grinding results in high processing costs, only for this material to be stored at facilities taking up space, posing an increased risk for interface fires, and eventually ending up primarily in the landfill. Many beneficial end uses of wood, such as compost or biochar, are prevented by mixing clean wood with other wood waste. GHD recommended using the classification of clean wood as defined in the Resource Recovery Facilities Regulatory Bylaw No. 2905 (as amended in January 2024; hereafter referred to as Bylaw 2905) and only accepting clean wood at an incentivized tipping fee, as this material can be processed and mixed with dried septage at the landfill facilities that receive septage, used as daily cover around the grizzly plates, road base, and as part of the cover mix used for landfill closure. GHD recommended that wood waste be charged at minimum the tipping fee for mixed waste and should be landfilled instead of processed and stockpiled.

Yard and Garden

Similar to wood waste, yard and garden materials are costly to manage due to processing and hauling, however with the compost facilities operating in Salmo and Creston, there is an end use for this material. Greater than 50% of the yard and garden materials collected are received during the free yard and garden events. Due to low tipping fees and free months, this service is substantially paid for through taxation. GHD recommended re-evaluating the free yard and garden waste months to help increase the tipping fee cost recovery for this material.

Rubble

Rubble is not received in significant amounts across the region. It comprises less than 1% of the total waste stream, varying from 0.4% in the Central sub-region to 2.3% in the East sub-region. Rubble was historically incentivized with a lower tipping fee such that the material could be stockpiled and used at facilities for road building; however the small quantities received make storage and processing of this material costly and inefficient. Due to this, it currently gets disposed as mixed waste (i.e. landfilled). GHD recommended that the tipping fee should reflect this by charging at minimum the rate of mixed waste, and ideally the rate of construction, demolition, renovation (CDR) waste to reflect the additional challenges in managing this bulky material.

Further analysis and Staff recommendations for changes in management of these materials are included in Section 3.1 of this report.

Recommended Changes to Tipping Fees

While tipping fee cost recovery is useful for better understanding and prioritizing material management, it should not be the only factor considered when setting tipping fees. The RRP goals of zero waste and user-pay are inversely correlated in that as the RDCK moves towards zero waste and increases diversion, tipping fee revenue (and therefore the sustainability of a user-pay system) will decrease. As diversion increases, the balance between tipping fees and taxation for cost recovery will need to shift as well; so, while a goal of this report is to establish tipping fee cost recovery goals for 2025, these should be periodically re-evaluated as programs and waste composition in the region change.

The tipping fee updates proposed by GHD were based on a general strategy of achieving 100% tipping fee cost recovery for mixed waste and most other landfilled materials, while keeping the existing higher tipping fees for asbestos (to account for added hazards and administration in handling this material) and CDR materials (to incentivize separation of divertible materials such as scrap metal and clean wood), and raising the tipping fees

for other divertible materials to 75% of the cost to manage mixed waste. As noted in Section 3.1 of the November 13 JRRC report, the proposed tipping fees as a result of this strategy were significantly higher than existing tipping fees and those in neighbouring regional districts for most materials.

To ensure that tipping fees are realistic, don't encourage illegal dumping or out-of-region waste disposal, and to strive for transparency, consistency, and fairness in the cost recovery structure, Staff propose an approach based more on categories of material management rather than simply using the cost to manage mixed waste as a benchmark of which to set the tipping fees for all other materials. Table 2 shows the proposed structure of this approach, outlining the categories of materials and tipping fee cost recovery objectives. The balance not covered by tipping fees would continue to be paid via taxation. Recyclable materials are not included, as to incentivize diversion there are no tipping fees for these materials. Cost recovery for these materials is achieved through a combination of incentives and taxation. Further financial analysis is provided in Section 3.1.

Table 2: Proposed waste categories and tipping fee cost recovery objectives

Category	Materials	Tipping Fee Cost Recovery Objective
Landfilled – simple	mixed waste, biosolids, wood waste	100%
Landfilled – complex	asbestos, CDR, rubble	125%
Diverted	Tires	75%
Diverted (RDCK receives incentives)	scrap metal	25%
Re-purposed	organics (food waste), clean wood, uncontaminated soil, yard & garden	50%
Re-purposed (limited use)	waste soil	75%
Liquid waste	Septage	100%

This strategy aligns with the RDCK's goals to be user-pay by continuing to rely more on tipping fees than taxation for most materials, while moving towards zero waste by continuing to incentivize diversion with lower tipping fees. This approach would still result in tipping fee increases, but slightly lower than those recommended by GHD, in recognition that those recommended values (provided in Table 5 of the November 13 JRRC report) were not likely realistic. These proposed tipping fees, provided in detail in Section 3.1 below, would still put the RDCK at the high end of tipping fees for most materials compared to neighbouring regional districts, but this is logical based on the fact that the RDCK system cost per capita is also the highest of these regional districts. The high cost to manage materials in the RDCK is likely due to many factors, and the implementing changes based on the efficiencies identified in the System Efficiency Study, such as the above changes to material management, changes to facility hours or facility closures, and administrative centralization, should help to bring the cost to manage materials down, and if successful, allow for stabilization or reduction in the reliance on tipping fees.

The above strategy could be implemented regionally, which would be based on the tipping fee cost recovery values for the RDCK as a whole, or the current tipping fee structure could be de-harmonized to allow each sub-region to establish targets based on the tipping fee cost recovery values in that sub-region. Staff advise against de-harmonization as it would be counter-intuitive based on the RDCK's goal to run the Resource Recovery system more efficiently. It would also further the inequities between sub-regions, as residents in the Central sub-region would end up paying both higher tipping fees and taxation for the same level of service as the other sub-regions.

While some of the tipping fee increases based on the recommendations in the study and the development of a cost recovery strategy may be substantial, Staff recommend that any tipping fee changes be implemented

incrementally over a period of several years. As notice has already been sent out regarding up to 10% tipping fee changes, it is recommended that tipping fee changes for 2025 are limited to this, with the exception of materials that are changing classification, but that the strategy be used to guide transparent and consistent planning of subsequent tipping fee increases in future years.

Figure 1 summarizes the current cost recovery structure, as well as the cost to manage mixed waste and current tipping fee for mixed waste, the highest throughput material, for each sub-region and the RDCK as a whole.

Figure 1: Comparison of overall cost recovery and cost to manage mixed waste, by sub-region and for the RDCK as a whole

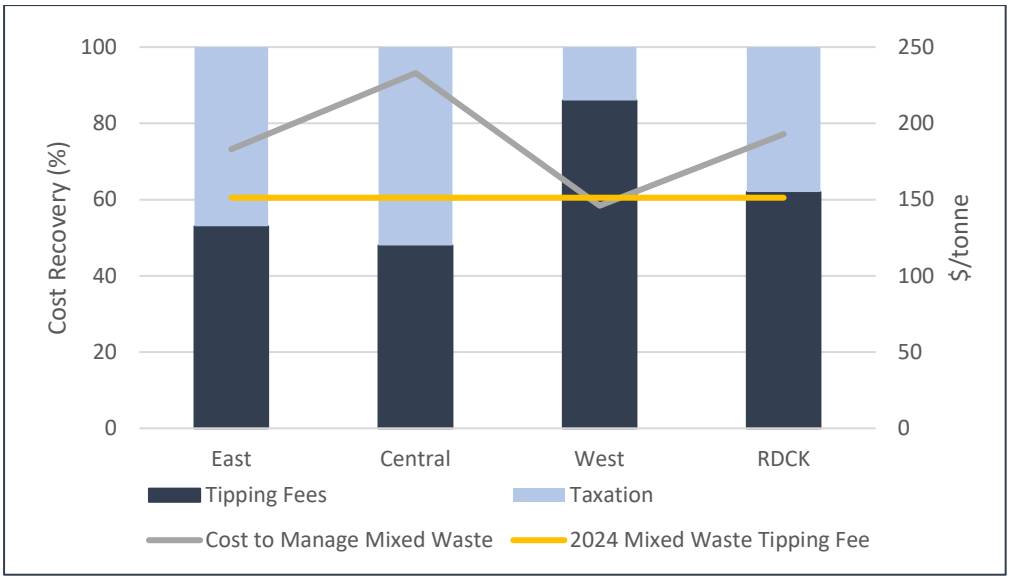

Figure 1 highlights the variability in cost recovery structure across the three sub-regions. There are several factors that influence this variability, such as the geographic location of waste disposal infrastructure, population of service area, the presence of scales at facilities, composition of the waste stream, and the administrative structure in which tipping fee revenue stays within the sub-region it was collected, not necessarily the sub-region where the waste was generated. As the RDCK regionalizes its waste management facilities and strives to meet the regulatory requirements in the *Landfill Criteria for Municipal Solid Waste* (BC Ministry of Environment, 2016) and proposed *Regulations Respecting the Reduction in the Release of Methane (Waste Sector)* (Government of Canada, 2024), it is anticipated that costs to manage the system are going to substantially increase due to more stringent requirements for infrastructure such as engineered liners, and landfill gas and leachate management systems. As waste management becomes more complex and costly, a regionalized administrative structure would maximize both financial efficiency and equitability for RDCK residents.

To ensure that the cost recovery strategy is fair and sustainable, Staff have developed the following options to promote administrative efficiency and address the sub-regional inequities in the current cost recovery structure:

1) Regionalize all Resource Recovery services (waste, compost, recycling);
2) Regionalize all Resource Recovery services (waste, compost, recycling), but create a new service for the management of HB Tailings Storage Facility based on the existing service area;
3) Regionalize only select Resource Recovery services (recycling, compost, septage) and leave the waste services as sub-regional, but implement a transfer of tipping fee revenue between sub-

regions, similar to the current transfer of Recycle BC incentives between sub-regions, that would equalize the taxation levels across sub-regions.

Continuing with the status quo would mean choosing to not address the sub-regional inequities and inefficiencies identified in the Study. All options would require some initial administrative time to implement. It is anticipated that Options 1 and 3 would best address the sub-regional inequities, while Options 1 and 2 would result in the greatest administrative efficiencies once implemented. Further analysis would be required to try to quantify this. Staff recommend Option 1 as this option best addresses both the sub-regional inequities and administrative inefficiencies, but are presenting these for consideration only at this point in time.

As requested at the November 13, 2024 JRRC meeting, Staff would like to meet with the JRRC members in a workshop format in January 2025. The intention of this workshop is to allow for more in depth discussion regarding the above options for addressing the sub-regional inequities and administrative inefficiencies of the current system identified by the System Efficiency Study, as well as around other outcomes and recommendations of the Study. This workshop will not be a repeat of what was presented in November, but an opportunity to provide more clarity on the results of the Study based on questions submitted by Directors, as well as to gather JRRC input on which recommendations from the study should be prioritized in Staff workplans for implementation or further analysis. Staff will reach out to Directors in advance of the workshop for questions to be submitted in writing and will use these questions to guide the workshop.

Staff recommend implementing the material management changes described in this report for wood, yard and garden waste, and rubble in 2025. Staff also recommend implementing incremental annual tipping fee increases, starting in 2025, to meet the cost recovery objectives of the tipping fee cost recovery strategy outlined in this report.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒ Yes ☐ No	**Financial Plan Amendment:**	☐ Yes ☒ No
Debt Bylaw Required:	☐ Yes ☒ No	**Public/Gov't Approvals Required:**	☒ Yes ☐ No

Changes in Material Management

Cost analyses and recommendations related to changes in management or classification of wood, yard and garden, and rubble are provided below.

Wood

GHD recommended to separate clean wood from wood waste, as per the definitions of these materials in Bylaw 2905, to continue the current management practices for clean wood, and to consider wood waste under the category of mixed waste as there is currently no viable end use for separated wood waste. This change is expected to result in significantly decreased processing costs, increased tipping fee revenue, as well as some smaller increases to hauling costs. Table 3 outlines the estimated financial implications that could be expected as a result of changing the Bylaw such that wood waste is accepted as mixed waste. This does not include preserved wood or wood products that are mixed with other construction materials, which is considered CDR under the Bylaw, and shall remain as such.

Table 3: Estimated financial impacts of changing the management of wood materials

Sub-Region	Estimated Annual Values			
	Reduction in Wood Grinding	Increase in Hauling	Increase in Tipping Fee Revenue[1]	Total Impact on Cost to Manage Wood Waste
EAST	-$44,897	$1,510	-$41,180	-$84,566
CENTRAL	-$75,770	$7,529	-$62,205	-$130,446
WEST	-$48,339	$13,160	-$59,958	-$95,137
RDCK	**-$169,006**	**$22,199**	**-$163,343**	**-$310,149**

[1] Based on 2024 tipping fee for mixed waste

There is insufficient data to estimate the proportion of the wood tonnages that is clean versus wood waste as, while the Bylaw differentiates these materials, it is not currently differentiated in the scale data system. For the calculation in the above evaluation, it was estimated that clean wood would make up 10% and waste wood would be 90% of the total wood tonnage. As wood materials have been historically stockpiled at many sites and material type is not tracked on waste hauling invoices, there is limited data to accurately determine hauling costs specifically for wood. The above increase in hauling values are considered best estimates based on the data that was available.

Based on the predicted cost savings and until a beneficial end use for wood waste can be determined, Staff agree with GHD's recommendation to treat materials that fall under the definition of Wood Waste in Bylaw 2905 as Mixed Waste, by increasing the tipping fee to match that for mixed waste and landfilling this material. Materials that fall under the Bylaw definition of Clean Wood Waste shall continue to be separated and ground, as these materials can be used in other facility operations.

Yard and Garden

GHD recommended re-evaluating the cost recovery strategy for the yard and garden waste program, specifically the biannual free disposal months. GHD estimated that the free months for yard and garden waste costs the RDCK almost $57,000 per year in lost tipping fee revenues based on the 2024 tipping fee. Table 4 below summarizes this estimated potential revenue, as well as the estimated annual cost of the yard and garden diversion program and average annual revenue from tipping fees by sub-region, based on the average annual tonnage collected during the free months from 2020 to 2022, and on 2024 tipping fees.

Table 4: Estimated yard & garden program costs, revenues, and potential revenue due to bi-annual free disposal months

Sub-Region	Estimated Annual Cost to Manage Yard & Garden Materials ($)	Average Annual Tipping Fee Revenue ($)	Average Annual Tonnage Collected at Free Events (tonnes)	Estimated Potential Revenue from Bi-annual Free Disposal Months ($)
EAST	135,884	18,979	497	30,083
CENTRAL	253,832	35,373	359	21,740
WEST	53,059	7,821	85	5,121
RDCK	**442,774**	**62,173**	**941**	**56,944**

The potential revenue estimates are likely an overestimate as they do not account for the fact that if free disposal months were not to occur, many residents would likely burn a portion of these materials, stockpile them on their property, or just reduce clearing of brush in general. This would result in decreased tonnages in

these months and therefore decrease this estimated potential revenue, while increasing community hazards such as fire risk and air pollution which are difficult to quantify.

Additionally, yard and garden waste materials are used as part of the composting process at Central and Creston landfills. As food waste collection increases, it is expected that the compost facilities should be able to keep up with the yard and garden waste collected from around the RDCK. Without this feedstock, the RDCK would likely have to source and potentially purchase material elsewhere for compost production. The cost of this was not determined as part of this analysis.

Due to the multi-faceted benefits of this program, historical tipping fees have been set low to incentivize diversion and FireSmart initiatives, and protect air quality. The System Efficiency Study indicated that the tipping fee cost recovery for yard and garden waste was 17-18% in all three sub-regions, meaning that this program is currently heavily subsidized with taxation. While tipping fee increases, as discussed later in this section, are recommended for yard and garden waste to achieve 50% cost recovery as proposed in the tipping fee cost recovery objectives, Staff recommend continuing the biannual free months for yard and garden waste collection, at minimum until proposed tipping fee increases and further analysis can be completed.

In conducting this analysis, a significant discrepancy was identified between the actual and expected tipping fee revenue for this material. This is likely due to the fact that most yard and garden materials are not charged by weight or volume, but by unit ("load"), and indicates that the unit rates are not sufficiently aligned with the by weight tipping fee. Staff plan to conduct further analysis to address the variation in weight, volume, and unit tipping fees for materials where this discrepancy in tipping fee revenue was observed to exist, and will provide further material management or tipping fee recommendations based on the outcome of this analysis.

Rubble

As noted above, rubble comprises a very small proportion of the overall waste stream in the RDCK and it is currently landfilled, not diverted. Table 5 summarizes the current cost recovery and the anticipated changes to cost recovery and additional revenue if rubble were to be charged at the rate for CDR or mixed waste (MW), based on the 2024 tipping fees, as recommended by GHD.

Table 5: Changes to cost recovery and estimated additional revenue by changing the tipping fee classification of rubble

Sub-Region	STATUS QUO		OPTION 1: Change to CDR rate			OPTION 2: Change to MW rate		
	Rubble Tipping Fee ($)	Cost Recovery (%)	CDR Tipping Fee ($)	Cost Recovery (%)	Additional Revenue ($)*	MW Tipping Fee ($)	Cost Recovery (%)	Additional Revenue ($)
EAST	53.25	17	242	132	48,320	151.25	83	25,088
CENTRAL	53.25	25	242	104	13,024	151.25	65	6,762
WEST	53.25	37	242	166	41,903	151.25	104	21,756
RDCK	**53.25**	**23**	**242**	**125**	**103,246**	**151.25**	**78**	**53,606**

It should be noted that the additional revenue shown in the table is likely an overestimate, as higher rates may encourage rubble generators to seek out alternative disposal options, such as businesses that process aggregates, several of which exist in the RDCK and some of whom accept rubble for free. Based on this, the change in the tipping fee for rubble may not significantly increase the cost recovery associated with managing this material in-house, but rather shift management of this material from the RDCK to external stakeholders capable of not only diverting it but upcycling it into a usable material.

GHD recommended that rubble be managed and charged as CDR waste to reflect the additional challenges associated with landfilling larger materials, or at minimum the fee for mixed waste. While treating rubble as CDR is logical and ideal based on cost recovery, Staff recommend that initially rubble be managed and charged at the rate for mixed waste, with an eventual goal of changing this to CDR once viable diversion end uses for this material are established or confirmed. To determine a viable end use and to discourage illegal dumping of this material due to rate increases, Staff would plan to engage with aggregate processors across the RDCK to determine if these businesses have sufficient capacity and/or interest in this material.

Changes to Tipping Fees

The System Efficiency Study identified that the cost to manage most materials exceeds the revenue recovered by the respective 2024 tipping fees and recommended increasing tipping fees for selected materials. Staff incorporated GHD's recommended changes in material classification, the tipping fee cost recovery values from the study, and the objective tipping fee cost recovery percentages in the strategy outlined in Table 2 above to calculate target tipping fees. For efficiency' sake due to time limitations for this report, these values assume a regional approach (i.e. keeping the tipping fees harmonized across sub-regions). If Director's prefer to de-harmonize tipping fees, further analysis can be completed and presented at a later date. Due to the magnitude of some of the increases, Staff propose these increases be implemented incrementally over a three or five year period. Tables 6 and 7 outline the proposed tipping fees changes and implementation schedule over a three and five year period, respectively. Only materials where changes to tipping fees are proposed are included.

Table 6: Proposed tipping fee increases on 3-year schedule

Material	2024 Tipping Fee ($/tonne)	Target Tipping Fee ($/tonne)	2025		2026		2027	
			% change	Tipping Fee ($/tonne)	% change	Tipping Fee ($/tonne)	% change	Tipping Fee ($/tonne)
Mixed waste	**$151.25**	**$193**	10%	$166	8%	$180	7.5%	$193
Biosolids	**$60.50**	**$88**	10%	$67	15%	$77	15%	$88
Rubble[1]	**$53.25**	**$193**	262%	$166	8%	$180	7.5%	$193
Soils (uncontaminated)	**$21.75**	**$44**	30%	$28	25%	$35	25%	$44
Soils (waste)	**$48.50**	**$66**	36%	$66	-	$66	-	$66
Wood (clean)	**$78.75**	**$100**	10%	$87	7.5%	$93	7.5%	$100
Wood (waste)[1]	**$78.75**	**$193**	145%	$166	8%	$180	7.5%	$193
Y&G	**$60.50**	**$82**	10%	$67	10%	$74	10%	$82

[1] Significant tipping fee increase is due to change in material classification as this material is recommended to be classified as mixed waste going forward.

Table 7: Proposed tipping fee increases on 5-year schedule

Material	2024 Tipping Fee ($/tonne)	Target Tipping Fee ($/tonne)	2025		2026		2027		2028		2029	
			% change	Tipping Fee ($/tonne)	% change	Tipping Fee ($/tonne)	% change	Tipping Fee ($/tonne)	% change	Tipping Fee ($/tonne)	% change	Tipping Fee ($/tonne)
Mixed waste	**$151.25**	**$193**	10%	$166	4%	$173	4%	$180	4%	$187	3%	$193
Biosolids	**$60.50**	**$88**	10%	$67	8%	$72	7%	$77	7%	$82	7%	$88
Rubble[1]	**$53.25**	**$193**	262%	$166	4%	$173	4%	$180	4%	$187	3%	$193
Soils (uncontaminated)	**$21.75**	**$44**	15%	$25	15%	$29	15%	$33	15%	$38	15%	$44
Soils (waste)	**$48.50**	**$66**	10%	$53	7%	$57	5%	$60	5%	$63	5%	$66
Wood (clean)	**$78.75**	**$100**	10%	$87	4%	$90	4%	$94	4%	$97	3%	$100
Wood (waste)[1]	**$78.75**	**$193**	145%	$166	4%	$173	4%	$180	4%	$187	3%	$193
Y&G	**$60.50**	**$82**	10%	$67	6%	$71	5%	$74	5%	$78	5%	$82

[1] Significant tipping fee increase is due to change in material classification as this material is recommended to be classified as mixed waste going forward.

Tipping fee changes in the tables above are by weight, but would be carried through to other per unit tipping fees using conversion values once additional analysis of these conversions is completed. Conversion values for bagged waste were updated in 2024 as a result of the 2023 Waste Composition Study, but as mentioned in the yard and garden section above, Staff will re-evaluate the conversion values for volume and unit tipping fees in the coming year and provide additional recommendations as appropriate.

Changes to tipping fees were not recommended for the following materials:

- Organics: As recommended by GHD, organics were not included in proposed tipping fee increases to give the cost to manage this material time to stabilize.
- Septage: Tipping fee increases are already set for this material in 2025 and management processes (and therefore costs to manage this material) are in flux.
- Tires: Based on the results of the System Efficiency Study, a tipping fee reduction for this material could be warranted; however Staff recommend keeping the existing rate to direct this material to extended producer responsibility (EPR) collection partners in the region and away from RDCK sites. Tire Stewardship BC identifies twenty (20) return to retailer locations for recycling tires in the RDCK.
- Asbestos, CDR, land clearing waste, and scrap metal: The current tipping fees for these materials satisfied the proposed tipping fee cost recovery structure.

Table 8 summarizes the estimated increase in annual revenue anticipated as a result of the proposed tipping fee changes once fully implemented (2027 or 2029, depending on the implementation schedule selected).

Table 8: Tipping fee objectives and anticipated impact on tipping fee revenue

Material	2024 Tipping Fee ($/tonne)	Target Tipping Fee ($/tonne)	Impact on Tipping Fee Revenue		
			EAST	CENTRAL	WEST
Mixed waste	**$151.25**	$193	$275,258	$397,251	$488,767
Biosolids	**$60.50**	$88	-	-	$6,573
Rubble	**$53.25**	$193	$35,776	$9,643	$31,025
Soils (uncontaminated)[1]	**$21.75**	$44	$7,498	-	$46,102
Soils (waste)[1]	**$48.50**	$66	$10,938	-	$67,358
Wood (clean)[2]	**$78.75**	$100	$1,339	$2,019	$1,955
Wood (waste)[2]	**$78.75**	$193	$64,894	$98,027	$94,485
Y&G[3]	**$60.50**	$82	$10,965	$25,155	$4,967
		TOTALS	**$406,667**	**$532,094**	**$741,230**

[1] The proportion of uncontaminated versus waste soil varies significantly from year to year; the proportion varied from 63-99% waste soil in the years since 2020. To provide a conservative estimate, the proportion of waste soil was assumed to be 65%.
[2] There is insufficient data to estimate the proportion of wood waste that is clean versus non-clean as, while the Bylaw differentiates these materials, it is not currently differentiated in the scale data system. It was estimated that clean wood would make up 10% and waste wood would be 90% of the total wood waste.
[3] Based on average tonnage of paid yard and garden waste (assumes continuation of bi-annual free yard & garden collection months).

These estimates are based on the average annual tonnages from the study (2020-2022) and do not account for fluctuations in tonnage that may occur due to changes in tipping fees and/or material management. Assuming the cost to manage these materials is relatively stable, the additional revenue from increasing tipping fees should reduce reliance on taxation required in the waste services.

As discussed in the November 13 JRRC report and in Section 2 of this report, while the above recommended tipping fee increases and material management changes would increase cost recovery, under the current administrative model the distribution of added tipping fee revenue would not be even across the three sub-regions and would further increase the discrepancies in taxation levels shown in Figure 1 above.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

Changes to tipping fees and material classification will require an amendment to the Resource Recovery Facilities Regulatory Bylaw No. 2905.

Staff recommend that further in-house evaluation be completed to assess the costs and benefits of regionalization of the Resource Recovery system based on the options presented in Section 2 of this report. Any changes related to allocation of expenses and tipping fees revenues would require amendments to the following bylaws:

- Creston and Electoral Areas A, B & C Refuse Disposal Local Service Area Bylaw No. 924 (1992), as amended by Bylaw No. 1072 and Bylaw No. 1148;
- Central Waste Management Subregion Refuse Disposal/Recycling Local Service Area Establishment Bylaw No. 1071, as amended by Bylaw No. 1149; and,
- West Waste Management Subregion Refuse Disposal/Recycling Local Service Area Establishment Bylaw No. 1070, as amended by Bylaw No. 1140.

3.3 Environmental Considerations

The Study, its recommendations, and this additional evaluation focus on efficiency primarily from a financial perspective; however decisions regarding how to implement the recommendations need to also take into account the related environmental impacts which are much more difficult to quantify. Due to the technical analysis required, the following environmental considerations are presented for consideration but were not able to be quantified as part of this report.

The recommendations to landfill non-clean wood waste and rubble are not expected to have significant environmental impacts, as despite current tipping fees indicating an intention to divert these materials, both are destined for the landfill based on current practices.

For rubble, the recommended change is primarily administrative to ensure that the tipping fee reflects the cost to manage this material, as it is currently disposed at the landfill alongside mixed waste. As mentioned in the section above, to discourage illegal dumping of this material due to rate increases, Staff would plan to engage with aggregate processors across the RDCK to determine if these businesses have sufficient capacity and/or interest in this material. If they are a viable alternative option for rubble disposal, this would reduce greenhouse gas (GHG) emissions associated with hauling and landfill disposal of this material.

For wood waste, this change in management will reduce GHG emissions associated with wood grinding and reduce the on-site fire hazard from storage of chipped materials at facilities. If this material were truly being diverted from landfills currently, as intended by the reduced tipping fee, then this change in management would result in an increased amount of waste hauling (and associated GHGs), increased landfill airspace consumption, and increased organic material in the landfill resulting in increased GHG emissions related to anaerobic decomposition. However, since there is not currently a viable end-use for this material, current practices of grinding and stockpiling wood waste have simply delayed its hauling and disposal, and the associated environmental impacts. The environmental benefit of reduced GHG emissions related to grinding the material

would likely be offset by the extra hauling required to account for the additional volume of the unprocessed wood waste.

The purpose of the biannual free yard and garden months is to incentivize FireSmart and air quality initiatives. Elimination of this program could result in increased community fire risk or reductions in local air quality due to increased burning of these materials.

Changes to practices in material acceptance or increases to tipping fees could also result in increases in illegal dumping or reductions in diversion of materials from the landfill.

3.4 Social Considerations:

Tipping fees have generally been set at the same rate across all three sub-regions to promote user equitability between sub-regions and to prevent excessive transportation of waste (i.e. users seeking cheapest disposal option). The revenue from these tipping fees currently stays in the sub-region in which it was collected. Where cost recovery is less than 100%, the balance is covered primarily through taxation, with some amounts covered by grants and/or incentives. The discrepancies in cost to manage materials across sub-regions, while having a single tipping fee structure to promote user equitability, results in inequitable tax subsidization for residents across the RDCK. Based on this structure, residents in the Central sub-region pay more than four times those in the West, while residents in the East pay almost three times those in the West in taxation for the same level of service. While raising tipping fees should decrease the overall reliance on taxation in each sub-region, the discrepancies between sub-regions will still exist and would likely widen. Regionalization is an option that would improve equitability in taxation across the Resource Recovery system.

3.5 Economic Considerations:

None at this time.

3.6 Communication Considerations:

Communication of plans to increase tipping fees by up to 10% for select materials was sent to all municipalities and account holders on October 18 and 30, respectively. The public will need to be notified of any additional changes to material acceptance practices and tipping fees that are recommended for implementation in 2025 as soon as possible once any amendments to Bylaw 2905 are approved.

3.7 Staffing/Departmental Workplace Considerations:

The Environmental Coordinator has drafted an amendment to Bylaw No. 2905 to increase the tipping fee for mixed waste in early 2025, and will incorporate additional increases based on the outcome of this report. The Resource Recovery Operations Coordinator and Field Supervisors would oversee Staff training related to any changes in material management and implementation of new tipping fees.

The Resource Recovery Projects Advisor, with oversight and support from the Resource Recovery Manager and General Manager of Environmental Services, is planning to facilitate a workshop with Directors on the outcomes and recommendations from the System Efficiency Study.

3.8 Board Strategic Plan/Priorities Considerations:

The changes to tipping fees and material management aligns with the RDCK's strategic objectives to manage assets and service delivery in a fiscally responsible manner and to continue to innovate to reduce the impact of waste.

SECTION 4: OPTIONS & PROS / CONS

RECOMMENDATION 1:

OPTION 1: That the Board authorize Staff to draft an amendment to Bylaw No. 2905 to incorporate rubble and wood waste under the definition and fee schedule for mixed waste.

Pros:

- Ensures that the tipping fees more accurately reflect the operational processes and associated cost to manage these materials
- Removes a financial incentive, intended to incentivize diversion, for materials that are not diverted as they do not currently have a viable end use and as a result are being stockpiled and/or disposed in the landfill
- Would reduce the fire risk associated with large stockpiles of wood waste at facilities across the RDCK
- Would reduce the cost to manage wood waste by reducing the need for grinding of this material

Cons:

- Increased cost to generators of these materials
- Significant increases to tipping fees for rubble and wood waste may lead to increased illegal dumping of these materials

OPTION 2: That the Board does not authorize Staff to alter the definition or classification of rubble and wood waste categories in Bylaw No. 2905.

Pros:

- Does not result in any increase to the tipping fee for generators of these materials

Cons:

- Existing tipping fee does not accurately reflect the operational processes and associated cost to manage these materials and provides a financial incentive intended for diversion, even though these materials are not being diverted from the landfill, resulting in more taxation required to subsidize the management of these materials
- Does not address the fire hazard of stockpiling wood waste at RDCK facilities
- Does not reduce the cost associated with grinding wood waste

RECOMMENDATION 2:

OPTION 1: That the Board authorize Staff to draft an amendment to Bylaw No. 2905 updating tipping fees to align with the proposed Tipping Fee Cost Recovery Objectives.

Pros:

- Increases the tipping fee cost recovery for management of several waste materials in alignment with the RRP's goal of a user pay system
- Provides a consistent and transparent structure for the establishment of tipping fees based on cost recovery

Cons:

- Increases the cost of disposal for generators of materials that have tipping fee increases proposed

OPTION 2: That the Board authorize Staff to draft an amendment to Bylaw No. 2905 updating only the tipping fee for mixed waste in 2025.

Pros:

- Minimal increases to tipping fees for waste generators

Cons:

- Does not address the gaps in cost recovery identified in the System Efficiency Study, resulting in heavier reliance on taxation as opposed to the user pay goal as set in the RRP

SECTION 5: RECOMMENDATIONS

RECOMMENDATION 1:

That the Board authorize Staff to draft an amendment to Bylaw No. 2905 to incorporate rubble and wood waste under the definition and fee schedule for mixed waste.

RECOMMENDATION 2:

That the Board authorize Staff to draft an amendment to Bylaw No. 2905 updating tipping fees to align with the proposed Tipping Fee Cost Recovery Objectives.

Respectfully submitted,
Heidi Bench, Projects Advisor

CONCURRENCE

Resource Recovery Manager – Amy Wilson
General Manager of Environmental Services – Uli Wolf
Corporate Administrative Officer – Stuart Horn

ATTACHMENTS:

Attachment A – Committee Report: Results of the Resource Recovery System Efficiency Study (presented to the JRRC on November 13, 2024)

Committee Report

Date of Report:	October 31, 2024
Date & Type of Meeting:	November 13, 2024; Joint Resource Recovery Committee (JRRC)
Author:	Heidi Bench, Projects Advisor
Subject:	RESULTS OF THE RESOURCE RECOVERY SYSTEM EFFICIENCY STUDY
File:	12-6300-20
Electoral Area/Municipality	All areas and municipalities

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to present a summary of the results of the Resource Recovery System Efficiency Study (the Study) and to recommend moving forward with the closure of Riondel, Kokanee Park Marina, and Winlaw Recycling Depots.

SECTION 2: BACKGROUND/ANALYSIS

The 2021 Resource Recovery Plan (RRP) committed to the strategy of ensuring that the RDCK Resource Recovery system is financially sustainable and resilient. As part of this, the RDCK set an action item of undertaking an efficiency study of the Resource Recovery system. The purpose of the Study was to:

1) Assess cost recovery of tipping fees to:
    a. Understand the costs of managing specific waste types and how much of these costs are currently covered by tipping fees versus taxation;
    b. Ensure that the balance between tipping fees and taxation is fair and equitable;
2) Benchmark the system to determine if the RDCK is over or under-serviced, both internally (between sub-regions) and externally (comparing similar regional districts); and,
3) Identify options to recognize efficiencies and improve cost-effectiveness and equitability, while ensuring regulatory compliance.

The proposed scope of work to accomplish these goals was presented to the JRRC in July 2023. The RDCK received proposals from two proponents and in September 2023, GHD Limited (GHD) was procured to complete the Study. GHD created a data model to assess tipping fee cost recovery and completed a benchmarking assessment comparing service levels in the RDCK both internally and externally. The results of these assessments were used to evaluate the performance and efficiency of the system as a whole, as well as for each sub-region.

The following sections will further detail each of the assessments, as well as summarize GHD's recommendations and how Staff see these fitting into their work plan.

TIPPING FEE COST RECOVERY ASSESSMENT

GHD worked with RDCK Staff to develop a data model to analyze the cost recovery of the existing tipping fee structure by waste material. This was completed by incorporating resource recovery expense, tipping fee revenue, and waste tonnage data from three full fiscal years (2020-2022), as well as capital expense data from 2016 through 2022 and planned capital expense data from 2023-2027. This data was used to estimate the cost

per tonne to manage specific materials as well as the revenue from tipping fees per tonne, both at the sub-regional and regional level.

Expenses were organized by three distinct sub-categories: operations and maintenance (O&M) costs, capital costs, and administrative costs. Expenses were allocated to waste material types where possible, and where not (some capital and most administrative expenses), they were allocated equally across the material types such that the cost to manage each material was proportional to the tonnage of that material handled.

GHD noted that the three administrative sub-region model of the RDCK Resource Recovery system, and the variation in infrastructure and in how materials and finances are managed across these sub-regions, is akin to operating waste management systems for three separate regional districts, which added a significant level of complexity to the building of this model. Due to this complexity and nature of the data available, there were numerous assumptions and limitations in developing the model. As such, the cost to manage output values in the model are not exact and have an uncertainty of +/-$10 per tonne for large throughput materials (those greater than 3% of waste stream by weight) and a higher level of uncertainty for smaller throughput materials (those less than 3% of waste stream by weight). Assumptions and limitations of the model include the following:

- Tonnage data:
    - As the RDCK does not have scales at all sites, conversion values were used to estimate total tonnages collected. Tonnage data for household hazardous waste, recycling, and tires was provided by the product stewardship organization or contractor collecting that material.
    - As the organics program for food waste had not yet been fully implemented in the assessment period, annual organics tonnages and associated tipping fee revenues were estimated based on tonnages received between January 2023 and July 2024.
- Expense data:
    - With the exception of salary-related expenses, expenses were averaged across the years of data available to determine average annual cost (2020-2022 for O&M and administrative expenses, 2016-2027 for capital expenses).
    - For salary-related expenses, the model used 2022 salary data as using an average would underestimate the salary burden of the resource recovery program. Salary-related expenses for positions that have been added since 2022 (Resource Recovery Projects Advisor, Field Supervisors, Compost Operator) were also added to reflect expenses as accurately as possible in the model.
    - Costs associated with HB Tailings Facility were not included in the model.
- Tipping fee revenue data:
    - To account for tipping fee increases that occurred since 2022 (10% in 2023 and a subsequent 10% in 2024), the 2020-2022 averaged tipping fee revenue values were increased to represent what the revenue would be based on 2024 tipping fees.

For each material in the study, the model generated a cost per tonne to manage and tipping fee revenue per tonne, for the RDCK as a whole and for each sub-region (Table 1). The cost to manage materials was generally lowest in the West due to having the largest throughput of waste, followed be East and then Central sub-regions. Costs were highest in the Central sub-region primarily due to significantly more hauling being required as there is no active landfill in this sub-region, yet Central still pays for a portion of landfill operations via an annual transfer to the West.

Table 1: Material Management Costs ($/tonne)

MATERIAL	EAST	CENTRAL	WEST	RDCK
Mixed waste[1]	$183	$233	$146	$193
Asbestos[2]	$183	-	$146	$193
Biosolids	-	-	$78	$88[3]
Construction, demolition, renovation (CDR)[2]	$183	$233	$146	$193
Organic waste	$613	$202		$314
Scrap metal[1]	$196	$174	$92	$144
Septage	-	$106	$78	$101
Soils	$95	$101	$78	$88
Tires[2]	$106	$136	$118	$125
Wood	$191	$239	$149	$199
Yard and garden	$135	$166	$168	$163
Recycling	$571	$1,039	$701	$933
Household Hazardous Waste (HHW)	$6,411	$1,195	$5,284	$1,664

[1] Includes materials that are managed as mixed waste (bulky waste, land clearing, noxious weeds, rubble)
[2] The actual cost to manage these materials is underestimated in the model as it was not possible to estimate and model the exact costs associated with management of each and every material, especially for the smaller throughput materials that require additional handling or administrative support. For example, asbestos-containing materials require additional administrative support for permitting and scheduling, require more soil or borrow material for immediate cover, and due to these cover requirements, take up more space in the landfill than just the footprint of the disposed asbestos.
[3] When administrative and capital costs are allocated across the entire region as a whole, they are slightly higher than those for just the West sub-region, resulting in a higher estimated cost to manage this material regionally than those estimated for the West sub-region to manage independently.

The cost/tonne and revenue/tonne values from the model were used to estimate the percent cost recovery from tipping fees for each material, for the RDCK as a whole and for each sub-region. Table 2 below summarizes the tipping fee cost recovery based on the results of the model.

Table 2: Tipping Fee Cost Recovery (%)

MATERIAL	EAST	CENTRAL	WEST	RDCK
Mixed waste	79%	78%	116%	87%
Asbestos	276%	-	231%	189%[2]
Biosolids	-	-	77%	69%[2]
Construction, demolition, renovation (CDR)	122%	112%	163%	122%
Organic waste	14%	63%		42%
Scrap metal[1]	49%	45%	75%	52%
Septage	-	54%	74%	57%[2]
Soils	23%	22%	61%	50%
Tires	284%	260%	311%	275%
Wood	38%	33%	47%	41%
Yard and garden	17%	17%	18%	18%

[1] While the tipping fees for scrap metal do not recover the costs associated with managing it, once the revenues from scrap metal recycling are applied, costs are fully recovered (estimated 153% cost recovery for the RDCK as a whole).
[2] Cost recovery for the RDCK as a whole is slightly underestimated for this material. This is due to the fact that this material is not managed in all three sub-regions. When administrative and capital costs are allocated across the entire region in the

model, they are slightly higher than those for just the individual sub-regions, resulting in a higher estimated cost to manage and therefore lower cost recovery regionally.

The tipping fee cost recovery assessment indicated that the RDCK's cost to manage most materials exceeds what is being recovered by current tipping fees, and that cost recovery varies significantly across sub-regions for some materials.

As per the 2021 RRP, the "user pay" model, where users who generate waste pay for its disposal, is something that the RDCK strives towards in its resource recovery system, where feasible. Based on this, tipping fees would ideally cover, at minimum, the cost to manage waste materials that end up in the landfill. User pay is also the goal of Extended Producer Responsibility programs such as RecycleBC; however, until stewardship organizations are able to establish rates that actually cover the cost to manage the materials they recycle, subsidization through taxation will be necessary for these programs.

According to GHD's waste specialists, typically in regional solid waste operations, mixed waste tipping fees are set higher than the estimated cost to manage this material in order to incentivize diversion and to provide revenue to subsidize the costs to manage divertible materials, such as wood, yard and garden, and scrap metal. However, as diversion rates increase, the waste stream going into the landfill and associated tipping fee revenue typically decreases, which, in the absence of EPR programs that cover the full costs of diversion, means that taxation will always be needed to achieve the goal of increasing diversion.

Based on the cost recovery values identified by the model and guided by the user pay principle and capabilities of the current Resource Recovery system, GHD made the recommendations shown in Table 3 below.

Table 3: Summary of Tipping Fee Assessment Recommendations

MATERIAL	RECOMMENDATION(S)	RATIONALE
Mixed Waste	Increase the tipping fee to approximately $193/tonne	Tipping fee should cover, at minimum, the regional cost to manage this material.
Wood	Increase the tipping fee for clean wood to 75% of the mixed waste tipping fee Increase the tipping fee for all other wood waste (i.e. painted wood, furniture, laminates, etc.) to match the rate for mixed waste and dispose of in the landfill without processing.	Clean wood and wood waste are currently accepted at a lower tipping fee to incentivize diversion, but the RDCK does not currently have an end market for the volume of wood being received, resulting in high processing costs (wood grinding), only for it to be stored at facilities taking up space or ending up in the landfill. Many beneficial end uses of wood, such as compost or biochar, are prevented by mixing clean wood with other wood waste.
Yard & Garden	Increase the tipping fee to 75% of the mixed waste tipping fee Consider the cost savings of discontinuing the free yard and garden drop-off months versus the community benefit (e.g. fire prevention)	Similar to wood waste, yard and garden materials are costly to manage due to processing and hauling, and the RDCK currently receives far more than it is able to use (in compost, mixed with dried septage at landfill sites). Greater than 50% of the yard and garden materials collected are received during the free yard and garden events. Due to low/lack of tipping fees, this service is substantially paid for through taxation.
Soil	Increase the tipping fee for clean soil to 75% of the mixed waste tipping fee	Soil is needed for landfill cover material, but not in the amounts that were received during the timeframe of the study. Accepting too much soil

MATERIAL	RECOMMENDATION(S)	RATIONALE
	Increase the tipping fee for contaminated soil to match the tipping fee for CDR	consumes valuable landfill airspace. As regulations regarding the relocation of clean soil have become more stringent, there are few options for clean soil disposal and a low tipping fee is not necessary to incentivize soil disposal at landfills. If additional clean soil is needed, a lower rate could be provided on a case-by-case basis. The environmental containment structure of a landfill is necessary to manage the potential impacts from contaminated soil, similar to any other landfill materials, therefore the tipping fee for this should at minimum, recover the life cycle costs of a landfill, as reflected in the tipping fee for mixed waste.
Rubble	Eliminate this waste category and include as CDR	Rubble is not received in significant amounts across the region, but a decent amount was received in the East sub-region during the timeframe of the study. Rubble was likely incentivized with a lower tipping fee such that the material could be stockpiled and used at facilities for road building; however it currently is disposed of as mixed waste (i.e. landfilled). As such, it should be charged to reflect this cost to manage as CDR to reflect the additional challenges associated with landfilling larger materials until an end use that allows for diversion is developed.
Septage	Implement planned increase to $90/tonne in 2025	The septage bylaw dictates that the tipping fee will increase by $20/tonne in 2025, bringing this tipping fee to $90/tonne. This will allow for slightly higher than cost recovery in the West sub-region, where the most septage is received, and close to cost recovery in Central, where minimal septage is received. Cost recovery for Septage in the East sub-region was not calculated as part of this study as significant changes are currently underway for septage management in the East sub-region, so detailed analysis of the current system did not have much value.
Organics	Allow time for full implementation of the program and evaluate cost recovery again in a few years	The organics program is still getting off the ground and increasing tipping fees at this point might discourage participation in this program. It would be best to re-assess cost recovery for this material in a few years once the tonnages going into the facility have stabilized more and the pilot for biosolids composting is completed.

MATERIAL	RECOMMENDATION(S)	RATIONALE
-	Aggregate system costs and revenues across the RDCK instead of by sub-region	Tipping fees are currently the same across all sub-regions, with the exception of the per container rate for mixed waste in the Central sub-region. As tipping fee revenue currently remains in the sub-region where it was collected, while the cost to manage materials varies across sub-regions, this results in significant variation in the level of taxation required across the three sub-regions. The taxation for waste management services in the Central sub-region is more than four times the taxation in the West sub-region, while taxation in the East is about triple that in the West. Aggregation of costs and revenues at the regional level would result in a more equitable and efficient Resource Recovery system for RDCK residents.

BENCHMARKING ASSESSMENT

GHD completed a jurisdictional scan to identify regional districts with similar characteristics and demographics to the RDCK for the external benchmarking assessment. From the list of twenty-seven (27) regional districts in BC, seven (7) regional districts were identified as similar to the RDCK. Service level and financial benchmarking criteria were set based on conversations between GHD and Staff, and public availability of data. Service level and financial data was collected, tabulated, and analyzed for the selected regional districts, as well as for the three RDCK sub-regions for internal benchmarking. Tables summarizing these detailed analyses are in Section 4 of the Study, included as Attachment A.

Comparison to Other Regional Districts

Of the seven regional districts, the RDCK ranked second in both the service level and cost benchmarking, indicating that the RDCK Resource Recovery system provides residents with a high level of service compared to the other regional districts in the Study, alongside a relatively high cost per capita to pay for the system and this level of service. Of the regional districts in the Study, the RDCK had the highest tipping fee for mixed waste.

Equitability in the balance between tipping fee revenue and taxation to cover the costs of the Resource Recovery system is a subjective measure. There is no correct or perfect amount, it depends on the values and goals of the governing body. GHD completed a simplified costing exercise to benchmark this balance across the regional districts in the Study. Based on this crude analysis, the RDCK ranked second for cost recovery via tipping fees, which is reflective of its higher tipping fees, indicating that the user pay principle is being applied more strongly in the RDCK than in other regional districts.

GHD notes that as diversion has been prioritized and growing over the past 15 years, solid waste systems are increasingly leaning on taxation as opposed to tipping fees for funding, due to loss of tipping fee revenue as materials are increasingly diverted from landfills. The results of the simplified costing exercise show that of the regional districts in the Study, on average 40% of waste system costs are being funded through tipping fees, with the remaining 60% through taxation. This excluded the RDEK who has limited tipping fees at landfills only and therefore relies almost exclusively on taxation for funding. Based on this simplified analysis, the RDCK was funded slightly more through tipping fees than average, with 45% tipping fee cost recovery and 55% funded through taxation.

Comparison between RDCK Sub-Regions

Based on the service level benchmarking analyses, GHD deemed the system to provide an equitable level of service across the RDCK, with slight variations. The East sub-region has the most facilities per capita and by area, but also the highest proportion of rural population without access to curbside services, while the Central sub-region has the highest service level with the most operating hours per capita and access to a year-round eco-depot, but accepts fewer materials than the other sub-regions due to not having an active landfill (i.e. asbestos, biosolids, bulky waste, and land clearing waste).

To further investigate where the Resource Recovery system might be under or over-operating internally, GHD completed a benchmarking analysis at the RDCK facility level by using the weekly number of summer operating hours and tonnage collected at each site to determine an estimated average weight collected per hour of operation at each site.

As expected, the landfills receive the highest weight of waste per hour of operation, while the standalone recycling depots receive the lowest. One exception to this is Grohman Narrows Transfer Station, which receives more waste than the Nakusp Landfill. There were three (3) facilities that received less than 50kg of material per hour of operation:

- Riondel Recycling Depot
- Kokanee Park Marina Recycling Depot
- Winlaw Recycling Depot.

GHD identified that these three facilities represent potential opportunities to reduce system costs as each is in close proximity (less than 20 minute drive) to other RDCK recycling facilities. As these facilities are satellite recycling depots, they only accept a portion of recyclable materials and residents must access nearby transfer stations/core depots for disposal of flexible plastics, foam, and other waste materials. Even at low weekly hours of operation, the costs of operating, maintaining, and hauling materials from these three facilities is approximately $120,000 per year, which is about 10% of the budget for recycling services.

An additional four (4) facilities only received between 50 and 100 kg per hours of operation:

- Salmo Recycling Depot
- Crescent Valley Recycling Depot
- New Denver Recycling Depot
- Yahk Recycling Depot and Transfer Station

GHD proposed that the Salmo, Crescent Valley, and New Denver facilities' hours of operation could be reduced to 12 hours or less per week to reduce operating costs and bring the efficiency of these sites more in line with other RDCK facilities. The Yahk facility is open only four (4) hours per week and there are no nearby RDCK facilities, so no changes were recommended here.

Core and Satellite Recycling Depot Comparison

GHD also completed a benchmarking of the distribution of core and satellite recycling facilities across the regional districts in the Study and across the RDCK. This identified that the RDCK operates the second highest number of recycling depots, and a high number of satellite depots compared to other regional districts, most of whom do not operate any. GHD states that even with the closure of the four satellite depots suggested above and some reduction in hours at the other depots listed, the RDCK would continue to provide its residents a reasonable to high level of service compared to most of the other regional districts in the Study.

SUMMARY

The Study identified that the RDCK Resource Recovery system is operated generally efficiently despite the complexities of the three sub-region administrative model. The RDCK provides a high level of service and accessibility to waste and recycling compared to similar regional districts and the cost to run the system reflects this. Internally, GHD deemed the system to provide an equitable level of service across the RDCK, with slight variations. GHD identified that efficiencies and cost savings could be recognized in several areas. Table 4 summarizes the recommendations made by GHD and how Staff propose to address these.

Table 4: System Efficiency Study Recommendations and Implementation Plan

Recommendation (GHD)	Proposed Plan (RDCK Staff)
Increase tipping fees for select materials	Tipping fee increases will be proposed for incorporation in an update to the Resource Recovery Facilities Regulatory Bylaw No. 2905, expected to be presented to the Board by the ***Environmental Coordinator*** in December 2024.
Change how select materials are accepted and stored (scrap metal, wood, yard and garden)	The ***Environmental Coordinator*** will conduct a review of end markets for scrap metal, wood, and yard and garden materials to guide/improve diversion strategies and reduce storage time at facilities (in-house).
Reduce the operating hours at three (3) facilities	The ***Resource Recovery Operations Coordinator*** will conduct a more thorough site hours review in early 2025 to determine if operating hours should be adjusted at RDCK facilities.
Closure of three (3) facilities	Staff seek authorization from the Board to plan the closure of at minimum, the Kokanee Park Marina Recycling Depot, as well as the Riondel and Winlaw Recycling Depots in 2025. This would be overseen by the ***Resource Recovery Technician.***
Continue to optimize use of Strong scale software to track flow of materials across the RDCK	The ***Environmental Coordinator*** will continue to optimize use of the Strong scale software, including implementing tracking of source sector of waste (i.e. residential, commercial, CDR) in 2025.
Track waste hauling by material type to better understand that costs associated with each material	The ***Operations Supervisor*** will request that waste material type be included on waste hauler invoices (East and West sub-regions) and implement internal tracking system for in-house waste hauling (Central sub-region) in 2025. The ***Resource Recovery Projects Advisor*** will compile and analyze this data after one year of collection to better understand the hauling costs associated with each material, to help guide further diversion strategy development.
Continue to monitor the implementation of new extended producer responsibility (EPR) programs and evaluate how the RDCK should participate	The ***Resource Recovery Technician*** will continue to advocate for increased EPR programs, and monitor and plan for their implementation.
Conduct a regionalization study to assess the cost-benefit of operating from a single, centralized administrative system	**Option 1:** The ***Resource Recovery Projects Advisor*** could conduct an equitability analysis using the 2025 budget to estimate the difference in tax allocation if all services were under one administrative sub-region, as well attempt to quantify potential efficiencies in staff time. **Option 2:** The ***Resource Recovery Manager*** and ***Technician*** could pilot regionalization by combining the allocation services for recycling (A116-A118) into one centralized service in 2025.

Staff have provided further analysis and recommendations on the suggested recycling facility closures in the sections below. The remaining recommendations from the Study are provided for information only at this point in time. Staff will assess each of GHD's recommendations and provide the JRRC with more fulsome analysis in coming months for those that require direction or authorization from the Board.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒ Yes ☐ No	**Financial Plan Amendment:**	☐ Yes ☒ No
Debt Bylaw Required:	☐ Yes ☒ No	**Public/Gov't Approvals Required:**	☒ Yes ☐ No

Tipping Fee Changes

Based on the results of the tipping fee cost recovery assessment, GHD recommended considering increases to tipping fees for mixed waste, clean wood, wood waste, clean (uncontaminated) soil, waste (contaminated) soil, rubble, and yard & garden waste. Table 5 shows the estimated increase in annual tipping fee revenue that could be expected based on GHD's recommended tipping fee increases and the average waste tonnages from the period of the Study.

Table 5: Estimated Annual Tipping Fee Revenue Increase

Material	Current Tipping Fee ($/tonne)	Proposed Tipping Fee ($/tonne)	Estimated Additional Annual Tipping Fee Revenue ($)[1]		
			EAST	CENTRAL	WEST
Mixed waste	$151.25	$193.00	$275,258	$397,251	$488,767
Clean wood waste[2]	$78.75	$144.75	$4,158	$6,290	$6,065
Wood waste[2]	$78.75	$193.00	$64,894	$97,992	$94,496
Uncontaminated soil[3]	$21.75	$144.75	$41,414	-	$254,899
Waste soil[3]	$48.50	$242.00	$120,996	-	$744,714
Rubble	$43.00	$193.00	$38,400	$10,350	$33,300
Yard & Garden[4]	$60.50	$144.75	$42,883	$56,233	$19,462
		TOTALS	**$588,003**	**$568,116**	**$1,641,703**

[1] Relative to the 2024 tipping fee revenue, based on 2020-2022 average waste tonnages.
[2] There is insufficient data to estimate the proportion of wood waste that is clean versus non-clean as, while the Bylaw differentiates these materials, it is not currently differentiated in the scale data system. Due to this, it was estimated that clean wood would make up 10% and waste wood would be 90% of the total wood waste.
[3] The proportion of uncontaminated versus waste soil varies significantly from year to year; the proportion varied from 63-99% waste soil in the years since 2020. To provide a conservative estimate, the proportion of waste soil was assumed to be 65%.
[4] Based on average tonnage of paid yard and garden waste (assumes continuation of bi-annual free yard & garden collection months).

These estimates do not account for fluctuations in tonnage that would likely occur due to changes in tipping fees and/or material management. When updating tipping fees, consideration should be given to the balance between the user pay (tipping fee) and taxation-based system models. GHD noted that while the RDCK strives to have a user-pay system, as diversion rates grow, increased taxation becomes necessary to fund waste systems, as tipping fee increases cannot be made in perpetuity. If tipping fees are too high, they will discourage proper disposal and diversion. Maintaining the use of tipping fees satisfies the RRP guiding principle to incorporate the user-pay model, where feasible, to reduce the amount of taxation required. While cost recovery is a helpful guide, it should not be the only factor in setting tipping fees. For comparison, Table 6 shows the range of per tonne tipping fees for these materials in neighbouring regional districts.

Table 6: 2024 Tipping Fees in Neighbouring Regional Districts ($/tonne)

Material	RDCK	Columbia Shuswap Regional District	Regional District of East Kootenay	Regional District of Kootenay Boundary
Mixed waste	$151.25	$90	free	$120
Clean wood waste	$78.75	$50	free	$50
Wood waste	$77.75	$50	$0-$200	$120-$175
Uncontaminated soil	$21.75	$10	$0-$40	$10-$20
Waste soil	$48.50	$40	$100	$20-$40
Rubble	$43.00	$90	free	$50
Yard & Garden	$60.50	$0-$90	free	$50[1]

[1] Tipping fee for woody plant waste. Grass clippings and leaves are $5/load.

Of these regional districts, the RDCK already has the highest tipping fees for mixed waste, clean wood waste, and uncontaminated soil. It is unlikely that other regional districts are recovering the full costs to manage these materials through tipping fees, indicating that they are likely leaning towards more taxation-based waste management strategies, or simply haven't quantified the cost of managing different waste types. This data will be considered in the development of formal recommendations relating to tipping fee and material management changes, to be made as part of an upcoming bylaw amendment.

While the recommended tipping fee increases and material management changes would increase cost recovery, under the current administrative model the distribution of added tipping fee revenue would not be even across the three sub-regions and would result in further discrepancies in taxation levels. The West sub-region would see the greatest benefit as it receives the greatest proportion of the high throughput materials (mixed waste, soil, septage), yet has the lowest cost to manage these materials. As GHD points out in the Study, the West sub-region waste services are likely being subsidized with tipping fee revenues from material generated in the Central sub-region, as the West hosts the primary receiving landfill for both sub-regions. This provides additional justification to consider evaluating centralizing system administration through a regionalization study.

In addition to increased equitability for residents across the RDCK, potential financial benefits of regionalization would also include cost savings related to administrative and operational efficiency. Both GHD and the consultants overseeing the RRP (Maura Walker Environmental Consultants Ltd. and Carey McIver and Associates Ltd.) pointed out that the current Resource Recovery system operates similar to three separate regional districts. While there are some cost savings compared to the operation of three independent regional districts in having staff that oversee programs across all three, administration and management of the three sub-regions is far more complex than operating as a single regional district. The cost benchmarking in GHD's Study identified that the RDCK had one of the highest costs per capita of the regional districts in the study. While part of this is likely related to the relatively high level of service provided by the RDCK, operating with three administrative sub-regions also results in increased staff, staff time, and associated cost. Further analysis would be required to quantify the cost savings of regionalizing waste services.

Changes to Service Levels

It is anticipated that the new RecycleBC incentive rates proposed for 2025 will cover close to 60-65% of the RDCK's current cost to manage recycling. The recommended facility closures and hours reductions would help to close the gap between recycling system costs and the incentive received from RecycleBC, further reducing the amount of subsidization required from taxes. Similar to the facilities GHD recommended for closure, the Ymir

Transfer Station and Recycling Depot is also located less than 20 minute drive from other RDCK facilities. The Ymir facility is currently only open 6 hours per week, so there would not be much cost savings in reducing hours at this site, but closure of this facility would result in cost savings for the Central sub-region, which currently has the highest tax burden of the three sub-regions.

Even with the closure of these four facilities, the RDCK would have above average facility density and operating hours per capita compared to other regional districts in the Study, indicating that the RDCK would still be providing a high level of service to its residents. The Central sub-region would still have the highest facility hours of operation per capita of the three sub-regions, but would have the lowest facility density.

The closure of these facilities would result in the cost savings shown in Table 8. The values in this table do not include costs related to administrative and managerial staff time for these facilities. The Study indicated that the cost per tonne for the RDCK as a whole to manage recycling is $933/tonne and to manage mixed waste is $193/tonne.

Table 8: Facility Operating Costs

Facility	Annual Operating Cost (2023)	Operating Cost per Tonne of Recycling
Winlaw Recycling Depot	$33,382	$2,384/tonne
WEST SUB-REGION TOTAL	**$33,382**	
Kokanee Park Marina Recycling Depot	$68,562	$1,459/tonne
Ymir Transfer Station and Recycling Depot	$45,304	$612/tonne[1]
CENTRAL SUB-REGION TOTAL	**$113,866**	
Riondel Recycling Depot	$17,552	$1,463/tonne
EAST SUB-REGION TOTAL	**$17,552**	

[1] Costs and tonnages are for waste and recycling combined, so this value reflects the combined cost per tonne for all materials accepted at this site (mixed waste and recycling).

Reductions in operational hours at other low volume facilities would also result in cost savings; however staff would need to conduct an operational hours review to determine what hours reductions would be reasonable and to quantify cost savings. It should be noted that, while it is not anticipated that this change would deter residents from continuing to separate recyclable materials from their waste, any reductions seen would result in a reduction to the incentive received from RecycleBC to fund this program.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

Tipping fee changes will require an amendment to the Resource Recovery Facilities Regulatory Bylaw No. 2905.

Staff recommend that further in-house evaluation be completed to assess the costs and benefits of regionalization of the Resource Recovery system, and recognize that any changes related to allocation of expenses and cost recovery would require amendments to the following bylaws:

- Creston and Electoral Areas A, B & C Refuse Disposal Local Service Area Bylaw No. 924 (1992), as amended by Bylaw No. 1072 and Bylaw No. 1148;
- Central Waste Management Subregion Refuse Disposal/Recycling Local Service Area Establishment Bylaw No. 1071, as amended by Bylaw No. 1149; and,
- West Waste Management Subregion Refuse Disposal/Recycling Local Service Area Establishment Bylaw No. 1070, as amended by Bylaw No. 1140.

3.3 Environmental Considerations

The Study and its recommendations focus on efficiency primarily from an equitability and financial perspective; however decisions regarding how to implement the recommendations need to also take into account the related environmental impacts which can be difficult to quantify.

Changes to tipping fees and practices in material acceptance could result in increases in illegal dumping or reductions in diverting materials from the landfill. In particular, the environmental impacts related to the recommendation to landfill non-clean wood waste are unclear. Environmental benefits include reducing greenhouse gas (GHG) emissions associated with wood grinding and reducing on-site fire hazard from storage of chipped materials at facilities. However, this would also result in an increased amount of waste hauling (and associated GHGs), increased landfill airspace consumption, and increased organic material in the landfill resulting in increased GHG emissions related to anaerobic decomposition. Similarly, elimination of the biannual free yard and garden months could result in increased community fire risk. Further analysis would be required to quantify the cost-benefit of recommended changes to wood and yard and garden material management.

Closure or hours reductions at recycling facilities may lead to more recyclable materials being landfilled. As residents using the Winlaw, Kokanee Park Marina, and Riondel satellite recycling depots need to use the nearby transfer stations/core depots to dispose of other waste materials anyways, it is not anticipated that this change would deter residents from continuing to separate recyclable materials from their waste, nor should it incur significantly more GHG emissions related to transportation. The supplemental waste composition study, scheduled for 2028, will help to quantify the impact of these changes in the waste stream (if implemented).

3.4 Social Considerations:

Tipping fees have generally been set at the same rate across all three sub-regions to promote user equitability between sub-regions and to prevent excessive transportation of waste (i.e. users seeking cheapest disposal option). The revenue from these tipping fees currently stays in the sub-region in which it was collected. Where cost recovery is less than 100%, the balance is covered primarily through taxation, with some amounts covered by grants and/or incentives. The discrepancies in cost to manage materials across sub-regions, while having a single tipping fee structure to promote user equitability, results in inequitable tax subsidization for residents across the RDCK. Based on this structure, residents in the Central sub-region pay more than four times those in the West, while residents in the East pay almost three times those in the West in taxation for the same level of service. Regionalization is an option that would improve equitability in taxation across the Resource Recovery system.

The potential closure of satellite recycling facilities would reduce convenience for users of impacted facilities, requiring residents to store their core recycling materials for delivery along with their other waste and recyclables at the nearest transfer station/recycling depot. Potential reductions in facility operating hours would require users to adapt to new hours.

3.5 Economic Considerations:

No economic considerations at this time.

3.6 Communication Considerations:

Communication of plans to increase tipping fees by up to 10% for select materials was sent to all municipalities and account holders on October 18 and 30, respectively.

If recycling facility closures are authorized, communication of closures would need to be made to the public and facility staff/operators a minimum of thirty days in advance of proposed closure date. As the Ymir Transfer Station and Recycling facility provides more service than the other satellite recycling depots, more notice would be required if closure of this facility were pursued.

No additional communication considerations at this time.

3.7 Staffing/Departmental Workplace Considerations:

The works proposed based on the recommendations of the Study shall be completed by several members of the Resource Recovery team, as highlighted in Table 4 above. The Resource Recovery Projects Advisor will guide the implementation of these actions, with oversight and support from the Resource Recovery Manager and General Manager of Environmental Services.

3.8 Board Strategic Plan/Priorities Considerations:

The Tipping Fee Cost Recovery Assessment and System Efficiency Study aligns with the RDCK's strategic objectives to manage assets and service delivery in a fiscally responsible manner and to continue to innovate to reduce the impact of waste.

SECTION 4: OPTIONS & PROS / CONS

RECOMMENDATION 1: CENTRAL SUB-REGION

OPTION 1: That the Board authorize Staff to not extend the existing lease agreement with Kokanee Creek Marine Ltd. for the lease of lands and operations associated with the Kokanee Park Marina Recycling Depot and permanently close the Kokanee Creek Marina Recycling Depot effective December 31, 2024.

Pros:

- Reduces costs to the Central sub-region by approximately $68,562 while still providing residents a reasonable to high level of service compared to other regional districts.
- Helps to close the gap between the operating cost of the RecycleBC program and the funding provided through RecycleBC incentives.

Cons:

- Residents who use this satellite depot will have less convenience for core recycling material disposal and will have to store these materials for delivery along with their other waste and recyclables at the nearest transfer station/recycling depot.
- May result in slight increases in recyclable materials being landfilled.

OPTION 2: That the Board authorize Staff extend the existing lease agreement with Kokanee Creek Marine Ltd. for the lease of lands and operations associated with the Kokanee Park Marina Recycling Depot.

Pros:

- Allows the RDCK to continue to provide a higher level of service than other regional districts.
- Residents who use Kokanee Park Marina Recycling Depot will continue to have convenient access for disposal of core recycling materials.

Cons:

- Does not result in any cost savings or help to close the gap between the operating cost of the RecycleBC program and the funding provided through RecycleBC incentives.

RECOMMENDATION 2: EAST SUB-REGION

OPTION 1: That the Board authorize staff to plan the permanent closure of Riondel Recycling Depot in 2025.

Pros:

- Reduces costs to the East sub-region by approximately $17,552, while still providing residents a reasonable to high level of service compared to other regional districts.
- Helps to close the gap between the operating cost of the RecycleBC program and the funding provided through RecycleBC incentives.

Cons:

- Residents who use this satellite depot will have less convenience for core recycling material disposal and will have to store these materials for delivery along with their other waste and recyclables at the nearest transfer station/recycling depot.
- As this site would no longer be staffed, this would eliminate the oversight for the current collection of waste in the same location through the site staff. This may either increase disposal without bag tag (resulting in revenue loss) or require additional staffing and therefore cost under service S189 Refuse Transfer Area A.
- May result in slight increases in recyclable materials being landfilled.

OPTION 2: That the Board does not authorize staff to plan the permanent closure of Riondel Recycling Depot in 2025.

Pros:

- Allows the RDCK to continue to provide a higher level of service than other regional districts.
- Residents who use Riondel Recycling Depot will continue to have convenient access for disposal of core recycling materials.

Cons:

- Does not result in any cost savings or help to close the gap between the operating cost of the RecycleBC program and the funding provided through RecycleBC incentives.
- Continues to provide the oversight for the current collection of waste in the same location through the recycling site staff.

RECOMMENDATION 3: WEST SUB-REGION

OPTION 1: That the Board authorize staff to plan the permanent closure of Winlaw Recycling Depot in 2025.

Pros:

- Reduces costs to the West sub-region by approximately $33,382, while still providing residents a reasonable to high level of service compared to other regional districts.
- Helps to close the gap between the operating cost of the RecycleBC program and the funding provided through RecycleBC incentives.

Cons:

- Residents who use this satellite depot will have less convenience for core recycling material disposal and will have to store these materials for delivery along with their other waste and recyclables at the nearest transfer station/recycling depot.
- May result in slight increases in recyclable materials being landfilled.

OPTION 2: That the Board does not authorize staff to plan the permanent closure of Winlaw Recycling Depot in 2025.

Pros:

- Allows the RDCK to continue to provide a higher level of service than other regional districts.

- Residents who use Winlaw Recycling Depot will continue to have convenient access for disposal of core recycling materials.

Cons:

- Does not result in any cost savings or help to close the gap between the operating cost of the RecycleBC program and the funding provided through RecycleBC incentives.

SECTION 5: RECOMMENDATIONS

RECOMMENDATION 1: CENTRAL SUB-REGION

That the Board authorize Staff to not extend the existing lease agreement with Kokanee Creek Marine Ltd. for the lease of lands and operations associated with the Kokanee Park Marina Recycling Depot and permanently close the Kokanee Creek Marina Recycling Recycling Depot effective December 31, 2024.

RECOMMENDATION 2: EAST SUB-REGION

That the Board authorize staff to plan the permanent closures of Riondel Recycling Depot in 2025.

RECOMMENDATION 3: WEST SUB-REGION

That the Board authorize staff to plan the permanent closure of Winlaw Recycling Depot in 2025.

Respectfully submitted,
Heidi Bench, Projects Advisor

CONCURRENCE

Resource Recovery Manager – Amy Wilson
General Manager of Environmental Services – Uli Wolf
Corporate Administrative Officer – Stuart Horn

ATTACHMENTS:
Attachment A – Tipping Fee Cost Recovery Assessment & Resource System Efficiency Study

Committee Report

Date of Report:	December 3, 2024
Date & Type of Meeting:	December 11, 2024 Joint Resource Recovery Meeting
Author:	Amy Wilson, Resource Recovery Manager
Subject:	S188 WEST WASTE FINANCIAL PLAN AMENDMENT – OOTISCHENIA TIPPING WALL BINS
File:	05-1700-30-ENV ENVIRONMENTAL SERVICES-RR BUDGET 2024
Electoral Area/Municipality	West Sub-Region

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to request an amendment of the 2024 Financial Plan to account for the purchase of bins for the Ootischenia Landfill.

SECTION 2: BACKGROUND/ANALYSIS

Bins to collect and transport waste from the tipping wall at the Ootischenia Landfill were in need of repair. At time of 2024 budget development staff was uncertain if the bins could be repaired or would require replacement. Budget was allocated in the Repairs and Maintenance Account in Service S188 West Waste.

Upon assessment it was determined some bins could be repaired, and two bins needed replacement. They were purchased for $8,490 each (total of $16,980), excluding taxes. As the bins are new assets, the Finance Department identified they should be accounted as capital items rather than repairs.

Staff recommend a 2024 financial plan amendment to reallocate funds from the Repairs and Maintenance account 55010 to the Capital Expenses account 60000 in Service S188 West Waste.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒ Yes	☐ No	**Financial Plan Amendment:**	☒ Yes	☐ No
Debt Bylaw Required:	☐ Yes	☒ No	**Public/Gov't Approvals Required:**	☐ Yes	☒ No

The 2024 Financial Plan for Service S188 West Waste allocated $20,000 to the Repairs and Maintenance Account 55010 for repair and/or replacement of bins for the Ootischenia Landfill, the cost of the two bins was $16,980, excluding taxes ($18,170 with PST).

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

None at this time.

3.3 Environmental Considerations

None at this time.

3.4 Social Considerations:

None at this time.

3.5 Economic Considerations:
None at this time.

3.6 Communication Considerations:
None at this time.

3.7 Staffing/Departmental Workplace Considerations:
None at this time.

3.8 Board Strategic Plan/Priorities Considerations:
None at this time.

SECTION 4: OPTIONS & PROS / CONS
N/A

SECTION 5: RECOMMENDATIONS
That the Board approve an amendment to the 2024 Financial Plan for S188 West Waste to decrease the Repairs and Maintenance Account 55010 by $18,170 and increase the Capital Expense Account 60000 by $18,170 for the Ootischenia Landfill Tipping Wall Bins.

Respectfully submitted,

Amy Wilson – Resource Recovery Manager

CONCURRENCE
Finance Manager – Heather Smith
General Manager of Environmental Services – Uli Wolf
Chief Administrative Officer – Stuart Horn

ATTACHMENTS:
None

Committee Report

Date of Report:	December 3, 2024
Date & Type of Meeting:	December 11, 2024 Joint Resource Recovery Meeting
Author:	Amy Wilson, Resource Recovery Manager
Subject:	S187 CENTRAL WASTE MFA EQUIPMENT FINANCING AUTHORIZATION – CENTRAL LOADER AND ROLL OFF BINS
File:	05-1700-30-ENV ENVIRONMENTAL SERVICES-RR BUDGET 2024
Electoral Area/Municipality	Central Sub-Region

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to request an authorization for a Municipal Finance Authority equipment financing for the 2024 Central Loader.

SECTION 2: BACKGROUND/ANALYSIS

Following the report received at the October 16, 2024 Joint Resource Recovery Meeting (Attachment A), the Board passed the following resolution (539/24):

> *That the Board authorize staff to purchase a Hyundai HL940A loader from Woodland Equipment Inc. up to a total cost of $287,790 (excluding taxes);*
>
> *AND FURTHER, that the Chair and Corporate Officer be authorized to sign the necessary documents;*
>
> *AND FURTHER, that the costs be paid from Service S187 Central Waste.*

The 2024 Financial Plan directed this purchase to be funded through equipment financing. However, in the process of preparing the draft 2025 Financial Plan for S187 staff have determined there are sufficient regular reserves to fund the purchase. Therefore, propose to instead fund the purchase of $284,395 through Regular Reserves and authorize an amendment to the 2024 Financial Plan.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒ Yes	☐ No	**Financial Plan Amendment:**	☐ Yes	☒ No
Debt Bylaw Required:	☐ Yes	☒ No	**Public/Gov't Approvals Required:**	☐ Yes	☒ No

The 2024 Financial Plan included $325,000 for the Central Loader in the Capital Expenses and the same value as Proceeds from Equipment Financing. The actual purchase price of the Loader is $284,395, including PST.

There is expected to be $895,467 in Central Regular Reserves at end of 2024. Using reserves to fund the purchase, rather than financing, would save approximately $60,000 annually in loan repayment costs over the next five years.

Reserve contributions are projected to rise in future years (2027-2029) in the Draft 2025 Financial Plan.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):
None at this time.

3.3 Environmental Considerations
None at this time.

3.4 Social Considerations:
None at this time.

3.5 Economic Considerations:
None at this time.

3.6 Communication Considerations:
None at this time.

3.7 Staffing/Departmental Workplace Considerations:
None at this time.

3.8 Board Strategic Plan/Priorities Considerations:
None at this time.

SECTION 4: OPTIONS & PROS / CONS

Option 1: That the Board That the Board approve an amendment to the 2024 Financial Plan for S187 Central Waste to decrease the Proceeds from Equipment Financing Account 43200 by $284,395 and increase the Transfer from Regular Reserves Account 45000 by $284,395 for the Central Loader.

Option 2: That the Board of the Regional District Central Kootenay authorizes up to $284,395 to be borrowed, under Section 403 of the *Local Government Act*, from the Municipal Finance Authority – equipment financing program, for the purpose of 2024 Central Loader; AND FURTHER that the loan be repaid within five (5) years from S187 Central Waste, with no rights of renewal.

SECTION 5: RECOMMENDATIONS

That the Board approve an amendment to the 2024 Financial Plan for S187 Central Waste to decrease the Proceeds from Equipment Financing Account 43200 by $284,395 and increase the Transfer from Regular Reserves Account 45000 by $284,395 for the Central Loader.

Respectfully submitted,

Amy Wilson – Resource Recovery Manager

CONCURRENCE

Finance Manager – Heather Smith
General Manager of Environmental Services – Uli Wolf
Chief Administrative Officer – Stuart Horn

ATTACHMENTS:
Attachment A – October 11, 2024 Purchase of Loader Committee Report

Committee Report

Date of Report: October 11, 2024
Date & Type of Meeting: October 16, 2024; Joint Resource Recovery Committee
Author: Larry Brown, Resource Recovery Operations Supervisor
Subject: Purchase of Loader
File: 06-2230-15-2024-101 ENV LOADER
Electoral Area/Municipality: CENTRAL SUB-REGION

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is seek Board direction to purchase of a new rubber tire wheel loader to be deployed within the Central Subregion.

SECTION 2: BACKGROUND/ANALYSIS

A request through Canoe to loader suppliers was sent out in late July and closed on August 15, 2024.

The criteria upon which the suppliers were to base their submissions on was as follows:

"The RDCK is requesting quotes from Canoe suppliers for the procurement of one (1) wheel loader; suitable for solid waste and recycling transfer station uses such as pushing up garbage or recycling piles, transporting, arranging, and loading "super sacks" (~ 1 tonne capacity woven sacks) filled with recycling material, loading and moving pallets, and moving snow. The following general specification has being provided:

1) *The machine MUST be new and be the current production model, provide details. Demo units with low hours (i.e. <250hrs) are acceptable provided comparable details are provided.*
2) *Minimum operating weight: 30,000lbs.*
3) *Self-leveling bucket*
4) *Bucket size: 3 – 3.5 cubic yards.*
5) *Quick change mechanism to allow for ease in changing the attachments.*
6) *Required attachments: adjustable forks."*

Six separate submissions were received from dealers located in the south-east region of BC. Staff reviewed the submissions based on the following criteria:

The RDCK will be making its purchase decision based on the evaluation criteria listed below.

- *Quote specifies that Canoe member pricing is provided, reference the RDCK's Canoe member number and the supplier's Canoe contract number. (Pass/Fail)*
- *Quote is provided in Canadian currency*
- *Price*
- *Terms of warranty*

- *Shipping fees*
- *Insurance terms during shipping*
- *Return policy and any return shipping fees*
- *Expected delivery date (delivery lead time)*
- *Service availability, location and operating hours*
- *Local parts availability*
- *Provision of operation and service manuals*
- *Operating hours for service*
- *Sustainability*

Staff met on several occasions over the course of a month following the closure date to review all information received and solicit feedback from staff. Several submissions were incomplete and required clarification. The evaluation score, overall ranking, and price are presented in the table below and the evaluation matrix is included as Attachment A.

Unit	Evaluation Score	Overall Ranking	Price
John Deere – 524P	75.32 %	4	$303,000
Case – 621G XT	**80.56 %**	**1**	**$303,010**
Hyundai – HL940A	80.55 %	2	$265,790
Komatsu – WA-270-8	78.48 %	3	$283,000
Volvo – L70H	71.97 %	6	$319,272
Caterpillar – AR 926M	72.35 %	5	$288,950

Evaluation Rating	Details
100%	Outstanding Proposal that Substantially Exceed Requirements
85%	Above Average Fulfilling Requirements
70%	Fully Meets Requirements
50%	Meets Minimum Requirements
25%	Does Not Meet Minimum Requirements in All Areas
0%	Unsatisfactory

Based on the evaluation staff recommend purchasing the Case 621G XT unit. The Case unit specifications meet operational needs, was the highest ranked, and the price is within the budgeted value. It also includes a 2000 hour Comprehensive Maintenance Plan, a 3000 hour warranty, and a service & repair technician is located in Castlegar.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒Yes	☐ No	**Financial Plan Amendment:**	☐Yes	☒ No
Debt Bylaw Required:	☐Yes	☒ No	**Public/Gov't Approvals Required:**	☐Yes	☒ No

The RDCK 2024 Financial Plan for Service S187 Central Waste includes $325,000 for a rubber-tired loader. The Case unit recommended by staff is $303,010, with provincial tax applied is $324,221, is within the budget.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

Board approval is required for this purchase.

3.3 Environmental Considerations

None at this time.

3.4 Social Considerations:

None at this time.

3.5 Economic Considerations:

None at this time.

3.6 Communication Considerations:

None at this time

3.7 Staffing/Departmental Workplan Considerations:

With support from the Procurement Coordinator, the Resource Recovery Operations Supervisor will lead the purchase of the selected loader and oversee the deployment of the unit into operations.

3.8 Board Strategic Plan/Priorities Considerations:

The purchase of a new loader aligns with the RDCK Strategic Plan focuses on developing more cost effective and practical approach to asset management.

SECTION 4: OPTIONS & PROS / CONS

Option 1: That the Board authorize staff to purchase a Case 621G XT from Inland Truck and Equipment up to a total cost of $303,010 (excluding taxes).

Pros:

- The purchase price is within the budget of $325,000.
- The Case loader scored 80.56 points which is the highest of all loaders on the evaluation scale.
- The unit comes with one of the best overall warranties (3 year 3000 hour). Only Case and Hyundai included a 3000 hour warranty. All other suppliers provided only one year.
- Included in the purchase price is a comprehensive scheduled 2000 hour Maintenance Service Plan which includes all labour and material (not including travel). The estimated value of this plan is $20,000. The benefit of this plan is not incorporated into the technical score of the evaluation. The overall score of the Case would increase to 82.42 if the value of the plan is deducted from the purchase price.
- Repair costs and potential down time over the anticipated life cycle for the Case loader will be lower than the next highest rated loader (Hyundai) due to the location of the dealership and service technician in Castlegar. This difference is included in the value adds section of the technical evaluation.

Cons:

- The purchase price is $37,220 (excluding taxes and environmental fees) higher the next highest rated loader (Hyundai).

Option 2: That the Board authorize staff to purchase a Hyundai HL940A loader from Woodland Equipment Inc. up to a total cost of $265,790 (excluding taxes).

Pros:

- The purchase price is within the budget of $325,000.
- The Hyundai loader scored very high on the evaluation scale. (80.55 points),
- The purchase price is $37,220 (excluding taxes and environmental fees) lower than the highest rated loader (Case loader).
- The unit comes with one of the best overall warranties (3 year 3000 hour).

Cons:

- The submission for the Hyundai was 0.01 points below the Case.
- Repair costs and potential down time over the anticipated life cycle for the Hyundai loader will be higher due to the location of the dealership and service technician in Kamloops.
- A 2000 hour comprehensive Maintenance Service Plan matching that of the Case for this loader is an additional $22,612.

SECTION 5: RECOMMENDATIONS

That the Board authorize staff to purchase a Case 621G XT loader from Inland Truck and Equipment up to a total cost of $303,010 (excluding taxes);

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S187 Central Waste.

Respectfully submitted,

Larry Brown
Resource Recovery, Operations Supervisor

CONCURRENCE

Resource Recovery Manager – Amy Wilson

ATTACHMENTS:
Attachment A – Evaluation Matrix

Committee Report

Date of Report:	December 3, 2024
Date & Type of Meeting:	December 11, 2024 Joint Resource Recovery Meeting
Author:	Amy Wilson, Resource Recovery Manager
Subject:	S187 CENTRAL WASTE / A120 FINANCIAL PLAN AMENDMENT – 2023 INTERNAL TRANSFER
File:	05-1700-30-ENV ENVIRONMENTAL SERVICES-RR BUDGET 2024
Electoral Area/Municipality	West Sub-Region

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to request an amendment of the 2024 Financial Plan to account for an error in the 2023 internal transfers from Service S187 Central Waste to Service A120 Central-West Compost.

SECTION 2: BACKGROUND/ANALYSIS

The 2023 Financial Plan for S187 Central Waste and A120 Central-West Compost services included a transfer from S187 to A120 for a total of $286,863 to support the Central Compost Facility.

It was determined at year end that the 2023 internal transfer request was missing $257,493 from the line item associated with tax-based subsidy coming from S187 to A120. Only a transfer of $29,369 representing the transfer of projected tipping fees was transferred from S187 to A120 in 2023. Reporting of year end balances from 2023 was delayed into late 2024 due to new accounting standards and asset retirement obligations. The $257,493 portion of the total transfer amount wasn't detected by staff until budget preparation began in late 2024.

Staff recommend a 2024 financial plan amendment to allocate funds from S187 Central Waste to A120 Central-West Compost services to correct the missed 2023 transfer value of $257,493.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒ Yes	☐ No	**Financial Plan Amendment:**	☒ Yes	☐ No
Debt Bylaw Required:	☐ Yes	☒ No	**Public/Gov't Approvals Required:**	☐ Yes	☒ No

As noted above the missing value of $257,493 was included in the 2023 Financial Plan for S187 Central Waste and A120 Central-West Compost services. When the funds were not transferred this resulted in an unaccounted surplus in S187 Central Waste and a deficit in A120 Central-West Compost services in 2024. The funds associated with the prior year surplus/deficit in the services will offset the funds transfer in 2024.

This 2024 transfer correction is noted in the Draft 2025 Financial Plan for both S187 and A120 so that the services are adjusted accordingly.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

None at this time.

3.3 Environmental Considerations

None at this time.

3.4 Social Considerations:
None at this time.

3.5 Economic Considerations:
None at this time.

3.6 Communication Considerations:
None at this time.

3.7 Staffing/Departmental Workplace Considerations:
None at this time.

3.8 Board Strategic Plan/Priorities Considerations:
None at this time.

SECTION 4: OPTIONS & PROS / CONS
N/A

SECTION 5: RECOMMENDATIONS
That the Board approve an amendment to the 2024 Financial Plan for S187 Central Waste to increase the Transfer to Other Services Account 59500 by $257,493 and increase the Transfer from Other Services Account 45500 by $257,493 for the 2023 transfer for support of the Central Compost Facility.

Respectfully submitted,

Amy Wilson – Resource Recovery Manager

CONCURRENCE
Finance Manager – Heather Smith
General Manager of Environmental Services – Uli Wolf
Chief Administrative Officer – Stuart Horn

ATTACHMENTS:
Attachment A – Excerpt from the 2023 S187 Financial Plan showing the intended 2023 transfer
Attachment B – Excerpt from the 2023 A120 Financial Plan showing the intended 2023 transfer

ATTACHMENT A

S187 - Central Resource Recovery - 5 year Financial Plan (2023-2027)

	Account	Account(T)	Work Order	Work Order(T)	2023 Budget	2024 Budget	2025 Budget	2026 Budget	2027 Budget	2023 Notes
113	**53040**	**Advertising**			**6,000**	**6,000**	**6,000**	**6,000**	**6,000**	
135	**53050**	**Insurance**			**27,380**	**28,749**	**30,187**	**31,696**	**33,281**	
141	**53080**	**Licence & Permits**			**9,950**	**19,954**	**9,958**	**19,962**	**9,966**	
143	**54010**	**Legal**			**60,000**	**0**	**0**	**0**	**0**	
148	**54020**	**Professional Fees**			**214,817**	**201,281**	**73,281**	**77,378**	**77,378**	
174	**54030**	**Contracted Services**			**613,956**	**604,571**	**641,866**	**645,294**	**693,312**	
204	**55010**	**Repairs & Maintenance**			**171,346**	**142,278**	**142,942**	**143,639**	**144,371**	
215	**55020**	**Operating Supplies**			**19,650**	**14,650**	**14,650**	**14,650**	**14,650**	
220	**55030**	**Equipment**			**39,450**	**1,000**	**1,000**	**1,000**	**1,000**	
227	**55040**	**Utilities**			**10,815**	**11,304**	**11,530**	**11,760**	**11,995**	
233	**55050**	**Vehicles**			**170,368**	**202,376**	**220,337**	**239,764**	**261,049**	
237	**55900**	**Provisions**			**0**	**0**	**0**	**0**	**0**	
240	**56110**	**Short-Term Financing Interest**			**5,312**	**60,343**	**47,418**	**34,492**	**21,566**	
243	**56010**	**Debenture Interest**			**296,942**	**296,942**	**311,882**	**311,882**	**311,882**	
246	**56120**	**Short-Term Financing Principal**			**0**	**286,600**	**286,600**	**286,600**	**286,600**	
249	**56020**	**Debenture Principal**			**341,766**	**341,766**	**371,009**	**371,009**	**371,009**	
254	**56610**	**Equipment Financing Interest**			**18,574**	**31,899**	**21,860**	**12,384**	**5,245**	
259	**56620**	**Equipment Financing Principal**			**125,125**	**248,452**	**271,275**	**213,606**	**103,628**	
262	**59000**	**Contribution to Reserve**			**461,250**	**95,264**	**302,394**	**536,605**	**787,328**	
263	59500	Transfer to Other Service	OVR153-100	Central RR Subregion Administration	1,000	2,000	0	0	0	A112 PM fees - all combined see notes
264	59500	Transfer to Other Service	OVR153-100	Central RR Subregion Administration	255,015	260,115	265,318	270,624	276,036	A102 Resource Recovery Placeholder: 70% (20% to A118 recycling allocation service and 10% to A120 C-W Compost allocation service)
265	59500	Transfer to Other Service	OVR153-303	Contribution to West	190,914	171,823	154,640	156,187	157,749	Placeholder, cont to West for OOT landfill, (reduction of 10% in 2024&25 for reduction from compost)
266	59500	Transfer to Other Service	OVR153-100	Central RR Subregion Administration	257,493	161,289	160,717	168,700	160,549	Placeholder - transfer to A120 compost allocation service A120 (subsidization)
267	59500	Transfer to Other Service	OVR153-100	Central RR Subregion Administration	29,369	58,739	64,612	67,843	68,522	Placeholder; GRO organics Tipping fees - Transfer to A120 Compost Allocation Service for CEN compost facility
268	59500	Transfer to Other Service	OVR153-100	Central RR Subregion Administration	696,216	920,212	941,919	879,008	906,705	Transfer to Central Recycling Allocation Service A117
269	**59500**	**Transfer to Other Service**			**1,430,007**	**1,574,178**	**1,587,206**	**1,542,362**	**1,569,561**	
271	**59510**	**Transfer to Other Service - General Admin. Fee**			**162,618**	**184,878**	**188,576**	**192,347**	**196,194**	

ATTACHMENT B

A120 - Central/West Compost - 5 year Financial Plan (2023-2027)

	Account	Account(T)	Work Order	Work Order(T)	2023 Budget	2024 Budget	2025 Budget	2026 Budget	2027 Budget	2023 Notes
2	42020	Sale of Services			(60,000.00)	(132,000.00)	(133,320.00)	(134,653.20)	(135,999.73)	
4	42030	User Fees			(2,500.00)	(10,000.00)	(10,000.00)	(10,000.00)	(9,999.00)	
6	43025	Grants - Specified			(1,452,632.00)	0.00	0.00	0.00	0.00	
8	43100	Proceeds from Borrowing			(276,065.09)	0.00	0.00	0.00	0.00	
10	43200	Proceeds from Equipment Financing			0.00	0.00	0.00	0.00	0.00	
12	45000	Transfer from Reserves			0.00	0.00	0.00	0.00	0.00	
13	45500	Transfer from Other Service	OVR153-100	Central RR Subregion Administration	(29,369.31)	(58,738.62)	(64,612.48)	(67,843.10)	(68,521.53)	Transfer from S187 - in lieu of tipping fees @ $80/T
14	45500	Transfer from Other Service	OVR153-100	Central RR Subregion Administration	(257,493.25)	(161,289.09)	(160,716.76)	(168,700.01)	(160,549.31)	Placeholder Transfer from S187 - organics (subidization)
15	45500	Transfer from Other Service	OVR154-100	West RR Subregion Administration	(43,697.68)	(131,224.27)	(132,536.51)	(133,861.88)	(135,200.50)	Transfer from S188 - in lieu of tipping fees @$80/T
16	45500	Transfer from Other Service	OVR154-100	West RR Subregion Administration	(257,493.25)	(161,289.09)	(160,716.76)	(168,700.01)	(160,549.31)	Placeholder Transfer from S188 - organics (subidization)
17	45500	Transfer from Other Service			(588,053.50)	(512,541.07)	(518,582.50)	(539,105.00)	(524,820.65)	
19	49100	Prior Year Surplus			867,000.00	0.00	0.00	0.00	0.00	
20	TOTAL REVENUE				(1,512,250.59)	(654,541.07)	(661,902.50)	(683,758.20)	(670,819.38)	
21	TIPPING FEES				(574,986.50)	(454,578.19)	(454,753.51)	(472,053.22)	(457,098.35)	
22	CAP FUNDING SUBTOTAL				(1,728,697.09)	0.00	0.00	0.00	0.00	
25	51010	Salaries			49,364.51	66,609.18	67,408.49	68,217.39	69,036.00	
27	51020	Overtime			1,000.00	500.00	500.00	500.00	500.00	
29	51030	Benefits			14,315.71	19,316.66	19,548.46	19,783.04	20,020.44	
31	51050	Employee Health & Safety			1,150.00	1,150.00	1,150.00	1,150.00	1,150.00	
33	51500	Directors - Allowance & Stipend			5,740.56	5,855.37	5,972.48	6,091.93	6,213.77	
35	51560	Directors - Travel			500.00	525.00	551.25	578.81	607.75	
37	52010	Travel			750.00	500.00	500.00	500.00	500.00	
39	52020	Education & Training			2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	
41	52030	Memberships, Dues &			0.00	0.00	0.00	0.00	0.00	
43	53020	Admin, Office Supplies & Postage			300.00	300.00	300.00	300.00	300.00	
45	53030	Communication			1,870.00	811.50	994.58	1,044.31	1,096.52	
47	53040	Advertising			3,500.00	3,500.00	2,000.00	2,000.00	2,000.00	
49	53050	Insurance			2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	
51	53080	Licence & Permits			200.00	204.00	208.08	212.24	216.49	
53	54020	Professional Fees			8,731.50	0.00	0.00	0.00	0.00	
56	54030	Contracted Services			50,000.00	85,000.00	81,600.00	83,232.00	84,896.64	
59	55010	Repairs & Maintenance			8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	
61	55020	Operating Supplies			1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	
63	55030	Equipment			1,000.00	1,000.00	1,000.00	2,500.00	2,500.00	
65	55040	Utilities			28,527.50	49,411.00	50,399.22	51,407.20	52,435.35	
67	55050	Vehicles			31,384.50	62,769.00	69,045.90	75,950.49	83,545.54	
69	55060	Rentals			0.00	30,000.00	31,500.00	33,075.00	34,728.75	
71	56110	Short-Term Financing Interest			7,122.43	7,122.43	7,122.43	7,122.43	7,122.43	
73	56120	Short-Term Financing Principal			152,653.47	152,653.47	152,653.47	152,653.47	152,653.47	
76	56610	Equipment Financing Interest			3,222.85	2,244.37	1,246.12	257.99	0.00	
79	56620	Equipment Financing Principal			39,328.55	40,307.03	41,305.28	28,107.03	0.00	
81	59000	Contribution to Reserve			5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	
85	59500	Transfer to Other Service			87,546.00	79,606.92	81,199.06	82,823.04	84,479.50	
87	59510	Transfer to Other Service - General Admin. Fee			15,322.00	3,178.00	3,241.00	3,306.00	3,372.00	
89	59520	Transfer to Other Service - IT Fee			5,516.00	5,626.32	5,738.85	5,853.62	5,970.70	
91	59550	Transfer to Other Service - Environmental Services Fee			17,991.00	18,350.82	18,717.84	19,092.19	19,474.04	
96	60000	Capital Expenditures			967,214.00	0.00	0.00	20,000.00	20,000.00	
97	TOTAL EXPENSES				1,512,250.58	654,541.07	661,902.50	683,758.20	670,819.38	