



# Waste as a Resource Action Plan

January 2023



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# Purpose

This Action Plan includes background information describing Our Food Future and the Circular Opportunity Innovation Launchpad's (COIL) involvement in waste reduction initiatives to date and identifies strategic priorities moving forward. The development of the Action Plan was informed by past research and consultations with key partners. This document is intended to:

- Guide the remaining work and resources of Our Food Future related to the Waste as a Resource Workstream
- Guide the continued collaborative efforts of the City, County, and community partners related to the Waste as a Resource Workstream into the future
- Help coordinate priorities and resources to address regional climate change goals
- Be a legacy of Our Food Future and the Waste as a Resource Workstream and align where appropriate with City and County long-term strategies and Master Plans moving forward

This aspirational Action Plan, in combination with the work of the Nutritious Food and Business Workstreams, **will create a shared vision for the next three years to guide the further development of a circular food system that respects planetary boundaries by recognizing the impact of wasted resources, and continue the work of Our Food Future into the future.**

# Background

## Our Food Future's Shared Vision

Our Food Future is [creating a circular food economy in Guelph-Wellington](#) that:

- Values, shares, and celebrates a diversity of affordable, nutritious, and culturally relevant foods that support a healthy, resilient community
- Inspires and creates a thriving, circular, and regenerative economy
- Respects planetary boundaries by recognizing the impact of wasted resources and the value of what's being thrown away
- Enables the systems change required for a circular regional economy, beginning with the food system, through collective knowledge, governance, and action

Funding was awarded through Infrastructure Canada's Smart Cities Challenge around three goals:

1. Affordable, Nutritious Foods
2. Circular Businesses and Collaborations
3. Waste as a Resource

As the project evolved, a fourth goal of Systems Change was included to recognize the broader data, technology, infrastructure and behaviour change elements that are required to support the original three goals.

# Waste as a Resource Workstream's Goal

The Waste as a Resource Workstream is made up of participants from the Smart Cities Office, the City and County Environmental Services Departments, and community partners and collaborators involved with waste reduction and circularity in the region. These partners work collaboratively towards achieving a 50% increase in circular economic revenues by unlocking the value of waste.

The objectives of the Waste as a Resource Workstream are:

- Ensure that communities understand the true cost of food waste
- Develop new collaborations to foster environmental and economic benefits across the supply chain
- Support innovative business models to reduce waste
- Conduct research, demonstration projects, and generate data to drive change

## Key Concepts

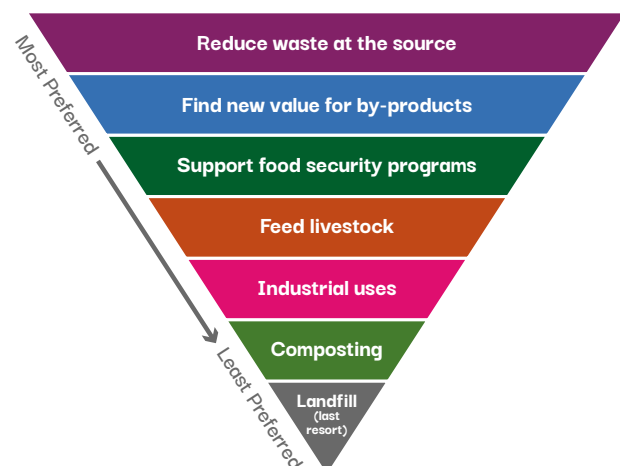
Waste in the food system can be categorized into food loss and food waste:

- Food loss occurs from post-harvest up to – but not including – the retail level
- Food waste occurs at the retail, food service and consumer levels<sup>1</sup>

There can be various opportunities for waste to be avoided (ie. reduce waste at the source), upcycled (find new value for by-products) or diverted (disposed of in a way that allows for nutrient and/or energy recovery, such as composting and anaerobic digestion) from landfill<sup>2</sup>.

The concept of the waste hierarchy is important to guide this Workstream, where reducing waste is the most desirable option, followed by opportunities for recovery and recycling. Disposal to landfill is the least desirable option, as shown in the diagram below. Appropriate management and end-of-life disposal of food waste is also an important part of the circular food system, as it offers significant opportunities for nutrient and energy recovery<sup>2</sup>.

## Food Recovery Hierarchy



# Alignment with International and Regional Frameworks

The Waste as a Resource Workstream is aligned with various frameworks that address food waste or the impacts of food waste:

## United Nations Sustainable Development Goals (SDGs)

In 2015, all UN member states adopted 17 [Sustainable Development Goals](#) (SDGs) as a universal call to action to end poverty, protect the planet, and improve the lives of everyone, everywhere. Sustainable development blends and balances social inclusion (people), environmental protection (planet), and economic growth (prosperity), meeting the needs of the present without compromising the ability of future generations to thrive.

Some of the goals have obvious links to food systems, such as zero hunger or good health and well-being. However, each SDG connects to food in one way or another. For example, reducing inequalities includes improving access to affordable nutrition. Climate action includes reducing carbon emissions from agricultural sectors, and quality education can't happen without well-fed students.

Specifically, **SDG 12 – Responsible Production and Consumption Patterns** addresses food waste. Target 12.3 aims to halve per capita global food waste at the retail and consumer level and reduce food losses along production and supply chains, including post-harvest losses, by 2030.



**SUSTAINABLE DEVELOPMENT GOALS**



## Climate Targets

The City of Guelph and the County of Wellington have climate targets to drastically reduce regional emissions. Building a circular economy takes regional collaboration and meeting ambitious climate reduction targets will require cooperation. The City of Guelph's climate targets have been articulated through becoming a signatory to the Race to Zero, a United Nations campaign that aims to engage cities, businesses, universities, and other institutions to commit to carbon emissions reductions. The Race to Zero aims to halve global emissions by 2030 and achieve net zero emissions by 2050. Signatories of the Race to Zero agree to develop and submit a plan on how the targets will be achieved and publish annual progress reports.

The City of Guelph signed on to the Race to Zero in 2021, setting targets to reduce GHG emissions by 63% against the 2018 baseline by 2030, and becoming a fully net zero carbon community by 2050.

The County of Wellington, while not a signatory of Race to Zero, has also developed a [Climate Change Mitigation Plan](#) that will see the county reduce emissions by 80% by 2050.

## Milan Urban Food Policy Pact



The Milan Urban Food Policy Pact is an international agreement of more than 250 Mayors. It is a concrete working tool for cities that includes 37 recommended actions to develop a sustainable, healthy food system clustered in six categories. For each recommended action, there are specific indicators to monitor progress in implementing the Pact. Pact category 6 focuses on Food Waste, with four recommended actions to reduce food loss and waste.

In 2022, the City of Guelph, as a signatory of the Pact, received special recognition for Our Food Future's Institutional, Commercial, and Industrial (IC&I) Food Waste pilot developed in collaboration with Circular Innovation Council. This practice will now be listed along with dozens of other identified best practices from around the world to drive food sector systems change.

## Provincial and Federal – Plans, Policy, & Strategies

The circular economy has been identified as a primary strategy in Canada's Climate Action Plan, which sets bold targets to reduce emissions by 40% by 2030 and achieve net zero emissions by 2050. The plan highlights that the path to a resilient future requires the adoption of clean technologies and resource efficient approaches that underpin a circular economy.

In late 2016, Ontario proclaimed the Waste Free Ontario Act, which consists of the Resource Recovery and Circular Economy Act and the Waste Diversion Transition Act. This legislation accelerates the transition to a circular economy by increasing resource recovery, through extended producer responsibility. The strategy, developed along with the Act, lays out Ontario's vision for a circular economy and goals of a zero waste Ontario with zero greenhouse gas emissions from the waste sector.

In 2018, Ontario released the Food and Organic Waste Framework, which includes both an Action Plan and Policy Statement to support movement towards zero waste. The framework emphasizes the various areas of focus for reduction of food and organic waste going to landfill in the effort to achieve net zero. These areas include education of consumers, food waste prevention, food waste diversion in the IC&I sector, data generation and collection, as well as policy levers such as amending existing regulations and the implementation of food and organic waste landfill bans.

# Grounded in Research & Innovation

## 1. Food and Food Waste Flow Study

In 2020–2021 Guelph–Wellington worked with Dillon Consulting and Metabolic to conduct a Material Flow Analysis (MFA) to assess the status of organic “waste” flows in the region. The Food and Food Waste Flow Study analyzed more than 70 comprehensive data sets to create a high-level understanding of the current picture of food flows within the region. This data serves as a baseline for prioritizing opportunities for interventions to redirect and revalorize waste and alleviate hotspots.

The data from the MFA is presented in a Sankey diagram, which gives a visual depiction of the quantities of commodities and the waste that occurs at each stage of the value chain (processing, production, distribution, retail, consumption, and end-of-life). Various opportunities that can be identified for the different commodities by assessing the pathway and where product loss occurs. Major findings of the MFA are:

- Storage and processing are large contributors to food waste across all the commodities, but particularly for fruits and cereals
- Significant amounts of food waste are the result of planned/unplanned losses during manufacturing processes. Typically, these losses will be single streams, which create strong opportunities for upcycling to other economic uses
- Two thirds of household food waste is avoidable, although approximately 60% is diverted from landfill
- Hotels, restaurants and institutions, and the business sector in general, does not separate their food waste, so it is being landfilled

Following identification of the food and food waste flows in the region and development of the Sankey Diagram, we secured funding from Federation of Canadian Municipalities to undertake additional work, building on the key opportunities for intervention (hotspots) identified in the MFA. We also developed a process to identify tangible business cases for intervention. The key opportunities identified were improving IC&I sector organic waste collection and redirection, improving existing food recovery platforms, and exploring the use of anaerobic digestion for food waste management. We are working to secure funding to implement pilot projects in each of these intervention areas.

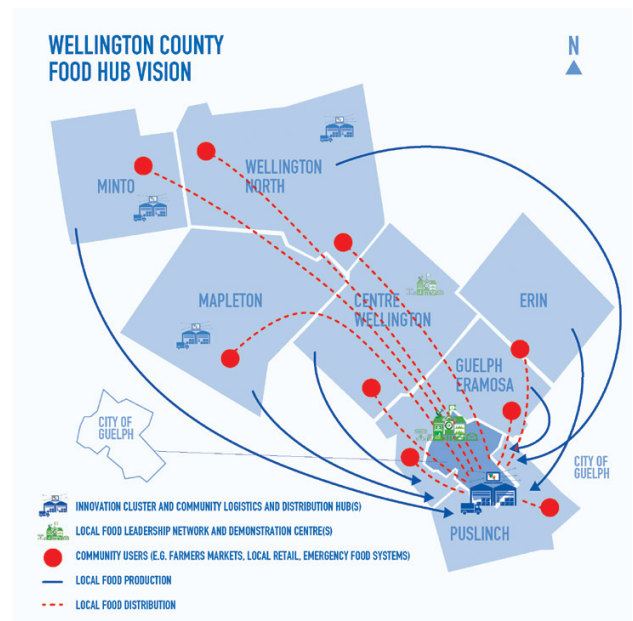
## 2. Food Hub Study

While Guelph–Wellington is a hub for food production and innovation that feeds into global export markets, smaller scale food production and manufacturing operations targeting the local market still represent a niche and costly alternative. The COVID-19 pandemic and subsequent supply chain instability highlights the need for robust local food infrastructure to feed the whole community, not just a higher end offering for premium products.

In collaboration with Next Generation Manufacturing Canada (NGEN), Our Food Future worked with consultants (Keegan & Associates, Pollinate) to assess existing food system assets and identify opportunities to better connect the supply chain, leveraging technologies and potential new physical infrastructure to facilitate the development of a robust local food system. Through a series of consultations with stakeholders in the food ecosystem in Guelph–Wellington, food hub ecosystem

mapping, and research into food hub infrastructure in other jurisdictions, the study proposed the development of a new Guelph–Wellington food hub to fill gaps and strengthen the local food ecosystem. Specifically, the study proposed the development of at least two core physical locations:

1. The Guelph–Wellington Innovation Cluster & Local Food Distribution Hub – an aggregation and logistics terminal for incoming food and food products. The Hub would leverage technology to drive more efficient food distribution to community, institutional, and commercial users, increasing access to local foods for the whole community. The proposed physical space would offer the facilities, resources and expertise for food rescue, upcycling, research and development and other waste reduction and management initiatives.
2. The Guelph–Wellington Local Food Leadership Network & Demonstration Centre – a physical space for addressing local food community needs through collaboration, wayfinding, data management and activation and education.



### 3. Business Optimization - R-Purpose Programs

We have worked with Anthesis Provision, an Our Food Future collaborator, to deliver several programs under the R-Purpose (Resiliency through Purpose) banner. The R-Purpose programs directly guide businesses through development of a circular business strategy, delivering cost and resource savings, and improved company culture.

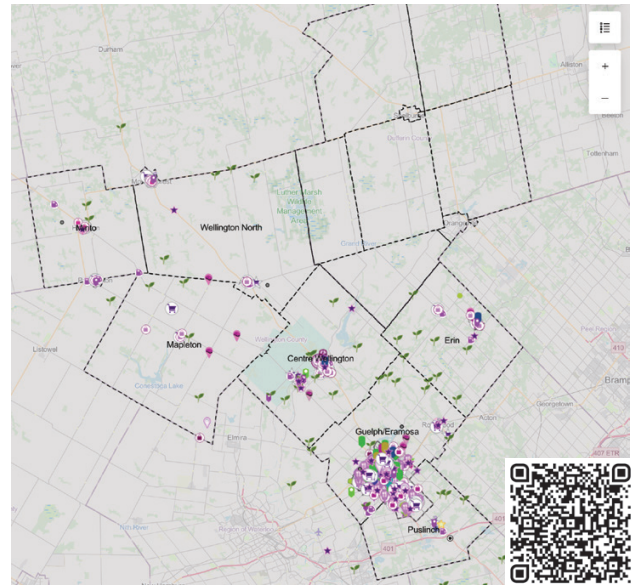
R-Purpose MICRO, also from Anthesis Provision, developed and delivered this training program for small businesses to incorporate circular economy principles and practices, thereby making their businesses more sustainable. More than 50 companies graduated from the program, expanding their skills and expertise in circularity and sustainability, creating valuable collaborative networks, and implementing their own circularity plans.

R-Purpose Food Loss and Waste Prevention, also delivered by Anthesis Provision, worked with eight local food or beverage manufacturing/processing companies over an 18-month period to reduce food loss and waste. Companies had access to tools and a team of experts to help build and integrate circularity into operations, products, and services. Outcomes focused on creating a circular business strategy, promoting a regenerative culture, preventing food waste in operations, and repurposing unavoidable waste.



## 4. Data Hub & Mapping

The Food Future Data Hub contains more than 60 datasets related to Guelph-Wellington's local food system, and dozens of applications including maps and data stories with insights on food access, food production and the food-related services provided by the municipality, as well as food waste. The Data hub also includes interactive maps that allow you to navigate interactive datasets. The maps follow the waste hierarchy of prevention, redistribution, energy, recover nutrients, and disposal. Specific maps determine sources of food waste (e.g., grocery stores, schools, etc.), sources to recover food waste (e.g., foodbanks), and sources to lack of food access, and food security.



Guelph-Wellington [Food Assets Map](#): Grocery/Retail, Eatery Places. Scan QR code to view.

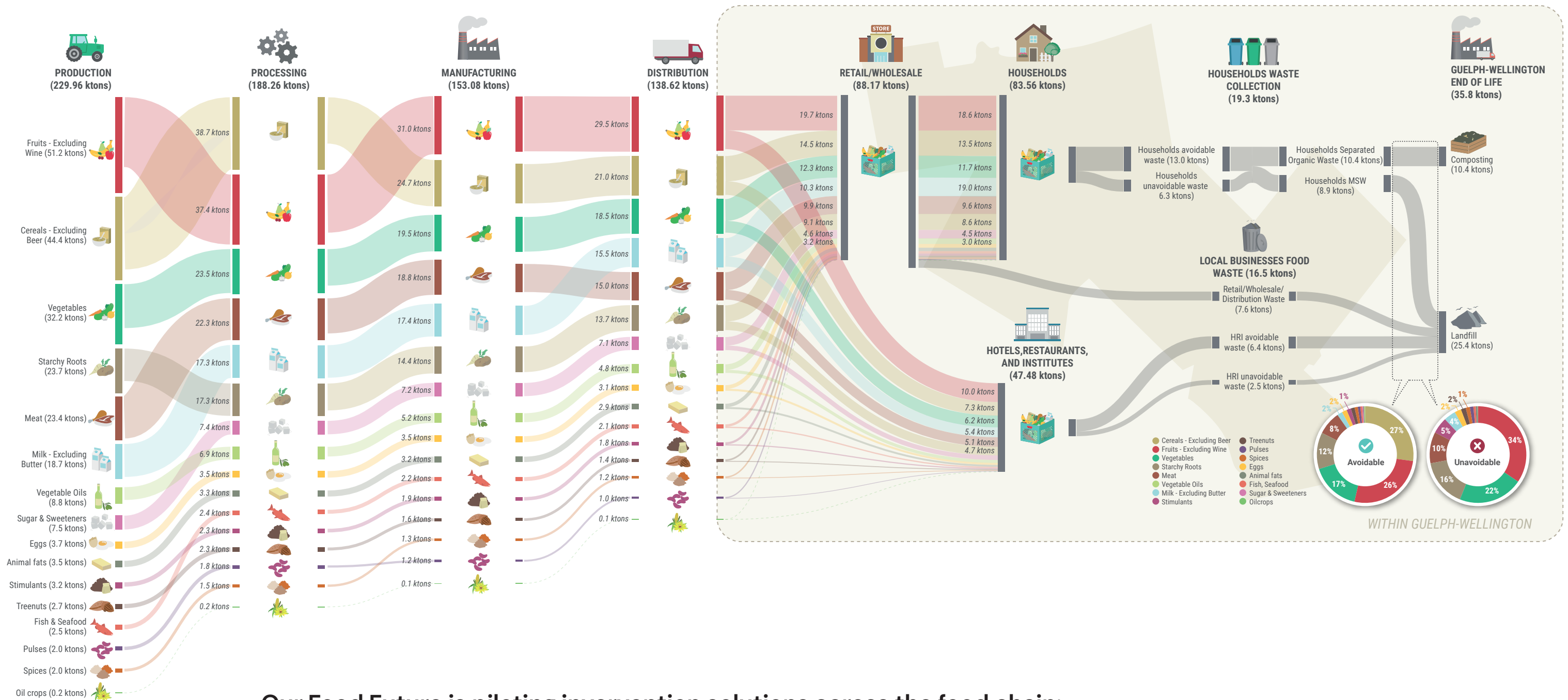
## 5. Curbside Audits

The City of Guelph conducts yearly curbside inspections, where assessments of sorting are made by seasonal staff during spring and summer months. A comprehensive 3-bin, 4-season audit was conducted between 2021-2022 by AET Consultants, including both detached and multi-residential dwellings. This comprehensive data set provides insight into food waste behaviours at the household level and helps to inform not only food waste diversion behaviours, but also opportunities for interventions by revealing the proportion of food waste that is avoidable.

Wellington County typically completes yearly curbside audits. As the municipal green bin collection program is new for the County, previous audits only assessed garbage and recycling streams, however in 2020-2021, a food waste audit was completed. This food waste audit was used to evaluate the efficacy of a food waste intervention project initiated as part of a master's research project at the University of Guelph. The intervention targeted 75 households, providing them with information and tools to help them reduce food waste. Researchers also launched a survey to evaluate residents' perceptions of their food waste habits and the intervention.

# Connecting the Dots

Our Food Future's Food and Food Waste Flow Study (2021) was a sweeping analysis of waste across the food system. It identified hotspots to focus interventions to reduce or divert waste. The chart along the bottom highlights some of the programs we've introduced to begin to address these losses – including developing valuable insight or replicable solutions that are already proving scalable in communities outside Guelph-Wellington.



## Our Food Future is piloting intervention solutions across the food chain:



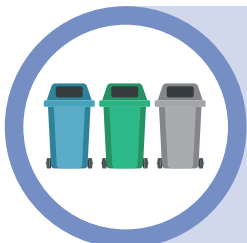
- On Farm:**
- Regenerative Agriculture Pilot
  - Precision Agriculture
  - Broadband Strategy



- Processing:**
- Food Hub Strategy
  - R-Purpose Program
  - IC&I Waste Diversion Pilot



- In Community:**
- Zero Waste Economic Transformation Lab
  - Behavioural Insights
  - Reimagine Food



- Tracking Waste:**
- Residential Waste AI Analysis
  - County Green Bins
  - Data Hub

# Our Approach

The Waste as a Resource Workstream is led collaboratively by the Our Food Future Office and the City of Guelph and County of Wellington Solid Waste departments, and includes other representatives from municipal government, academic researchers, NGOs, consultants, and business partners to guide decision-making and carry out strategic priorities of the workstream. These partnerships in development and delivery of the Action Plan increase accountability to the community and are leveraged to ensure various perspectives are included to guide the work.

## Solid Waste Management Master Plans and Strategies

The City of Guelph and County of Wellington's Solid Waste programs are guided by their long-term strategies and Master Plans. City Council approved Guelph's updated Solid Waste Management Master Plan in 2022, which will guide the City in its waste management goals and objectives for 25 years. The process of developing it included assessing the current state of solid waste management in Guelph, analyzing strategies for single-use plastics, developing projections for future state and growth, and analyzing the IC&I sectors. The plan recommends a strong focus on the advancement of a local circular economy (9.3.1), such as attracting circular economy businesses, exploring waste exchange opportunities and the development of the Zero Waste Economy Transformation Lab at the Circular Opportunity Innovation Launchpad (COIL).

In addition, the plan includes several recommendations (9.3.2) for increased promotion and education to help achieve waste reduction and diversion goals. Foundational research has been conducted by various collaborators to better understand the best methods for implementation of the strategic priority actions. To date, we have surveyed residents, researched behaviour change, and identified collaborations.

Wellington County's Solid Waste Services Strategy summary report was released in 2021. Food waste management is one of the key topic areas of the strategy, and resolutions are highlighted that address increased education and outreach, partnerships with the IC&I Sector, encouraging home composting, and exploring other partnerships to reduce food waste in the County.

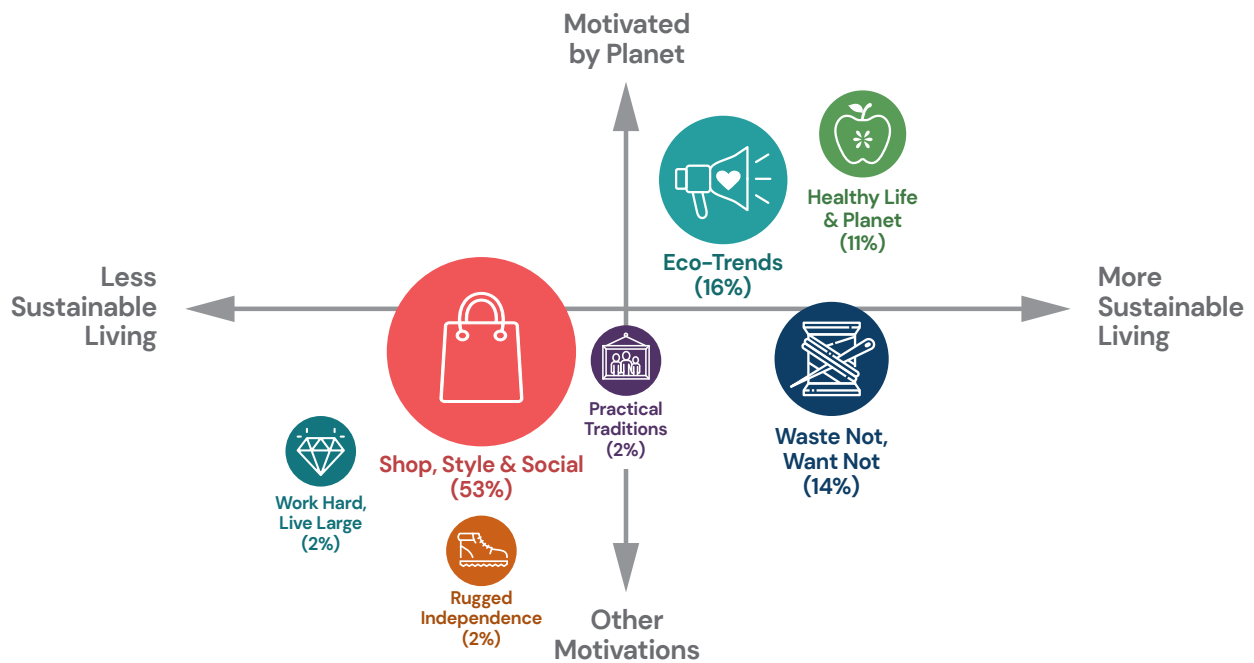
## Behavioural Insights Approaches

Building a future food system also requires solving inherently behavioural challenges, for example — shifting individual and household waste norms and habits, working with communities to adopt new waste infrastructure investments, and setting new norms around treating waste as a resource. The City is planning to design and field test behavioural science solution(s) to reduce residential waste. This applied behavioural science approach offers a practical way to identify the behaviours required to achieve a certain goal, understanding what is limiting these behaviours, and developing scalable solutions through design workshops and the implementation of pilot projects.

# Motivations Survey and Research

In 2022, Our Food Future contracted OneEarth Consulting to conduct a survey to understand the diverse motivations that lead people in Guelph-Wellington to engage in climate- and planet-friendly behaviours. These behaviours include supporting circular products and services, actively reducing food waste, and other sustainable actions.

Through a quantitative survey and qualitative in-depth interviews, we identified 4 main Motivations for lighter living actions in Guelph-Wellington: Shop, Style & Social (53%), Eco-Trends (16%), Waste Not, Want Not (14%), and Healthy Life & Planet (11%). By understanding peoples' motivations for lighter living, we can better target communications to drive behavioural change.



## Translating Our Food Future Approach to other Environmental Sectors (Construction & Demolition)

We have applied our learnings from our work in food waste to other environmental sectors. Through our business incubator, COIL, with funding from Cooperators, we developed the Zero Waste Economic Transformation Lab (ZWETL), which is currently focused on developing zero waste solutions for the Construction and Demolition (C&D) sector. Development of the ZWETL was a recommendation identified in the City of Guelph's Solid Waste Management Master Plan.



**Zero Waste**  
Economic Transformation Lab



# Success Stories

## AI Data Collection & Analysis



How much avoidable food waste and non-organic material are Guelph residents tossing in their green carts? In October 2020, the City of Guelph launched a Residential Waste Data Challenge to find out. Eagle Vision Systems responded.

The Kitchener company had worked with the City in the past to automate other aspects of waste collection by developing CartSeeker, an automated arm operation. Leveraging similar technology, this time they set out to develop a first-of-its-kind system to analyze organic waste in real time as each household green cart is emptied into the collection vehicle.

Working with researchers at the University of Guelph's Intelligent Control and Estimation (ICE) Lab, Eagle Vision developed a video system that records material going into the trucks. From there, Artificial Intelligence (AI) algorithms were used to detect five target items: compostable bags, non-compostable bags, yard waste, recyclables, and avoidable food waste. Two summer students reviewed thousands of video stills to train the AI to identify target items. By the end of the pilot project, the technology could identify these items with 90 percent accuracy.

This high-tech initiative provides a lot more knowledge about exactly what is being thrown away and in which neighbourhoods, without the need for manual waste audits.

In Phase 2 of the Residential AI Challenge, we plan to put a camera in the hopper of two organics collection vehicles to capture images of contamination. A sensor on the collection vehicle will tie the information to a specific address through radio frequency identification (RFID) technology on the cart. This enables us to directly engage with the household where the contamination is taking place. Our goal is to raise awareness of avoidable food waste, while reducing costs of engagement.

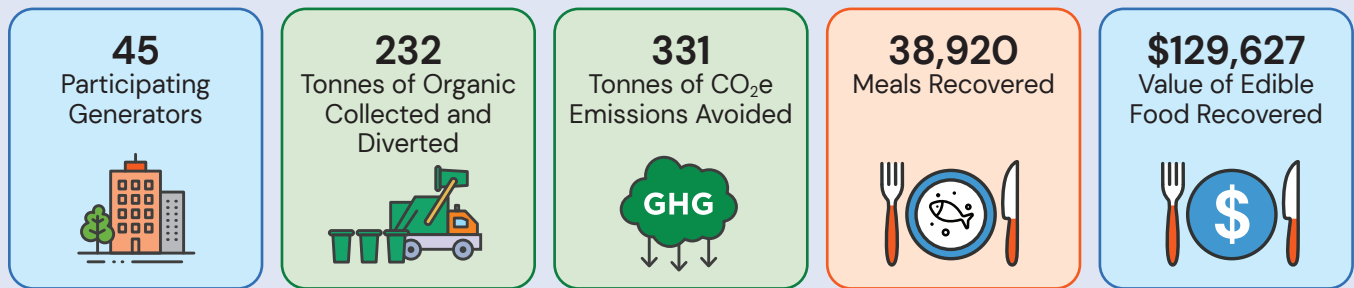
## Industrial, Commercial and Institutional (IC&I) Food Waste Collection Pilot – Milan Urban Food Policy Pact

The Circular Food Recovery and Waste Diversion Pilot, led by Circular Innovation Council in partnership with Our Food Future, has been successfully trialing an innovative model to improve management and recovery of edible food and food waste from the IC&I sector to redefine value and put circular economy concepts into action.

With seed funding from Agriculture and Agri-Food Canada and local support from County of Wellington and City of Guelph solid waste divisions, alongside Grand River Agricultural Society, Longo's, Skyline Group of Companies, University of Guelph, Walker Industries, Waste Management, Second Harvest, CleanRiver Recycling, Glad and other local non-profit partners, the pilot aims to mimic the efficient municipal model of door-to-door waste collection by regionally consolidating a collection route for all sizes and types of businesses and institutions generating food waste.

Following a unique co-operative cost-sharing financial model, the pilot aims to improve affordability of organic waste collection, reduce garbage disposal costs by removing organics, reduce greenhouse gas emissions, and connect businesses to charitable agencies that are able to redistribute 'rescued' fresh food that might otherwise be wasted.

## Results – November 2021 to December 2022



Preliminary results indicate strong staff engagement and support for the pilot, alongside minimal additional training required to successfully separate food waste. In addition, more than 80% of IC&I participants have agreed to cost share the majority of organic collections as the pilot moved from fully subsidized to partially subsidized organic waste collection.

The pilot, in partnership with the City of Guelph's Our Food Future initiative, received a special mention award from the Milan Urban Food Policy Pact in October 2022 at the policy forum in Rio de Janeiro, Brazil.

## Food Material Flow Study

Where does the greatest amount of waste happen within our region's food system? Our Food Future researchers set out to identify these waste "hotspots." The Food Material Flow Study is the first of its kind in Canada, offering valuable insights to inform circular strategies. In the first phase of this complex undertaking, researchers from Dillon Consulting, Metabolic, and the University of Guelph compiled more than 70 sets of national and local data. Next, they undertook a Material Flow Analysis of that data to understand what resources flow into the food system, where they end up and where waste occurs at each stage: growing and processing, distribution and packaging, and consumption in restaurants, institutions, and homes.

The findings — published in the June 2021 Food and Food Waste Flow report — revealed that 55 percent of all food in Guelph-Wellington is thrown away. Almost half of this could be avoided. The analysis also identified specific areas that warrant deeper investigation, such as fruit losses before manufacturing and losses of cereals at the processing stage. Although the volume of wasted meat and milk isn't as high as other food categories, it creates significant environmental impacts because of the energy required to produce these foods. Now, Our Food Future collaborators are exploring the most effective interventions to reduce these losses or find new value in the waste through living lab pilot projects.

## Wellington County Green Bin Program



When food waste ends up in landfills, it gets buried under layers of garbage that starve it of the oxygen it needs to decompose aerobically. As a result, it generates potent greenhouse gases instead of being converted into nutrient-rich compost that can fertilize land.

Until recently, the landfill was the only option for residents in Wellington County who didn't compost food waste themselves. That changed in July 2020, when the County launched its Green Bin Organics Program. Through the initiative, 34,000 green bins and kitchen catchers were distributed to households in the area. In the first year alone, the program diverted nearly 2,500 tonnes of organic material from landfill – 25 percent more than their target – and thus avoided the equivalent of 2,575 tonnes of CO<sub>2</sub> emissions. The program's second year saw a further 15 percent increase in the organic material collected.

The company contracted to collect waste for the County switched to trucks that are more eco-friendly. These new vehicles run on compressed natural gas instead of diesel, further reducing emissions.

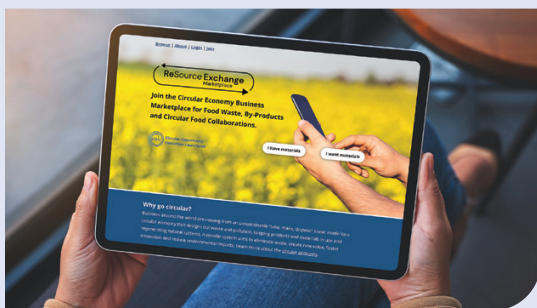
## Curb Your Carbon on CBC



The City of Guelph was featured on CBC's the Nature of Things' episode "Curb Your Carbon". The program shows simple and effective ways for people to reduce their carbon footprint. One segment takes place at Guelph's Waste Resource Innovation Centre (WRIC), showing a collections vehicle tipping household waste, and a group of "waste ninjas" sorting through it. The City's very own Division Manager of Solid Waste Resources, Cameron Walsh guides a group of "waste ninjas"

through a food waste audit to demonstrate the amount of waste generated by households. This re-enactment replicated the methods and findings of a study conducted by the University of Guelph in partnership with the City of Guelph, who collaborated with the producers in preparing the content for this episode<sup>3</sup>. The program is framed in a positive way, to demonstrate to the public the scale of food being wasted through the humour of "food ninjas" and encouraging people to think more about the cumulative impact of food waste.

## B2B Waste Reduction Initiatives – COIL, Resource Exchange & ZWETL



We've also launched the Circular Opportunity Innovation Launchpad (COIL). Founded in 2021, in collaboration with Innovation Guelph and IOG, with support from other business organizations, COIL is helping accelerate circular businesses and innovations across southern Ontario in the food and environment sectors. COIL is launching innovation challenges across supply chains and will support five industrial scale demonstration projects that inspire broader circular change. It also

established the Resource Exchange Marketplace, an online platform that helps businesses connect, buy, sell, and repurpose products/co-products or waste that they generate in their business but can't use. The Zero Waste Economic Transformation Lab will expand COIL's work beyond food, applying place-based circular economy strategies to develop and test new opportunities to reduce or redirect waste from sectors across the economy, starting with construction, renovation, and demolition materials.



# Identifying Strategic Priorities

In October 2022, key partners gathered in facilitated meetings to prioritize actions that will contribute to the goal of reducing food waste and reposition waste as a resource. Members of Our Food Future's Nutritious Foods and Business Workstreams were also in attendance. During these meetings, partners discussed opportunities with momentum and synergy that could be priorities over the next three years.

Five strategic priorities for future food waste reduction initiatives were advanced:

1. **Food and Food Waste Flow Analysis – Opportunities for Intervention** – Identifying food waste flows in the system and intervening in targeted areas to reduce waste.
2. **Behaviour Change Strategies in Household Food Waste Interventions** – Incorporating scientifically validated behaviour change strategies into waste reduction and diversion programming.
3. **Local Food and Diversion Infrastructure: Secondary Distribution Network and Hubs** – Improving food production infrastructure and integration to facilitate waste reduction and management opportunities.
4. **Leverage Data and Technology to Support Waste Interventions** – Evaluating and implementing technology innovations that allow for improved data collection about food waste.
5. **Waste to Value: IC&I Sector Innovations and Interventions** – Increasing uptake of food waste avoidance and diversion opportunities in the industrial, commercial, and institutional sectors.

The next section describes each strategic priority, providing additional context and proposed next steps for implementation. In combination, the Waste as a Resource Workstream believes these strategic priorities can contribute to substantial reduction of food waste in Guelph–Wellington and set the collective direction for collaborative workstream efforts moving forward.

# Strategic Priority #1: Food and Food Waste Flow Analysis – Opportunities for Intervention

## Background

To assess the current food and food waste flows in Guelph–Wellington, Our Food Future commissioned a Material Flow Analysis, in alignment with the City's Solid Waste Management Master Plan. Data was collected from each point along the food supply chain (production, processing, distribution, consumption, and end of life), and an understanding of the flow of consumed, lost, and wasted food products was developed. The waste flows were identified and quantified at each stage, and from this, waste hotspots were identified, where there was significant opportunity to intervene and reduce waste. This first set of data was valuable for the development of a Food and Waste Flow Analysis, depicted in a Sankey diagram, but more data is needed to refine the model, and understand changes in the material flow over time.

The second phase of this work built upon the hotspot identification, and developed a process to identify tangible business cases for areas of intervention.

## Connection to Our Food Future's Waste Initiatives:

- City of Guelph Solid Waste Management Master Plan
- City and County Solid Waste Audits
- R-Purpose Circular Mindset and Food Loss and Waste Prevention
- Geospatial Mapping – Waste, Rescue & Processing Sites
- Behavioural Insights Pilot
- COIL Co-Lab
- IC&I Pilot

## Proposed Actions

This strategic priority builds on work done to date in developing a regional Food Flow Analysis (Work Package 1 – Food & Food Waste Flow and Work Package 2). As a continuation of this work, additional actions have been identified. We are currently seeking funding to develop pilot projects in the following areas (Work Package 3):

- Sustain and expand Institutional, Commercial & Industrial (IC&I) Food and Food Waste Collection
- Enhance Existing Food and Food Waste Redirection Platforms
- Harness Energy Potential of Food Waste

To complement the above actions, we will focus on building out primary material flow data collection methodology, and a mechanism for updating the data. This will help to ensure that any changes over time are incorporated into the Food and Food Waste Flow Analysis and any impact from interventions or legislative changes can be updated in the model.

In addition, we plan to work with the National Zero Waste Council to build awareness of this regional initiative and encourage other regions to evaluate their waste flows in a similar manner.

## Outcome Statement

Increased understanding of food waste hotspots in the system, and a comprehensive strategy and resources to target interventions at those hotspots.

## Implementation

Year 1	Year 2-3
<p>Create appropriate data collection methodology in partnership with the University of Guelph</p> <p>Develop a strategy and mechanism for updates to food flow data</p> <p>Work with one Canadian municipality to replicate material flow analysis and mapping to inform a regional circular food strategy</p> <p>Revise and update ReSource Exchange Platform* to expand B2B collaborations</p> <p>Sustain and expand IC&amp;I Food Waste Collection Pilot through additional funding and seeking a delivery partner, and rural collection</p> <p>Explore food waste-to-energy technologies such as anaerobic digestion</p>	<p>Implement Work Package 3, and any additional work as identified during Work Package 3 (contingent upon funding)</p> <p>Implement data collection methodologies and evaluate effectiveness</p> <p>Support further growth of customer base for IC&amp;I organic waste collection for operations and delivery partner</p> <p>Increase awareness and participation in food rescue and redirection platforms at business and household level (contingent upon funding)</p> <p>Work with national organizations (e.g. National Zero Waste Council) to help more municipalities design regional food strategies</p> <p>Support business case and outreach to partners on potential application of anaerobic digestion (contingent upon funding)</p>

\*ReSource Exchange Platform is a business-to-business marketplace aimed at connecting food waste, by-products/co-products to new uses and opportunities.

# Strategic Priority #2: Behaviour Change Strategies in Household Food Waste Interventions

## Background

Data gathered in the [Food and Food Waste Flow](#) study showed that in Guelph–Wellington, much of the food being thrown away at the household level could have been consumed (and thus, the waste is avoidable). There is an intention–behaviour gap, where people may intend to manage food to minimize waste, however almost 50% of the total food waste generated across all parts of the food system in Canada occurs at the household level<sup>4</sup>. Behavioural science provides insight into human behaviours and how they can be shaped to achieve beneficial outcomes.

The City of Guelph recently completed a comprehensive 4–season, 3–bin curbside waste audit. The audit characterized total household waste generation and contamination across the waste streams. Overall, the results showed that a substantial quantity of food waste is not being properly sorted into the organics bin (contaminating the recycling and garbage streams), and a significant portion of food waste is avoidable. This audit provides baseline data for household food waste generation and sorting and can be used to assess the efficacy of any interventions.

In addition, we have been evaluating the use of the Artificial Intelligence technology to accurately assess curbside contamination from images taken in the hopper of the curbside collection trucks. The technology is being tested for its ability to efficiently generate food waste data and provide feedback to evaluate interventions at the household level.

## Connection to Our Food Future’s Waste Initiatives:

- City of Guelph Solid Waste Management Master Plan
- City and County Food Waste Audits
- County Curbside Green Bin Collection
- Residential Waste Data Challenge
- Circular Meal Pilot
- Reimagine Food Campaign

## Proposed Actions

The proposed action is to develop an understanding of behaviour change strategies and how they can be applied to food waste reduction and diversion programs. A pilot project will be developed to encourage household food waste reduction in the City. The pilot project will be evaluated for its efficacy in a randomized controlled trial. We will also develop a list of additional programs that could be implemented in the future based on behavioural science and explore ways to incorporate behaviour change strategies into existing programs.

# Outcome Statement

Municipal food waste programming incorporates validated behaviour change strategies to reduce household food waste and improve diversion.

## Implementation

Year 1	Year 2-3
Workshop on Behavioural Insights with City Staff	Incorporate food waste reduction into municipal educational materials
Implementation of Behavioural Insights Pilot with the City of Guelph on food waste reduction	Continuation of Reimagine Food Campaign - various events/programs
Data collection on Behavioural Insights Pilot	Evaluate existing programs for opportunities for Behavioural Insights/Motivations components
Workshop on Motivations with City Staff	Implement 1-2 additional pilot projects on Behavioural Insights/Motivations and evaluate results
Develop and communicate Imagined Futures Visualizations	Work with city/county departments to leverage Behavioural Insights/Motivations as part of broader Circular Economy strategy and operations
Implement Reimagine Food* engagement campaign	Establish city/county roundtable to meet annually to share learnings and best practices leveraging Behavioural Insights/Motivations
City Circular Economy Strategy to include Behavioural Insights/Motivations to advance sustainability objectives	Evaluation of results and framing future collaboration with other departments

\*Reimagine Food is an engagement and promotional campaign to inspire a circular food economy movement.

# Strategic Priority #3: Local Food and Diversion Infrastructure – Secondary Distribution Network and Hubs

## Background

The current food rescue and emergency food provision system (e.g., food banks, sliding scale markets, etc.) experiences periods of fluctuating supply, which makes it difficult to plan resources. Both staffing and logistics of food rescue and provision are costly and challenging. There are opportunities to explore where existing infrastructure, logistics and expertise can be used to address these issues.

This Strategic Priority is linked to Strategic Priority #2: Local Food Infrastructure, under the Nutritious Foods Workstream. Under the Waste as a Resource Workstream, there is potential to contribute to development of a Local Food Hub and expand on the work of the hub to support diversion, upcycling, processing and distribution. Developing infrastructure for food storage, processing and distribution furthers goals of community food access, while also contributing to waste diversion.

## Connection to Our Food Future’s Waste Initiatives:

- Geospatial Mapping – Waste, Rescue & Processing Sites
- Upcycle Kitchen (the SEED)
- Food Material Flow Study
- Industrial, Commercial & Institutional Food Loss Waste Pilot

## Proposed Actions

Leverage ongoing work and learnings from the Nutritious Food Workstream and Guelph–Wellington’s Food Hub Study to further understand the barriers and benefits of developing additional local food infrastructure and capacity. Build a model of a feasible and sustainable secondary distribution network and hub(s), leveraging the Food Flow Study, Processing and Business expertise, IC&I study and University of Guelph institutional case study and Solid Waste Resources’ logistics expertise. This Strategic Priority area would assist with, and build on the work of the Nutritious Food Workstream Priority #2, by supporting efforts to establish food hub(s), and incorporating elements of food recovery, upcycling and diversion.

Ensure that Guelph–Wellington’s unique strengths are utilized fully in the approach (academia, progressive, agricultural, clean tech, community minded, etc). The existing work from the Food Hub Pilot, IC&I Pilot and Food Flow analysis can be utilized to identify opportunities and barriers in this approach.

# Outcome Statement

Increased capacity and collaboration in food rescue logistics, processing and storage.

## Implementation

Year 1	Year 2-3
<p>Work with the Nutritious Foods Workstream to Identify barriers and benefits of moving food hub plans into practice</p> <p>Support the identification of local assets and market gaps</p> <p>Participate in governance development and steering committee</p> <p>Engage with key partners in development of a strategy for a food hub</p> <p>Support a needs assessment and business case development</p>	<p>Assist with development of community and business support</p> <p>Support the development of funding models</p> <p>Support the establishment of hub</p> <p>Promote and develop community awareness of the hub</p> <p>Iterate and feedback to improve</p>

# Strategic Priority #4: Leverage Data and Technology to Support Waste Interventions

## Background

Manual curbside audits of residential waste only provide data for a single point in time, and are costly and labour intensive to undertake. In the IC&I sector, there is minimal reliable food waste data produced by businesses. This makes it difficult to evaluate interventions or collect data to guide policy and programming changes.

## Connection to Our Food Future's Waste Initiatives:

- City and County Food Waste Audits
- Behavioural Insights
- Food Material Flow Study
- Geospatial Mapping – Waste, Rescue & Processing Sites
- IC&I Food Loss Waste Pilot

## Proposed Actions

Leverage technologies to access real time data that will guide new food waste interventions at the residential and business levels. Specifically, work with Artificial Intelligence companies on a pilot to assess food waste at the time of curbside collection to link interventions to changes in food waste behaviour.

Establish partnerships with the business sector to pilot sensors that can help provide reliable, timely data on the waste produced by businesses, and leverage that data to test behavioural and economic strategies to encourage waste reductions by participating businesses.

This strategic priority also seeks to continue the piloting of local carbon currency technology as a strategy to encourage sustainable living behaviours among residents and build market share for circular businesses and products.

## Outcome Statement

Household and IC&I waste data can be collected accurately and efficiently and used to provide timely feedback on waste intervention efficacy.



# Implementation

Year 1	Year 2-3
<p>Implement Artificial Intelligence Pilot Project to provide real time data on household waste separation and rapid interventions</p> <p>Beta test Carbon Credit Challenge application and regional currency with residents in partnership with City Transportation Department</p> <p>Deploy sensor technology in IC&amp;I Pilot – Telus and Taoglas – to collect data on business waste.</p> <p>Launch data utility platform to help IC&amp;I businesses understand organic waste in broader industry context and reduce</p>	<p>Communicate data results with policy makers, municipalities, associations, processors</p> <p>Leverage data to support advocacy on broader organics diversion policies (e.g. landfill ban)</p> <p>Support delivery partner in development of recognition program for IC&amp;I and City to City competition</p> <p>Support identification and targeting of businesses with clean waste streams with potential for upcycling and value creation (Grow Guelph)</p> <p>Provide data to support pilot approaches for the IC&amp;I sector to increase economies of scale in order to reduce collection and processing costs</p>

# Strategic Priority #5: Waste to Value: IC&I Sector Innovations and Interventions

## Background

Collection of waste from the institutional, commercial and industrial sector is fragmented, limiting economies of scale and increasing overall management costs including collection and processing. In particular, few viable options exist for the collection of organic waste. The IC&I sector may not be aware of the opportunity that exists in “clean” waste streams, such as upcycling, and strategies for overall waste reduction.

## Connection to Our Food Future’s Waste Initiatives:

- R-Purpose: Circular Mindset and Food Loss and Waste Prevention
- Food Material Flow Study
- Re(Purpose) Incubator
- Geospatial Mapping – Waste, Rescue & Processing Sites
- ReSource Exchange Marketplace

## Proposed Actions

Identify further objectives for improving food waste diversion and management in the IC&I sector. Work with businesses to identify potential clean waste streams that could support business innovation where waste can be transformed into a resource. While individual business support will likely be required for some time, work towards tools like the ReSource Exchange Marketplace to organically support B2B waste to value exchanges and new business innovations.

We will also evaluate the need for more strategies and resources for businesses to provide support with the changing regulations that affect packaging (Single Use Plastic, Blue Box Transition).

## Outcome Statement

The industrial, commercial and institutional sector has efficient and economically feasible options for management of food waste and the infrastructure required for connecting with other businesses and organizations to evaluate repurposing or food rescue opportunities.

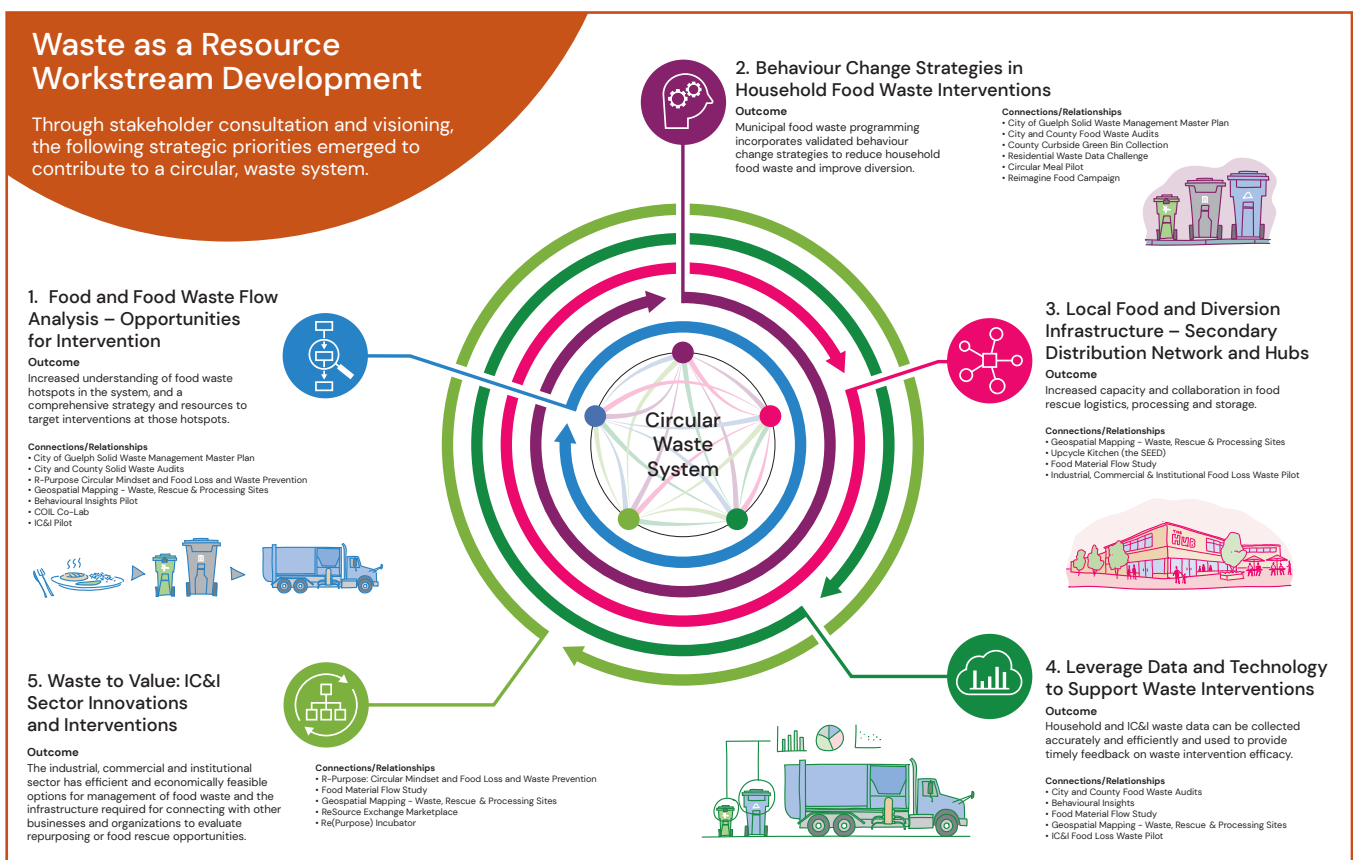
# Implementation

Year 1	Year 2-3
<p>Support delivery partner in expansion of IC&amp;I collection program to multiple days per week</p> <p>Support delivery partner in expansion of program to other cities</p> <p>Develop sustainable business case and operational plan for a local food security organization to take over the IC&amp;I collection program, including potential sponsorship to support technology capacity building</p> <p>Develop and communicate expanded KPIs</p> <p>Integration and expansion of ReSource Exchange</p> <p>Leveraging key synergies with other Workstreams (ReSource Exchange, Food Hub, etc.)</p> <p>Expanded waste diversion training and business support</p>	<p>Support IC&amp;I delivery partner with growth and expansion of customers</p> <p>Connect with National level programs for ReSource Exchange</p> <p>Increase awareness and participation in food rescue and redirection platforms as part of standard business waste management strategies (i.e. ReSource Exchange, etc.)</p> <p>Support delivery partner in exploring shared bins with proper technology to attribute weight</p> <p>Support community capacity to process, store and distribute rescued food (link to Strategic Priority #3)</p> <p>Working towards organics ban in 2030</p> <p>Digital and physical food hubs/distribution in full collaboration</p> <p>Re(Purpose) Incubator - national growth and hub development</p> <p>Intellectual property - finite time to work privately - plan forward to release publicly</p> <p>IC&amp;I Gala celebrating positive food sector actors</p>

# Conclusion

Our Food Future has a goal of decreasing household food waste and building demand for circular food products. This Action Plan includes background information describing Our Food Future's involvement in food waste initiatives to date and identifies five strategic priorities moving forward:

1. **Strategic Priority #1: Food and Food Waste Flow Analysis – Opportunities for Intervention**
2. **Strategic Priority #2: Behaviour Change Strategies in Household Food Waste Interventions**
3. **Strategic Priority #3: Local Food and Diversion Infrastructure – Secondary Distribution Network and Hubs**
4. **Strategic Priority #4: Leverage Data and Technology to Support Waste Interventions**
5. **Strategic Priority #5: Waste to Value: IC&I Sector Innovations and Interventions**



# References

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## An Initiative of



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## Delivery Partners



## Contact information

To learn more about the projects in this report, or to discuss sponsoring or participating in the programs and projects of Our Food Future, please contact us at:

### Smart Cities Office

City of Guelph

519-822-1260 extension 3559

foodfuture@guelph.ca

[www.foodfuture.ca](http://www.foodfuture.ca)

[www.coil.eco](http://www.coil.eco)

[www.reimaginefood.ca](http://www.reimaginefood.ca)

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