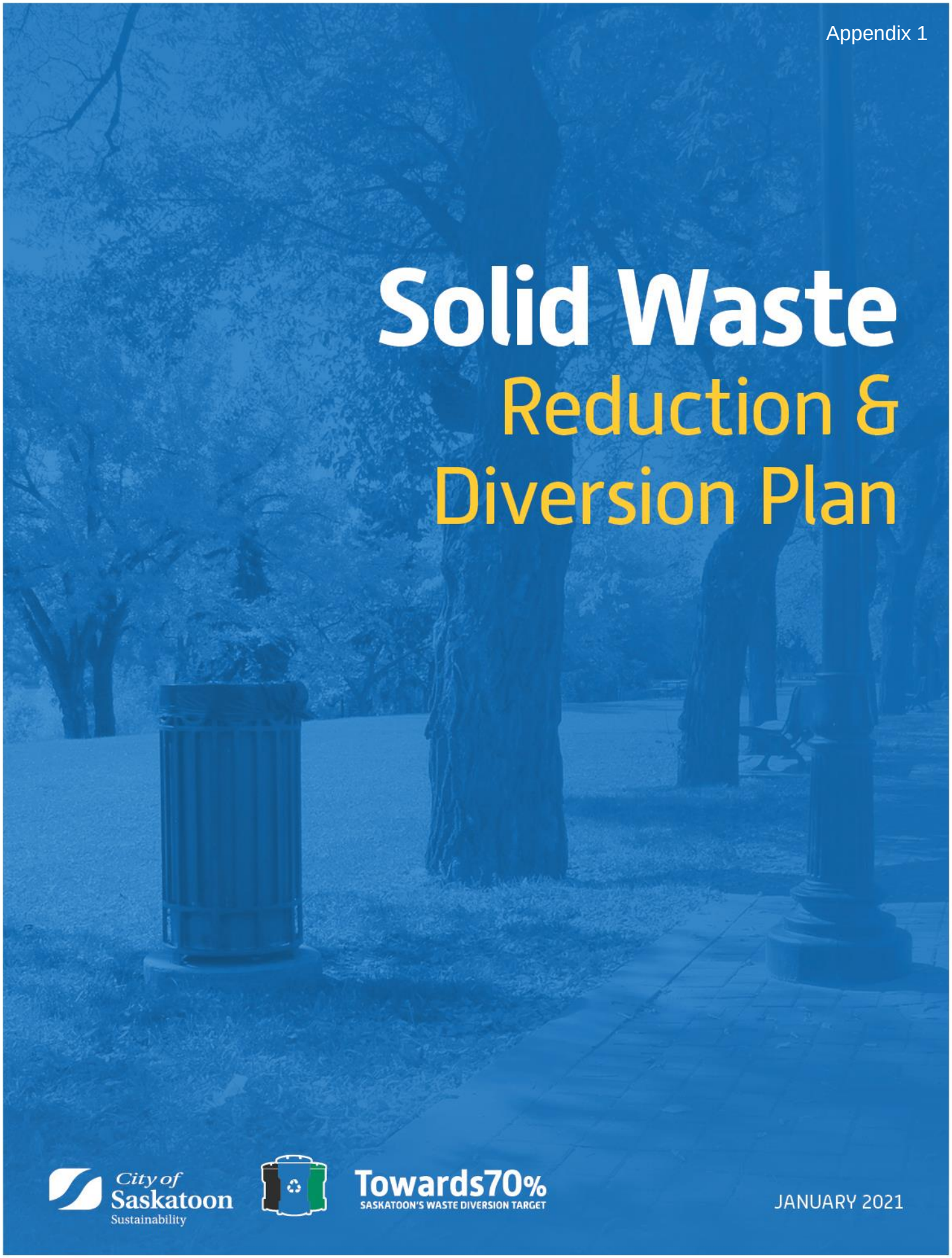
Appendix 1

Solid Waste Reduction & Diversion Plan



City of Saskatoon
Sustainability

Towards70%
SASKATOON'S WASTE DIVERSION TARGET

JANUARY 2021

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Introduction

The City of Saskatoon (the City) takes an integrated approach to waste management by combining solid waste diversion, disposal, and education services. The *Solid Waste Reduction and Diversion Plan* (the Plan) provides clear actions for waste program and policy development that support the strategic direction of the City. It strives to bring Saskatoon's waste management system in line with comparable Canadian municipalities and make Saskatoon a leader in solid waste policy and regulation across the Prairie Provinces by:

- Providing a framework for decision making through the lens of the waste hierarchy, circular economy and tools to support behaviour change;
- Communicating the City's goals, priorities, and actions to the public;
- Ensuring changes to existing services and new actions are moving in a desired direction; and
- Identifying infrastructure and resource needs.

Based on feedback from residents received through engagement, the following vision and mission will guide implementation of the Plan:

VISION:

We produce less waste and recycle or compost most of it.

MISSION:

Saskatoon is a leader in waste reduction and diversion on the prairies.

The Plan identifies clear actions the City can take and presents them in relation to the levels of the waste management hierarchy: reduce and reuse, recycle (including food and yard waste), energy recovery, and treatment and disposal. It outlines services and regulations that advance the City toward meeting the target of 70% waste diversion from the Saskatoon Regional Waste Management Centre (Landfill). Going beyond the 70% target and achieving our vision will require further actions to reduce and divert waste from privately-owned landfills; these are also outlined in the Plan.

Actions within the Plan will also contribute to meeting Saskatoon's greenhouse gas reduction target of 80% by 2050, including the *Low Emissions Community Plan's* target for cumulative greenhouse gas reductions from waste of 1.303 million (M) tonnes of $C0_2e$ by 2050. This equates to reducing or diverting 90% of organics, 95% of plastics, and 90% of paper from the Landfill.

The actions in the Plan aim to:

- Provide sustainable and equitable service to residents

- Reduce waste and greenhouse gas emissions;
- Improve waste diversion and landfill asset management;
- Foster new economic opportunities; and
- Contribute to a clean and healthy community.

The Plan includes an overview of approaches to waste management (e.g. waste hierarchy and circular economy) and tools (e.g. education and economic incentives) that can be used to influence behaviour change. Opportunities to support other levels of government currently working on waste reduction and diversion actions are also outlined. The Plan identifies and prioritizes short, medium, and long-term actions based on research, public engagement, and previous work.

Background

The Plan was developed by assessing previous waste management planning efforts, public engagement results, and Council directives (Appendix A). By directly supporting and building on these initiatives, the Plan will help the City achieve its strategic goal of Environmental Leadership. Additional best practice research from other municipalities as well as engagement with internal and external stakeholders was used to solidify the vision and mission and develop the proposed actions.

In 2007, the *Saskatoon Waste & Recycling Plan*[1] introduced concepts such as Education and Awareness Building, Support for User Pay Philosophy, and Leadership and Innovation as key components of successful waste management. This was followed by a period of development of new services, most notably the curbside and multi-unit recycling programs, and growth of the subscription green cart service.

Waste planning continued in 2016 with a comprehensive waste audit that informed the 2017 *Waste Diversion Opportunities Report*[2]. This report reaffirmed that a city-wide curbside organics program and a waste utility were major opportunities to improve waste reduction and diversion.

Through 2017, 2018, and 2019, a series of recommendations were presented to Council resulting in approval of the Residential Curbside Organics program, Recovery Park, and a sustainable funding model for Solid Waste Operations. In 2020, Council approved the recommendation to develop requirements for businesses and organizations to divert recyclables and organics. Meanwhile, work continued on this plan to address the future of waste management.

The Triple Bottom Line Decision Making tool was used to help develop the Plan in adherence with C08-001 Triple Bottom Line Policy[3]. In accordance with the policy, the environmental health

[1] Rudder, W., Keane, M., Ng, L., and Prime, M., 2007. City of Saskatoon Waste and Recycling Plan. Prepared for the City of Saskatoon, Saskatchewan by Earth Tech (Canada) Inc.
[2] City of Saskatoon Waste Diversion Opportunities Report, 2017. Prepared for the City of Saskatoon, Saskatchewan by Dillon Consulting Limited.
[3] City of Saskatoon Council Policy: Triple Bottom Line Policy available at: https://www.saskatoon.ca/sites/default/files/documents/city-clerk/civic-policies/C08-001.pdf

and integrity, social equity and cultural wellbeing, and economic prosperity and fiscal responsibility of each action was considered.

Public engagement helps ensure that Saskatoon's waste management services are supported by, and consider the needs of, Saskatoon residents and businesses. Since the development of the *Saskatoon Waste and Recycling Plan* in 2007, residents continue to say that waste management is important to them. This is evident in the number of people who provide feedback and in the results of the engagement. For instance:

- The 2010 *Let's Talk Recycling* engagement (prior to implementing curbside recycling) found that 70% of those surveyed wanted a new recycling program;
- Over 7,000 residents participated in the 2011 *Saskatoon Speaks* Community Vision[4], establishing the waste vision: *We produce less waste and recycle or compost most of it*;
- The 2019 residential waste and recycling survey[5] found resident support for food waste reduction (90% of those surveyed), single-use item reduction (87%), and disposal bans (70% for recyclables and 68% for organics);
- Over 5,500 residents participated in curbside[6] and multi-unit[7] organics and waste utility engagement; 80% of those surveyed supported curbside organics, 82% multi-unit organics, and 60% a waste utility;
- A total of 870 individuals participated in engagement on the Industrial, Commercial, and Institutional (ICI) Regulatory Approaches for recycling and organics indicating a strong interest in diversion for that sector[8]; and
- In 2019, an external subject matter expert workshop was held to refine the vision, mission, and actions for the Plan. Participants identified education, municipal leadership, and measurement as key themes for successful waste management. These themes are emphasised in the Tools to Support Behaviour Change section of this Plan.

Moving forward, the Plan will be reviewed every five years to incorporate changes in local conditions, provincial or federal policies, and industry trends. The review process will identify new and outstanding actions to be prioritized for business case development and implementation. The review process will be informed by ongoing public surveys, waste characterization studies, best practice research, and continued involvement in solid waste industry associations.

[4] Saskatoon Speaks: Shape our Future. https://www.saskatoon.ca/sites/default/files/documents/community-services/planning-development/neighbourhood-planning/saskatoon_speaks_community_vision_document_june_2011.pdf
[5] Each survey needs a footnote with a link to the full results
[6] Changes to Waste Management in Saskatoon: Engagement Results: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=45d99a17-70cf-4ab0-86e8-3d6a5dc88ca5&Agenda=Merged&lang=English&Item=26

[7] Multi-Unit Residential Proposed Changes to Waste Management – Engagement Results: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=8eb7539b-7aab-42a6-be61-027b3177f4c1&Agenda=Merged&lang=English&Item=20

[8] Saskatoon Talks Trash: Businesses & Organizations: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=e1abf585-57f0-4946-92c3-a28ae8cf72c6&Agenda=Merged&lang=English&Item=24

Waste Reduction and Diversion Benefits for Saskatoon

Waste reduction and diversion contribute to making Saskatoon a great place to live, work, learn, and play through several wide-ranging benefits:

Improved quality of life: Proper waste management keeps Saskatoon beautiful and clean. Having access to a full suite of waste services allows residents to make sustainable actions a part of their daily lives, whether at home, in the community, or at work.

Improved environmental health: Reducing waste generation and diverting waste away from landfills prevents pollution. Gains in both areas will result in lasting environmental benefits, such as reduced risks from the release of toxic and hazardous substances.

Reduced greenhouse gas emissions: When organic materials (food and yard waste) end up in the landfill, they are mixed with garbage and quickly buried in an airless environment. Because organics need air to decompose properly, they do not turn into soil or compost. Instead, they release methane gas and create garbage fluids, called leachate. Methane is a much more potent greenhouse gas than carbon dioxide, and leachate needs to be managed under strict environmental regulations. Only 23% of the methane produced by the Landfill is captured as landfill gas and converted into energy, while the remainder is released into our atmosphere.

Reduced use of finite resources: As waste is reduced and diverted the use of finite resources will be reduced, ensuring they are available for future generations.

Economic diversity: Diversion creates jobs. Organics and other recyclable material can add economic value by creating compost, energy, and new products. These valuable resources do not belong in a landfill. The circular economy model shows promise for adding new opportunities for our community.

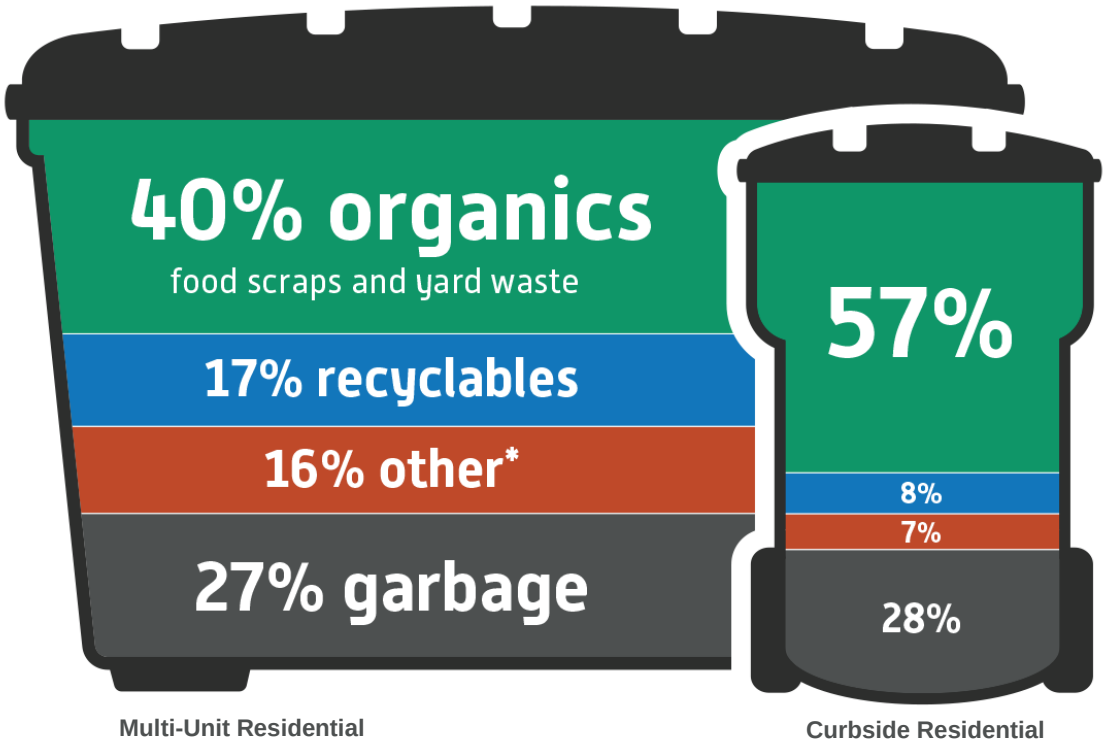
Deferred infrastructure investment for solid waste management: Changes made now can extend the life of the Landfill and help save or defer the future costs of siting a new landfill or having to haul waste long distances. In addition to the capital cost of developing a new landfill (estimated at $100 million), a landfill located outside of city limits will increase costs for waste collection services. Longer haul distances will require more trucks, fuel, and operators to provide an equivalent level of service. Estimated impacts include $5 million in capital investments to the garbage collection fleet, as well as annual operating increases of $2.5 million, not including the longer haul distance.

The *Integrated Landfill Management Plan* (2011) identifies 8.7 million cubic metres of airspace remaining if all planned capital investments and operating targets are achieved. Depending on the annual amount of garbage disposed at the Landfill, this translates to 40 to 50 years of remaining landfill life. The more waste received, the faster that airspace is consumed. Conversely, successful waste reduction and diversion will increase landfill life.

Most items placed in the Garbage are Divertible

A comprehensive waste characterization study is conducted every several years to understand opportunities for program improvement and new program development. The 2019 *Waste Characterization Study* confirmed the need to develop diversion services to address residential organic waste, ICI recycling and organics, and construction and demolition waste. The study also quantified the amount of recyclable material in garbage carts and contamination of recycling carts with garbage, which demonstrates the importance of ongoing education programs and the further development of behaviour change tools.

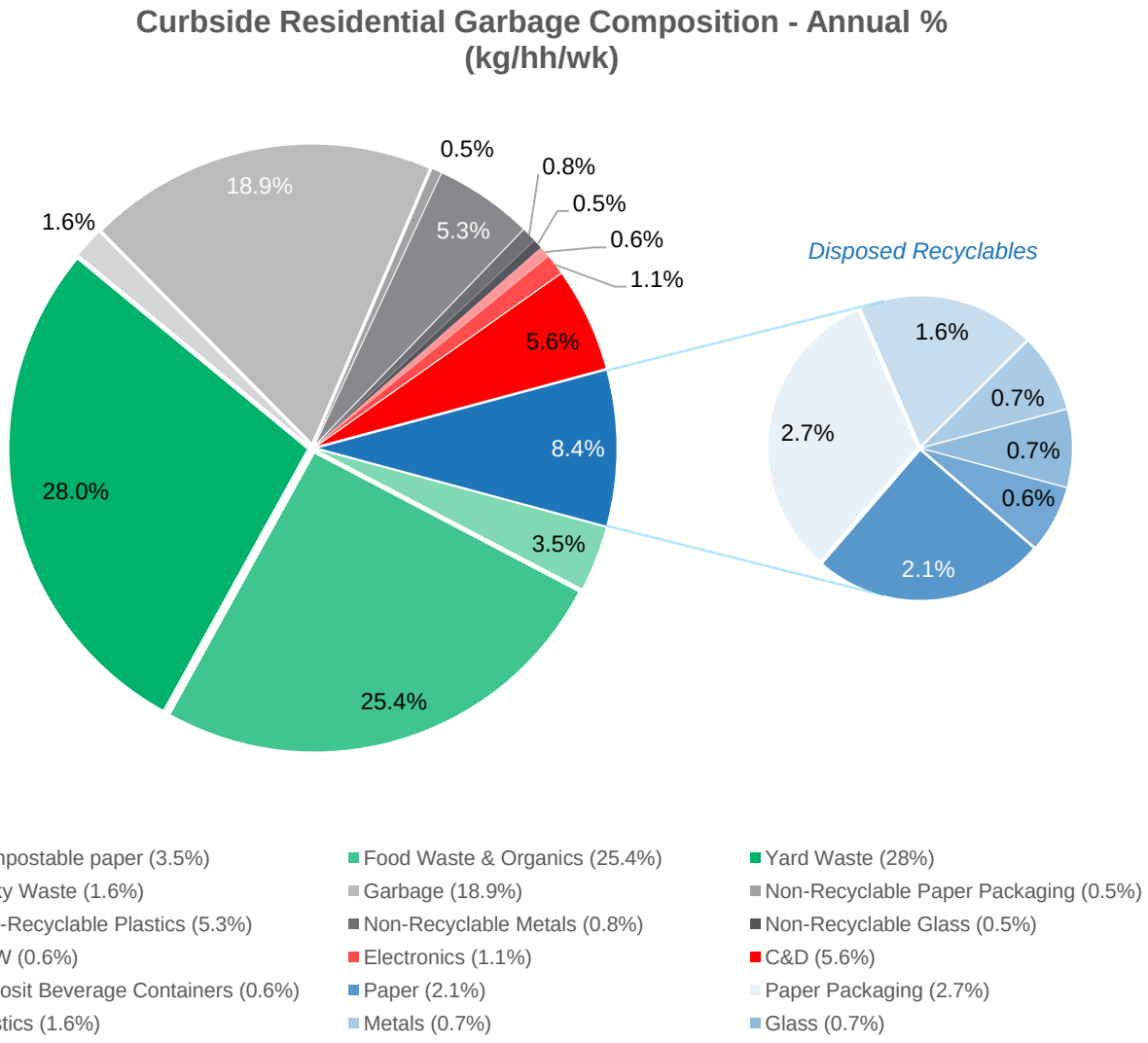
Figure 1 Multi-Unit Residential Garbage Bin and Curbside Residential Garbage Cart Composition (2019)



*hazardous waste, electronics, construction waste

Curbside residential households produce 18.2 kilograms of waste per week (or 946 kilograms per year). When considering all the garbage, recycling, and organics disposed of, this is equivalent to nearly 6,300 litres or 17.5 roll-out carts full of waste each year[9]. As shown in Figure 2, over 65% of what went to the Landfill from curbside residential households in 2019 could have been diverted.

Figure 2 Curbside Residential Garbage Composition



[9] Material densities reported by the EPA (2016) "Volume-to-Weight Conversion Factors for Waste" were assumed to apply to uncompact municipal solid waste, residential/commercial/institutional, 250 lbs/cubic yard or 0.15 kg/litre.

Multi-unit residential households produce 7.9 kilograms of waste per week or 411 kilograms per year. This is equivalent to nearly 2,700 litres or 7.5 roll-out carts full of waste each year. Figure 3 shows the composition of garbage collected from multi-unit residential households.

Figure 3 Multi-unit Residential Garbage Composition

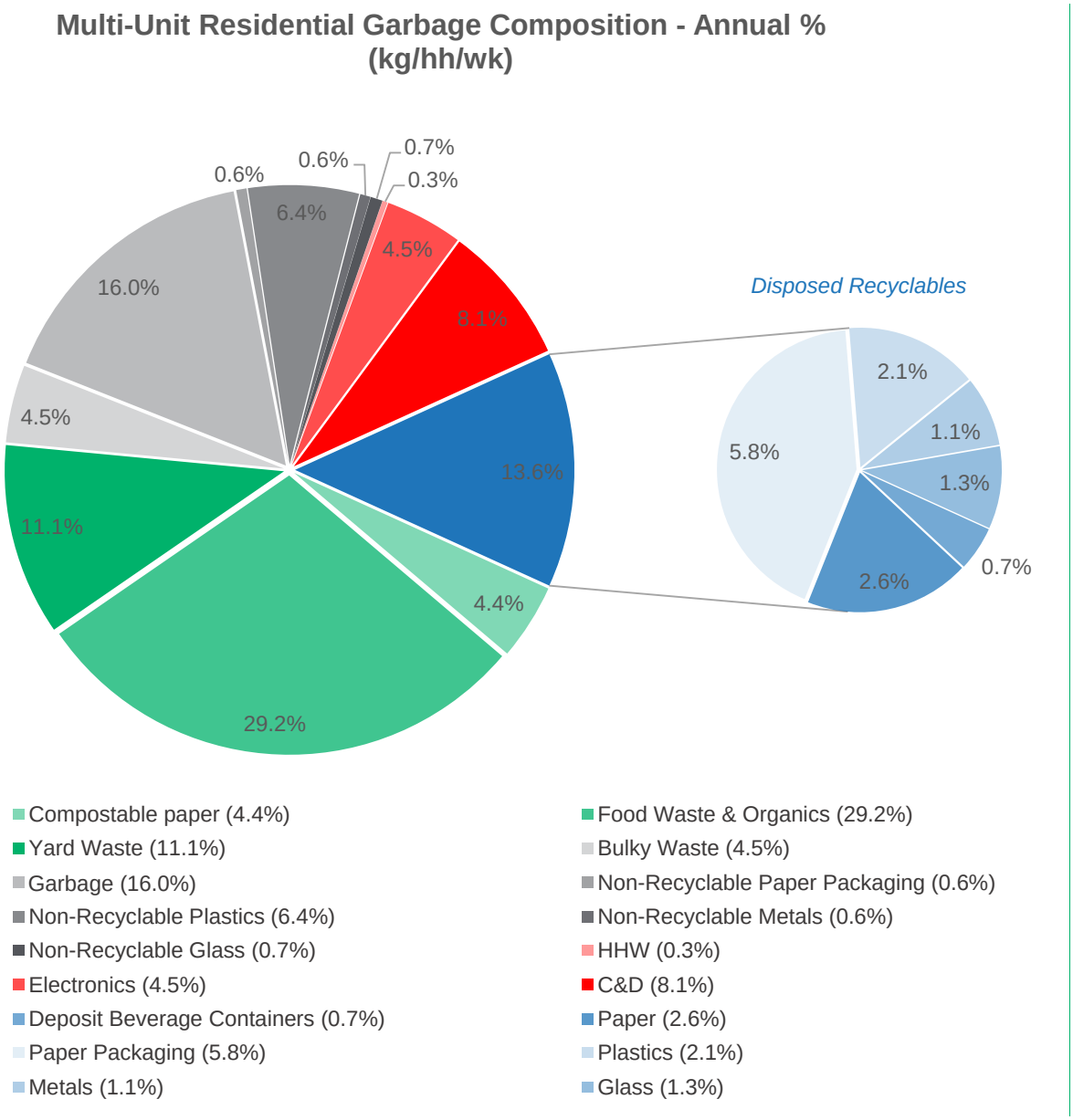
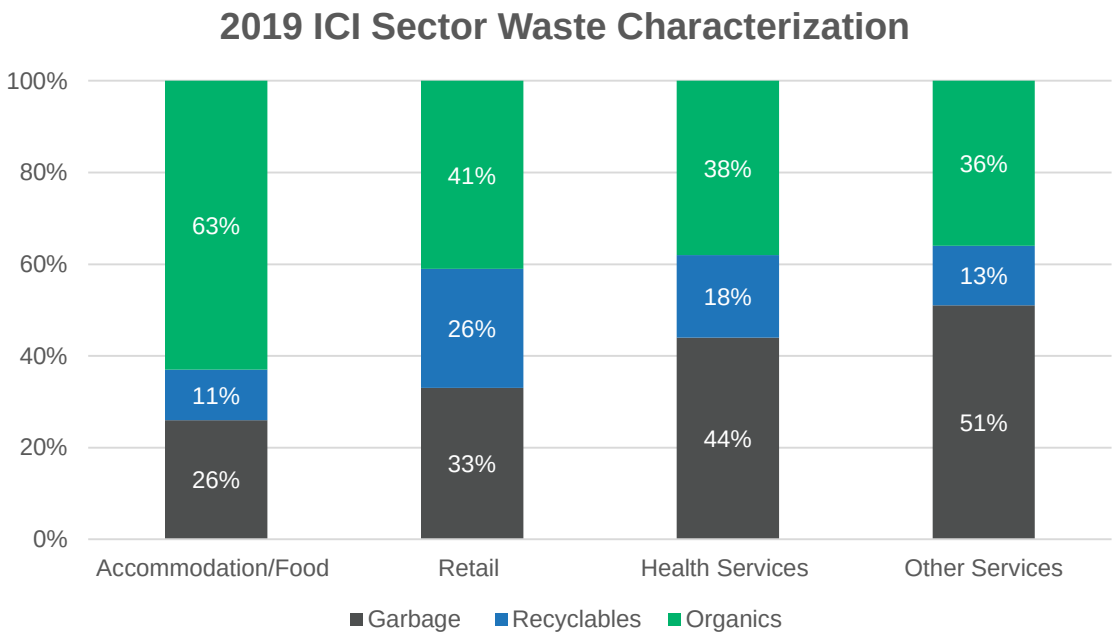


Figure 4 shows the results from an ICI sector audit and highlights the work needed to improve waste diversion from this sector. The following is a summary of results:

- Accommodation/food services garbage samples contained an average of 11% recyclable material and 63% organics;
- Retail services garbage samples contained an average of 26% recyclable material and 41% organics;
- Health services garbage samples contained an average of 18% recyclable material and 38% organics; and
- Other services (including automotive, furniture and lawn and garden businesses) garbage samples contained an average of 13% recyclable material and 36% organics.

Figure 4 ICI Waste Characterization



Waste Management in Canada:
Roles, Responsibilities and Current Actions

Waste is a shared responsibility. In Canada, the responsibility for handling waste falls primarily on municipalities, non-profit organizations, and private industry, while higher levels of government (federal, provincial, or territorial) focus on regulation. The following section outlines roles and responsibilities for each level of government, highlighting those actions that impact municipalities.

Government Roles and Responsibilities

The Government of Canada

The Government of Canada's primary responsibility in solid waste management is the control of international and interprovincial movement of hazardous waste and hazardous recyclable material through regulatory instruments and other measures. The federal government also identifies best practices to reduce possible toxic pollution under the authority of the *Canadian Environmental Protection Act*, *1999*. Since 2018, the federal government has focused on the environmental and health impacts of plastic waste:

- In 2018, the Government of Canada proposed the *Ocean Plastics Charter*[10]. The Charter seeks a more efficient and sustainable approach to plastic management by ensuring plastics are designed for reuse and recycling. It is endorsed by 21 countries and 63 businesses and organizations.
- On June 10, 2019, the federal government announced a nine-step integrated plan to reduce plastic pollution. Among these steps is a ban on harmful single-use plastics and reduction of pollution from plastic products and packaging.
- In October 2020, the federal government released *A proposed management approach to plastic products: discussion paper*, which outlined six single-use plastics that will be banned in 2021, including: grocery checkout bags, straws, stir sticks, six-pack rings, plastic cutlery, and food takeout containers made from hard-to-recycle plastics. It also outlined the federal government's proposed approach to establish performance standards for plastics that remain in the economy and to encourage end of life responsibility.

Government of Saskatchewan

Provincial and territorial authorities establish waste reduction policies and programs as well as approve and monitor waste management facilities and operations. In Saskatchewan, the Ministry of Environment (MOE) regulates solid waste management through approvals, licensing of facilities, and monitoring of operations. The MOE also establishes financial and operational

[10] Ocean Plastics Charter (2018) Government of Canada website https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/international-commitments/ocean-plastics-charter.html

responsibility for recycling of certain products through waste stewardship regulations. These regulations shift financial and physical responsibility away from municipalities to the businesses that produce or bring products into Saskatchewan or to the consumers who purchase the products.

Many of the waste diversion programs regulated by the Government of Saskatchewan use an extended producer responsibility (EPR) model. Based on the *Canada-wide Action Plan for Extended Producer Responsibility*[11], Saskatchewan has implemented recycling programs for a number of products, including used oil, oil filters and oil containers, antifreeze, scrap tires, paint and paint containers, electronic waste, packaging and printed paper, and agricultural plastics. Saskatchewan also uses a deposit refund system to recycle beverage containers through SARCAN[12].

The Government of Saskatchewan is also an active member of the Canadian Council of Ministers of the Environment (CCME), which released the *Canada-wide Action Plan on Zero Plastic Waste*[13] in two phases in 2019 and 2020. The CCME Plan emphasizes the importance of plastic in our daily lives and acknowledges that zero waste does not mean zero plastic. The ideal result is better life-cycle management for plastic through reduction, redesign, and improved recycling. Phase 1 of the CCME Plan identifies six priority areas, including single-use and disposable products while Phase 2 focuses on awareness, science and environmental impacts. The CCME is planning to provide a roadmap to identify problematic single-use items, promote solutions, and identify sustainable alternatives by the end of 2021.

Saskatchewan's Solid Waste Management Strategy released in 2020 includes six goals:

1. Enhance education, awareness, and technical understanding;
2. Encourage regional collaboration;
3. Provide a modern, efficient, and effective regulatory system;
4. Enhance waste diversion;
5. Foster innovation and sustainable solutions; and
6. Demonstrate government leadership.

To guide the roll-out of the provincial strategy, the province adopted waste reduction targets of 30% by 2030 and 50% by 2040. The province will report annually on priorities related to the Solid Waste Management Strategy.

Municipalities

Waste management is identified as a public utility in the *Cities Act*, giving municipalities' authority to provide waste management services directly, either through a controlled corporation or by agreement with any person. To achieve this, municipalities often focus on providing

[11] Extended Producer Responsibility, Canadian Council of Ministers for the Environment website https://www.ccme.ca/en/resources/waste/extended_producer_responsibility.html
[12] Government of Saskatchewan website https://www.saskatchewan.ca/residents/environment-public-health-and-safety/green-living/reducing-waste-and-recycling
[13] Plastic Waste, CCME website https://www.ccme.ca/en/resources/waste/waste/plastic-waste.html

residential services such as the collection, recycling, composting, and disposal of household waste. Ensuring waste services are available to other sectors, such as businesses, is typically not an issue due to the existence of competitive private waste hauling and disposal companies. Many municipalities in Canada also contract the private sector to deliver aspects of residential solid waste management services.

Municipalities may play a role in reduction and diversion by providing services directly to residents, enactment of policies that encourage waste reduction, and delivering education programs. Specific programs and services in each municipality are influenced by regional factors, including resources, access to technology, recycling markets, political will, regulatory authority, and facility-siting challenges. The result is slightly different municipal programs across Canada, making direct comparison between municipalities difficult.

Saskatoon

Saskatoon's integrated approach to managing solid waste is intended to prevent, recover, and dispose of waste in ways that protect human and environmental health. In practice, this includes providing safe waste collection and disposal, a variety of diversion programs, and education and outreach actions. The most current information on solid waste services offered by the City of Saskatoon, as well as industry trends, can be found in the annual *Integrated Waste Management Report*[14].

Safe and efficient waste handling is a priority for day-to-day service delivery. Safety is achieved by operating in accordance with provincial and federal regulatory requirements, including an MOE-issued *Permit to Operate a Waste Disposal Ground for the Landfill* and *Permit to Construct/Operate an Industrial Effluent* Works for the west compost depot.

Efficient waste handling is achieved through the delivery of an *Integrated Landfill Management Plan*[15] and continuous improvement in collections. The *Integrated Landfill Management Plan* identifies numerous capital and operating investments required to maximize existing airspace at the Landfill and ultimately achieve a 40 plus year lifespan. Improvements include increasing waste diversion opportunities, maximizing compaction of waste through better equipment and filling methods, developing new cell expansions, reclaiming inefficiently filled areas, and achieving steeper side slopes to maximize overall height of the Landfill.

The City focuses on providing collection services for residential waste, which makes up approximately 36% of all waste generated in the city and 73% of waste handled at the Landfill. Curbside residential customers, who produce 81% of residential waste, have waste collected in carts assigned to their individual dwelling while multi-unit residential customers, who produce 19% of residential waste, typically have waste collected in large communal bins.

[14] www.saskatoon.ca/services-residents/waste-recycling/waste-diversion
[15] Landfill Optimization Report (2011), City of Saskatoon website: https://www.saskatoon.ca/sites/default/files/documents/corporate-performance/environmental-corporate-actions/landfill_optimization_report.pdf

Most of the waste (64%)[16] generated in Saskatoon is generated by the ICI sector and collected by private hauling companies, with little oversight by the City. The City Landfill is one of three landfills in the immediate vicinity of Saskatoon. The Loraas landfill is located north of the city and the Green Prairie Environmental landfill is located south. Competition from these other two landfills has affected the number and type of customers using the City Landfill. Trends show a significant decrease in the commercial customer base and a smaller decrease in the residential customer base at the Landfill. Commercial customer tonnages at the Landfill have decreased by more than 47% since 2014.

[16] Currently, the City does not track waste generated by the ICI sector; this percentage is based on an estimate from the 2016 Waste Characterization Study.

Saskatoon's Approach to Waste Management Planning

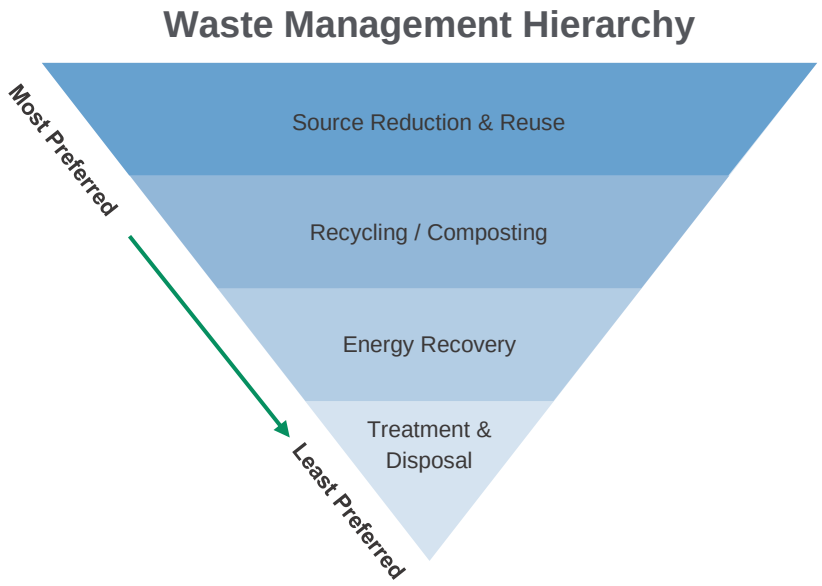
To achieve the Plan's vision and mission, an Action Plan (Appendix B) was developed based on research, best practice review, public engagement, and direction from City Council. Below, three key concepts are introduced that, when combined, will help the City deliver an effective, integrated waste management system:

1. Waste management hierarchy;
2. Circular economy; and
3. Tools to support behaviour change.

Waste Management Hierarchy

The waste management hierarchy[17] (Figure 5) ranks actions from most to least environmentally preferred based on use of natural resources and energy, production of pollution, and potential toxicity. The hierarchy emphasizes source reduction and reuse, followed by recycling and composting, and finally energy recovery from waste and treatment and disposal (landfilling). Economic or social constraints are not typically considered, although there have been links to economic growth and job creation from waste diversion activities and long-term financial liability connected to disposal sites.

Figure 5 Waste Management Hierarchy, US Environmental Protection Agency



[17] United States Environmental Protection Agency: Waste Management Hierarchy. https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

The waste hierarchy lens is useful for long-term planning because it pushes municipal governments to think beyond collection and disposal to consider broader environmental risks of waste handling and the long-term impacts of services. The hierarchy prioritizes waste reduction, reuse, and recycling/composting over energy recovery and disposal. This supports sustainability goals by reducing environmental impacts, lessening the risks of waste disposal, and lowering operating costs for waste management. It can also lead to potential job creation.

The waste management hierarchy has been endorsed by the Solid Waste Association of North America and the U.S. Environmental Protection Agency and has been used by the federal government, CCME and many Canadian municipalities. The hierarchy has guided development of Saskatoon's waste program for many years and was included as a key consideration in the 2007 *Waste and Recycling Plan*.

Reduce and Reuse

Two effective ways residents can protect the environment and extend the life of the Landfill are reducing and reusing. These also have upstream benefits, such as reducing the amount of resources and energy used in production and shipping and reducing hazardous materials used in production.

Waste reduction and reuse are closely linked to the Circular Economy concept discussed in section 3.2.

Current Status

The City of Saskatoon offers some waste reduction and reuse education and programing. This includes Saskatoon Curbside Swap, Rolling Education Unit, School Education programs, and partnerships with organizations such as the Saskatchewan Waste Reduction Council and National Zero Waste Council. Through a Research Junction grant, the City and the University of Saskatchewan are researching opportunities to redistribute surplus food that otherwise would become waste to charitable organizations.

Opportunities and Challenges

Public sector procurement provides an opportunity to use buying power to influence positive outcomes. The City uses a “Best Value”[18] approach when procuring goods and services. Best Value involves emphasizing factors beyond lowest cost to select a supplier and includes social and environmental considerations. This policy can support waste reduction and reuse actions by rewarding waste reduction actions in the procurement process, such as including a waste plan in construction and demolition projects and suggesting alternatives to non-recyclable single use items when supplying Civic operations. Continued involvement in the National Zero Waste Council as well as the Municipal Collaboration on Sustainable Procurement (MCSP) provides

[18] As stated in the City of Saskatoon’s Policy and Protocols Manual for Purchasing Goods, Services, or Construction: “The City of Saskatoon is committed to the use of a Best Value approach in its Procurement. A Best Value approach means that the City will consider how to structure and conduct Procurements in a fashion which allows for a consideration of factors beyond lowest cost, where appropriate, in determining which Supplier provides the overall greatest benefit.”

the City an opportunity to collaborate and learn from innovative waste reduction and sustainable procurement actions across Canada.

Community-wide waste reduction and reuse can be improved by developing programs to encourage edible food donation, highlight existing businesses that offer share, repair or reuse services, and by supporting provincial and federal actions to reduce plastic waste. Civic policies can also be developed to reduce the use of single use items during events on City owned property. Also, by dedicating resources to review corporate and community standards and building/demolition regulations, the City can remove unintended roadblocks for source reduction and reuse in the community.

Policy measures, such as implementing disposal bans at the Saskatoon Landfill and developing economic incentive tools to support reduction and diversion, are also opportunities for the City to progress reduction and reuse.

One challenge related to waste reduction and reuse in Saskatoon is the availability of accurate community-wide data to provide a benchmark and measure success. The City only tracks data for waste collected through City programs, such as curbside recycling, green cart programs and waste delivered to the Saskatoon Landfill. This leaves a large gap of waste generated by the ICI sector, which makes measuring the impact of reduction and reuse actions difficult. Currently, the City would not be able to determine the effectiveness of waste reduction actions; however, continued collaboration with other levels of government and industry and improving data collection are priorities in the City's ICI Waste Diversion Strategy that will help address this challenge.

The Plan's actions address opportunities and challenges related to **reduction and reuse**:

Actions	Next Steps	Timeline	Outcome
Federal single-use plastic ban and performance standards for plastics	Participate in federal engagement opportunities Consider impacts of ban and performance standards for plastics on waste management services	**Short:** 2021-2023	Understand the impacts of the Federal Governments 2021 single-use plastic ban and new performance standards for plastics on waste management programs
Waste reduction through procurement and specifications	Support waste reduction and diversion in sustainable procurement through the implementation of the Triple Bottom Line policy	**Short:** 2021-2023	Influence waste reduction and recycling markets through procurement policies
Public space and event waste reduction	Develop business case to resource engagement and research	**Medium:** 2024-2025	Require festivals and events that occur on City property to meet waste diversion criteria
Food waste reduction program	Align with development of a City Food Policy Support federal, provincial and community initiatives Develop a business case to pilot a program to redirect edible food waste	**Medium:** 2024-2025	Reduce food waste. Redirect edible food to support people in our community. Divert unavoidable food waste
2025 Waste Reduction and Diversion Plan Update	Identify and prioritize waste management actions for 2026 -2030 with an increased focus on reduce and reuse following the establishment of core diversion services	**Medium:** 2024-2025	**Diversion:** n/a **GHG reduction:** n/a Updated Solid Waste Reduction & Diversion Plan
Share, reuse, and repair program	Explore opportunities for research partnership Support federal, provincial and community initiatives	**Long:** 2026+	Improve waste reduction by increasing the longevity of items in use

Recycling (including food and yard waste)

After reduction and reuse, recycling is the next environmentally preferred method of waste management. Recycling means the collection, processing, and marketing of solid waste into reusable material. In Saskatoon, this includes any initiative that diverts paper and packaging, organic waste, construction and demolition waste, or other materials for the purpose of being processed and turned into another useful material. Ideally, recycled material will replace the extraction and use of raw material. For example, recycling can turn plastic bottles into fabric and composting can turn food waste into soil amendment, thus reducing the need for virgin textiles and fertilizer.

Diversion programs reduce the amount of waste buried at the Landfill by diverting material to other recycling processors. This helps mitigate depletion of natural resources, prevent environmental degradation, and reduce release of greenhouse gasses related to waste disposal. For example, diverting organic waste from the Landfill lowers the production of methane, a greenhouse gas that has a warming potential 25 times greater than carbon dioxide.

Current Status

Recycling is a priority for the City and has progressed over the past decade through curbside and multi-unit recycling programs, recycling depots, and public space recycling. The City's programs are supported by community education and outreach. The City diverts organic waste through a subscription green cart program, home composting education, and compost depots. The City also provides drop off locations for safe disposal or recycling of household hazardous waste.

To improve recycling in Saskatoon, the City is currently developing a city-wide residential organics program, regulatory approaches to enhance recycling for the ICI sector, and Recovery Park at the Landfill. These actions are expected to be implemented by 2023. The City is also collaborating on the implementation of a provincial household hazardous waste stewardship program.

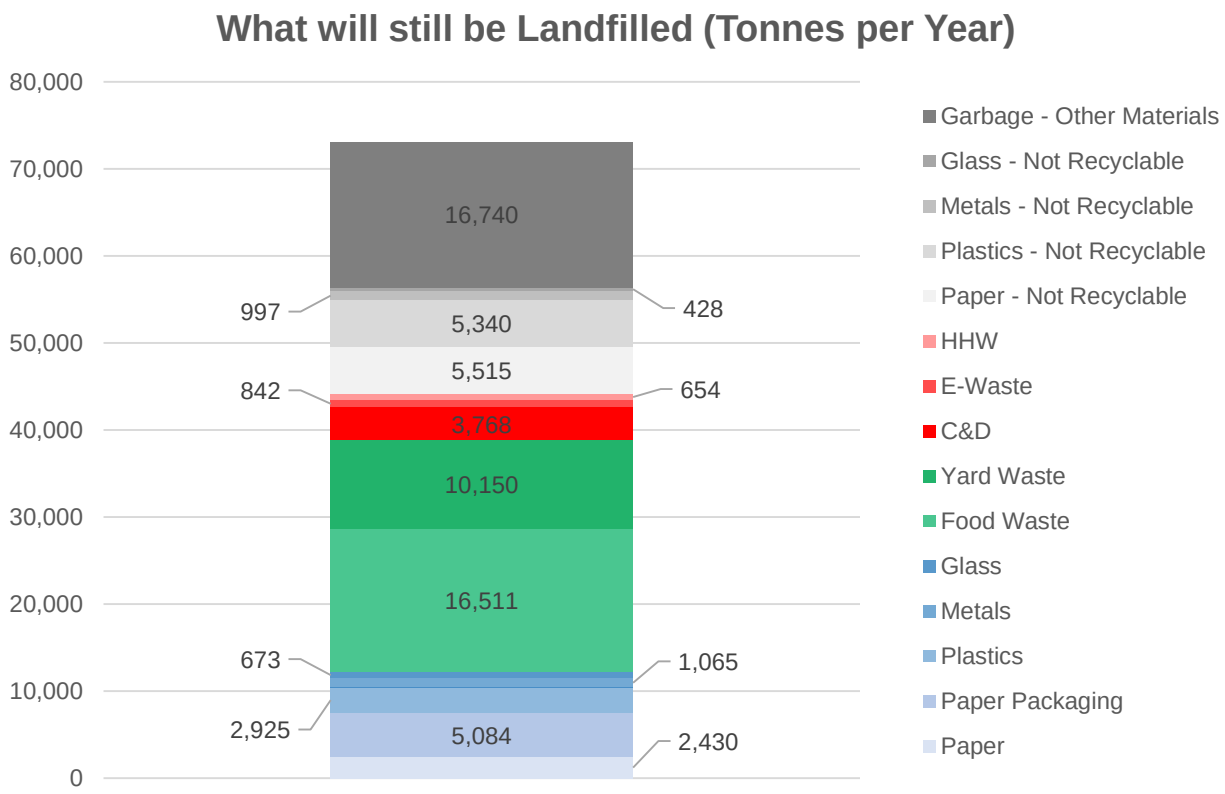
Actions	Next Steps	Outcome
Residential curbside organics	Develop capital purchase plan Develop implementation, education and communications plan	**Implementation:** 2023 **Diversion:** 15,000 (8%+) - 22,000 (12%+) tonnes per year **GHG reduction:** 12,000 - 17,000 tonnes CO_2e per year
Requirements for businesses and organizations to divert recyclables and organics	Waste Bylaw update Develop education resources Communication and phase-in of requirements	**Implementation:** 2022-2024 **Diversion:** 5,400 (5%+) tonnes per year (City landfill) 38,000 tonnes per year (private landfills) **GHG reduction:** 38,000 tonnes CO_2e per year
Recovery Park	Develop materials business plan Develop site operations plan Construction and site commissioning	**Implementation:** 2023 **Diversion:** 5,000 (4%) – 17,000 (13%) tonnes per year **GHG reduction:** 8,400 tonnes CO_2e per year
Provincial household hazardous waste regulation	Monitor and actively participate in implementation of the provincial regulation	Prepare for the launch of provincial stewardship program in 2021 Collaborate with stewards on a permanent depot at Recovery Park

Opportunities and Challenges

Saskatoon's waste diversion rate remains low compared to similar sized municipalities across the Canada, simply because the services are not in place to divert waste. By implementing new programs and supporting policies Saskatoon has the opportunity notably improve waste diversion in the community.

The 2019 *Waste Characterization Study* demonstrated the need for continued development and improvement of recycling programs. Figure 6 shows that 60% of what continues to be thrown in the garbage can be recycled through existing and approved programs. The remaining 40% includes categories such as textiles, sanitary products, and pet waste, which will require new diversion services and waste reduction actions.

Figure 6 Types of material placed in the garbage in Saskatoon



Two major challenges with municipal recycling programs, in general, are the lack of control over packaging design and market volatility. Recycling processors were caught off guard in 2018 when China, which had the largest market for recyclable paper and plastic from North America, banned certain recyclable material from import and implemented new quality standards on the remaining incoming materials. This resulted in the short-term landfilling of recyclable material, program changes, and, in extreme cases, cancelation of municipal recycling services. As of 2020, the long-term impacts of market changes are still unknown, although it appears that domestic markets for recycled material are growing and the federal government is working towards on performance standards for plastics that will require recycled content. Working with other levels of government to improve extended producer responsibility regulations could help reduce market uncertainty and create packaging that is easier to recycle.

Another challenge, when comparing waste management programs with other municipalities, is a lack of standard protocol for calculating diversion rates, collection rates, residuals, and contamination. Most municipalities use similarly named performance indicators, however, direct comparisons are difficulty due to variations in service levels, funding models (taxes versus fees), infrastructure (e.g. landfills and material recycling facilities) and provincial programs and a lack of national guidelines to monitor and track diversion performance data. The National Solid Waste Benchmarking Initiative (NSWBI), of which the City has been a member since its inception in 2011, provides an opportunity to compare data as well as to improve reporting

consistency between municipalities, but more work remains to ensure consistency across Canada.

Through the *Saskatchewan Solid Waste Management Strategy*, the provincial government has signalled the intent to review all stewardship programs for effectiveness and efficiency, beginning with household paper and packaging in 2020/2021. This review could result in changes to the delivery of residential recycling and will continue to be monitored by the City.

To address these opportunities and challenges, the Plan recommends the following actions:

Actions	Next Steps	Timeline	Outcome
Mandatory residential multi-unit organics	Complete "Multi-Unit Residential Proposed Changes to Waste Management" reporting in 2021 with multi-unit organics options and recommendation	**Short:** 2021-2023	**Diversion:** 600 (0.5%) - 900 (1%) tonnes per year **GHG reduction:** 431 - 980 tonnes CO_2e per year
Business and organization waste diversion regulation compliance	Conduct an operational analysis and needs identification for City facilities to comply with the incoming regulation Collaborate to develop a business plan to deliver recycling and organics services at City facilities	**Short:** 2021-2023	**Diversion:** negligible, as many facilities currently recycle **GHG reduction:** negligible Demonstrate leadership and ensure compliance with the mandatory recycling requirement for the ICI sector
Compost depot program review	Understand the impact of new programs and city growth on service levels Engage with users Provide City Council with a service recommendation	**Short:** 2021-2023	**Diversion:** n/a **GHG reduction:** n/a Determine the role of compost depots in future waste management services

Construction and demolition waste diversion: City of Saskatoon options	**Short-term**: develop business case for engagement and research **Medium-term**: Implementation Align with Recovery Park operation	**Short:** 2021-2023	**Diversion:** 700 (0.7%) – 1,200 (1.3%) tonnes per year **GHG reduction:** TBD Support the success of Recovery Park Approximately 17,000 tonnes of C&D material were buried in the Landfill in 2019
Recycling market development	Develop a business case to resource engagement and research Consider opportunities as part of Recovery Park (ex. bulky waste, mattresses) Assess community partnership and social enterprise opportunities	**Short:** 2021-2023	**Diversion:** TBD **GHG reduction:** TBD Provide partnerships and incentives to recycle difficult material. Prepare a Civic Re-use Policy to support the beneficial re-use of materials diverted at Recovery Park in civic projects and operations, such as concrete, asphalt shingles, glass, porcelain, compost, and wood waste.
Disposal ban at the Saskatoon Landfill	**Short-term:** develop a business case to resource engagement and research Provide City Council with a service recommendation **Medium-term:** Implementation Develop an approach for a disposal ban at the Saskatoon Landfill for any materials where diversion opportunities are in place for all sectors	**Short:** 2021-2023	**Diversion:** 2,500 (3%) – 5,000 (5%) tonnes per year **GHG reduction:** 1,500 – 3,000 tonnes CO2e per year Encourage similar landfill bans at a regional level by working with other landfills operating in the region and the provincial government
Recycling depot program review	Short-term: develop a business case to resource engagement and research Understand the impact of new programs and city	**Short:** 2021-2023	**Diversion:** TBD **GHG reduction:** TBD Determine the role of recycling depots in future

	growth on service levels Provide City Council with a service recommendation		waste management services
Provincial stewardship program review	Actively seek opportunities to participate in the review of provincial programs, beginning with the Multi-Material Recycling Program which dedicates funding for residential recycling	**Short:** 2021-2023	**Diversion:** n/a **GHG reduction:** n/a Ensure the City of Saskatoon provides input on the future of residential recycling Understand the service impacts of any changes
Construction and demolition waste diversion: community options	Research best practices for construction and demolition waste diversion policies and programs Align with the services available at Recovery Park	**Medium:** 2024-2025	**Diversion**: 700 (0.7%) – 1,200 (1.3%) tonnes per year **GHG reduction:** TBD Support the success of Recovery Park Approximately 17,000 tonnes of C&D material were buried in the Landfill in 2019
2024 Waste Characterization Study waste from City projects	Procure a comprehensive waste characterization study to determine the initial impact of new programs	**Medium:** 2024-2025	**Diversion:** n/a **GHG reduction:** n/a Understand Saskatoon's residential waste composition after the implementation of Curbside Organics and Recovery Park Identify education opportunities and challenges and future waste diversion options
Textile and apparel reduction and recycling program	Identify research or community partnership opportunities	**Long:** 2026+	**Diversion:** 45 (0.04%) - 90 (0.08%) tonnes per year **GHG reduction:** material type not available in model

	Support federal, provincial and community initiatives		
Economic incentive tools to support reduction and diversion	Monitor developments to economic incentives to improve residential reduction and diversion such as pay-per-tip for waste	**Long:** 2026+	**Diversion:** 5,000 (5%) – 16,000 (17%) tonnes per year **GHG reduction:** 3,000 – 10,000 tonnes CO2e per year

Energy Recovery

After opportunities to reduce, reuse, and recycle have been considered, energy recovery is the next most environmentally preferred option ahead of disposal in the waste hierarchy. Energy recovery can reduce carbon emissions if it offsets fossil fuel energy sources; it can also reduce the volume of waste that needs to be disposed. Energy recovery is commonly thought of as the combustion of waste through incineration, but also takes the form of pyrolysis, anaerobic digestion and landfill gas recovery.

Current Status

In Saskatoon, landfill gas management began in 2012 with the completion of a clay cap on the north mound of the Landfill. This was followed by the installation of a network of gas collection wells and construction of collection and power generation facilities. The system captures 50,000 tonnes CO_2e of emissions annually, which is equivalent to removing 11,000 cars from the road. The captured methane is either flared or converted to electricity, which is sold to SaskPower and used in a local electricity generation facility. Beyond GHG emissions reduction, 12,100 GWh of electricity was produced from Landfill gas in 2016, the equivalent of powering 1,200 homes. In 2019, the system generated $1 million in revenue for the City.

The *Integrated Landfill Management Plan* identifies several opportunities to expand landfill gas collection by drilling more wells into the Landfill for increased methane capture. With approximately 40% of the GHG emissions being destroyed by the current landfill gas system, there remain opportunities to increase capture by expanding the landfill gas wellfield. Work in 2018 expanded the horizontal wellfield to capture approximately 18,000 tonnes CO_2e/year within 3-5 years.

To improve landfill gas collection in Saskatoon, further gas well expansion at the Landfill is planned. This action is expected to be implemented by 2023.

Actions	Next Steps	Outcome
Vertical landfill gas well installation	Procurement and construction	**GHG reduction:** 25,000 tonnes CO_2e per year for 10-20 years

Opportunities and Challenges

Anaerobic digestion technology, which is currently being used at Saskatoon's Wastewater Treatment Plant, could be used in the future to process organic solid waste and produce power in a system similar to the Landfill. Proactively designing this type of system would result in greater capture efficiency and utilization of available gas compared to landfill gas collection. It should be noted that this technology was not selected for processing organics for the Curbside Residential Organics program.

Energy recovery through thermal treatment is still relatively uncommon is Canada and investment would come with risk. There are six larger scale facilities with capacity ranging

between 26,000 – 312,000 tonnes per year. Four facilities are incinerators, one gasification, and one that has waste separation technology and pyrolysis (which is still being commissioned). There is a seventh facility that currently is incineration only, with no energy recovery. The majority are in jurisdictions where their landfill was nearing its capacity, or their landfill had been decommissioned. There are also examples where municipalities have invested in waste-to-energy projects that have been unsuccessful. Edmonton's biofuel facility has never operated at expected capacity, resulting in waste being hauled to a landfill 85km away and additional investment being required in residential organics programs similar to what Saskatoon is implementing. The City of Ottawa invested in a Plasma Gas however it was never operationalized and the City investment into this work was never realized.

At the time this report was prepared, the Government of Canada and Government of Saskatchewan would not provide financial support to Saskatoon to study the feasibility or offset the capital costs of a waste-to-energy facility. The only funding opportunity for this technology is through FCM's Green Municipal Fund which requires Saskatoon to reach a 60% diversion rate before consideration. New funding may become available through the Low Carbon Economy fund, which the City will continue to monitor. The Province of Saskatchewan has indicated through *Saskatchewan's Solid Waste Management Strategy* that it will foster innovative and sustainable solutions for waste reduction, including waste to energy. The Province of Saskatchewan has not yet initiated work on this piece of its strategy and indicated that at this time it would only play a role in ensuring regulatory compliance.

The City of Saskatoon will continue to monitor technological advances in energy recovery through the Renewable Energy Strategy and will asses the feasibility of new technologies as part of the Landfill closure and replacement plan outlined as an action in the next section.

Treatment and Disposal

Following efforts to reduce, reuse, recycle, and recover energy, remaining waste is disposed in a landfill. Landfills are the most common form of waste disposal in North America. In Saskatchewan, landfills are regulated by the provincial government and are designed, built, and operated in compliance with provincial regulation to protect human and environmental health.

Current Status

The Saskatoon Landfill is an engineered waste management facility regulated by the Saskatchewan Ministry of Environment. It has been operating since 1955 and is used for both disposal and energy recovery (through collection of landfill gas). The Landfill is located within city limits and adjacent to the Circle Drive freeway creating an efficient disposal site for collection vehicles. In 2018, the Landfill airspace was valued at $75 per tonne[19] (representing the cost to operate and close the landfill plus develop a new landfill site) which is an affordable disposal rate compared to tipping fees at private landfills located near the city.

[19] Landfill Airspace Value report (2018), available at: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=27a08dd0-0bb0-476a-9179-aa9bd399a52c&Agenda=PostMinutes&lang=English#46

The cost of a new landfill is estimated at approximately $100 million, not including the closure and post-closure costs of the existing landfill. Therefore, maximizing the lifespan of the current facility is preferred. The City's *Integrated Landfill Management Plan* identifies numerous capital and operating investments required to maximize the existing airspace and ultimately achieve a 40 plus year lifespan for the existing facility. Improvements include increasing waste diversion opportunities, maximizing compaction of waste through better equipment and filling methods, developing new cell expansions, reclaiming inefficiently filled areas, and achieving steeper side slopes to maximize overall height of the Landfill.

Two private landfills operate in the RM of Corman Park (which borders the city) and accept waste generated in Saskatoon.

Opportunities and Challenges

There are many near-term opportunities to improve the City's services and infrastructure related to waste disposal. Developing a landfill service and sustainability plan that models population growth and land use patterns while also considering the impact of diversion on landfill lifespan, would provide a better understanding of future opportunities. For example, meeting diversion targets laid out in the *Low Emissions Community Plan* will add 100+ years to landfill operating life. Efforts to use the Landfill wisely, such as keeping recyclable material out, improving compaction, and using less daily cover, will continue to extend its operating life.

The two private landfills present a challenge as the City has no oversight of these facilities, and the Saskatoon's ICI sector disposes most of their garbage at these locations. Another challenge will be to ensure sustainable funding for garbage disposal as waste reduction and diversion decrease the tonnes (and associated tipping fees) at the Landfill.

To address these opportunities and challenges and to continuously improve waste management service delivery, the Plan recommends the following actions:

Actions	Next Steps	Timeline	Outcome
Recycling depots: immediate safety/contamination improvements	Identify options for safety and contamination improvements at Recycling Depots Provide City Council with a service recommendation	In progress	Alleviate safety and contamination concerns until the Recycling Depot review is complete
Requirements for storage and safe collection of waste at multi-unit buildings	Finalize "Waste Collection Design Guidelines for Residential Developments" document	In progress	Provide clear service guidelines to multi-unit developments
Emergency waste management and recycling strategy	Review disaster debris management and operations plans from other jurisdictions	**Short:** 2021-2023	Ensure equipment, infrastructure, and plans exist to handle influx of waste or service

	Build on work completed as part of COVID-19 response		disruptions from emergencies such as extreme weather or pandemics
Accessible curbside collections program	Initiate a project to explore the feasibility of alternatives to expand and alter the existing Special Needs Garbage Collection Service Provide City Council with a service recommendation	**Short:** 2021-2023	Ensure equitable access to curbside solid waste collection services for residents
Long-term waste management service and sustainability plan	Build on Compost depot and Recycling Depot reviews Explore future disposal needs, including alternate/additional waste handling/transfer stations. Explore comprehensive modeling which integrates the financial impacts of all recycling/diversion programs	**Medium:** 2024-2025	A clear understanding of the impacts waste diversion and population growth will have on the landfill capacity, revenue and related infrastructure
Residential waste cart technology	Monitor technological developments in pay per tip garbage collection in other jurisdictions Asses if a pilot project is required in Saskatoon	**Medium:** 2024-2025	Determine the ability of cart collection tracking by household
Special/bulky waste program for collection, recycling and disposal	Investigate service options to reduce illegally dumped waste and/or implement a pilot program at hot spots, such as the recycling depot	**Medium:** 2024-2025	**Diversion**: 500 (0.5%) – 1,000 (1%) tonnes per year **GHG reduction**: material type not available in model Reduction in illegal dumping
Landfill closure and replacement plan	Review results of the long-term waste management service and sustainability plan. Explore options for waste to energy after reduction and diversion options have been exhausted and a firm date is	**Long:** 2026+	A plan to provide garbage disposal once the Saskatoon Landfill reaches capacity Promote innovation by exploring alternative waste processing opportunities

established for Landfill closure

Circular Economy

The circular economy is an alternative to the current linear “take-make-dispose” economy of production and consumption. This alternative system aims to keep products, components, and materials at their highest utility and value, at all times. In practice, this translates into:

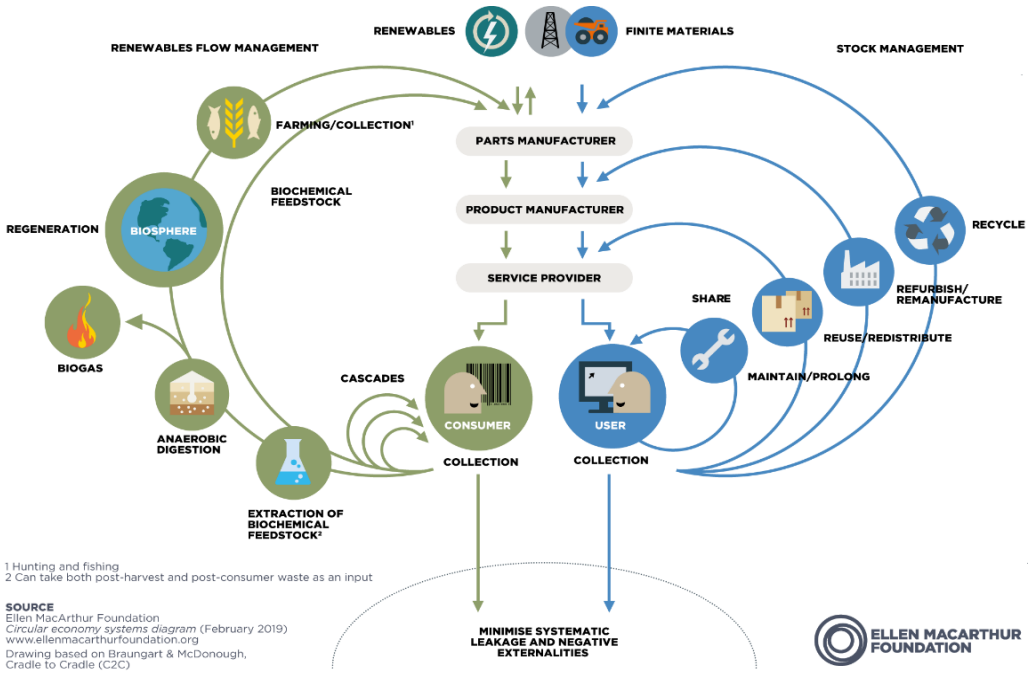
- Preventing waste through new and innovative business models or through improved design – either for disassembly or for longevity;
- Maximizing the continuation of a product’s life through enhanced reuse, repair, or remanufacture; and
- Improving end of life processing and resource recovery.

A circular approach would result in changes to waste management and reduced GHG emissions as innovative design and new business models reduce the amount of residual waste being created and expand markets for recyclable material.

Progress on the circular economy is happening through work by non-governmental organizations, governments, universities, and corporations. This work is resulting in a wealth of resources to assist planners, policy makers, and economic development entities in driving concepts within their respective communities. In particular, the Ellen MacArthur Foundation’s *Circular Economy in Cities*[20] report and the “butterfly diagram”, which depicts material flows in the circular economy (Figure 7). The report describes five policy levers (vision, engagement, urban management, economic incentives, and regulation) that can be used in combination to progress a circular economy within a city.

[20] *Circular Economy in Cities* https://www.ellenmacarthurfoundation.org/publications/circular-economy-in-cities-project-guide

Figure 7 Butterfly diagram depicting the Circular Economy, Ellen MacArthur Foundation



The circular economy concept is being integrated into waste planning and strategy throughout Canada, including in the National Zero Waste Council and the Canadian Council of the Ministers of the Environment. It is an important concept in the recently released *Canada-wide Action Plan on Zero Plastic Waste*.

Status in Saskatoon

The City is currently monitoring progress and development of the circular economy concept; in particular, how municipalities can incorporate this emerging idea into procurement, operations, and waste management. Currently, the integrated solid waste management system in Saskatoon is focused on end-of-life disposal or diversion.

Opportunities and challenges

A circular economy can be enabled by the development of “reduce and recycle actions” identified above, such as programs for food and textile waste reduction, and by supporting growth of share, reuse, and repair businesses. Additional opportunities exist through partnerships, municipal procurement, and waste planning. Municipal recycling and composting infrastructure and policies supporting share, maintenance, reuse and refurbishment will be needed to support circular economy concepts. These concepts should be considered early in municipal planning and policy development.

Cities currently advancing aspects of the circular economy, such as Phoenix[21], Charlotte[22] and Vancouver[23], have partnered with other organizations to create business incubators focused on

[21] Reimagine Phoenix: https://www.phoenix.gov/publicworks/reimagine
[22] Circular Charlotte: https://www.envisioncharlotte.com/circular-charlotte/
[23] Zero Waste 2040: https://vancouver.ca/green-vancouver/zero-waste-vancouver.aspx

circular economy start-ups. In these cases, municipal governments provide businesses with insights into waste streams and access to waste that may otherwise not be available to start-up entrepreneurs.

As a relatively new concept, it may be challenging to move circular economy ideas beyond waste management professionals into municipal planning and economic development and to gain political and public support. Since economic development is not a municipal department in Saskatoon as it is in other cities, continued partnership and collaboration with economic development organizations is important.

Tools to Support Behaviour Change

Behaviour is determined by many factors, such as values, past learning, and access to information. It is ingrained in social norms, culture, and local institutions. Increasing waste reduction and diversion requires changing deeply embedded behaviours. A combination of influencing factors is critical to cultivating behaviour change. Public buy-in, participation, and behaviour changes are key to successful waste programs and critical to ensuring the Plan's success.

In the *2019 Waste and Recycling Survey*, residents identified knowledge as a barrier to recycling more. However, the same study showed a year-over-year increase in demonstrated recycling knowledge. This highlights that while there is a desire for more information on recycling, knowledge is actually improving. A variety of tools are required to continue this positive behaviour change, meet the expectations of Saskatoon's citizens, and promote proper use of City programs and services.

Partnerships and Collaboration

Behaviour change involves building a new culture around waste. Many local institutions, community groups, and businesses believe that reducing waste will help make Saskatoon a thriving city. By continuing to build relationships, the City will work with partners and collaborators to leverage knowledge, resources, and support to change waste culture. The City currently works with a number of community groups and organizations on waste reduction and diversion, such as the Global Gathering Place, Open Door Society, Food Bank and Learning Centre and Saskatchewan Waste Reduction Council. The City has also collaborated on projects and research with waste stewardship groups, such as Electronics Products Recycling Association, Multi-Material Stewardship Western, Product Care and SARC, Federation of Canadian Municipalities, National Zero Waste Council, SARCAN, and University of Saskatchewan.

To continue our partnership and collaborations, the Plan includes ongoing actions:

- Communicate, monitor, and collaborate with community groups, University of Saskatchewan, provincial and federal governments, Saskatchewan Waste Reduction Council, and National Zero Waste Council;
- Continue to develop and submit project proposals that support the development of waste reduction and diversion policy and programs; and
- Continue to identify external funding sources, such as the Federation of Canadian Municipality's Green Municipal Fund, and submit applications.

Leading by Example

The Plan's mission is for Saskatoon to be a leader in waste reduction and diversion on the prairies. A key tool in supporting behaviour change is for the City to embody and exemplify the desired behaviour. Leading by example allows the City to demonstrate excellence in waste

reduction, allow residents to have the same diversion opportunities where they live, work and play, and diversion corporately, providing an example for the ICI sector to emulate and building a reputation as a leader in corporate sustainability. To support this, the Plan recommends several actions in sections 3.1.1 and 3.1.2.

Education & Research

Education and access to information are key to behaviour change. Program success is dependent on residents' knowledge of acceptable materials in each diversion service. The City uses research to better understand knowledge gaps. Waste audits and public surveys help the City develop education material and identify segments of the population that require further communication.

The goals of communication actions are to build awareness, educate, and encourage/motivate residents to practice better waste reduction and diversion. A variety of communication channels are used to provide waste information to the public including an online calendar and a waste diversion search engine, broad awareness campaigns on social and traditional media channels, news media, website pages, print materials, signage on carts and collection vehicles, and service alerts. These ongoing efforts better educate residents and are continually improved based on waste audits and public surveys.

To continue education and research, the Plan includes ongoing actions:

- Continue using a variety of communication channels to provide waste information to the public in order to build awareness, educate, and encourage/motivate residents to practice better waste reduction and diversion; and
- Continue the following data collection and reporting actions:
  - Annual Integrated Waste Management Report
  - National Solid Waste Benchmarking Initiative
  - Waste and Recycling Survey every two years
  - Waste Characterization Studies

Community-Based Social Marketing

Information alone is not enough to change behaviour, personalized engagement is often required. Community-Based Social Marketing (CBSM) is an approach to education and outreach that emphasizes direct personal contact among community members in order to foster positive behaviour change[24]. CBSM is used to educate the general public about single stream recycling to help reduce contamination in residential recycling carts. A number of other programs are offered that use a one-on-one approach to change behaviour. Programs include:

- **Education Rooms and School Programs:** the City's recycling service providers, Cosmopolitan Industries (Cosmo) and Loraas Recycle, provide recycling education at their facilities;

[24] Community Based Social Marketing, McKenzie-Mohr, 2011. https://www.cbsm.com/

- **Recycling Education Unit:** a mobile trailer used at festivals, events, and other public locations facilitates learning about waste diversion;
- **Newcomer Recycling and Composting Workshops:** the City educates newcomers, especially those with English as an Additional Language (EAL), about household recycling and waste management; and
- **Neighborhood Cart Blitz Program:** A tagging system used to inform residents of their recycling behaviours is designed to educate residents through the use of direct engagement.

Building a Waste Brand

Just as a variety of communication channels to provide information to residents are important, so is the consistency of the message. Residents and visitors to Saskatoon should see the same icons, fonts, colours, and plain language on communication material at home and in public. Brand consistency will help build awareness of and familiarity with waste services, ultimately reducing public confusion and fostering behaviour change.

As programs and communications continue to improve, common symbols and terminology related to Saskatoon's integrated waste management will be developed. Where possible, Saskatoon will strive to harmonize symbols and terminology with developing national standards. For example, by using nationally recognizable colour and symbols, a resident should intuitively be able to identify an organics bin in Saskatoon, Calgary or Halifax.

Enforcement

Enforcement is another tool that contributes to the success of an integrated waste management system. The City prioritizes education over enforcement; however, enforcement is useful where education falls short. It can also be adjusted over time to address specific concerns impacting the operation of waste services.

Currently, Environmental Protection Officers carry out education and enforcement actions in accordance with the Waste Bylaw, 2004. The purpose of this bylaw is to protect resident health and welfare, provide for abatement of nuisances, and protect the environment by regulating and monitoring the collection, handling, and disposal of waste and recyclable material within the City. Enforcement typically consists of a three-phase approach, beginning with education material, followed by a warning letter, and ultimately a Notice of Violation ($100 ticket).

To continue enforcement, the Plan includes ongoing actions:

- Continue a variety of enforcement actions in accordance with the *No. 8310 - Waste Bylaw, 2004* to build awareness, educate, and encourage/motivate residents to practice better waste reduction and diversion.

Economic Incentives

Economic incentives support behaviour change by providing opportunities to save money. Currently, Saskatoon households do not pay directly for waste management as it is a combination of property taxes, fixed utility charges and user fees. As such, there is no incentive to reduce the amount of waste produced or to use waste diversion programs because there are no cost savings for doing so. Although politically sensitive, economic incentives can be valuable tools to cultivate behaviour change.

In October 2018, Canada's Ecofiscal Commission released a report titled "Cutting the Waste: How to save money while improving our solid waste systems." The report focused primarily on identifying and addressing public policy issues through market-based tools to improve solid waste management in Canada. The report recommends that municipalities charge households directly for waste disposal based on volume, weight, or number of bags put out for collection. Each approach shares a common principle: households that generate less waste pay less. As a result, households have a continuous incentive to dispose of less waste.

In a report commissioned by the City, Skumatz Economic Research Associates (SERA) found that if residents paid directly for the amount of waste they produce, they would produce an estimated 17% less waste[25]. In other words, a volume-based fee for waste would lower waste generation and ensure better use of diversion programs. An alternative option, used in Europe and being piloted by the City of Calgary in 2021, is a pay-per-tip model that charges households each time they put their cart out for collection.

The SERA report informed the City Administration's recommendation of a variable cart size model for waste in 2018. Council did not support the recommendation and indicated that further work was needed to develop a household waste utility model.

To strengthen this tool, the Plan recommends continued work on collection cart technology and the development of options for economic incentives to reduce waste and improve diversion.

Triple Bottom Line

The Triple Bottom Line (TBL) Decision Making Tool was used as a high level assessment to identify the Plan's environmental, social, economic, and governance outcomes, as well as to identify opportunities to achieve even greater sustainability benefits. The results were used to identify areas that could be strengthened as the Plan was developed and will support ongoing decision making, rather than be relied upon as a fixed sustainability evaluation.

Overall, the results of Administration's TBL review indicate that:

- TBL impacts were largely unknown resulting in low scores.

[25] City of Saskatoon: Research and Recommendations on PAYT Subscription Level Shifts, Incentive Design and Organics Program Options, (2018) Skumatz Economic Research Associates, Inc. (SERA).

- There are additional opportunities that could be explored to enhance the TBL outcomes of the initiative such as equity and emergency preparedness.

A summary of results for each TBL principle and indicator are included in Appendix C of this document. To provide context, a numerical description of the outcomes are shown in the following table:

Principle	Score	Max Points	%	Max In-Scope Points	%
Environmental Health and Integrity	**25**	205	12%	135	19%
Social Equity and Cultural Wellbeing	**5**	170	3%	115	4%
Economic Prosperity and Fiscal Responsibility	**25**	165	15%	155	16%
Good Governance	**42**	140	30%	140	30%
Entire TBL Score	**97**	**680**	**14%**	**545**	**18%**

To effectively apply triple bottom line principles, the Plan must emphasize the importance of social equity and cultural well-being related to waste management. Data collection and service delivery have highlighted the disproportionate use of waste diversion services between household types and neighbourhoods in Saskatoon. This is due, in part, to low and moderate income households facing greater barriers, including access to drop off depots, access to services in multi-unit households, and outreach and awareness. This highlights the need to improve equitable access to services. Municipalities can begin by orienting their resources to help ensure that renters and homeowners – regardless of income, household type, neighbourhood, or other factors – can access waste reduction and diversion programs.

To improve equitable access to services, it is recommended that an equity lens be applied to waste programs and services. The Sustainability Division is currently developing an *Equity Toolkit* for Saskatoon which aims to identify ways to design equity into sustainability related initiatives such as water conservation, energy efficiency and generation, and waste diversion and reduction. The recommendations from the *Equity Toolkit* should be considered in waste management planning, once available.

Performance Measures

In waste management, diversion - the percentage of waste diverted from the landfill - is often used as the primary performance measure. Municipalities set a diversion target with the belief that a higher diversion rate indicates a better waste management system. The reality is that waste management and public expectations have shifted, and diversion alone is not a robust indicator of success. Diversion does not capture waste reduction actions, such as residents consuming less, businesses using less packaging, or more product reuse through garage sales, curbside swaps, and charity donations. Further, recycling is heavily reliant on economic factors, so fluctuating recycling markets around the globe can impact what materials are accepted and overall effectiveness of municipal programs.

The solid waste industry and governments are looking at additional performance measures (e.g. capture rates, waste generation by sector, greenhouse gas production) to better understand recycling program effectiveness, waste reduction, and climate impact. Additionally, the connections between waste and social equity, waterway pollution, and the climate crisis, are becoming more apparent which means other measures may be necessary to monitor the broader impacts of waste management.

This section looks at performance measures the City could use, improve or develop further, to measure progress in waste management and provide strategic direction for future program development.

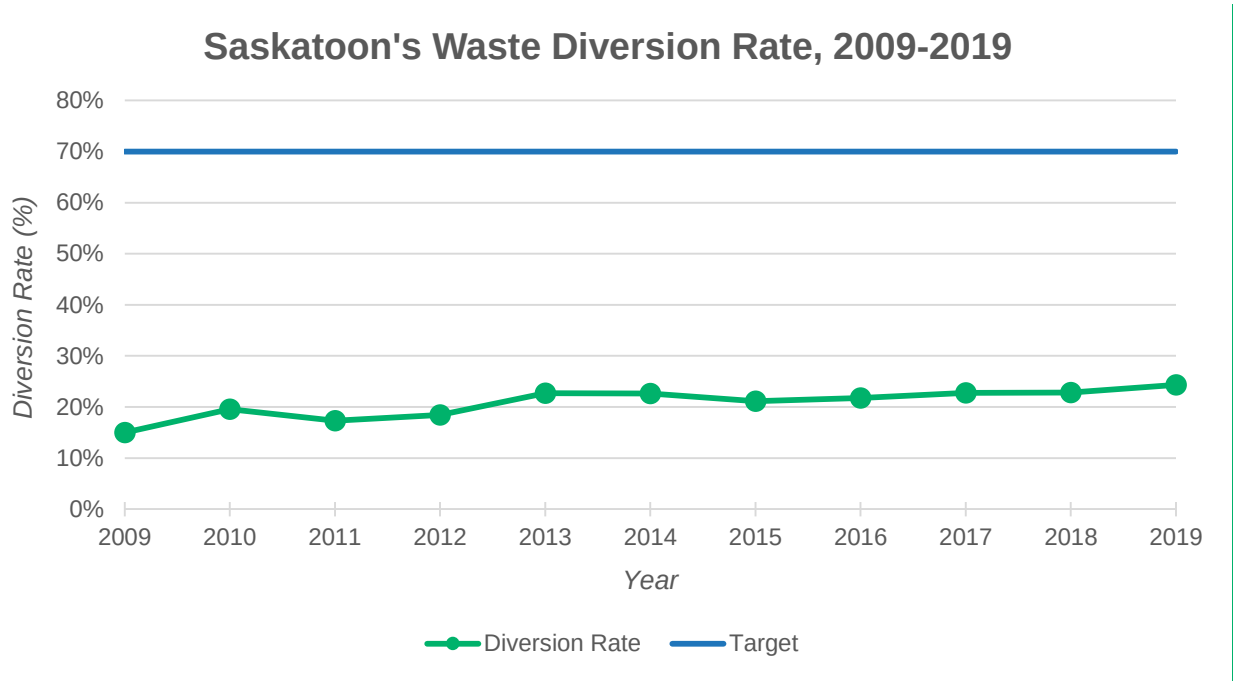
70% Waste Diversion Target

City Council adopted a 10-year 70% waste diversion target in alignment with the 2013 Strategic Goal of Environmental Leadership.

Saskatoon's current diversion rate only includes waste handled by City-run diversion efforts. It represents material diverted from Landfill disposal through programs like curbside recycling and depots, green carts, compost depots, and the household hazardous waste program. The current diversion rate is 24%, which has been relatively stable since recycling was introduced in 2013 (Figure 8).

Due to regional differences in regulation, programs, and markets, diversion rates are often calculated slightly differently from city to city, making direct comparison difficult.

Figure 8 Saskatoon's Waste Diversion Rate 2009-2019

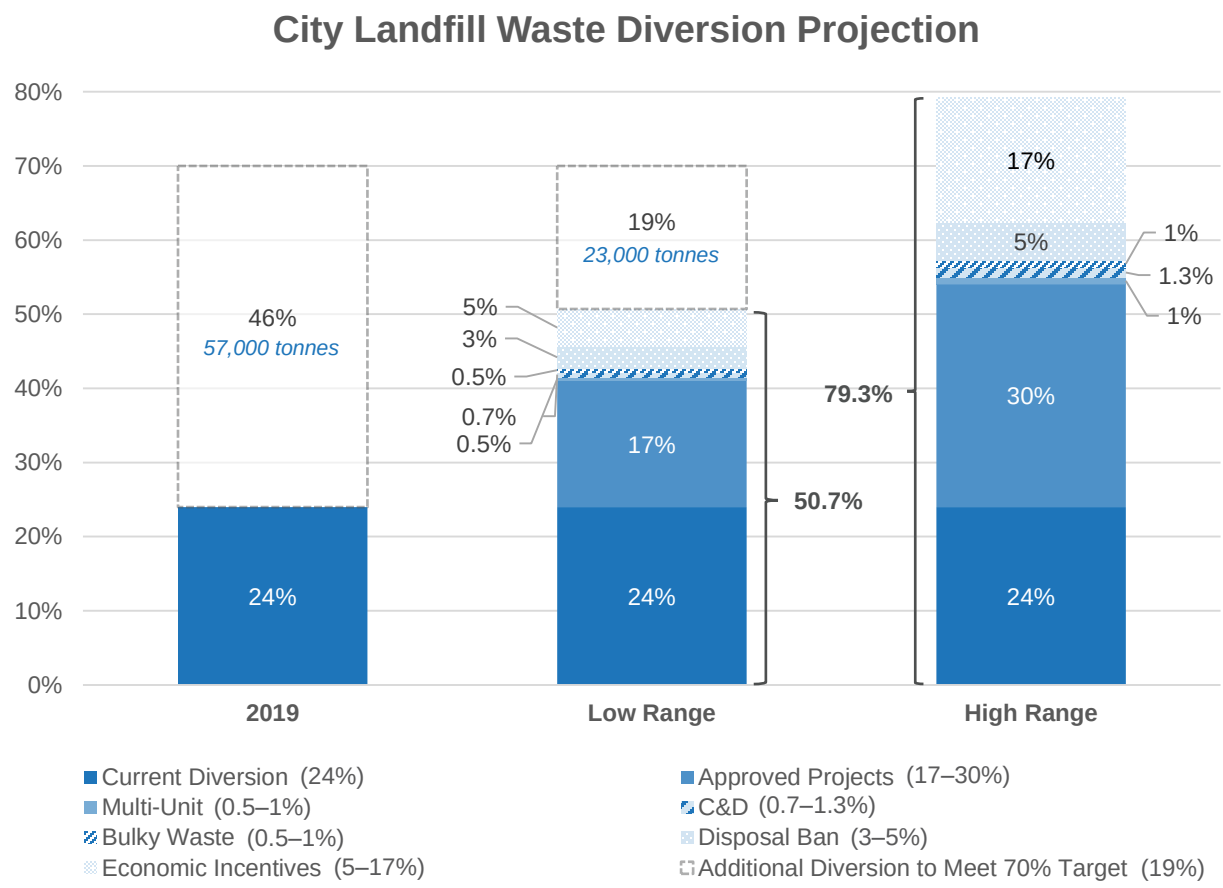


The 2017 *Waste Diversion Opportunities Report*[26] looked at the feasibility of meeting the City's target; the conclusion is that, even with development of new programs, the 70% target might not be met within the remaining timeframe. The report recommended that resources be identified, and program implementation start immediately. While some progress has been made since 2017, the City will not be able to meet its 70% target by 2023. That said, significant progress will be made through implementation of city-wide organics, Recovery Park, and mandatory recycling and organics for the ICI sector that will bring Saskatoon in line with other prairie cities.

As shown in Figure 9, the projected diversion rate – including the yet to be implemented curbside organics, ICI and Recovery Park programs - is between 40% and 53%, depending on final program design, public uptake and use of education, incentives, and enforcement in new programs. To achieve an additional 30% to 17% diversion to reach the 70% target, improved capture from existing programs is required. Diversion programs for additional material streams, such as textiles, will also be necessary, but will have a smaller impact as they make up a small fraction of the waste stream. The Action Plan (Appendix B) lays out the actions needed to meet the 70% diversion target, which may be feasible by as early as 2030.

[26] City of Saskatoon: Waste Diversion Opportunities Report (2017), Dillon Consulting

Figure 9 City Landfill Waste Diversion



Diversion Reporting Improvements

Since the City's diversion rate does not account for waste disposed at private landfills or material from private sector or provincial stewardship waste diversion programs, additional performance measures are required to fully measure understand waste generation and diversion in Saskatoon. A methodology for reporting a community-wide diversion rate will be developed in order to provide a holistic picture of solid waste management in Saskatoon.

In addition to a community-wide diversion rate, the data can be reported by sector (curbside, multi-unit, ICI) to highlight the unique services each sector requires. Improvements in sector-specific reporting requires future work to collect and manage ICI data.

Since most municipalities offer garbage, recycling, and organics collection, the diversion rate has become an industry standard performance measure commonly used to benchmark solid waste management. Comparing across municipalities is difficult, because municipalities have inconsistent methodology or variations in service level. Through the National Solid Waste Benchmarking Initiative (NSWBI), Saskatoon is participating in an industry effort to develop a consistent methodology to calculate waste diversion.

Other Performance Measures

Through the implementation of actions in the Plan, new performance measures will be identified and developed. These measures will be based on best available quantitative and qualitative information for Saskatoon and will be included as part of annual reporting through the annual *Integrated Waste Management Report* and Environmental Dashboard at Saskatoon.ca.

This report identifies three performance measures for solid waste management (greenhouse gases, capture rate and waste generation) that improve our understanding of the broader impacts of waste management and recommends putting resources towards further development of these measures.

Greenhouse Gases from Waste

The greenhouse gas (GHG) emission implications of waste management need to be included in decision making. The City currently tracks emissions associated with buried waste as part of the annual GHG emission inventory process, and estimates the emissions avoided through waste diversion actions as part of other annual reporting requirements.

Emissions associated with buried waste include fuel used by collection trucks and performance of the landfill gas system. These emissions show up in the annual GHG emission inventories in the Transportation and Waste sectors, respectively. In 2018, total emissions associated with the Waste sector (i.e., from waste buried at the City Landfill and one of the regional landfills) were 235,000 tonnes CO_2e. This value reflects the resulting emissions after subtracting emissions captured through the City's landfill gas system, which were calculated at 50,000 tonnes CO_2e.

Emission reductions associated with waste diversion actions are estimated using Environment & Climate Change Canada's *GHG Calculator for Waste Management*, which compares the GHG implications of different waste management scenarios. In 2019, total emissions avoided by diverting recyclables and organics from landfilling were estimated at 46,500 tonnes CO_2e, with approximately 89% of this total linked to recycling actions. Environment & Climate Change Canada is in the process of updating the calculator to include a full life GHG implications and it is expected to be completed in 2021.

GHG emissions related to solid waste are an important component of meeting the City's target of reducing emissions by 80% below 2014 levels by 2050. This target applies to both corporate (City of Saskatoon) and community emissions, with opportunities to divert waste from both sources. The *Low Emissions Community Plan* provides a waste management 2020-2050 cumulative emissions reduction target of 1.303 million tonnes CO2e.

Table 1 provides examples of waste management GHG emission factors from the U.S. Environmental Protection Agency Waste Reduction Model based on material type. This illustrates the impact a GHG lens can have when prioritizing waste actions and is presented as information since it has more material categories than the current Environment & Climate Change Canada's calculator.

Table 1 EPA GHG Emission Factors for Waste Management

Material	GHG Emissions per Ton of Material Source Reduced ($MTCO_2E$)	GHG Emissions per Ton of Material Recycled ($MTCO_2E$)	GHG Emissions per Ton of Material Landfilled ($MTCO_2E$)	GHG Emissions per Ton of Material Composted ($MTCO_2E$)
Newspaper	(4.68)	(2.71)	(0.82)	NA
Mixed Paper (general)	(6.07)	(3.55)	0.14	NA
Food Waste	(3.66)	NA	0.54	(0.18)
Fruits and Vegetables	(0.44)	NA	0.54	(0.18)
Dairy Products	(1.75)	NA	0.54	(0.18)
Yard Trimmings	NA	NA	(0.18)	(0.15)
Grass	NA	NA	0.13	(0.15)
Leaves	NA	NA	(0.52)	(0.15)
Branches	NA	NA	(0.50)	(0.15)
Mixed Plastics	(1.87)	(1.03)	0.02	NA
Portable Electronic Devices	(29.83)	(1.07)	0.02	NA
Mixed Metals	(3.65)	(4.39)	0.02	NA
Glass	(0.53)	(0.28)	0.02	NA
Asphalt Concrete	(0.11)	(0.08)	0.02	NA
Asphalt Shingles	(0.19)	(0.09)	0.02	NA
Dimensional Lumber	(2.02)	(2.47)	(1.01)	NA
Drywall	(0.22)	0.03	(0.06)	NA
Mixed Recyclables	NA	(2.85)	0.09	NA

Material Capture Rates

A good measure of diversion program effectiveness is the material capture rate. Capture rate determines how much recyclable material is placed in the correct cart. It is determined by calculating the amount of material captured in a recycling program compared to the overall amount of material generated. A high capture rate means residents are using the program correctly; for instance, putting recyclables in the recycling cart instead of the waste cart. One downside to measuring the capture rate, and the reason it is not used regularly, is that it can only be calculated through a comprehensive waste audit, which needs to be conducted regularly.

In 2019, the overall capture rate for recyclables was 74%, meaning that of all the recyclable material generated, 74% by weight was placed correctly in the blue cart and the other 23% was thrown in the garbage. Looking deeper at specific material types (Appendix D) we can infer that Saskatoon residents properly recycle newspaper (92% capture rate) but there is room to improve metal recycling (37% capture rate).

Waste Generation

Waste generation measures the creation of waste based on a variety of factors ranging from economic trends to federal regulation, product design and manufacturing, shipping, consumer behaviour, and population growth. Changes to any factor can directly impact waste generation. Recent examples include the move to online media reducing the volume of paper collected in recycling programs and lighter weight packaging impacting recycling tonnes. Due to the number of influencing factors, waste generation trends can be difficult to attribute to a specific program, policy, or education effort. Still, as a measure, it is a useful representation of the collective waste system.

In Canada, waste generation is tracked at the provincial scale by the federal government. To provide a useful metric, the provincial value is divided by the population to calculate a per capita value. By monitoring and reporting waste generation per capita, the City will be better prepared to measure the impact of future waste reduction actions.

The City will begin to report waste generation per capita as a performance measure to monitor progress towards Government of Canada and Province of Saskatchewan waste reduction targets[27] of:

- 30% reduction in per capita waste generation by 2030 (compared to 2014); and
- 50% reduction in per capita waste generation by 2040.

[27] Aspirational Canada-wide Waste Reduction Goal. https://www.ccme.ca/en/current_priorities/waste/waste/aspirational-canada-wide-waste-reduction-goal.html

Future Performance Measures

Additional measures that are currently unavailable due to data limitations (e.g. private haulers and landfills, material handled by stewardship groups such as SARCAN) will be developed specific to actions developed by the City. These could include:

1. Community Waste Diversion:
    - home composting
    - provincial stewardship programs
    - donations
    - community clean ups
2. Industrial, Commercial, and Institutional waste generation;
3. Share, reuse, and repair activities; and
4. Value of landfill airspace saved through diversion programs.

Funding Opportunities

The City funds its waste operations through a combination of:

- **Property taxes:** garbage and HHW collection;
- **Utility fees:** recycling fee on utility bills; and
- **User fees:** landfill tipping/entry fees, green cart subscriptions, and compost depot permits.

New waste reduction and diversion actions have been funded through a variety of mechanisms, including the Waste Minimization Reserve, Landfill Replacement Reserve, Reserve for Capital Expenditures (RCE), surplus Multi-Material Stewardship Western (MMSW) funds, and external grants. There is no dedicated funding pool for work identified in the Plan; instead, funding occurs on a project-by-project basis during municipal budgeting.

Funding

Prior to implementation, projects require funding for research, engagement, options development, implementation planning, and program start-up. Historically, funding for project development has come from a variety of sources. For instance:

- Curbside residential recycling implementation was only partially funded. The capital project went into a deficit position to pay for communications, engagement, and early implementation costs. Surplus utility funds then paid back the balance.
- Residential curbside organics capital funding was originally approved to be borrowed from a proposed waste utility in 2018. Funding was allocated from excess MMSW funds through the Waste Minimization Reserve. The 2020 budget identifies $10 million from the gas tax to fund the purchase of curbside organics bins.
- In 2019, multi-unit organics engagement and ICI waste diversion program development and engagement were both funded from surplus MMSW funding through the Waste Minimization Reserve; additional funding was allocated for implementation of ICI recycling and organics requirements from the gas tax and from RCE in the 2020 budget.

The Actions listed in the Plan will all require capital funding for planning and preparation for implementation. Operating and mill rate impacts will be brought forward for Council's consideration as program details are determined. Reserve funding could be considered to ensure funds are available in a sustained manner, alleviating the need for regular capital requests from the RCE.

Waste Minimization Reserve

The Purpose of the Waste Minimization Reserve is to accumulate funds for the purpose of funding pilot projects or to supplement existing programs related to waste minimization actions[28]. A $2 million balance limit (increased from $100,000) was approved in 2019. If this level of funding is realized, it would adequately provide funding for project development. However, a sustainable funding mechanism is required to build the reserve.

The City could use a number of opportunities to fund the Waste Minimization Reserve, including:

- Implement a dedicated waste minimization fee for all households – This approach could be explored within the current recycling utility model, even with garbage and organics still funded through property taxes. This approach is used in Calgary and Winnipeg.
- Allocate an annual contribution from property taxes or the waste utility – The City commonly uses this approach. It is the funding mechanism for the Landfill Replacement Reserve, where a contribution from the Landfill operating budget is set out in the Bylaw. Similar contributions occur to fund other reserves.
- Excess Multi-Material Stewardship Western funding – Excess MMSW funds have historically been transferred from the Waste Minimization Reserve and reallocated to other projects. This model could continue; however, in the 2020 budget, MMSW funds were used for other projects, including City-wide Solar Strategy, Property Assessed Clean Energy (PACE) Financing Program, Waste Reduction, and High Performance Building Policy[29]. In 2021, excess MMSW was allocated to the Sustainability Reserve, which has not been adjudicated at the time of this report. Further, the province has indicated that the funding model for MMSW may change (see section 5.2.1), or they may put stricter requirements on how the funding is used.

Sustainability Reserve

In 2020, City Council approved the establishment of a Sustainability Reserve. This reserve has $250,000 of seed funding approved annually for 2020 and 2021. The reserve is expected to be used for environmental sustainability actions, including emissions reduction (mitigation), improved resiliency (adaptation), and other environmental sustainability initiatives. The funds in this Reserve will be used to fund projects prioritized through criteria relating to greenhouse gas reduction, improved resiliency, green infrastructure support or enhancement, and other environmental sustainability benefits.

[28] City of Saskatoon Council Policy C03-003 Reserves for Future Expenditures: https://www.saskatoon.ca/sites/default/files/documents/city-clerk/civic-policies/c03-003.pdf
[29] 2020/2021 Business Plan and Budget Capital Prioritization Process https://pub-saskatoon.escribemeetings.com/filestream.ashx?DocumentId=105382

In 2021, funds from the Multi-Material Stewardship Western (MMSW), the body responsible for the provincial Multi-Material Recycling Program (MMRP), were allocated to the Sustainability Reserve.

Landfill Replacement Reserve (LRR)

The purpose of the Landfill Replacement Reserve is to finance the cost of replacing the City's Landfill. While this has been broadly interpreted to include landfill optimization and waste diversion in the past, it is critical that this reserve be left in place for its intended purpose of Landfill decommissioning and replacement. The LRR has a dedicated funding source through the Landfill's operating budget; it currently has a positive balance and is accumulating funds.

Opportunities to use the LRR to contribute to waste reduction actions that defer landfill replacement could be explored further through the waste management service and sustainability plan action.

Provincial Funding

The Government of Saskatchewan identified a number of funding opportunities in *Saskatchewan's Solid Waste Management Strategy*. These include a commitment to explore the potential benefits of a landfill levy to fund waste reduction and diversion efforts, to fund solid waste management actions through the Gas Tax Fund, and to review stewardship programs. The implementation of a provincial stewardship program for household hazardous waste and a review of other stewardship programs, beginning with household paper and packaging, have potentially significant implications for the City. These processes will be actively monitored.

Manitoba and Québec currently use disposal levies to fund new infrastructure such as organics processing facilities or other diversion expenses.

Federal Funding

The Federation of Canadian Municipalities (FCM) Green Municipal Fund provides matching funding for waste diversion and waste stream management plans, studies, pilot projects, and capital projects. The City used FCM funding in 2018 for a feasibility study to help develop the curbside organics program. Funding is available for projects that contribute to a 60% waste diversion rate, projects that are innovative and impactful, or projects to address specific waste stream challenges. Recent changes in the allowable level of in-kind funding from municipalities will allow more staff costs to be eligible for FCM funding.

Operational Funding:
Property Taxes or Utility Funding

Once established, waste services require ongoing operational funding. Currently, programs are funded through a mix of property tax, utility fees, and user fees. As reported in 2017[30] [31], most waste services were underfunded and required property tax increases to correct. Underfunding puts a strain on overall service delivery and makes it challenging to fund diversion projects, landfill optimization, and landfill replacement. The 2017 report states that because of inadequate funding, the Landfill Replacement Reserve was in a deficit, putting the City at risk if the Landfill needed decommissioning and replacement.

Utility funding for curbside collection of recycling was implemented as the program was introduced, and residents currently pay a monthly fee on their utility bill. The curbside residential fee fully covers the cost of the program, with some surplus placed in a Recycling Stabilization Reserve to be used as a contingency over the life of the contract. The multi-unit recycling program fee is not full cost-recovery, with MMSW fees covering the overage.

In 2018, the idea of charging utility fees for all waste services was explored[32]. This type of funding has been used in many other cities and is considered a best practice by the industry. Waste services provided to individual households are similar to water and electricity. As such, they are categorized as a private good, distinguished from public goods such as parks, roads, and fire protection and common goods such as swimming pools or public transit. This idea was explained in depth in the discussion paper, *Using the Right Instruments to Pay for the Right Services*[33]. The paper points out that not only does utility funding provide sustainable funding, it has also been shown to change behaviour and encourage better use of diversion services when a variable rate is used.

In 2018, City Council decided not to pursue a variable rate for garbage based on cart size; however, a more accurate volumetric measurement such as charging per tip could be explored further as technology improves.

[30] Waste Management Master Plan – State of Waste: https://pub-saskatoon.escribemeetings.com/filestream.ashx?DocumentId=42764
[31] Expanding the Waste Services Utility – Key Considerations: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=4d4c82d9-da17-4b4a-8a34-cdce348f9fb9&Agenda=PostMinutes&lang=English&Item=81
[32] Waste Services Utility Design Options: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=49dce5e1-bce9-42d1-ac0b-eef07bbff9b4&Agenda=PostMinutes&lang=English&Item=39
[33] Using the Right Instruments to Pay for the Right Services: Principles, Concepts, and Ideas on how the City of Saskatoon Should Deliver and Pay for the Collection and Disposal of Solid Waste: https://pub-saskatoon.escribemeetings.com/filestream.ashx?DocumentId=35647

Multi-Material Stewardship Western

MMSW provides funds to municipalities in Saskatchewan for the collection of recyclables through the Multi-Material Recycling Program (MMRP). MMSW funding is provided as a fixed rate per household. This program responds to province's *Household Packaging and Paper Stewardship Program Regulations*.

The MMSW funding program has been in place since 2016. Funds are typically allocated to offset the Multi-Unit Residential Recycling (MURR) Program; they have also been used for the compost depots and the green cart program. Surplus goes to the Waste Minimization Reserve or Sustainability Reserve to fund other waste diversion initiatives as described above.

While the MMSW Services Agreement between the City and MMSW clearly articulates the auditable reporting requirements for proving that appropriate recycling services are being provided to the households for which claims are made, it does not specify how MMSW funds need to be spent.

A provincial review of the household paper and packaging stewardship program is planned for 2021, which may change the availability and allocation of this funding source. For instance, the province of British Columbia's move to a full producer responsibility stewardship model resulted in most curbside recycling programs being operated by a provincial entity.

Changes to the funding model for the household paper and packaging stewardship program at the provincial level will significantly impact how the City funds its waste programs. Currently, a utility fee is charged to residents to pay for recycling programs; MMSW funds are meant to offset these costs but the City has control over how funds are spent.

If the province switches to directly funding recycling, as in British Columbia, the City will need to review its funding model for waste programs. It may be an opportunity to consider introducing utility funding for other waste services. Curbside and multi-unit residents are accustomed to paying a recycling utility fee; if MMSW directly funds recycling, this fee will no longer be necessary, but could be kept in place to fund waste and organics, or waste diversion programming.

Appendix A: Chronology of Saskatoon's waste management milestones

The Plan was developed by reviewing the previous waste management planning efforts, public engagement results, and Council directives outlined below.

Year	
2002	▸ Subscription Green Cart begins ▸ Leaves and grass depots open
2006	▸ First Waste Characterization Study ▸ Engagement on, and development of, the *Saskatoon Waste and Recycling Plan* ▸ Compost depots open
2007	▸ *Saskatoon Waste & Recycling Plan* approved
2008	▸ Transition to individual curbside garbage carts
2011	▸ *Saskatoon Speaks* Community Vision, establishing the waste vision: We produce less waste and recycle or compost most of it
2012	▸ Landfill gas collection begins
2013	▸ Curbside recycling begins
2014	▸ Multi-unit recycling begins
2015	▸ *Environmental Policy C02-036* update ▸ City Council approves Membership in the National Zero Waste Council ▸ City Council sets a Waste Diversion Performance Measure of 70% by 2023
2017	▸ *Waste Diversion Opportunities Report* and city-wide characterization study results
2018	▸ Curbside[34] and multi-unit[35] organics and waste utility engagement; approval of curbside organics program ▸ *Strategic Plan 2018-2021* ▸ *Procurement Policy C02-045* approved; includes consideration of economic, environmental and social sustainability
2019	▸ *Residential Waste* Survey ▸ Industrial, Commercial and Institutional (ICI) sector engagement ▸ *Low Emissions Community Plan* ▸ Corporate Adaptation Plan ▸ *Triple Bottom Line Council Policy C08-001* approved
2020	▸ *Official Community Plan – Bylaw 8769* redesign ▸ Approval of ICI regulatory approach

[34] Changes to Waste Management in Saskatoon: Engagement Results: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=45d99a17-70cf-4ab0-86e8-3d6a5dc88ca5&Agenda=Merged&lang=English&Item=26

[35] Multi-Unit Residential Proposed Changes to Waste Management – Engagement Results: https://pub-saskatoon.escribemeetings.com/Meeting.aspx?Id=8eb7539b-7aab-42a6-be61-027b3177f4c1&Agenda=Merged&lang=English&Item=20

Appendix B: Action Plan

The following implementation plan outlines short, medium and long-term actions recommended in the *Solid Waste Reduction Plan*. As well as projects currently under development/in progress.

Overview

In Progress

- Residential Curbside Organics
- Requirements for businesses and organizations (ICI) to divert recyclables and organics
- Recovery Park
- Recycling depots: immediate improvements
- Provincial household hazardous waste regulation
- Requirements for storage and safe collection of waste at multi-unit buildings
- Vertical landfill gas well installation

Short Term Actions: 2021-2023

- Accessible curbside collections program
- Business and organization waste diversion regulation compliance
- Emergency waste management and recycling strategy
- Compost depot program review
- Mandatory residential multi-unit organics
- Construction and demolition waste diversion: City of Saskatoon options
- Recycling market development for Recovery Park
- Disposal ban at the Saskatoon Landfill
- Recycling depot program review
- Waste reduction through procurement and specifications
- Federal single-use plastic ban and performance standards for plastics
- Provincial stewardship program review

Medium Term Actions: 2024-2025

- Waste management service and sustainability plan
- Residential waste cart technology
- Special/bulky waste program
- Construction and demolition waste diversion: community options
- Public space and event waste reduction
- Food waste reduction program
- 2024 Waste characterization study
- 2025 Solid Waste Reduction & Diversion Plan update

Long Term Actions: 2026+

- Share, reuse, and repair program
- Textile and apparel reduction and recycling program
- Economic incentive tools to support reduction and diversion
- Landfill closure and replacement plan: waste to energy assessment

Details

In Progress

Initiative	Key Actions	Details
Residential curbside organics	▸ Complete organics processing procurement ▸ Develop capital purchase plan ▸ Develop implementation, education and communications plan	**Implementation:** 2023 **Diversion:** 15,000 (8%+) - 22,000 (12%+) tonnes per year **GHG reduction:** 12,000 - 17,000 tonnes CO_2e per year
Requirements for businesses and organizations (ICI) to divert recyclables and organics	▸ Waste Bylaw update ▸ Develop education resources ▸ Communication and phase-in of requirements	**Implementation:** 2022-2024 **Diversion:** 5,400 tonnes per year (City landfill) 38,000 tonnes per year (private landfills) **GHG reduction:** 38,000 tonnes CO_2e per year
Recovery Park	▸ Develop materials business plan ▸ Develop site operations plan ▸ Construction and site commissioning	**Implementation:** 2023 **Diversion:** 5,000 (4%) – 17,000 (13%) tonnes per year **GHG reduction:** 8,400 tonnes CO_2e per year
Recycling depots: immediate safety/contamination improvements	▸ Identify options for safety and contamination improvements at Recycling Depots ▸ Provide City Council with a service recommendation	Alleviate safety and contamination concerns until the Recycling Depot review is complete
Provincial household hazardous waste regulation	▸ Monitor and actively participate in implementation of the provincial regulation	Prepare for the launch of provincial stewardship program in 2021 Collaborate with stewards on a permanent depot at Recovery Park
Requirements for storage and safe collection of waste at multi-unit buildings	▸ Finalize "Waste Collection Design Guidelines for Residential Developments" document	Provide clear service guidelines to multi-unit developments
Vertical landfill gas well installation	▸ Procurement and construction	**GHG reduction:** 25,000 tonnes CO_2e per year for 10-20 years

Short Term (2021-2023)

Action	Next Steps	Outcome
Accessible curbside collections program	Initiate a project to explore the feasibility of alternatives to expand and alter the existing Special Needs Garbage Collection Service Provide City Council with a service recommendation	Ensure equitable access to curbside solid waste collection services for residents
Business and organization waste diversion regulation compliance	Conduct an operational analysis and needs identification for City facilities to comply with the incoming regulation Collaborate with Facilities Management to develop a business plan to deliver recycling and organics services at City facilities	**Diversion:** negligible, as many facilities currently recycle Demonstrate leadership and ensure compliance with the mandatory recycling requirement for the ICI sector **GHG reduction:** 431 - 980 tonnes CO2e per year
Emergency waste management and recycling strategy	Review disaster debris management and operations plans from other jurisdictions Build on work completed as part of COVID-19 response	Ensure equipment, infrastructure, and plans exist to handle influx of waste and service continuation during emergencies such as extreme weather events or pandemics
Compost depot program review	Understand the impact of new programs and city growth on service levels Engage with users Provide City Council with a service recommendation	Determine the role of compost depots in future waste management services
Mandatory residential multi-unit organics	Complete “Multi-Unit Residential Proposed Changes to Waste Management” reporting in late 2020 or early 2021 with multi-unit organics options and recommendation	**Diversion:** 600 (0.5%) - 900 (1%) tonnes per year **GHG reduction:** 431 - 980 tonnes CO_2e per year
Construction and demolition waste diversion: City of Saskatoon options	**Short-term**: develop business case for engagement and research **Medium-term**: Implementation Align with Recovery Park operation	**Diversion:** 700 (0.7%) – 1,200 (1.3%) tonnes per year **GHG reduction:** TBD Support the success of Recovery Park

		Approximately 17,000 tonnes of C&D material were buried in the Landfill in 2019
Recycling market development for Recovery Park	Develop a business case to resource engagement and research Consider opportunities as part of Recovery Park (ex. bulky waste) Assess community partnership and social enterprise opportunities	Provide partnerships and incentives to recycle difficult material. Prepare a Civic Re-use Policy to support the beneficial re-use of materials diverted at Recovery Park in civic projects and operations, such as concrete, asphalt shingles, glass, porcelain, compost, and wood waste.
Disposal ban at the Saskatoon Landfill	**Short-term:** develop a business case to resource engagement and research Provide City Council with a service recommendation **Medium-term:** Implementation Develop an approach for a disposal ban at the Saskatoon Landfill for any materials where diversion opportunities are in place for all sectors	**Diversion:** 2,500 (3%) – 5,000 (5%) tonnes per year **GHG reduction:** 1,500 – 3,000 tonnes CO2e per year Encourage similar landfill bans at a regional level by working with other landfills operating in the region and the provincial government
Recycling depot program review	**Short-term**: develop a business case to resource engagement and research Understand the impact of new programs and city growth on service levels Provide City Council with a service recommendation	Determine the role of recycling depots in future waste management services
Waste reduction through procurement and specifications	Support waste reduction and diversion in sustainable procurement through the implementation of the Triple Bottom Line policy	Influence waste reduction and recycling markets through procurement policies
Federal single-use plastic ban and performance standards for plastics	Participate in federal engagement opportunities Consider impacts of ban and performance standards for plastics on waste management services	Understand the impacts of the Federal Governments 2021 single-use plastic ban and new performance standards for plastics on waste management programs

Provincial stewardship program review	Actively seek opportunities to participate in the review of provincial programs, beginning with the Multi-Material Recycling Program which dedicates funding for residential recycling	Ensure the City of Saskatoon provides input on the future of residential recycling Understand the service impacts of any changes

Medium-term (2024-2025)

Actions	Next Steps	Outcome
Long-term waste management service and sustainability plan	Build on Compost depot and Recycling Depot reviews Explore future disposal needs, including alternate/additional waste handling/transfer stations. Explore comprehensive modeling which integrates the financial impacts of all recycling/diversion programs	A clear understanding of the impacts waste diversion and population growth will have on the landfill capacity, revenue and related infrastructure
Residential waste cart technology	Monitor technological developments in pay per tip garbage collection in other jurisdictions Asses if a pilot project is required in Saskatoon	Determine the ability of cart collection tracking by household
Special/bulky waste program for collection, recycling and disposal	Investigate service options to reduce illegally dumped waste and/or implement a pilot program at hot spots, such as the recycling depot	**Diversion**: 500 (0.5%) – 1,000 (1%) tonnes per year **GHG reduction**: material type not available in model Reduction in illegal dumping
Construction and demolition waste diversion: community options	Research best practices for construction and demolition waste diversion policies and programs Align with the services available at Recovery Park	Diversion: 700 (0.7%) – 1,200 (1.3%) tonnes per year Approximately 17,000 tonnes of C&D material were buried in the Landfill in 2019
Public space and event waste reduction	Develop business case to resource engagement and research	Require festivals and events that occur on City property to meet waste diversion criteria
Food waste reduction program	Align with development of a City Food Policy Support federal, provincial and community initiatives Develop a business case to pilot a program to redirect edible food waste	Reduce food waste. Redirect edible food to support people in our community. Divert unavoidable food waste

2024 Waste Characterization Study	Procure a comprehensive waste characterization study to determine the initial impact of new programs	Understand Saskatoon's residential waste composition after the implementation of Curbside Organics and Recovery Park. Identify education opportunities and challenges and future waste diversion options.
2025 Waste Reduction and Diversion Plan Update	Identify and prioritize waste management actions for 2026 - 2030 with an increased focus on reduce and reuse following the establishment of core diversion services	Updated Solid Waste Reduction & Diversion Plan

Long-term (2026+)

Actions	Next Steps	Outcome
Share, reuse, and repair program	Explore opportunities for research partnership Support federal, provincial and community initiatives	Improve waste reduction by increasing the longevity of items in use
Textile and apparel reduction and recycling program	Identify research or community partnership opportunities Support federal, provincial and community initiatives	Diversion: 45 (0.04%) - 90 (0.08%) tonnes per year GHG reduction: material type not available in model
Economic incentive tools to support reduction and diversion	Pilot, research, and develop options for economic incentives to improve residential reduction and diversion such as pay-per-tip for waste	Diversion: 5,000 (5%) – 16,000 (17%) tonnes per year GHG reduction: 3,000 – 10,000 tonnes CO2e per year
Landfill closure and replacement plan	Review results of the long-term waste management service and sustainability plan Explore options for waste to energy after reduction and diversion options have been exhausted and a firm date is established for Landfill closure	A plan to provide garbage disposal once the Saskatoon Landfill reaches capacity Promote innovation by exploring alternative waste processing opportunities

Appendix C: Triple Bottom Line Review

Process and Methodology

Administration used the City of Saskatoon's Triple Bottom Line (TBL) Decision Making Tool in order to comply with *Council Policy C08-001 - Triple Bottom Line*.

This review is meant as a high level assessment to identify the initiative's environmental, social, economic, and governance outcomes, as well as to identify opportunities to achieve even greater sustainability benefits. The results are meant to support ongoing decision making, rather than be relied upon as a fixed sustainability evaluation.

Caveats and Limitations

Some TBL areas were considered out of scope, including items that were not contingent on and/or influenced by the initiative: Water conservation; Green buildings and land use; Sustainable transportation; Light pollution; Housing; and Leisure Activities.

Results & Findings

Overall, the results of Administration's TBL review indicate that:

- There are additional opportunities that could be explored to enhance the TBL outcomes of the initiative (see the "For Further / Future Consideration" sections later in this document).
- Additional consultation at the onset of each action would be required to achieve TBL outcomes.

A summary of results for each TBL principle and indicator are included in the subsequent section of this document. To provide context, a numerical description of the outcomes are shown in the following table:

TBL Score	TBL Outcome
Below 0%	Not Meeting Expectations
0-19%	Needs Improvement
20-39%	On-Track
40-59%	Meeting Expectations
60-79%	Exceeding Expectations
Above 80%	Leading the Way

Principle: Environmental Health and Integrity

TBL Outcome (by Principle)

Solid Waste Reduction and Diversion Plan:

Principle	Score	Max Points	%	Max In-Scope Points	%
Environmental Health and Integrity	25	205	12%	135	19%

TBL Outcomes (by Indicator)

Indicator	Solid Waste Reduction and Diversion Plan
Renewable Energy	▸ No Impact / Not Applicable
Conservation of Resources	▸ Positive impact on the sharing economy and reduced consumption of raw resources.
Climate Change Mitigation and Adaptation	▸ Positive impact on greenhouse gas reduction. ▸ Unknown impacts for adaptation.
Green Buildings and Sustainable Land Use	▸ Mostly not applicable. ▸ Unknown impacts for connectivity for current or existing assets.
Sustainable Transportation	▸ Mostly not applicable. ▸ Supports sharing initiatives and electric vehicles in city operations.
Healthy Ecosystems	▸ Many unknown impacts. ▸ Opportunity to collaborate with Green Infrastructure Strategy during program development.
Clean Air, Water, and Land	▸ Proper waste management prevents the release of harmful toxins into the environment. ▸ Does not rehabilitate contaminated sites.
Waste Reduction and Diversion	▸ Significant benefits and positive impacts.
Storm Water Management	▸ Meets standard.
Sustainable Food System	▸ Area of significant opportunity as food waste is a large part of Saskatoon's current garbage composition.

For Further / Future Consideration

- Renewable energy and climate adaptation are areas that could be considered in the future.
- Impacts on healthy ecosystems are largely unknown due to a lack of expertise in this area and future collaboration with the Green Infrastructure Strategy would help better understanding the potential impacts of these areas.

Principle: Social Equity and Cultural Wellbeing

TBL Outcome (by Principle)

Principle	Score	Max Points	%	Max In-Scope Points	%
Social Equity and Cultural Wellbeing	5	170	3%	115	4%

TBL Outcomes (by Indicator)

Indicator	Solid Waste Reduction and Diversion Plan
Equity and Opportunity	▸ Unknown impacts.
Diversity and Inclusion	▸ Unknown impacts.
Heritage, Arts, and Culture	▸ Unknown impacts.
Self Sufficiency and Living with Dignity	▸ Meets minimum standard. ▸ Can provide employment opportunities.
Health and Wellbeing	▸ Positive impacts. ▸ Clean community.
Safety and Resiliency	▸ Unknown impacts.
Civic Participation	▸ Not applicable. ▸ Creates volunteers opportunities in the community.
Recreation	▸ Positive impact. ▸ Promotes a clean and beautiful community.

For Further / Future Consideration

- Equity and opportunity, diversity and inclusion, heritage, arts and culture and safety and resiliency provide opportunities that could be considered in the future.
- Impacts on these indicators are largely unknown due to a lack of expertise in this area and program development and pilot programs could be focused on better understanding the potential impacts of these areas.

Principle: Economic Benefits

TBL Outcome - by Principle:

Principle	Score	Max Points	%	Max In-Scope Points	%
Economic Prosperity and Fiscal Responsibility	25	165	15%	155	16%

TBL Outcomes - by Indicator:

Indicator	Solid Waste Reduction and Diversion Plan
Innovation	▸ Positive impacts.
Sustainable Procurement	▸ Positive impacts.
Financial Planning and Resourcing	▸ Many of the long term financial impacts are unknown at this time and will be assessed through the budget process.
Affordability for Users	▸ Unknown impacts.
Support the Local Economy	▸ Positive impacts. ▸ Potential to improve through implementation of the plan.
Asset Management	▸ Meets minimum standards.
Skills and Training	▸ Unknown impacts.
Labour Rights and Employment	▸ Meets minimum standards.

For Further / Future Consideration

- Innovation and procurement are key to successful implementation of the plan.
- Circular economy concept is important to plan.

Principle: Good Governance

TBL Outcome - by Principle:

Principle	Score	Max Points	%	Max In-Scope Points	%
Good Governance	42	140	30%	140	30%

TBL Outcomes - by Indicator:

Indicator	Solid Waste Reduction and Diversion Plan
Ethical and Democratic Governance	▸ Positive impact. ▸ Not meeting target set in 2015.
Effective Service Delivery	▸ Positive impacts.
Education, Communication, Engagement, Capacity Building	▸ Positive impacts ▸ Supported by public engagement.
Monitoring, Reporting and Compliance	▸ Positive impacts. ▸ Annual reporting and benchmarking.
Agility and Adaptiveness	▸ Plan will be iterative.
Roles, Responsibilities and Rewards	▸ Meets minimum standard.

For Further / Future Consideration

- Improvements to data tracking and performance measures are recommended in the plan.

Appendix D: Material Capture Rates

Table 2 Material Capture Rates, 2019 Waste Characterization Study

Material Category	Recycled kg/hh/wk	Generated kg/hh/wk	Capture Rate %
Newspaper - Daily and Weekly	0.12	0.13	94.88%
Newsprint - Other	0.41	0.45	90.77%
Telephone Books	0.02	0.03	90.06%
Magazines & Bound Materials	0.11	0.13	84.37%
Mixed Fine Paper	0.14	0.32	43.38%
Shredded Paper	0.01	0.01	65.64%
Other Paper - Non-obligated	0.02	0.05	35.24%
Corrugated Cardboard	0.56	0.65	86.10%
Boxboard / Cores	0.32	0.48	67.49%
Kraft Paper	0.02	0.07	34.43%
Molded Pulp	0.03	0.06	54.65%
Polycoat Hot Beverage Cups	0.005	0.02	20.58%
Polycoat Cold Beverage Cups	0.002	0.02	9.23%
Icecream Containers	0.002	0.01	11.72%
Spiral Wound Containers	0.01	0.02	48.80%
Gable Top Containers - Beverage	0.01	0.01	56.58%
Gable Top Containers - Non-beverage	0.001	0.002	34.48%
Aseptic Containers - Beverage	0.003	0.01	34.32%
Aseptic Containers - Non-beverage	0.003	0.005	62.93%
#1 PET Bottles - Beverage	0.01	0.03	52.44%
#1 PET Bottles - Non-beverage	0.03	0.07	37.55%
#1 PET Thermoform	0.05	0.09	49.18%
#2 HDPE Beverage	0.01	0.02	57.76%
#2 HDPE Non-beverage	0.04	0.07	53.22%
#2 Other HDPE Containers	0.005	0.02	30.11%
#3 PVC	0.0003	0.001	42.44%
#5 PP	0.04	0.11	38.37%
#6 PS Non-expanded	0.01	0.03	31.65%
Aluminum - Beverage Cans	0.01	0.02	38.83%
Aluminum Foil	0.001	0.04	3.61%
Steel Beverage Cans	0.0003	0.003	10.48%
Steel Food Cans	0.06	0.11	56.16%
Glass Beverage Containers	0.07	0.11	65.35%
Glass - Non-beverage	0.12	0.21	55.43%
Overall capture Rate - All Recyclables	2.26	3.42	65.93%

Since paper and cardboard represent a significant amount of material placed in the blue cart (69% of material by weight) the high capture rate of these materials means that the overall program effectiveness is good. Capture rates can be useful in identifying items for public education campaigns to incrementally improve program effectiveness.