PW14.2 - Attachment 1

Attachment 1 – Final Long Term Waste Management Strategy

Waste Strategy Highlights

Initiation of the City of Toronto's Long Term Waste Management Strategy

Waste management and diversion programs in the City of Toronto (the City) have significantly evolved over time. In 2013, City Council recognized the need for an updated comprehensive long term waste management plan and commissioned the development of a Long Term Waste Management Strategy (Waste Strategy). Since 2014, the City has been working through a comprehensive technical evaluation process supported by widespread public and stakeholder engagement activities to develop this Waste Strategy document. Policies, programs and technological options and best practices for new and emerging waste reduction, diversion and disposal methods were considered and evaluated. The Waste Strategy recommends waste reduction, reuse, recycling, recovery and residual disposal policies and programs, in that order, that are cost-effective, socially acceptable and environmentally sustainable for the long term.

Waste Strategy Vision and Guiding Principles to Navigate the Future System

A successful Waste Strategy reflects the interests of the community that it serves, now and in the future. It is driven by a Vision Statement and Guiding Principles that express a philosophy of what the Waste Strategy will strive to achieve and what will be important in making decisions along the way. The following City Council approved vision statement was developed for the future of the City's Integrated Solid Waste Management System.

> *"Together we will reduce the amount of waste we generate, reuse what we can, and recycle and recover the remaining resources to reinvest back into the economy. We will embrace a waste management system that is user-friendly, with programs and facilities that balance the needs of the community and the environment with long term financial sustainability. Together, we will ensure a safe, clean, beautiful and healthy City for the future."*

This vision statement will be used in concert with eight guiding principles developed to support decision making in the future as the Waste Strategy is implemented.

Maximizing the Life of Green Lane Landfill

The development of the Waste Strategy placed a priority on maximizing the life of Green Lane Landfill by minimizing the amount of garbage sent for disposal. Factors that have led to updated estimates of the life of Green Lane Landfill, to approximately 2040, include:

- The new series of 5Rs (Reduce, Reuse, Recycle, Recover, Residual Disposal) options being recommended through the Waste Strategy has the potential to further extend the life of the landfill.
- A refinement of the projections of material to be received at Green Lane Landfill.
- A review of current landfill operations has revealed that the settlement rate of materials in the site is occurring at a greater rate than initially estimated. The rate of settlement is contingent on the composition of the waste and the analysis suggests that the current rate of settlement will continue.

A Commitment to Prioritizing the Waste Hierarchy through Reduction, Reuse and Recycling

The Waste Strategy places emphasis on waste reduction, reuse and recycling (the 3Rs) activities to promote the importance of resource conservation and to reduce environmental impact. The recommended waste reduction programsrequire minimal capital investment and when combined with education and enforcement have the potential to significantly reduce the amount of material requiring management by the City,once fully implemented.

The Waste Strategy recommends five new reduction, reuse and recycling focused programs for early implementation that address food waste reduction, textiles diversion, sharing and reuse opportunities and support community based waste exchange programs.

Leveraging Programs and Services Already in Place in order to Further Improve Waste Diversion Potential

The City of Toronto Solid Waste Management Services efficiently and effectively operates a world class system, particularly when considering the size and variability of its customer base (e.g. ~50 per cent of the City's population resides in multi-residential buildings), materials collected, and complexity in the system. However, there is always room for improvement. The Waste Strategysupports the City's integrated waste management system by highlighting the potential of existing programs, infrastructure and services in place that will assist in achieving a70% residential waste diversion rate. Additional diversion can be achieved through processing residual waste after source separation of Blue Binrecyclingand Green Bin organics from the garbage stream. Achieving a 70% residential waste diversion ratewould make Toronto a leader amongst similar-sized cities in North America and world-wide. During the first five years of the Waste Strategy, emphasis will be placed on improving the performance of the current integrated waste management system by focusing on improving participation and ensuring proper utilization of existing programs and services.

Enforcement coupled with ongoing education and engagement of existing programs, services and by-laws will improve system performance and divert significant amounts of material currently being landfilled.

Waste Strategy Options for Multi-Residential Buildings

The Waste Strategy has identified options that are specific to the multi-residential customer base to improve participation and ensuring proper utilization of existing programs and services. This is especially important in the multi-residential sector where opportunities for greater participation and decreased contamination exist. Most new households constructed in City of Toronto consists oflow and high rise multi-residential buildings with condominium ownership as well as rental units, which makes this sector increasingly important in achieving waste reduction and diversion goals. Options targeting the multi-residential sector include organics management; waste collection methods; and planning, policies and enforcement. A significant element of these recommendations includes extensive promotion, education and enforcement to the residents, property managers and superintendents to ensure program comprehension and compliance. Waste from multi-residential buildings will be the primary source of material for a Mixed Waste Processing Facility with Organics Recovery, should it be deemed necessary.

Strategic System Planning to Minimize the Need for New Capital Infrastructure Investments

The Waste Strategystrategically recommends deferring the need for new capital infrastructure investment (such as energy from waste and other emerging technologies) by placing emphasis on residents and non-residential customers of the City to “do the right thing” by reducing the amount of waste they generate and ensuring participation in already existing programs.

In later years of the Waste Strategy implementation, a Mixed Waste Processing Facility with Organics Recovery is being recommended for further consideration as a final step to recover additional divertible resources before landfilling. Testing of this option is being recommended in the early years of the Waste Strategy to determine the diversion rates which can be achieved. Construction of a full scale facility would only be consideredafter the 5year review combined with the completion of a supporting business case to proceed. This allows sufficient time to collect data to determine the success of the Waste Strategy, as well as any impacts resulting from the promulgationof the *Waste-Free Ontario Act* and its proposed regulations on the waste stream in the City, and to reassess the need for additional processing and resource recovery technologies in the system.

Working Together with Community Partners to Enhance Access to Diversion Programs, Collaborate in Service Delivery and Increase Citizen Engagement to Support Sustainable Solid Waste Management Practices

The Waste Strategy recommends a number of different options where the involvement of community partners will be critical tothe successful delivery of these new programs. The options should enhance, not duplicate, the work already being undertaken by the non-profit sector. This will be of particular importance when considering new reuse initiatives such as swap events and waste exchanges. This approach respects the City's

diverse population and civic identity through supporting collaboration amongst community members which share neighbourhoods and also fosters opportunities where people can share experiences from within their social organizations.

Maintaining Flexibility for Future Changes to the Waste Management Landscape

Waste management systems are in a constant evolution with new technologies and approaches becoming available, changes in consumer buying habits and product packaging and new advances in environmental protection and governing legislation. All these changes require a Waste Strategy that has specific goals but is flexible to adapt to a constantly changing environment in which the system operates. The timing of some recommended options considers the implications of the *Waste-Free Ontario Act*and the Provincial Waste Reduction Strategy required in the legislation and the potential impacts it may have on how waste is managed in the future.

Service, Stewardship and Commitment in Continuing to Deliver High Quality and Cost Effective Customer Service for Waste Management Programs

A new cost allocation and sustainable rate model has been developed to support implementation of the Waste Strategy.This new model will ensure that high quality services, stewardship over the City's waste management practices and commitment to cost efficient services being provided are fair and reasonable.

Minimizing Wasted Resources

A Zero Waste goal prioritizes waste prevention to minimize the amount of waste requiring disposal and focuses on conserving resources and building a circular economy. A circular economy shifts the way waste is viewed. It requires a change in how waste is viewed, how products and packaging are designed, and how waste is managed to maximize resource recovery.The Waste Strategy makes a commitment to minimizing wasted resources, through an investment in programs targeting waste reduction and reuse, and an aspirational goal of working towards Zero Waste. This goal is further supported through the development of a Unit for Research, Innovation & a Circular Economyto find new markets and uses for waste and look at other leading practices and social research to reduce waste. Progress toward Zero Waste was strongly supported throughout the development of the Waste Strategy through consultation and represents a shift in thinking from the traditional linear approach to waste management and disposal to innovative ways to conserve and recover resources.

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1 Importance of Having a Waste Strategy

Waste management and diversion programs in the City of Toronto (the City) have evolved from simple garbage collection to a complex system of collecting source separated materials including Blue Bin recycling, Green Bin organics, garbage, yard waste, oversized and metal items, electronic waste and household hazardous waste, as well as a range of other items.

The most recent diversion plan approved by Toronto City Council in 2007, Target 70, outlined a strategy to achieve the goal of 70% diversion by 2010. The plan outlined a number of programs and initiatives including:

- source reduction initiatives;
- development of reuse centres;
- replacement of blue boxes with Blue Bins;
- addition of new recyclable materials;
- implementation of Green Bin organics programs for multi-residential buildings;
- education and enforcement of the City's diversion by-law;
- introduction of a volume-based rate structure;
- investigation of emerging source separation techniques; and,
- development of a residual waste processing facility to recover resources from mixed residual waste.

The new Long Term Waste Management Strategy (Waste Strategy) represents an evolution of the 2007 Target 70 diversion plan. Many of the components of the Target 70 diversion plan have been implemented already, while some have been re-examined as part of the Waste Strategy. The Waste Strategyrecommends waste reduction, reuse, recycling, recovery and residual disposal(the 5Rs) (see Figure 1-1 below for a more complete description of the 5Rs) policies and programsthat are cost-effective, socially acceptable and environmentally sustainable for the long term. This "triple bottom line" approach gives consideration to each component during the development of theWaste Strategy. The Waste Strategy is intended to be a living document and will be reviewed, revised and updated every five years as appropriate.

Figure 1-1: 5Rs Waste Management Hierarchy

2 Developing the Waste Strategy

Development of a Long Term Waste Management Strategy is Strategic Action #7 in Council's 2013-2018 Strategic Action Plan. The intent of the Waste Strategy is to provide a high level decision making document to guide Solid Waste Management Services' (SWMS) policy decisions for the duration of the planning horizon of 30 to 50 years.

The development of the Waste Strategy has been governed by five guiding principles that were approved by City Council:

1. Consideration of options which support waste reduction, reuse, recycling and recovery before final disposal;
2. Consideration of all other environmentally approved disposal options to extend the life of Green Lane Landfill;
3. An open and transparent review of the options;
4. Innovation and flexibility to adapt to emerging technologies and changes to the regulatory environment; and,
5. Development of policies and opportunities for collaboration.

The Waste Strategy was prepared in three phases with each phase being supported by comprehensive consultation and engagement with the public, and input from a stakeholder advisory group and key stakeholders including members ofCityCouncil. The overall Waste Strategy development process is presented in Figure 2-1 with a brief description of each phase of the Waste Strategy development process.

Figure 2-1: Waste Strategy Development Process

Phase 1 - BUILDING THE FOUNDATION

Building the foundation included establishing a comprehensive baseline to identify the current state of all aspects of the City's integrated waste management system and also identified the long-term need of the system in the future.

Deliverable 1 –"Where are we? Establishing a Comprehensive Baseline"

The purpose of this phase was to document the existing waste reduction, reuse, collection, transfer, processing, disposal and financial systems used to manage waste in the City. This baseline was used as the foundation upon which future programs, policies and facilities' recommendations are based. As part of the baseline, previous strategies that have been developed were taken into consideration, including past studiesassessingthe development of a Mechanical Biological Treatment (MBT) facility. Phase 1 sets the baseline from which future options and recommendations were assessed in the Waste Strategy. The baseline has been documented in Technical Memorandum No. 1[1].

Deliverable 2 – "Where do we need to go? Identifying the Long-Term Needs"

[1] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD

Once a baseline had been established, projections for the future were developed in order to estimate requirements for waste management for the next 30 to 50 years. Variables that could impact the system including population growth, housing trends, economic growth, product design, packaging changes, City planning initiatives, and potential changes to legislation were reviewed in this phase. Technical Memorandum No. 2[2] documents the gaps, challenges and/or opportunities in Toronto's integrated waste management system. It includes projections for the future quantities of waste to be managed and the vision and guiding principles to guide the implementation of the Waste Strategy in the future.

Phase 2 - DEVELOP THE WASTE STRATEGY

In order to develop the Waste Strategy, a critical review of the current system was completed. This was done in order to identify areas of opportunity for improvement, as well as to consider policies, programs, and technologies that may help to improve the current system. Where options were identified, they were critically evaluated and, where appropriate, recommended for implementation in the future.

Deliverable 3 – "Howdo we get there? Consideration of Options"

A range of policies, programs, and facility/technology options were reviewed to identify options the City could consider in the future. Options included additional waste reduction and reuse programs and services, other waste diversion techniques and practices, renewable energy projects, waste technologies (e.g. Mixed Waste Processing, Energy from Waste), alternative disposal options (e.g. redirecting waste to other landfills), and long-term opportunities for Green Lane Landfill. Where appropriate, separate options were identified to manage waste from the single family residential and multi-residential sectors as these two sectors have different waste management needs and in some cases may require different programs and infrastructure. Technical Memorandum No. 3[3] identifies and discusses a list of options available to the City and describes the evaluation methodology and criteria used to evaluate each option.

Deliverable 4 – "Evaluate the possibilities. Identifying the Best Options for the City"

[2] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD

[3] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD

During this phase, a detailed evaluation of the options identified in Phase 2 was conducted from an environmental, social and financial perspective. This identified a series of recommended long-term options for the City. Technical Memorandum No. 4[4] documents the evaluation process and resulting recommended options for the City.

Phase 3 – DOCUMENT AND DECIDE

Once the recommendations for change weredetermined, theWaste Strategy document was prepared to identify what the new system will look like, the timing for any proposed changes, the financial requirements to support the new system and the roles and responsibilities of all those involved.

Deliverable 5 – "The Long Term Waste Management Strategy" (SUBJECT OF THIS DOCUMENT)

TheWaste Strategy was developed using the results of the evaluation process and through consideration of the feedback received through consultation. It includes an implementation "roadmap" to help guide the City's integrated waste management system for the next 30 to 50 years.

[4] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD

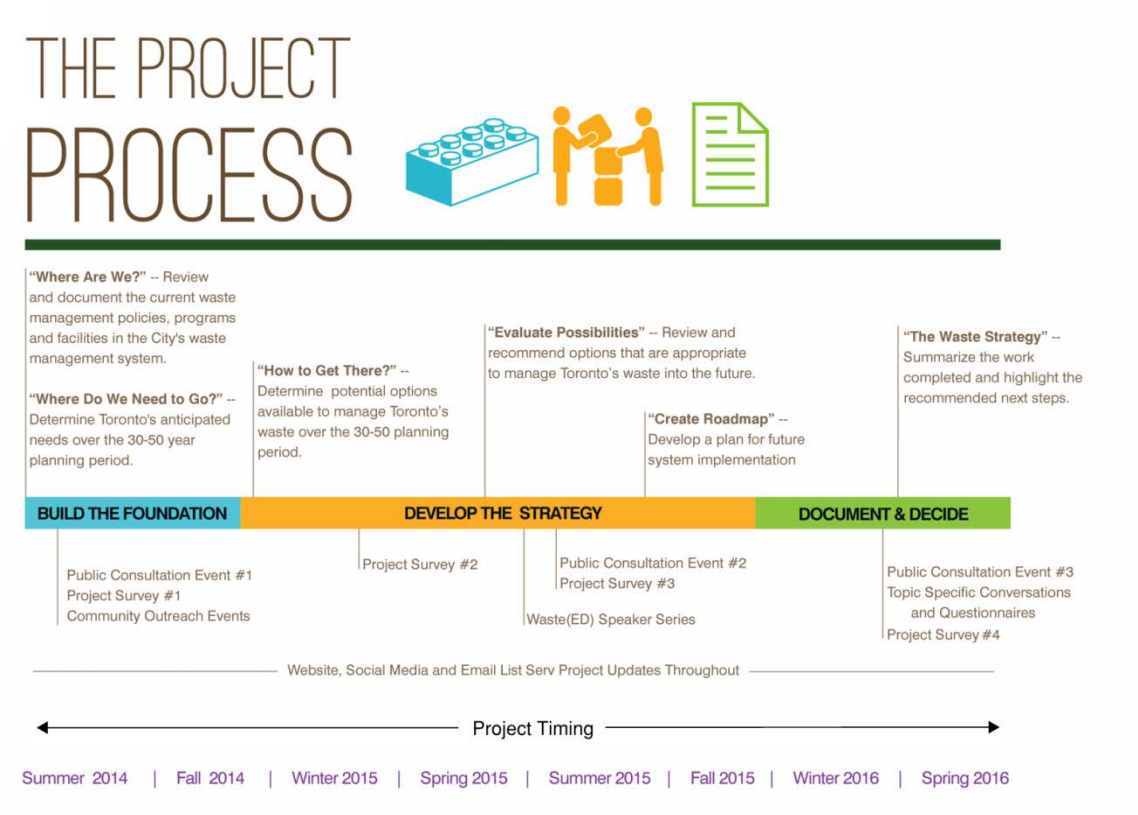
3 Consultation Summary

The participation of stakeholders and the public in the development of waste management policies and programs is critical for effective implementation and the ultimate achievement of the City's waste management reduction and diversion goals. This participation has been central to the development of the Waste Strategy and is meant to support community buy-in of the Waste Strategy and foster participation during implementation of the recommendations. Throughout the development of the Waste Strategy, thousands of participants from across the City have provided feedback, engaged in dialogue and accessed key project information through a variety of consultation and engagement activities. These conversations with stakeholders and the public have had a significant impact on the formulation of the recommendations put forward in this Waste Strategy.

Consultation activities were divided into three phases: Building the Foundation; Developing the Waste Strategy; and Documenting and Deciding on this Waste Strategy. A variety of consultation methods were used at each phase of the process, engaging participants in a two-way dialogue on critical Waste Strategy development themes.

The following Figure 3-1 shows how the consultation plan developed for the Waste Strategy was incorporated into the three phases described above.

Figure 3-1: The Project Process



Members of the general public were reached through a variety of methods, offering numerous opportunities to access information and engage in meaningful dialogue on the development of the Waste Strategy. Key consultation and engagement activities included:

- Public Information Centres (PICs), including in-person events, webinars and a webcast;
- Stakeholder charrettes;
- Surveys, including an interactive online tool;
- Project Update newsletters;
- Fact Sheets on the 5Rs (reduce, reuse, recycle, recovery and residual);
- Community outreach events, including farmers markets, Green Living Show, and Community Environment Days;
- Media relations;
- Corporate e-newsletters;
- Project website;
- Social media presence;
- Email communications;
- Informational videos;

- A Vendor Days event;
- Waste related film screenings;
- Engagement with University of Toronto and Ontario College of Art & Design (OCAD) students on waste management innovation; and,
- An educational waste-focused speaker series (Wast(ED) - Waste Education).

In addition to the broader City of Toronto general public, consultation and engagement activities involved a number of stakeholders in the Waste Strategy development process, including: the institutional sector; non-governmental organizations, as well as environmental groups; the residential sector; the business and retail sector; other City divisions and agencies; the waste management industry; community members; and Toronto City Staff and Council, who were invited to participate in consultations and were kept abreast of the project process and ways to become involved through online engagement. Aboriginal communities in the vicinity of Green Lane Landfill and City of Toronto were provided with information and informed of the progress of the Waste Strategy.

A Stakeholder Advisory Group (SAG) was established at the outset of the project to provide advice and feedback to the project team at key points in the process. The 16 SAG members included on the committee represented a variety of interests in Toronto and the waste management sector. Organizations that were represented on the SAG included:

- Greater Toronto Apartment Association
- Ontario Waste Management Association
- Recycling Council of Ontario
- Social Planning Toronto
- Toronto Association of Business Improvement Areas
- Toronto Atmospheric Fund
- Toronto Catholic District School Board
- Toronto Community Housing
- Toronto District School Board
- Toronto Environmental Alliance
- University of Guelph
- University of Toronto

In addition, a series of Key Stakeholder Meetings (KSMs) were held throughout the project, wherein representatives of environmental groups, Aboriginal communities, multi-residential buildings and tenants association, not-for-profit organizations, current service providers, and ratepayers groups were invited to become engaged in focused discussions on particular elements of the Waste Strategy. Throughout the process,

project team members also met with the Executive Environment Team, consisting of senior staff from most City Divisions.

Figure 3-2 summarizes the various consultation activities undertaken and provides a snapshot of participation.

Figure 3-2: Consultation and Engagement Activities Summary

Throughout consultation, a number of common themes emerged, which had an important bearing on the Waste Strategy development process. It was clear that the environment, along with our community's health, should be a priority, including working to mitigate climate change. Taking responsibility for our own waste by focusing efforts on reducing the amount of waste generated in the first place and creating a "3Rs-first strategy" was another central theme that emerged through consultation. Many stakeholders also highlighted the need to treat waste as a resource and to reinforce the concept of a circular economy[5]. Stakeholders and members of the public also stressed the importance of creating user-friendly, convenient and accessible programs and facilities with enhanced enforcement utilized where necessary. Ultimately, it was recognized that there was a desire to find solutions that balanced the needs of the community and the environment with long term financial sustainability.

[5]"A circular economy… aims for the elimination of waste through the superior design of materials, products, systems and business models."Towards the Circular Economy, Ellen MacArthur Foundation.A circular economy shifts the way waste is viewed and requires a change in the way we think about waste, how products and packaging are designed, and how waste is managed to maximize resource recovery.

The importance of education to foster positive behaviour change and promotional mechanisms to drive participation in waste reduction and diversion programs also emerged as key themes throughout the consultation. There was a desire to build on the strengths of what the community is already doing and finding a role for the City to facilitate the good work of others through collaboration and partnerships. The community was also looking for businesses to do more to divert waste and producers to take more responsibility for the products and packaging that they make and management of the resulting waste. Finally, the opportunities for improvement in the multi-residential sector comprised much of the dialogue throughout the engagement process. Participants highlighted the challenges associated with the design of buildings and facilities that hamper efforts to improve diversion in multi-residential buildings. They also expressed an interest in seeing more enforcement to encourage diversion and strong education and awareness efforts targeted at the multi-residential sector.

These key themes emerging through extensive consultation were captured in the project vision statement, helped inform the evaluation of options, and provided the foundation for the recommendations ultimately put forward in this Waste Strategy.

4 A Vision for the Future & Guiding Principles

A successful Waste Strategy reflects the interests of the community that it serves now and in the future. It is driven by a Vision Statement and Guiding Principles that express a philosophy of what the Waste Strategy will strive to achieve and what will be important in making decisions along the way.

4.1 A Vision for the Future

The Vision Statement for the Waste Strategy was developed through a combination of feedback received during the Phase 1 public consultation events in June 2014, a visioning session with Stakeholder Advisory Group members and a visioning session with members of the SWMS'Senior Management Team. The resulting draft themes for the Vision Statement were presented to the public in a survey in Phase 2 of the consultation process.

Based on the feedback received during the consultation and engagement period, a final Vision Statement was prepared and approved by City Council in October 2015:

> "*Together we will reduce the amount of waste we generate, reuse what we can, and recycle and recover the remaining resources to reinvest back into the economy. We will embrace a waste management system that is user-friendly, with programs and facilities that balance the needs of the community and the environment with long-term financial sustainability. Together, we will ensure a safe, clean, beautiful and healthy City for the future.*"

4.2 Guiding Principles to Stay on Track

The Phase 2 consultation process also presented a list of Guiding Principles. Consultationparticipants were asked to identify one or more Guiding Principles that were most important to them.

The top three Guiding Principles selected by participants were:

- Work to Mitigate Climate Change;
- Treat Waste as a Resource; and,
- Prioritize our Community's Health & Environment.

Through the consultation process, there were no comments received in opposition to any of the guiding principles, nor were there suggestions that would support removing some from the list. In October 2015, City Council approved the following list of eight Guiding Principles to support decision making and to guide the implementation of the Waste Strategy in the future:

- Work to Mitigate Climate Change Impacts- To reduce our impact on climate change we will find solutions that reduce greenhouse gas emissions associated with our waste management system.
- Treat Waste as a Resource- Waste is an asset that needs to be conserved. We should make best use of our waste by recovering materials and energy remaining after reducing, reusing, and recycling.
- Prioritize our Community's Health and Environment- The health of our residents and the environment is a priority in decision making to minimize negative impacts and to maximize the benefits.
- Embrace Social Equity- Create an easy-to-use system that all residents and the community can understand and participate in.
- Lead the Change- Strong leadership is taking ownership, leading by action and being responsible for the waste we produce.
- Ensure Financial Sustainability- Financially sustainable solutions that are easy and affordable to maintain by future generations and also help to stimulate economic growth within our community.
- Make the Future System Transparent- Future decisions on the implementation of the Waste Strategy will be open, accessible and based on best practices and facts to find solutions that benefit all.
- Support Development of Community Partnerships- Working together with local community groups and organizations will help us reach our goals and reduce waste more effectively and efficiently.

4.2.1 A Circular Economy and Zero Waste Future

As part of Phase 3 consultation, Survey No. 4 was completed to seek public input on the recommended options and implementation of the Waste Strategy. It also sought feedback on whether the City should include anaspirational goal of working towards a Circular Economy and Zero Waste future in the Waste Strategy to align with the Provincial goal proposed as part of the *Waste-Free Ontario Act*.

A Zero Waste goal places emphasis on preventing waste (e.g. reducing packaging), rather than managing it at the end of life. A circular economy shifts the way we view waste, looking at how products and packaging are designed, and how waste is managed to maximize resource recovery. This goal was strongly supported by respondents in Survey No. 4; 79% of respondents strongly agreed with the goal, 11% agreed and 10% were neutral or disagreed. The Stakeholder Advisory Group also strongly supported this goal.

It is recommended that the City include the aspirational goal of working towards a Circular Economy and Zero Waste future. The Waste Strategy includes strategies to move the City towards this goal including the 3Rs options, the Unit for Research,

Innovation & a Circular Economy and establishing a circular economy/waste reduction advisory group to inform on-going waste planning and implementation processes.

5 The Current Waste Management System

The following provides an overview of the current waste management system components, their function and performance.

5.1 Current Integrated Solid Waste Management System Overview

The City of Toronto is the capital of the Province of Ontario and Canada's largest city with a population of 2,615,060 (2011 census). Toronto is one of the world's most diverse cities with approximately half of the population born outside Canada[6].

The City is at the centre of the Greater Toronto Area (GTA), bordered by the Regions of Peel, York and Durham.Geographically, the City spans an area of 630 square kilometers, approximately 21 kilometers from north to south and 43 kilometers from east to west. The City is bordered by Lake Ontario to the south, Etobicoke Creek and Highway 427 to the west, Steeles Avenue to the north and the Rouge River/Scarborough-Pickering Townline to the east. Figure 5-1 provides an overview of the geographic boundaries of the City of Toronto[7].

Figure 5-1: City of Toronto Geographic Boundaries and Neighbouring Municipalities

The City of Toronto provides a comprehensive waste management system that includes providing support and services from the initial generation of waste (or avoidance of

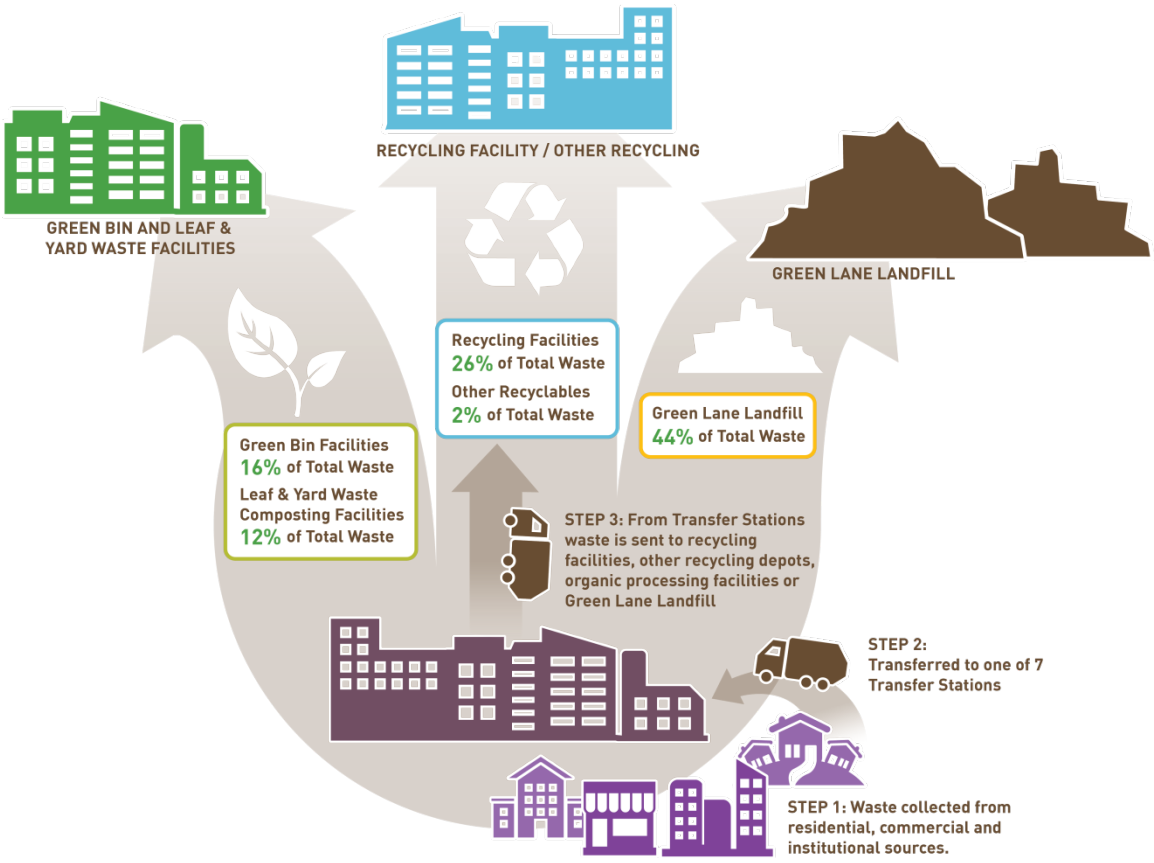
[6] City of Toronto Website - Toronto Facts - Diversity
[7] http://commons.wikimedia.org/wiki/File:Greater_toronto_area_map.svg

generation) through to the monitoring of closed landfill sites, long after the final residual waste has been disposed and the site has been closed. This system is a comprehensive network of programs, services, truck fleets, transfer and drop-off facilities, processing facilities, and landfills. The system provides services to a wide range of customers and is financially supported through a number of funding and revenue sources.

The City of Toronto Solid Waste Management Services Division is one of the largest municipal solid waste management operations in North America.

Figure 5-2provides a high-level graphic overview of the operational components of the solid waste management system.

Figure 5-2: Solid Waste Management System Overview [8]



[8] Percentages presented are based on 2014 data.

The following provides some quick facts on the City's solid waste management system and the services either supported or delivered in 2014:

Customers Served[9]

- Residential
    - Single familyresidences (approximately 460,000);
    - Residential Units Above Commercial (RUAC) establishments (approximately 12,000); and,
    - Multi-residentialbuildings (approximately 420,000 units).
- Non-Residential
    - Small commercial establishments (approximately 14,500);
    - City of Toronto Divisions, Agencies and Corporations;
    - Charities, Institutions and Religious Institutions;
    - Schools (Elementary and Secondary);
    - Private Industrial, Commercial and Institutional (IC&I) waste accepted at transfer stations and landfill;
    - Specific service sharing arrangements with other municipalities; and,
    - IC&I Customers utilizing the City's drop and load service[10].

Quantities of Waste and Materials Managed (2014)

- Collection of:
    - 483,0000 tonnes/year of Blue Bin recyclingand Green Bin organics for diversion including:
        - Over 215,000 tonnes of Blue Bin recycling;
        - Over 138,000 tonnes of Green Bin organics; and,
        - Over 130,000 tonnes of yard waste.
    - over 900 tonnes of Electronics;
    - almost 2,200 tonnes of Household Hazardous Waste (HHW);
    - over 11,000 tonnes of oversized and metal items (such as mattresses and appliances), porcelain (e.g. toilets) and other materials (e.g. plastic outdoor furniture, drywall and old corrugated cardboard);
    - over 77,000 tonnes/year of waste (predominantly garbage) received at transfer stations from residents and small businesses (requires payment of a tipping fee);and,
- Disposal of approximately 524,000 tonnes of garbage.

[9]All numbers presented are based on 2014 data.

[10]The City offers a drop and load (tolling) service which allows private haulers to bring garbage to a transfer station and access the City's certified scales, staff and equipment to weigh waste materials for a fee per tonne.

Public Space Bins

- Collection of approximately 8,500 street litter/recycling bins;and,
- Maintenance and collection of approximately 10,000 park litter bins and collection of litter from public right-of-ways.

Trucks, Bin Delivery, and Maintenance Operation

- Operation and management of over 600 vehicles and pieces of equipment; and,
- Delivery, maintenance and tracking of approximately 1.6 million Garbage Bins, Blue Bins, and Green Bins.

Waste Management Facilities

- The City owns and operates:
    - Seven transfer stations (six with HHW depots);
    - A maintenance facility;
    - Four collection yards; and,
    - One litter collection yard.
- The City owns the following facilities which are operated by private contractors:
    - Green Lane Landfill; and,
    - Disco Road Organics Processing Facility.
- The City owns the following facilities which are currently not in operation or undergoing construction:
    - Dufferin Material Recovery Facility (MRF[11]); and
    - Dufferin Organics Processing Facility[12].
- SWMS leases the facility in which the Reuse Centre is operated;and,
- To ensure the proper maintenance and longevity of its facilities, the City operates a comprehensive asset management program and state of good repair program.

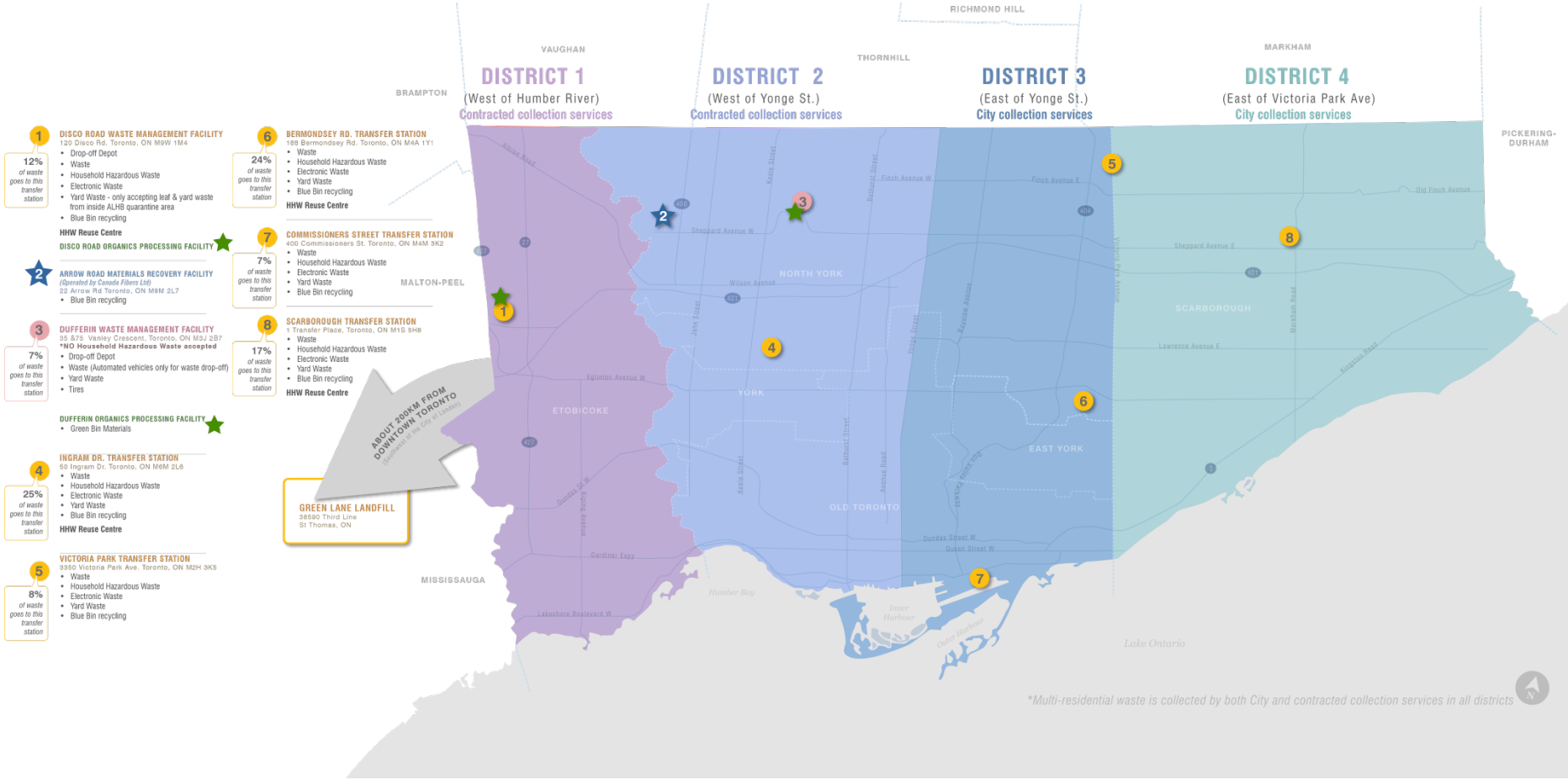
Closed Landfills Monitoring

- Provision of perpetual care for 160 closed landfill sites.

Figure 5-3 presents a map of the waste management facilities in the City of Toronto and provides a brief description of materials accepted at each facility.

[11]This facility is closed as of November 2014. Blue Bin recycling is processed at a City contracted service provider facility.
[12]Currently shut down in preparation for an expansion. It is anticipated this facility will be back in operation in 2018.

Figure 5-3: Map of Waste Management Facilities and Collection Districts



5.2 Components of the CurrentIntegrated Solid Waste Management System

The City of Toronto operates an integrated waste management system with a wide range of components that function as a completely integrated system. It is important to understand each individual component, as well as how each contributes to and interrelates with other components of the system. In an integrated waste management system, a change to one component has the potential to impact other components of the system and therefore this interrelationship needs to be clearly understood prior to any changes being implemented.

5.2.1 Current Integrated Solid Waste Management SystemComponents

The following Figure 5-4provides an overview of the components of the City's integrated solid waste management system. The figure helps illustrate:

- the integrated nature of components;
- the flow of waste from generation to final disposal and beyond;
- the 5Rs and solid waste hierarchy priority;
- where each of the 5Rs fit within the system;
- aspects of a circular economy approach; and,
- internal and external influences on the system.

The City of Toronto's solid waste management services and programs are strongly influenced by a number of policies and legislative requirements both internal and external to the City.

Figure 5-4: Components of the System and Potential Influences

6 Projected Long Term Needs

The growth of the City presents both challenges and opportunities for the future system. As part of the development of the Waste Strategy, estimates of the future quantities of waste requiring management were calculated based on economic indicators (e.g. population, employment and unemployment rates, gross domestic product), and population projections. A number of factors can influence waste generation and result in an increase or decrease in waste tonnes requiring management, including:

- Changing composition of the waste stream (less paper, more packaging);
- Change in number of customers served by the City;
- Waste reduction and reuse activities;
- Economic factors; and,
- Seasonal/natural events (e.g., flooding, ice storms, etc.)

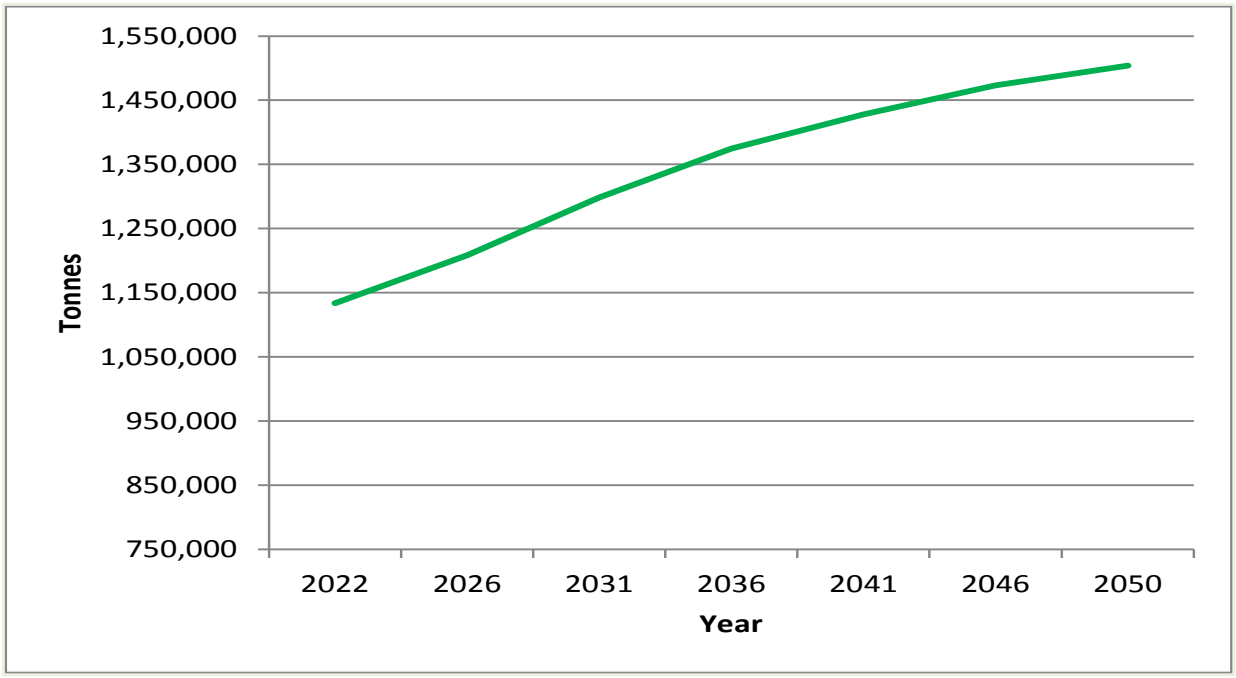
Figure 6-1 provides historical waste generation values as well as high/low estimates to 2021 of waste requiring management based on economic indicators and population growth.

Figure 6-1: Historical and Projected High/Low Total Annual Waste Generation (2001 to 2021), Based on Economic Indicators and Population Growth

Figure 6-2 provides a long-term projection of total waste generation from 2022 to 2050 based on population growth. Waste projections from 2022 to 2031 were developed based on population and household projections obtained from the City of Toronto

Planning Division and projections from 2032 to 2050 were developed assuming a steady state growth rate similar to the growth rate projected for the 2022 to 2031 period.

Figure 6-2: Projected Total Annual Waste Generation (2022 to 2050), Based on Population Growth



Key findings from the analysis relevant to the Waste Strategy include:

1. It is estimated that by the end of the planning period, the City could be managing over 1.5 million tonnes annually of material generated by the City's customers, if no waste reduction takes place (see Figure 6-2).
2. With the implementation of the recommended series of new waste reduction, reuse, recycling, and residual programs and facilities as part of the Waste Strategy, the life of Green Lane Landfill could be extended to approximately 2040.This is described in more detail in Section 9.4.
3. Based on the projections developed for quantities of Blue Bin recycling, and barring any changes to the current system, it appears that there is sufficient processing capacity for the amount of Blue Bin recycling collected until the end of the contract period in 2022. This is described in more detail in Section 9.6.3.1.
4. Based on the projections developed for tonnages of Green Bin organics requiring management, it is anticipated that the City will require additional processing capacity after 2020 when current contracts with private sector facilities expire.This is described in more detail in Section 9.6.3.2.

7 Gaps, Challenges and/or Opportunities

The development of the Waste Strategy included the identification of a number of gaps, challenges and/or opportunities in the current system as well as those opportunities resulting from pending Provincial legislation. The following sections present an overview of the gaps, challenges and opportunities identified through the strategy development process as outlined in Table 7-1 and those that may result from Provincial legislation.

7.1 Gaps, Challenges and/or Opportunities in the Current System

The gaps, challenges and/or opportunities in the current system which needed to be considered in developing the Waste Strategy were identified through:

- A combination of stakeholder consultations;
- City staff review and input;
- A jurisdictional review of other similar systems; and,
- The expertise of the consultant team.

Table 7-1:Identified Gaps, Challenges and/or Opportunities

Gap, Challenge and/or Opportunity	Summary
Waste Reduction & Reuse	A challenge facing the City is how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.
Dufferin Waste Management Facility	The City has a Material Recycling Facility that closed in November 2014 with no current long-term plan for its future use. A challenge facing the City is to examine the function and role of the entire Dufferin Waste Management Facility to identify future roles within the City's integrated solid waste management system.
Multi-residential Waste Diversion	A challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.

Gap, Challenge and/or Opportunity	Summary
Performance Measures	An opportunity for the City is to develop more current and robust performance metrics that will accurately measure the waste management system performance and account for changing waste streams, composition, community demographics, etc.
Public Education and Engagement	A challenge facing the City is being able to reach out to a diverse community to educate its customers on program changes, good waste management practices, and where possible, how to better reduce and reuse.
Regulatory, Control and Role/ Responsibility Challenges	A challenge facing the City is having a system where some waste management responsibilities are outside of the City's control and therefore subject to uncertainty and risk with respect to external parties making changes that can impact the City's system.
Residual Waste Disposal Capacity	A challenge facing the City is to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Waste Strategy.
Solid Waste Services for the Institutional, Commercial &Industrial (IC&I) Sector	A challenge facing the City is identifying a mechanism to allow the City to influence greater waste diversion in the IC&I sector for waste materials being generated within the City of Toronto, but managed outside the City of Toronto waste management system. An opportunity for the City is to provide the IC&I sector with options which promote greater diversion and are flexible to accommodate changing waste streams and customer accessibility.
Commissioners Street Transfer Station	A challenge facing the City is the decision needed about the future of the Commissioners Transfer Station (TS); whether it should be relocated or closed. If the facility is relocated, there are options to construct a new facility that may or may not include a residential drop-off facility. If the facility is closed, the City will need to decide how the current services available at the Commissioners TS will be replaced.

Gap, Challenge and/or Opportunity	Summary
Future Role of and Need for Drop-off Facilities	An opportunity for the City is to provide its customers with more convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility.
Value of Food and Food Waste	A challenge facing the City is the need to reduce waste through 1) decreasing the amount of food that is being wasted, and 2) increasing the amount of food waste that is being captured for diversion.
Waste Financing System	A challenge facing the City is the development of a sustainable financing strategy that will allow the City to move toward greater waste diversion while balancing program sustainability and in support of the need for long-term infrastructure investments. This sustainable waste financing strategy needs to be specific to waste such that revenues collected and reserve funds established need to be used only for future waste management related expenditures.
Waste Recovery Technologies	A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.
Future Waste Processing Capacity	A challenge facing the City is to maximize the use of its facilities and infrastructure, in particular waste processing capacity, and maintain sufficient capacity in the system to address its future demands.
Impacts of Energy Costs on the Waste Management System	A challenge facing the City is that the system depends on fuel for the collection of waste, and fuel and other energy costs are expected to continue to increase in the future.
Impacts of Intensification	A challenge facing the City is the impacts of intensification and the changes required to manage additional waste generated by multi-residential housing units with typically lower waste diversion performance and in areas that are more difficult to collect using traditional methods.
Impacts of a Changing Waste Stream	A challenge facing the City is the changing composition of the waste stream and the ability for programs and infrastructure to adapt.

Gap, Challenge and/or Opportunity	Summary
Solid Waste Services for Construction, Renovation and Demolition (CRD) Materials	An opportunity for the City is to address residential renovation waste and provide its renovator customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and accessibility. An additional challenge facing the City is how to better promote and facilitate diversion of CRD materials generated by the CRD sector.
Enhanced Enforcement	A challenge for the City is to maximize the effective and efficient use of its current programs, services and facilities. To date, significant effort and success has been realized through promotion and education;however, there are still areas of the system where voluntary compliance is not at the desired level, requiring strategic consideration of mandatory measures.

7.2 Gaps, Challenges and/or Opportunities with New Legislation

There are two pieces of legislation that may present opportunities for the City with respect to waste management roles and responsibilities. The *Waste-Free Ontario Act* may impact the City's role in managing certain materials and the *Climate Change Mitigation and Low-carbon Economy Act*may provide additional financial opportunities for the City. Each of these pieces of legislation is further discussed below.

7.2.1 *Waste-Free Ontario Act*

On November 26, 2015, the Ontario Minister of Environment and Climate Change (MOECC) introduced for first reading, the *Waste-Free Ontario Act, 2016 (the Waste-Free Ontario Act)*. The Act is intended to change the existing waste diversion framework in the Province of Ontario and support a circular economy, which will increase waste reduction and resource recovery. The enabling legislation consists of:the *Resource Recovery and Circular Economy Act* (RRCEA) and the *Waste Diversion Transition Act* (WDTA) which repeals and replaces the *Waste Diversion Act*, 2002, and lays out how Ontario stewardship programs will transition from the current structure to a full extended producer responsibility (EPR) framework[13]. The bill was passed on June 1,2016.

[13]The WDTA sets forth a legislative framework for transitioning existing Industry Funding Organization (IFO) programs for Blue Box materials, municipal hazardous and special waste (MHSW), Waste Electrical and

The legislation will impact how the City managessome materials in the waste stream, particularly Blue Bin recycling. It is likely that the City will continue to manage residential garbage and Green Bin organics, however, the legislation provides opportunities for the City to examine and consider the extent to which it wants to continue to be involved in the management of Blue Bin recycling,Municipal Hazardous and Special Waste (MHSW), Waste Electrical and Electronic Equipment(WEEE) and used tires, where producers will become physically and financially responsible for end of life management under the new legislation. Future regulations under the Act are expected to designate a number of additional materials, which are included in the Waste Strategy, including: textiles, mattresses, carpet, construction and demolition waste and furniture in particular[14]. If these regulations pass, then producers will be responsible for the end of life management of these materials. The City may have the option to continue to manage these materials on behalf of producers, subject to satisfactory financial arrangements, or the City may have the option to leave management entirely up to the responsible producers.

Along with the *Waste-Free Ontario Act*, the government released a *Draft Strategy for a Waste-Free Ontario: Building the Circular Economy*[15]. This strategy sets out the Province's key goals with respect to waste recovery and a series of actions to shift the Province towards a circular economy and waste-free future. Several of the actions mentioned in the Draft Provincial Strategy will overlap with elements of this Waste Strategy. In particular, as part of the Draft Provincial Strategy, the Province intends to:

- establish an organics action plan which may mandate organics bans at disposal facilities;
- consider material bans at disposal facilities, possibly including construction and demolition waste;
- put better data collection systems in place to address the need to divert more IC&I waste; and,
- demonstrate provincial leadership through green procurement.

7.2.2 Cap and Trade Program

On February 24, 2016, the MOECC released Bill 172, the *Climate Change Mitigation and Low-Carbon Economy Act, 2016*[16], and the draft*Cap and Trade Program Regulations* on February 25, 2016.Bill 172 received Royal Assent on May 18, 2016. In addition to

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Electronic Equipment(WEEE) and used tiresto an extended producer responsibility (EPR) regime under the new *Resource Recovery and Circular Economy Act.*

[14]Textiles, furniture, carpets, mattresses and construction and demolition waste are targets for the Canadian Council of Ministers of Environment (CCME) Phase 2 EPR program. All provinces in Canada, including Ontario, have committed to regulating EPR for these materials by 2017.

[15]http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&BillID=3598

[16]http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&Intranet=&BillID=3740

codifying Ontario's Greenhouse Gas (GHG) reduction commitments, this legislation,lays the foundation for Ontario's cap and trade program.

Under the cap and trade system, the Ontario government willimpose a mandatory cap on the GHG emissions that regulated industries and sectors are allowed to produce within a given compliance period. To comply with the cap, which declines each year, emitters may either reducetheir emissions or trade/purchase allowances and emissions credits in the carbon market.

The Bill could have several implications for this Waste Strategy. The Act establishes a Greenhouse Gas Reduction Account, which is proposedto be used, in part, to fund programs that reduce or support the reduction of GHG emissions. Projects related to Green Binorganics processing are specifically listed as eligible for funding from the Greenhouse Gas Reduction Account.

The legislation could also mean potential new financialopportunities for the City through the sale of GHG emission offsets, or "credits." The first offset auction is expected in March 2017. Although the government has yet to define what constitutes an "offset credit," they have identified organics processing as a priority area for consideration and may also include landfill gas capture projects. While recycling results in significant GHG benefits, to date the Province has not indicated any immediate plans to create an offset protocol which would allow the sale of recycling-related GHG reductions as offsets. However, Ontario is part of a large trading pool which includes Quebec and California (through the Western Climate Initiative), therefore on-going protocol developments are anticipated which may benefit thisWaste Strategy.

8 Identification and Evaluation of Options

As part of the development of the Waste Strategy, a number of options that addressed the gaps, challenges and/or opportunities in the current waste system were identified. These options all represent enhancements or additions to the current system. The evaluation of potential options followed a four phase approach that used both qualitative and quantitative data where available[17].

Phase 1: Background Data Collection. Data was collectedfor each option so that they could be evaluated. For example, in order to evaluate the relative cost implications of each option, background research was required to develop the cost estimates for each option.

Phase 2: Grouping of Similar Options. For evaluation purposes, similar options that could address specific gaps, challenges and/or opportunities were grouped together into the following categories: Waste Reduction and Reuse; Drop-off Facilities; Commissioners Transfer Station; Recovery (new facilities); Residual Waste; Multi-residential; Industrial, Commercial & Institutional; Construction, Renovation, Demolition; Control, Influence & Enforcement; and Incentive Based Mechanisms. These categories reflected the various components of the integrated waste management system (see Figure 5-4). Within each category, like options were comparatively evaluated to determine the recommended options. Some of the options identified were not evaluated using the criteria below, but rather were identified as Future Considerations or Implementation Tools. These options will be considered in the context of what is recommended for implementation (e.g. an Implementation Tool option will be utilized to support the implementation of a recommended program or facility) or a Future Consideration where timing for a more detailed evaluation will be identified (e.g. future processing capacity needs to be considered where there is already capacity in the system for the foreseeable future, and a recommendation on how to proceed is best deferred to a more appropriate time in the future once the impact of recommended programs and facilities is better understood following their implementation).

Phase 3: Application of Evaluation Criteria and Identification of Relative Scoring. The defined evaluation criteria were applied to estimate the potential impacts

[17]More information on options identification and evaluation can be found in Technical Memoranda No. 3 and 4 on the Waste Strategy website http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD.

and opportunities of the specific option, and relative scoringwas applied to identify which options "scored" higher within a particular grouping of options addressing a common need.Where necessary, priorities (environmental, social and financial) were applied where options "scored" the same. For example, the potential impacts to air were identified and those options that helped to reduce air emissions (and/or were less than other opportunities being identified) were considered advantaged over other options that may have greater air emissions.

Phase 4: Recommendation of Preferred Options. Once the data was collected, and the criteria were applied, the options that had the highest "score"were considered advantaged over the others and wererecommended for implementation.

It is important to note that through this evaluation process, multiple options could have been identified as preferred (i.e. options result in similar "scores") and in these circumstances, priority for implementation was placed on those opportunities that were more advantaged over others and/or better met the identified gap, challenge and/or opportunity.

Solid Waste Management Services staff consulted with Toronto Public Health to seek advice on the most appropriate means to undertake an evaluation of "estimated health care costs".Toronto Public Health developed an approach that is in line with the Waste Strategy's evaluation process and conducted a public health analysis of the options using a rapid Health Impact Assessment (HIA) for the waste management options by applying a public health lens to each option[18].The evaluation process concluded with a series of recommended options for implementation in the City of Toronto that have been identified as changes that either: a) have potential for improving the current system; or, b) will provide a potential replacement/ alternative/ substitute for a current component of the system.

The following Table 8-1presents the list of options[19] considered during the evaluation process and identifies the gap, challenge and/or opportunity addressed. The recommended options brought forward to form this Waste Strategy are discussed in the following sections.

[18]Further information on Toronto Public Health's evaluation can be found in Attachment 3 of the City's staff report to the February 2016 PWIC meeting located here http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.PW11.3

[19] For more information on the options considered and the evaluation process, please see Technical Memorandum No. 3, Options Identification and Evaluation Process. For more information about the evaluation results, please see Technical Memorandum No. 4 – Options Evaluation, both located here - http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD

It should be noted that the options identification and evaluation process was undertaken by system component, however, the options presented in Table 8-1 have been regrouped to follow the outline of the presentation of the recommended options (i.e. by the 5Rs hierarchy) in Section 9.

Table 8-1: List of Options Considered During the Strategy Development Process

Options Considered	Gap, Challenge and/or Opportunity
Reduce, Reuse, Recycle	
Food Waste Reduction Strategy.	• Waste Reduction & Reuse • Value of Food and Food Waste
Textile Collection and Reuse Strategy.	• Waste Reduction & Reuse
Sharing Library.	
Support Reuse Events.	
Explore Opportunities for Waste Exchange.	
Mobile Drop-off Depots.	• Drop-off Facilities • Impacts of a Changing Waste Stream • Impacts of Intensification • Waste Reduction & Reuse
Neighbourhood Drop-off Depots (formerly referred to as Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations).	
Develop a Series of Stand Alone Drop-off and Reuse Centres.	
Reverse Vending Machines (formerly referred to as Incentive Based Drop-off System (e.g. Reverse Vending Machines).	• Impacts of a Changing Waste Stream • Regulatory, Control and Role/Responsibility Challenges
Deposit-return System for City of Toronto for Selected Materials.	
Multi-residential Services	
Organics Management	
Support for CommunityComposting (formerly referred to asCommunity/Mid-scale Composting).	• Waste Reduction & Reuse • Value of Food and Food Waste • Multi-residential Waste Diversion
On-site Organics Processing.	
In-Sink Disposal Units.	• Multi-residential Waste Diversion • Impacts of Energy Costs on the Waste Management System

Options Considered	Gap, Challenge and/or Opportunity
Waste Collection Methods	
Data Management and Accessibility (formerly referred to asContainer Management).	• Multi-residential Waste Diversion • Performance Measures • Impacts of Energy Costs on the Waste Management System
Elimination of Collection Service to Multi-residential Buildings.	• Multi-residential Waste Diversion • Regulatory, Control and Role/Responsibility Challenges
Multi-residential Collection using Alternative Vehicles.	• Multi-residential Waste Diversion • Impacts of Intensification • Impacts of Energy Costs on the Waste Management System
Alternative Collection Methods for Multi-residential Buildings –One Container System.	
Alternative Collection Methods for Multi-residential Buildings – Vacuum System.	
Multi-residential Policies and Enforcement	
Multi-residentialBy-laws and Enforcement.	• Multi-residential Waste Diversion • Enhanced Enforcement Opportunities • Regulatory, Control and Role/Responsibility Challenges
Updates to Current Multi-residential Development Standards.	• Multi-residential Waste Diversion • Enhanced Enforcement Opportunities • Impacts of Energy Costs on the Waste Management System • Regulatory, Control and Role/Responsibility Challenges
Industrial, Commercial and Institutional (IC&I) Services	
Expand Yellow Bag program to More Businesses (formerly referred to asExpand City of Toronto Share of IC&IWaste Management Market To Provide Diversion Opportunities to More Commercial Businesses in City of Toronto).	• Solid Waste Services for the IC&I Sector • Impacts of a Changing Waste Stream • Regulatory, Control and Role/Responsibility Challenges
City Explores Mandatory Approaches to IC&IWaste Diversion.	• Solid Waste Services for the IC&I Sector • Impacts of a Changing Waste Stream • Regulatory, Control and Role/Responsibility Challenges • Enhanced Enforcement Opportunities

Options Considered	Gap, Challenge and/or Opportunity
City of Toronto Exits the IC&IWaste Management Service.	• Solid Waste Services for the IC&I Sector • Impacts of a Changing Waste Stream • Regulatory, Control and Role/Responsibility Challenges
Construction, Renovation, Demolition (CRD) Services	
Depots and Policies for Home Renovation Waste (formerly referred to asDepots and Policies to Divert CRD Waste).	• Solid Waste Services for the CRD Sector • Impacts of a Changing Waste Stream • Regulatory, Control and Role/Responsibility Challenges • Enhanced Enforcement Opportunities
Disposal Bans for Some CRD Materials (formerly referred to asCRDWaste Disposal Ban).	
Recovery	
Mixed Waste Processing.	• Waste Recovery Technologies • Multi-residential Waste Diversion • Impacts of Energy Costs on the Waste Management System
Mixed Waste Processing Facility with Organics Recovery.	
Organics Recycling Biocell or Biomodule.	
Direct Combustion.	• Waste Recovery Technologies • Impacts of Energy Costs on the Waste Management System
Emerging Technologies.	
Refuse Derived Fuel.	
Waste to Liquid Fuel Technologies.	
Residual	
Landfill Mining and Reclamation.	• Waste Recovery Technologies • Impacts of Intensification
Bio-reactor Landfill.	• Residual Waste Disposal Capacity • Impacts of Energy Costs on the Waste Management System
Expand Green Lane Landfill (formerly referred to asLandfill Expansion).	• Residual Waste Disposal Capacity
Landfill Operation Continuous Improvement and Best Practices.	
Review and Adjust Tipping Fees or Changes to Customer Base.	
Purchase of a New Landfill.	
Utilizing Disposal Capacity at Other Approved Disposal Sites (formerly referred to asSecureDisposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfill).	

Options Considered	Gap, Challenge and/or Opportunity
Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity.	
Greenfield Landfill.	
Overall System Recommendations	
Unit for Research, Innovation & a Circular Economy(formerly referred to as the Research, Development, and Innovation Unit).	• Public Education and Engagement • Impacts of a Changing Waste Stream • Impacts of Energy Costs on the Waste Management System • Multi-residential Waste Diversion • Impacts of Intensification
Expanded Blue Bin Recycling/Printed Paper and Packaging, Expanded Producer Responsibility Options and Potential Impacts for Toronto.	• Regulatory, Control and Role/Responsibility Challenges
Performance Measures to Define Success and Shape the Future of Waste Management.	• Performance Measures
Operational Considerations	
Green Procurement.	• Regulatory, Control and Role/Responsibility Challenges
Coordinated and/or Alternative Contracts.	• Impacts of a Changing Waste Stream • Impacts of Intensification • Impacts of Energy Costs on the Waste Management System
Future Blue Bin Recycling Processing Capacity.	• Future Waste Processing Capacity
Future Green Bin Organics Processing Capacity.	
Future Materials Recycling and Other Reuse Related Processing.	
Dufferin Waste Management Facility.	• Dufferin Waste Management Facility • Multi-residential Waste Diversion • Waste Recovery Technologies
Relocation of Commissioners Transfer Station within the Port Lands Area.	• Transfer Station at Commissioners St. • Impacts of Intensification • Drop-off Facilities
Redirecting Waste to an Existing Transfer Station(s).	
Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).	

Options Considered	Gap, Challenge and/or Opportunity
Implementation Tools	
Promotion, Education and Enforcement	
Interactive Online Waste Management Tool.	• Public Education and Engagement
Environmental Impacts Calculator.	
Expand Social Media Presence.	
Provide Additional Tools and/or Resources to the 3Rs Ambassadors and Other Volunteer Programs.	
Incentivizing 3Rs Ambassadors and Other Volunteer Programs.	
Targeted Group Communications.	
Multi-residential – Workshops and Other Outreach for Buildings Not Receiving City Waste Collection Services.	
Create a Community Partnership Unit Within Solid Waste Management Services (SWMS) Division.	
Targeted Outreach and Education Campaign to Reduce Waste.	
City to Assume Role of Facilitator to Encourage Industrial, Commercial and Institutional Waste Diversion.	
Develop an Advocacy Strategy.	
Establish Advisory Groups to Inform On-going Waste Planning/Implementation Process (formerly referred to as Establish a Circular Economy/Waste Reduction Advisory Committee to Inform On-going Waste Planning/Implementation Process).	
City Explores Mechanisms to Introduce City-wide Controls Over Waste Management.	• Regulatory, Control and Role/Responsibility Challenges • Public Education and Engagement
System Financing	
Fully Independent Utility.	• Waste Financing System
Public-Private Partnerships (P3) for Major Capital Works.	
Debt Financing.	
Increase Solid Waste Management Services Customer Base.	
Allocating Costs for Waste Management to Applicable Waste Streams.	
Alternative Revenue Generation Opportunities.	

Options Considered	Gap, Challenge and/or Opportunity
Performance Based Incentives.	• Waste Financing System • Performance Measures • Multi-residential Waste Diversion

9 Recommended Options

The following sections present the recommended options that form the Waste Strategy. The recommendations are presented according to the waste hierarchy, to reflect the City's commitment first to the 3Rs as an overarching goal of the Waste Strategy.

9.1 Reduction & Reuse

The City currently supports reduction and reuse of waste through a number of initiatives and programs however,the Waste Strategy planning process identified a number of gaps, challenges and/or opportunities facing the City currently and in the future with respect to reduction and reuse.

These include:

- Value of Food and Food Waste:the need to 1) decrease the amount of food that is being wasted; and, 2) increase the amount of food waste that is being captured for diversion.
- Public Education and Engagement: being able to reach out to a diverse community to educate on program changes, good waste management practices, and where possible, how to better reduce and reuse.
- Waste Reduction & Reuse: how to better promote and facilitate the reduction and reuse of waste materials, including textiles, to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

Based on these specific gaps, challenges and/or opportunities identified, the following options were recommended and included in thisWaste Strategy.

Food Waste Reduction Strategy
A food waste reduction strategy can promote reduction of food waste which can potentially reduce the amount of waste sent to disposal by up to 34,000 tonnes/year by Year 10 of the Waste Strategy. The food waste reduction strategy focuses on information and outreach programs to educate residents about the benefits of food waste reduction from an economic, environmental and social perspective. If successful, this option would lower the amount of Green Bin organics generated, reduce the need for new organics processing infrastructure, and reduce the amount of garbage to be managed.
Textile Collection and Reuse Strategy
This option involves the development of a textile diversion awareness campaign and the provision of textile (e.g. clothing, shoes, curtains, sheets, towels) diversion opportunities that would enable textiles to follow the 5Rs hierarchy and be reused or recycled and potentially divert up to 15,000 tonnes/year of waste from landfill by Year 10 of the Waste Strategy.

Sharing Library

Some sharing libraries already exist in the City of Toronto where items may be borrowed through a membership (e.g. Toronto Tool Library) or through the Toronto Public Library (e.g. pedometers). Additional opportunities could be developed to allow the public to sign-out materials that are used infrequently. This could be accomplished by partnering with existing organizations within Toronto (e.g., tool sharing library, bike sharing) or establishing new sharing programs in different areas of the City and/or within multi-residential buildings. Materials can be donated to the sharing libraries or organizations can purchase and cover expenses through user fees.

Support for Reuse Events

The City could support reuse events that allow residents to obtain gently used materials for reuse (e.g., furniture, toys) in a convenient, yet structured way so that the events do not contribute to litter or illegal dumping. The events could include garage sales, curbside giveaway events in common areas (for multi-residential buildings) or at curbside (for single-family households), swap events (e.g., parent-to-parent sales, jewelry or clothing exchanges).

Explore Opportunities for Waste Exchange

This option involves the establishment of a waste exchange network and/or partnership with existing organizations that collect gently used materials, such as arts and crafts supplies, school and office supplies, recovered construction materials, plastic containers, etc.

While some of the recommended options are not expected to divert significant amounts of waste from disposal, they have many social benefits and were strongly supported through the consultation process. The primary objectives and benefits of proceeding with the implementation of all of these recommendations include:

- Estimated reduction of approximately 50,000 tonnes/year in waste requiring management by the City by Year 10 of this Waste Strategy. [20]
- Builds public knowledge of waste targets and issues potentially resulting in long-term change in attitudes and behaviour around waste.
- Reduces the amount of food waste in households, resulting in potential household savings on grocery bills and reinforces message of food production sustainability.

[20] By reducing the amount of waste being generated, and assuming the waste being reduced would have likely been diverted originally, the waste diversion rate for the City may decrease which is positive because it means less waste has to be collected and processed.

- Increases attention and participation in sustainable food movement and food security issues.
- Increases awareness of the benefits of recycling/reusing used textiles.
- Has potential to be integrated with other initiatives, such as neighbourhood depots.
- Provides cost saving opportunities to residents through access to goods at either reduced rates or for free instead of buying new.
- Creates reuse opportunities and therefore reduces waste sent for recycling or disposal and increases the diversion of materials that could have otherwise ended up in landfill.
- Creates beneficial uses fordiscarded materials and may provide revenue for partnering organizations.
- Provides opportunities for collaboration and partnerships among residents, partnering organizations and industry.

9.2 Recycling

The City of Toronto provides a comprehensive recycling program to its customers, collecting a large number of Blue Bin materials. All City customers are expected to participate in the Blue Bin recycling program. The City also collects a number of materials that are recycled, such as porcelain and mattresses; however, there are some materials that are currently not collected by the City, such as textiles or small household items that could be diverted.

To increase diversion, a number of recommendations were developed to make diversion more convenient for residents, particularly for residents in multi-residential buildings, with options such as mobile and neighbourhood drop-off depots. The Waste Strategy also makes recommendations to divert more multi-residential, IC&I and CRD waste to increase diversion through the Blue Bin recycling, Green Bin organics and other waste diversion programs.

9.2.1 Collection& Drop-off Depots

SWMS collects waste at the curb and accepts materials at transfer stations, drop-off depots, and at Community Environment Days from the single family and multi-residential sectors, as well as from the non-residential sector. Waste materials received at transfer stations and drop-off depots are charged a fee depending on the type and quantity of material delivered[21].

In order to encourage participation in waste diversion programs, customers need to be provided with convenient options thatthat are accessible and flexible to accommodate

[21]For more information on collection and drop-off provided by the City, please refer to Technical Memorandum No. 1.

changing waste streams.The impact of intensification and the changes required to manage additional waste generated by multi-residential buildings with typically lower waste diversion rates require more innovative solutions that are easy to participate in and access.

Based on these challenges,a combination of mobile and permanent drop-off depots has been recommended to make diversion more convenient, particularly for residents in multi-residential housing who may not have access to a car to take divertible materials to a transfer station. It has been recommended that the mobile drop-off depots be planned and implemented first to identify locations suitablefor the neighbourhood drop-off depots. This combination of a mobile service and locally based neighbourhood drop-off depots provides the best complement to the City's extensive curbside programs (i.e. in terms of encouraging additional non-curbside, non-Blue Bin material diversion from landfill).

These options are further described below.

Mobile Drop-off Depots

A fleet of up to five dedicated mobile depots would be established that would travel to high density areas across the City to collect small household items (pots and pans, etc.) and textiles (clothing, household linens, etc.), HHW and other recyclable/reusable materials. An added benefit of the mobile depot service is that it could also be used to support and co-promote other sustainable environmental practices across the city (e.g. water conservation, energy conservation, alternative household cleaners, food waste reduction, renewable energy, etc.). Priority would be placed on collection of high value, low volume materials which are easier to manage and store due to limited capacity in the vehicles. Collection vehicles could be the size of a tractor trailer suitable for larger locations, with one or more smaller vehicles available to access smaller locations or areas with space restrictions within the downtown core. These mobile depots could be used to support community events (e.g. neighbourhood swap events), move-outs (student and/or multi-residential), and/or could move to different areas of the City on a pre-determined basis. Non-profit groups could assist with collection/sorting of materials collected at larger events.

Neighbourhood Drop-off Depots

This option is based on establishing 10 to 20 staffed neighbourhood drop-off depots which would ideally be located near transit accessible locations. The findings and success of the mobile drop-off service would assist with selection of locations for permanent depots (i.e. identifying high traffic areas with good participation). The facilities could be City owned and operated, privately contracted or some depots could be developed in partnership with local community based organizations (some of which already provide material specific drop-off and reuse services/locations to their customers).

The primary objectives and benefits of the mobile and neighbourhood drop-off depots include:

- Diversion of up to 20,000 tonnes/year by Year 10 of the Waste Strategy (includes some tonnes from non City-serviced multi-residential buildings).
- Supports expanded drop-off opportunities and convenience for single family residential and multi-residential buildings and small businesses.
- Encourages greater diversion/exchange of reusable materials (e.g. books, clothing, furniture, carpets, small household items).
- Increases diversion of HHW, electronics, oversize and metal items, textiles and other materials remaining in the current waste stream from landfill.
- Provides opportunity for outreach to profile waste reduction and other sustainability activities in the City.
- Provides opportunities to engage not-for profit sector and charitable groups.

9.2.2 Incentive Based Options

An opportunity for the City is to provide its customers with more convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility. One way to address this challenge is to provide incentives that reward particular activities and behaviours such as reverse vending machines or a deposit-return system. Reverse vending machines are common in Europe and are typically used in jurisdictions with deposit return systems and in the United States for specific materials (i.e. mobile phones, drink containers, light bulbs and batteries).Toronto residents' current deposit-return experience is with the Ontario Deposit Return Program for alcohol beverage container systems for beer, wine and liquor containers that have been established Province-wide, as well as deposits on specific containers established by specific vendors (e.g. 10 gallon reusable water bottles). The recommended option is to explore the establishment of reverse vending machines for the recovery of materials which have value such as small electronics and mobile phones. The implementation of this option will be dependent on the outcome of the *Waste-Free Ontario Act.*

Reverse Vending Machines

A number of reverse vending machines could be located throughout the City in high traffic, secure and monitored areas which may include Community and Civic Centres, arenas, libraries, transit hubs, etc. The machines would dispense a coupon or voucher with financial or other valueto participants who drop off the solicited materials.

The primary objectives and benefits of the recommended incentive based option include:

- Diversion of an estimated 1,000 tonnes by Year 10 of the Waste Strategy
- Direct and immediate incentive to residents who participate.

- Potential for partnerships and agreements with take back agencies and other organizations responsible for the materials which might be captured.
- Higher participation and potentially slightly higher diversion rates for targeted materials.
- Opportunity to trial innovative technology and incentive approach.
- Visual reminders to support the City's commitment to waste diversion to residents and visitors.

9.2.3 Multi-residential Services

The City provides solid waste management services (collection of Blue Bin recycling, Green Bin organics, garbage, oversized items, yard waste, electronics, andHHW) to multi-residential buildings throughout the City. The Toronto Municipal Code defines multi-residential to include:

- buildings with nine or more units and generally include apartments, condominiums and some types of townhouses.
- small multi-residential buildings that receive curbside waste collection using wheeled curbside bins.
- large multi-residential buildings that use front-end containers for waste collection.

It is important to note that the majority of multi-residential buildings are eligible for City services; however, some have opted out of receiving this service and have elected to retain a private contractor. Of the 621,000 multi-residential units in the City of Toronto, approximately 420,000, or about two-thirds, receive City service. The portion of waste generated by multi-residential buildings that is currently being managed by the private sector is not subject to the City's collection by-laws, including diversion requirements.

The multi-residential sector is an extremely important part of the overall Waste Strategy as the waste from multi-residential households now accounts for a significant component of the waste managed by the City. The number of multi-residential households in the City continues to grow, therefore reaching diversion targets requires that significant efforts are made to divert more waste from this sector. A number of gaps, challenges and/or opportunities were identified with respect to the provision of waste services to multi-residential customers, including:

- The need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.
- How to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

- The impacts of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and some of which are in areas that are more difficult to service using traditional methods. Buildings that do not receive City collection services due to access limitations cannot participate in the variety of waste diversion services offered by the City.
- The need for enforcement to maximize the effective and efficient use of the City's current programs, services and facilities. To date, significant effort and success has been realized through promotion and education; however, there are still areas of the system where performance is not at the desired level requiring strategic consideration and engagement of enforcement measures.

The options for the multi-residential sector were grouped into three main categories: organics management, waste collection methods and planning, policies and enforcement to address the gaps, challenges and/or opportunities specific to these categories.

Organics Management
Support for Community Composting
Consider supporting community composting initiatives operations in locations where community members can compost their garden or kitchen waste using low-tech approaches such as a large backyard composter or a three-bin wooden composter. Organic waste collection bins could be located at different participating sources, e.g., religious institutions, community gardens etc. Final compost could be used in community gardens or to address local landscaping needs.

Waste Collection Methods
Data Management and Accessibility
Investigate and consider the use of new technology for more efficient container management, such as live tracking of waste, recycling and/or organic waste container volumes. A waste tracking technology, could be used with existing and new bins to provide data and statistics for each multi-residential building (e.g. weight of materials collected could be used to calculate diversion rates and potentially optimize collection frequency thereby reducing the number of collection trips in a given week). The City could require that the technology be used at properties that receive collection either through the City (through municipal or private collection forces) or investigate this as a future requirement for all multi-residential buildings in the City. Use of technology can provide better reporting back to property owners and management to help manage the set-out of bins and monitor waste generation.

Multi-residential Policies and Enforcement

Multi-residential By-laws and Enforcement

The City continuously assesses how to more effectively enforce existing measures to achieve its goals. However, where existing measures are inadequate, the City would consider enacting new, legally permissible by-laws to mandate City-wide waste diversion requirements (Blue Bin recycling and Green Bin organics service, etc.) to all multi-residential buildings, regardless of service provider. The goal of the new mandatory source separation or service provision by-laws would be to mandate diversion at the building level (with building owners responsible) and/or through mandatory requirements for haulers operating within the City and servicing multi-residential buildings. Enactment of the *Waste-Free Ontario Act* and subsequent adoption of regulations under the Act might affect implementation of this option. To be effective, any new by-laws or mandatory service requirements would require proper and consistent enforcement.

Updates to Current Multi-residential Development Standards

The City of Toronto would review, and revise where appropriate, the City's multi-residential development standards and introduce, where necessary, new requirements such as common area drop-off depot requirements or flexible space requirements to allow for the addition of future waste diversion programs. New standards could require that space be set aside for drop-off depots, space for sharing libraries and modifications to loading space in order to allow for collection by smaller vehicles.

The primary objectives and benefits of the recommended options for multi-residential waste include:

- Diversion of approximately 43,000 additional tonnes/year by Year 10 of the Waste Strategy, predominantly through policies and enforcement;
- Helps build sense of community and promotes sustainable behavior;
- Provides data to measure performance by multi-residential buildings;
- Provides information to help manage the set-out of bins; and,
- Greater enforcement, support and communication of existing waste diversion by-laws.

The quantities of waste diverted through community composting are expected to be minimal; however, the social value of this program is quite high and was supported through public consultation. This option provides an opportunity to encourage community composting programs, creates opportunities for community engagement and education on the value of composting. Community composting also produces compost that can be used in other community projects, such as community gardens, creating a closed-loop system and further reinforcing the Zero Waste message.

Similarly, it is expected that container management would divert limited quantities of waste; however, it can provide building-specific data on waste management performance and increase accessibility for on-demand billing information.It is also possible that this could lead to behaviour change at the building management level. There is some potential for possible reduction in collection costs (less trucks, fuel, labour) and traffic congestion associated with a decrease in the amount of pick-up services required.

It is through planning, policies and enforcement for the multi-residential sector that the greatest potential for diversion exists among these recommended options. These options would introduce a level playing field whereby diversion services would be in place for all multi-residential customers, regardless of the service provider, thereby ensuring environmental sustainability.At present, multi-residential buildings of a certain size are required to establish a source separation program (which does not include Green Bin organics) by the Province; however, there is limited enforcement of these requirements. City measures would ideally complement the existing or newlyproposed Provincial regulations and could possibly encourage buildings to come back on to City collection services.

It is important to note that in addition to the multi-residential specific options, the full scope of reduction, reuse, recycling and recovery options presented above will also help to reduce waste and increase recovery of resources from this sector. In particular, the intent of the Mobile Drop-off Depots is to establish collection points in high density areas (generally areas with a large proportion of multi-residential buildings), which will attract a large customer base and improve diversion from those that may not have easy access to a drop-off depot.

While all the promotion and education implementation tools will be useful in increasing waste diversion from this sector, there are several that are particularly earmarked for multi-residential customers, as presented in Table 9-1 (e.g. tools, resources and incentives for 3Rs Ambassadors, targeted communications and education campaigns, workshops and outreach and the establishment of a Multi-Residential Waste Diversion Advisory Group).

9.2.4 Industrial, Commercial & Institutional Services

A substantial quantity of waste from the IC&I sector is managed by the private sector outside of the City of Toronto system. Although the City is not obligated or mandated to provide waste management services to the IC&I sector, a portion of the waste stream generated by these sectors is managed by the City under certain circumstances, in particular where IC&I buildings and residential customers are combined (e.g. Residential

Unit Above Commercial (RUAC))[22]. Typically the locations receiving service are defined as "small Commercial", and:

- are generally less than four floors and less than 500 square metres of ground floor space.
- must be eligible for and subscribe to the City's Yellow Bag program.

The City faces a number of challenges and opportunities with respect to management of waste from the IC&I sector including:

- providing the IC&I sector with options which promote greater diversion and are flexible to accommodate changing waste streams and customer accessibility; and,
- identifying a mechanism to allow the City to influence greater waste diversion in the IC&I sector for waste materials being generated within the City of Toronto, but managed outside the City of Toronto waste management system.

It is anticipated that waste managed by the private sectorwill be addressed to some extent with future Provincial regulations anticipated under the *Waste-Free Ontario Act*, or possibly through various instruments being contemplated as part of the future Provincial Strategy, which has committed to giving more attention to IC&I waste diversion.

Based on these specific gaps, challenges and/or opportunitiesidentified, the following options are recommended for the Waste Strategy.

Expand Yellow Bag program to More Businesses

The City currently provides IC&I waste collection service to small commercial establishments primarily within the downtown core, and provides disposal options at City transfer stations, as well as at the Green Lane Landfill. Eligible commercial establishments pay for garbage collection and disposal through the Yellow Bag program, and receive Green Bin organics and Blue Bin recycling collection at no additional cost. At transfer station facilities and at the Green Lane Landfill, IC&I customers are charged a tipping fee on a cost per tonne basis. In this option, the City would explore the feasibility of expanding the number of commercial business that are eligible for City collection through the Yellow Bag program (but would not include large businesses, institutions or industries). Small businesses currently on the Yellow Bag program are required to participate in Green Bin organics and Blue Bin recycling programs. All new Yellow Bag customers would also be required to participate in these diversion programs.

[22] A discussion of privately managed waste is included in Technical Memorandum No. 1 in order to provide a complete picture of the waste currently managed within the City's geographic boundaries and other sources of waste which the City may either manage, or have some influence over in the future.

City Explores Mandatory Approaches to IC&I Waste Diversion

The City would explore whether IC&I waste diversion can occur more effectively through a combination of legally permissible City-wide mandatory recycling by-laws, other incentives or disincentives, and/or joint enforcement efforts with the Province. It should be noted that some IC&I establishments are required to source separate and divert waste under current Provincial regulations[23] but new regulations are expected in the next few years under the *Waste-Free Ontario Act*, or possibly through other instruments contemplated in the Provincial Strategy.

The primary objectives and benefits of the IC&I recommendations include:

- Diversion of an estimated 7,500 additional tonnes/year by Year 10 of the Waste Strategy (note that an estimated additional 4,200 tonnes of garbage would also be collected);
- Ensures that IC&I diversion occurs for all IC&I accounts directly serviced by the City;
- Increases IC&I waste diversion as the City has more control over IC&I accounts that it services and can provide Blue Bin and Green Bin diversion at rates which are affordable for small commercial businesses; and,
- Increased diversion from all City-serviced IC&I establishments.

[23] Ontario Regulations 102/94, 103/94 and 104/94

9.2.6 Construction, Renovation & Demolition Services

The City provides limited waste management services for Construction, Renovation & Demolition (CRD) materials at City transfer stations, predominantly consisting of waste from yard and single family home renovations. Typically large amounts of these waste materials are managed by the private sector outside of the City of Toronto waste management system.

Management of this waste stream presents a number of challenges;

- To date, since the City is not responsible for managing this material, there has been little pressure placed on the CRD sector by the City to divert waste.
- Where the City has tried to implement new diversion programs (for materials such as shingles, clean wood, etc.), there has been difficulty in finding appropriate sustainable markets to make these services financially viable.
- Private sector initiatives to construct and operate CRD recycling facilities in the Greater Toronto Area (GTA) have failed due to economicsas landfill disposal remains the less-costly option.
- There is limited Provincial enforcement of CRD waste and little information on the amount of CRD waste generated or diverted.
- The City has no authority over CRD waste managed by the private sector.

Based on these specific challenges identified, the following options are recommended for the Waste Strategy[24].

Depots and Policies for Home Renovation Waste

The City would establish dedicated CRD drop-off bins at each transfer station for materials[25] such as clean wood, drywall, concrete, plastic piping, corrugated cardboard, metal items, ceramics and asphalt shingles. Mixed CRD waste would be accepted for a higher fee than separated waste.

The City would investigate the feasibility of developing policies, by-laws and economic incentives (e.g. differential tipping fees, CRD debris deposit, requirement of proof of recycling to get occupancy permit, etc.) to encourage greater reuse and recycling of CRD waste, and use of the drop-offs.

[24]Note: the original option included a processing component intended to "close the loop" on the options to divert CRD materials however; it was recommended that the City not include the establishment of a processing facility in the Waste Strategy in light of recently failed private facilities, difficulty in finding markets and uncertainty regarding the *Waste-Free Ontario Act*.

[25]Note: Some of these materials are already accepted by the City at existing Transfer Station/Drop-off Locations.

Disposal Bans for Some CRD Materials

Toronto would consider phased-in disposal bans on CRD materials at City transfer stations ensuring that well established and stable markets are available for the diverted materials, in conjunction with the development of depots and policies.

The City would work with GTA municipalities and other key stakeholders to seek input on materials to be banned and encourage similar bans. The bans could begin with a determined contamination threshold (e.g. 10 %) and would target CRD wastes for which stable recycling markets exist (clean wood waste, drywall, corrugated cardboard, and asphalt shingles).

The City would work closely with CRD associations to gather input and help to educate members about the bans. In addition, the City would liaise with Ministry of the Environment and Climate Change (MOECC) to ensure that CRD bans are consistent with those under consideration by the Province at this time, and which are likely to be implemented Province wide over time through regulations under the *Waste-Free Ontario Act* or the proposed Provincial Waste Strategy[26].

The primary objectives and benefits of the CRD recommendations include:

- Diversion of up to 15,000 tonnes/year of CRD materials from disposal by Year 10 of the Waste Strategy.
- Helps to generate local jobs.
- Allows the City to enhance waste diversion in the CRD sector for waste materials managed by the private sector.
- Helps to promote, encourage and facilitate diversion of CRD waste where markets are available.
- Provides an opportunity for the City to take a leadership role in developing diversion policies and programs targeting CRD wastes generated by the CRD sector.
- Provides disposal and diversion opportunities for small businesses and home renovation waste.

[26] The Province of Ontario has announced that it plans to implement material disposal bans over time, through regulations under the proposed *Waste-Free Ontario Act*. The Draft Strategy which accompanies the Act specifically identifies CRD materials as potential candidates for a Provincial ban. Should the City implement CRD material bans, coordination with the Province would be required.

9.3 Materials & Energy Recovery

Following the reduction, reuse and recycling of materials, there are opportunities to recover valuable resources from the waste that remains. These resources could be in the form of additional recyclables such as metals (mixed with other materials), organics or energy resources including gas and heat.

A Landfill Gas/Biogas Utilization Study was completed for the City of Toronto in 2015. The study investigated utilization options for landfill gas/biogas generated at Green Lane Landfill, the expanded Dufferin Organics Processing Facility and the new Disco Road Organics Processing Facility. Options examined as part of the study included using the gas to produce electricity and/or heat, renewable natural gas, or other viable alternative utilization options. The City is currently exploring opportunities to maximize the benefits of gas utilization from these facilities by taking a triple bottom line approach.[27]

The City wants to preserve landfill disposal capacity for as long as possible. Alternative processing technologies could divert additional materials from disposal, particularly from the multi-residential sector and extend the life of Green Lane Landfill.

The recommended option is the development of a Mixed Waste Processing Facility with Organics Recovery.

Mixed Waste Processing Facility with Organics Recovery

This option involves consideration of the development of a Mixed Waste Processing Facility with Organics Recovery which would receive a mixed waste stream (i.e. garbage) for mechanical processing to recover recyclable materials followed by composting/digestion of the remaining material. The mixed waste stream is anticipated to come primarily from multi-residential sources. Mechanical processing technologies are typically able to recover plastics and metals. The organic fraction of the waste stream can be recovered and processed biologically to recover energy (e.g. biogas) and/or a compost material. Depending on the quality of the recovered materials, up to 65% of the material processed may be diverted from disposal. The amount of diversion achieved is expected to decrease to 30% if the compost product produced does not meet quality standards and cannot be marketed. This option is intended to support an increase in the overall waste diversion achieved and to extend the life of Green Lane Landfill.

This recovery option has the greatest ability to divert a larger amount of waste, including both Blue Bin recyclables and Green Bin organics, while providing flexibility for managing

[27] For more information on waste recovery services provided by the City, please refer to Technical Memorandum No. 1.

Mixed Waste Processing Facility with Organics Recovery

a variable waste stream. Depending on the quality of materials recovered and availability of markets, the residual waste stream could be considered for further processing as an energy source (e.g. refuse derived fuel).

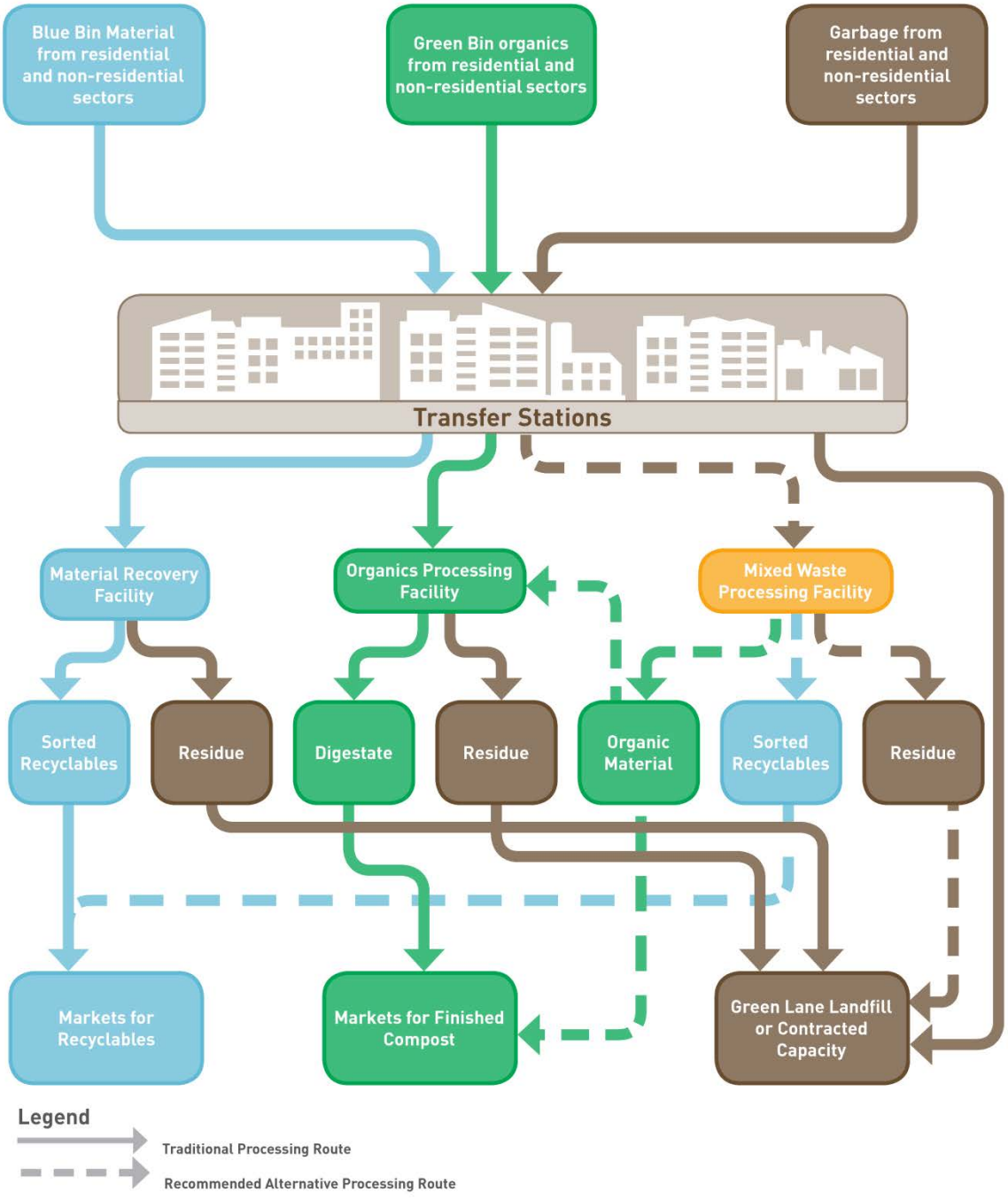
The primary objectives and benefits of a Mixed Waste Processing Facility with Organics Recovery are:

- A full scale facility for the City is expected to process approximately 150,000 tonnes per year of mixed waste, depending on the success of the other 3Rs options. Assuming 50%[28] of the material can be diverted as recyclables or compost, an estimated 75,000 additional tonnes of waste may be diverted from landfill disposal each year.
- That it produces a variety of materials, including those that can be used for energy generation.
- That it is flexible to changes in waste quantities and composition.
- That mechanical processing can be coupled with a variety of technologies to generate outputs such as refuse derived fuel (RDF), biogas and compost/digestate. RDF and biogas can be used to generate energy.

Figure 9-1 provides a graphic showing how a Mixed Waste Processing Facility with Organics Recovery would be integrated with the rest of the waste management system.

[28] 50% diversion is a conservative estimate.

Figure 9-1: Integration of a Mixed Waste Processing Facility with Organics Recovery



The specific need and timing for a Mixed Waste Processing Facility with Organics Recovery will be influenced by:

- The success of the 3Rs options (reduce, reuse, recycle) recommended as part of the Waste Strategy. Emphasis will be placed on the Waste Strategy recommendations in the first five years which have the potential benefit of increasing capture rates for Blue Bin recyclables and Green Bin organic materials (in particular from multi-residential buildings); and,
- The impact of the *Waste-Free Ontario* Act and the proposed *Draft Strategy for a Waste-Free Ontario: Building the Circular Economy* which includes several actions that will overlap with elements of the City's Waste Strategy. In particular, the establishment of an organics ban at disposal facilities may impact the need for the recommended recovery option.

As a result, it is recommended that during the first five years of implementation of the Waste Strategy the City investigates testing of this option on its residual or garbage streams. The purpose of testing would be to assess different pieces and types of equipment for recovery of recyclables, along with the quality of the recovered materials. This may include use of existing facilities that utilize comparable equipment and would involve the Unit for Research, Innovation & a Circular Economy(see Section 9.5). In addition, the recovered organic fractioncouldbe processed through existing anaerobic digestion facilities to assess performance, diversion achieved and quality of the end product. Testing on approximately 16,000 tonnes per year of residual waste is anticipated to divert approximately 8,000 tonnes per year of material and support the City's diversion objectives in the first ten years of the Waste Strategy.

During this testing phase, planning for a business case would be initiated in early 2020 with the development and issuance of an RFP for professional consulting services to develop the business case.The business case would be complete by early 2021 so that the results of the business case can be used for the5-year update of the Waste Strategy.

Should the results of the business case indicate that a Mixed Waste Processing Facility with Organics Recovery is feasible, in 2022, the City would develop and issue an RFP for a consultant to assist with the conceptual design and specifications (including site(s) if required) as presented in the business case. This would be followed by a vendor selection process considering the preferred approach to design, build, operate, and long-term maintenance as identified in the business case. It is anticipated that construction would start after 2026.

Should the business case indicate a Mixed Waste Processing Facility with Organics Recovery is not feasible (i.e. due to the impact of the *Waste-Free Ontario Act* or success of other options), the 5-year update of the Waste Strategy will reassess the options required to reach the City's 70% diversion target and other Key Performance Indicators (KPIs).

9.4 ResidualWaste Disposal

The City owns and operates Green Lane Landfill (GLL) as its primary facility to manage residual waste[29]. For contingency purposes, the City also has contracts with a number of private waste disposal facilities.

The recommendations in the Waste Strategy will help to extend the lifespan of GLL to approximately 2040[30] by:

- continuing and expanding the focus on 3Rs;
- enhancing diversion programs supported with community partnerships, comprehensive education and enforcement of by-laws; and,
- strategically using existing contracts to redirect some City of Toronto waste to other approved landfills.

The options considered and evaluated included options for implementation in the near term (i.e. over the next 10 years) and over a longer period of time. These options are distinctly different and achieve residual disposal capacity either by extending the life of GLL or by providing new future disposal capacity once GLL has reached its approved capacity.

9.4.1 Near Term Residual Waste Options

The identified near term residual waste options recommended for implementation include:

Review and Adjust Tipping Fees or Customer Base
This option considers adjusting tipping fees to discourage acceptance of waste from paid private customers and/or adjust the types of customers permitted to use City of Toronto waste facilities. An increase in tipping fees will discourage paid private customers increasing landfill life but, potentially decreasing revenues for the City of Toronto.
Utilizing Disposal Capacity at Other Approved Disposal Sites
This option looks at securing residual waste disposal capacity from other approved residual waste management facilities (e.g.,Landfills, Mixed Waste Processing Facilities and/or Energy from Waste facilities) in order to preserve long-term landfill capacity at GLL.

[29] For more information on residual waste management provided by the City, please refer to Technical Memorandum No. 1.

[30] Estimates of the anticipated extended lifespan of GLL factored in updated settlement figures, projections and settlement related to new composition of materials.

Adjusting tipping fees and securing alternate disposal capacity are being recommended primarily as a means to further extend the life of Green Lane Landfill. When the City conducts its regular reviews and updates of the Waste Strategy, consideration should be given at that time to the remaining capacity available at Green Lane Landfill, the timeline to secure new capacity, and the potential to implement the other identified options to provide additional residual waste disposal capacity in the future.With respect to securing alternate disposal capacity, the City already has contracted capacity with three private landfills (expiring in 2021) which can be utilized.A minimum or baseline quantity of waste would continue to be disposed and landfilled at Green Lane Landfill to maintain the efficient operation of the landfill. Any amount of waste above the baseline quantity could be directed to another facility.This would extend landfill development, operations, closure and post-closure care costs over a longer time period.

The primary objectives and benefits of these recommendations include:

- Estimated 100,000 additional tonnes redirected from Green Lane Landfill each year over the 10 year period.[31,32]
- Anticipated cost savings of approximately $10/tonne by using alternative private sector capacity.
- Preserves long-term disposal capacity by increasing tipping fees for commercial or private waste tonnes and City transfer stations.
- Provides secure access to required disposal capacity for the duration of the contract.

9.4.2 Long Term Residual Waste Options

Four options were identified for consideration to provide the City with long term residual waste disposal capacity:

- Expand Green Lane Landfill;
- Purchase of a New Landfill;
- SecureDisposal Capacity for Residual Management Following GLL Reaching its Approved Disposal Capacity; and/or,
- Develop a New Greenfield Landfill.

One or more of these options may be implemented in the long-term, depending on disposal requirements and GLL capacity.The completion of an Environmental Assessment will be required for a landfill expansion and a greenfield landfill, assuming that any new landfill under consideration for purchase or alternate disposal capacity has already undergone the required approval and permitting processes. It is anticipated that,should

[31] 60,000 tonnes will be redirected in 2017, increasing to 100,000 tonnes thereafter.
[32] Assuming the City can renegotiate similar contracts after 2021.

the City consider a landfill expansion or a greenfield landfill, the City would undertake the Environmental Assessment process which could take several years. The options of purchasing a new landfill or securing alternate disposal capacity require that the disposal capacity be developed by others (although some potential for partnerships may exist) and at this time it is not known to what extent these options will be available to the City in the future.

An assessment of the remaining capacity available at Green Lane Landfill will be part of the five year review for the Waste Strategy. Should it be determined that planning for additional disposal capacity is required, the four long-term residual waste disposal capacity options will be reviewed.

9.5 Overall System Recommendation –Unit for Research, Innovation & a Circular Economy

Through the consultation process, the concept of a Unit for Research, Innovation & a Circular Economy within SWMS was identified. It was strongly supported that this group could act as a catalyst to advance new, innovative ideas promoting resource conservation andsupport the growth of the circular economy. It could also potentially be expanded to include other environmental sustainability objectives with water, and energy stakeholders. The Unit for Research, Innovation & a Circular Economycould help toresearch, develop and promote new markets for recyclable materials and could include an Economic Development and Green Sector Market Acceleration Program to support innovation and commercialization by local green companies. TheUnit for Research, Innovation & a Circular Economywould also explore opportunities for social innovation, work to develop partnerships and could also facilitate training.

The primary objectives and benefits of thisrecommendationinclude:

- Potential diversion of up to 8,000 tonnes/year by Year 10 through testing of at least 16,000 tonnes/year of residual waste through mixed waste processing technologies (see Section 9.3);
- Potential diversion of up to 8,000 tonnes/year by Year 10 through testing of approaches to divert residue from Green Bin and Blue Bin processing facilities from disposal. This would include testing of at least 16,000 tonnes of processing residues throughnew technologies to recover and clean materials, and finding stable end markets for these materials;
- Potential creation of green jobs and circular economy development opportunities;
- Offers a central unit to promote community partnerships and collaboration, circular economy, promotion and education;
- Support innovation and commercialization by local green companies and organizations through partnering on applied research and proof of concept pilots; and,

- Research and potential development of new waste diversion technologies, environmental training and education programs.

It is recommended that this option be further investigated and, where appropriate, consider how other recommended options or implementation tools could be addressed through the development of this Unit for Research, Innovation & a Circular Economysuch as a community partnership unit, various testing or pilot programs associated with recommended options, and other research and development type activities.

9.6 Operational Considerations

The development of the Waste Strategy included a number of considerations of issues not related to the 5Rs, but more operational in nature, relating to collection, transfer, processing and disposal. These operational considerations are presented in the following sections.

9.6.1 Alternative Service Delivery Approaches

As the implementation of each of the recommended options is undertaken, other implementation tools such as coordinated and/or alternative contracts may be considered to further enhance the potential success of each recommendation. Other options include partnerships to procure services (e.g. coordinating contracts with other City Divisions) to recognize greater economies of scale or modifications to specifications, such as collection on only one side of the street, where appropriate. These types of options are best considered when preparing contract documents for new collection services, rather than trying to implement them during the middle of an ongoing contract.

Coordinated and/or Alternative Contracts
The City of Toronto typically procures specific solid waste management services on an individual operation function basis (i.e. collection, transfer, processing and disposal are typically all contracted on their own). This option involves consideration of procuring waste management services with alternative contract terms in order to facilitate more efficient and cost effective service delivery from private sector contractors. This may include combining services under one contract which have historically been treated separately.Alternative contract terms may include a longer contract period to provide the private sector with additional flexibility for developing or providing infrastructure requiring significant investment of capital and financing.

One Side of the Street Collection
The Waste Strategy considered collection on only one side of the street through its addition to the Coordinated and/or Alternative Contracts option. Further analysis of one-

Coordinated and/or Alternative Contracts

side of the street collection will be required. Based on some initial research completed as part of the development of the Waste Strategy in consultation with Legal Services and Equity, Diversity & Human Rights, preliminary considerations were highlighted:

- To mandate one-side of the street collection in designated parts of the City, Council would need to adopt a by-law requiring residents in those areas to cross the roadway with their bins to receive waste collection services. Moreover, to avoid conflicting with the Ontario Highway Traffic Act and be consistent with Chapter 950 of the Toronto Municipal Code, the by-law would likely need to make clear that such roadway crossing with the bins occur only at street corners and/or marked pedestrian crossovers. Residents may choose not to cross the road at crossings or corners, thereby raising substantial pedestrian and vehicular safety concerns.
- Such waste collection service changes may cause significant equity impacts and accessibility concerns for vulnerable communities, such as those with mobility, cognitive or vision disabilities and seniors. These impacts are further exemplified by requesting residents to wheel their bins (at least two waste streams bins are collected weekly) and only cross the street at a marked crossover or corner.
- Seasonal challenges, especially during the winter months, could make it quite challenging for residents to navigate their bins to the new collection location. This is of particular concern in snow and ice conditions where set-out space can be very limited.
- Having residents move bins up, down, and across streets and/or leave bins in front of other properties for longer than permitted can lead to increased street and sidewalk litter, as well as stranded, lost, and stolen bins.

9.6.2 Commissioners Street Transfer Station

The City owns and operates seven transfer stations (see Figure 5-3: Map of Waste Management Facilities and Collection Districtsfor locations of these facilities within the City), which accept waste from collection vehicles for transfer to other facilities and serve as drop-off depots for additional types of waste from residents and small commercial haulers. In general, the City's transfer stations are mainly used to transfer Blue Bin recycling, Green Bin organics, yard waste, and garbage.

Commissioners Street Transfer Station is located within an area of the waterfront scheduled for redevelopment (i.e. the Port Lands Acceleration Initiative). The City is facing a challenge regarding transfer capacity in the downtown core in that the current transfer station land use does not fit within the future planning framework.This transfer station provides the only City-owned downtown option for residents to drop off waste materials (including household hazardous waste). It is also the closest transfer station for City collection vehicles and City-contracted service providers to unload waste collected

from downtown routes. The Commissioners Street Transfer Station is an essential component of the City's system required to efficiently deliver waste management services to the downtown core. A facility located at or in close proximity to the current facility will be required in the future in order to continue service provision in this growing part of the City.

Based on these specific challenges, the recommended option for transfer capacity is to relocate Commissioners Street Transfer Stationwithin the Port Lands Area.

Relocation of Commissioners Transfer Station within the Port Lands Area

Construct and operate a new waste transfer facility at a new site located within the Port Lands area. Depending on the timeframe for redevelopment occurring within the Port Lands, relocation could occur within the short term. It is anticipated that waste generation will continue to increase in the downtown core as a result of continued development and intensification, supporting the ongoing need for waste transfer capabilities in the area.

The primary objectives and benefits of the recommended Commissioners Street transfer station option include:

- Provides for the continuation of the City's existing waste transfer station service within the Port Lands area.
- Continues existing level of service provided by the City.
- Maintains potential user's familiarity with location and services available.
- Provides a convenient option for waste drop-off from downtown customer base.
- Ensures transfer station is compatible with local land uses and traffic patterns.
- Supports and services continuing development growth in the downtown area as new multi-residential buildings are built.
- Provides potential to incorporate designs for an enhanced drop-off depot for residents.
- Provides access for a full range of divertible and residual garbage management options for waste collection vehicles and potentially small commercial haulers and residential customers.

9.6.3 Future Processing Considerations

The City provides recycling and processing services for the materials that it collects through either its own facilities or contracts with private sector facilities including:

- Blue Bin Recycling
- Green BinOrganics
- Yard Waste

- Oversized Items and Metals
- Construction, Renovation and Demolition Waste
- Electronics
- Used Tires
- Household Hazardous Waste

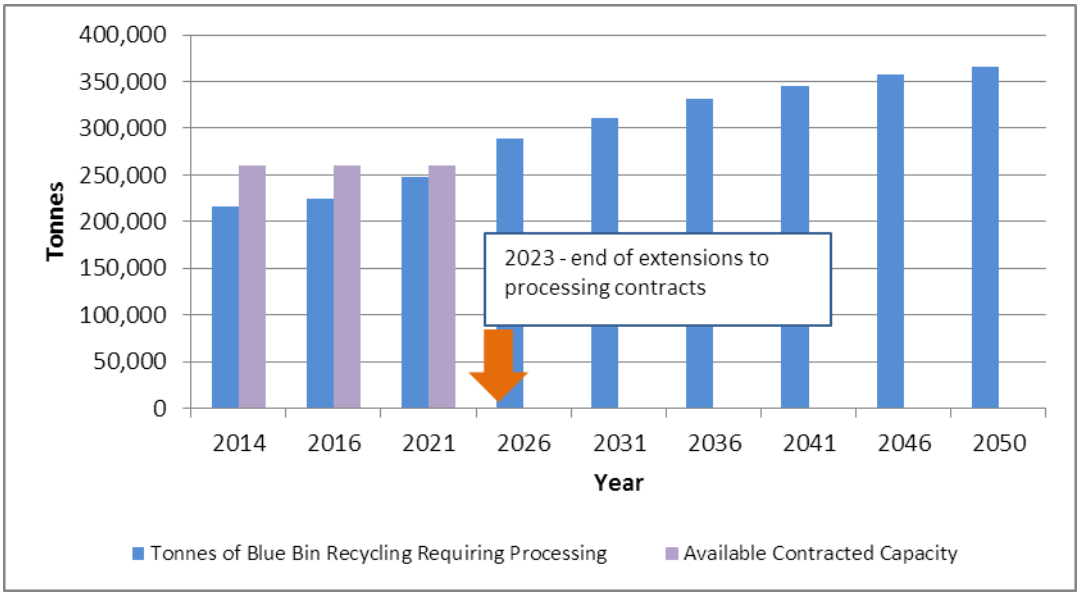
The following sections discuss recycling and processing recommendations for Blue Bin recycling and Green Binorganics for the future based on existing contracts and future quantities of waste requiring management.It is not anticipated that the recommendations in the Waste Strategy would significantly impact the quantities of the other materials listed above and that the City would continue to utilize private sector processing facilities as required.

9.6.3.1 Blue Bin Recycling Processing

Blue Bin recycling is either transported directly to the contracted Material Recovery Facility (MRF)or hauled and consolidated at the closest City transfer station. Historically, Blue Bin recycling wastransported to one of two MRFs in the City; to either the City's now-closed MRF located at the Dufferin Waste Management Facility or to a contracted MRF located on Arrow Road, which is owned and operated by a private company. Currently, all the City's Blue Bin recycling (approximately 260,000 tonnes) is processed by a private company through two contracts.

The following Figure 9-2 provides an overview of how these contracts compare with the long term projected needs for Blue Bin recycling processing capacity, considering the impact of the tonnes of Blue Bin recycling diverted through the Waste Strategy (assumes a 1% growth in Blue Bin recycling generated after 2026).

Figure 9-2: Blue Bin Recycling Projections and Contract Alignment



As is evident from the figure, the City currently has sufficient capacity in its current Blue Bin recycling processing contracts to manage the projected quantities up to 2023. Blue Bin recycling processing capacity requirements will need to be reassessed upon each five year review of the Waste Strategy to monitor the impact of the options implementation.

These contracts align well with the anticipated timelines for the*Waste-Free Ontario Act*legislation and proposed regulations, which will likely change how Blue Bin recycling materials are managed in the future in Ontario.

It is recommended that the City not make any investments with respect to long-term Blue Bin recyclingprocessing capacity until the impact of implementing the recommended options in the Waste Strategyand specific details of future regulations (particularly the anticipated Blue Box regulation) under the *Waste-Free Ontario Act*legislation are better understood and the future role of the City is more clearly defined.

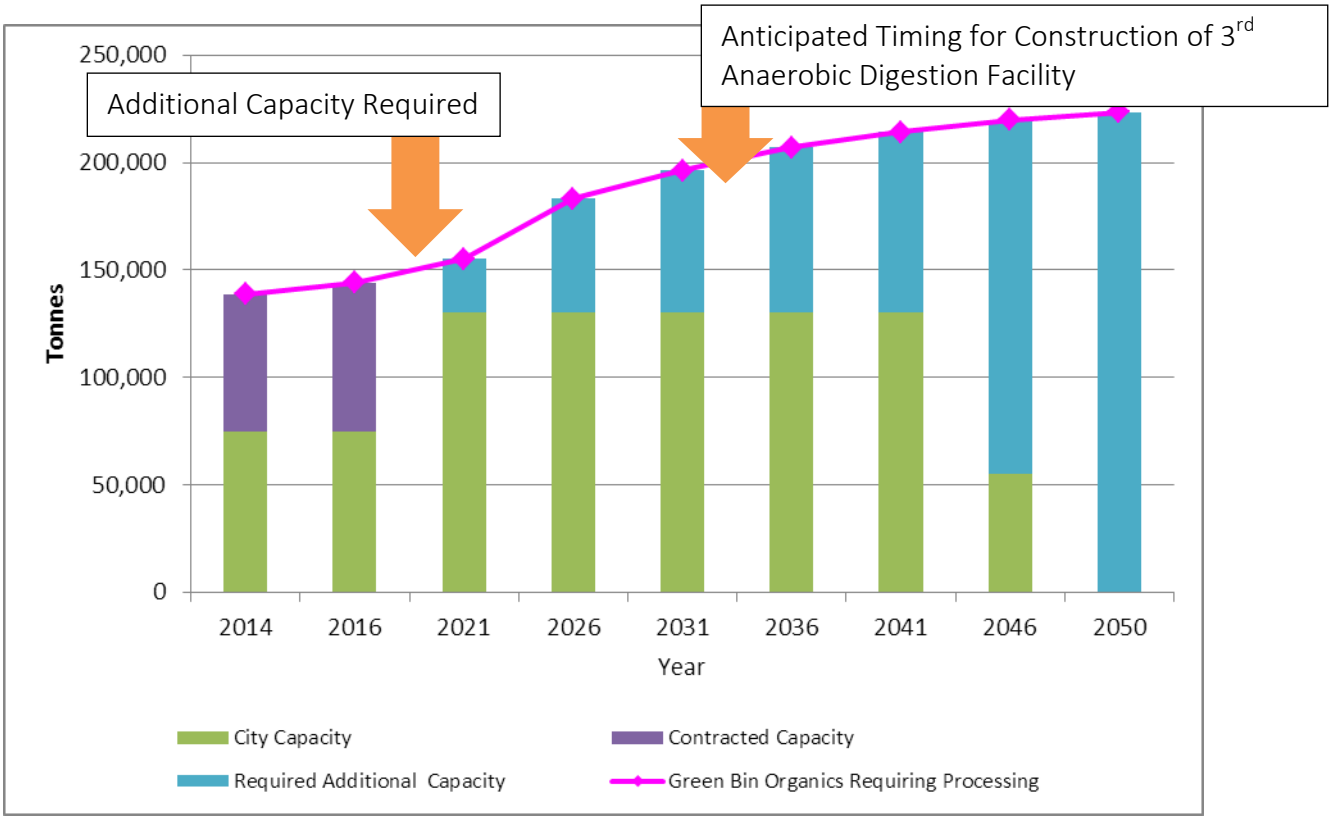
9.6.3.2 Green Bin Organics Processing

As part of implementation of the Green Bin organics program, the City initiated the development of a facility to process the Green Bin organics collected from residential and non-residential sources. The first facility was located at the Dufferin Waste Management Facility, utilizing anaerobic digestion technology. This technology was chosen for its ability to process a complex organics stream,to allow for the use of plastic bags as liners in order to make the program as convenient as possible for residents and to capture materials such as diapers and sanitary waste.

As the Green Bin organics program expanded, additional processing capacity was required. In May 2007, Council authorized the design and development of two organic processing facilities in Toronto. This authorization included a new facility at the Disco Road Waste Management Facility (operational in 2014) and an expanded facility at the Dufferin Waste Management Facility. Once the expanded Dufferin Anaerobic Digestion Facility is operating (expansion is underway and anticipated to be complete in 2018), these two facilities will have a combined processing capacity of approximately 130,000 tonnes per year.

In addition to the City's own organics processing capacity, it has also secured several processing contracts with private sector operators. Currently, the City has contracts with three private sector processing facilities for a total of 85,000 tonnes of Green Bin materials. These contracts are in place to provide contingency capacity and processing capacity while the Dufferin Anaerobic Digestion Facility is being expanded. The following Figure 9-3provides an overview of how these contracts compare with the long-term projected need for organics processing capacityand when a third anaerobic digestion facility may be considered, considering the impact of the changes to the quantities of Green Bin organics from the Waste Strategy. This assumes all extensions for existing contracts are utilized (use of extensions would extend contracts to 2020) and that tonnes of Green Bin organics increase at 1% per annum after 2026. Organics processing capacity requirements will need to be reassessed upon each 5 year review of the Waste Strategy to monitor the impact of the options implementation.

Figure 9-3: Green Bin Organics Processing Projections and Contract Alignment*



*Includes planned food waste reduction estimate as identified in Section 9.1..

Based on the current facilities and private sector contracts, the City will not have sufficient organics processing capacity to manage its projected needs as of 2020.

There are currently a number of variables with respect to Green Bin organics processing requirements, including:

- Given the quantities of organics requiring management in 2020 and forecasted out into the future assuming status quo, a third Anaerobic Digestion facility of similar size to the new Disco Organics Processing Facility (75,000 tonnes per year) may not be required for another 10-15 years as the City will not have sufficient quantities of organics until then to support this investment.
- A Mixed Waste Processing Facility with Organics Recovery should take into account the potential need for long-term organics processing capacity for recovered organic materials which could include investigating opportunities to co-manage similar organic waste streams.
- The City is also currentlyrolling out a larger Green Bin to single family residential customers that could also impact the quantities of material requiring management. Should this program modification result in additional tonnes

requiring management, additional processing capacity may be required in the system earlier than currently projected.

- As part of the Provincial Strategy required under the *Waste-Free Ontario Act,* the Province of Ontario is considering a ban on organics disposal in the future. The implementation of this type of ban could have significant implications on the demand for Green Bin organics processing capacity in the Province.
- As part of the Waste Strategy, a recommendation has been proposed to implement a food waste reduction strategy (see Section 9.1above). The successful implementation of this strategy will reduce the amount of Green Bin organics requiring management and therefore should reduce the need for additional organics processing capacity.

It is recommended that the City monitor the success of the Food Waste Reduction Strategyidentified for early implementation in this Waste Strategy to determine its potential impact on long-term organics processing capacity requirements. Additionally, the City shouldclosely monitor the discussions on a potential organics ban in Ontario and the potential implications to the City as it relates to the ability to secure long-term private sector organics processing capacity and the need and/or opportunity to construct new organics processing capacity for City managed Green Bin organic materials.

9.6.3.3 Future of Dufferin Material Recovery Facility

The City owns the now closed[33]Material Recovery Facility (MRF) at the Dufferin Waste Management Facilitywhich was identified as a potential candidate for several alternative uses depending on the recommended options in the Waste Strategy. It could be considered for a number of uses (potentially processing) as part of a future facility siting process, as required.

9.6.4 Future Residual Waste Considerations

Two options were originally identified as part of the Residual Waste Disposal options:

- Landfill Mining and Reclamation; and,
- Landfill Operation Continuous Improvement and Best Practices.

These options are more operational in nature and will not provide the required residual waste disposal capacity over the planning period. They are, andcan be considered for the future as ongoing enhancements to existing operations.

9.7 Implementation Tools

A range of implementation tools have been identified to support the promotion and education for new programs and services and in the financing and funding of new

[33]As of November 2014.

infrastructure and services to be implemented as part of this Waste Strategy. These tools are further described in the following sections.

9.7.1 Promotion, Education and Enforcement

The purpose of solid waste outreach, education and enforcement is to effectively communicate to the City's customers how to participate in the City's waste management programs and to encourage reduction, reuse and recycling of waste. The following sections provide an overview of some of the tools the City may use for promotion of programs,education of customers and enforcement of current and future by-laws.

9.7.1.1 Promotion & Education

The City offers comprehensive promotion and educational tools (some of which are engagement and outreach activities) and resources to its customers, including:

- Videos
- Waste Wizard (online waste sorting tool)
- Collection calendars
- Live Green Toronto
- 311
- 3Rs Ambassador Volunteers
- Community Environment Day Events
- Targeted campaigns and advertisements
- Multi-residential outreach

As part of its ongoing promotion and education efforts, the City maintains a comprehensive website (toronto.ca/recycle) which contains a variety of information. In addition to the online resources, the City also makes available printed resources such as calendars, posters, bin stickers, and sorting guides which can be printed from the website, or hard copies ordered through 311.

The City will continue to use the existing promotion and education tools and may utilize a number of tools presented in Table 9-1 to enhance existing programs and support the Waste Strategy.

Table 9-1:Promotion and Education Implementation Tools

Implementation Tool	Summary
Interactive Online Waste Management Tool	Enhancements to the Waste Wizard tool could be undertaken to develop a new online and/or mobile application that can provide various additional SWMS information, such as sorting information, collection schedules, changes/updates to the waste management program and opportunities for reuse, recycling and safe disposal. For example, the tool could allow a postal code to be entered (for an internet-based website) or could be GPS-enabled to find the closest locations to manage the waste in question and could also

Implementation Tool	Summary
	provide collection scheduling information for single family and other customers. This tool could help encourage participation as well as help to clarify Toronto's waste management system and have the ability to provide information in different languages.
Environmental Impacts Calculator	An online tool (e.g., mobile application, web-based calculator) could be developed to provide consumer information on the lifetime environmental impacts (otherwise referred to as life cycle analysis) for different products (e.g. plastic versus wooden stir sticks, disposable versus cloth diapers) to help consumers make sustainable decisions and promote waste reduction and behaviour change. For example, to estimate the environmental impacts of disposable diapers, the tool would consider the process involved to extract the materials needed to manufacture the diapers (e.g., cotton, plastic) and the process to manage the materials after use, including the energy and water requirements and emissions to air, water and land. This tool could help encourage participation as well as help to clarify the complexities associated with Toronto's waste management system. The tool could be made available online and as a mobile phone application.
Expand Social Media Presence	Expanding social media channels to could be used to inform people of program changes, provide reduce and reuse tips/videos, clarify system complexities, promote 3Rs (Reduce, Reuse, Recycle) opportunities within the City and through partnerships with local organizations and support behavior change. There is opportunity to address cultural diversity through translating and tailoring messages. Dedicated additional resources can be used to increase the City's online presence through social media and to increase two-way communication. Opportunities include adding/expanding use of social media tools for SWMS purposes such as Facebook, Pinterest, YouTube, Twitter, Instagram, Mind Mixer and the City's website (and other tools as they develop over the planning period). It is recommended a social media strategy be developed that considers the various approaches to increasing the City's presence on social media sites.
Provide Additional Tools and/or Resources to the 3Rs Ambassadors and	Creation of an Ambassador forum on the website to facilitate connections with Ambassadors in other neighbourhoods, form community hubs to collaborate on outreach initiatives, and provide a forum for Ambassadors to share ideas, resources and initiatives. Resources for Ambassador forums could include:

Implementation Tool	Summary
Other Volunteer Programs	• presentation packages for multi-residential building annual general meetings and other building events; • discussion tool-kits on key multi-residential challenges; • opportunities for Ambassadors to share their ideas and initiatives including materials developed; • a map of multi-residential buildings so that Ambassadors could collaborate on initiatives; • discussion groups to brainstorm or help plan waste initiatives with the ability to translate to different languages; and, • poster/notice templates for building waste initiatives developed by Ambassadors.
Incentivizing 3Rs Ambassadors and Other Volunteer Programs	Consideration of the introduction of incentives for Ambassadors/volunteers to expand the program's reach in multi-residential buildings. Incentives could include a small honorarium, monthly draws for prizes, recognition awards for outstanding or long-term performance, or passes to City of Toronto events, etc. The City should continue to promote volunteer opportunities through local high schools for students looking to fulfill community service hours and create/promote opportunities during holidays, Professional Activity (PA) days, March Break and summer vacation.
Targeted Group Communications	The City of Toronto has a diverse population and it is challenging to reach customers, particularly for those whom English is not their first language and those that have recently become City residents. This new tactic would focus on new and alternative communications to ensure that more Toronto residents and stakeholders are reached. This may include research tactics such as focus groups to test messages, concepts and information delivery mechanisms.
Multi-residential – Workshops and Other Outreach for Buildings Not Receiving City Waste Collection Services	Coordination of on-site workshops/seminars/outreach or waste reduction challenges to buildings that are currently not receiving City collection services to encourage participation in diversion programs, improve program participation, and reduce contamination.
Create a Community Partnership Unit Within Solid	Strengthening and building partnerships with various non-profit and for-profit organizations in the City as well as other partnerships related to waste reduction will support further waste reduction and diversion. This initiative would be managed by a specially

Implementation Tool	Summary
Waste Management Services (SWMS) Division	established Community Partnership group within SWMS or with partnership/collaboration with other City Divisions where applicable. The group would develop arrangements or agreements with external agencies or organizations, monitor and track annual performance, and evaluate partnerships on an on-going basis to work together to encourage and promote waste diversion.
Targeted Outreach and Education Campaign to Reduce Waste	Development of more audience specific and targeted outreach and education campaigns designed to encourage people to think about the impact of their purchasing and consumption choices. As demographics and lifestyles change, more convenience items are being developed that contribute to waste generation. Develop targeted outreach and education campaigns to promote reduction of waste.
City to Assume Role of Facilitator to Encourage Industrial, Commercial and Institutional Waste Diversion	The City assumes a role of a facilitator/coordinator to help the Industrial, Commercial and Institutional (IC&I) sector (including those not receiving City service) implement waste reduction, reuse, and recycling activities. City would play a role of educator and outreach coordinator to help businesses understand the benefits of waste diversion and help them to facilitate adoption of waste diversion activities.
Develop an Advocacy Strategy	The City of Toronto develops an advocacy strategy to support the implementation of the Waste Strategy and/or involvement in various committees, organizations and processes which lead to regulatory/legislative change or consumer products or other changes which benefit the City of Toronto solid waste management system. This requires Toronto's engagement at both the provincial level (e.g. where most waste legislation is enacted) and at the federal level – especially engaging with bodies such as the Canadian Council of Ministers of the Environment (CCME) where provinces work in collaboration with federal government to advance issues like extended producer responsibility (EPR).
Establish Advisory Groups to Inform On-going Waste Planning/Implementation Process	Two advisory groups are recommended for implementation; • A Circular Economy Waste Reduction Advisory Group will be established to provide input into ongoing waste reduction planning processes, specifically those identified in the Waste

Implementation Tool	Summary
	Strategy. This Advisory Group will support the City's efforts to reduce waste and support innovation, with a specific focus on the development and implementation of efforts that support a circular economy. Invitations to participate will first be extended to those organizations that currently comprise the Waste Strategy's Stakeholder Advisory Group and may be extended to other organizations. • A Multi-residentialWaste Diversion Advisory Group will be established to provide advice and feedback on the Waste Strategy's multi-residential related options to increase diversion from this sector. Membership will likely consist of multi-residential industry, community not-for-profit groups and property management representatives.

As the Waste Strategy recommendations are implemented,promotion and education tools will be used to support each recommendation.

9.7.1.2 Controls, Bans and Enforcement

The City has enacted a number of by-laws that pertain to solid waste matters, namely Toronto Municipal Code Chapters 548, 604, 629, 841, 844, and 846, along with Chapters 441 and 442 that address solid waste rates and fees. City enforcement of these by-laws can provide alternative remedies where outreach, education and engagement have not sufficiently achieved the desired performance levels.

It is recommended that the City consider extending mandatory source separation requirements to include all multi-residential buildings as part of the Waste Strategy. Higher diversion performance by the multi-residential sector and enforcement of new by-laws, as well as additional enforcement of existing mandatory source separation by-laws at existing City-serviced buildings, who are supposed to be diverting both Blue Bin recycling and Green Bin organics materials, are key to the success of the Waste Strategy.

The City's Municipal Licensing & Standards Division (ML&S) collaborates with Solid Waste Management Services (SWMS) to resolve by-law infractions where required. To a large extent, investigations into by-law infractions are complaint driven (especially for residential issues). However, ML&S may discover infractions by the commercial sector while out on duty (e.g. illegal dumping).Violations of the various City by-laws that pertain to solid waste matters can lead to prosecution by the City, pursuant to the *Ontario Provincial Offenses Act* for set fines or other outcomes.

The Province is currently reviewing 3Rs Provincial regulations (O. Regs. 102/94,103/94,104/94) and new regulations are anticipated with the *Waste-Free Ontario Act* within the first five years of the Waste Strategy. Joint Provincial/municipal enforcement of Provincial waste regulations should be considered as part of this option.

There are a number of challenges facing the City currently and in the future with respect to controls, bans and enforcement. These include:

- Regulatory, Control and Role/Responsibility Challenges: having a system where some waste management responsibilities are outside of the City's control and therefore subject to uncertainty and risk with respect to external parties making changes that can impact the City's system[34].
- Impacts of Intensification:the impacts of intensification (i.e. increased urban density) and the changes required to manage additional waste generated by multi-residential buildings with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.
- Waste Reduction and Reuse:how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.
- Enhanced Enforcement Opportunities: to maximize the effective and efficient use of current programs, services and facilities. To date, significant effort and success has been realized through promotion and education; however, there are still areas of the system where opportunity exists toachievethe desired level of program use, which may require strategic engagement of enforcement measures.

The City has in place services that allow residents, small businesses and organizations to easily participate in convenient waste diversion programs. Recent waste audit studies indicate that there is an opportunity to improve participation in diversion programs as a significant amount of divertible materials are still found in the garbage stream. As previously mentioned in Section 9.7.1 (P&E), the Waste Strategy recommends increasing funding for waste diversion communication, promotion and education. To support and complement this recommendation, greater enforcement of existing by-laws is also being recommended in parallel. This includes having additional dedicated resources to oversee and strategically manage enforcement efforts as well as increasing the number of by-law staffing resources to more comprehensively support existing and new Waste Strategy recommendations.

[34] The City has no authority over IC&I, CRD and Multi-residential waste managed by the private sector. This waste is governed by the Provincial 3Rs regulations; however, there is limited enforcement of these regulations. The City provides waste management services to some small commercial businesses and Multi-residential buildings, however, is not required to do so.

SWMS will work collaboratively with ML&S to develop an approach to educating customers and enforcing compliance of waste by-laws. This will include development of a divisional service level agreement that will include annual reporting of activities undertaken by ML&S and the outcome of their enforcement activities as well as an assessment of appropriate enforcement related staffing levels in general. It will also include development of multi-year enforcement plans. The plans will be structured to address improvement of participation in existing diversion programs and services as well as any new programs being introduced through the Waste Strategy. An inter-divisional working group will also be established to discuss target issues and develop an annual enforcement and communications plan to address the areas of focus.

City Explores Mechanisms to Introduce City-wide Controls over Waste Management

The City explores whether and how greater waste reduction and diversion might result from undertaking one or more of the following City-wide controls, where legally permissible: banning certain packaging and other material; mandating recycling separation and processing of recyclables; imposing levies; implementing disposal bans (e.g. construction, renovation and demolition materials); developing local Extended Producer Responsibility measures; improving enforcement of existing City Waste by-laws; and coordinating with the Province on joint enforcement of Provincial regulations.

These instruments could apply to both residential and non-residential (e.g. IC&I and CRD) waste and would be designed to reduce the amount of waste disposed and increase diversion. Residential (single family and multi-residential) households already have comprehensive service but the policy would target the remaining waste stream and could lead to additional diversion of materials to fulfill policies such as organics disposal bans.

The primary objectives and benefits of these recommendations include:

- Diversion of an estimated 49,000 additional tonnes/year from landfill by Year 10 of the Waste Strategy, through enforcement of existing by-law requirements at multi-residential buildings currently serviced by the City; and,
- Proper enforcement of existing by-laws and new measures which may achieve a level playing field for all players so that those who comply voluntarily are not disadvantaged.

9.7.2 System Financing and Funding

As the implementation of the recommendations is undertaken, the financing tools presented in Table 9-2 may be considered to fund implementation. As part of the development of the Waste Strategy, a long term sustainable rate model was developed to maintain the current system and fund new projects brought forward as a result of the

Waste Strategy. A more fulsome discussion of a fully independent utility is provided in Section 11.2.

Table 9-2:System Financing and Funding Implementation Tools

Implementation Tool	Summary
Fully Independent Utility	This option involves recommendations for elimination of the Solid Waste Rebate which wouldsupport the City's priority to achieve long-term sustainability of the Waste Strategy and to move towards a full user pay utilitythat is funded through volume based user fees. This option would involve transitioning to a new, long term, sustainable rate model. This change would allow the City's Solid Waste Management Services (SWMS) Division to evolve into a utility that is fully self-financed through flat or variable fees charged to its customer base and would allow for cost recovery of public service goods (such as litter collection), to be funded from the Property Tax Base.
Public-Private Partnerships (P3) for Major Capital Works	Public-PrivatePartnerships(P3s) are a long-term performance-based approach for procuring public infrastructure where the private sector assumes a share of the responsibility in terms of risk and financing for the delivery and the performance of the infrastructure, from design and structural planning, to long-term maintenance. Under this option, the City could consider entering into a long-term agreement with a private sector partner to design, construct, finance, operate and maintain a major capital project that would be part of the Waste Strategy. The City would define the scope of the capital project and run a competitive procurement process to select a private sector consortium that provides the best value to the City.
Debt Financing	This option involves the City raising capital by borrowing to finance capital investments.
Increase Solid Waste Management Services Customer Base	Increasing the City's SWMS customer base in the multi-residential/condominium and IC&I sectors beyond current service levels has the potential to generate additional fee revenues and potentially realize some economies of scale. In addition, providing collection service to a broader customer base would allow the City to influence waste diversion behaviour by requiring participation in Blue Bin recycling and Green Bin organics programs as a condition of receiving City collection service.

Implementation Tool	Summary
Allocating Costs for Waste Management to Applicable Waste Streams	The City would describe the separate fees for each material type collected (garbage, Blue Bin recycling, Green Bin organics, yard waste etc.) rather than charging one combined fee placed on garbage. Currently this includes provision of collection services for waste and divertible materials. The drawback of the current fee approach is that the multi-residential garbage fee is expensive compared to garbage fees charged by private sector haulers for pick-up of garbage only, because the City fee includes the costs of Blue Bin recycling, Green Bin organics and other support and education services in the garbage rate charged.
Alternative Revenue Generation Opportunities	The City would identify and implement additional revenue generating opportunities through options such as utilizing biogas produced by City of Toronto facilities (Anaerobic Digestion and landfills) as a source of energy, selling processing capacity at future facilities such as a Mixed Waste Processing Facility with Organics Recovery and other potential revenue sources that may be introduced or present in the industry in the future.
Performance Based Incentives	Provide performance based incentives (e.g. financial) to management of commercial and multi-residential buildings (generally the building supervisor, owner or management staff) to encourage behaviour that will result in an increase of their diversion rates.

9.8 Summary of Recommended Options and Implications

One of the primary goals of the development of this Waste Strategy was to identify the means to reduce the amount of waste being sent to landfill in the future. This can be accomplished by reducing the amount of waste being generated, reusing materials, and increasing diversion of Blue Bin recycling, Green Bin organics and other materials.

Table 9-3 provides a summary of the options being recommended for implementation in the future and highlights those that specifically contribute to lower amounts of waste to landfill over the next 10 years. These options essentially comprise the 3Rs plan.

Table 9-3:Summary of Recommended Options for 3Rs Plan

	Recommended Options	Contributes to Waste Diversion
Reduction & Reuse		

	Recommended Options	Contributes to Waste Diversion
	• Food Waste Reduction Strategy • Textile Collection and Reuse Strategy • Sharing Library • Support Reuse Events • Explore Opportunities for Waste Exchange	✓
Recycling		
Drop-off Depots	• Develop a Mobile Drop-off Service • Develop a Network of Permanent Neighbourhood Depots	✓
Multi-residential Services	• Mandatory Multi-residential by-law • Updates to Current Multi-residential Development Standards • Community/Mid-Scale Composting • Container Management	✓
Industrial, Commercial & Institutional	• Expand Yellow Bag program to More Businesses • City Explores Mandatory Approaches to IC&I Waste Diversion	✓
Construction, Renovation & Demolition	• Depots and Policies for Home Renovation Waste • Disposal Bans for Some CRD Materials	✓
Incentive Based Options	• Reverse Vending Machines	✓
Recovery		
Materials & Energy Recovery	• Mixed Waste Processing Facility with Organics Recovery Development	✓

	Recommended Options	Contributes to Waste Diversion
Residual		
Residual Waste Disposal	Near Term Recommendations • Review and Adjust Tipping Fees or Customer Base • Utilizing Disposal Capacity at Other Approved Disposal Sites Long Term Recommendations • A range of options have been provided with respect to the appropriate next steps and timing associated with the next steps to address these future considerations.	
Overall System Recommendation		
Unit for Research, Innovation & a Circular Economy	• Unit for Research, Innovation & a Circular Economy	✓
Operational Considerations		
Recycling & Processing	• A range of options have been provided with respect to the appropriate next steps and timing associated with the next steps to address these future considerations.	✓
Commissioners Transfer Station	• Relocation of Commissioners Transfer Station within the Port Lands Area	
Implementation Tools		
Promotion, Education and Enforcement	• A range of implementation tools have been identified to support the promotion and education of new programs and services to be implemented as part of this Waste Strategy. • City Explores Mechanisms to Introduce City-wide Controls over Waste Management	✓
System Financing and Funding	• A range of implementation tools have been identified to support in the financing and funding of new infrastructure and services to be implemented as part of this Waste Strategy.	

It has been estimated that approximately 150,000 additional tonnes/year [35] of residential waste will need to be diverted by Year 10 of the Waste Strategy to achieve a 70% residential diversion rate(See Section 12 for further discussion on Goals and Targets). These estimates have been developed based on recent waste audit information supplied by the City for single family and multi-residential households and reflect reduction or capture of materials in the garbage bin, Green Bin and Blue Bins. Achieving diversion ofthese estimated tonnes relies heavily on participation, promotion and education, and enforcement to achieve this goal.

Table 9-4 presents a summary of the tonnes diverted through the recommended options. The implementation timeline has been superimposed on the tonnages to provide context for the diversion estimates. It should be noted that diversion estimates are purposely conservative in the first five years until the impact of the *Waste-Free Ontario Act* is known. After the 5-year review of the Waste Strategy and as the implications of the *Waste-Free Ontario Act* are more evident, the diversion estimates increaseat a greater rate in order to achieve the targeted 70% residential diversion rateby Year 10 (i.e. 2026) of the Waste Strategy. These diversion estimates represent aggressive targets and it will be necessary to allocate sufficient resources (budget and staffing) to realize these tonnages, supported by active participation and engagement by the community.

[35] Based on 2014 Datacall information provided by the City.

Table 9-4: Summary of Recommended Options (tonnes)

Option	2017	2018	2019	2020	2021		2022	2023	2024	2025	2026
Residential Tonnage Diverted Annually											
Food Waste Reduction Strategy	200	400	3,400	6,800	10,200		14,960	19,331	23,703	28,074	34,000
Textile Reuse and Collection Strategy	200	1,500	2,250	3,000	3,750		6,000	8,250	10,500	12,750	15,000
Drop Off Depots				500	1,000		1,500	6,125	10,750	15,375	20,000
Reverse Vending Machines								500	667	833	1,000
City Explores Mechanisms To Introduce Additional Controls Over Waste Management , By Laws and Acts		2,450	4,300	7,400	9,850		17,680	25,510	33,340	41,170	49,000
Updates to Multi-residential Development Standards, Community Composting, DataManagement									20	40	60
CRD Depots, Policies and Disposal Ban									10,000	12,500	15,000
Unit for Research, Innovation & a Circular Economy	3,000	3,000	3,000	5,000	7,000		8,800	10,600	12,400	14,200	16,000
Total Residential Tonnage Diverted	3,400	7,350	12,950	22,700	31,800		48,940	70,316	101,380	124,943	150,060
Other Tonnage Diverted Annually											
Expand IC&I Service &IC&I By-laws					750		2,100	3,450	4,800	6,150	7,500
Multi-residential By-laws and Enforcement	500	1,000	1,500	8,600	10,750		17,200	23,650	30,100	36,550	43,000
Total Tonnes Diverted	3,900	8,350	14,450	31,300	43,300		68,240	97,416	136,280	167,643	200,560
	Planning			Implementation					Maintain and Monitor		

5 year Waste Strategy Review

10 Long Term System Outlook and Roadmap for Implementation

> "*Together we will reduce the amount of waste we generate, reuse what we can, and recycle and recover the remaining resources to reinvest back into the economy. We will embrace a waste management system that is user-friendly, with programs and facilities that balance the needs of the community and the environment with long term financial sustainability. Together, we will ensure a safe, clean, beautiful and healthy City for the future.*"

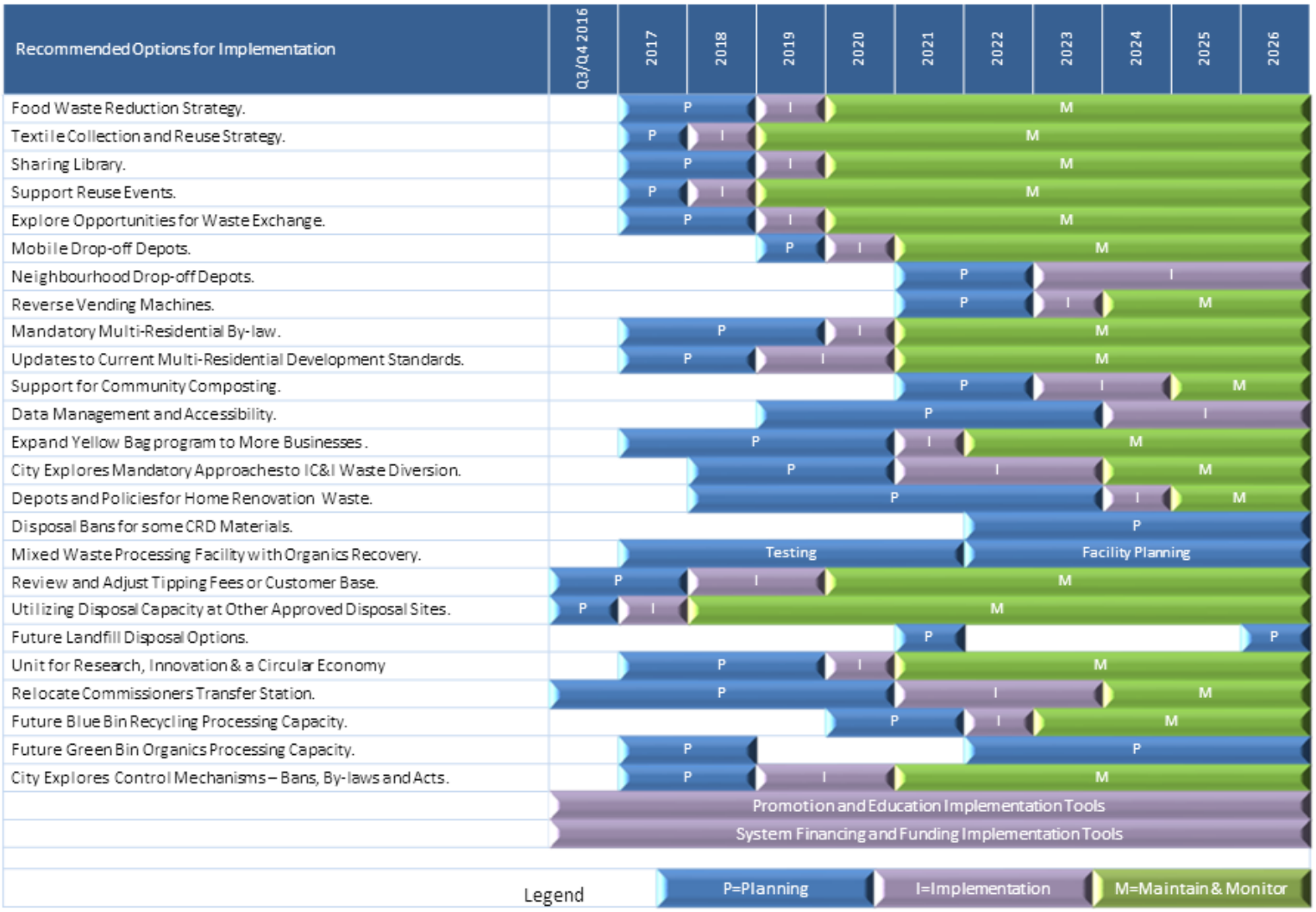
This vision statement, used in concert with theeight (8) Guiding Principles discussed in Section 4.1will guide the implementation of the Waste Strategy in the future.

10.1 Road Map for Implementation

Figure 10-1provides the overall timing and sequencing for implementation of the recommended options during the first 10 years. The proposed approach to implementation has been developed taking into account:

- Environmental benefits of the options;
- Consistency with the waste hierarchy (focus on 3Rs first);
- Commitment to social responsibility/acceptability;
- Needs of the system to sustain current operations (e.g. facility capacity requirements);
- Alignment with current contracts where appropriate to facilitate transition;
- Alignment with other external influences (e.g. pending legislation changes in Ontario);
- Availability of staff resources to implement;
- Financial sustainability; and,
- Potential to extend the site life of Green Lane Landfill.

Figure 10-1: Waste Strategy Implementation Timeline



11 Waste Strategy Costs and Financing

This section presents the capital and operating costs associated with implementing the recommended options in the Waste Strategy as well as enhancing existing solid waste management programs.

11.1 Waste Strategy Capital and Operating Costs

Table 11-1provides an overview of the capital and operating costs over the initial 10 years of the planning period, broken out into 5 and 10 year totals. It also presents longer term capital requirements that will need to be taken into account in future budgeting processes. Estimates have been developed for longer term capital requirements such as a future Green Bin processing facility (e.g. an anaerobic digestion facility), a Mixed Waste Processing Facility with Organics Recovery, and disposal capacity. It should be noted that these are high level estimates based on information available at the time this document was prepared. The costs presented in this table include those costs associated with implementing the recommended options in the Waste Strategy as well as costs for enhancement and support for existing waste management services.

A more detailed breakdown of the capital and operating costs associated with the Waste Strategy in the first 10 years is provided in the following sections.

Table11-1: Capital and Operating Costs Over the Planning Period ($000s)

System Component	Capital and Operating Costs 2016 - 2026 ($000s)			Capital Costs 2027- 2052 ($000s)						
	Q3/Q4 2016 - 2021 Total	2022-2026 Total	10 Year Total	2027-2031	2032-2036	2037-2041	2042-2046	2047-2051	2052+	Total Potential Capital Costs from 2027 to 2052
Reduction, Reuse, Recycling										
Reduction & Reuse	4,689	3,545	8,234							
Drop-off Depots	1,705	17,400	19,105							
ReverseVending Machines	28	223	250							
Multi-Residential Services	2,020	2,075	4,095							
IC&I Services	330	193	523							
CRD Services	665	1,745	2,410							
Materials & Energy Recovery										
Testing of Mixed Waste ProcessingTechnologies	15,600	35,720	51,320							
Mixed Waste Processing Facility with Organics Recovery	150	3,050	3,200	155,000	155,000					310,000
Residual Waste Disposal										
Near and Long Term Residual Waste Management	(4,580)	(5,000)	(9,580)		50,000	50,000	50,000			150,000
Overall System Recommendations										
Unit for Research, Innovation & a Circular Economy	1,850	2,180	4,030							
Operational Considerations										
Commissioners Transfer Station Relocation	6,300	21,500	27,800							
Future Blue Bin Recycling Processing Capacity	-	-	-							
Future Green Bin Organics Processing Capacity	50		50		50,000	50,000				100,000
Implementation Tools										
Promotion & Education	10,290	6,150	16,440							
Controls, Bans and Enforcement	5,140	9,900	15,040							
5-year Update of Waste Strategy	500	500	1,000							
Total	**44,736**	**99,180**	**143,916**	**155,000**	**255,000**	**100,000**	**50,000**	-	-	**560,000**

11.1.1 10-Year Waste Strategy Costs

Table 11-2 presents the estimated costs associated with implementing the recommended options for the Waste Strategy and supporting existing solid waste management programs to increase participation and diversion in the first 10 years. Estimates of costs are presented in the table below as well as a general description of what the costs include.

Table 11-2: Waste Strategy Costs (2016-2026)($000s)

System Component	Q3/Q4 2016	2017	2018	2019	2020	2021	Q3/Q4 2016 – 2021 Total	2022	2023	2024	2025	2026	2022-2026 Total	10 Year Total
Costs ($000s)														
Reduction, Reuse, Recycling														
Reduction & Reuse	$0	$1,110	$1,121	$842	$842	$774	$4,689	$702	$700	$715	$715	$715	$3,545	$8,234
Costs include: Campaigns to promote food waste reduction strategy, textile collection and reuse strategy, audits to measure pre- and post-implementation of options, professional and technical services, a mobile education unit and staffing.														
Drop-off Depots	$0	$0	$0	$245	$980	$480	$1,705	$480	$3,330	$3,930	$4,530	$5,130	$17,400	$19,105
Costs include: Staffing, studies to identify what materials to collect, where to locate mobile and permanent depots, partnership opportunities to collect from the community, communications for roll-out of programs, planning, 5 mobile depots (2020), consideration of costs required to process/recycle/dispose of additional material and costs to develop permanent depots (10-20 starting in 2023).														
Reverse Vending Machines	$0	$0	$0	$0	$0	$28	$28	$128	$65	$10	$10	$10	$223	$250
Costs include: Staffing and development of agreements with stewards and studies to determine which materials to collect and/or potential incentive arrangements.														
Multi-Residential Services	$0	$360	$415	$415	$415	$415	$2,020	$415	$415	$415	$415	$415	$2,075	$4,095
Costs include: Consultation for development standards, costs for IT to support development of reporting tools related to data management and other metrics, costs to support community composting (e.g. P&E and grants) and staffing.														
IC&I Services	$0	$110	$55	$55	$55	$55	$330	$55	$55	$28	$28	$28	$193	$523
Costs include: Staffing to survey existing and new IC&I customers and to research eligibility criteria.														
CRD Services	$0	$0	$125	$180	$180	$180	$665	$349	$349	$349	$349	$349	$1,745	$2,410
Costs include: Staffing and audits to determine composition of waste received at Transfer Stations and studies for potential markets.														

System Component	Q3/Q4 2016	2017	2018	2019	2020	2021	Q3/Q4 2016 – 2021 Total	2022	2023	2024	2025	2026	2022-2026 Total	10 Year Total
Materials & Energy Recovery														
Testing of Mixed Waste ProcessingTechnologies	$0	$2,120	$3,370	$3,370	$3,370	$3,370	$15,600	$7,120	$7,120	$7,120	$7,120	$7,240	$35,720	$51,320
Costs include: Procurement of processing capacity or services, purchase of processing equipment such as magnets, shredders, studies on results and staffing.														
Mixed Waste Processing Facility with Organics Recovery	$0	$0	$0	$0	$0	$150	$150	$300	$300	$700	$700	$1,050	$3,050	$3,200
Costs include: Staffing, business case, studies on siting, technology, feedstock, and professional services.														
Residual Waste Disposal														
Near Term Residual Waste Management	$20	-$600	-$1,000	-$1,000	-$1,000	-$1,000	-$4,580	-$1,000	-$1,000	-$1,000	-$1,000	-$1,000	-$5,000	-$9,580
Costs include: Savings incurred due to difference in tipping fee and transfer costs through redirection of waste to other disposal facilities.														
Overall System Recommendations														
Unit for Research, Innovation & a Circular Economy	$0	$370	$370	$370	$370	$370	$1,850	$370	$370	$480	$480	$480	$2,180	$4,030
Costs include:Staffing, Studies, grants, partnerships, pilots, conferences, membership fees, travel.														
Operational Considerations														
Commissioners Transfer Station Relocation	$100	$100	$100	$500	$500	$5,000	$6,300	$10,000	$10,000	$500	$500	$500	$21,500	$27,800
Costs include: Planning, approvals and permitting costs, construction and professional services.														
Future Blue Bin Materials Processing Capacity	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
There are no incremental capital or operating costs associated with procurement of future Blue Bin processing capacity.														
Future Green Bin Organics Processing Capacity	$0	$50	$0	$0	$0	$0	$50	$0	$0	$0	$0	$0	$0	$50

System Component	Q3/Q4 2016	2017	2018	2019	2020	2021	Q3/Q4 2016 – 2021 Total	2022	2023	2024	2025	2026	2022-2026 Total	10 Year Total
Costs include: Development of a Request for Expression of Interest for Future Green Bin Processing Capacity.														
Implementation Tools														
Promotion & Education	$50	$1,220	$1,580	$2,480	$2,480	$2,480	$10,290	$1,230	$1,230	$1,230	$1,230	$1,230	$6,150	$16,440
Costs include: Staffing and P&E to enhance existing programs and support implementation of Waste Strategy.														
Controls, Bans and Enforcement	$0	$220	$580	$880	$1,480	$1,980	$5,140	$1,980	$1,980	$1,980	$1,980	$1,980	$9,900	$15,040
Costs include:Staffing and promotion and education of controls, bans and enforcement options.														
5 year Update of Waste Strategy	$0	$0	$0	$0	$0	$500	$500	$0	$0	$0	$0	$500	$500	$1,000
Costs include: Professional services to conduct Strategy review at years 5 and 10.														
Total Cost	$170	$5,060	$6,716	$8,337	$9,672	$14,781	$44,736	$22,129	$24,914	$16,456	$17,056	$18,626	$99,180	$143,916
Legend	Planning			Implementation			Maintain/Monitor							

Table 11-3 presents the additional staffing requirements for the implementation of the recommended Waste Strategy options. It should be noted that staffing levels are not cumulative, but represent year over year staff requirements, over and above existing staff levels. Staffing levels change over time with planning, implementation and monitoring/maintenance of options.

Table 11-3: Staffing to Support Implementation of Options (FTEs)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Reduction & Reuse	1	1.10	2.20	2.20	1.60	0.95	0.95	0.95	0.95	0.95
Drop-off Depots	-	-	1	2	2	2	7	12	17	22
Reverse Vending Machines	-	-	-	-	0.25	0.25	1	-	-	-
Multi-Residential Services	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
IC&I Services	1	0.5	0.5	0.5	0.5	0.5	0.5	0.25	0.25	0.25
CRD Services	-	-	0.5	0.5	0.5	1	1	1	1	1
Testing of Mixed Waste Processing Technologies	3	3	3	3	3	2	2	2	2	2
Mixed Waste Processing Facility with Organics Recovery	-	-	-	-	-	1	1	1	1	3
Near Term Residual Waste Management	-	-	-	-	-	-	-	-	-	-
Unit for Research, Innovation & a Circular Economy	1	1	1	1	1	1	1	2	2	2
Commissioners Transfer Station Relocation	-	-	-	-	-	-	-	-	-	-
Future Blue Bin Processing Capacity	-	-	-	-	-	-	-	-	-	-
Future Green Bin Processing Capacity	-	-	-	-	-	-	-	-	-	-
Promotion & Education	3	4	4	4	4	4	4	4	4	4
Controls, Bans and Enforcement	1	3	6	12	17	17	17	17	17	17
Total Staff Resources	10.00	13.00	17.50	24.00	29.75	30.25	35.50	40.75	45.75	52.75
Legend	Planning		Implementation		Maintain/Monitor					

11.2 Sustainable Rate Model Development

A financial analysis of the costs of the City's current waste management system and the impact of the Waste Strategy was conducted. It involved the development of a robust financial model (the Model)that allowed the City to estimate the net operating expenditures (operating expenses less non-rate base revenues[36]) required to service the City's residential and non-residential customers. These customers include single family households, multi-residential households, Residential Units Above Commercial (RUAC), City Divisions, Agencies and Corporations (DACs), Non-Residential customers (i.e. charities, institutions or religious organizations), schools and small commercial businesses. The Model also identified all other operating costs that are not directly applicable to servicing the City's rate-paying customers (e.g., public goods that benefit the entire City of Toronto population such as litter collection).

In essence, the Model was developed to identify the total net operating cost (both direct and indirect) incurred by the City in providing waste management services to customers and allocated those costs to each type of customer. Waste management services include collection of garbage, Blue Bin recycling, Green Bin organics and other waste materials, in addition to the transfer, processing and disposal of those materials. Collection costs were allocated based on collection services frequency for curbside customers or estimated tonnage from centrally collected customers (i.e. bulk collection from multi-residential buildings), while the costs associated with processing, disposing and transferring materials, system overhead costs, public goods services, parks collection costs and beautification (e.g. litter clean-up) costs were allocated to all customers based on the estimated tonnage generated by each customer type.

The Model assumed a forecast period of 10 years (to 2026). The net operating expenditures were forecasted over this period by an assumed inflation index[37] and included the incremental operating costs assumed to be incurred from implementing the recommended options in the Waste Strategy. In addition, the forecast considered projected changes to the customer base (single family and multi-residential customers), as well as the projected annual incremental tonnage and increased diversion rate from implementing the Waste Strategy. The incremental cost and waste tonnage assumptions from the Waste Strategy were phased into the Model in accordance with the proposed timing outlined in the Waste Strategy for each recommended option.

[37] An inflation index of 2.5% per year has been assumed in the Model. This assumption reflects the estimated annual inflation in costs, plus any additional cost increases based on the City's existing contracts with third party service providers.

Using the forecasted net operating expenditures, the Model estimated utility rates for each customer type based on the total cost allocated to that customer type and the total number of customers serviced by the City. The calculated utility rates were set to cover contributions to capital reserves to fund the City's capital costs included in the Toronto 2016 Capital Budget and the incremental capital costs identified in the Waste Strategy such as the costs involved with building a Mixed Waste Processing Facility with Organics Recovery. The calculated utility rates were also set to cover 100% of the City's forecasted net operating expenses, including incremental operating costs incurred from implementing the Waste Strategy, to support the City in transitioning towards a fully sustainable utility model.

Rate scenarios that would generate the required revenue to support continued provision of waste services and the Waste Strategy recommendations were developed and included;

1. Average annual rate increase for 2017 to 2026 by customer type;
2. Uniform rate increase that sees a single annual growth rate applied equally across all customer types; and,
3. One-time adjustment to 'true-up' costs in 2017 and an average rate increase thereafter.

The annual rate increases are subject to change based on any new budgetary directions.

12 Targets and Goals

Based on the recommended options outlined in the Waste Strategy, and their anticipated performance and successful implementation, three targets have been set for the Waste Strategy:

- Achieve 70% diversion of residential waste managed by the City by Year 10 of Waste Strategy (2026). This includes waste from single family residences and multi-residential buildings serviced by the City, and translates to additional diversion of about 150,000 tonnes by Year 10;
- Achieve70% diversion of materials collected (Green Bin, Blue Bin, garbage) from Industrial, Commercial & Institutional customers that receive City collection services by Year 10 of the Waste Strategy (2026); and,
- The overall target is diversion of 200,000 tonnes by Year 10 of the Waste Strategy. This may be achieved through diversion of an additional 50,000 tonnes from sources currently not serviced by the City (through implementation of mandatory waste diversion by-laws for all multi-residential buildings, regardless of service provider, and additional service to small IC&I establishments).

The Waste Strategy identifies an aspirational goal of zero waste over the longer term. The long term goal of zero waste is defined as zero wasted resources being landfilled or having no waste go directly todisposal without having first been used as an input to another process.One innovative element of the City's Waste Strategy is the establishment of a Unit for Research, Innovation & a Circular Economyto research technologies and explore opportunities to establish processing markets to support the circular economy framework. In establishing this unit, Toronto would be one of the first cities in North America to make the circular economy a framework for a dedicated unit within their waste management organization with a goal towards Zero Waste.

13 Measuring Performance in the Future

The City tracks a comprehensive set of performance metrics as part of the integrated solid waste management system. Monitoring the performance of the current waste system, as well as new system options that may be added is vital to ensure its success and effectiveness. Understanding the performance of the overall waste system, as well as each component of the system, provides for a better understanding of the potential areas for improvement, future trends to watch for, and return on investment as new programs or facilities are implemented. The identification of additional performance metrics to reflect the new Waste Strategy components is consistent with the Implementation Tool "Performance Measures to Define Success and Shape the Future of Waste Management".

The metrics identified below should be considered for future reporting and have been specifically identified to:

- Reflect the performance of the current integrated waste management system;
- Measure the impact of the new Waste Strategy;
- Monitor trends associated with waste reduction and reuse activities; and,
- Provide for transparency on aspects of solid waste management including customer service, enforcement actions, safety performance, etc.

As new programs and facilities are implemented, the list of performance measures should be reviewed to ensure that future performance is appropriately tracked. The performance metrics presented in Table 13-1 have been separated into those specific to measuring the success of the Waste Strategy and those that are operations related.

Depending on when an option may be implemented, a baseline may be set using 2015 or 2016 data, or if the performance metric is new, the year the option is implemented may act as the baseline.

On an annual basis, some performance metrics will need to be calculated using tonnage information that the City already tracks for the materials that are managed within their waste system and for various reporting requirements. These metrics will be compared to either the baseline or previous year to assess progress toward achieving the Waste Strategy targets. For some metrics, it will be necessary to conduct waste audits or other studies to measure baselines and progress.

As an example, food waste reduction can be measured by performing waste audits that look at the composition of waste, specifically looking at the amount of wasted food, packaged food and food waste in all waste streams (i.e. garbage or Green Bin organics).

Performance metrics such as a per capita residual disposal rate, which many municipalities are using, and waste reduction are tied to the goal of Zero Waste. Achievements in reducing these numbers are evidence of working towards a Zero Waste goal.

Three of the performance metrics, safety performance, green procurement and GHG emissions, will be tracked on a corporate level. Measurements of safety performance include lost time, medical and first aids, and collisions (preventable and non-preventable) and are tied to corporate goals and initiatives. The City currently reports GHG emissions related to waste management using the Global Protocol for Cities (GPC). The protocol focuses on disposal-related GHG emissions, and currently does not account for the benefits (or emission reductions) resulting from waste diversion (i.e. Green Bin organics diversion). A new GHG measurement and analysis model is being developed as part of the TransformTO initiative and will be finalized in late 2016. SWMS staff are working at a corporate level to ensure consistent GHG reporting on behalf of the City.

Table 13-1: Recommended Performance Metrics

Category	Metric
Waste Strategy Related	
Waste Generation Rate	Change in waste generation rate
Single Family Residential	Kilograms/Capita
Multi-residential	Kilograms/Capita
Non-residential	Kilograms/customer
Waste Diversion Rate	Change in % diverted
Single Family Residential	Kilograms/Capita
Multi-residential	Kilograms/Capita
Non-residential	Kilograms/customer
Reduction Circular Economy – Food Waste Reduction	Change in organics in Green Bin and/or garbage bins
Single Family Residential	Kg/unit or kg/capita for units served
Multi-residential	kg/unit or kg/capita for units served
Reuse	
Textile Reuse or Recycling	Change in quantities of textiles in garbage bins

Category	Metric
Single Family Residential	Kg/unit or kg/capita for units served
Multi-residential	kg/unit or kg/capita for units served
Residual	
Residual Disposal Rate	Change in disposal rate - kg/capita/year
Other	
Customer Satisfaction Rating	Customer Satisfaction Rating
Greenhouse Gas Emissions Related to the System	Annual tonnes of CO_2equivalents reduced
Number of procurements that include waste reduction, reuse or recycling requirements such as mandating the use of recycled materials.	Total Annual
Operations Related	
Safety Performance	Annual Measures
Total Tonnage Managed	Tonnes
Green Lane Landfill Volume Filled	Cubic metres (m^3)/year
Green Lane Landfill Volume Remaining	Cubic metres (m^3)
Projected year of closure of GLL (or remaining years of capacity at GLL)	Year

14 Waste Strategy Updates, Revisions and Reporting

Waste management planning is a continuous process, which involves reviewing and revising the plan or strategy at regular intervals. Aside from providing a formal mechanism to incorporate lessons learned and new information obtained over the previous implementation period, having a regular review process allows adjustments to be made to ensure progress towards the Waste Strategy's long-term objectives.

An annual report should be prepared to present an ongoing update of progress of the Waste Strategy.The annual report should also identify any specific achievements or issues that arose during the year and how they were addressed. Implementation plans for options in the following year should also be identified.

The following sections provide an overview of the processes involved in updating and reviewing the Waste Strategy and annual system monitoring and reporting.

14.1 Updates and Revisions to Waste Strategy

It is recommended that the first formal review of the Waste Strategy be completed in five years or during 2022, with subsequent updates being completed every five years. The five year review periods are anticipated to coincide with the timing of the reviews of the *Waste-Free Ontario Act* legislation and proposed regulations. Formal review points, and as required interim review points, provide an opportunity for any adjustments to the Waste Strategy as required.It is recommended that the initial review include a comprehensive assessment of the performance of each Waste Strategy option implemented to determine if the anticipated objectives over that period have been met, and identify any issues that may have affected their implementation and performance. The review will consider the annual performance metrics data recorded to confirm any trends that may need to be investigated further. Reasons for success or under performance should be explored and documented. The Waste Strategy can be updated to reflect the results of the review, identify any changes in the Waste Strategy required to achieve the targets, or any changes in the implementation timeline for the planning period.

The following are some key factors that should be considered and may necessitate the need for revision of the Waste Strategy:

- A significant change in customer base;
- Changes in waste composition and generation;
- A change in legislation as it relates to program and/or service delivery;
- Financial impacts/opportunities such as new sources of funding or decreased material markets, customers and commodity prices;
- Advancements in new technologies that could benefit the City; and,

- Remaining capacity at Green Lane Landfill.

The review process should be formally documented for presentation to Toronto Council and to the broader community. This would take the form of an update report on the Waste Strategy.

14.2 Annual System Monitoring and Reporting

Annual reporting, both internally and externally, beyond the data collected and reported formally to other parties, is an excellent means of demonstrating the progress achieved by both the municipality and the non-municipal partners and participants.Across Ontario, many large municipal jurisdictions prepare some form of annual report on waste management program performance. These reports can provide an opportunity to present data gathered and reported as part of the Financial Information Return (FIR), Ontario Municipal Benchmarking Initiative (OMBI) and Waste Diversion Ontario (WDO) requirements, in a more engaging and interesting format.

The annual report card presents the opportunity to report on the current year, highlight accomplishments, and present minor adjustments. It is recommended that an annual report card documenting the performance of the waste management system be prepared in the spring of each year, once final year end accounting is complete. At a minimum, this report card should include data on performance measures identified in Table 13-1 above.

In addition to the performance of the subject year, a comparison to the baseline should be provided with commentary where appropriate to address items such as:

- Programmatic or facility changes that were implemented that could have impacted quantities managed, tonnes diverted, etc.;
- Waste generation anomalies (e.g. severe weather event);
- Changes to external influences such as changes to Provincial or Federal legislation;
- Any other internal or external factors that impacted the Waste Strategy implementation;
- Contract changes with City contracted service providers; and,
- Identification of potential trends, such as a year over year increase in waste generation that should be monitored to assess the potential for future system impacts.

The following provides a sample of what is recommended for inclusion in the annual report card:

- Summary
    - Short, graphic summary of key performance indicators, major accomplishments and most significant new initiatives implemented.
- Annual Implementation Activities
    - Overview of the prior year's plan and what has been implemented to-date; and,
    - Highlights of upcoming year's plan.
- Integrated Solid Waste Management System Performance Assessment
    - Overview of the performance for all of the strategies/Initiatives completed the prior year;
    - Industry recognition and awards; and,
    - Identification of trends, drivers and external influence changes.
- Public and Stakeholder Engagement Activities
    - Summary of public and stakeholder engagement activities completed in the prior year.
- Proposed Current Year (and upcoming year) Initiatives
    - Breakdown of the planned initiatives for the current year.
- Concluding Commentary

15 Keys to Success

The Waste Strategy has been developed to enhance the City's existing waste management programs and with a number of elements which will contribute to its success. However, there are a number of risk factors that need to be considered which could affect the implementation of the Waste Strategy, some of which are currently beyond the City's control.

15.1 Success Factors

The Waste Strategy is a robust, forward-looking plan that builds on the City's historic waste diversion success and leadership, and lays the foundation for achieving an ambitious diversion target going forward. The anticipated successful implementation of the plan is based on a variety of key factors:

- Customer participation – Although the Waste Strategy outlines several new and innovative waste management options (e.g. food waste and textiles reduction and reuse strategies; mobile and permanent neighbourhood drop-off depots, etc.), a central focus of this plan is to further improve participation and proper utilization of the City's existing programs and services by, for example, updating multi-residential development standards or expanding industrial, commercial, and institutional (IC&I) services and policies. The success of the Waste Strategy is very dependent on the participation of the customers of the City of Toronto.
- Expanded public engagement – In a widely diverse city, there are significant challenges associated with engaging residents from diverse backgrounds in waste management initiatives, but also tremendous opportunities. Meaningful and effective public engagement is a cornerstone to the successful implementation of this Waste Strategy. Increased levels of engagement among multi-residential building residents will be essential to the success of the Waste Strategy.
- Balance among environmental, economic and social considerations - All three of these factors, including a first of its kind health impact considerations assessment and a thorough review of system funding and financing mechanisms, were considered in great detail in recommending the specific program options and elements for inclusion in the Waste Strategy.
- Inclusion of a strong Zero Waste research, development and innovation component- This is another novel and distinguishing element of the plan. It starts from the concept of waste as a resource and is one of the first long term waste management plans in North America built around the idea of a sustainable circular economy and no wasted resources.
- Inclusion of significantly enhanced controls, bans and enforcement capabilities to support the implementation of core program elements– Adequate enforcement and openness to tools, such as enhanced controls and material bans, are key

complements to the related focus on expanded, multi-channel public engagement.

- Sustainable longer term financing - The Waste Strategy needs to be properly financed to ensure success. Also, over time, rates need to be set to accurately reflect the changing costs of different components of the waste management system service, and to charge users the full cost of services provided. The rate model developed as part of the Waste Strategy will ensure that the costs needed to properly implement the Waste Strategy are incorporated into the rates charged to Toronto system customers today and for the next ten years.

15.2 Barriers and Risks

Section 15.1 outlined factors that will help lead to the success of the City's Waste Strategy. It must be noted, however, that as in any other planning process, there are risk factors that could result in the Waste Strategy not producing the expected results. These could include both internal factors (e.g. failure to engage City residents) and external factors (e.g. changes in waste composition, consumer patterns,and/or governing legislation). It is important that the Waste Strategy is flexible so that it is able to respond to risks and barriers that have been identifiedthroughout the implementation and operating periods. The first five year review is one element that allows for a mid-course correction if some of the assumptions built into the Waste Strategy are found to not occur as anticipated over time.

Barriers and related risks that may influence the success of the Waste Strategy include the following:

1) Changes in Provincial waste legislation, regulations, strategies

Changes in Provincial waste legislation have the potential to significantly impactthe City's ability to achieve higher waste diversion. Some waste streams may no longer be managed by the City within the initial ten year time-frame. The implications of the *Waste-Free Ontario Act* and its regulations will be more evident at the time of the 5-year review. The feasibility of implementing various waste reduction measures will be clearer at that time and may require modification of the Waste Strategy.

2) Diversion estimates may not be reached

The diversion estimates presented in the Waste Strategy may not be reached either because:

- Waste composition changes over time in ways which are not predictable today; and/or,
- Citizens may not participate, or do not participate properly in the waste reduction and diversion programs, thereby resulting in lower capture rates for targeted materials.

3) The impacts of the "evolving" tonne

Changes in the composition of waste that will be generated by City households and businesses through the Waste Strategy timeline present a risk to success, as diversion estimates have been based on the current waste composition. Some of the most significant changes in the waste stream that have been anticipated to continue throughout the planning process include:

- a significant decline in the generation of newsprint;
- a significant increase in plastics packaging (especially hard-to-recycle films, stand-up pouches and plastic laminates);
- an increase in old corrugated cardboard in both households and businesses due to growing internet sales; and,
- an increase in the quantity and types of waste electronics and electrical equipment (WEEE) in both households and businesses.

4) Failure to successfully engage City residents in efforts towards 70% diversion

Diversity is one of Toronto's greatest assets, but it is also a challenge for those responsible for designing and delivering environmental programs that require "right actions" (from purchasing items with reduced packaging to separating and setting out recyclables and organics for collection) each and every day by millions of residents.

Toronto has always been a leader in developing and distributing materials in multiple languages using visually attractive and engaging education and outreach tools wherever possible. Toronto has also been a leader in providing direct hands-on support for hard-to-reach audiences (like multi-residential households through the 3Rs Ambassador program and small businesses) to encourage all citizens to "do the right thing" when it comes to reducing/diverting waste.

The Waste Strategy broadens the City's education and outreach efforts in several ways. It moves into a focus on strategic "new materials" (like food waste and textiles) where more materials need to be diverted, and the physical presence in the community through mobile and neighbourhood drop-off depots which are expected to raise awareness of waste management in general.

However, one of the key risk factors to the success of this Waste Strategy is its high dependence on citizen engagement, particularly engagement of the multi-residential sector. There is always the possibility that residents will not participate in waste diversion initiatives at the level anticipated by the City, or even if they do, that the material captured through the program is of such low quality that it cannot be recycled.

5) Enforcement may not be sufficiently resourced or supported

The Waste Strategy supportsthe City's capacity to enforce municipal by-laws and policies that improve the effectiveness and efficiency of current and future waste diversion programs required to reach the diversion targets. The Waste Strategy includes more enforcement staff focused specifically on enforcing waste by-laws and correcting improper participation in waste diversion programs.

6) The Waste Strategy depends on successful partnerships

Elements of the Waste Strategy require partnerships with NGOs (non-government organizations) for particular programs. The food waste reduction strategy, could be strengthened by collaborating or working with GTA municipalities and various food related organizations, as well as universities and colleges interested in the topic. Operating textile and drop-off facilities should ensure that NGOs currently collecting these materials are not negatively impacted by the City program, and partnerships with the existing NGOs may be considered to expand the service. Partnerships require a significant investment of time to establish and maintain, and unless they are executed effectively, they may not be successful.

7) Toronto may not have control over its own waste

As discussed earlier in the Waste Strategy, the *Waste-Free Ontario Act* will make producers in Ontario fully responsible for end of life management of products such as packaging, electronics, etc. placed into the Ontario marketplace. It is not clear at this time who will be responsible for managing the different types of waste produced by Toronto residents, which the City currently manages. Various industry groups may decide to operate independent programs to manage components of the residential waste stream for which they will be responsible. Therefore, Toronto may not have full control over the waste created by its current customer base.

15.3 Transition Considerations

The Waste Strategy places a focus on the "3Rs first", building on the City's existing and extensive waste diversion programs and supported by the implementation of new and complementary programs for waste reduction, reuse, and recycling. The implementation of these programs will be staggered over the first 10 years of the Waste Strategy, allowing sufficient time for planning, resourcing and promotion/education to ensure the success of each program. No fundamental changes to the City's existing waste management programs and system are required as part of the Waste Strategy.

A senior staff member will be assigned the overall responsibility for guiding the implementation of the Waste Strategy. This role will include assigning responsibilities for specific programs based on the skills and resources required. Timelines and milestones will also be established and confirmed. The City enjoys the support of one of the largest and most experienced professional waste management support staff of any city in North America. Wherever possible, the Waste Strategy has identified opportunities to either

work in partnership with existing community partners in program delivery or to contract out specialty services (e.g. the operation of mobile depots for some hazardous household waste) to trained private contractors.

As noted, key components of the Waste Strategy are incremental in nature and, at least within the first ten years of implementation, there is minimal reliance on new or cost intensive capital technology applications. In areas where new technology applications are recommended for trials and tests (e.g. reverse vending machines for selected waste electronic equipment, mixed waste processing with organics recovery), the risks involved will be shared (where appropriate) with private partners or are being investigated on a relatively small and limited scale to control any potential risks.

The annual system monitoring and reporting process will be beneficial for the City to identify any gaps in the transition to the new programs as part of the Waste Strategy.

16 Conclusion

In summary, Toronto is set to implement a number of initiatives that will complement an already world class waste management system. These initiatives are intended to emphasize the 3Rs and to promote greater performance of the current integrated waste management system in the first ten years. This includes the rollout of several new programs with supporting promotion and education in combination with a more aggressive approach to enforcement of existing programs, services and by-laws.

Solid Waste Management Services and City Council adopted Strategic Plans to guide the vision, mission and goals for Toronto in the coming years. As identified in Section 2 of this report, City Council approved 26 Strategic Actions for 2013 – 2018. Strategic Action #7 was to develop a Long Term Solid Waste Management Strategy. In addition, at a divisional level, Solid Waste Management Services established a Strategic Framework to guide the Division in becoming an international leader in municipal solid waste management. The completion of the Long Term Waste Management Strategy fulfils these elements of the corporate and divisional strategic plan actions.

The Waste Strategy consists of options that work with the current system to reduce the amount of waste generated and to increase the amount of waste diverted from landfill. Three targets have been set to extend the life of Green Lane Landfill until approximately 2040:

- Achieve 70% diversion of residential waste managed by the City by Year 10 of Waste Strategy (2026). This includes waste from single family residences and multi-residential buildings serviced by the City, and translates to additional diversion of about 150,000 tonnes by Year 10;
- Achieve 70% diversion of materials collected (Green Bin, Blue Bin, garbage) from Industrial, Commercial & Institutional customers that receive City collection services by Year 10 of the Waste Strategy (2026); and,
- The overall target is diversion of 200,000 tonnes by Year 10 of the Waste Strategy. This may be achieved through diversion of an additional 50,000 tonnes from sources currently not serviced by the City (through implementation of mandatory waste diversion by-laws for all multi-residential buildings, regardless of service provider, and additional service to small IC&I establishments).

The City of Toronto, along with many other large municipalities around the world, are incorporating the principles of Zero Waste into waste management planning. Zero Waste represents a profound change to the approaches to managing waste, recognizing the value of waste as a resource. These targets, along with specific initiatives such as a Unit for Research, Innovation & a Circular Economy, will contribute to the City's progress

towards achieving the aspirational goal of Zero Waste to preserve resources for future generations.

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