Appendix 1: Final List of Options

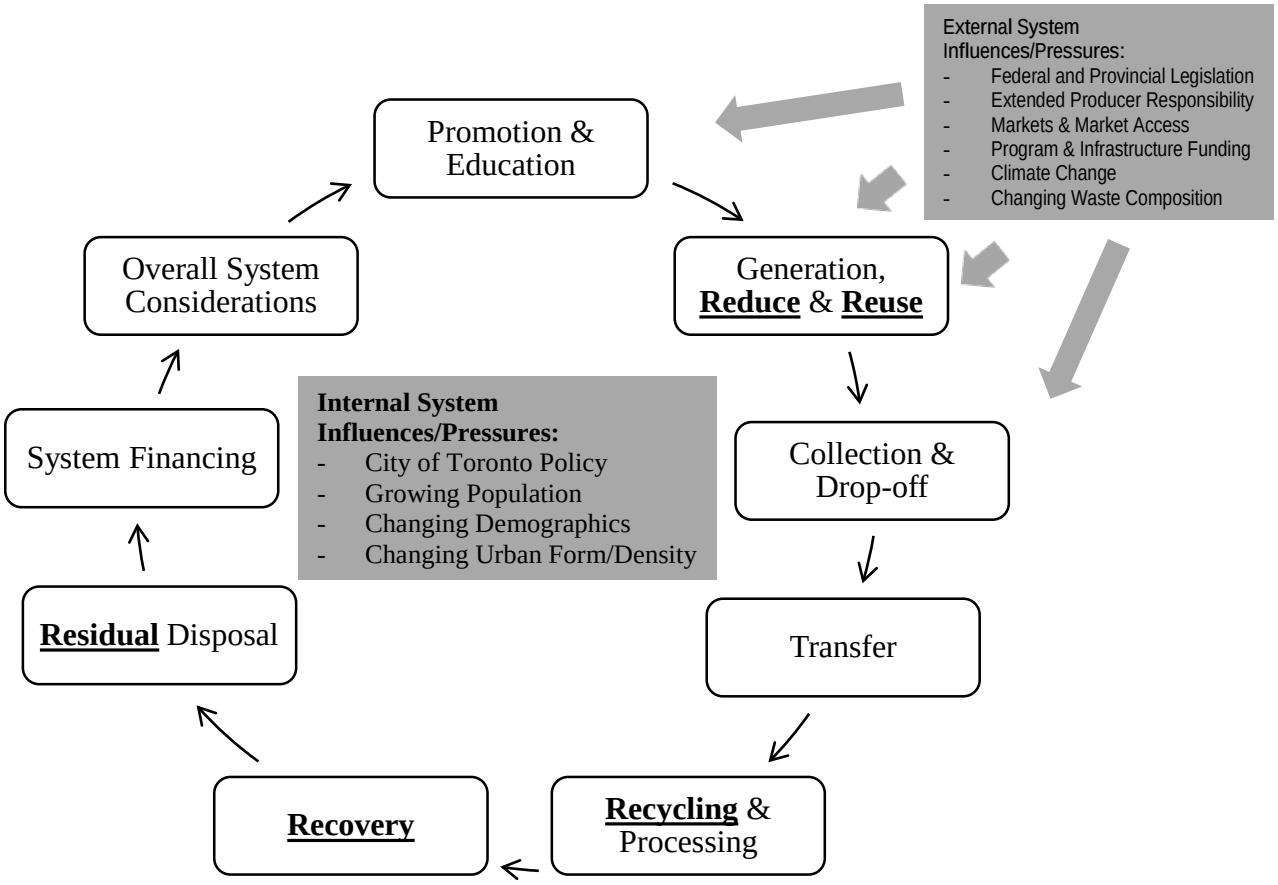
Appendix 1 provides an overview of the final list of options to be considered in the development of the Waste Strategy. Research on a full range of policy and technological options and solutions to address Toronto's waste management needs for the next 30 to 50 years was conducted as part of the Waste Strategy. The list of potential options covers the full range of the waste management hierarchy (5Rs – Reduction, Reuse, Recycling, Recovery, and Residual Disposal), with a primary focus on the first 3Rs.

City Council requested staff to report back on options to introduce financial incentives, including one time or ongoing, to encourage waste diversion and achieve targets contained in the Long Term Waste Management Strategy. Financial incentives are included in the list of options, which are presented below. The final Waste Strategy will bring forward all recommended options in Spring 2016, which will include an evaluation of options, including those that introduce financial incentives to encourage waste diversion, and how they could be applied during implementation (e.g. one time or ongoing).

A preliminary list of options was presented to the public and stakeholders in June 2015. Based on the feedback received, the list of options has been revised and extended to include new options brought forth. No options have been removed from the list.

As part of the development of the Waste Strategy, an organization model was developed to organize and present information consistently throughout the project process. City staff and consultants decided on an integrated systems approach that follows the flow of waste from generation to final disposal. This approach highlights the 5Rs, follows the hierarchy priority and mirrors aspects of a circular economy or cradle-to-cradle approach. It also identifies internal and external influences on the system, such as City of Toronto policies or Provincial legislations. The options in this report are presented according to this integrated systems approach, starting with promotion and education and ending with overall system considerations to address internal and external system influences or pressures. Figure 1 below presents a graphical representation of the integrated systems approach.

Figure 1: Integrated Systems Approach



Final List of Options – Summary Table

The remaining pages of this appendix present the final list of options to be considered, which have been deemed consistent with the long term Vision and Guiding Principles for the future Waste Strategy. Table 1 below presents a listing of the options organized by the integrated systems approach noted above. New options added to the list are noted.

Table 1: Final List of Options

Option	Classification
Promotion & Education	
Option 1.1: Interactive Online Waste Management Tool.	Implementation Tool
Option 1.2: Environmental Impacts Calculator.	Implementation Tool
Option 1.3: Expand Social Media Presence.	Implementation Tool
Option 1.4: Provide Additional Tools and/or Resources to the 3Rs Ambassadors and Other Volunteer Programs.	Implementation Tool
Option 1.5: Incentivizing 3Rs Ambassadors and Other Volunteer Programs.	Implementation Tool
Option 1.6: Targeted Group Communications.	Implementation Tool
Option 1.7: Multi-Residential – Workshops and Other Outreach for Buildings Not Receiving City Waste Collection Services.	Implementation Tool
Option 1.8: Multi-Residential By-laws and Enforcement.	Implementation Tool
Option 1.9. Updates to Current Multi-Residential Development Standards. ***New***	Program
Option 1.10: Community Partnership Unit Within Solid Waste Management Services (SWMS) Division. ***New***	Implementation Tool
Generation, Reduce & Reuse	
Option 2.1: Outreach and Education Campaign to Reduce Waste.	Program
Option 2.2: Food Waste Reduction Strategy.	Program
Option 2.3: Textile Collection and Reuse Strategy.	Program
Option 2.4: Sharing Library.	Program
Option 2.5: Support Reuse Events.	Program
Option 2.6: Explore Opportunities for Waste Exchange.	Program
Option 2.7: Community/Mid-Scale Composting. ***New***	Program
Collection & Drop-off	
Option 3.1: Container Management.	Program
Option 3.2: Alternative Collection Methods for Multi-Residential Buildings.	Facilities/Infrastructure
Option 3.3: Stand Alone Drop-off and Reuse Centres.	Facilities/Infrastructure
Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations.	Facilities/Infrastructure
Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials.	Facilities/Infrastructure
Option 3.6: Incentive Based Drop-off System (e.g. reverse vending machines).	Facilities/Infrastructure
Option 3.7: Multi-Residential Collection Using Alternative Vehicles. ***New***	Facilities/Infrastructure

Option	Classification
Transfer	
Option 4.1: Relocation of Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.	Facilities/Infrastructure
Option 4.2: Redirecting Waste to an Existing Transfer Station(s).	Facilities/Infrastructure
Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area.	Facilities/Infrastructure
Recycling & Processing	
Option 5.1: On-Site Organics Processing.	Program
Option 5.2: In-Sink Disposal Units.	Program
Option 5.3: Future Blue Bin Processing Capacity.	Future Consideration
Option 5.4: Future Green Bin Processing Capacity.	Future Consideration
Option 5.5: Future Materials Recycling and Other Reuse Related Processing.	Future Consideration
Waste Recovery Technologies	
Option 6.1: Mixed Waste Processing.	Facilities/Infrastructure
Option 6.2: Mechanical Biological Treatment (MBT).	Facilities/Infrastructure
Option 6.3: Direct Combustion.	Facilities/Infrastructure
Option 6.4: Emerging Technologies.	Facilities/Infrastructure
Option 6.5: Organics Recycling Biocell or Biomodule.	Facilities/Infrastructure
Option 6.6: Refuse Derived Fuel.	Facilities/Infrastructure
Option 6.7: Waste to Liquid Fuel Technologies.	Facilities/Infrastructure
Residual Waste Disposal Capacity	
Option 7.1: Landfill Expansion.	Facilities/Infrastructure
Option 7.2: Landfill Mining and Reclamation.	Facilities/Infrastructure
Option 7.3: Bioreactor Landfill.	Facilities/Infrastructure
Option 7.4: Landfill Operation Continuous Improvement and Best Practices.	Future Consideration
Option 7.5: Adjust Tipping Fees or Customer Base.	Facilities/Infrastructure
Option 7.6: Purchase a New Landfill.	Facilities/Infrastructure
Option 7.7: Divert Waste to a Third-Party Owned Disposal Facility.	Facilities/Infrastructure
Option 7.8: Greenfield Landfill. ***New ***	Facilities/Infrastructure
System Financing	
Option 8.1: Fully Independent Utility with No Rebate Program.	Implementation Tool
Option 8.2: Public-Private Partnerships (“P3”) for Major Capital Works.	Implementation Tool
Option 8.3: Debt Financing.	Implementation Tool
Option 8.4: Increase Solid Waste Management Services Customer Base.	Implementation Tool
Option 8.5: Allocating Costs for Waste Management to Applicable Waste Streams.	Implementation Tool
Option 8.6: Alternative Revenue Generation Opportunities.	Implementation Tool
Option 8.7: Performance Based Incentives.	Implementation Tool

Option	Classification
Overall System Considerations	
Option 9.1: Elimination of Collection Service to Multi-Residential Buildings.	Program
Option 9.2: Coordinated and/or Alternative Contracts. ***New***	Implementation Tool
Option 9.3: Expand City of Toronto Share of Industrial, Commercial and Institutional Waste Management Market.	Program
Option 9.4: City Implements Industrial, Commercial and Institutional Waste Diversion Policies.	Program
Option 9.5: City of Toronto Exits the Industrial, Commercial and Institutional Waste Management Service.	Program
Option 9.6 – City to Assume Role of Facilitator to Encourage Industrial, Commercial and Institutional Waste Diversion.	Implementation Tool
Option 9.7: City Explores Mechanisms to Introduce Additional Controls Over Waste Management – Bans, By-laws and Acts.	Program
Option 9.8: Deposit-Return System for City of Toronto for Selected Materials. ***New***	Program
Option 9.9: Expanded Blue Bin/Printed Paper and Packaging, Expanded Producer Responsibility Options and Potential Impacts for Toronto. ***New***	Program
Option 9.10: Develop an Advocacy Strategy**. *New***	Program
Option 9.11: Green Procurement**. *New***	Program
Option 9.12: Performance Measures to Define Success and Shape the Future of Waste Management. ***New***	Implementation Tool
Option 9.13: Centre of Excellence. ***New***	Implementation Tool
Option 9.14: Establish a High Profile Circular Economy/Waste Reduction Committee to Inform On-going Waste Planning/Implementation Process. ***New***	Implementation Tool

Option Details

For each option that will be considered, further details are provided below, including: a summary; City of Toronto Experience; Municipal/Waste Industry Experience; Case Studies/Examples; Considerations; and Potential Outcomes.

Option 1.1: Interactive Online Waste Management Tool

Enhance the Waste Wizard tool by developing an online Solid Waste Management Services (SWMS) tool that can provide sorting information, collection schedules, changes/updates to the waste management program and opportunities for reuse, recycling and safe disposal directly off the internet or from a mobile smartphone. The tool could allow a postal code to be entered (for an internet-based website) or GPS-enabled to find the closest locations to manage the waste in question and could also provide collection scheduling information for single-family and other commercial customers. This tool could help encourage participation as well as help to clarify the complexities associated with Toronto's waste management system and have the ability to provide information in different languages. Thought should be given to the name of the tool and if the "Waste Wizard" theme is worth continuing.

System Component: Promotion & Education **Source of Option:** Consultation

City of Toronto Experience:

- City has an online tool called "Waste Wizard" which helps users understand where and how to sort waste in the City's waste collection programs (recycling, disposal). There is no information or promotion of reusing or repairing materials.
- Toronto Waste – a collection schedule app is using data from City of Toronto Open Data[1]. The City provides an Excel file of the collection schedule to Open Data.

Municipal/Waste Industry Experience:

- Apps are becoming more common tools that jurisdictions are offering to its residents. Content varies from collection day notifications to providing information on reuse, recycling and disposal opportunities (either through municipal, private or non-profit organizations).

Case Studies/Examples:

- BURBA (Bottom-up selection, collection and management of URBAn waste) – This program (includes smart phone app) was funded by the EU and allows citizens to monitor the waste they are disposing and if they are sorting correctly using RFID technologies and intelligent waste containers.
- www.york.ca/bindicator This web site based application is similar to Waste Wizard but also provides guidance on how/where to take gently used items for reuse. Reuse option is listed first and curbside/depot management is listed last.
- www.BCrecycles.ca and Recyclepedia mobile app. This web site consolidates information on all provincial stewardship programs. The app returns up to 10 of the nearest locations (using the phone's GPS system) of where to drop off the material(s) in question.
- Recycle! App - A Belgian app developed to provide collection calendar, collection points (including re-use centres) with opening hours and days and a sorting guide. The app is available on iTunes[2].

Considerations:

- Broadens the way in which customers can access information on how to properly manage their waste which can increases diversion.
- Information is readily available which is how people want to receive information.

[1] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=7e57e03bb8d1e310VgnVCM10000071d60f89RCRD
[2] https://itunes.apple.com/be/app/recycle!/id730904895?mt=8

Option 1.1: Interactive Online Waste Management Tool

- Changes to programs could be sent through this tool instead of waiting for paper notices and the annual collection calendar to be distributed. Reduction in paper usage.
- According to a Statistics Canada survey, 85% of Ontario households have an active cell phone that could also have access to apps [3].
- Apps are very common, convenient and easy to use.
- Multi-language options can be provided.
- Requires app and website developer (external or City staff) for revised Waste Wizard tool and resources to maintain/update information for both the app and website.
- Requires City resources to identify and vet non-City reuse/recycling opportunities.
- Restricted to customers with access to internet and cell phones.

Potential Outcomes:

- Mobile App which helps users divert waste and correctly participate in the City's programs.
- Updated online version of tool.
- Increased awareness about SWMS and other organizations that manage waste.
- Increased diversion through increased awareness of how to participate.

[3] http://www.statcan.gc.ca/daily-quotidien/140623/dq140623a-eng.htm

Option 1.2: Environmental Impacts Calculator

This option looks at the development of an online tool (e.g., mobile application, web-based calculator) that can 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 further educate consumers on making 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 for 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 cell phone app.

System Component: Promotion & Education

Source of Option: Consultation

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- Lifecycle calculators have been used as impact estimators in the construction industry and for energy conservation (e.g., Energy Star).

Case Studies/Examples:

- The Paper Calculator[4] is run by a coalition of 100 US based not-for-profit organizations. It will calculate and compare the environmental impacts of different paper choices.
- The US Environmental Protection Agency has many different environmental impact calculators such as:
  - ReCon[5] – helps companies and individuals estimate GHG emissions and energy impacts from purchasing products with varying degrees of post-consumer recycled content.
  - Food Waste Management calculator[6] helps food service establishments track how much food is being wasted and estimates the cost competitiveness of alternatives to food waste disposal (e.g., source reduction, donation, composting).
  - The electronics environmental benefits calculator[7] assists institutions in quantifying the benefits of environmentally sound management of electronic equipment.
- Athena Sustainable Materials Institute[8] – Lifecycle analysis-based software package that helps designers incorporate environmental information into projects.

[4] http://c.environmentalpaper.org/home
[5] http://epa.gov/epawaste/conserve/tools/warm/ReCon_home.html
[6] http://www.epa.gov/foodrecovery/tools/
[7] http://isse.utk.edu/ccp/projects/benefitscalculator/elecbenecalc.html
[8] http://www.athenasmi.org/our-software-data/ecocalculator/

Option 1.2: Environmental Impacts Calculator

Considerations:

- Sustainability is top of mind and developing a tool like this responds to the demands of those wanting to make the sustainable choice but are confused on how to do so.
- Reduces doubts/scepticism about benefits of recycling.
- Tool is a valuable resource for both residential and non-residential sectors.
- Increases public awareness of the complexity of managing different waste materials
- Ideally, facility information (e.g., emission data, energy usage) would be based on actual facilities used by the Toronto waste management system (e.g., Green Lane Landfill, Material Recovery Facility (MRF), Anaerobic Digestion facilities) however this information may not be available for all facilities considering that the City contracts out some waste management services.
- Access to accurate data may be challenging and will require updating as changes to facilities are made.
- Requires resources (external or City staff) to develop, maintain and update tool.
- Web-based tool will be available only to those who have access to the internet.
- Staff time to assemble database of indicators, facilities, products used in the calculator.
- Staff time to verify data (initially, ongoing).
- Hire external contractor/developer to develop the calculator.
- Ongoing monitoring and updating, as needed.

Potential Outcomes:

- Mobile application and/or online portal.

Option 1.3: Expand Social Media Presence

Social media can be a tool to inform and engage people of program changes, provide reduce and reuse tips/videos, clarify system complexities, promote 3Rs 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 first be developed that considers the various approaches to increasing the City's presence on social media sites.

System Component: Promotion & Education

Source of Option: Consultation

City of Toronto Experience:

- The City of Toronto uses a variety of social media tools depending on the department. Overall, the City has experience with using Twitter, Facebook, YouTube, Flickr, Instagram, Pinterest, blogs and LinkedIn. Additional resources and agreed upon protocol would increase opportunities to use available on-line tools.
- SWMS has a separate website and a video on YouTube. Twitter updates are sent through @GetInvolvedTO and Facebook updates are posted on Get Involved Toronto.
- Current social media activities are typically a one way communication/information out format as opposed to two-way communication.

Municipal/Waste Industry Experience:

- Social media has been embraced by many municipalities as a convenient way to connect with the community.
- In Halton Region residents can get weekly reminders through email, phone or Twitter and can add a collection schedule to personal calendars. There are also virtual tours of the Halton Waste Management Site on YouTube, blogs and a Pinterest account.

Case Studies/Examples:

- Central Vermont Solid Waste Management District[9] – Communication tools include an array of social media (Facebook, Twitter, Pinterest, YouTube), cable access television, website, e-newsletter (incorporating videos where possible), e-surveys, virtual communities and listservs. Research conducted showed that 90% of adults have a cell phone so outreach was targeted towards mobile devices. Collaborated with different organizations to cross promote.
- Zero Waste Europe[10] - is a knowledge network and as an advocacy group, representing active communities in European Union (EU) countries. Provides information on Facebook, Twitter, LinkedIn and YouTube (zero waste videos from different individuals or communities).
- Halton Region used to have separate social media accounts for different divisions (including waste) but has now collapsed them into one set of accounts (for Twitter, LinkedIn, Facebook) to balance out messaging coming out of the Region. The Communications department develops the messages and the social media team releases them on social media. Staff from 311 respond to questions through social media on all programs including waste.

[9] www.cvswmd.org.

[10] http://www.zerowasteeurope.eu/about/

Option 1.3: Expand Social Media Presence

Considerations:

- 2 in 3 Canadians use social media according to a 2013 Macleans article[11].
- Social media responds to the demands to receiving information quickly through a variety of media (Tweets, pictures, videos).
- Can provide another opportunity to alert users of changes to waste management programs.
- Can target diverse audiences and provide information in different languages.
- Relies on user to have access to the internet or cell phone.
- Challenge with getting responses/content approved internally in a timely manner to keep up with demand for quick release of information.
- Requires effort to get followers on City social media sites.
- Requires changes to the City's current use of social media.
- Potential to become another 311 type of service where the main topics relate to complaints/service disruptions.
- Development of a social media strategy that considers costs and metrics to gauge success and consideration on level of activity (e.g., monitor, respond and/or update) for each social media tool and associated frequency.
- Staff time to develop initial setup and content, monitor, respond, and/or update material.
- Staff time to identify new/popular social media tools and determine advantages of using them.

Potential Outcomes:

- Enhanced social media presence for SWMS.
- Increase in communication tactics to reach more people.

[11] http://www.macleans.ca/education/uniandcollege/two-in-three-canadians-use-social-media/

Option 1.4: Provide Additional Tools and/or Resources to the 3Rs Ambassadors and Other Volunteer Programs

Create an Ambassador corner on the web site 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 and initiatives. Opportunities that the Ambassador corner could have include provision of the following:

- **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 that have Ambassadors to encourage collaboration on initiatives;**
- **discussion group 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.**

System Component: Promotion & Education **Source of Option:** Consultation

City of Toronto Experience:

- The City was one of the first jurisdictions to implement a Multi-residential resident-led volunteer program. The program started in 2009.
- Training is required for all volunteers and tool-kit is provided.
- City has a dedicated staff resource to coordinate the program.
- At present, there are approximately 200 Ambassadors and 150 buildings that have an Ambassador assigned to it.
- Appreciation events are held to recognize Ambassadors for their volunteer efforts.

Municipal/Waste Industry Experience:

- Other municipalities have similar versions of volunteer-run programs for Multi-residential sites related to waste diversion.

Case Studies/Examples:

- City of Seattle, WA has a program called Friends of Recycling and Composting, similar to the Ambassador program. The "Friend" monitors collection containers, hangs up posters and educates residents. Building gets $100 credit if they have a "friend" and if they sign a pledge.
- City of Surrey, BC recently piloted an Ambassador program, similar to Toronto's program among 30 Multi-residential buildings. The pilot program timing coincided with the implementation of an organics collection program with which the Ambassadors assisted. Half of the Ambassadors focused not only on reducing residual waste but also on conserving water and energy.
- New York City, NY – Apartment Building Recycling Initiative[12]. The Department of Sanitation provides the following services: free recycling training sessions on how to recycle properly, free outreach visits to ensure recycling is set up properly, provides materials (e.g., decals, signs, posters) and provides support from recycling experts.

[12] http://www1.nyc.gov/site/dsny/resources/initiatives/apartment-building-recycling-initiative.page

Option 1.4: Provide Additional Tools and/or Resources to the 3Rs Ambassadors and Other Volunteer Programs

Considerations:

- The use of online tools provide Ambassadors with the flexibility of obtaining information and participating whenever it is convenient for them (and after City business hours which is typically when most Ambassadors are promoting waste diversion initiatives).
- The use of online tools and resources allow for interaction among other Ambassadors and building community connections.
- Sharing success stories among Ambassadors allows for Ambassadors to hear from others who may have gone through similar experiences and their lessons learned (rather than a top-down approach from the City).
- The Ambassador corner could provide copies of translated materials that were developed for activities within their buildings.
- The provision of presentation packages, discussion tool-kits and materials for waste initiatives (in addition to the materials provided by the City) can reduce the efforts of Ambassadors so that they focus on education, rather that creating educational materials. Additionally, these can assist Ambassadors who may find it challenging to know what information to provide to various stakeholders.
- The web-based tools may not be easy for some Ambassadors to use and therefore participation may be low. Training on how to access and use the tools could be added to the training program to help alleviate this but it would still present a disadvantage to those that do not regularly use or have access to the Internet.
- Any tools on the website that could be used to distribute to residents or post in the building should be made available to Ambassadors by the City so that the Ambassador is not responsible for printing. This may require extra City resources to track and ship requests. However, currently the Ambassadors can contact the City to obtain copies of print materials (e.g., Green Bin sorting instructions).
- Additional City resources may be required to monitor discussion and feedback on the website.
- City staff would need to get permission to disclose contact information from Ambassadors that wish to contact other Ambassadors for collaboration opportunities.
- Initial set up of Ambassador corner either by City staff or external assistance to develop content and layout.
- Staff time to monitor discussion and update information, as required.

Potential Outcomes:

- Dedicated online venue for Ambassadors to connect and share ideas.
- Creation of local or neighbourhood scale collaborative opportunities.

Option 1.5: Incentivizing 3Rs Ambassadors and Other Volunteer Programs

Consider incentives for Ambassadors/volunteers to expand the program reach in Multi-residential buildings. Incentives could include small honorarium, monthly draws for prizes, City of Toronto paraphernalia, recognition awards to outstanding or long-term performance, passes to City of Toronto events and/or facilities, rebates in waste fees for achieving a waste diversion milestone (or reducing the quantity of residual waste). 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.

System Component: Promotion & Education **Source of Option:** Consultation

City of Toronto Experience:

- The City hosts an appreciation event for all Ambassadors.
- Entrance fees are covered for volunteers helping out at City booths at festivals, events, trade shows/conferences, etc.
- The City provides certification of hours for volunteering at certain types of events.
- The City engages the Toronto school boards regularly to recruit volunteers, attend college/university volunteer fairs, speak to environmental clubs and organizations and develops elementary-level lesson plans for the Toronto District School Board.

Municipal/Waste Industry Experience:

- Utility companies often offer incentives for their customers such as rebates.
- Some provinces offer specialized tax credits to volunteers for certain types of volunteer programs.

Case Studies/Examples:

- BC Hydro is currently running a multi-unit residential pilot program for managers of rental apartment buildings where the manager would have access to incentives for in-suite and common area upgrades and other energy saving opportunities[13].
- Nova Scotia began offering a tax credit to search and rescue crews and volunteer firefighters in 2007[14].
- An Ambassador pilot program (similar to the City's 3Rs Ambassador program for Multi-residential buildings) for the City of Surrey, BC provided free passes to the City's recreational centres for volunteers who participated in the program.
- City of Toronto Investing in Neighbourhoods Initiative[15] is run by the Employment and Social Services Department that connects qualified candidates with non-profit organizations looking to create a job opportunity to strengthen and contribute to the community. The program objectives are to provide people who are receiving Ontario Works benefits with new skills, increased contacts and references for permanent work, strengthen the capacity of communities and support organizations in improving the quality of life for people living in their communities. The initiative offers financial incentives to the

[13] https://www.bchydro.com/powersmart/business/programs/multi-unit-residential-building-program.html
[14] http://volunteer.ca/content/tax-incentives-volunteering
[15] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=7ea9707b1a280410VgnVCM10000071d60f89RCRD&vgnextchannel=6553d08099380410VgnVCM10000071d60f89RCRD

Option 1.5: Incentivizing 3Rs Ambassadors and Other Volunteer Programs

	participating non-profit organization including 100% of the employee's salary for up to 1 year and a minimum hourly rate of $12.

Considerations:

- Offering incentives to Ambassadors/volunteers could increase program participation since it encourages people to participate in a program who might not have an interest in volunteering otherwise.
- Ambassador/volunteer retention may increase if incentives continue to be offered long-term throughout the program.
- Incentives may encourage Ambassadors/volunteers to uphold their program related duties since they are being rewarded for their efforts.
- Increased volunteer opportunities can help to develop a sense of pride for their City.
- Incentives do not have to be worth a large amount of money to motivate volunteers. People are often happy to receive anything that is free even if the incentives are in the form of a travel mug or gift card to a local shop.
- Volunteers typically participate because they want to contribute their time to a cause that is important to them, not for the recognition.
- Offering incentives can attract certain types of people that do not care about the program and therefore may not feel as much of an investment in the success of the program.
- If incentives are offered, they will have to continue to be offered throughout the duration of the entire program. People may not react well if incentives are suddenly removed from the program.
- Creating a sense of community and offering knowledge can create a longer lasting sense of intrinsic motivation towards participating in environmental initiatives rather than using incentives.
- The costs of obtaining, tracking and providing incentives will have to be incorporated into the program budget.
- City staff time required to identify, acquire, track and develop a program to distribute incentives.
- City staff time required to promote the incentives for volunteering with the City.

Potential Outcomes:

- Increased interest in volunteering and Solid Waste Management Services.
- Increased partnerships and collaboration with potential incentive providers.
- Creation of volunteer opportunities for the public including students looking for community service hours.
- Increased awareness of waste diversion programs.

Option 1.6: Targeted Group Communications

The City of Toronto has a diverse population and it is challenging to reach customers, particularly those that do not speak English as a first language and those that have recently become City residents. This option looks at exploring opportunities for other communication tactics and alternative communications to ensure that all audiences in Toronto are reached which will benefit both single-family and Multi-residential residents through the development of a communications strategy which will establish a consistent approach, branding or look to achieve improved communications strategically.

System Component: Promotion & Education **Source of Option:** Consultation

City of Toronto Experience:

- The City of Toronto website can translate over 50 languages.
- Posters on the City's waste management system are available in a limited number of languages.
- The customer service line (311) is able to offer information in more than 180 languages.

Municipal/Waste Industry Experience:

- One of the most common barriers to waste diversion faced by many municipalities is residents who do not understand how to effectively participate in waste management programs (either because of language barriers, cultural barriers (those new to Canada may not have had similar programs in their previous location), they are not aware of the programs available to them, or because of confusion regarding which materials are acceptable).
- Municipalities recognize the importance of educating youth on waste diversion related topics through school programs. This not only instills good habits early on in life but these habits can be passed on to their parents and translated into the family's native language/dialect.

Case Studies/Examples:

- Metro Vancouver, BC: Provides videos about their recycling program, the zero waste challenge, suggestions on consistent colour schemes for signage, and images for different products available to download for free by member municipalities and the general public to make the program more recognizable.
- City of Coquitlam, BC: at City festivals and events, volunteers were coordinated to stand at the waste container stations to provide on-the-spot training of how to properly sort waste. Volunteers selected spoke the most common languages and were able to communicate with attendees from different cultural groups.
- Nottingham, England: A dedicated WISE (Waste in School Education) Education Officer works with schools throughout Nottingham to promote waste diversion. Sessions are tailored to each individual school and curriculum.
- San Francisco, CA[16:] More than 40% of the population does not speak English. A variety of media is used to reach its diverse population as different cultures respond differently to different types of social media (some respond better to television and newspaper ads while others require more individual outreach). Two neighborhood campaigns are undertaken each year to increase recycling rates (the entire city is covered every three years) which includes publishing monthly multilingual advertisements in neighbourhood

[16] http://www.calrecycle.ca.gov/LGCentral/Library/Innovations/DiversePops/SanFrancisco.htm

Option 1.6: Targeted Group Communications

	newspapers. The City places trilingual stickers and posters in apartment buildings, operates a trilingual recycling hotline (English, Chinese, and Spanish), and hires a consultant to oversee community focus groups in order to determine the best way to reach the demographic in certain neighbourhoods.

Considerations:

- Increased awareness and broader reach of local waste diversion programs. The use of social media incorporated into these campaigns also helps to generate more buzz and media attention.
- Creating a recognizable brand helps to maintain consistency throughout a region and reduce confusion.
- Providing or displaying educational materials in different languages allows for a wider range of residents to be reached.
- Tailoring campaigns to specific demographics/neighbourhoods may produce more effective results in regards to reducing contamination.
- Educating youth will provide a good foundational understanding of solid waste programs which continues into adulthood and the information can be passed on and translated to their parents.
- Additional resources required to provide services in multiple languages and media.
- There is a lot of messaging that the public is exposed to on a daily basis. Campaigns will need to be creative to attract attention.
- Social media sites need to be updated in a timely manner and monitored which requires staffing resources.
- Purchasing advertising space or television or radio airtime can become expensive depending on the size of the campaign.
- Creating consistent branding may have significant start-up costs (e.g., replacing signage and public space bins to adhere to a new colour scheme).
- Implementing education campaigns which target different audiences in Toronto requires a significant investment in staff time and financial resources.
- Initial and ongoing research to identify different methods/media to reach and integrate with targeted residents. Can be completed by external marketing firm or by City staff (may require staff training).
- External agency or volunteers retained to translate materials.
- Discussions and coordination with other GTA municipalities regarding regional brand for promotion and education.
- Staff resources to prepare presentation and outreach materials.
- Development of standard images for communication materials.
- Continued coordination with Toronto schools to update waste education materials for students of different grades.

Potential Outcomes:

- Broader distribution of information.
- More informed residents.
- More participation in waste management programs with less contamination and higher diversion.

Option 1.7: Multi-Residential – Workshops and Other Outreach for Buildings Not Receiving City Waste Collection Services

Provide on-site workshops/seminars/outreach to buildings who are currently not receiving City collection services to encourage participation in diversion programs, improve program participation, and reduce contamination.

System Component: Promotion & Education **Source of Option:** Consultation

City of Toronto Experience:

- The City of Toronto web page has a section specifically for building owners, managers, and superintendents with information and links to resources related to waste diversion.
- Posters and other print materials are available for download from the City's website.
- 3Rs Ambassador training package includes messaging and materials targeted at building management.
- City staff provide workshops to current Multi-residential building customers.

Municipal/Waste Industry Experience:

- Because the success of diversion programs relies heavily on building management (including janitorial staff) involvement and engagement, targeted education and outreach will increase participation and awareness of waste diversion programs.

Case Studies/Examples:

- City of San Francisco, Recology[17], provides a separate webpage called "Property Manager's Lounge" that includes signage and posters for composting, recycling, trash and additional programs (e.g., batteries, HHW, bulky waste) and emails that property managers can copy and email to their respective residents.
- Halifax Regional Municipality (HRM), Nova Scotia. Solid Waste Resources staff provides free education sessions, workshops, brochures, and signs for the property owners and managers. Onsite workshops, generally following a waste audit, are scheduled by HRM where tenants learn more about what is in their waste and what can be diverted. Door-to-door information sessions and brochures are available in multiple languages to accommodate tenants with language barriers and varying time schedules.
- The City of San Diego, Education Toolkit [18] provides materials on their website available for download for use at Multi-residential buildings or businesses in response to the Recycling Ordinance. Examples of materials include signage, frequently asked questions, sample newsletter articles, sample letters and an inspection checklist. The inspection checklist helps property managers stay in compliance with the Recycling Ordinance which ensures that the collection containers are placed in a convenient area, proper signage is visible, chutes are clearly labelled, flyers and letters to promote waste

[17] http://www.recologysf.com/index.php/property-managers-lounge/121-property-manager-s-lounge
[18] http://www.sandiego.gov/environmental-services/recycling/ro/toolkit/index.shtml

Option 1.7: Multi-Residential – Workshops and Other Outreach for Buildings Not Receiving City Waste Collection Services

	diversion are posted in a visible location, and a written notice is sent to all residents upon any change in diversion programs. Onsite information sessions for direct interaction with the tenants can be arranged upon request. Property managers are responsible to educate their tenants and to arrange private collection services. Haulers are also required to provide outreach to residents twice a year.

Considerations:

- Outreach to managers and residents will help create buy-in from the stakeholders that would be involved in the approval and maintenance of future waste diversion programs.
- Meeting directly with buildings who are not receiving City collection will provide an opportunity to address any barriers identified by residents or management which may have prevented them from signing on to waste diversion programs (e.g., space constraints).
- Some of the educational materials can be used for the 3Rs Ambassador training program.
- Increased awareness of the City's waste diversion programs in addition to curbside collection programs.
- Exposure to non-City customers has the potential to bring in new customers to the City.
- Buildings who are not currently receiving City waste collection services may not be willing to participate because they have negative views towards diversion programs such as increased costs or fears of pest infestation if they provide for source-separated organics collection.
- Outreach to buildings not receiving services will require staff time and funds (both for the educational sessions and scheduling of the sessions).
- Outreach to non-City serviced buildings may be seen as soliciting business from those that are already receiving private collection services.
- Development and maintenance of buildings not receiving City collection services (e.g., address, property manager).
- Development of targeted messaging to buildings not receiving City services.
- Staff time and resources to administer and deliver the program and develop educational materials.

Potential Outcomes:

- Might get better information on waste management practices in buildings not receiving City services.
- Increased awareness of City services.
- Potential new customers.

Option 1.8: Multi-Residential By-laws and Enforcement

Implement by-laws to support mandatory common waste diversion requirements (Blue Bin and Green Bin service, etc.) to all Multi-residential buildings regardless of collection service provider. This can be achieved by mandating diversion at the building level (with building owners responsible), or through mandatory requirements for haulers operating within the City and servicing Multi-residential buildings. This ensures that should any Multi-residential buildings leave the City service related to the apparent utility costs, they will be required to provide the same level of comprehensive diversion service as is provided by City forces and financed through the utility, thus creating a level playing field between City services and private sector services, and ensuring that residents receive diversion service regardless of service provider.

System Component: Promotion & Education

Source of Option: Consultation

City of Toronto Experience:

- The City of Toronto provides garbage, recycling and organics collection services to all locations eligible for City collection. All new developments and redevelopments must meet SWMS guidelines that outline requirements for collection and participation in all diversion programs. It is estimated that the City provides waste diversion and garbage services to 422,000 Multi-residential homes in 2014.
- The Places to Grow Act (2005) requires 40% of new development to be within urban areas, and the City development plan supports Multi-residential developments, particularly along transportation corridors. The intensification requirements means that much of the new residential development in Toronto must build up and will be mixed use (i.e. residential combined with commercial).
- The City utility charges garbage rates for Multi-residential units that pay for garbage, Green Bin, Blue Bin and all other services through the user fee. Private haulers compete for this service but can charge much lower garbage rates as the garbage rate only covers garbage collection and disposal, with no diversion in some cases.

Municipal/Waste Industry Experience:

- Many municipalities have regulatory requirements that address waste collection

Case Studies/Examples:

- County of San Diego, CA: The City's Solid Waste Ordinance (Section 68.571) requires that all Multi-residential buildings with four or more units participate in recycling. Buildings must maintain at least a 40% diversion rate. Noncompliance is subject to a citation with escalating penalties.
- San Jose, CA: The City contracts its garbage and recycling collection services to the private sector and uses a variable rate system for charging garbage collection in Multi-residential buildings. The contractor is financially penalized for not maintaining a 35% diversion rate in Multi-residential buildings. However, the major contractual incentive to achieving 35% diversion is potential contract extensions. Favourable consideration is given to contract extensions (2 3-year extensions) based on performance, including a review of administrative charges and achieving minimum diversion targets.
- Calgary, AB: Recycling is mandatory in Multi-residential buildings through a by-law, effective in 2016.
- Halifax Regional Municipality, NS: By-law S-600 requires all IC&I properties to provide all building occupants with access to recycling and organics collection. The Multi-residential sector (buildings with six or more units) is considered part of the IC&I sector and must comply with the by-law.
- Burnaby, BC: The Solid Waste and Recycling By-law was amended in 2011,

Option 1.8: Multi-Residential By-laws and Enforcement

and diversion in the Multi-residential sector. These requirements can be through by-laws directed at the building owner, or through mandatory diversion service requirements for haulers providing service within the city limits.

- Some municipalities have chosen to use by-laws forcing property owners/managers of Multi-residential buildings to provide recycling and/or composting services to residents.
- Some communities have put the onus on the haulers to provide recycling and/or organics services to clients and set diversion targets that the haulers must achieve or face a financial penalty.
- The Ontario Government introduced legislation in 1994 (Ontario Regulation 103/94), which requires that Multi-residential buildings with six or more units and located in municipalities with a population greater than 5,000 provide source separation (recycling) programs in their buildings.

requiring the source separation of recyclable, organic (food scraps, yard waste) and residue waste material in the Multi-residential sector. It also requires building management (e.g., strata council) or owner to communicate program specifics to all new tenants and all tenants on an annual basis.

- Sacramento, CA: Ordinance Number 5 requires haulers to divert 30% of the waste by volume from Multi-residential customers. As part of the requirement, haulers have to complete a diversion plan showing how the recycling space will be developed.

Considerations:

- The difference in public and private rates is a threat to the financial viability of the utility, and can be corrected to some extent by mandatory service level requirements.
- Existing by-laws must be amended or new by-laws created.
- Enforcement procedures must be developed and additional enforcement staff must be hired and trained.
- Multi-residential property management/owners must be educated about the new by-law.
- Additional Multi-residential customer service staff may need to be hired (temporary or permanent) to address the needs of Multi-residential buildings.
- Wording of by-law is important to ensure that Multi-residential building owners/property managers don't just put bins in place and not promote the program – source separation requirements of tenants and targets will be important.
- Toronto continues its role as a leader in waste diversion.
- Establishes a level playing field for all Multi-residential buildings, whether service is through City of private sector haulers.
- Can ensure better data collection through mandatory provisions for data reporting applied to haulers servicing the Multi-residential sector in the City.
- Could possibly encourage buildings to come back on City collection services, increasing the customer base and revenue.
- Provides consistent waste diversion service to Multi-residential buildings throughout Toronto and treats the Multi-residential sector equal to single-family sector in the level of waste diversion services received.

Option 1.8: Multi-Residential By-laws and Enforcement

Potential Outcomes:

- If properly enforced, instruments such as by-laws or mandatory service levels or diversion targets applied to haulers would ensure that all Multi-residential buildings in the City would have some level of waste diversion in place.

Option 1.9: Updates to Current Multi-Residential Development Standards

City of Toronto review and revise where appropriate, the Multi-residential development standards and introduce new requirements being implemented in other jurisdictions such as common area drop-off depot requirements, flexible space requirements to allow for the addition of future programs, etc. 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.

System Component: Promotion & Education **Source of Option:** City Staff

City of Toronto Experience:

- City Of Toronto *Requirements For Garbage, Recycling And Organics Collection Services For New Developments And Redevelopments (revised 2012)* stipulates requirements to receive City collection service. Collection of divertible materials is ensured if City service is provided, but not if private service is provided.
- Some older existing buildings or new proposed developments cannot be serviced as space restrictions do not permit access for full size front end loading trucks.

Municipal/Waste Industry Experience:

- Lack of sufficient access and space for the collection of multiple waste streams is a barrier to higher waste diversion. Some municipalities address future developments with stringent development restrictions.
- Lack of convenient opportunities for residents of Multi-residential buildings to divert a wide variety of materials (Waste electrical and electronic equipment, durable goods, Blue Box recycling, Green Bin organics) from disposal.

Case Studies/ Examples:

- Set aside of "flexible space" which can be used for all types of recycling and other community activities is required in Metro Vancouver

Considerations:

- More diversion from Multi-residential buildings.
- All new buildings and redevelopments will be able to meet Standards.
- Reserved space is available to develop small scale neighbourhood depots.
- Potential resistance from development community who may be opposed to new requirements that reduce the potential number or size of future units.
- Collaboration with City Planning and Engineering and Construction services.

Potential Outcomes:

- Space needed for small neighbourhood drop-off depots infrastructure is set aside on a go-forward basis, and is designated for this use.

Option 1.9: Updates to Current Multi-Residential Development Standards

- Updated Multi-residential development by-law standards which would require set-aside of space for drop-off depots at new Multi-residential complexes to make sure sufficient space is available for neighbourhood style depots.
- Addition of space to allow for future flexibility for the management of changing waste streams and diversion requirements.

Option 1.10: Community Partnership Unit Within Solid Waste Management Services (SWMS) Division

Partnerships with various non-profit and for-profit organizations in the City as well as other partnerships related to waste reduction. This initiative would be managed by a specially established Community Partnership group within the Division. The group would develop mutual arrangements 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.

System Component: Promotion & Education

Source of Option: City Staff

City of Toronto Experience:

- Toronto already has a number of established partnerships (e.g. Goodwill participates at Environment Days) with non-profit organizations –which already divert a wide range of materials from Toronto households (mainly though re-use).

Municipal/Waste Industry Experience:

- Partnerships with both for profit and not-for profit organizations are effective ways of delivering specific aspects of the waste diversion system.
- Partnerships particularly with not-for-profit organizations, evaluated as other business arrangements, sometimes related to the nature of the organization involved.
- Some municipalities have partnerships with not-for-profits at manage materials dropped off at depots/recycling centres.
- Charities and not-for-profits operate in cities across Canada, helping to divert materials from disposal.

Case Studies/Examples:

- Powys County Council, UK - The council has developed a recycling strategy based upon partnerships with local community groups and the volunteer sector. Community groups receive recycling credit payments per tonne for materials collected.
- Sutton "Adopt-a-bank" recycling scheme – London, UK - Groups agree to look after tidying up centres, sweeping glass and removing litter and in return the group gets financially compensated for each tonne of paper and glass collected in the banks.
- TRAID Textile Bank Service, U.K. - TRAID works with local authorities, businesses, housing associations, households and schools to divert clothes from the waste stream for reuse. Regular provision of data including tonnage figures and carbon equivalent savings; area audits to find best locations for new textile banks.
- New York City has established a partnership with a non-profit organization (re-fashioNYC), which maintains textile recycling bins in Multi-residential buildings.
- York Region in Ontario has established reuse centres at its Community Environmental Centres. Elements of the reuse centres are managed by Goodwill and Habitat for Humanity through partnerships with the Region.
- Town of Markham, in partnership with FCM (Federation of Canadian Municipalities) is launching a pilot program in fall, 2015 to install clean, attractive, well located and well lit depots to significantly increase the diversion of a wide range of clothing/textiles (clothing, shoes & bag and piloting selected larger items such as baby car seats and high chairs).

Option 1.10: Community Partnership Unit Within Solid Waste Management Services (SWMS) Division

Considerations:

- City develops a methodology to manage, monitor and track the success of various partnerships.
- The City and partner will work together to establish reporting of metrics to be determined
- Some not-for-profit organizations may not have waste diversion reporting metrics currently in place and may require additional resource in order to provide metrics.
- SWMS would need to coordinate this effort with existing City Divisions and Agencies where appropriate.
- Development of a standard working arrangement or MOU (Memorandum of Understanding) for each partnership which clearly lays out the obligations, expectations and outcomes for each side of the partnership.
- Additional administration time for City staff.
- Development of promotion and education materials.

Potential Outcomes:

- Formalized relationship between for-profit and not-for-profit organizations with which the City is involved to ensure that each partnership delivers results which fit with City objectives.
- Opportunity to review performance of partnerships on a pre-determined basis.
- Documentation and tracking of results of partnerships, and identifying potential areas of improvement.

Option 2.1: Outreach and Education Campaign to Reduce Waste

Continue to develop outreach and education campaigns designed to get people thinking 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 outreach and education campaigns to inform and teach people why avoidable waste occurs and how to reduce this waste in the future.

System Component: Generation, Reduce & Reuse

Source of Option: Consultation

City of Toronto Experience:

- Toronto already has many effective waste reduction programs and policies in place (bi-weekly garbage collection; user pay for garbage, convenient diversion, waste reduction ad campaigns).
- The plastic bag levy, when in place in Toronto, achieved 77% reduction in plastic bag usage.
- Backyard composting is a successful waste reduction approach, with a mature system already in place in Toronto.
- In December, 2008, Toronto introduced a ban on the sale and distribution of bottled water in all Civic Centres, City Facilities and parks, effective January, 2012.
- In May, 2007, Council approved establishment of three committees to advise and support staff in implementation of the 70% diversion by 2010, including the 3Rs Working Group, the In-Store Packaging Waste Diversion Group and the Multi-Family Waste Diversion Working Group. All focussed on education campaigns to reduce waste. A few areas – hot drink cups and plastic bags- focussed on reduction efforts.

Municipal/Waste Industry Experience:

- Waste reduction refers to actions which led to lower quantities of waste produced (as kg/household) and requiring management by the City system, and like energy and water conservation is the most cost effective method to reduce system costs.
- Food waste reduction is addressed in Option 2.2 and has significant potential for up-stream waste reduction

Case Studies/Examples:

- Bell Canada's education campaign to get customers to switch to e-bills has resulted in almost 40% of customers now receiving monthly e-bills.
- Metro Vancouver launched a waste reduction campaign that runs at Christmas called **"***Create Memories, not Garbage***"** which aims to get people to think about what they are giving as gifts and consider giving gifts of time, experience or long lasting gifts.
- Scotland's "*Make Things Last"* campaign (launched June 2015) is about engaging the public to find solutions to end the throwaway culture and make the most of what we already have.
- *Better than New: 100% Old* campaign in Barcelona, Spain – The campaign was launched to increase the public's awareness of excessive waste and how this can be avoided through repair and reuse to extend products useful lives.
- Greater Besançon Metropolitan Authority, France launched the *"Waste on a Diet"* campaign to reduce waste, increase re-use and recycling.
- *Eco Point Campaign in Toyko, Japan* – consumers can earn points on a special Eco card if they refuse a shopping bag or perform other waste prevention behaviour when shopping and provide proof from the participating store.
- *iFixit* (a website run from Stuttgart and California) is the primary source of technical information to support the repair of electronic devices and consumer gadgets by producing free online repair guides and manuals, and sells spare parts. It has over 3.5 million visits monthly.

Option 2.1: Outreach and Education Campaign to Reduce Waste

- Seattle set a goal of 1.9% reduction in packaging waste through source reduction.
- Outreach and education campaigns on waste reduction are most successful when partnered with economic policies to drive waste reduction (e.g. levies on plastic bags, pricing for waste, etc.).
- The success of waste reduction campaigns has traditionally been difficult to measure.

Considerations:

- Builds public knowledge of waste targets and issues potentially resulting in long-term change in attitudes and behaviour around waste.
- Public interest and support for waste reduction issues.
- Potential for the development of green industry (reuse) and green jobs.
- Difficulty/challenge measuring the effectiveness of specific public education and engagement campaigns, especially as it applies to waste reduction.
- Some residents may feel that the City is encroaching in their lives and trying to tell them what to do.
- City will need to also set example and policies that support waste reduction at their facilities.
- Need to work in collaboration with retail sector (grocery stores, restaurants, etc.) to address policies and practices that encourage waste reduction.
- Identify partners to help promote the campaign.
- Traditional public education campaigns (e.g. newspaper ads, radio, direct mail) may not be effective and new forms of outreach will be required in order to promote behavior change.
- Assessment of need to develop policies to support the campaign.
- Design an approach and monitoring program to measure waste reduction which may include pre and post waste audits and surveys in pilot areas to determine impact of waste reduction campaign (address activities outside the home as well).
- Market research and pilot programs to test messaging and outreach campaigns.
- Targeted campaigns to address unique audiences such as millennials, different cultures and language groups, and the general cultural diversity in the City.
- Design and develop communication materials including a social media campaign as one element of the waste reduction campaign.
- Assessment of specific materials that should become the target of the waste reduction campaign (better than general messaging).

Potential Outcomes:

- Measured waste reduction in pilot areas would provide proof of concept for implementation city-wide.
- Supportive policies are needed for success of various programs (e.g. bottle ban and plastic bag levy), and there may be partnership opportunities.
- Measured impacts of waste reduction campaigns over time.
- Resulting savings to the City in reduced collection, processing and disposal costs.

Option 2.2: Food Waste Reduction Strategy

Develop a strategy that promotes reduction of food waste generated primarily in the household but also in the small commercial sector serviced by the City. Focuses on information and outreach programs to educate residents about the benefits of food waste reduction from an economic, environmental and social perspective.

System Component: : Generation, Reduce and Reuse

Source of Option: Consultation

City of Toronto Experience:

- Food waste not specifically addressed at this time; however the City has updated their waste audit sort categories to include more details on the types and quantities of food waste to better track and measure food in different waste streams (e.g. garbage, Blue Bin, Green Bin).
- City of Toronto staff have recently become involved in the Southern Ontario Food Waste Municipal Collaborative, an initiative with a goal of developing common key messages for food waste reduction, exploring collaborative projects and advocating for change in policy to support food waste reduction.
- Toronto Public Health run the Toronto Food Policy Council[19], but food waste is not addressed.
- City of Toronto provides core funding to FoodShare, a non-profit food security organization that supports Toronto Compost Leaders, a grass roots initiative to build community composting capacity in Multi-residential buildings using food waste.
- City of Toronto is a member of the National Zero Waste Council (NZWC) Food Waste Reduction Working Group.
- Solid Waste Management Services has collaborated with the Toronto Food Policy Council to promote food waste reduction at outreach events such as the Green Living Show.

Municipal/Waste Industry Experience:

- The City of Guelph food waste audits showing up to 53% of the food waste put in the Green Bins is avoidable.

Case Studies/Examples:

- The Love Food, Hate Waste campaign in West London, UK resulted in 14% reduction in avoidable food waste over a period of six months and for every £1 spent on the campaign, £8 was saved in collection and disposal costs. It was estimated that each participating household saved on average £24 (Cdn $50) over a six month period by not buying food that ended up being thrown out.
- Metro Vancouver paid a license fee to UK Waste and Resources Action Program (WRAP) to use the LFHW promotional and web based materials. The campaign was officially launched in May 2015, and will help Metro Vancouver achieve its goal of reducing per capita waste generation by 10% by 2020.
- King County (WA) piloted the Food: Too Good to Waste (a food waste reduction campaign developed by the US EPA) on over 100 families with small children. The pilot achieved 28% reduction in food waste but fewer than 15% of families completed the five week pilot.
- France considered legislation in May 2015 banning grocery stores from throwing away or destroying unsold food, and requiring them to donate unsold food to charities or for animal feed. The legislation was overturned in August, 2015.
- York Region launched the Good Food Campaign in March 2015, which encourages healthy eating and food waste reduction. The campaign is in the early stages of development with plans for pre

[19] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=75ab044e17e32410VgnVCM10000071d60f89RCRD

Option 2.2: Food Waste Reduction Strategy

- The Municipal Waste Association (MWA) in Ontario has established a Food Waste Reduction Working Group.
- The industry-led Food Waste Reduction Coalition, as a subcommittee of the Southern Ontario Food Coalition, was formed to address food waste in the food and beverage industry.

and post waste audits, outreach and communication strategies and information to help reduce food waste (e.g. recipes for leftovers). Their Green bin waste audits showing that up to 35% of food placed in the Green Bin is considered still edible.

Considerations:

- Build public knowledge of waste targets and issues potentially resulting in long-term change in attitudes and behaviour around waste.
- Households that are able to reduce the amount of food waste will save on grocery bills.
- Opportunity to encourage community composting programs
- Consistent with and reinforces message of food sustainability.
- Food waste reduction message is useful in raising environmental consciousness.
- Some residents may feel that the City is encroaching in their lives and trying to tell them what to do.
- City will need to also set example and policies that support waste reduction at their facilities.
- Need to work in collaboration with retail sector (grocery stores, restaurants, etc.) to address policies and practices that encourage food waste reduction.
- Design of a food waste reduction campaign tailored to meet Toronto's unique characteristics, targeting single-family, Multi-residential households as well as various cultural/ethnic groups and City-serviced commercial customers.
- Conduct pre and post waste audits focussing on avoidable and unavoidable food waste.
- Establish on-going monitoring program to measure results over time.
- Design and development of communication and outreach activities. Development of a business case which documents benefits of long term investment in a food waste reduction strategy, documenting savings in collection, processing and disposal costs, as well as environmental benefits of lower food waste quantities over time.

Potential Outcomes:

- Measured reduction in avoidable food waste requiring management.
- Measured $ savings to the City in reduced collection and processing operations.
- Measured $ savings in resident food bills.
- Increase in attention and participation in sustainable food movement and food security issues.

Option 2.3: Textile Collection and Reuse Strategy

Develop a textile diversion awareness campaign and provide separate textile (e.g. clothing, shoes, curtains, sheets, towels) diversion opportunities that would enable textiles to follow the 5Rs hierarchy and be reused or recycled.

System Component: : Generation , Reduce & Reuse

Source of Option: Consultation

City of Toronto Experience:

- The City of Toronto piloted curbside collection of textiles in Etobicoke in the mid-1990s but dropped the pilot due to high operating costs, and issues such as textiles getting wet (which causes mould and de-values the loads).
- The City does not currently collect textiles; however, the second-hand textile economy is very active in the City of Toronto.
  - There are numerous charitable organizations operating textile reuse centres throughout the City.
  - Toronto also has many for profit, used clothing, consignment retail stores.
  - Other organizations provide door-to-door textile collection. The collected textiles are sold at reuse centres or to overseas markets or to be recycled into rags and industrial wipes.
  - Textile swaps are growing in popularity in Toronto. Interested participants get together in a designated location to swap gently used clothing with one another.
  - The Toronto Repairathon allows residents to bring 2-3 items which need small repairs to the event and volunteers repair the clothing so it can be used for longer, thereby reducing waste.

Case Studies/Examples:

- The City of Markham has received Federation of Canadian Municipalities (FCM) funding to develop a textile recovery pilot using high profile, well lit, clean Markham-branded drop-offs targeting older clothes and household textiles that would not be sent to a charitable organization for reuse. Markham expects opposition from "traditional clothing" recyclers who oppose the pilot as it cuts into their business.
- Communities in Arizona, Massachusetts, New Jersey, Pennsylvania and Washington have introduced curbside collection of textiles, often using special bags that are placed next to recycling containers. Clothing is typically sorted into reusable which is sold, or exported, and non-wearable which is used as industrial wipes.
- New York City has established textile drop off areas at 31 Greenmarkets (farmers markets), promotes clothing swap events, and provides drop off bins for apartment buildings (nearly 250 apartment buildings are participating). Collection of full bins is free and the city will issue a tax receipt (for up to $250) per bin.
- A clothing collection initiative was established in public schools in Weymouth, Massachusetts. The program accepted "The Good, the Bad and the Ugly" of textiles. Each

Option 2.3: Textile Collection and Reuse Strategy

Municipal/Waste Industry Experience:

- It is estimated by the USEPA that only 15% of clothing is diverted through reuse programs and on average a person discards 32 kilograms (70 lbs) of textiles annually. New York City estimates that residents dispose of 21 kilograms (46 lbs) annually.
- The Canadian Council of Ministers of the Environment (CCME) has targeted textiles as part of its Phase 2 Extended Producer Responsibility (EPR) materials with a goal of having EPR legislation in place by 2017. To date, there has been no progress in any Canadian province or territory to plan or develop an EPR strategy targeting textiles.

participating school received a $250 start-up incentive and were paid $100 per ton of textiles collected.

- The United Kingdom launched the *Love Your Clothes* Campaign to raise public awareness about the value of clothes and encourage people to repair and care for their clothes to make them last longer. Workshops are offered on how to mend and sew clothes.
- The UK Waste Reduction Action Programme (WRAP) has developed a Sustainable Clothing Action Plan, which is a collaborative effort with industry to improve the sustainability of clothing from manufacturing to end of life.
- France has implemented an EPR program targeting "Clothing, Household Linen and Footwear (TLC in French)" producers, distributors or importers. The program is called Eco TLC and represents more than 93% of the industry. Companies pay a stewardship fee per clothing item based on the size of the clothing. Smaller clothing companies selling less than 5,000 items pay an annual flat fee. Companies that use a minimum 15% of recycled fibers from post-consumer textile, linen or shoes, receive a 50% discount on their contributions for these products.

Considerations:

- Can be integrated with other initiatives, such as neighbourhood depots.
- Charitable organizations and for-profit textile recyclers may have concerns that the City is encroaching on their business, but collaborative opportunities and partnerships may address the issue.
- Identify specific textiles within the waste stream that will be focus of the program.
- Develop a number of pilots targeting different types/quality of textile goods (e.g. worn clothing, shoes, handbags) and/or different groups for collection (e.g. schools, markets, retailers) to collect information on the amount of textiles that can realistically be captured and market opportunities for these specific textiles.
- Use results of pilots to firm up textile diversion program design.
- Carry out market research and develop a campaign and messaging along with a dedicated website page and promotional materials.
- Staff time and resources.
- Identify partners to help promote campaign and establish collaborative partnerships to assume roles in reuse and recycling.

Option 2.3: Textile Collection and Reuse Strategy

Potential Outcomes:

- Reduction in textiles ending up in the garbage stream.
- Increased awareness of the benefits of recycling/reusing used textiles.

Option 2.4: Sharing Library

Provide more opportunities where the public can 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, car share programs) or establishing new sharing programs in different areas of the City and/or within Multi-residential buildings. Materials can be donated to the libraries or organizations can purchase and cover expenses through user fees.

System Component: Generation, Reduce & Reuse

Source of Option: Consultation

City of Toronto Experience:

- Toronto Public Library offers a variety of books, DVDs, CDs and temporary usage of computers for library card holders.
- In 2010, Public Bicycles System Company (Bike Share) provided the City of Toronto with 1,000 bikes at 80 locations in downtown Toronto that allows patrons to rent a bike at a reasonable cost and return it to any dock station in Toronto[20].

Municipal/Waste Industry Experience:

- Tool share libraries are available in U.S. and some southern Canada locations which allow local public to sign-out tools as required for home projects[28].
- Many public libraries and educational institutions offer a variety of books, DVDs, CDs and temporary usage of computer at no cost.

Case Studies/Examples:

- Toronto Tool Library – Toronto has three tool share libraries through non-profit programs that operate in Toronto[21]. The organization is looking to expand to create a Vertical Living Library where residents living in Multi-residential buildings can access tools, kitchen appliances and entertainment products from a common area.
- The Kitchen Library (Toronto)[22] – For a small membership fee ($9/month), members can borrow kitchen appliances (e.g., juicer, dehydrator, pasta maker).
- NE Seattle's Tool Library inspires participation in community projects and pursues sustainability through projects like backyard gardens, home energy improvements, food preservation, and water harvesting. They also offer classes and host community events to advance the community[23].
- Recreational Sharing Library (CityStudio Vancouver) – A pilot program that allows neighbours to bring underutilized recreational items (e.g., sports equipment, board games) to a place where they can be stored and played together[24]. CityStudio is an innovation and leadership hub where City staff, citizens and university and college students work together to find solutions.
- Comox Valley Toy Library Society, BC – A volunteer non-profit society that provides

[20] http://www.bikesharetoronto.com
[21] http://torontotoollibrary.com/
[22] http://thekitchenlibrary.ca/
[23] http://neseattletoollibrary.org/
[24] http://citystudiovancouver.com/projects/shareable-neighbourhood/
[28] http://localtools.org/find/#map_top

Option 2.4: Sharing Library

families with an opportunity to borrow or test out toys before purchasing them[25]. Membership fees are $20 per year.
- Spare to Share (Chicago, US) – A community management tool for residential and commercial buildings that allows tenants to connect to share materials (e.g., tools, video games), sell used goods, skills (e.g. pet sitting) and space (e.g., parking spot)[26].
- Oakland Public Library allows patrons to borrow tools including drills, saws, routers, hand trucks, ladders, voltage detectors, lawn mowers, etc. for up to three days[27].

Considerations:

- Provides cost savings to users of sharing libraries.
- Community developments and opportunities for community engagement.
- Makes everyone in the community feel equal by offering useful materials and objects regardless of family income.
- Provides opportunities for local organizations/initiatives to grow and for innovative approaches to be developed.
- Difficult to track the impact on diversion.
- Distribution of sharing libraries across communities.
- Decision on approach to sharing libraries – does the City want to develop separate events and/or promote/partner with existing organizations.
- Researching and verifying existing or emerging organizations.
- Promotion of organizations and ongoing updates to the City website (e.g., Waste Wizard).

Potential Outcomes:

- Reduction in the purchase of materials that are used infrequently.
- Increase in community collaboration and networking opportunities.
- Increased awareness about unnecessary purchases and opportunities to reuse and share materials.
- Reduce end-of-life waste if fewer materials are being purchased.

[25] http://cvtoylibrary.weebly.com/
[26] https://www.asparetoshare.com/
[27] http://www.shareable.net/blog/libraries-become-centers-for-sharing

Option 2.5: Support Reuse Events

This option looks at the City supporting 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 uncleanliness, 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., mom-to-mom sales, jewelry or clothing exchanges).

System Component: Generation, Reduce & Reuse

Source of Option: Consultation

City of Toronto Experience:

- Although this is not a City of Toronto led initiative, many residents in Toronto already leave their unwanted reusable goods on the curbside which is available to anyone at no cost.
- The City's current bylaw does not allow for curbside giveaway events to occur. Article V, 844-23 Prohibited Acts states that "*No person shall pick over, interfere with, disturb, remove or scatter any waste set out for collection unless authorized to do so by the General Manager.*" Section 844-25 states that if convicted, the individual or corporation could be fined up to $25,000 to $100,000[29].

Municipal/Waste Industry Experience:

- Jurisdictions in Canada have dedicated days or weekends where they encourage residents to set out reusable items at the curbside to give away at no cost. Examples include Cities of Ottawa, Peterborough, Guelph and Owen Sound.
- Swap events and garage sales have been in place for a long time and are coordinated through different organizations, through the community level, among friends or by individuals. Data on waste diverted through these means is not typically tracked.

Case Studies/Examples:

- Halifax, NS: The municipality hosts two curbside giveaway weekends each year (fall, spring) where residents can place household items at the curb with stickers or signs indicating the items are free. Residents in Multi-residential buildings are encouraged to attend and to work with the landlord to get permission and find a common space. Items not taken by Sunday evening are to be removed from the curb and residents are encouraged to donate the remaining materials[30]. The Cities of Winnipeg, Ottawa and Yellowknife host similar giveaway weekends.
- Davis, CA: A partnership between the municipality and property managers for an Apartment Move-Out Waste Reduction Program. City staff supply flyers and posters and mark off the donation stations with signs. Property managers distribute fliers and posters to residents. Residents bring unwanted reusable items to donation stations for pick up by non-profit organizations, residents moving in, current residents and apartment staff. Remaining items are taken to local non-profit organizations (some have "wish lists" and items from the list are taken to the organization). There are over 100 properties with over 10,000 units. Program runs in late August and the City recruits volunteers to assist during the event[31].
- Stop 'N' Swap, various locations, NYC[32]. These community reuse events are put on by

[29] http://www.toronto.ca/legdocs/municode/1184_844.pdf
[30] http://www.halifax.ca/mediaroom/pressrelease/pr2014/residentsencouragedtotakepartincurbsidegiveawayweekend.php
[31] https://localwiki.org/davis/Apartment_Move-Out_Waste_Reduction_Program
[32] http://www.grownyc.org/swap

Option 2.5: Support Reuse Events

	Grow NYC, a local non-profit. Events often take place at a community centre where drop-off tables are set up and residents can leave or take unwanted items for free. Although this is not directly related to municipal bylaws, it is a community level example of residents exchanging unwanted items that could be applicable to the Multi-residential sector. • Sustainable Move Out, McMaster University, Hamilton, ON[33]. Collection boxes are set up in different locations during the end of school year where clothing, food and books can be donated to local not-for profit organizations. Staff also collect gently used items (e.g., blankets, school and kitchen supplies) and donate items to incoming International students and local community agencies.

Considerations:

- Gives opportunity to residents to access used goods instead of buying new at either reduce rates or for free.
- Creates reuse opportunities and therefore reducing waste sent for recycling or disposal and increasing the diversion of materials that could have otherwise ended up in landfill.
- Community events can unite a community as people interact with each other and get to know their neighbours through such events.
- Potential for prohibited or unacceptable materials to be set out which may pose health & safety concerns (e.g., mattresses containing bed bugs, child car seats, helmets, etc.).
- Good opportunity for promotion through schools and universities that have student housing.
- Residents may not remove materials after the event which can create litter and an uncleanly neighbourhood.
- Collection of large and bulk items.
- Illegal dumping may occur if not properly planned.
- Remove bylaw condition that prohibits curbside giveaway events.
- Consider holding events during the same time period so that it becomes common knowledge.
- Promotion and advertising to provide residents enough time to collect their unwanted materials and educate on acceptable items.
- Enforcement/approach to manage materials remaining after events.
- Develop a method to track the material diverted from landfill through the various reuse events.

Potential Outcomes:

- Reduction in waste setout for recycling or disposal.
- Increased awareness about the value of materials.
- Cost saving opportunities for residents to buy used instead of new goods.

[33] http://www.macinsiders.com/showthread.php/help-support-sustainable-move-out-411.html?s=036a5672cbb8182ff868dee45d36dedc&t=41411

Option 2.5: Support Reuse Events

- Creation of community events and increased social interactions.

Option 2.6: Explore Opportunities for Waste Exchange

Establish a waste exchange centre and/or partner with existing organizations that collect gently used materials such as arts and crafts, school and office supplies, construction and demolition waste, plastic containers, etc.

System Component: Generation, Reduce & Reuse

Source of Option: Consultation

City of Toronto Experience:

- The City of Toronto hosts Community Environment Days in each ward of the City. Residents can bring their unused and gently used household items such as art supplies, buttons, keys, clipboards, and children's books which are donated to local schools and sporting goods, books, eyeglasses, small household items (e.g., dishes, utensils, games), clothing, and non-perishable foods which are donated to other organizations, such as Goodwill and ArtsJunktion.
- The City of Toronto's SWMS website has an area called ReUseIt where listings of not-for-profit agencies that accept donated items and organizations that loan, repair and reuse materials are provided as well as tips for how to reduce waste at home.

Municipal/Waste Industry Experience:

- Some municipalities have websites which show listings and prices for the used materials. Buyers are encouraged to directly contact the seller. Websites operate similar to Craigslist and Kijiji.
- Ongoing reuse websites are popular to give away or sell used goods.
- There are numerous online tools that support waste exchanges to increase diversion of waste from landfill around the world.

Case Studies/Examples:

- Toronto Region Conservation Authority (TRCA), Partners in Project Green[34]. TRCA offers a Materials Exchange Program which matches and connects organizations looking to sustainably dispose of materials and facilitates exchanges between them. The Materials Exchange Network is an online platform that facilitates the exchange of materials between organizations, companies and service providers to divert waste from landfill.
- ReusefulUK – Scrapstores (England) – Clean reusable scrap materials are made available from local businesses for children to play with through a network of independent "scrapstores" across the UK. Scrapstores may operate differently with some requesting membership fees or fees for materials taken. Approximately 80,000 community groups are benefiting from their local scrapstore (e.g., Scouts, Brownies, day care centres, registered child minders, home educators, etc.)[35]. Examples of materials accepted include containers (e.g., cookie tins, cassette cases, plastic pots), paint, paper, cards, paper stationary (e.g., cardboard tubes, envelopes), pens, pencils and rubber bands.
- Creative Pitch (Chicago, IL)[36] – An organization that gathers unwanted art materials and provides them, free of charge, to art educators, art therapists and other professionals.
- A new American Firm finds innovative waste and recycling solutions for a variety of industries and finds ways to divert

[34] https://www.partnersinprojectgreen.com/your-needs/waste-management/
[35] https://www.scrapstoresuk.org/
[36] http://www.creativepitch.org/index.html

Option 2.6: Explore Opportunities for Waste Exchange

waste generated by one industry and selling it to another in Canada and the US. This firm does not own recycling facilities or landfills. Materials that they manage and examples of products created include cardboard to paper products, construction and demolition (C&D) waste to gravel substitutes, food waste into compost, animal feed, or biofuel, grease and oil into biodiesel or electricity, pallets into landscaping and building materials and industrial manufacturing materials into fuel pellets.

- Homeless Homes Project, California[37]. Organization that takes materials from illegal street dumping, commercial sector and excess household items and turns it into mobile shelters for the homeless people. Volunteers help to build the mobile homes. Materials used include bed and futon frames, solid doors, glass refrigerator shelves, wood, nails, etc.

Considerations:

- Cost savings and potential of earning for residents and partnering organizations.
- Collaboration among residents and partnering organizations and among a variety of industries.
- City staff time to research, verify and maintain relationships with partnering organizations.
- Difficult to measure the impact on diversion rate if not City-run.
- Need to determine if the City establishes its own waste exchange centre and provides donations to partnering organizations or partners/promotes existing organizations that collect and distribute used materials.
- Research and verify partnering organizations.
- Maintain City website and other education/promotion materials (e.g., Waste Wizard) with information on partnering organizations.
- Different methods of advertising the waste exchange program to spread awareness.
- Develop a way to track the material diverted from landfill.

Potential Outcomes:

- Creating beneficial uses of unwanted materials.
- Increasing awareness of the need for unwanted supplies in the community.

[37] http://www.homelesshomesproject.org/index.html

Option 2.7: Community/Mid-Scale Composting

Consider composting operations in locations where community members can compost their garden or kitchen waste using technologies such as small scale in-vessel or vermicomposting. Organic waste collection bins could be located at different participating sources, e.g., churches, community gardens and kitchens, coffee shops, etc. Collected waste would be dropped off to the community composting area. Final compost could be used in community gardens or local landscaping needs.

System Component: Generation, Reduce & Reuse

Source of Option: Consultation

City of Toronto Experience:

- City of Toronto provides guidance and sale of backyard composters for use at homes, Multi-residential buildings and community organizations (e.g., schools, community gardens, religious institutions).
- Educational materials are posted on the City's website that provides information to those wishing to start and maintain a community composting operation and problem solving techniques.
- City of Toronto provides core funding to FoodShare, a non-profit food security organization that supports Toronto Compost Leaders, a grass roots initiative to build community composting capacity in Multi-residential buildings using food waste.

Municipal/Waste Industry Experience:

- Most jurisdictions provide guidance on setting up a low-technology composting operation mainly in the context of backyard composting which can be scaled up for community composting operations.
- Some jurisdictions have permit to rule approval processes (a process where if the proponent meets all the requirements or "rules", a permit will be issued without having to apply for and obtain an approval) for composting operations under a certain size (e.g., British Columbia, Washington, California, Iowa).

Case Studies/Examples:

- FoodShare, Toronto[38]. Works with communities and schools to produce healthy food and deliver food education. The Urban Agriculture initiative encourages growing of produce in cities and also has a mid-scale compost processing operation where compost produced is used at their greenhouse and garden. Youth, volunteers and staff help in the operations. FoodShare is a partner supporting Toronto Compost Leaders, a group of community leaders that support composting in Multi-residential properties and growing resident compost knowledge.
- The New York City Department of Sanitation started the NYC Compost Project in 1993[39]. There are over 200 community composting operations and approximately 10 mid-size operations in five boroughs. The majority of community composting operations are located at community gardens. Technologies range from 3-bin systems at community gardens to windrows and aerated static piles at the medium-scale sites. The Project has dedicated staff and funding which has maintained the success of this program. There is also a Local Organics Recovery Program that sets up food waste drop off sites (including 'pop-ups' at subway stations).
- Wyecycle Community Composting, UK[40]. A not-for-profit community business operates the community composting program which has been in place since

[38] http://www.foodshare.net/composting
[39] http://www.biocycle.net/2013/11/18/community-composting-in-new-york-city/
[40] http://ec.europa.eu/environment/waste/publications/pdf/compost_en.pdf

Option 2.7: Community/Mid-Scale Composting

	1990. Garden waste is composted in a static pile/aerated windrow system and kitchen waste is first placed in a second hand shipping container (to partially degrade) before being added to the garden waste system. • Food Scraps Drop Spot, Vancouver, BC[41]. Not-for-profit volunteer organization that sets up drop off locations for residents living in Multi-residential buildings that don't have access to organics collection. Materials collected at the Drop Spots are taken to an organics processing facility (i.e., not managed at a community composting operation).

Considerations:

- Creates opportunities for community engagement and education on the value of composting.
- Produces compost that can be used in other community projects such as community gardens creating a closed-loop system.
- Requires dedicated staff to maintain operations and monitor parameters such as feedstock quality and temperature.
- Community compost may be low quality as it is rarely tested due to high testing costs. Contamination of feedstock, i.e. plastic forks degrades the quality of the compost.
- Potential for odour complaints during high heat or windy conditions and attraction of pests and vermin if not operated correctly.
- Decide on City's role in community/mid-scale composting operations and determine thresholds for permitting requirements.
- Dedicate area(s) for community composting operations.
- Funding for initial set up and ongoing maintenance and compost product quality testing.
- Train staff and volunteers to ensure the composting process is being followed and that quality compost is produced.
- Promotion and education of program.
- Determine end use of finished compost.

Potential Outcomes:

- Increase in community collaboration opportunities and awareness of value of compost.
- Finished compost can be used in community gardens, local landscaping projects, etc.

[41] http://foodscrapsdropspot.ca/

Option 3.1: Container Management

Use new or modern technology for more efficient container management, such as live tracking of waste, recycling and/or organic waste container volumes, to better manage collection needs particularly in Multi-residential buildings however, this could potentially be applied to single-family residential customers. The technology, such as radio frequency identification (RFID) could be used with existing and new bins to optimize collection frequency thereby reducing the number of collection trips in a given week and can also be used to provide data and statistics for each Multi-residential building such as waste generation rates, weight of materials collected, waste densities and/or diversion rates. The City could require that the technology be used in buildings that receive collection either through the City (through municipal or private collection forces) or become a future requirement for all Multi-residential buildings in the City.

System Component: Collection & Drop-Off **Source of Option:** Consultation

City of Toronto Experience:

- In 2009, the City installed over 17,000 front-end bins and equipped more than 30 trucks with Radio Frequency Identification (RFID) readers to provide near real time data for the City's billing system for Multi-residential buildings. The RFID readers were put in place for the potential to track bins and lifts however, it not currently being used. The new contract with the collection provider will manage this going forward. All City issued bins for garbage and recycling have RFID installed.

Municipal/Waste Industry Experience:

- RFID chips are gaining popularity as a method for tracking waste performance and improving waste collection services in the residential and IC&I sectors.
- The use of intelligent waste compactors on waste containers have sensors to alert when the containers are full or highly odourous and therefore collection routes can be altered to collect from only full containers. More commonly used in public spaces but can be applied to Multi-residential buildings as well for different waste streams.

Case Studies/Examples:

- Monroe County, Mississippi. Rolled out RFID tagged carts to each household on their official customer list. Each lift is recorded making it easier to identify bagged trash and know which residents do not have a cart and are not paying for service.
- Peachtree and Alpharetta, Georgia. Used RFID technology to incentivize people to recycle through a rewards program.
- Region of Peel implemented a RFID system for waste collection reporting at Multi-residential buildings in 2013. The Region intends to track building-specific data such as weights of waste collected and diversion rates.
- Tufts University and Save That Stuff, MA. Used a technology at five locations on campus to see if by reducing the number of pickups the overall collection costs would be reduced. The two month 2014 pilot program saw a reduction from 11 collections per week to 6.5 collections per week and a monthly savings of approximately 45%. The university is planning to expand the use of this technology campus-wide. The technology uses wireless sensors to measure and forecast the fill level of waste containers and automatically generates smart collection schedules and routes that can accessed on wireless cellular devices.
- New York City, NY is using new technology to create hotspots by installing Wi-Fi units inside the public waste containers.

Option 3.1: Container Management

Considerations:

- Can provide building-specific data on waste management performance and increase transparency in billing.
- Allows the City to track which areas/buildings generates the most garbage or not setting out expected quantities of recyclables and/or organics. As a result, the City can focus on educating specific areas.
- Provides 3Rs Ambassadors with actual data on their building performance which can help with their education programs.
- Reduction in collection costs (less trucks, fuel, labour) and traffic congestion associated with standard waste collection routes and schedules.
- Costs to purchase, distribute and place technology (e.g., RFID tags/chips, GPS geo-coding positioning, sensors) on collection containers.
- Costs for equipment and distribution on waste collection vehicles (or make as a requirement in collection contract).
- Installation/start-up costs to implement the program and ongoing maintenance costs.
- Technology is still relatively new.
- Reliance on external cloud-based platform to manage data and automatic collection routing.
- Utility rates may change with decreased collection frequency.
- Procurement of technology.
- Staff time required to input of collection container, scheduling and routing information into database.
- Training to waste collection drivers on how to use the system.

Potential Outcomes:

- Building-specific data on waste management statistics (e.g., quantities collected, diversion rate).
- Real-time optimized collection routes that collect from only containers that are full.

Option 3.2: Alternative Collection Methods for Multi-Residential Buildings

Use of alternative approaches to collect waste from Multi-residential buildings including approaches to implementing alternative technologies to increase convenience for customers to dispose their waste. Examples include allowing residents to place all source separated waste into one collection location (e.g., bin, chute) using different coloured bags and/or placing waste in a chute that uses a vacuum to transport the waste to a central (possibly off-site) location.

System Component: Collection & Drop-Off

Source of Option: Consultation

City of Toronto Experience:

- Multi-residential buildings in Toronto vary in terms of the method to manage waste. Older buildings tend to have a single chute on each floor that collects garbage with separate collection bins for Blue and Green Bin materials in a common area (e.g., outdoors).
- The Toronto Green Standards has requirements (Tier 1) for Multi-residential buildings that are 4+ floors with 31 or more units or where front-end collection is required including provision of a waste sorting system using a tri-sorter or two chutes with one having a bi-sorter, minimum floor spaces for waste storage, bulky items and other diversion programs. Voluntary requirements (Tier 2) are to provide three separate chutes and provide separated cabinet space for collection of three streams or a dedicated common area for collection and storage of recyclables and organics.

Municipal/Waste Industry Experience:

- Underground vacuum collection is being used around the world in densely populated areas. Waste is set out in accessible inlets either indoors or outdoors. Full inlets are emptied at regular intervals and sucked away to collection station. This technology is best suited for new developments. Redevelopment areas are in consideration but there is not much progress due to cost implications.

Case Studies/Examples:

- Some cities in Europe (e.g., Oslo, Norway, Stockholm, Sweden, Amsterdam, Holland) are using colour coded bags for collection of waste that are optically sorted at a receiving facility. Customers use different coloured bags corresponding to different waste streams which can be collected via a single chute and placed in a single location for storage. The bags are then optically sorted based on the colour of the bag and sent for processing/ disposal. This technology has been in place since 1990.
- Use of vacuum waste collection can eliminate the open storage and management of waste at participating buildings and reduces the number of collection stops and traffic in a given area. Several examples are:
  - Quebec City, Quebec. Vacuum waste collection system in new development (La Cité Verte) for residential and retail waste collection (residual, organic, mixed recyclables). Consists of 63 inlets.
  - Sanya Serenity Coast, China. Collects one waste stream (about 20 tons of waste per day, 1,755 inlets) from hotels, business district, recreational facilities and over 9,300 apartment units.
  - Wembley City, Great Britain. System collects from multi-family buildings, retail, hotel and leisure facilities (85 acres in area). Approximately 252 inlet points collect about 160 tons of source separated waste (four streams) each week.

Option 3.2: Alternative Collection Methods for Multi-Residential Buildings

- The coloured bag system is used in many European jurisdictions to collect multiple waste streams and transport to a processing plant where bags are sorted based on their colour and sent for further processing. This system is well suited for urban areas for both new and redevelopments.

Considerations:

- Reduced collection costs and traffic with fewer vehicles collecting from buildings since all streams are combined (e.g. colour coded bags) or fewer number of collection points (e.g. vacuum waste collection).
- Greater convenience to users as all waste can go into plastic bags and be dropped off in one location (e.g., colour coded bags). This can lead to increased participation in diversion programs.
- Savings in operating and maintenance costs and space at buildings since there is no requirement to collect, store and set out containers for collection (vacuum waste collection example).
- Potential for residents to contaminate the waste streams (e.g., colour coded bags, vacuum waste collection).
- High installation costs and disruption due to construction (vacuum waste collection example).
- Extensive initial and ongoing promotion and education required for new and existing tenants, property managers/superintendents and janitorial staff to reduce contamination.
- Still requires residents to source separate their waste which has been an ongoing challenge for multi-residential buildings (e.g., colour coded bags).
- Bagged recyclables would have to be opened before going through the Material Recovery Facility (MRF) (e.g. colour coded bags).
- Cost of bags to maintain program (e.g. colour coded bags).
- Source-separated waste (i.e., Blue Bin, Green Bin, residual waste).
- Distribution or provision/sale of colour coded bags to residents.
- Promotion and education campaign on how to participate and/or training on the new collection system, targeted to property management staff, janitorial staff and tenants.
- Removal of individual building containers and installation of vacuum waste collection system (central collection facility, inlets, piping).
- Installation of optical sorting equipment at receiving processing plant to sort out different colours of bags.

Potential Outcomes:

- Sorted material streams (in colour coded bags).
- Fewer collection points (vacuum waste collection example).
- Increased convenience for users of the system.
- Additional space available for non-waste related purposes at Multi-residential buildings with reduced collection points.

Option 3.3: Stand Alone Drop-off and Reuse Centres

Establish large scale, stand-alone, one-stop, urban drop-off and reuse opportunities.

System Component: Collection & Drop-off **Source of Option:** City Staff & Consultants

City of Toronto Experience:

- Drop-off opportunities are provided at existing City of Toronto transfer stations for garbage, household hazardous waste (HHW), electronic waste, yard waste, Blue Bin materials, drywall (up to 1 tonne), tires (up to 5) and scrap metal from mostly residential customers, but also some small businesses.
- Additional drop-off opportunities are provided at Environment Days held once per year in each ward.
- Reuse opportunities are provided through a number of retail outlets run by not for profits such as Salvation Army, Habitat for Humanity, Goodwill and others.

Municipal/Waste Industry Experience:

- Several municipalities have established large scale Recycling/Reuse Drop-off Centres that create opportunities for household (and small business) goods to be re-used and recycled rather than disposed. In the GTA alone York Region, Peel Region, Halton Region and the Cities of Toronto and Hamilton have all significantly expanded drop-off services to help divert recyclable and some reusable materials.
- There are about 150 multi-material drop-off depots in operation across Ontario. These are primarily located at landfills and transfer stations and divert over 300,000 tonnes per year of recyclables ranging from heavy materials – e.g. tires and scrap – to hazardous waste such as used oil and lamps to blue bin materials such as cardboard and plastic film.
- In large urban centres, one-stop drop-off centres are designed to: include a full range of depot services plus re-use, re-purpose, swap, expanded recyclables; and, communications/education facilities.

Case Studies/Examples:

- Burnaby BC – The City's Eco –Centre is one stop spot for the 225,000 residents of the city in the Metro Vancouver area and as a central transfer facility for recyclables and green waste collected through the city's curbside programs. The centre accepts a range of 20 different types of recyclable materials including : green waste (yard trimmings) for $65/tonne; materials included under the province's extensive set of EPR programs: all forms of household printed paper and packaging, household and automotive batteries, household paints and pesticides, electronic waste, used motor oil/filters and anti-freeze, propane tanks, large appliances, scrap metal, Styrofoam and used cooking oil: and a range of "voluntary" materials such as good used clothing and books for reuse. The single largest material diverted through the eco centre (by weight) is green waste (5,249 tonnes in 2014). Other significant tonnes diverted include: over 60,000 litres of oil, over 1,000 car batteries, 679 skids of paint, 200 tonnes of both mixed paper and cardboard and 1,000 tonnes of metals.
- The Region of Peel, Ontario operates 3 Community Recycling Centres (CRCs) at Bolton, Caledon and Mississauga. The CRCs accept Blue Box materials, large metal appliances (white goods and fixtures), passenger and light truck tires, select electronics, scrap metal and shredded paper at no charge. Reusable items such as books, building materials, clothing, dimensional lumber, doors and windows, home furnishings, housewares, plumbing fixtures, tools and shop equipment, toys and working small appliances are also accepted at no charge if in good condition. Municipal Hazardous or Special Waste (MHSW) and

Option 3.3: Stand Alone Drop-off and Reuse Centres

- Some charitable organizations in Ontario (e.g. Habitat for Humanity, Goodwill, the Salvation Army, Furniture Bank) are also active (both independently and in collaboration with some municipalities) in providing a range of reuse services (for clothing, furniture, tools, construction materials, etc. –see Option 3.7).
- Some municipalities (see Markham's Neighbourhood Recycling Centres program in Option 3.4) complement larger scale one stop drop-off facilities.

sharps/needles are also accepted. Fees are charged on carpet, clean fill, construction/renovation/demolition waste, drywall, garbage, rubble, scrap wood and shingles. Residential yard waste is accepted at no charge at the Bolton and Caledon CRCs year round, but has a fee at the Mississauga CRC. Some locations feature a reuse store operated by Goodwill.

- The Region of York operates two CECs (Community Environmental Centres) in Vaughan and Richmond Hill. Materials accepted are similar to Region of Peel, with many reuse options for materials where partnerships are established.

Considerations:

- Drop off locations could be neighbourhood based, in public libraries, fire stations, or located on public transit to increase user access.
- Presents diversion opportunities for residents, municipalities and charitable organizations.
- Programs are already well established for diverting some targeted materials. There may be opportunities to expand services and increase diversion.
- Over time, new materials can be added as partnerships are developed.
- Can be used to foster new markets and pilot the management of new waste materials.
- Carpet, textiles and furniture are currently required to meet Ontario commitment to Canadian Council of Ministers of the Environment (CCME) Phase 2 Expended Producer Responsibility (EPR) CAP (Canada Wide Action Plan) by 2017.
- Easy to track the diversion of materials brought to storefront and site.
- Reuse/drop-off programs are in place for many materials; uptake from multi-residential building residents may be lower because of transportation restrictions (e.g. students/senior with more limited access to private vehicles).
- If there is any interest in expanding the range of materials for drop off, the City may need to keep track of materials that are collected from residential sources separate from materials that are dropped off by IC&I sources (e.g. producers in Ontario are not currently obligated to pay fees on corrugate cartons sold into non-residential markets).
- Need to avoid creating overlap with existing curbside services that are already a more convenient option for some materials.
- Risk of taking materials away from charitable organizations. Can mitigate through establishing partnerships to ensure that the new site/sites do not take materials away from charitable organizations (share the collected material, etc.).
- Carry out a study to establish the business case for a new stand alone depot and the advantages vs developing numerous small depots (Option 3.4).
- Establishment/construction of one or more stand-alone, large scale drop off and reuse sites throughout the City in areas not well serviced by drop-off at transfer stations.
- A reuse area or store allows residents to reclaim materials dropped off by others.

Option 3.3: Stand Alone Drop-off and Reuse Centres

Potential Outcomes:

- Greater diversion of materials not captured in the Blue Bin and providing enhanced service to the public.

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations

Develop, implement and operate a network of permanent, small scale neighbourhood waste diversion stations throughout City of Toronto at convenient locations such as multi-residential complexes, subway stations, grocery store parking lots, etc. The concept is to have small scale depots to service a future Toronto which will have more dense housing and be more like a highly urban European city. Typically, recycling centres are often established in coordination with large-scale drop off programs that are more commonly located at landfills and /or transfer stations (Please see the description on this complementary approach as Option 3.3).

System Component: Collection & Drop-off

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Drop-off opportunities are provided at existing City of Toronto transfer stations for garbage, household hazardous waste, electronic waste, yard waste, Blue Bin materials, drywall, tires and scrap metal from mostly residential customers, but also some small businesses. Additional drop-off opportunities are provided at 44 Environment Days held once per year, one for each ward.
- Reuse opportunities are provided through a number of retail outlets run by not for profits such as Salvation Army, Habitat for Humanity, Goodwill and others.

Municipal/Waste Industry Experience:

- This approach is much more developed in Europe, where neighbourhood recycling systems are quite common (either as a complement to or in lieu of curbside collection).
- These systems are prevalent particularly in Northern European countries - e.g. the UK "bring" (where residents bring materials) or civic amenity (CA) sites and in the Netherland and France. Some of these facilities are quite small and are deliberately located in retail spaces and/or community centres in local neighbourhoods to optimize consumer convenience and active regular use.
- Where deposit return programs exist in Canada (e.g. Nova Scotia, Alberta and BC), one stop, multi-material depots are expanding from "deposit-only" drop offs to

Case Studies/Examples:

- Switzerland has bottle banks at every supermarket, with separate slots for clear, green and brown glass, with neighbourhood depots to collect recyclables.
- In France 4,600 drop off sites reportedly divert 12 million tonnes/year (or 185 kg/capita). One depot is sited for every 14,000 residents across France with an average diversion of 2,600 tonnes/site/year.
- Wealden District, UK has over 70 Neighbourhood Recycling Points (NRP), which collect Blue Box recyclables, textiles, shoes, books, CDs, Computer Games and Waste Electrical and Electronic Equipment (WEEE). Overall in the UK, 4,000 drop-off depots divert about 4 million tonnes/year or about 64kg/capita/year.
- In Alberta, depot and retail return programs recycle over 400,000 tonnes/year of materials (e.g. beverage containers, organics, tires, WEEE and organics); this equates to about 100kg/capita/year.
- The city of Markham, ON is currently operating 4 neighbourhood recycling centres that each accept a wide range of materials–i.e. no waste is generated/disposed (thus no ECA (Environmental Compliance Approval) is required).

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations

recover a wider range of both EPR (Extended Producer Responsibility) and non-EPR regulated materials. These depots number in the hundreds in BC and Alberta and many are located in urban centres. The introduction of Printed Paper and Packaging (PPP) legislation in BC in 2014 in particular has helped make even small scale, staffed neighbourhood depots a cornerstone of growing waste diversion programs in that province (with a target of 75% of PPP now established).

Considerations:

- Well-located neighbourhood diversion stations could serve as a convenient way to complement both curbside diversion programs (for single and multi-residential households) and large drop-off stations currently located at Toronto's seven transfer stations.
- Neighbourhood diversion stations support a move away from a car centric model (where appropriate) as Toronto's urban form continues to move towards greater emphasis on public transit.
- Need to minimize overlap with current curbside services which are already a more convenient option.
- Series of collection containers located in the neighbourhood diversion centres for use by residents to divert primarily materials not in the Blue Bin.
- Specially designed and attractive front-end loading bins could be used and collected by the City using front end loading vehicles, which would be taken to a transfer station or Material Recovery Facility (MRF) for consolidation and transfer to recycling markets.
- For the most part, recyclables tend to be high volume materials; material consolidation and shipping requirements will also be need to be examined as part of developing a business case for this option.
- Determine most suitable locations and materials for collection.
- Permitting may be required for the collection of certain materials (e.g. batteries).

Potential Outcomes:

- Greater diversion of materials not captured in the Blue Bin and providing enhanced service to the public.

Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials

A mobile depot service would be located in high traffic/high density areas for a period of time (e.g. a few days to a few weeks) then moved to the next location. The depot would enable users to divert materials that are not generally collected curbside for recycling (e.g. Municipal Hazardous or Special Waste (MHSW), pots/pans and other metals, textiles, batteries, used bikes, used eyeglasses collected for charities, books, kitchenware, etc.) and could also be used as a mobile education centre to help promote other environmental activities, such as water conservation, alternative household cleaners, general waste reduction and reuse, food waste reduction, etc.

System Component: Collection & Drop-off **Source of Option:** City Staff & Consultants

City of Toronto Experience:

- Toronto's Toxic Taxi collects Municipal Hazardous or Special Waste (MHSW) from single-family and Multi-residential households (fluorescent bulbs, cooking oil, sharps, batteries, paint, etc.) via on an online or 311 call service request basis (free of charge).
- Toronto ran a pilot mobile depot program for MSHW and Waste Electrical and Electronic Equipment (WEEE) at 18 Multi-residential buildings for 6 months in 2009, along with an Air Miles bonus rewards incentive (which 72% of participants accepted). Results were much lower than projected – 10 tonnes of MSHW collected (vs 86 tonnes projected), and 22 tonnes of WEEE collected (vs 135 tonnes projected). The pilot concluded that short term events were more cost effective than open ended hours, and call-in appointments was probably better for Multi-residential buildings.
- Toronto held 43 Community Environment Days in 2014, attracting approximately 30,000 people and diverting 562 tonnes of: MHSW; WEEE and non-Blue Bin materials such as art supplies, sporting goods, books and small household items. (18.7kg/participant) at a total cost of $715K or $16K per event. Community Environment Days also provide an outlet for purchase/pickup of backyard composters, Green Bins and kitchen containers and pick up of finished compost.
- Toronto experience is that service is not widely used (33,000 participants in 2014),

Case Studies/Examples:

- PMD Recycling, Vancouver Island holds mobile depot events at 13 community locations once per month for 3 hours on a rolling schedule (each location is open 3 hours on e.g. 3rd Saturday of month. Plastics, paper, car seats and electronics are accepted (no old corrugated cardboard (OCC)). Temporary canopies and bag buddies are set up to collect and sort materials. Volunteers help to run the events with staff. Residents are charged fees to recycle, and 20% of the fees collected are returned to the community. Each event collects 125 to 600 bags of recyclables – sufficient to fill a truck load which is returned to the main depot.
- Pinellas County FL - Mobile collection events for electronics (TVs and computers) and MHSW (paints, pesticides, etc.) are held on Saturdays from 9 a.m. to 2 p.m. at various locations throughout the County, free to Pinellas County citizens. Businesses pay a reduced fee. Haz-to-Go is a service that brings a collection trailer to community groups that request to host their own mini-mobile events for the collection of hazardous electronics and chemicals. Groups such as homeowner or condo associations can use Haz-to-Go to provide a convenient "clean-up day" for their residents. The Haz-to-Go collection trailer is available for scheduling on weekdays for a three-hour period.
- Brussels Belgium - Small hazardous waste and chemical waste such as detergents, paint, varnish, oil and cosmetics can be dropped at collection

but Toxic Taxi provides ultra-convenient service to shut-ins and others not able to get material to Community Environment Days or drop off facilities at transfer stations.

Municipal/Waste Industry Experience:

- This approach is not widely used in North America. The majority of municipalities in other parts of Canada require residents to drop off MHSW or other unique divertible materials at depots or through special collection events.
- Experience elsewhere is that mobile drop-off provides service to areas and residents which are otherwise underserviced.

points or "green spots" (groene plekjes) found in regional container parks. In Brussels, a mobile Green Spot service is also available at fixed hours and locations. The hours and locations of collection points change every month and the complete list can be found on the city website.

- King County, WA. collects MHSW at 3 fixed permanent facilities and through a mobile service. The Wastemobile travels to communities and remains at various sites for two to three days. This provides residents with a place to take their MHSW that is more convenient than the permanent drop-off facility. The Wastemobile is not an actual truck, but a canvas tent with no sides and lanes with cones and signage to direct traffic.

Considerations:

- Offers the opportunity to expand the materials recovered at a drop-off beyond primarily MHSW.
- Could also be used as a mobile education centre to help promote other environmental activities, such as water conservation, alternative household cleaners, general waste reduction and reuse, food waste reduction, etc.
- Good community relations for the City by providing a convenient way for the public to divert materials that would otherwise end up in the landfill.
- Local neighbourhood profile for the City's overall waste diversion outreach efforts.
- Opportunity to communicate other environmental measures to citizens and collaborate with other City divisions.
- Anticipated low recovery rates with potentially high staffing costs (i.e. because of the availability of convenient diversions services already provided by the City).
- Recovery from multi-residential households will continue to present challenges (i.e. based on the lower uptake for the Toxic Taxi service to date for Multi-residential households).
- Event logistics (e.g. where to park truck) can be challenging in buildings with limited or little space for the vehicles to park and operate the service.
- Staffing and material storage.
- Coordination with buildings/communities for staging mobile drop-off events.

Potential Outcomes:

- Additional diversion of materials that could otherwise have been sent to landfill.

Option 3.6: Incentive Based Drop-off System (e.g. reverse vending machines)

Participation in a drop off/donation centre is rewarded either through returning cash or coupons for the company/retailer/association/municipality sponsoring the reverse vending equipment.

System Component: Collection & Drop-off

Source of Option: City Staff & Consultants

City of Toronto Experience:

- There is no experience of reverse vending machines for recyclable materials managed by the City of Toronto Solid Waste Management Services Division at this time.

Municipal/Waste Industry Experience:

- Reverse vending machines (RVMs) have been used in deposit jurisdictions, particularly in the US, with some success for recovery of a few specific materials (mobile phones, drink containers, bulbs and batteries).
- RVMs are quite common in Europe. This is not a widely used approach in North America for encouraging higher diversion of non-deposit recyclable materials.
- RVMs are a significant component of the beverage container recovery system in Quebec (about 2,400 machines). A few (<20) are installed in BC. There are over 16,000 RVMs throughout US deposit states.
- Where the reward (in coupons or cash) is sufficient, RVMs can be successful for specific materials. Ontario does not have deposits on most drink containers – only on beer and LCBO containers. These containers have real value in redeemed deposits and the financial inventive would likely be sufficient to encourage use of this approach at specific locations (see Inputs/Outputs section).
- BRINC (Beverage Recovery in Canada – an affiliate of the Canadian Soft Drinks Association at the time) ran a RVM pilot program in two high –performing recycling Multi-residential buildings in North York to improve the recovery of large PET soft drink containers. The pilot ran for a short period of time and was not deemed promising – recovery rates were

Case Studies/Examples:

- A private recycling company has 1,890 "ATM-like" machines in shopping malls and retailers in the US. The company is a fully automated phone and small electronic device recycler that lets users drop off old mobile phones, then pays for them in cash. (As an example, it will pay $8 to $25 for an iPhone 4S).
- In Norway, plastic bottles can be taken to local supermarkets where they are deposited into RVMs that produce a ticket for the refund amount to use at the cashier. A similar pilot project has recently been launched by the grocery association in France, again targeting household plastics recovery.
- A large Swedish company wanted to increase bulb and battery recycling rates and initiated the development of a reverse vending machine with the private sector. Light Bulb Recycling machines were installed in 3 UK locations. A similar system of 5 machines that accepts all domestic light bulbs (including incandescent bulbs) as well as any domestic batteries was installed in Sharaj, United Arab Emirates in 2012.
- Sydney Australia - High tech RVMs have been installed in Sydney that let citizens deposit recyclable waste like plastic bottles and cans in turn for rewards like bus tickets. The vending machines hold about 2,000 bottles before having to be emptied. The machine offers rewards like two-for-one food truck vouchers, a chance to win tickets to local events or entry to win bus tickets in exchange for the donations of aluminum, PET and glass bottles. Users can also choose to donate ten cents for every container to Clean-Up Australia.

Option 3.6: Incentive Based Drop-off System (e.g. reverse vending machines)

very low and the technology was deemed too expensive. Participants were rewarded with store/product coupons, not cash.	• California's rePLANET Recycling Centers are drop off locations for cans and bottles, some of which have RVMS set up in convenience zones for easy access by the public. Bottles and cans are sorted by consumers, weighed and counted by staff, a receipt is provided and cash is paid at local retailers/grocery stores. • Oregon Beverage Recycling developed the Bottle Drop concept; full-service redemption centers centrally located near several large retailers. OBRC picks up from nearly 3,000 grocery stores then counts, sorts, crushes, bales and recycles millions of containers per day. • RecycleBank (purchased by Waste Management Inc.) is a classic incentive based program where residents were paid in coupons to local stores based on recycling performance. It was implemented in 300 US communities, with mixed success. RecycleBank is not applicable to the curbside Toronto program as high diversion performance is already in place for single-family households.

Considerations:

- Novel approach to recover new, non-deposit materials, as well as for deposit materials with agreement of LCBO, Beer Store and to a lesser extent OES (Ontario Electronics Stewardship) for small electronics, or Stewardship Ontario (SO) for bulbs, batteries, etc.
- Automated systems minimize staffing and labour costs (less labour intensive redemption system).
- Provides direct and immediate incentive to residents who participate (including the opportunity to channel money returned to selected charities).
- RVMs might be considered for Multi-residential buildings but the high cost may be a barrier.
- Requires active participation of interested producers with obligated materials to be collected.
- Significant effort to collect small amounts of material from multiple sites (as many as 500 in a fully developed system).
- Reverse vending technologies tend to be expensive (at least $15-20K depending on the type of machine and material targeted for recycling.
- Significant effort and complexity to establish partnerships with those responsible for collecting some of the targeted materials (e.g. LCBO and beer drink containers, small electronics).
- Investigate RVMs and other incentive opportunities materials such as cell phones, MP 3 players, fluorescent lamps, batteries, etc.
- Carry out pilot program to measure diversion performance for one year

Option 3.6: Incentive Based Drop-off System (e.g. reverse vending machines)

- Potential partnerships and agreements with take back agencies and other organizations responsible for the materials which might be captured.
- Develop partnerships with retailers willing to finance small incentives or coupons.
- Identify sources of funding to finance the incentive approach.
- Develop a business plan to include locations, number of RVMs, costs of incentives, likely diversion achieved.
- Develop a business case to justify the RVM approach and compare to other approaches which would achieve same diversion at lower costs.

Potential Outcomes:

- Higher participation and slightly higher diversion rates for targeted materials.
- Substantial network of RVMs at grocery stores, libraries and other community locations.
- Collection system to recover materials from RVMs.
- Partnerships with retailers and City departments on likely RVM locations.

Option 3.7: Multi-Residential Collection using Alternative Vehicles

The City of Toronto could address current service restrictions to Multi-residential buildings through implementation of a fleet of alternative (i.e. smaller) collection vehicles to access Multi-residential developments with space restrictions.

System Component: Collection & Drop-off **Source of Option:** City Staff

City of Toronto Experience:

- Some older existing and new infill mid-rise Multi-residential cannot be serviced (or are not built as per Solid Waste Multi-residential Development requirements) as the access to collection set out areas and other space restrictions do not permit access for full size front end loading trucks.

Municipal/Waste Industry Experience:

- With single-family diversion relatively mature, municipalities are now focusing on Multi-residential households and addressing barriers to the extent possible through development standards as well as by-laws, or in some cases, unique service arrangements. As urban intensification continues in the City, there are challenges with accessing certain buildings due to narrow laneways, traffic, on-street parking and building design (insufficient space for standard collection vehicles to access waste containers). Requires a need for smaller collection vehicles to be used to access buildings with these unique set of challenges.
- Lack of sufficient access to tight spaces or turning circles in existing developments is a barrier to higher waste diversion. Further research is required in order to determine whether this is a barrier for Toronto and whether it would actually result in increased waste diversion and be a efficient and cost effective alternative.
- Municipalities can address future developments with stringent development

Examples:

- The City of Hamilton investigated purchasing smaller garbage collection vehicles to collect materials on private roadways with shorter turning radii, but concluded that smaller vehicles would increase the City's capital costs and reduce efficiency since the smaller collection vehicles will complete fewer stops before needing to be unloaded[42].
- Meaford Ontario has recently tendered for collection service using smaller vehicles for private and seasonal roads.[43]
- Hertsmere, UK collection contract included one small vehicle to address locations where access was restricted[44]. For Toronto, in addition to Multi-residential buildings, this could also cover narrow streets in the downtown area where commercial service is provided at street level (with residential above).
- Copenhagen, Denmark has a population density of 600 people/km^2 and a population of 500,000 with about 90% living in Multi-residential buildings. Most collection vehicles are standard sizes (2-3 axles) with a few smaller vehicles. Smaller vehicles can access the narrow streets but fill up faster so there is an increase in traffic and number of trips. There are not many suppliers for smaller vehicles in the area so it is challenging to find alternatives.
- New Orleans, LA. City awarded collection of garbage and recyclables to a private service provider[45] who uses specialized waste bins and smaller vehicles to collect

[42] City of Hamilton Staff Report to Public Works Committee, September 6th, 2011 – Agreement for On-Site Collection of Municipal Solid Waste PW11066) – City Wide

[43] http://www.meaford.ca/forms/administrator-information/5159-tender-op-es-2015-03-waste-collection/file.html

[44] http://www5.hertsmere.gov.uk/democracy/Data/Executive/20030416/Agenda/$Item 7 2 - Purchase of Small Refuse Vehicle and Approval of Contract Documents.doc.pdf

45 http://www.nola.com/politics/index.ssf/2014/01/recycling_collection_returns_t.html

Option 3.7: Multi-Residential Collection using Alternative Vehicles

restrictions, although owners can contract privately for collection services and not use city services. • In some older developments existing collection and set out spaces do not provide flexibility and may only be accessed with small vehicles.	waste from the curb in dense neighbourhoods.

Considerations:

- More diversion from Multi-residential buildings as City can now provide service with better access.
- More City service to Multi-residential buildings – better data collection and management from more Multi-residential buildings.
- Research required and performance specifications developed to access narrow streets or back alleys with smaller collection vehicles.
- Accessibility to narrow streets or back alleys with the use of smaller collection vehicles.
- Study of impacts and costs of smaller collection fleet for difficult to service Multi-residential complexes, and potential use of fleet to service narrow downtown streets.
- City establishes small vehicle collection fleet to service specific areas and buildings.

Potential Outcomes:

- Two separate collection fleets – larger and smaller vehicles.
- Access to challenging collection areas (e.g., narrow streets, back alleys).

Option 4.1: Relocation of Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation

Construct and operate a new waste transfer facility at a new site located within the Port Lands area or designate land in the area for development as a transfer station in the future. Depending on the timeframe for redevelopment occurring within the Port Lands, relocation could occur within the short term or land may be designated and held for future use as a transfer station over a longer time period. 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.

System Component: Transfer

Source of Option: City Staff & Consultants

City of Toronto Experience:

- City of Toronto already has extensive experience in the operation of transfer stations. This option is being considered to address the change in land use around the current Commissioners Street Transfer Station and Drop-off Depot and the potential need for relocation.
- City of Toronto currently owns and operates seven transfer stations, geographically spread out across the City.

Municipal/Waste Industry Experience:

- There is an extensive network of municipal and private sector solid waste transfer stations operating throughout Ontario.
- Most large municipalities own/operate transfer stations. The private sector may own and/or operate transfer stations to serve municipalities.

Case Studies/Examples:

- Region of York currently utilizes a combination of their own transfer station and contracts with the private sector.
- Region of Durham utilizes a combination of their own transfer stations and contracts with the private sector.
- City of Hamilton owns and operates their own transfer stations.

Considerations:

- Transfer station can be relocated either in the short to mid term.
- Continuation of existing level of service provided by the City.
- Potential users familiar with location and services available.
- Convenient option for drop off of waste from downtown customer base.
- Transfer station compatible with local land uses and traffic patterns.
- Support and service continuing development growth in the downtown area as new Multi-residential buildings are built.
- New transfer station could incorporate designs for enhanced drop off depot for residents.
- Future development of Port Lands may not be consistent with this form of land use.
- Parcels of land required to develop a new transfer station to accommodate all materials may not exist in the current Port Lands Planning framework.

Option 4.1: Relocation of Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation

- Time required to obtain required permits and approvals (as compared to the other options for Commissioners).
- A new facility would allow access for a full range of divertible and residual management options for curbside collection vehicles and potentially small commercial haulers and residential customers.
- Large number of collection vehicles with wide range of relatively small waste quantities.
- Toronto staff to coordinate with City Planning Department to identify if suitable lands and site exist for a new transfer facility.
- New waste transfer facility will require Environmental Compliance Approval (ECA) from the Ministry of the Environment and Climate Change (MOECC). This application will need to be supported by a Design and Operations Report. Additional technical studies may be required to support the application depending on the site location including a stormwater management plan and traffic assessment. An air/noise assessment and approval from MOECC may also be required depending on the facility design. All technical studies and ECA applications would be prepared by an independent engineering consultant and reviewed by Toronto staff.
- If transfer capacity of the new facility is to exceed 1,000 tonnes per day of waste for final disposal, an Environmental Screening Process under the Environmental Assessment Act will be required. Will require additional technical studies to be completed by independent consultant(s) plus requirement for City staff to lead mandated consultation activities.
- Land use approvals (e.g. Official Plan, Zoning By-law, Site Plan) will be required for new transfer station site. May require additional technical studies beyond those prepared for the ECA. Coordinate with City Planning Department to identify required studies to be completed by independent consultant(s).
- New site within the Port Lands will require full servicing for utilities.

Potential Outcomes:

- Wastes from large number of vehicles and in small quantities are consolidated into a larger long haul tractor trailer for transport to the appropriate receiver/market.
- Environmental Compliance Approval and land use approvals (plus Environmental Assessment Act approval if required) obtained to allow the new transfer station to be constructed and operated.

Option 4.2: Redirecting Waste to an Existing Transfer Station(s)

All waste related traffic currently being received at the Commissioners Street Transfer Station would be redirected to an existing City of Toronto Transfer Station (e.g. Ingram or Bermondsey). Facility design/operation at the receiving facilities may need to be modified or expanded to reflect additional traffic and waste volumes. This may include eliminating some existing services for small waste quantity generators and drop off services, as appropriate.

System Component: Transfer

Source of Option: City Staff & Consultants

City of Toronto Experience:

- City of Toronto currently owns and operates six transfer stations, other than the Commissioners Street facility. These transfer stations are geographically spread out across the City with Bermondsey and Ingram located in the closest proximity to the Port Lands area and Commissioners Street.

Municipal/Waste Industry Experience:

- Extensive network of municipal and private sector solid waste transfer stations operating throughout Ontario. Most large municipalities own/operate or contract operation of transfer stations. Private sector may own and/or operate transfer stations to serve municipalities.

Case Studies/Examples:

- N/A

Considerations:

- Redirecting waste to an existing transfer station(s) may require the facility(ies) to be updated/expanded.
- Continuation of existing level of service.
- Transfer station(s) already exist and are compatible with existing and local land uses and traffic patterns.
- Potential to improve traffic flow and separate commercial traffic from residential/small commercial traffic with modifications to transfer stations which may be accepting more waste.
- All transfer station facility users required to drive greater distances and potentially leading to broader traffic conflicts at the existing receiving facility(ies).
- Reduced convenience for curbside collection vehicles and small generators with potential longer haul distances and travel times requiring additional collection vehicles and staff to maintain curbside service levels.
- Users of transfer station may not be familiar with other facilities requiring a period of adjustment.
- Loss of transfer station capacity near downtown area would not be able to support future development growth.
- No access in the vicinity of the Commissioners Street Transfer Station. All waste related traffic would be redirected to an existing alternate City owned transfer station facility for curbside collection vehicles and potentially all other small waste quantity generators.

Option 4.2: Redirecting Waste to an Existing Transfer Station(s)

- Existing waste transfer facilities already have Environmental Compliance Approval (ECA) in place from the Ministry of the Environment and Climate Change (MOECC). If modifications are required to the facility or to the operations as allowed by the existing ECA, an application to amend the ECA will be required. Dependent on the specific amendments, this application may need to be supported by technical studies, including an updated Design and Operations Report and traffic assessment. All technical studies and ECA applications would be prepared by an independent engineering consultant and reviewed by Toronto staff.
- If transfer capacity of the existing facility is not permitted to exceed 1,000 tonnes per day of waste for final disposal, and it is necessary to exceed this threshold due to the redirected waste volumes, an Environmental Screening Process under the Environmental Assessment Act will be required. Will require additional technical studies to be completed by independent consultant(s) plus requirement for City staff to lead mandated consultation activities.
- Land use approvals (e.g. Site Plan) may be required for the existing transfer station site dependent on the modifications required. May require additional technical studies beyond those prepared for the ECA amendment. Coordinate with City Planning Department to identify approval requirements and any studies to be completed by independent consultant(s).

Potential Outcomes:

- No access in the vicinity of the Commissioners Street Transfer Station. All traffic would be redirected to an existing alternate City owned transfer station facility for curbside collection vehicles and potentially all other small waste quantity generators.
- Environmental Compliance Approval and land use approvals (plus Environmental Assessment Act approval if required) obtained as necessary to allow the existing waste transfer station facilities to accommodate the redirected waste volumes.

Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area

Procure waste transfer station capacity from a private sector facility operator in the vicinity of the Port Lands area (if available).

System Component: Transfer

Source of Option: City Staff & Consultants

City of Toronto Experience:

- City of Toronto already has extensive experience in the operation of seven transfer stations as well as with private contractor waste facility contracts. This option is being considered to address the change in land use around the current Commissioners Street Transfer Station and Drop-off Depot and the potential need for relocation.
- City of Toronto has utilized private waste transfer stations within the City under special circumstances previously.
- City of Toronto contracts with the private sector for other waste services including curbside collection, transfer haul, and Green Lane Landfill operation.

Municipal/Waste Industry Experience:

- Extensive network of private sector transfer stations operating throughout Toronto and Ontario.

Case Studies/Examples:

- Region of York currently utilizes a combination of its own transfer station and contracts with the private sector.
- Region of Durham utilizes a combination of its own transfer stations and contracts with the private sector.

Considerations:

- Continuation of existing level of service.
- Potential users familiar with location and services available.
- Transfer station compatible with existing and local land uses and traffic patterns.
- This option could be done relatively quickly, once the procurement process is complete because no environmental or land use approvals would be required of the City.
- Future development of Port Lands may not be consistent with this ongoing form of land use.
- Reduced convenience for curbside collection vehicles and small generators with potential longer haul distances and travel times requiring additional collection vehicles and staff to maintain curbside service levels.
- Not a City-owned facility – the City would be restricted to their operating conditions and limits.
- Limited number of private facilities in Port Lands area reduces ability to obtain competitive prices for services.
- All waste related traffic currently being received at the Commissioners Street Transfer Station and Drop-off Depot would be redirected to a private sector transfer station facility.
- Existing private sector waste transfer facilities already have Environmental Compliance Approval (ECA) in place from the Ministry of the Environment and Climate Change (MOECC). If modifications are required to the facility or to the operations, the private

Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area

sector operator will be required to obtain the necessary approvals from the MOECC. This would include the preparation of any technical studies.

- The operator of the existing private sector waste transfer facility will be required to confirm that the facility is approved to exceed transfer of 1,000 tonnes per day of waste for final disposal, if necessary, in order to accommodate waste from the City of Toronto. If required, the private sector operator will need to conduct an Environmental Screening Process under the Environmental Assessment Act.
- Land use approvals (e.g. Site Plan) may be required for the existing transfer station site dependent on the need for any modifications. It is the responsibility of the private sector operator to obtain any land use approvals that may be required.

Potential Outcomes:

- Arrangements for management of facility outputs would need to be determined as part of the procurement process.
- All City-related traffic for curbside collection vehicles and all other small waste quantity generators would be redirected to an existing private transfer station facility.
- Private sector facility operator has obtained all required environmental and land use approvals prior to accepting waste from City of Toronto.

Option 5.1: On-Site Organics Processing

This option looks at the different roles the City could provide to encourage the use of on-site small scale aerobic or anaerobic digestion technologies to process organic waste generated at Multi-residential buildings. The resultant compost product can be used by the participating building(s), neighbouring community gardens or in neighbouring areas. The City's role could be to provide guidance on types of organics processing technologies for different building characteristics (e.g., number of units, space available), how to participate in the program and the benefits of managing organics on-site, how to effectively and safely produce compost (e.g., ideal feedstock, monitoring requirements), and how/where finished product can be used. Initially, the City could implement a pilot program at one or more buildings to test out the effectiveness of on-site organic processing technology(ies) and program(s).

System Component: Recycling & Processing

Source of Option: Consultation

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- There are small scale community composting operations (e.g., windrow, compost tea barrel and vermicomposting) in Toronto although not affiliated with the City of Toronto. These facilities manage between 10 to 20 tonnes per year and are affiliated with urban agricultural programs, community gardens and/or community kitchens, schools and universities.
- Municipalities are looking at on-site organics processing to complement existing waste infrastructure. They are interested in looking into options that are sustainable and responsible (e.g., reducing the number of collection trucks on the road which reduces emissions through less frequent pick-up and less travelling to and from a disposal facility).
- Some US jurisdictions have permit by rule processes (a process where if the proponent meets all the requirements or "rules", a permit will be issued without having to apply for and obtain an approval) for small scale operations that process materials that pose a low level of risk from hazardous substances, physical contaminants and human pathogens (e.g., Washington State, Oregon).

Case Studies/Examples:

- City of Coquitlam, BC: Metro Vancouver piloted a fully automated, on-site in-vessel composting system for a 67-unit townhouse complex. The system can process about 20 kg of mixed organics per day. Material composts for 14 days and then cures for four weeks in a separate container.
- Cercle Carré (Montreal), QC: A co-op housing building (60-75 residents) uses two rotating composters to manage their organics. Each unit is designed for 20 to 30 people. Residents get a key to the compost room after they have had a training session. Food waste, soiled paper and yard waste are processed with wood pellets purchased to mix. About 40 kg/week is processed in each unit. It takes 3-4 weeks for a unit to get full and then it is locked and cured for 3-4 weeks.
- The Stop (Toronto, ON): an urban agricultural program that includes gardens, greenhouse and a compost demonstration centre. The compost demonstration centre consists of large composting units and vermicomposting bins which divert organic waste generated from within the building and neighbouring residents and businesses (e.g., local coffee shops), produce compost for the

Option 5.1: On-Site Organics Processing

	greenhouse plants and opportunity to teach others about composting.

Considerations:

- Compost created on-site can be used for other purposes on-site such as landscaping or growing food (depending on the grade of compost produced).
- Technology types can run from simplistic (e.g., wooden boxes) to off-the shelf fully enclosed composters depending on the space available, budget and feedstock.
- Provides learning opportunities for building residents on the quantity of food wasted and how to compost.
- Organic wastes such as leaf and yard waste, soiled paper products, food scraps can be processed in any type of small scale technologies.
- Other materials accepted in the Green Bin program (i.e., fats and oils, meat and dairy products, diapers, sanitary waste, pet waste) may work in certain types of organics processing technologies.
- Shows tangible benefit of source separating organics and diverting this material from landfill and turning it into beneficial material.
- The cost of purchasing an on-site composting system can be very expensive depending on the type of system selected. Maintenance and operating fees will also be ongoing.
- Certain on-site composting systems will require a large amount of space for the unit, potentially a concrete pad and any foundational requirements or hook-ups.
- Potential for contamination of feedstock.
- Ongoing education on how to participate in the program will be required.
- Potential confusion if the program is different than the City's Green Bin program.
- Potential for leachate, odour generation and nuisance issues from pests (e.g., insects, rodents) if unacceptable materials are processed and/or if ongoing maintenance (e.g., turning) does not occur.
- Assurance that the quality of the end product (compost) meets Canadian Council of Minsters of Environment guidelines before use on-site or by residents.
- Research into appropriate technologies and feedstock for urban environments.
- Discussion with Ministry of the Environment and Climate Change (MOECC) on capacity thresholds for approval/permit requirements.
- Decision by City as to what elements of the program would be paid for by the City (if any).
- Educational materials for tenants on how to participate.
- Equipment to provide adequate control over the composting process (dependent on type of technology selected). This could include a temperature gauge, garden shovels or compost aerators, a hand pump to collect leachate.
- Training on the operation, monitoring and maintenance is required for building staff and/or volunteers. Ideally, a dedicated staff person would help to ensure that the process runs effectively.

Potential Outcomes:

- Finished product (compost material) can be used as mulch on landscaped areas, home plants, and/or in community/residential gardens.
- Unprocessed organic waste would either be reintroduced into the compost process, placed in the Green Bin or in the garbage stream.

Option 5.2: In-Sink Disposal Units

Explore the use of in-sink disposal units in the City in place of source separated collection for the diversion of food scraps that are accepted in the Green Bin program, particularly for Multi-residential buildings. This would include an option to amend the current by-law to allow use in areas of the City that have combined sewers.

System Component: Recycling & Processing

Source of Option: Consultation

City of Toronto Experience:

- Toronto Municipal Code - Sewers, Chapter 681-10, E. states that the use of in-sink disposal units are prohibited from use for domestic purposes in areas of the City served by combined sewers (a single pipe that collects both sewage and surface water runoff).

Municipal/Waste Industry Experience:

- Use of in-sink disposal units varies by jurisdiction; some jurisdictions allow their use, others do not[49,50]. They are banned in some Canadian cities and strongly discouraged in others due to perceived concerns with clogging of the pipes and having negative impact on the sewer systems.

Case Studies/Examples:

- Ongoing debates within Metro Vancouver where there is a large population of residents living in Multi-residential buildings[46]. Metro Vancouver estimates that $2 million is spent on cleaning out fats, oils and grease from the wastewater treatment systems each year. The estimated cost per tonne to process organic waste at sewage treatment plants is $1,800 compared to $70 per tonne for source-separated organics. Metro Vancouver is looking into a by-law to require Multi-residential buildings to have a source-separated organics collection program instead of focusing on the banning of in-sink disposal units.
- New York City banned in-sink disposal units in the 1970s in areas served by combined sewer systems to reduce the direct discharge of raw organic waste into water bodies during wet weather and to prevent deterioration of the City's sewer system. After a 21-month pilot program to study the effects of allowing the units to be used in combined sewer areas, the ban was lifted in 1997 since the pilot program showed that the impacts would be manageable. This issue continues to be monitored by the Department of Environmental Protection[47].
- Chartered Institution of Water and Environmental Management (CIWEM) UK[48]. A Policy Position Statement on the

[46] http://www.cbc.ca/news/canada/british-columbia/garburators-cost-metro-vancouver-2m-a-year-in-clogged-up-sewers-1.3128519
[47] http://www.nyc.gov/html/dep/html/residents/grinders.shtml
[48] http://www.ciwem.org/policy-and-international/policy-position-statements/food-waste-disposers.aspx
[49] http://sustain.ubc.ca/sites/sustain.ubc.ca/files/Zero%20Waste%20-%20Alison%20McKenzie%20-%20Garburators%20vs%20%20Composting.pdf
[50] http://watercanada.net/2013/everything-but-the-kitchen-sink/

Option 5.2: In-Sink Disposal Units

	use of food waste disposers was issued in February 2011. CIWEM concluded that the evidence demonstrates that food waste disposers are effective tools for source-separating food waste and diverting to treatment, use and recycling through existing infrastructure. The cost savings are comparable to other routes, there is an opportunity for increased participation and the food waste and other organic residuals should be treated and used on land to conserve soil organic matter and complete nutrient cycles.

Considerations:

- Convenient method to dispose of food waste and divert from disposal.
- Reduced collection and storage requirements since large portion of Green Bin materials would be diverted through the in-sink disposal units.
- Avoidance of vermin attraction and odour generation with storing food waste.
- Potential for generation of additional quantities of biogas.
- Will add more volume to the existing wastewater treatment plants.
- Increased costs for the wastewater treatment plants to manage the increase in organic materials.
- Clogging can result due to grease, bones, soiled paper products building up inside pipes which may result in an increase in service calls for residents.
- Increased use of potable water to push food waste through building and municipal pipes to the wastewater treatment plants.
- Capital cost to install the units.
- Coordination with Toronto Water to assess impact of increased organic materials on the City's wastewater treatment plants.
- Revision of City Municipal Code to lift ban in areas where combined sewers exist.
- Education and promotion of use of in-sink disposal units to reduce confusion about use of Green Bin or in-sink disposal units.
- Determine if Green Bins should still be used at Multi-residential buildings that install in-sink disposal units to collect non-food scrap materials that are accepted in the Green Bin program.

Potential Outcomes:

- Increased convenience and potentially diversion of food scraps from disposal, depending on the ultimate use of biosolids generated from wastewater treatment plants.
- Increased quantity of organic material to be handled at the City's wastewater treatment plant.
- Increased convenience to residents living in Multi-residential buildings.

Option 5.3: Future Blue Bin Processing Capacity

The City's future Blue Bin processing requirements could change dramatically with potential changes in extended producer responsibility and through consideration of other processing options such as mixed waste processing facilities.

System Component: Recycling & Processing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City owns a Material Recovery Facility (MRF) (now decommissioned). The City has now contracted for private sector processing capacity for all Blue Bin materials.
- The City has contracts with the private sector for Blue Bin processing capacity for up to 120,000 tonnes per year until 2021. With current agreements in place new contract will need to be established in 2022 at the latest.

Municipal/Waste Industry Experience:

- Most municipally owned MRFs are operated by the private sector.
- Many municipalities also contract out Material Recovery Facility (MRF) processing to the private sector.

Case Studies/Examples:

- York and Peel Region, City of Hamilton are examples of municipalities with single and dual stream recycling programs who own their own MRF but contract operation of the facility to the private sector.
- The City of Winnipeg and the City of Calgary both utilize privately owned and operated MRFs.

Considerations:

- The new Waste Reduction & Resource Recovery Act (WRRRA) may change what Blue Bin recycling materials are collected and who is responsible for processing those materials.
- In the future, the City may manage only select streams of Blue Bin recycling materials.
- The City's current contract with Canada Fibres Ltd. may require amendments before the end of the contract pending the new WRRRA.
- Implementation of various waste reduction, recycling and recovery strategies and technologies may impact the tonnes of Blue Bin materials requiring processing.
- Although the timing of the new Waste Reduction & Resource Recovery Act is still unknown, it is anticipated that an announcement could be made in Fall 2015/Winter 2016.
- BC's recycling regulation was amended in 2011 for Extended Producer Responsibility (EPR) of packaging and printed paper. MMBC (Multi-material BC) spent 2 years developing a Packaging and Printed Paper Stewardship Plan which was approved by the BC Ministry of Environment in April 2013. In May 2014, the amendments came into effect and MMBC's collection system started operation. Assuming a similar timeline, a new program could be in place in Ontario as early as 2019.
- Potentially, a new EPR program could be in place before the City's recycling contracts expire. The transition of existing programs /contracts will be important so as to not erode the integrity of the current waste management system.

Option 5.4: Future Green Bin Processing Capacity

The City's future Green Bin processing requirements could change dramatically with potential changes in extended producer responsibility and through consideration of other processing options such as Mechanical Biological Treatment facilities.

System Component: Recycling & Processing **Source of Option:** City Staff & Consultants

City of Toronto Experience:

- The City owns two organics processing facilities that use anaerobic digestion (AD) to process Green Bin organic materials. The facility at Disco Road Transfer Station began operation in 2014. The facility at Dufferin Waste Management Facility has been decommissioned and is being expanded. The contract is currently being awarded for Design, Build, Operate (DBO).
- The City utilizes the private sector to process the remaining tonnes for which they have no capacity. With current agreements in place new contracts will need to be established in 2020.
- A renewable energy approval (REA) process was initiated for a combined heat and power (CHP) biogas utilization facility at the Disco Road Organics Processing Facility.

Municipal/Waste Industry Experience:

- Many municipalities own organics processing facilities. The majority are operated by the private sector.
- Many facilities have been designed with excess capacity to be large enough to process future tonnes of organics as population increases. This excess capacity is being sold to other consumers.

Case Studies/Examples:

- The Cities of Hamilton and Guelph process organics from other municipalities.
- The Regions of York and Durham do not own any organics processing facilities and utilize private sector processing capacity.
- The City of Surrey[51], BC is constructing an Anaerobic Digestion (AD) facility to process residential and commercial organics which will help the City achieve its goal of 70% waste diversion and reduce its carbon footprint through a switch to compressed natural gas (CNG) trucks for waste collection. The 80,000 tpy facility is expected to be operational in 2017 and is anticipated to produce more fuel than is required for the waste collection vehicles, allowing the remainder to be sold to other customers.

Considerations:

- The province of Ontario is considering an organics diversion strategy as part of its Waste Reduction Strategy[52]. Organics could become a designated waste which would change how these materials are handled and by whom.
- The City may consider alternate processing technologies such as MBT which would provide additional processing capacities.
- Should new technologies to capture more organic waste be implemented, additional processing capacity may be required.

[51] https://www.fcm.ca/Documents/presentations/2012/webinars/PCP_City_of_Surrey_Approach_to_a_Fully_Integrated_Organic_Waste_Management_System_EN.pdf

[52] http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2013/011-9262.pdf

Option 5.4: Future Green Bin Processing Capacity

- In the future, the City may consider technologies that produce biofuel that could replace fossil fuels.
- Even with both City facilities operational, the City will still need additional processing capacity.

Option 5.5: Future Materials Recycling and Other Reuse Related Processing

The City may require a facility to sort and transfer materials which could be recycled or reused.

System Component: Recycling & Processing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City collects material for recycling/transfer at a Durable Goods Facility in the Port Lands.
- The City collects materials such as mattresses, white goods, metal items, plastic furniture, ceramics (e.g. toilets) and stores them until quantities warrant shipping to processors. Currently, items such as furniture and carpet are not recycled.

Municipal/Waste Industry Experience:

- Many municipalities collect similar materials but do not undertake any processing themselves.
- Similar to the City, most municipalities store sorted materials until there are sufficient quantities to ship to processors.

Case Studies/Examples:

- N/A

Considerations:

- The City's current processing facility is located in the Port Lands area which is expected to be part of the redevelopment area. Such a facility is unlikely to be compatible with the planned future land use.
- The City utilizes the weigh scales at Commissioners Street Transfer Station to weigh materials before delivering them to the Durable Goods Processing Facility. Should the Commissioners Street Transfer Station be relocated, these scales would not be available for a period of time depending on which future option is recommended.
- Planning for a new facility or way to manage the waste could coincide with the plan for Commissioners Street Transfer Station.
- The Strategy may identify partnership opportunities in which case the City may not need to develop their own facility(ies).

Option 6.1: Mixed Waste Processing

Mixed Waste Processing is the use of mechanical based processing equipment to recover recyclable material from a mixed or unsorted waste stream.

System Component: Waste Recovery Technologies

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- The City of Toronto has previously studied this option through the Mixed Waste Processing Study, including an RFP process. Target 70 included consideration of a full scale mixed waste processing facility. The Study identified a mechanical biological technology (MBT) facility as the preferred option. The City chose to not move forward with such a facility as diversion in Multi-residential buildings was expected to increase which would have reduced quantities of the primary feedstock for an MBT facility and the uncertainty about an end use for finished compost.

Municipal/Waste Industry Experience:

- Mixed waste processing facilities can be found throughout Europe (and a few in North America) with applications similar to what could be considered for Toronto, especially with respect to Multi-residential waste. These facilities are particularly suited to waste streams that are heavily contaminated (i.e. Multi-residential waste).

Case Studies/Examples:

- Edmonton, AB – The City only collects two streams curbside; recycling and garbage. The organic fraction of garbage is separated at the City's mixed waste facility and co-composted with biosolids. The residual waste is processed into Refuse Derived Fuel (RDF). The City processes approximately 220,000 tonnes per year (tpy) of residential municipal solid waste (MSW) and 30,000 tpy commercial waste (2012)[53].
- Montgomery, AL. – This facility is the newest mixed waste processing plant in the Eastern US, becoming operational in 2015[54]. Facility can process 300 tpd of Mixed MSW, 100 tonnes per day (tpd) of Single Stream recyclables with an annual capacity of 185,000 tpy or 30 tonnes per hour (tph). Organic fraction composted in outdoor windrows and used as landfill cover due to level of contamination. Reported 60% overall waste stream recovery including recovery of contaminated organic stream for use as alternative daily cover. Facility competes with low tipping fees at landfill. The next phase of this facility will be to install a dry anaerobic digestion system to process the organic fraction and produce CNG and compost.
- Sun Valley, CA. – An 80,000 ft^2 facility was opened in 2014 designed to process more than 330,000 tpy of mixed waste (1,500 tpd)[55]. The facility is a state-of-the art facility costing approximately $50 million (US).
- Ventspils, Latvia – Facility processes 30,000 tpy of MSW using an organics extrusion press and organic polishing system resulting in 40% of MSW recovered as cleaned organic fraction. The facility was operational in 2013.

[53] http://www.cpans.org/assets/Uploads/Presentations/NewFolder/Session-35Jim-Schubert.pdf
[54] HDR, site visit
[55] http://www.bulkhandlingsystems.com/athens-services-opens-state-art-mixed-waste-mrf/

Option 6.1: Mixed Waste Processing

Considerations:

- Can process contaminated Blue Bin material, primarily from the Multi-residential sector, and recover additional materials from the waste stream.
- City could continue to provide Blue Bin collection service and recover additional recyclables from the garbage stream.
- Can be coupled with a variety of technologies to generate outputs such as RDF, biogas and compost/digestate. RDF and biogas can be used to generate energy.
- Tonnage of material requiring processing may encourage development of such a facility by the private sector with whom the City could contract for processing services.
- Technology is flexible to changes in waste quantities and composition.
- Reduces material going to disposal and therefore increases landfill life.
- Fewer recyclable materials can be recovered due to contamination with garbage.
- A City-owned facility would require significant capital expenditures.
- If coupled with a technology to process remaining waste, compost produced may be low-grade and not likely to meet Class A requirements for unrestricted use compost. Requires an end-market or end use for compost.
- The primary inputs are typically a mixed waste stream, but can be also a heavily contaminated Blue Bin recycling stream.

Potential Outcomes:

- Primary outputs include recovered plastics, metals and residual waste. A by-product of mixed waste processing (similar to MBT) can also include an RDF type material that can be further processed by a thermal technology.

Option 6.2: Mechanical Biological Treatment (MBT)

MBT Is a combination of mechanical materials recovery and either mixed waste composting or anaerobic digestion (AD) as a subset technology.

System Component: Waste Recovery Technologies

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- This option was recommended as part of the Mixed Waste Processing Study which identified MBT combined with aerobic composting or AD at Green Lane as the only option to satisfy all initial screening requirements. However, an MBT Facility to recover resources from mixed residential waste was not constructed, due to a number of factors described below that have yet to be resolved:
  - The primary feedstock for any potential MBT is Multi-residential waste; primarily because diversion is poor in this sector and the waste stream contains higher amounts of organic and recyclable material. In 2011, the Multi-residential diversion rate for buildings managed by the City was 20%. If a Multi-residential diversion rate of 65% or 70% could have been achieved through various diversion initiatives, then the MBT Facility would be redundant and inefficient.
  - An important consideration and criteria in proceeding with MBT was that it would qualify as diversion as defined by the Ministry of Environment and Climate Change. Due to the variability of the mixed waste feedstock and the quality of the materials produced from MBT processing, the finished compost is of poorer quality than, for example, compost made from yard waste or Green Bin organics, and would be classified as Class B compost. Class B compost was recently approved by the Ministry of the Environment and

Case Studies/Examples:

- An in-vessel, mechanical, rotating drum technology (also referred to as "rotary digesters") is used at the Edmonton Composting Facility in Edmonton, Alberta which is an example of a commercially available MBT technology that processes residential waste.
- Southwark, U.K. – An 87,000 tpy MBT facility produces refuse derived fuel which is sent to an energy recovery facility. Part of an integrated waste management facility featuring a Material Recovery Facility (MRF), public reuse and recycling centre and education and visitor centre. The facility became operational in 2012[56].

[56] http://veolia.co.uk/southwark/integrated-waste-management-facility/integrated-waste-management-facility/facility

Option 6.2: Mechanical Biological Treatment (MBT)

Climate Change but can only be land applied for restricted beneficial use. The viability of MBT is subject to being able to find beneficial use markets for the Class B compost. Without markets, the compost produced would have to be landfilled.

Municipal/Waste Industry Experience:

- This technology has been used in Europe, including Germany, the United Kingdom, Spain and Italy. There has not been widespread commercial application of this technology on mixed municipal solid waste streams in North America. The majority of the applications for this technology are in the agricultural and meat processing industries.

Considerations:

- Produces a variety of materials, including those that can be used for energy.
- Flexible to changes in waste quantities and composition.
- Can be coupled with a variety of technologies to generate outputs such as RDF, biogas and compost/digestate. RDF and biogas can be used to generate energy.
- Will still require landfill disposal for some portion of the remaining waste stream.
- Compost produced may be low-grade and not likely to meet Class A requirements for unrestricted use compost.
- Requires an end-market or end use for compost.
- Primary feedstocks - municipal solid waste (typically fully mixed waste stream).
- Secondary feedstocks – may include segregated IC&I wastes, organic materials, and/or RDF (refuse derived fuel) dependent upon the specific MBT approach.

Potential Outcomes:

- Recovered recyclables, RDF or compost or biogas fuel for electricity, heat energy, biostabilized output to landfill.

Option 6.3: Direct Combustion

Direct combustion or incineration of wastes coupled with energy and materials recovery derived from heating water to create steam and/or electricity.

System Component: Waste Recovery Technologies

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- The City of Toronto has operated a number of municipal waste incinerators in the past including the Symes Road incinerator, Don River incinerator, Wellington Destructor and Commissioners Street incinerator.

Municipal/Waste Industry Experience:

- Direct combustion facilities are used world-wide. There are over 500 operating facilities in Europe, over 80 operating facilities in the United States, 6 operating facilities in Canada, and a number in Asia.
- Large-scale commercial end uses for ash have not occurred in North America.

Case Studies/Examples:

- Brampton, ON: Private facility processes ~150,000 tpy of waste, sells steam to a neighbouring paper company and electricity. This facility recently amended its Environmental Compliance Approval (ECA) to increase its service area to include all of Ontario.
- Metro Vancouver Waste to Energy Facility, Burnaby, BC: processes ~280,000 tpy of waste, generates steam which is sold to nearby paper mills and electricity which is sold to BC Hydro.
- Durham/York Energy Centre, Durham, ON: Currently being commissioned, has capacity for processing 140,000 tpy of post-diversion residual waste (i.e. the solid waste remaining after reuse, reduction and recycling (including composting) initiatives).

Considerations:

- Technology widely used world-wide, significant operating experience.
- This technology is the most demonstrated and commercially viable of all the waste recovery technologies.
- Mass burn minimizes the handling and processing of waste (little preprocessing required beyond removal of large bulky items such as furniture and white goods).
- Can remove additional materials (e.g. ferrous metals).
- Can generate energy - electricity or heat.
- Reduces weight and volume of waste.
- Ash residue can be used as daily cover and for other landfill uses.
- Facility can be designed for zero discharge of water.
- Approval will be required under the Environmental Assessment Act. The approval requirements will vary depending on if energy is recovered as part of the waste combustion. The approvals are streamlined compared to a full individual EA. Depending on the potential effects identified; an Individual EA could still be required.
- Still requires landfill disposal of bottom ash.
- Requires disposal of fly ash in a hazardous waste landfill.
- May be public opposition to siting facilities due to concerns around, health, traffic, odours, etc.
- Public perception that diversion programs become less important due to requirements to supply specific tonnages through “put or pay” contracts.

Option 6.3: Direct Combustion

- Materials processed as primary feedstock include a wide range of non-hazardous materials typically accepted in the municipal solid waste stream. Other feedstock can include biosolids and Refuse Derived Fuel (RDF)
- Make-up water (for cooling) and chemicals (for emissions treatment) are also required.

Potential Outcomes:

- Electricity and or heat energy, recovered metals.

Option 6.4: Emerging Technologies

There are many new and emerging technologies which could be utilized to process the City's waste and either produce additional materials (e.g. syngas, chemical by-products) or can recover other products (e.g. metals). Many of these technologies do not currently process waste at a commercial scale, but could be considered for the future.

System Component: Waste Recovery Technologies

Source of Option: Consultation, City Staff & Consultants

Gasification:	• Carbonaceous feedstock material (such as wood waste) is converted into a gas under the application of heat (593 – 982ºC) and sub-stoichiometric or no oxygen. Following a cleaning process, this gas, called syngas, can be used as a fuel to generate electricity directly in a combustion turbine, or fired in a heat recovery steam generator to create steam that can be used to generate electricity via a turbine. • Gasification has been used successfully for select feedstock (e.g. woody biomass). There has been mixed success using municipal solid waste, with several operating facilities in Japan and some planned pilot/demonstration facilities in North America. • Examples: United Kingdom, United States (Montgomery, NY), Europe (Germany). • Inputs: either RDF (refuse derived fuel) or a subset of select, pre-processed solid waste materials such as wood waste, tires, carpet, and/or scrap plastic. • Outputs: Solid residue (ash, metals, other reject material), syngas, chemical by-products
Plasma Arc Gasification	• Plasma arc gasification uses electrical energy and extremely high temperatures (3,000 to 8,000°C) to break down the organic portion of the waste into its elemental compounds and produce a syngas (synthesis gas which is used to synthesize other chemicals e.g. methanol or ammonia). • To-date it has been applied to process municipal solid waste at a demonstration scale. • Examples: United Kingdom (Teesside), North America (FL), Asia (Thailand, China, Japan, India). • Inputs: either RDF or a subset of select, pre-processed solid waste materials such as wood waste, tires, carpet, and/or scrap plastic • Outputs: Vitrified slag, syngas, and chemical by-products.
Hydrolysis	• Hydrolysis is a chemical reaction in which water reacts with another substance to form new substances and extracts cellulose from solid waste to form products or sugar which is then fermented into ethanol. • Used at a number of facilities to process biosolids and organic materials (including food scraps). • Examples: Dundalk, ON, Banff, AB. • Inputs: Select organic solid wastes, biosolids.

Option 6.4: Emerging Technologies

	• Outputs: Fuel-grade ethanol.
Pyrolysis	• Pyrolysis involves heating (400 – 450°C) solid waste in an oxygen-free environment to produce a combustible gaseous or liquid product and a carbon char residue. • There have been some commercial-scale pyrolysis facilities in operation in Europe on select waste streams. Pyrolysis systems have had some success with more homogenous and higher energy content wastes, such as coal tar, tires, plastics and woody waste feedstocks. Several attempts to commercialize large-scale pyrolysis systems using municipal solid waste in the U.S. in the 1980s failed, but there are several pilot projects at various stages of development. • Torrefaction is a closely related process that happens at lower temperatures (250 – 400°C) and produces a biochar. • Examples: Europe (Germany), Charlotte, NC. • Inputs: mixed municipal solid waste or RDF. • Outputs: Syngas, oil, char/carbon black, chemical by-products.
Thermal and Catalytic Depolymerisation	• In catalytic or thermal depolymerization, the plastics, synthetic-fibre components and water in the municipal solid waste feedstock react with a catalyst under non-atmospheric pressure and temperatures to produce a crude oil. This crude oil can then be distilled to produce a synthetic gasoline or fuel-grade diesel. • There are no large-scale commercial facilities using depolymerization technology with mixed solid wastes or municipal solid waste as feedstock. There are some facilities in Europe and one in Mexico that utilize this or a similar process to convert waste plastics, waste oils, and other select feedstocks. • Examples: Europe, Mexico, United States (Missouri). • Inputs: High plastics content waste stream or waste oils, catalyst, hydraulic fluid. • Outputs: Solid Residue (ash), diesel fuel, metals.

Considerations:

- Produce a variety of outputs.
- Some technologies can produce a fuel to replace fossil fuels.
- Extend landfill lifespan due to reduction in materials requiring disposal.
- It is anticipated that any facility would require additional permitting and approval; including in some cases, approval under the Environmental Assessment Act.
- Limited experience with processing Municipal Solid Waste (MSW).
- Typically require a homogeneous feedstock.
- May only process a portion of the waste stream.
- Few to no commercial scale facilities processing MSW.

Option 6.5: Organics Recycling Biocell or Biomodule

Involves using engineered systems to create and maintain favorable conditions inside a lined cell for rapid biodegradation of the organic portion of the waste stream. Following sufficient biodegradation, a compost by-product is created and removed from the lined cell for further processing/curing as required. The cell is then used again.

System Component: Waste Recovery Technologies

Source of Option: City Staff & Consultants

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- These technologies have been used at a number of facilities with both mixed waste and also mixtures of source separated organic waste with and without wastewater treatment plant biosolids.
- There are no full scale continuous operation facilities currently in use. However, a number of feasibility studies and pilot scale design and operations have been conducted. These programs have indicated positive economic benefits with a relatively low initial investment and the ability to expand the systems to incorporate additional organic waste and reuse the processed materials for a variety of secondary use applications.

Case Studies/Examples:

- Biocell Pilot - Calgary, AB[57,58]. The City of Calgary developed a biocell pilot at their existing landfill in 2005 to measure landfill gas production and the potential to reclaim airspace following the processing. The processing includes an anaerobic digestion stage followed by an aerobic composting stage within the biocell itself. The biocell was constructed in 1 ha of an existing landfill and is designed to process over 50,000 tonnes of commercial and residential Mixed Solid Waste over a 6 year period. The biocell is comprised of geomembrane liner materials, a leachate recirculation system, and a gas collection/air injection system. The system continues to operate.
- Biocell/Biomodule Pilot – Leon County, FL[59]. Leon County Florida developed a biocell pilot within their existing operating landfill in 2012 that processed a mixture of source separated organic food and agriculture waste, yard waste, wastewater treatment biosolids. The biocell was equipped with leachate recirculation and biogas capture which utilized the existing landfill gas control system (to pull the gas from the biocell) and leachate collection infrastructure (to seed the biocell with anaerobic bacteria). Once the majority of the gas was generated (in approximately 3 months), the material in the cell was excavated and composted at the landfill, and the cell was recharged with a fresh mix of material and capped for another round of anaerobic digestion.

[57] http://www.esaa.org/wp-content/uploads/2015/06/10-Davies.pdf
[58] City of Calgary
[59] HDR Engineering

Option 6.5: Organics Recycling Biocell or Biomodule

- Biocell Pilot – Coimbatore, India[60]. In 2011, the City of Coimbatore utilized a section of a newly lined landfill and dedicated it to organic waste processing. Organic waste was placed in the dedicated area over a 2 month period and covered during and after the surcharging period to develop anaerobic conditions from which biogas was collected. The processing period was approximately 4 months. Processed materials were moved to a dedicated windrow composting pad adjacent to the landfill for reuse.

Considerations:

- Biodegradation of organic waste within contained area allowing easier management of leachate and gas.
- Creates an alternative process at the landfill that utilizes waste materials without disposal and utilizes the landfill infrastructure and area for waste processing.
- Creates resource outputs in the form of gas for energy and compost. Recyclables may also be recovered.
- Land can be recovered for future use.
- Requires a separate area and individual cells (outside the active working face) within the landfill to manage mixed waste and/or organics for biocell processing.
- More costly to construct and operate than conventional landfill.
- Concerns around odours and leachate management.
- Has not been proven at a full commercial scale.
- Can process mixed solid waste, organics and biosolids mixture, or mixed organic waste.

Potential Outcomes:

- Landfill gas fuel for electricity, heat energy, recyclables recovery and compost.

[60] HDR Engineering

Option 6.6: Refuse Derived Fuel

Refused derived fuel (RDF) involves processing solid waste into a refined, homogenous solid fuel that can then be used by a thermal process to produce energy, or alternatively as a soil amendment in some applications. These technologies can either produce a RDF fluff, pellet or briquette

System Component: Waste Recovery Technologies

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- There are a number of commercial-ready technologies that convert the waste stream into a stabilized RDF fluff, pellet or briquette that can be fired in an existing solid fuel boiler or cement kiln.
- Proven technology used in a number of plants in the US, Europe and Asia.
- RDF is typically used as a fuel in cement kilns, Energy from Waste (EFW) facilities, boilers, power stations, and combined heat/power facilities.

Case Studies/Examples:

- RDF Facility, Vaughan, ON: In 2008, an RDF facility commenced operations, processing municipal solid waste, primarily from York Region, and creating fuel pellets. At the time, it was one of the first of such plants in North America. The plant experienced operational and material market issues and recently closed in 2014.
- A number of cement companies in Ontario have conducted research on the use of alternative fuels, including shredded plastic bags, plastic materials, paper fibre and woody materials removed from compost generated from residential source separated organics programs for their cement kiln. The purpose of the research is to demonstrate compliance with Ministry of Environment and Climate Change (MOECC) emissions limits.

Considerations:

- Municipal Solid Waste (MSW) can be sorted at the plant; a recycling line can separate out recyclables.
- Most post-recycling MSW can be processed with limited presorting.
- RDF can be used in a variety of facilities using different technologies.
- RDF plants can be quite complex in order to produce a fuel with a consistent size, moisture and ash content.
- Full scale commercial facilities exist in the U.S. so it is a demonstrated technology.
- Front-end processing can be challenging; MSW is very abrasive resulting in wear and tear on equipment and high maintenance costs, repairs and frequent cleaning.
- Processing costs may limit ability of end product to be sold at a competitive price.
- In Ontario, currently the MOECC views RDF from MSW as a waste. If it is combusted/incinerated, then the receiving facility must have gone through an EA approval to burn/use the RDF.
- Will have some air emissions directly from the processing as well as from the boiler. Odours could be an issue from the boiler.
- Can process municipal solid waste as a primary feedstock and select, pre-processed solid waste materials such as wood waste, tires, carpet, and/or scrap plastic as secondary feedstocks.

Option 6.6: Refuse Derived Fuel

Potential Outcomes:

- RDF (fluff, pellet or briquette), solid residue, recyclables, wastewater (potentially).

Option 6.7: Waste to Liquid Fuel Technologies

Generation of liquid fuels from biomass and organic wastes using technologies such as hydrolysis, pyrolysis, gasification etc.

System Component: Waste Recovery Technologies

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- The component systems that comprise this technology, such as those used for feedstock preparation, gasification, and Fischer-Tropsch or methanol synthesis, are viable on a commercial scale. However, until recently, the combination of these individual technologies in a single system using mixed waste streams as a feedstock has not been demonstrated commercially.

Case Studies/Examples:

- Edmonton, AB: A Technology provider has established a public private partnership with the City of Edmonton and Alberta Innovates (Energy and Environment Solutions). The waste to biofuels facility will convert approximately 180,000 tpy of residual waste into 100,000 tpy of Refuse Derived Fuel (RDF) into 38 million litres of biofuel. RDF is converted into syngas and then later to methanol.
- Varennes, QC – Several technology developers have announced plans to develop a project at a corn ethanol plant. The plant will use IC&I and construction and demolition (C&D) waste.
- United States (Florida, Virginia, Iowa, Mississippi).

Considerations:

- Syngas can be used as a liquid fuel or to generate energy.
- Can process biomass wood wastes, construction and demolition wood waste, municipal solid waste, IC&I waste.
- Limited experience with commercial scale facilities utilizing municipal solid waste as a feedstock.

Potential Outcomes:

- Liquid bio-fuels, other organic alcohols, char, waste water, solid residue, carbon dioxide.

Option 7.1: Landfill Expansion

Consider the possibility of expanding the Green Lane Landfill (GLL) in the event that residual waste capacity is required. An Individual Environmental Assessment (EA) will be required if a potential expansion might be contemplated as a viable option.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The Green Lane Landfill has not been expanded since the City purchased it in 2007. The previous owner of the landfill completed two separate Environmental Assessments for expansions to the site.
- The City has previously undertaken Environmental Assessments (EA) for landfill expansion (e.g. Beare Road).

Municipal/Waste Industry Experience:

- Several landfills in Ontario have been been approved for expansions
- According to O. Reg. 101/07 Waste Management Projects under the Environmental Assessment Act, expansion of an existing landfill with approved capacity greater than 100,000 m3 requires that an Individual Environmental Assessment be prepared.
- This applies to both municipal and private sector landfill sites.

Case Studies/Examples (reference www.ontario.ca):

- Some of the recent landfills that have gone through the individual EA process to expand include:
  - *Clean Harbors, Lambton Landfill Expansion (Approved)* To provide an additional disposal capacity of 4.5 – 5.0 Mm^3 to the existing landfill and extend its projected lifespan by approximately 25 years.
  - *Waste Management, Ottawa Waste Management Facility (Approved).* To expand the landfill by 38 hectares for a disposal capacity of 6.5 Mm^3 and disposal rate of 400,000 tonnes per year.
  - *Brighton Landfill, County of Northumberland (Approved)* to provide additional disposal capacity to allow the County to continue to operate the landfill through the year 2023. Expansion of approximately 500,000 m^3 of disposal capacity.
  - *Waste Management, Twin Creeks Landfill (formerly known as Warwick landfill) (Approved)* To dispose of 750,000 tonnes per year of residential and IC&I waste generated in Ontario for a period of approximately 25 years. Landfill expansion is on lands owned by the proponent adjacent to the existing landfill site.
  - *Humberstone Landfill, Niagara Region (Proposed - submitted in June 2015).* Applied to provide additional disposal capacity for solid non-hazardous waste for the southern part of the Niagara Region in order to meet residual waste disposal needs of south Niagara for a period of approximately 25 years or more.

Option 7.1: Landfill Expansion

Considerations:

- Individual EA process considers a broad range of alternatives and incorporates extensive consultation with the public and Aboriginal communities.
- The existing monitoring programs can be expanded to include the new disposal areas.
- The City's investment in the associated infrastructure of the existing landfill is retained and optimized.
- Perception of social inequity by those residents who live in an area near the landfill within an expectation that it would close when the approved capacity was reached.
- Removal of green vegetated areas.
- Potential relocation of surface water drains and stormwater management pond associated with a potential horizontal expansion.
- Uncertainty regarding length of time required to obtain Terms of Reference (ToR) and EA approvals.
- Preparation of ToR as first stage of EA process. Would include consultation with the public, Aboriginal communities and government agencies to define the project, identify what will be assessed in the EA and describe the assessment process.
- ToR would require approval by the MOECC (Ministry of Environment and Climate Change) following consultation and review by all interested stakeholders.
- Official plan and zoning by-law amendments may be required.
- EA process typically less complicated compared to that required for greenfield site.

Potential Outcomes:

- Approved Terms of Reference which outlines the alternatives to be assessed in an EA to provide residual waste disposal capacity, focused on expansion of the Green Lane Landfill.
- Approved EA which assesses the range of alternatives identified in the ToR and through consultation, and recommends the preferred alternative for providing residual waste disposal capacity.
- Consultation and feedback from the public, Aboriginal communities and government agencies incorporated into the ToR and EA.

Option 7.2: Landfill Mining and Reclamation

Landfill mining is a process where solid wastes, which have previously been landfilled, are excavated, processed (to recover soil and potential recyclables) and/or relocated. This is becoming more prevalent in landfills where incinerator ash has been buried from older incinerators due to the high metals content that can be captured and recycled. This is now also being considered as a means to reclaim valuable property as many of these sites are located in urban areas where cities have grown over time around closed sites.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- In Ontario there are limited examples of landfills which have implemented this option and generally at smaller sites. Main focus of landfill mining has been to remediate impacts to groundwater, and then gain airspace, and/or to avoid having to acquire new land for additional disposal capacity.
- More recently in the United States, landfill mining is becoming commonly used for ash landfills to recover metals.

Case Studies/Examples:

- Barrie Landfill, ON (approved)[61]. Approximately 60% of the landfill was reclaimed to extend the life of the landfill by 18 years. The waste excavation volume was estimated to be around 380,000 m3. The project began in 2008 and is estimated to be completed by the end of 2015. The landfill is being re-engineered to install a liner for the long-term protection of groundwater and surface water. Mined waste is screened to separate fines from garbage by using a trommel to screen the waste from the fine material which is used as daily/interim cover. Samples were collected and analyzed based on the Ministry of Environment and Climate Change (MOECC) Soil, Ground Water and Sediment Standards (Table 3 for generic site conditions standards). Some materials (e.g., tires, metals, concrete) have been removed and re-used or recycled.
- Escambia County, FL: Perdido Landfill Mining – Phase 1 – 2008 - 2011. The County hired a subcontractor to perform a 15 acre mining operation in an unlined and closed landfill adjacent to an operating lined landfill. Mining was used to expand lined limits, material recovery, soil reuse, and address groundwater impacts. Currently in construction for a 15 acre lined cell and preparing to begin Phase 2 mining within the next two years.

[61] http://www.barrie.ca/Living/GarbageAndRecycling/Pages/LandfillProject.aspx

Option 7.2: Landfill Mining and Reclamation

	The reclaimed soil, which constituted more than 50% of the excavated material, was used as daily/intermediate cover and as construction fill (outside the landfill). • Bay County, FL – Steelfield Road Landfill Mining – 2013 – Ongoing. Ongoing mining project in which the County has a permit to mine an unlined landfill as needed to recover soils for their adjacent lined landfill operations. Mining used to recycle operations soils for the County's landfill, to recycle higher BTU waste for the County's WTE facility, and to address groundwater impacts. Currently mining 1 acre at a time in an ongoing operation. Once the 20 acres are fully mined the area is intended for the next lined landfill expansion area.

Considerations:

- Provides additional airspace capacity.
- Extends the operational site life.
- Recovers recyclable materials such as metals and plastics.
- Reclaimed soil can be used on site as daily cover material on other landfill cells.
- Opportunity to remediate any potential impacts on groundwater caused by existing landfill unlined cells, if required.
- Reclaimed land has potential value for sale or repurposing as passive or active recreational areas.
- Uncertainty regarding actual volume of disposal capacity that can be recovered.
- Costs associated with excavating and handling the waste.
- Potential odour issues during waste screening and sorting.
- Reclamation activities shorten the useful life of equipment, such as excavators, trommels and loaders, because of the heterogenenous nature of the materials, including large metal or concrete pieces.
- Potential release of landfill gases during waste excavations, dependent on age of waste.
- Depending on the landfill site layout, it can compromise the integrity of adjacent waste cells.
- Low quality/value recyclables recovered.
- Require equipment to excavate and process waste.
- If the purpose of landfill mining is to develop additional landfill disposal capacity, Environmental Assessment Act approval (with supporting technical studies) as well as a potential suite of other provincial approvals will be required. This includes approval of a Terms of Reference and Environmental Assessment, based on consultation with the public, Aboriginal communities and government agencies.

Potential Outcomes:

- Additional landfill capacity available following approval of Terms of Reference and EA.

Option 7.2: Landfill Mining and Reclamation

- Recyclable materials recovered and sent for processing.
- Reclaimed soil that can be used as cover material.

Option 7.3: Bioreactor Landfill

A properly designed and constructed bioreactor landfill is intended to work to degrade organic waste at a faster rate than a traditional landfill operation. The increase in waste degradation and stabilization is accomplished through the addition of liquid (typically recirculation of leachate) and air to enhance microbial processes. The purpose of this process is to enhance the production of landfill gas for collection and energy production, plus potentially recover materials and/or disposal capacity within the landfill cells where waste has degraded and stabilized.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- There are limited examples of successful bioreactor landfill operations in Ontario (Ottawa, Sault Ste. Marie). Most of the experience has been on a relatively small scale and/or associated more with overall leachate management than landfill gas generation and disposal capacity recovery. Ministry of the Environment and Climate Change has also expressed some concerns with this approach related to potential nuisance effects.
- Bioreactor landfills and specifically leachate recirculation as part of an overall leachate management strategy is a more common practice in the United States.
- At the Trail Road Landfill in Nepean[64], leachate was recirculated in a small area for a short period of time and the following observations were noted:
  - increase in odour emissions, which necessitated the installation of an active gas-recovery system; and
  - recovery of approximately 30% of disposal capacity due to enhanced settlement of the waste as a result of leachate recirculation.

Case Studies/Examples:

- Lafleche Landfill, Moose Creek, ON[62]. Leachate recirculation is predicted to accelerate the decomposition of waste by as much as 15 to 20 years and enhance the production of methane to power at least 1,000 homes for more than 50 years.
- Seneca Meadows Landfill, Waterloo, New York. Leachate is recirculated under favourable weather conditions to reduce leachate on-site treatment quantities, accelerate settlement and gain additional landfill capacity at operational cells. The landfill receives over 2 million tons of waste per year.
- Mill Seat Landfill, Monroe County, New York[63]. Leachate recirculation in three hydraulic separated double composite-lined cells which are part of Stage I, which has an area of 38 ha and a total waste depth of up to 34 m.

Considerations:

- Accelerated waste stabilization.

[62] http://www.solidwastemag.com/features/bioreactor/

[63] http://www.epa.gov/projectxl/yolo/895oper5.pdf

[64] http://www1.toronto.ca/city_of_toronto/solid_waste_management_services/divisional_profile/green_lane_landfill/files/pdf/0721-102-APPM.pdf

Option 7.3: Bioreactor Landfill

- Recovery of landfill space as waste decomposes potentially increasing the landfill site life.
- Significant increase in landfill gas generation in the short term that when captured, can be used for energy recovery projects.
- Leachate recirculation reduces leachate management costs in the short term.
- Reduced post-closure care since it is expected to involve less monitoring over the duration of the post-closure period than conventional landfills.
- Potential physical instability of waste mass due to increased moisture and density, if moisture addition is not properly managed.
- Potential impact on liner systems due to build up of leachate.
- Potential for surface seeps of leachate, if moisture addition is not properly managed.
- Green Lane Landfill does not currently have the ability to sell electricity and therefore the advantage of additional gas generation is limited.
- Different types of bioreactor configurations:
    - **Aerobic:** leachate is recirculated into the landfill in a controlled manner. Air is injected into the waste mass, using vertical or horizontal wells, to promote aerobic activity and accelerate waste stabilization.
    - **Anaerobic**: moisture is added to the waste mass in the form of recirculated leachate and other sources to obtain optimal moisture levels.

Potential Outcomes:

- A potential to gain, in a relatively short period of time, increased landfill space due to an increase in waste decomposition and settlement.

Option 7.4: Landfill Operation Continuous Improvement and Best Practices

Continue to review current and future best practices for landfill operations to identify those which could be implemented in the future.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff

City of Toronto Experience:

- The City of Toronto regularly reviews its landfill operations in an effort to ensure that the operations, including the requirements it places on its contractors are at a minimum industry standard.

Municipal/Waste Industry Experience:

- The landfill operation business is constantly changing with new technologies designed to allow the opportunity for continuous improvement and maximize airspace usage.

Case Studies/Examples:

- N/A

Considerations:

- Ability to implement new technologies or practices.
- Contractual flexibility.
- Applicability to site specific considerations at Green Lane Landfill.

Option 7.5: Adjust Tipping Fees or Customer Base

Adjust tipping fees to either encourage or discourage acceptance of waste from paid private customers and/or adjust types of customers permitted to use City of Toronto waste facilities (e.g., transfer stations, Green Lane Landfill). Encouraging additional waste from paid private customers will increase revenue generated and discouraging will extend the life of the landfill.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Toronto charges a fee per tonne to private customers who want to use their waste transfer stations and Green Lane Landfill.
- Tipping fees for residual waste are approved annually by City Council.
- The quantity of paid private waste received at Green Lane Landfill has been decreasing recently which results in less revenue generated by the City and higher net operating costs[65].
- The tipping fee charged by Toronto at its transfer stations and Green Lane is currently $106.09 per tonne (2015). This is considerably higher than the tipping fee charged by private sector landfill operators located in southwestern Ontario and in Michigan and New York.
- In the past, Toronto utilized disposal capacity in Michigan partly due to the lower tipping fees.

Municipal/Waste Industry Experience:

- The private sector sets landfill tipping fees to attract and retain customers within a competitive business environment. In Ontario, the competitive landfill tipping fee is linked to the tipping fee for commercial and industrial waste disposal in Michigan and New York states.
- Most municipal landfill sites in Ontario have increased their landfill fee tipping fees over the past several years to

Case Studies/Examples:

- A number of large private landfills with excess disposal capacity are situated within close proximity of the Ontario border in Michigan and New York. These landfills offer relatively lower tipping fees in order to attract greater waste quantities for optimizing revenues. Consequently, over 3 million tonnes of commercial and industrial waste generated in Ontario is disposed in Michigan each year and almost one million tonnes of commercial and industrial waste generated in Ontario is disposed in New York State each year (2014).
- Essex-Windsor Solid Waste Authority annually raised their landfill tipping fees to the point that the fee reached $104.77 in 2011. The Authority however identified that the funding model for the landfill was no longer sustainable at this rate due to the lost revenue from paid private clients. In 2011 a business review of the landfill operations and financing strategy was completed to identify an alternative approach to cost recovery. As a result, the landfill tipping fee was reduced to $59 per tonne in 2015 and can be gradually reduced to as low as $30 per tonne for incremental increases in waste tonnage to be disposed.
- Metro Vancouver revised their tipping fee structure in April 2015[66] to more accurately reflect the true costs of managing waste from different customers. Small residential drop-offs require more time and staff to process waste compared to large loads but

[65] http://www.toronto.ca/legdocs/mmis/2015/bu/bgrd/backgroundfile-74775.pdf

[66] http://www.metrovancouver.org/services/solid-waste/bylaws-regulations/tipping-fee/Pages/default.aspx

Option 7.5: Adjust Tipping Fees or Customer Base

discourage commercial and industrial waste and preserve landfill capacity for residential waste. • Fees must also balance local and surrounding market prices and be set at a rate to avoid increased illegal dumping.	were paying the same tipping fee. As a result the tipping fee for small loads up to one tonne increased from $109/tonne to $130/tonne up to a maximum load fee of $109. Tipping fees for large loads exceeding nine tonnes decreased from $109/tonne to $80/tonne. Minimum charges and peak hour charges were also instituted to encourage off-peak deliveries and to encourage customers to deliver larger loads less frequently. A transaction fee of $5 is now applied to all loads to contribute to fixed costs such as weigh scales, staffing, maintenance etc.

Considerations:

- Changes to number of customers at landfill and/or transfer stations.
- Depending on whether tipping fees are increased or decreased, potential for changes to:
  - revenue;
  - number of customers;
  - landfill life;
  - capital/operating/maintenance expenditures; and,
  - traffic.
- City to determine the preferred strategy for Green Lane Landfill utilization ranging from preserving long term disposal capacity by increasing tipping fees or lowering tipping fees to attract additional commercial and industrial waste tonnes.
- Annual review of financial data to determine changes to tipping fees (potentially increase or decrease fees) at Green Lane and transfer stations.
- Approval from City Council to adjust tipping fees.
- Assessment of market capacity to attract the desired quantity of waste if tipping fee is lowered.

Potential Outcomes:

- Change in revenue depending on whether tipping fees are increased or decreased.

Option 7.6: Purchase a New Landfill

This option looks at the possibility of purchasing another licensed landfill site in Ontario when there is a need for additional residual waste disposal capacity or to preserve the life of the Green Lane Landfill.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City acquired the Green Lane Landfill in response to the closure of the Michigan border in 2010 to the receipt of municipal solid waste.

Municipal/Waste Industry Experience:

- The City of Sault Ste. Marie acquired their municipal landfill from Cherokee Construction.
- Private companies have acquired existing landfill sites to expand their environmental services.

Case Studies/Examples:

- Terrapure Stoney Creek Landfill (previously Newalta/Taro Landfill)[67]. The 59 ha non-hazardous industrial waste landfill site was sold in late 2014 to Toronto-based Revolution Acquisitions LP.
- Capital Environmental Resource Inc. (CERI) in Burlington, ON acquired Omni Waste in Osceola County, Florida[68]. This 2,200 acre facility, which serves Osceola County and the greater Orlando area (population of over 2 million), has a permitted capacity of 18 million m3.
- Laflèche Environmental Inc. Eastern Ontario Waste Handling Facility, Moose Creek, ON[69]. Transforce Inc. acquired the Lafleche facility in a series of transactions and concluded the complete acquisition in 2010. The complex includes a landfill, and environmental services such as recycling, composting, soil treatment, and waste water treatment, all aimed at diverting waste from landfill, and is developing a project to convert methane gas into electricity.
- Maine, US[70] acquired Carpenter Ridge from Lincoln Pulp and Paper which had 1.4 Mm3 of landfill capacity and Juniper Ridge from Georgia Pacific and applied for vertical and lateral expansions which increased the landfill capacity by 14.8 Mm^3.

Considerations:

[67] http://www.solidwastemag.com/recycling/newalta-sells-waste-recycling-assets-toronto-firm-300m/1003278326/
[68] http://www.prnewswire.com/news-releases/capital-environmental-resource-inc-completes-purchase-of-municipal-solid-waste-landfill-site-under-development-in-osceola-county-florida-55553042.html
[69] http://www.transforcecompany.com/media-center/press-releases/2010/transforce-inc-acquires-100-lafleche-environmental-complex
[70] http://maine.gov/decd/meocd/landfills/index.shtml

Option 7.6: Purchase a New Landfill

- City controls and retains the waste disposal revenue (tipping fees).
- Approvals to increase the landfill capacity within approved landfill area may be less time consuming.
- Secure long term landfill capacity with financial certainty.
- Haulage costs depending upon location.
- Capital and operational costs associated with developing the site in accordance with current landfill regulations, financing and post-closure care costs.
- There is uncertainty around the availability of potential sites within Ontario of sufficient capacity to meet the City's long term needs.
- Identification of a cost-effective site based on ownership, remaining capacity, hauling distance, environmental and social concerns, etc.

Potential Outcomes:

- Long term residual waste disposal capacity for the City of Toronto.

Option 7.7: Divert Waste to a Third-Party Owned Disposal Facility

This option looks at acquiring/securing landfill airspace from private/municipal landfill sites in order to preserve landfill capacity at the City's Green Lane Landfill or diverting waste to other disposal facilities (e.g. Energy from Waste) as a long-term solution to residual management.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Prior to purchasing the Green Lane Landfill, the City had a Long-term agreement to ship residual waste to a landfill in Michigan State.
- In 2011, the City entered into contracts with 3 different private sector landfills for the provision of contingency final disposal capacity in Ontario in the event the City of Toronto cannot dispose of its waste at its own landfill or the City wishes to re-direct limited quantities of waste.

Municipal/Waste Industry Experience:

- Not all municipalities have their own disposal facilities; it is common for municipalities to send their waste to other landfills or to Energy from Waste (EFW) facilities.
- Landfill facilities exist in Ontario and the United States with capacity to process the City's waste.
- EFW facilities exist in Ontario and the United States (US) with capacity to process the City's waste.
- Prior to December 2010, the majority of GTA residential waste was being disposed of in landfills in the US (e.g. Michigan State, New York State). Subsequently, the Ontario government reached an agreement with Michigan which effectively eliminated this practice.

Case Studies/Examples:

- Municipalities throughout Ontario utilize private sector landfill and/or resource recovery alternatives to manage their residual waste.
- Landfills and EFW facilities are utilized in both Ontario and outside Ontario, including in the United States.

Considerations:

- Savings in landfill development, operations, closure and post-closure care.
- Secure access to required disposal capacity over the time period of the contract.
- Cost certainty for long term disposal of waste.
- Limited number of landfill facilities, both public and private, with enough airspace to secure the City's long-term waste disposal requirements.
- Increased risk with disposal facilities located in US (border crossings, currency fluctuation, Superfund liability, etc.).

Option 7.7: Divert Waste to a Third-Party Owned Disposal Facility

- Procurement process to receive qualified bids from potential vendors that are able to provide secure disposal capacity over the timeframe required by Toronto.
- Set up disposal service agreements with selected licensed landfill site(s) or EFW facilities.
- Arrange for hauling of residual waste from transfer stations to landfill site(s) or EFW facilities.

Potential Outcomes:

- Minimized liabilities associated with owning and operating a landfill site.
- Cost competitive disposal price.

Option 7.8: Greenfield Landfill

This option considers the possibility of identifying a suitable site, and obtaining approval, for a new greenfield landfill site (i.e. a site not previously used for waste disposal) in Ontario to meet the City of Toronto's long term requirements for residual waste disposal capacity.

System Component: Residual Waste Disposal Capacity

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- Toronto has conducted a number of greenfield landfill site searches dating back to the late 1980s. This includes the Solid Waste Interim Search Committee (SWISC), Solid Waste Environmental Assessment Process (SWEAP), Interim Waste Authority (IWA), Adams Mine Site Assessment Process (AMSAP), and Toronto Integrated Solid Waste Resource Management (TIRM). None of these processes resulted in a new greenfield landfill for the City.
- Toronto's most recent greenfield landfill was the Keele Valley site. The site was a former quarry purchased by the City in the 1970s which opened in 1983 and closed December 31, 2002.

Municipal/Waste Industry Experience:

- Generally very limited successful municipal and waste industry experience in Ontario and across Canada with developing greenfield landfill sites over the past 15 – 20 years. Preferred approach has been to seek approval to expand existing landfill facilities.
- Large Ontario municipalities including Regions of Peel, Durham and York have adopted a policy that no new landfill developments will be supported within the municipality.

Case Studies/Examples (reference www.ontario.ca):

- There is one private sector greenfield landfill in Ontario awaiting approval of an Environmental Assessment Terms of Reference in order to proceed.

Considerations:

- Approval of a new greenfield landfill site must first be completed within the context of an Environmental Assessment (EA). This requires that a reasonable range of alternatives (i.e. alternative site locations) be identified and assessed as part of the EA. Toronto will first need to consider their approach to identifying alternative sites which may include conducting a site selection process, requesting site owners to bring forward potential sites for consideration (i.e. willing host), or some other process.

Option 7.8: Greenfield Landfill

- Greenfield landfill site selection processes have been very controversial and typically disruptive to the local community. Extensive consultation with stakeholders potentially affected will be required but may not be sufficient to address the concerns or issues identified.
- Approval under the Environmental Assessment Act is required. First stage includes preparation of Terms of Reference (ToR) based on consultation with the public, Aboriginal communities and government agencies. ToR requires approval by the Minister of the Environment and Climate Change.
- Proceed with preparation of the EA following ToR approval. Will require a wide range of extensive technical studies to be completed by independent consultants to assess potential effects on the environment.
- Submit EA for review by all interested stakeholders and approval by the Minister of the Environment and Climate Change.
- Environmental Compliance Approval (ECA), Official Plan and Zoning by-law approvals will be required.
- Will require additional detailed technical studies beyond those prepared for the EA. to be completed by independent consultants.
- All technical studies and ECA applications would be prepared by an independent engineering consultant and reviewed by Toronto staff.

Potential Outcomes:

- New Landfill site with appropriate approvals in place of to satisfy long term residual disposal needs.

Option 8.1: Fully Independent Utility with No Rebate Program

This option involves elimination of the Solid Waste Rebate currently provided to customers which is funded through the tax base. The rebate supports the City's priority to achieve long term sustainability of the Waste Strategy and to move towards a full user pay system that is funded through volume based user fees. SWMS (Solid Waste Management Services) does not have control over how long this revenue stream will be available. This option would involve transition to a implementing a sustainable rate model This change would allow the City's solid waste department to become a separate utility that is fully self-financed through flat or variable fees charged to its customer base.

System Component: System Financing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- SWMS implemented a user fee program in 2008, with all costs for waste management being applied to a new joint water and solid waste utility bill.
- The program is financed through fees charged to customers (single-family, Multi-residential buildings, residential units above commercial (RUAC), Yellow Bag program for commercial locations, and tipping fees), as well as other revenue sources.
- The 2015 residential rebate ($224/ single-family and $185/Multi-residential household) is paid from property taxes and offsets the charge of the user fee. Fees charged to customers are shown at full actual rates with the rebate deducted.
- The City of Toronto arrangement of moving funds from the property taxes to the utility and rebating residential customers is unique. This arrangement was necessary when the utility was established for a number of reasons.

Municipal/Waste Industry Experience:

- Most municipalities pay for waste management through property taxes (with service limits such as bag limits), partially through property taxes combined with user fees, or through fully financed utilities.
- A number of other municipalities charge all waste management costs through a variable fee based on the volume of garbage disposed, and do not pay a solid waste rebate.

Case Studies/Examples:

- Vancouver, BC has financed solid waste through utility fees for a number of years. Prior to 2006, all services were charged through one flat fee. In 2006, the fee structure was changed to charge separate fees for recycling and yard waste. Metro Vancouver now charges volume-based annual rates to customer's property taxes for garbage and green waste collection.
- Edmonton, AB moved over time from a solid waste management system funded partly from property taxes and partly through utility fees, to a system which is now fully financed through utility fees only.
- Seattle, WA has financed solid waste services through a separate utility, fully financed through fees since 1989.

Option 8.1: Fully Independent Utility with No Rebate Program

Considerations:

- Garbage rates charged to residential utility customers reflect the true cost of managing garbage across the City.
- Provides an opportunity to reinforce the importance of waste diversion and encourage customers with larger bins to divert more waste and subscribe to a smaller bin size.
- Supports the City's priority to achieve long term financial sustainability of the Waste Strategy.
- Removing the rebate program will increase the cost to existing residential customers without a perceived increase in service or a reduction in property taxes.
- If several customers downgrade their bin sizes, it will reduce revenues from user fees without a corresponding decrease in operating costs.
- This option may be unpopular and result in multi-residential customers switching to private sector collection.
- Require mandatory diversion by-laws to ensure a level playing field.
- A transition strategy needs to be developed to phase out the rebate program over a few years.
- A public communication strategy will be important as the rebate is transitioned.
- The sustainable rate model will indicate that some customers are not currently paying the true costs for service, and rates can be adjusted to reflect true costs.
- No impact on the Solid Waste Management Services rates and operating budget.
- True costs are fully transparent.
- Reclamation activities shorten the useful life of equipment, such as excavators, trommels and loaders, because of the heterogeneous nature of the materials, including large metal or concrete pieces.
- Potential release of landfill gases during waste excavations, dependent on age of waste.
- Depending on the landfill site layout, it can compromise the integrity of adjacent waste cells.
- Low quality/value recyclables recovered.
- Equipment to excavate and process waste.
- If the purpose of landfill mining is to develop additional landfill disposal capacity, Environmental Assessment Act approval (with supporting technical studies) as well as a potential suite of other provincial approvals will be required. This includes approval of a Terms of Reference and Environmental Assessment, based on consultation with the public, Aboriginal communities and government agencies.

Potential Outcomes:

- Will result in a net increase in the rate for single-family residential utility customers which will be shown on the utility bill.

Option 8.2: Public-Private Partnerships ("P3") for Major Capital Works

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 would enter 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 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.

System Component: System Financing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- N/A

Municipal/Waste Industry Experience:

- Several P3s have been delivered in the waste sector globally.
- Within Canada, there are well-established P3 models, practices and template procurement documents for capital projects in the waste sector.
- P3s are typically only contemplated for capital projects with costs greater than $100 million.

Case Studies/Examples:

There have been several capital projects in the waste sector under P3 models in Canada, including:

- Peel Region, ON (Energy from Waste (EFW) Facility) currently in the planning stages will be a Design-Build-Operate-Maintain facility contract.
- Durham-York Energy Centre, ON (EFW Facility) currently in the commission stage is a Design-Build-Operate-Maintain facility contract.
- Surrey, BC, currently in the Design stage is a Design, Build, Finance, Operate, Maintain contract to develop the Surrey Organics Biofuels Facility.
- Vancouver, BC, P3 partnership with an independent power producer to process landfill gas at its cogeneration facility.

Considerations:

- Potential to apply for funding (up to 33% of eligible capital costs) through the P3 Canada Fund.
- Single tender for construction, operations and maintenance and major capital rehabilitation.
- Greater degree of certainty regarding the private sector meeting the construction schedule due to the discipline that comes with private financing and lender due diligence.
- Can provide greater construction cost certainty and long-term budget certainty related to operating and maintaining the asset.
- Integration of roles (design, build, finance, operate, maintain) has the potential to drive innovative solutions.
- A transfer of risk to the private sector over the life of the asset anchored with private sector capital at risk.
- Financing costs or the cost of capital under this model typically exceed that of the public sector, which can borrow capital at lower rates than the private sector.
- The complexity of a P3 model is likely to require additional resources from the public sector when compared to traditional delivery during the procurement phase and lead to increased planning procurement costs.

Option 8.2: Public-Private Partnerships ("P3") for Major Capital Works

- Develop a P3 business case for the project to qualitatively and quantitatively assess a range of infrastructure project delivery models to ultimately select the optimal delivery model that provides demonstrable public benefit and value for money for tax payers. A P3 business case would inform the City's decision on whether to proceed with a P3 delivery model and would describe an implementation plan for delivery of the project under the chosen delivery model.
- Market sounding exercise to gauge market appetite for the project, acceptability, potential challenges, and preferred deal structure, including optimal risk transfer.

Potential Outcomes:

- Business case demonstrating the delivery model that delivers the best value for money to the City and taxpayers for developing the project (can be traditional or P3 delivery).
- Development of procurement documents (e.g., Project Agreement, Request for Qualifications, Request for Proposals).
- Fixed price contract with the private sector consortium for term of the contract (e.g., construction period plus approx. 30 year operating period).

Option 8.3: Debt Financing

This option involves the City raising capital by borrowing to finance capital investments.

System Component: System Financing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- This is the City of Toronto's current method to finance capital expenditures.
- Under the City of Toronto Act 2006 (COTA), the City may issue long-term debt only for capital purposes and cannot borrow for operations.
- The City's debt is structured for terms of 10-30 years. The City has not issued debt for a term greater than 30 years. Going forward, the City will only issue debt for a period of greater than 20 years on an exception basis.
- The City is committed to achieving the lowest cost of funds when financing capital requirements, based upon current capital market conditions. When making decisions regarding the financing of a capital expenditure through the issuance of debt, Council must be satisfied that the lowest cost alternative is utilized from a total cost of funds perspective.
- The City finances SWMS investments by borrowing debt, however the principle and interest is serviced through the SWMS operating budget rather than the City's tax base. As a result, it is categorized as "recoverable debt" and does not impact the City's debt service ratio (or borrowing restrictions).

Municipal/Waste Industry Experience:

- This is a very common form of financing for municipalities, although Canadian municipalities borrow relatively little compared to municipalities in other countries such as the United States[72].

Case Studies/Examples:

- The City of Barrie borrowed $75 million to fund the completion of its surface water treatment plant in 2011, which will be repaid over 40 years.
- A number of cities in the United States have borrowed to finance EFW facilities[71].
- The Greater Moncton Wastewater Commission recently announced that it intends on financing federally mandated upgrades to its facility and process (approximately $65 million) through debt financing. Debt service amounts must be fully recovered through utility rate charges.

Considerations:

- If the borrowing is used to pay for a new asset, it provides an opportunity to pay for the cost of services as the benefits flow over the life of the infrastructure, rather than the majority of costs borne by today's taxpayers.

[71] Waste-to-Energy Facilities Provide Significant Economic Benefits, The Solid Waste Association of North America, http://swana.org/portals/Press_Releases/Economic_Benefits_WTE_WP.pdf.

[72] http://www.conferenceboard.ca/economics/hot_eco_topics/default/12-08-30/canada_s_cities_struggling_financially_but_still_solvent.aspx

Option 8.3: Debt Financing

- Takes advantage of low interest rates.
- Debt can provide the City with more affordable financing by matching the repayment term to the economic useful life of the project, instead of funding the entire cost from current revenues.
- Debt financing will increase annual operating costs due to interest and other debt charges and will likely need to be offset by an increase in operating revenues.
- It is a policy decision for the City to increase their outstanding debt. SWMS must ensure that there is sufficient operating funding to make debt service payments/repay the debt (i.e., recover debt service payments from the rate base).

Potential Outcomes:

- Additional funding for the Toronto solid waste utility.
- Increased debt obligations under the SWMS operating plan.

Option 8.4: Increase Solid Waste Management Services (SWMS) Customer Base

Increasing the City's SWMS customer base in the Multi-residential/condo 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 Blue Bin and Green Bin set-outs as a condition of receiving City collection service.

System Component: System Financing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Almost all single-family households are serviced by the City.
- Multi-residential buildings must fully participate in the City's diversion programs to receive City waste collection; those buildings opting for private waste collection are not eligible for any of the City's waste diversion programs.
- Multi-residential customers (categorized as having 9 or more units) have the option to opt out of City services and therefore are sensitive to price changes.
- In 2010, the Multi-residential User Fee Structure switched from a bin equivalent rate to a linear cubic yard charge. Each building is charged a base rate, plus an excess fee for compacted or un-compacted garbage and receives solid waste rebate based on the number of units. Garbage fees include pickup for recyclables, yard waste, organics, bulky items, waste electronics and household hazardous waste in addition to garbage collection.
- In 2014, residents living in single-family homes had a diversion rate of 66% and those living in multi-unit residential buildings achieved a rate of 26%[73]. The diversion rate of the IC&I and Multi-residential sectors not serviced by the City is not known.

Municipal/Waste Industry Experience:

- Other jurisdictions provide services to Multi-residential/condo buildings and IC&I locations on a fee for service basis.

Case Studies/Examples:

- Greensboro, NC – Provides waste collection services to commercial and multi-family developments that have dumpsters. There is a charge for this collection service that is competitive with the private sector[74]. The City takes a proactive approach to describe how its commercial and Multi-residential waste services compare to its private sector competitors. Garbage pickup is available 1 to 6 times per week (bulk trash no additional cost) for dumpsters that are 6 or 8 cubic yards. Recycling pickup is available 1 to 6 times per week at a much lower monthly rate than garbage pickup to encourage diversion of recyclables[75].
- Port Coquitlam, BC – An annual rate is charged to Multi-residential customers for the collection services that varies for different material streams and container sizes.
- Halifax, NS does not provide garbage or recycling collection services to the Multi-residential sector.
- Regina, SK does not provide garbage collection to the Multi-residential sector.
- Vaughan, ON, provides garbage and recycling service to a handful of grandfathered Multi-residential buildings that were provided waste management services prior to the revised by-law.
- City of Vancouver, BC collects garbage in wheeled garbage carts from a small number of multi-unit residential buildings

[73] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=d5397312da0a2410VgnVCM10000071d60f89RCRD&vgnextchannel=03ec433112b02410VgnVCM10000071d60f89RCRD

[74] http://www.greensboro-nc.gov/index.aspx?page=521

[75] http://www.greensboro-nc.gov/modules/showdocument.aspx?documentid=25374

Option 8.4: Increase Solid Waste Management Services (SWMS) Customer Base

	and are not accepting new customers for this service. • In the US, the following cities do not provide any garbage collection service to the multi-residential sector:, Portland, OR, Sacramento, CA, Houston, TX, Dallas, TX, Chicago, IL, and Washington, DC.

Considerations:

- Additional revenues for SWMS that may allow for expanding programs and services not currently offered
- Greater participation to increase economies of scale.
- Additional flexibility to meet Multi-residential/condo and IC&I customer's needs.
- Potential to increase diversion rates of current non-city customers
- Increasing the Multi-residential/condo and IC&I customer base can increase revenues to the utility and impact diversion rate.
- Additional resources required to service expanded utility customer base (more billings, etc.).
- Private sector haulers may oppose the City being competitive to their business.
- Additional volume of waste (e.g. residual waste) to be managed – increases size of City operation.
- Additional City resources needed to support diversion programs.
- Carry out an assessment of the fee structure that would be required to attract more Multi-residential/condo customers into the solid waste utility.
- Carry out a consultation program to determine if there is a market for the City providing collection to more Multi-residential /condo and IC&I locations.
- Determine the potential impact of mandatory recycling by-laws (see Option 1.8) on private sector rates charged to Multi-residential /condo and IC&I customers, as this would significantly impact rates which City would need to charge to be competitive.
- Determine the impacts of additional tonnages on processing and disposal infrastructure needs.

Potential Outcomes:

- Additional revenues for the Toronto solid waste utility.
- Additional collection, processing, disposal and transfer costs.
- Higher volumes of waste for collection, processing, disposal and transfer.
- Better control over waste diversion activities, by Multi-residential /condo and IC&I sector not currently serviced by the City, encouraging/mandating Blue Bin and Green Bin participation.
- Better data on waste diversion in the sectors serviced in the expanded program.

Option 8.5: Allocating Costs for Waste Management to Applicable Waste Streams

The City would begin charging customers for the collection of each material type (garbage, recycling, organics, leaf and yard waste, bulk material) using separate fees for each service rather than charging a single fee for garbage collection which includes provision of collection services for 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, Green Bin and other services in the garbage rate charged.

System Component: System Financing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Customers currently pay a single fee to receive the City's waste services. The single fee is based on the size of a customer's garbage bin, frequency of garbage collection or number of garbage bin lifts. If a customer pays the garbage rate, the City will also provide collection services for recyclables, yard waste, organics, bulky items, waste electronics and household hazardous waste in addition to garbage collection.
- The rate charged for garbage by the City appears high for Multi-residential buildings, as it covers the costs of all other diversion services as well. Private sector haulers can charge a much lower rate for garbage collection only (which does not include Blue Bin or other diversion services), as O. Reg. 101/94 mandating Blue Box service in Multi-residential buildings is not enforced and does not include SSO. This has led to some Multi-residential buildings leaving the City system.

Municipal/Waste Industry Experience:

- Some other jurisdictions charge customers separate fees for each type of service.

Case Studies/Examples:

- City of Vancouver, BC (separate fees for garbage, Green Bin and recycling collection).
- St. Albert, AB (separate fees for garbage, recycling and yard waste collection).
- Seattle, WA (separate fee for yard waste with embedded fee for garbage and recycling).
- San Francisco, CA (separate fees for garbage, Green Bin and recycling collection, with garbage fee 13 times higher than the recycling and green bin).

Considerations:

- Rates charged to customers will reflect the break out of costs by material stream (garbage, Blue Bin recycling, Green Bin materials) to manage and process waste.
- Provides an opportunity to reinforce the importance of waste diversion and encouraging customers with larger bins to divert more waste and subscribe to a smaller bin size (as larger bins will have higher processing costs allocated to them) or frequency of collection.
- Analyze the collection, transfer, disposal and processing costs associated with each waste stream using the costing model being developed as part of the Strategy.

Option 8.5: Allocating Costs for Waste Management to Applicable Waste Streams

- May discourage customers from separating their materials, since they will be charged a fee for recycling, organics and leaf and yard waste which was previously perceived as being "free", and in fact diversion may be more expensive than disposal for some streams.
- Public education needed to develop understanding and support for new system.
- Public consultation program to determine whether diversion behaviour will change if diversion is more expensive than disposal.
- Analyze the behavioural impact of customers on diversion rates for organics, recycling and leaf and yard waste materials.
- Public education program to explain why utility bills are changing.

Potential Outcomes:

- Rates charged for each material type would be reflective of the costs associated with collecting, transferring, disposing and processing each waste stream.
- Diversion will no longer appear to be "free".

Option 8.6: 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 (AD) and landfills) as a source of energy, selling disposal capacity at the Green Lane Landfill, selling processing capacity at future facilities such as a mixed-waste, mechanical biological treatment (MBT) or energy from waste (EFW) facility and other potential revenue sources that may be introduced or present in the industry in the future.

System Component: System Financing

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City's main source of revenue is from the rates charged to its customers for its solid waste management services. Revenues are also obtained from the sale of recyclable materials.
- The City-owned Keele Valley and Brock Road North landfills supply gas to on-site power plants that produce electricity.
- The City already utilizes biogas from AD facilities at wastewater treatment facilities. Biogas from the City's AD facilities (currently only the Disco Road organics processing facility is operational) is flared. Landfill gas collected at Green Lane is also currently flared.

Municipal/Waste Industry Experience:

- Landfills in Ontario with capacity greater than 1.5 million cubic metres are required to have a landfill gas (LFG) collection system which supports the development of a gas utilization program. Virtually all large landfill sites in Ontario, public and private, utilize landfill gas for the production of energy.
- Collection of methane is a standard practice as part of large scale wastewater treatment plant operations, which supports the development of a gas utilization program.
- AD facilities are typically sized to produce sufficient volumes of biogas to make it financially feasible to collect and process biogas into another form of energy or fuel.

Case Studies/Examples:

- Niagara Landfill Gas Utilization Project (Niagara on the Lake, ON) – Landfill gas (LFG) is cleaned, dehydrated, compressed and conveyed via dedicated pipeline to a nearby paper mill.
- Britannia Landfill Gas (Mississauga, ON) – LFG is captured and is piped to an off-site generation plant to generate 5MW of power.
- Trail Road Landfill Gas to Energy Facility (Ottawa, ON) –LFG is converted into 5 MW of power.
- A waste management company converts LFG into RNG (renewable natural gas) at its landfill in Lachainie, Quebec. The RNG produced will be injected into the TransQuébec & Maritimes Pipeline adjacent to the landfill.
- The City of Hamilton uses anaerobic digesters to process sludge from its Woodward Avenue Wastewater Treatment Plant and uses the biogas to fuel a combined heat and power (CHP) plant and create biomethane or renewable natural gas (RNG), which is injected into the local pipeline.
- The City of Hamilton markets excess capacity at their centralized composting facility and processes SSO for the County of Simcoe and Region of Halton.
- Surrey, BC is developing a 115,000 tpy anaerobic digestion facility for residential and IC&I organic waste. The natural gas produced by the facility will exceed the amount required for the City's waste collection vehicles. The City estimates that the facility will produce enough gas to run

• Many municipalities sell excess processing capacity to other municipalities (e.g. for source separated organics processing capacity, recyclables processing capacity) to generate additional revenues and offset costs	five times the fleet. Surplus fuel can be utilized by the City or sold to other consumers.

Considerations:

- Can take advantage of economies of scale for larger processing facilities.
- Facilities can be sized to manage additional sources of waste (e.g. IC&I)
- Potential source of fuel to allow conversion of waste collection truck fleet to CNG (from diesel) over time.
- Selling landfill capacity at Green Lane may assist the City in reaching tonnes required for put-or-pay agreement if waste requiring disposal decreases with additional diversion or disposal options.
- Contract administration associated with marketing additional capacity.
- May be difficult to obtain a contract for electricity purchase for Ontario FIT (feed in tariff) program.
- More difficult to develop LFG collection infrastructure in already developed areas of Green Lane.

- Selling disposal capacity at Green Lane will decrease its life requiring the City to find alternate disposal sooner rather than later.
- Additional infrastructure to be developed to utilize LFG from operating landfills and biogas from AD facilities to generate energy or marketable renewable natural gas for sale to market.
- Determine if there is a market close by.
- Studies already completed by Toronto on utilization options (e.g. for Disco).
- Renewable Energy Approval (REA) application.
- Application to secure a contract for electricity purchase through the Ontario FIT (feed in tariff) program.
- Business case to determine operating and capital costs for various facilities.

Potential Outcomes:

- Heat generation.
- Electricity generation.
- Renewable natural gas.
- Combined heat and power generation at Green Lane Landfill and two AD facilities.

Option 8.7: 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.

System Component: System Financing

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- The City does not currently provide any performance based incentives for any type of customers (single-family, commercial, Multi-residential, etc.) to increase their diversion efforts. The City's user fee structure inherently rewards residents for putting out less garbage.
- Research carried out for Toronto Community Housing (TCHC) has shown that motivated building managers have a significant ability to increase the diversion at Multi-residential buildings.
- Solid Waste Management Services highlighted top Multi-residential building performers at their annual Multi-Residential Waste Diversion Workshops for property managers and superintendents. The City also posts case studies of well-performing non-residential organization or charities on the City's website, to showcase best practices in waste diversion.

Municipal/Waste Industry Experience:

- Several municipalities in North America provide incentives and disincentives to multi-residential properties to encourage increased waste diversion.
- Several municipalities in North America provide incentives and disincentives to haulers which service Multi-residential properties to encourage increased waste diversion.

Case Studies/Examples:

- San Jose, CA: The City of San Jose contracts its garbage and recycling collection services to the private sector. The City has built financial incentives into the collection contract of waste hauling contractors for maintaining specific diversion rates among its Multi-residential customers. Waste hauling contractors are rewarded for working with building managers and ensuring a 35% Multi-residential diversion rate for curbside recycling. For every 1% above the diversion standard, haulers receive a bonus of ½% of prior year payments. Diversion targets are 95% for yard trimmings (with a 50% compost requirement), 70% for Multi-family garbage, 50% for large item pick-pickups, and 75% for neighborhood cleanups[76].
- St. Paul, MN: Eureka Recycling, a non-profit organization, provides multifamily recycling services to the City of St. Paul. During each collection, the collection crew manually records the number of carts collected and their fullness which is converted to tonnes of material diverted. Using this information collected, Eureka Recycling sends out congratulatory letters to multi-family buildings for their recycling efforts at the end of each year and provides the tonnages recycled as well as information to show the environmental impacts of their diversion efforts[77].
- Portland, OR: Monthly recognition and awards for multi-family buildings with successful recycling programs.
- Dresden, Germany and the Netherlands. Pay-As-You-Throw (PAYT) chamber

[76] http://www.recycletogether.com/cities/california/san-jos%C3%A9-california
[77] https://guelph.ca/wp-content/uploads/SWMMP_AppendixC.pdf

Option 8.7: Performance Based Incentives

	system that meters the amount of waste each multi-family unit disposes. The waste is deposited in the chamber and then recorded electronically by volume or weight. Users are either billed directly or prepaid credits are deducted as payment. • The City of Hamilton implemented a "Gold Box" program designed to reward residents through visual waste audits at the curb (i.e. proper setout, capture rates and low contamination in blue box, visible food scraps and lack of contamination in a green cart and one bag or less of garbage at the curb etc.) by giving them a gold/yellow recycling box. • Seattle, WA – Seattle Public Utilities runs a program called "Friends of Recycling and Composting (FORC)". A FORC educates residents and monitors containers at properties of at least 5 units and must be on the property at least once per week. The property receives a one-time $100 credit on its utility bill for having a FORC.

Considerations:

- Provides the people with the most influence to increase diversion in a building (superintendents or building owners) with incentives to increase diversion.
- Rewards good diversion behaviour.
- Encourages behaviour that will result in an increase of commercial and Multi-residential buildings diversion rates.
- Single-family customers may expect to also receive performance based incentives related to their diversion efforts.
- Significant efforts would be required to create awareness among Multi-residential and commercial units, in particular those units which have opted out of the City's waste services.
- Impact of performance incentives to the revenue generated will be difficult to determine and will need to be evaluated for sustainability.
- Continued efforts to identify most effective way to engage building superintendents in promoting and encouraging waste diversion behaviour in tenants.
- Determine what the most effective performance based incentives or disincentives for the management of commercial and Multi-residential buildings are in the City and how to implement them.

Potential Outcomes:

- Increased tonnage of Blue Bin and potentially Green Bin material diverted from Multi-residential and commercial buildings.

Option 9.1: Elimination of Collection Service to Multi-Residential Buildings

The City of Toronto would transition away from collection service to over 4,500 Multi-residential buildings currently serviced by the City, and financed through the utility. All of these buildings would need to obtain service from private sector haulers. The City loses the ability to directly control/mandate recycling at Multi-residential complexes and would need to consider alternative approaches (mandatory recycling by-law, hauler licensing, etc.) to ensure that waste diversion continues at Multi-residential buildings.

System Component: Overall System Considerations

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City of Toronto provides garbage and Blue Bin recycling service to over 4,500 Multi-residential buildings (416,815 Multi-residential households). Of these, 2,760 Multi-residential buildings (373,573 units) receive front- end bin service and 1,781 small Multi-residential buildings (43,242 units) use 360 litre carts.
- City By-law mandates that City-serviced Multi-residential buildings must participate in the Blue Bin recycling and Green Bin organics programs to receive garbage collection.
- 55,776 tonnes of Blue Bin recycling material were collected from large Multi-residential properties in 2014, and an additional 8,104 tonnes from small Multi-residential buildings (compared to 137,205 tonnes from single-family households).
- In 2014, 9,963 tonnes of Green Bin organics material were collected from large Multi-residential buildings and 3,427 tonnes from small Multi-residential buildings (compared to 111,364 tonnes from single-family homes)

Municipal/Waste Industry Experience:

- Some municipalities do not provide any service to Multi-residential buildings and leave it to private sector haulers to offer the service.
- Some municipalities have mandatory recycling by-laws to ensure recycling even though they do not provide the service directly.

Case Studies/Examples:

- City of Calgary does not provide any recycling collection to Multi-residential buildings but has established a mandatory recycling by-law effective February, 2016.
- City of Coquitlam BC does not provide any collection to Multi-residential buildings. The City has provided suggested questions to ask private haulers regarding provision of various collection services.
- City of Vaughan, ON does not provide collection to Multi-residential buildings constructed after 2005, when a new by-law was implemented. With the exception of those locations 'grand-parented' by council on December 12, 2005, the City does not provide municipal garbage / recycling collection services to institutional, commercial, industrial or mixed use (i.e.; residential / commercial) developments or re-developments. These types of developments / re-developments are required to seek private waste / recycling collection service providers[78].
- Examples of cities in Canada that do not provide Multi-residential garbage collection include Halifax and Regina.
- The City of Vancouver collects garbage in wheeled garbage carts from a small number of Multi-residential buildings and are not accepting new customers for this service.
- Examples of cities in the U.S. that do not provide Multi-residential garbage collection include Portland, OR, Sacramento, CA, Houston, TX, Dallas, TX, Chicago, IL, San Diego, CA, and Washington, DC.

[78] https://www.vaughan.ca/services/residential/solid_waste_management/multi_residential/Pages/default.aspx

Option 9.1: Elimination of Collection Service to Multi-Residential Buildings

- Some municipalities ensure that the infrastructure is available for recycling through by-laws or policies applied at different stages in building development
- Some municipalities ensure Multi-residential waste recycling through licensing of haulers.
- New York City, NY provides garbage and recycling services to all residents, including those in Multi-residential buildings.
- Many large European cities provide garbage and diversion services to the Multi-residential sector (e.g. Paris, Amsterdam, Copenhagen, Berlin).

Considerations:

- Extensive consultation with stakeholders involved to identify level of public acceptance, impacts on business and a realistic transition timeline.
- Significant impacts on budget and operation of the utility need to be fully scoped out and planned for.
- Simplified solid waste management system for the City.
- Would result in much lower funding/revenue to the City's Solid Waste Utility.
- Over 4,500 building owners who currently receive City service would need to find service from private sector haulers.
- More trucks on the road as the economies of scale and efficiency achieved by the City's contractor fleet will be lost in a competitive market.
- Potential risk of lower waste diversion and higher waste disposal tonnages when the City is no longer in charge of the collection system.
- Waste management service fees charged by private sector to buildings who would need to leave the City system are not known; therefore, it is unknown whether Multi-residential building owners/property managers would financially benefit or suffer if the City no longer provided service.

Potential Outcomes:

- There will be more private hauler collection vehicles on the road servicing the Multi-residential buildings
- The City's Solid Waste Utility will be much smaller, and operation of City system will be much smaller with significant amounts of current activity eliminated. Removal of Multi-residential service would result a smaller customer base and reduction in revenue.
- Less contamination in the recycling and organics streams, which tends to be higher in the Multi-residential sector.

Option 9.2: Coordinated and/or Alternative Contracts

The City of Toronto typically procures specific solid waste management services on an individual basis. 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 (i.e. collection, transfer, processing and disposal are typically all contracted on their own). 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.

System Component: Overall System Considerations

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Toronto typically procures waste management services through contracts of terms from 5 – 8 years with options for 1-2 year renewals.
- The City has previously combined waste transfer haulage with disposal.

Municipal/Waste Industry Experience:

- Municipalities have entered into long term agreements with private sector waste management service providers in situations when significant capital infrastructure is required with financing over a long time period.
- Municipal waste management contracts have typically been separated by service type to increase competition. A smaller contract value typically allows more respondents to qualify.

Case Studies/Examples:

- The Regions of Durham and York entered into a 20 year design build operate maintain (DBOM) contract, with the potential for extension, with a private sector operation related to the new Durham York Energy Facility.
- The City of Ottawa entered into a 20 year contract with a private entity for processing residential waste through its proprietary technology to generate energy. The contract was contingent on the company securing financing for the development of a commercial scale facility and was cancelled when it was not successful in obtaining financing.
- York Region entered into a 20 year contract with a private entity to process residual residential waste into fuel pellets. The contract between York Region and the entity was cancelled when financial and operational issues combined with the inability of the fuel pellets to be sold in Ontario forced the closure of the facility in 2014.
- The City of Surrey has entered into a 25 year contract with the Government of Canada and a private sector technology provider to develop and operate a new organics Biofuel Processing Facility.

Considerations:

- City not required to assume large long term debt in order to finance development of new waste management infrastructure.
- Potential for decreased costs by bundling services.

Option 9.2: Coordinated and/or Alternative Contracts

- Scope of services and contract values may be too large if multiple services are combined, limiting the number of potential respondents.
- City to review contracts and procurement process related to waste management infrastructure and services to assess any potential barriers to competition and achieving best price.
- Assess potential for alternative contracting and financing approaches in the development of any new waste management infrastructure.

Potential Outcomes:

- Contracting approach used by City for waste management infrastructure and services from private sector promotes cost effective responses from broad base of competition.

Option 9.3: Expand City of Toronto Share of Industrial, Commercial & Institutional Waste Management Market

The City currently provides Industrial, Commercial & Institutional (IC&I) waste collection service to businesses on main City streets, and provides disposal options at City transfer stations as well as at the Green Lane landfill. For waste collected at curbside, IC&I waste collection is financed through the waste utility Yellow Bag program, and the cost of Green Bin organic and Blue Bin recycling programs are paid for through Yellow Bag fees. At Transfer Station facilities and at Green Lane, IC&I customers are charged a tipping fee on a cost per tonne basis. In this option, the City would expand the number of businesses that have the option to use City collection services. All City IC&I customers would be required to also participate in Green Bin organic and Blue Bin recycling programs, thus increasing diversion in the IC&I sector.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- The City of Toronto currently provides collection service to about 14,000 IC&I customers. Green Bin and Blue Bin materials are collected at no direct cost. All garbage is collected in Yellow Bags for a fee that covers the cost of garbage as well as Green Bin and Blue Bin service through the City utility.
- Where the City provides service, diversion rates of IC&I material are high, as there is a strong financial incentive to minimize waste set-outs which are at a cost, whereas Green Bin and Blue Bin are free.
- Over the past decade, the City has increased tipping fees at its Transfer Stations and at Green Lane which has provided a disincentive for IC&I loads which are now redirecting themselves to lower cost private sector options.

Municipal/Waste Industry Experience:

- In general, most municipalities have limited involvement in IC&I waste management, as this market is typically well serviced by private haulers. Some municipalities have particular reasons for getting involved in the IC&I market (tax payer request, to keep private sector rates in line, etc.), but the general trends is towards less involvement.

Case Studies/Examples:

- The City of Calgary has a policy to provide collection service to 10% of the City IC&I accounts on a user pay basis to keep costs charged by the private sector competitive – this is done as a service to the IC&I sector.
- The City of Rochester, New York's Commercial Refuse division provides waste collection service to commercial customers throughout the city, including rental properties, stores, apartments, large and small businesses, industrial parks, schools, and other commercial cites. Container size and collection frequency varies depending on business needs, from daily to bi-weekly service.
- All businesses in Minneapolis, Minnesota must recycle as of 2011. Businesses that utilize carts for once weekly garbage collection and bi-weekly recycling collection may be able to opt-in to City garbage and recycling service. However, businesses that require more frequent collection and/or larger containers must hire a private hauler for the service.
- Seattle Public Utilities provides commercial garbage collection services for a monthly rate. Commercial garbage rates for regular collections vary depending on container size and type, service frequency, and whether the material is compacted. The monthly rate for collection of non-compacted material ranges from $44.82 for a 32-gallon container to

Option 9.3: Expand City of Toronto Share of Industrial, Commercial & Institutional Waste Management Market

- Many municipalities have no involvement with IC&I waste (strictly residential involvement) and leave it completely to the private sector to manage.
- The general trend is for municipalities to reduce involvement in IC&I waste over time.
- The level of IC&I collection service provided by municipality varies. Many provide some level of service to BIAs (Business Improvement Areas) or selected smaller businesses in the downtown core partly to ensure that streets remain clean.
- In Ontario, municipalities do not have a legal obligation to collect and manage waste from the IC&I marketplace.

$998.71 for an 8-yard container, while the rate for compacted material pickup ranges from $304.62 for 1 yard of material to $1484.54 for 6 yards of material.

- The Region of Niagara provides both a basic and "enhanced" collection service to selected IC&I customers along main routes and in BIAs and the downtown cores of its 12 area municipalities on a fee for service basis.

Considerations:

- City ensures that IC&I diversion occurs for all IC&I accounts they service.
- Additional revenues to the City waste utility.
- Potential to purchase fleet of smaller vehicles which can also be used for Multi-residential service.
- Competition with private sector - City is cutting into private sector hauler business – potential for small business to lose hauling contracts – strong resistance from waste management industry.
- Uses up disposal capacity more quickly.
- Processing and disposal capacity requirements increase.
- Consultation process to determine level of acceptance of this approach and rationale for the City getting more involved in the IC&I market.
- Market assessment to determine IC&I customers which could be added to the City service.
- Gradual process whereby IC&I generators involved can move collection services from their current service provider to the City.
- Study of financial and economic impact on small city businesses.
- Need for more Blue Box and Green Bin processing capacity.
- More City trucks– implications for staffing, operating costs, management etc.

Potential Outcomes:

- Increase in IC&I waste diversion as City has more control over IC&I accounts and can provide diversion at cost competitive prices.
- Well documented rationale through public consultation process to justify why the City is getting more involved in the IC&I waste management business.

Option 9.4: City Implements Industrial, Commercial and Institutional Waste Diversion Policies

The City ensures that Industrial, Commercial and Institutional (IC&I) waste diversion occurs through policy instruments such as mandatory recycling by-laws for all or some IC&I establishments, and for a long or short list of recyclable materials, mandatory provision of diversion service by haulers as a condition of providing garbage service and other by-laws targeting diversion by the IC&I sector.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- Most IC&I waste in City of Toronto is managed by private sector haulers. The IC&I waste diversion rate is not known, but based on Statistics Canada data it is estimated at 12%.
- Pro-rating provincial figures, an estimated 840,000 tonnes of IC&I waste are generated in Toronto each year. About 700,000 tonnes of IC&I waste could be disposed by Toronto IC&I waste generators.
- City of Toronto was more involved in IC&I diversion activities when it owned its own landfill (Keele Valley) and was concerned with preserving capacity, over 20 years ago. Involvement has been minimized in recent years.

Municipal/Waste Industry Experience:

- Low disposal rates in the US (as low as $8 to $10US/tonne) are a barrier to higher IC&I waste diversion in Ontario and also in the City of Toronto.
- Diversion increases when disposal costs are high; an increase in disposal costs is not expected in the foreseeable future.
- Existing 3Rs regulations mandating source separation of recyclables by some IC&I generators are not enforced, and most businesses are unaware that they exist.
- Municipalities get involved in the IC&I waste issue to varying extents, from no involvement, to some service involvement, to implementing policies to encourage or force diversion. The reasons for different approaches vary locally.

Case Studies/Examples:

- In June 2005, the Regional District of Nanaimo enacted a ban on the disposal of food and other organic waste from IC&I sources at the region's solid waste facilities.
- At the beginning of 2013, the City of Abbotsford, BC implemented a bylaw mandating all IC&I properties to offer adequate space for recycling on their premises.
- All IC&I enterprises in St. John's, Newfoundland with 25 or more employees are required to participate in a mandatory office paper recycling program that began in September 2005. All remaining businesses need to comply with the regulation starting March 2006.
- In Halifax, Nova Scotia, IC&I property owners/managers must obtain separate bins for recyclables, paper, cardboard, garbage, and organics from their commercial waste hauler.
- Since 1994, operators of all IC&I establishments in Philadelphia have been required to provide recycling collection of the same materials as residents. Penalties for noncompliance can be as high as $300 per violation per day. IC&I generators are required to develop a recycling plan.
- Since 1996, businesses in City of Portland, Oregon are required by City Code to recycle 50% of their waste. Metro Portland has adopted Business Recycling Requirements which require businesses in the Portland metropolitan area to recycle paper, metal cans, plastic bottles, and glass bottles/jars. In addition to the Business Recycling Requirements, Oregon state law states that a

Option 9.4: City Implements Industrial, Commercial and Institutional Waste Diversion Policies

- Haulers generally can provide diversion services to IC&I customers but at an additional cost. Many IC&I customers will go for the cheapest option (disposal) but some IC&I companies/institutions are committed to environmental goals and have diversion programs – all voluntary.

hauler cannot charge more for recycling collection than would be charged for the same quantity of waste collection.

- As of July 1, 2012, state law required that the City of Santa Clarita create a commercial recycling program. Under this law, all Santa Clarita businesses with four yards or more of collection services per week are required to establish and maintain recycling service.
- Boston, MA - In 2008, a City ordinance was passed requiring all commercial waste haulers working in the city to provide recycling services or risk losing their licenses. Failure to offer these services can result in a $150 fine for the first violation, $300 fine for the second violation, and on a third violation the hauler's permit will be revoked.
- In 2010, Austin City Council passed the Universal Recycling Ordinance. By October 1, 2017, all commercial properties larger than 50,000 sq. ft. (retail, medical facilities, hotels and motels, religious buildings, office buildings, private educational facilities, industry and manufacturers) will be required to ensure that tenants and employees have convenient access to recycling.

Considerations:

- Toronto is seen as a leader, not only diverting large amounts of waste it is responsible for (mostly residential) but also waste it is mostly not responsible for (IC&I) through innovative policies and by-laws.
- Potential that green jobs and local employment are created by higher diversion rates.
- Less IC&I waste to landfill from Toronto sources, although this waste currently goes to private sector landfills and does not impact City of Toronto facilities. Businesses will see this as one more burden that they do not have resources or time to address, and potentially as unnecessary City interference.
- Haulers will not be supportive of policies that mandate service levels for diversion as a requirement to haul garbage.
- New licencing requirements for haulers.
- Additional enforcement staff.
- Carry out an assessment of the potential impact of the IC&I policies and other instruments on waste diversion infrastructure (which could be shared with residential or separate), including collection fleets and processing (Blue Bin, Green Bin).
- Research appropriate instruments (by-laws, etc.) to accomplish objective of increasing IC&I waste.
- Public consultation program to identify attitudes and likely impacts of different policies on different stakeholders.

Option 9.4: City Implements Industrial, Commercial and Institutional Waste Diversion Policies

Potential Outcomes:

- Higher amounts of diverted materials requiring processing and end markets.
- Possible creation of new businesses which use the diverted materials.

Option 9.5: City of Toronto Exits the Industrial, Commercial and Institutional Waste Management Service

The City currently provides Industrial, Commercial and Institutional (IC&I) waste collection service to businesses on main City streets, and provides disposal options at City transfer stations as well as at the Green Lane landfill. For waste collected at curbside, IC&I waste collection is financed through the waste utility Yellow Bag program, and the cost of Green Bin and Blue Bin service are paid for through Yellow Bag fees. At Transfer Station facilities and at Green Lane, IC&I customers are charged a tipping fee on a cost per tonne basis. In this option, the City could exit the waste collection market, which in turn would require the private sector marketplace to provide services to these customers. In addition, the City could decide to more completely exit the IC&I market by not accepting IC&I waste at their own transfer stations or at Green Lane landfill. In the future therefore, the City would have no involvement with IC&I waste management (i.e. the City ceases to provide any collection to businesses on City streets and ceases to accept IC&I waste at transfer stations or at the Green Lane Landfill). All businesses in Toronto that currently receive City collection, free Blue Bin recycling and free Green Bin organics collection, and pay for this through the Yellow Bag program, will need to contract with private sector haulers for service.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- The City involvement in IC&I waste management has been decreasing over many years, reduced from 100,000 businesses served by City collection 20 years ago to about 14,000 today.
- City staff decided to minimize involvement in IC&I waste about 10 years ago in an effort to focus on residential waste, for which they are responsible, and preserve landfill capacity.
- Over the past decade, the City has increased tipping fees at its transfer stations and at Green Lane which has provided a disincentive for IC&I loads which are now redirected to lower cost private sector options.

Municipal/Waste Industry Experience:

- Many municipalities have no involvement with IC&I waste (strictly residential involvement) and leave it completely to the private sector to manage.

Case Studies/Examples:

- Ottawa, ON tried unsuccessfully to fully exit IC&I market. The City initially exited the market to save contract costs. Businesses in the downtown core complained about littering, so the City re-introduced a user fee based service and hired one person to collect subscriptions. By that time most businesses had found alternative arrangements so that subscription rates were modest.
- Vaughan, ON exited the IC&I market in 2005 (no involvement unless grandfathered in).
- Halton Region, ON does not accept private sector hauled IC&I waste at its landfill but provides waste management service to Business Improvement Areas (BIAs) (which is sent to the Region's landfill).
- Many US cities do not provide competing IC&I collection service but rather use franchises/licensing to influence diversion in IC&I establishments. Waste haulers who are awarded franchises must meet waste diversion goals (e.g. 30% diversion) among their ICI customers and will be penalized if they do not achieve and maintain these goals. Examples include:

Option 9.5: City of Toronto Exits the Industrial, Commercial and Institutional Waste Management Service

- Some cities have exited the market after many years of involvement in IC&I waste management.
- This lack of involvement is not a concern as long as tax payers clearly understand that the service is not provided, nor charged for. This message is much simpler with the City utility.
- Many cities have no involvement in IC&I waste service but control service requirements through franchising arrangements (any haulers in the City need to meet certain requirements).
- In the Province of Ontario, municipalities do not have a legal obligation to collect and manage waste from the IC&I marketplace.
    - Santa Clarita, CA (hauler must achieve 50% diversion)
    - Boston, MA (Hauler must provide diversion services)
    - Seattle, WA (must provide diversion services)
    - Elk Grove, CA (hauler must achieve 30% diversion).
- Portland, OR has franchising for residential services, but not for IC&I services as businesses don't want it – they feel it might interfere with their choice of hauler.
- New York and Los Angeles both have IC&I waste collection franchising as a method to achieve diversion goals. City forces are not involved but IC&I waste diversion goals are achieved through policies.

Considerations:

- Toronto is seen as a leader, not only diverting large amounts of waste it is responsible for (mostly residential) but also waste it is mostly not responsible for (IC&I) through innovative policies and by-laws.
- Reduces City staff requirement to manage collection, recycling and disposal of IC&I waste.
- Provides additional business for private sector contractors.
- City loses ability to influence waste diversion behaviour unless strong by-laws and policies in place.
- City cannot measure diversion performance for IC&I sector.
- Consultation process to determine level of acceptance of this approach and rationale for exiting the market.
- Gradual process whereby all IC&I collection services are withdrawn from business on city streets and at City transfer stations.
- Research to determine the extent to which this new approach will adversely affect IC&I waste diversion.
- Development of schedule and implementation plan.
- Study of financial and economic impact on small city businesses.
- All existing businesses which use City services would need to arrange for service with a private contractor.
- Transition plan for City union staff currently on night run; reduced vehicles will be required to collect the remaining RUAC waste (residential units above commercial).

Potential Outcomes:

- Well documented rationale through public consultation process to justify why the City gets out of the IC&I waste management business (or stays in the IC&I waste management business).
- All IC&I generators who currently receive City collection need to contract with private sector haulers
- City no longer accepts private loads at transfer stations.

Option 9.5: City of Toronto Exits the Industrial, Commercial and Institutional Waste Management Service

- Fewer City trucks (elimination of night run) – implications for union staffing, reduced maintenance requirements, reduction in size of city fleet, garages, maintenance staff.

Option 9.6: 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.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- City of Toronto historically used to actively engage with the IC&I sector on waste diversion issues through SWISC and other committees, with efforts to reduce IC&I waste disposed at their own landfill. These efforts were disbanded with the closure of the Keele Valley Landfill in 2002.
- Partners in Project Green (Toronto and Region Conservation Authority) provides IC&I support which can be used by City of Toronto IC&I generators.

Municipal/Waste Industry Experience:

- Ontario Regulation 103/94: Industrial, Commercial and Institutional Source Separation Programs require some large IC&I establishments to source separate some materials but is not enforced, and does not address most IC&I establishments.
- New York City conducted a study in 2012, which estimated that businesses in the city, including offices, restaurants, retail stores, hotels, and health care, attained 24% recycling rate (average). Furthermore, an examination of a typical collection truck load from a restaurant route found that 67% was food waste, 20% was cardboard and paper and 5% was recyclable beverage containers.
- In urban areas, most IC&I waste tends to be generated by 4 sectors (retail, accommodation, health care/social assistance and manufacturing) and over 50% of disposed IC&I waste is either food or paper.

Case Studies/Examples:

- Green Calgary is a non-profit environmental organization, partially funded by the City of Calgary to provide technical assistance to local businesses to divert waste. The organization encourages waste diversion activities in the IC&I sector by offering a wide variety of services including environmental education, waste audit and reduction plans, technical assistance, and a waste exchange.
- Partners for a Clean Environment (PACE), based in Boulder, Colorado, helps businesses achieve sustainability goals by providing free advisor services, financial incentives and a certification program. Supported by the City of Boulder that provides tax relief and financial incentives to businesses to reduce/recycle their waste.
- Smart Green Business helps small and medium businesses (fewer than 250 employees) in Central London, UK save money and improve their environmental performance by implementing environmental programs including waste diversion.
- The Unionville retailers, located in the Business Improvement Area (BIA), are cooperating in an outreach program established by the Town of Markham to promote waste diversion by agreeing to use only recyclable cups and take-out packaging, which is accepted by the Big Blue Belly program. Participating businesses receive promotional materials and decals to display showing that they are participating in the pilot.

Option 9.6: City to Assume Role of Facilitator to Encourage Industrial Commercial and Institutional Waste Diversion

- Cities and communities engage with IC&I sector on waste issues to varying degrees, from supportive/educational (this option) to regulatory, policy or market capture (see other IC&I options).

Considerations:

- Toronto can gain prominence for its leadership role.
- Promote waste reduction and diversion in the IC&I sector resulting in overall environmental benefits for the City.
- Businesses may benefit from better public relations by showing that they are participating in waste reduction and diversion activities.
- Businesses can play a greater role in addressing food insecurity in the City.
- To increase the chances of success, the education and outreach should be paired with regulatory measures.
- Many small and medium businesses may be working close to the profit margin, making waste diversion a less desirable activity to implement due to the higher costs than disposal.
- City determines information and outreach needs of the IC&I sector.
- City hires Educational Volunteers or Staff, develops supporting tools, such as handbooks, posters, check lists, provides free webinars, open houses, offers dedicated website providing waste diversion information and technical assistance to businesses, makes presentations at general meetings and association conferences, establishes separate working groups for specific sectors and organizes peer-to-peer learning sessions.

Potential Outcomes:

- IC&I establishments gain increased knowledge about the benefits of waste diversion.
- IC&I establishments learn from peers, share best practices.
- IC&I establishments implement waste diversion programs.
- Potential for decrease in kg/capita waste generated and/or waste disposed (generally via regular audits/monitoring) in participating establishments.

Option 9.7: City Explores Mechanisms to Introduce Additional Controls Over Waste Management – Bans, By-laws and Acts

The City ensures that waste reduction and diversion occurs through policy instruments such as mandatory recycling by-laws, landfill bans and Extended Producer Responsibility (EPR) legislation. These instruments could apply to both residential and non-residential (IC&I) waste and would be designed to reduce the amount of waste disposed and increase diversion. Many of these instruments need to be implemented and supported at the provincial level, and would require advocacy efforts coordinated with other stakeholders.

System Component: Overall System Considerations

Source of Option: City Staff

City of Toronto Experience:

- City has implemented very comprehensive waste diversion programs for all its collection customers.
- There is limited or no influence on diversion of IC&I waste not managed or collected by the City.
- Many waste diversion/reduction policies cannot be implemented at the local level, and need to be implemented at the regional/provincial or national level to be effective.

Municipal/Waste Industry Experience:

- Municipalities across Canada get involved in waste policies to varying extents depending on local disposal capacity availability, state/provincial laws, and local interest/commitment to environmental and sustainability issues as well as commitments on waste diversion.
- Landfill or disposal bans on various materials (generally recyclables, cardboard, clean wood, organics) have been successful in reducing waste to landfill and encouraging waste diversion through establishment of processing infrastructure.
- Processing infrastructure needs to be established before a landfill ban is implemented – processing options need to be available for the banned material. Ideally, end markets should also be secure for the materials produced.
- Where landfill/disposal bans are implemented, it is important to have ensured/created end markets for the

Case Studies/Examples:

- Province of Nova Scotia implemented a "dry landfill" policy as a condition of approval of Otter Lake landfill. This led to landfill bans on all recyclables and organics over time, which in turn led to local ordinances requiring compliance with the provincial requirements. The results are that Nova Scotia has a high diversion rate and the lowest provincial per capita disposal rate in Canada.
- Flow control (forcing haulers to direct waste to particular facilities) has proven unconstitutional in various legal challenges in Canada (Halifax, NS and Vancouver, BC) and the US (C&A Carbone Inc. vs Town of Clarkstown, New York), but continues to be a policy which can ensure that facilities established to process waste receive sufficient waste to ensure financial sustainability.
- Metro Vancouver developed processing infrastructure for cardboard and wood, and then implemented landfill/disposal bans on each of these materials.
- Organics bans are in place in Vermont, Massachusetts Rhode Island and California in the US, as well as in Nova Scotia, PEI and Metro Vancouver, BC (which controls disposal capacity for all area municipalities). These are implemented in different ways, some targeting haulers and generators, and some applying the ban at the disposal facility.
- Extended Producer Responsibility (EPR) legislation in BC has been applied to 14 different waste streams (including electronics, appliances, Municipal and

Option 9.7: City Explores Mechanisms to Introduce Additional Controls Over Waste Management – Bans, By-laws and Acts

materials diverted to ensure sustainability of the policy/by-law/regulation. This can be done in part through aggressive Green Procurement policies.	Special Hazardous Waste, printed paper and packaging). Together, this legislation has reduced the amount of waste disposed, and has made producers physically and financially responsible for the end of life management of their products, including meeting recycling and reuse targets. • Oregon state law states that a hauler cannot charge more for recycling collection than would be charged for the same quantity of waste collection.

Considerations:

- Comprehensive suite of coordinated/integrated policies and regulations to address all aspects of the waste management system and reduce waste disposed.
- Removing materials from the waste stream to "highest and best use" consistent with circular economy framework[79].
- Potential that green jobs and local employment are created by higher diversion rates.
- Significant time and effort on advocacy efforts where provincial legislation needs to be changed.
- Resistance from waste generators and haulers affected.
- Additional City of Toronto resources, depending on the options chosen.
- Research appropriate instruments (disposal bans, by-laws, regulations etc.) to accomplish the specific objectives.
- Public consultation program to identify attitudes and likely impacts of different policies on different stakeholders.

Potential Outcomes:

- Lower amounts of waste disposed.
- Higher amounts of diverted materials requiring processing and end markets.
- Possible creation of new businesses which use the diverted materials.

[79] A **circular economy** is an alternative to a traditional linear **economy**(make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life (www.wrap.org.uk)

Option 9.8: Deposit-return System for City of Toronto for Selected Materials

Toronto would seek to establish a deposit return system for targeted materials that would subsequently be removed from the waste stream. Targeted materials might include non-alcoholic beverage containers and/or batteries. Toronto would also advocate for a deposit/return on additional products such as soft drink and other containers which are amenable to deposit/return and for which deposit/return systems are in place in other provinces in Canada and in many US states.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants

City of Toronto Experience:

- Toronto residents' only current deposit-return experience is with the alcoholic beverage container systems for beer, wine and liquor containers that have been established province-wide. Some stores offer milk in jugs or refillable glass bottles for which a deposit is paid.

Municipal/Waste Industry Experience:

- In Ontario, the beer return system has been in place for many years; the LCBO deposit system was introduced in 2007. Beer stores across Ontario have served as the collection/deposit return agent for wine and liquor containers as well since 2007. The overall collection rate for wine and spirit containers sold in LCBO stores in 2013-14 was 80%. The overall recovery rate of both the LCBOs Ontario Deposit Return system (ODRP) and all Beer store packaging (mainly re-usable beer bottles) in 2014 was reported as 98.7%[84].
- Systems similar to deposit systems are also in place for lead acid vehicle batteries and tires – at some stores, a deposit refund is given when these products are returned.
- There is always some material returned to the deposit/return system that comes from out of province or out of state, when deposit and non-deposit states or provinces share a border.

Case Studies/Examples:

- The City of Columbus Missouri operated the only municipal-level deposit system in North America for beer, malt, carbonated/mineral waters and soft drinks for 20 years. It was repealed in 2002 once the city decided to implement its blue bag program
- The small municipality of Osthammar in Sweden placed a small deposit (3 cents Euro) on batteries to encourage their recovery. The deposit was small enough that batteries were not returned from other area municipalities.
- The State of Oregon – with the first US "bottle bill" - has reported that its redemption rate for bottled water, soda, beer and malt liquor has fallen to 68%[80] (with a 5 cent deposit). The reasons cited for the falling rate are the "unpleasant experience" returning containers to grocery stores and competition with more convenient curbside service.
- In total, there are 11 deposit (or bottle bill) states in the US. Recycling rates by state vary considerably (as does the range of materials on deposit) from a low of 66% (in Massachusetts) to a high of 96% in Michigan (March 2015). The largest program in the nation is California with a reported recycling rate of 85%[81]. Recycling rates for traditional beverage container types were twice as high in deposit states than in non-deposit states (in 2010).
- BC implemented the first non-alcoholic beverage container deposit system in Canada in 1971. The system has a network of about

[80] Resource Recycling Magazine article; August 4, 2015
[81] Container Recycling Institute; Container Recycling Rates by State, March 2015 Update
[84] Ontario Deposit Return Program description; 2013

Option 9.8: Deposit-return System for City of Toronto for Selected Materials

- While the beer, liquor and wine container recovery system has been operating well for a number of years, it is not likely to serve as a useful model/extension for non-alcoholic beverage containers - i.e. the additional quantity of containers to be collected would likely overwhelm the "Beer Store" collection system.
- The two alternate options that could be explored and developed (based on experience in other parts of Canada) are: a return to retail program and/or a dedicated depot program i.e. for non-alcoholic beverage containers and potentially other materials – e.g. e-waste, paints, household hazardous wastes, lamps, batteries, etc.

175 Return-it depots and retail locations. The system reported a recovery rate of 79.1% in 2014, with total expenditures of about $90 million and a full-time equivalent of 700 employees in the system[82].

- Alberta also operates an extensive network system collecting over 128,000 tonnes of deposit materials through 216 depots; in 2013 Alberta reported almost 82%[83] return rate for non-refillable beverage containers - the highest in Canada.
- The Nova Scotia deposit is unique in that while consumers receive a full refund of their deposit when they bring refillable containers to one of the 78 "Enviro-Depots", only half is returned for non-refillables. The remainder of the deposit pays for program costs.

Considerations:

- May result in reduced beverage container litter.
- Higher overall recovery rate for the targeted material (i.e. because deposit systems recover more beverage containers and other material recovery is expected to remain the same).
- Could serve as another source of income for drop off locations that apply to become part of the non-alcoholic beverage industry-led and funded depot network.
- May impact aluminum revenues from Toronto curbside program.
- Assess the impacts of a provincial deposit/return system on all beverage containers and other materials on the City Blue Bin program.
- Establish new dedicated return system infrastructure (e.g. return to retail, reverse vending, new depots) and dedicated processing system.

Potential Outcomes:

- Would also include deposit material recovery from the small business and IC&I sectors.

[82] Encorp Pacific 2014 Annual Report

[83] Alberta Beverage Container Recycling Corporation, 2013 Sustainability Report

Option 9.9: Expanded Blue Bin/Printed Paper and Packaging, Expanded Producer Responsibility Options and Potential Impacts for Toronto

The province of Ontario is continuing with consultations to introduce a new Resource Recovery and Waste Reduction Strategy with Extended Producer Responsibility (EPR) as a core element. The new Circular Economy Act may be introduced to the legislature in Fall 2015 or in 2016. When fully implemented, the Act will have significant impacts on how the Blue Box program in Ontario is operated and financed. The Canadian Stewardship Services Alliance (CSSA –a national producer oversight agency, including Stewardship Ontario and thus the Blue Box Program) has proposed changes to Blue Box funding if/when producers assume 100% printed paper and packaging program (PPP) responsibility (as evidenced in new PPP program changes in BC and Saskatchewan in particular). Changes to how producers fund blue box/bin programs in Ontario – i.e. from the current 50/50 shared responsibility model – could have important funding, control and future infrastructure implications for the City of Toronto. Producers would expect more control over the overall recycling system if their level of funding were to be increased. Provinces (including) Ontario have committed through CCME (Canadian Council of Ministers of Environment) to introduce EPR legislation for C&D materials, furniture and carpet by 2017. Thus far, only BC has made public its schedule for EPR programs for these (Phase 2) materials.

System Component: Overall System Considerations

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The Blue Bin program involves funding from stewards/producers who have been obligated in the Blue Box plan to finance 50% of the residential portion of the Blue Bin program costs annually since 2003.
- Other EPR programs for which Toronto receives funds include: Municipal Hazardous or Special Waste (MHSW), Waste Electronic and Electrical Equipment (WEEE) and tires, but the $ amounts are much smaller.
- Current Blue Bin materials are processed for Toronto through a competitively bid contract.

Municipal/Waste Industry Experience:

- Through the Waste Diversion Act and the Blue Box Plan, Ontario municipalities have received funding for approximately 50% of their Blue Box/Bin program costs since 2003. Some of the funding is received as “in-kind” free advertising in newspapers.

Case Studies/Examples:

- In British Columbia, Multi-material BC (MMBC – CSSA/obligated steward’s agent in BC) has operated North America’s first 100% producer responsibility program for printed paper and packaging (PPP) since May 2014. MMBC offered BC municipalities a market clearing price incentive to manage (or directly provide) collection contracts/services for single or multi-family households. Most municipalities accepted this arrangement; in other cases MMBC has contracted directly with private operators (i.e. with no municipal involvement). A small number of BC municipalities chose to opt out of the program entirely and receive no funding. MMBC has directly contracted (through a competitive bid) with Green By Nature to provide material processing across the province, using 20 subcontractors to help operate 40 receiving facilities on GBN’s behalf. GBN is paid a per tonne

Option 9.9: Expanded Blue Bin/Printed Paper and Packaging, Expanded Producer Responsibility Options and Potential Impacts for Toronto

- The new Circular Economy Act is expected to institute producer responsibility –as the cornerstone of future waste legislation in Ontario. This is expected to move 100% of Blue Box funding to producers/stewards over time.

processing fee and markets materials with MMBC retaining material revenues.

- In Saskatchewan, Multi-Material Stewardship Western (MMSW – another CSSA "affiliate") developed a plan in response to a government regulation in 2013 that includes producer funding of up to 75% of municipalities' costs to operate "effective and efficient" recycling programs.
- In Europe, only 3 countries, out of some 28 with PPP programs, have full producer EPR for packaging – Germany, Austria and Sweden – and the Swedish government recently committed to revert to a shared model (i.e. producer funding with municipal operation).
- In Belgium, FOST Plus pays all packaging related costs to municipalities for a specific set of materials.

Considerations:

- More budget available to apply to other waste management issues.
- 100% EPR for PPP would save the City money, many millions annually.
- Future EPR for Blue Bin materials could remove risk from City financial projections, as producers are taking the risk (and benefit) of processing and recycling markets
- Under the model CSSA has negotiated in BC and Saskatchewan, the City could have the ability to retain a level of involvement on Blue Bin material collection.
- Responsibility for meeting future diversion targets would fall to Producers.
- Consistent recycling messaging would be broadcast (province-wide) for Blue Box programs.
- Public space recycling could be enhanced (with no cost to the City) if this were to be included as part of the producer funding program.
- Higher recycling targets could be established for all recyclables through negotiations among the province, producers and municipalities. (For example, BC has set a PPP target of 75% - that includes energy recovery).
- For EPR of other materials expected over time, generally the City may not be involved in collection and processing – these materials will leave the City system.
- Under full EPR for Blue Box, the City will have less control over the Blue Bin system, including what PPP materials are collected at the curb, it will lose its revenues from the sale of materials and will likely have less control regarding communicating recycling messages to its residents (i.e. if province wide advertising were to be implemented).
- The City will likely continue to get queries from residents about "what's recyclable" regardless of who funds what; calls about Green Bin and regular garbage collection will still need to be managed by city staff and websites.
- The City of Toronto will need to be an active participant and advocate (along with other municipalities/AMO) in consultations with the province to express and defend its interests in

Option 9.9: Expanded Blue Bin/Printed Paper and Packaging, Expanded Producer Responsibility Options and Potential Impacts for Toronto

any move towards a 100% producer responsibility funding regime for Blue Box and other materials.

Potential Outcomes:

- The City may need to re-negotiate collection and processing contracts with current service providers for Blue Box materials (depending on current contract timing and the timing of provincial regulatory changes).
- With plan for EPR legislation on CCME Phase 2 materials (construction and demolition waste; furniture; textiles and carpets and appliances including ODS (ozone depleting substances)), Toronto has the option to partner or not partner with obligated stewards. An assessment of the impacts of partnering on broader EPR programs should be carried out.

Option 9.10: Develop an Advocacy Strategy

The City of Toronto develops an advocacy strategy to support the implementation of the Waste Strategy.

System Component: Overall System Considerations

Source of Option: City Staff

City of Toronto Experience:

- City of Toronto has advocated for changes in legislation which promote waste reduction though various organizations, including partnering with AMO (Association of Municipalities of Ontario) (Toronto is not a member), and RPWCO (Regional Public Works Commissioners of Ontario) on the municipal response to Bill 91 and other legislation.
- City of Toronto is a member of SWANA (Solid Waste Association of North America), RCO (Recycling Council of Ontario), OWMA (Ontario Waste Management Association), National Zero Waste Council, PacNEXT and numerous other entities and is actively involved in advocacy by these organizations.
- Multi-stakeholder groups have the best chance of bringing about regulatory change, as government perceives that the initiative has broad based support.
- Through RWPCO (and in collaboration with the Municipal Waste Association – formerly the Association of Municipal Recycling Coordinators which the city of Toronto helped to establish) Toronto participated in a number of 'top to top" meetings with Stewardship Ontario/CSSA in the fall of 2013 to attempt to clarify areas of common agreement – and disagreement - between municipalities and producers on key elements of the proposed Bill 91.
- Historically, Toronto has been an active participant in collective waste diversion advocacy with other Canadian municipalities especially on federal issues through the Federation of Canadian Municipalities (FCM).
- City of Toronto is a member of MIPC (Municipal Industry Program Committee) and has advocated for a fair payment of

Case Studies/Examples:

- York Region has dedicated resources to coordinate departmental or regional responses to advocate their position on various environmental issues, including waste management, to stakeholders such as the Ministry of the Environment and Climate Change.
- In BC, municipalities have an organization similar to AMO called the Union of BC Municipalities (UBCM). This organization had a very active voice in the 100% PPP EPR (Paper and Printed Packaging Extended Producer Responsibility) program design in BC. Similar groups exist in Saskatchewan for both urban and rural communities but are less engaged in waste issues compared to UBCM.
- There are many key waste advocate organizations in Canada such as Recycling Council of Ontario, Alberta, and BC.

Option 9.10: Develop an Advocacy Strategy

Blue Box obligations by stewards for a number of years. The City was a party to the arbitration between Stewardship Ontario and AMO regarding Blue Box payments in 2014 which led to a $15 million higher amount of funding than originally proposed.

- City of Toronto was heavily involved in advocating for the development of the Waste Diversion Act (WDA) in 2002. This lead to 50% funding of Blue Box and funding for Waste Electronic and Electrical Equipment (WEEE), Municipal Hazardous or Special Waste (MHSW) and tires collected and managed by the City.
- City of Toronto has been heavily involved (in partnership with RPWCO, AMO and others) in advocating for new waste reduction legislation since the review of the Waste Diversion Act (WDA) was stalled as a result of the eco-fee issue in 2010. This led to the release of Bill 91 – the Waste Reduction Act in 2013. The bill contained virtually all of that the City and its municipal partners requested, but died on the order paper when a provincial election was called.
- Toronto participates in the National Zero Waste Council, a recent initiative started by FCM in collaboration with several Canadian municipalities. The Council is currently working in three priority areas: national level communication and education campaigns to promote waste prevention; advancing policy development and – where appropriate - policy harmonization; and facilitating knowledge exchange and dialogue among industry, government and other stakeholders.

Municipal/Waste Industry Experience:

- Partnerships with appropriate advocates are essential to effective advocacy and lobby federal and provincial governments.
- Other, broader partnerships (e.g. PacNext) help to bring about system change (in packaging design) which is good for City

Option 9.10: Develop an Advocacy Strategy

of Toronto and other municipalities in Ontario and across Canada.

Considerations:

- Legislative and policy changes at the federal and provincial level are the easiest way to bring about waste reduction, as participation is mandatory (it is the law).
- Significant time and effort by City staff, much of which does not necessarily result in immediate or positive outcomes.
- 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).

Potential Outcomes:

- Regulatory and or legislative change which benefits City of Toronto.
- Facilitates exchanges of waste diversion best practices among large municipalities with similar waste diversion goals and objectives.

Option 9.11: Green Procurement

Ensure that all procurement activities by the City of Toronto incorporate green procurement and environmentally preferable purchasing policies and specifications which lead to waste reduction, reuse and recycling and contribute to market development and stability for recycled content materials.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultant

City of Toronto Experience:

- Each year the City of Toronto's purchases are valued at over $1.5 billion resulting from over 2,000 contracts issued to vendors for goods and services, professional services and construction services.
- The City is a founding member of Governments Incorporating Procurement Policies that are Environmentally Responsible (GIPPER). GIPPER policy states "*In order to contribute to waste reduction and to increase the development and awareness of Environmentally Sound Purchasing, acquisitions of goods and services will ensure that wherever possible specifications are amended to provide for the expanded use of durable products, reusable products and products (including those used in services) that contain the maximum level of post-consumer waste and/or recyclable content, without significantly affecting the intended use of the products or service. It is recognized that cost analysis is required in order to ensure that the products are made available at competitive prices*".
- The City established it's Environmentally Responsible Procurement Policy in 2007 with the goal of increasing the development, awareness and purchase of environmentally preferred products and services.
- The City has incorporated green requirements into almost 50 product specifications including paper products, cleaning products, paints, lumber, vehicles, electronics, etc.

Case Studies/Examples:

- In 2010, the City of Edmonton engaged all of the City's five General Managers and nearly 100 operational staff to develop a sustainable purchasing strategy (and policy) to connect the practice of sustainable purchasing to most of the City's key strategic plans in order to significantly increase awareness of the sustainable purchasing program. The City has provided information sessions and a sustainability trade show to over 1,300 employees about the Sustainable Purchasing Policy.
- The City of Edmonton developed a partnership with a private company to ensure that recycled paper generated in the City of Edmonton administrative offices is collected and processed at their recycling facility, located at the Edmonton Waste Management Centre. The newly manufactured recycled content paper is sold back to the City of Edmonton.
- The Toronto Zoo requires bidders to provide a brief statement that outlines the bidder's sustainable practices, a description of the positive attributes of the product or services to be provided (e.g. considering GHG reductions, waste reduction, toxicity reduction) and to complete the Zoo's Bidder's Environmental Questionnaire describing how the bidder's service will be provided in a sound sustainable manner.
- The UK Waste Reduction Action Programme (WRAP) has developed a

Option 9.11: Green Procurement

- The Purchasing and Materials Management Division developed a local food policy in 2011 requiring that when purchasing food (for purchases greater than $3,000) that all Request for Proposals (RFPs) and Request for Quotations (RFQs) shall include language to increase the percentage of food that is grown locally.
- Toronto established its Social Procurement Framework with the aim to advance workforce development through initiatives including customized recruitment strategies, offering apprenticeship programs and providing customized training.

Municipal/Waste Industry Experience:

- Green procurement (environmentally preferable purchasing) has evolved into sustainable purchasing in many municipalities.
- Over 20 Canadian municipalities have become members of the Municipal Collaboration for Sustainable Procurement (MCSP) to share best practices for operational excellence by collaborating and sharing resources to further green, sustainable and ethical purchasing. Toronto is not currently a member.
- Municipalities have found that supporting sustainable purchasing objectives has resulted in better supplier collaboration resulting from conversations about supplier sustainable achievements which have helped to build stronger relationships with suppliers.

sustainable procurement program that provides tools and resources to help public and private sector establishments adopt sustainable procurement actions and evaluate the sustainability of their supply chain. WRAP has developed e-learning modules including Introduction to Sustainable Procurement and key categories including construction and refurbishing, furniture, information/communication/technology, reuse and remanufacturing and textiles. The modules are designed to help procurement staff achieve cost savings by using resources more efficiently, and sending less waste to landfill.

- The State of Massachusetts has developed an extensive procurement training program that includes: reports, handbooks, specifications, policies and regulations, specific products and services information, checklists, contracts, events, links, contacts, and conference. The state offers networking events to bring vendors of green products with suppliers and has developed numerous specifications to be used by others.

Considerations:

- Sustainable purchasing embraces different types of purchasing practices that addresses various sustainability issues, such as: environmental preferable purchasing, ethical purchasing and socio-economic purchasing (purchasing to promote economic development and supporting minority groups).
- Toronto has major purchasing power and influence to make changes in environmentally preferred and sustainable purchasing.

Option 9.11: Green Procurement

- Toronto will be seen as "walking the talk" in promoting environmentally responsible purchasing.
- Potential for economic growth.
- Competitive nature of procurement may limit number of companies able to respond.
- Need for dedicated staff to assume the responsibility to continue pushing the environmental preferred purchasing cause.
- Need to overcome a perceived barrier that environmentally preferred or sustainable purchasing may be expensive to achieve.
- Assess the extent to which green procurement is actively practiced in City of Toronto.
- Quantify the impact of existing green procurement practices on market development and stabilizing markets for recycled products.
- Develop training and engagement programs with procurement staff.
- Staff and resources to develop an expanded sustainable/green procurement strategy.
- Corporate buy-in and support.

Potential Outcomes:

- Increased number of specifications for different goods and services.
- Expanded procurement objectives and strategy.

Option 9.12: Performance Measures to Define Success and Shape the Future of Waste Management

Expand on the current performance measures for solid waste management to align with the three fundamental concepts of sustainability.

System Component: Overall System Considerations

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City utilizes diversion rates as a measure of success for waste management programs.
- The City issues a Performance Measurement and Benchmarking Report which reports on Community impact (diversion rates), Customer Service (garbage collection complaints) Efficiency (costs to divert and dispose waste), Initiatives to improve effectiveness (addition of new materials to diversion programs).
- Toronto's Management Information Dashboard provides information to assess trends and directions of key indicators for Toronto as a whole and for City of Toronto services. Waste management revenue is one of many indicators monitored.
- The City provides information to the Ontario Municipal Benchmarking Initiative (OMBI).
- The City participated in the Global City Indicators Facility (GCIF) which is a program of the Global Cities Institute, created to allow cities across the world to share knowledge and information about city performance. Over 250 cities are participating, including the City of Toronto. Waste management is one of the indicators.

Municipal/Waste Industry Experience:

- Currently Ontario municipalities (including the City of Toronto) are highly focused on achievement of diversion (defined by Waste Diversion Ontario diversion = mass of waste diverted ÷ mass of waste generated) as the primary metric to judge the performance and future direction of their waste management systems.

Case Studies/Examples:

- York Region – Developed a data and performance management strategy as part of the SM4RT Living plan. York Region uses annual diversion reports, MMAH (Ministry of Municipal Affairs and Housing) Financial Information Return, Ontario Municipal Benchmarking Initiative, WDO Datacalls, and Statistics Canada Waste Management Industry Survey for data reporting and associated performance measures. Recommendations for the strategy included; a new performance matrix, polling, surveys and additional data collection, development of a data warehouse, and development of an annual reporting template.
- Durham Region has been working on an initiative called "Invisible Diversion" which investigates other programs and activities that lead to waste reduction and reuse (e.g. garage sales), as well as new ways of calculating waste diversion that take into account changes in packaging.
- California requires all jurisdictions to report diversion by kg/capita disposal to determine if they are achieving 50% diversion.
- Nova Scotia uses kg/capita to measure its goal of 300 kg/capita disposed by 2015.
- In BC all municipalities and facilities (public and private) must report tonnages and activities to the regional districts who then report to the Provincial Government through Re-Trac. The summary information at the Regional district level is published as total (tonnes) and kg/capita disposal.

Option 9.12: Performance Measures to Define Success and Shape the Future of Waste Management

- Light-weighting of products and packaging is skewing the familiar of a mass-based metric of blue box diversion.
- Heavier packaging (e.g. glass and steel) replaced by pouches, plastic, aluminum, aseptic and polycoat containers).
- Changes in waste composition – reduction in fibres with a shift to electronic media, increases in new types of packaging, light-weighting.
- Many of the more recent increases in diversion rates in Ontario have resulted from municipalities moving to divert source separated organic wastes from disposal.
- While there remains room for improvement, it is clear that increases in diversion of blue box tonnage has slowed and in many cases become static.

Considerations:

- Each waste management and diversion activity (i.e. collection, processing, recycling and disposal) has a different sustainability profile for each waste stream (i.e. garbage, Blue Bin, Green Bin etc.) in terms of environmental considerations, community implications and financial costs.
- Acknowledges initiatives other than curbside waste collection designed to increase reduction, reuse and recycling waste.
- The growing trend toward increased producer responsibility will continue to influence the solid waste management industry in Ontario for the foreseeable future; however it is currently uncertain as to precisely how this influence will manifest itself.
- There are practical limitations on the ability of downstream management approaches (i.e. application of processing technologies and recycling) to reduce long-term reliance on landfill disposal. At the same time, the City's ability to influence upstream activities (i.e. reduce and reuse) is largely indirect, has practical limitations and is focused in the areas of advocacy, promotion, education and enforcement.
- Measurement of reduction and reuse activities can be time intensive and difficult to track.
- Develop a full suite of key criteria and metrics to reflect the City's priorities and take into account the degree to which the City can control or influence the outcomes embedded in the criteria. Criteria may be unique to the City and/or similar to those used in other municipalities for comparison.
- The metrics for each criterion would be measured and calculated for the entire City's waste management system.
- Develop a database with the capability to import data from many sources, and should have reporting functions tailored to allow for program reporting that address key performance metrics identified for each strategy or program.

Option 9.12: Performance Measures to Define Success and Shape the Future of Waste Management

Potential Outcomes:

- An overall balanced scorecard which compares each metric against its target and assigns an individual score.
- The scores of the metrics can be considered individually to assess achievement for discrete aspects of the City's waste management system and an overall performance score can be tallied.
- By establishing objective metrics, comparison of scores over time can provide a gauge of progress.

Option 9.13: Centre of Excellence

Toronto develops an environmental Centre of Excellence to advance new, innovative ideas promoting resource conservation, including waste, water, energy resulting in cost savings and reduction in greenhouse gases. The Centre can help to 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. Governance of the Centre would allow City staff to enter into financial partnerships for some projects subject to City approval. The Centre would work to develop partnerships and facilitate training.

System Component: Overall System Considerations

Source of Option: City Staff & Consultants
City of Toronto staff request

City of Toronto Experience:

- Toronto has been a leader in waste diversion by virtue of being the first community in North America to develop Anaerobic Digestion for residential source separated organics (SSO) and the largest community to introduce variable cart Pay as You Throw and Green Bin collection.
- The City is the largest municipality in Canada and could be influential in developing new ideas and recyclable end markets.
- Toronto established the Environment and Energy Division in 2012 through the consolidation of the Toronto Environment Office and the Energy and Strategic Initiatives group in Facilities Management to promote environmental sustainability, energy efficiency and conservation within the City's internal operations and to develop and implement environmental policies and programs that promote sustainable development and the growth of the green economy.

Municipal/Waste Industry Experience:

- Communities are addressing integrated resource conservation.
- Waste reduction, energy and water conservation are the most cost effective method to reduce system costs.
- Universities and colleges have established Centres of Environmental Excellence (e.g. Sir Wilfred Grenfell College, NL; International Centre for Indoor

Case Studies/Examples:

- Opened in 2003, the Edmonton Waste Management Centre of Excellence (EWMCE) is a non-profit corporation formed by the City of Edmonton in partnerships with institutions (including University of Alberta, Alberta Research Council, Northern Alberta Institute of Technology) and private sector interests. The Centre was instrumental in developing innovative facilities such as a paper recycling facility, biofuel facility, and a construction and demolition waste recycling facility. The education centre provides training to help establishments reduce and divert waste including IC&I training, First Nation's solid waste site safety training, wastewater treatment and biosolids training.
- United Kingdom Waste Reduction Action Programme (WRAP) is a registered charity governed by a Board of Trustees that acts on the principles of a Centre of Excellence. WRAP brings together different stakeholders to work collaboratively on issues and opportunities around thinking of waste as a resource and promoting waste reduction and resource efficiency. WRAP has embraced the Circular Economy paradigm and has focused its efforts on the areas of food and drink, clothing and textiles, and sustainable electronics. WRAP develops programs, training and education promoting the key areas of focus.
- The Syracuse Center of Excellence (SyracuseCoE) is a federation of firms, organizations, and institutions promoting

Option 9.13: Centre of Excellence

Environment and Energy at the Technical University of Denmark; CAS-TWAS Centre of Excellence for Water and Environment, Chinese Academy Science (CAS), Beijing; and Jane Goodall Center for Excellence in Environmental Studies at the Western Connecticut State University) as places to bring together stakeholders of different disciplines for research, learning, networking and information exchange purposes.

excellence in energy and environmental systems in urban settings. The purpose of the SyracuseCoE is to create jobs and wealth in New York State through collaborations in research, development, and education.

- The MaRS Discovery District is a not-for-profit corporation located in Toronto with a goal of supporting entrepreneurs and new ventures, particularly in the areas of work and learning, health and energy.

Considerations:

- Places Toronto in a leadership position.
- Toronto has already established the Environment and Energy Division which can provide leadership and support in creating a Centre of Excellence.
- Potential creation of green jobs and "circular economy" development opportunities.
- Toronto could use the Centre of Excellence to promote other environmental programs where Toronto is known to be a leader.
- Offers a central unit to promote community partnerships and collaboration, circular economy, promotion and education.
- The Centre would create synergies by having innovative thinkers and programs with similar needs under one roof (e.g. partnership program).
- Up-front investment is unknown and dependent on potential partnership arrangements.
- Needs up-front effort to establish partnerships and funding support.
- May be difficult to sell the business case in the short to medium term.
- Performance or success may be intangible or difficult to measure.
- Determine what environmental issues will be featured and services to be offered (e.g. research, funding, education, training, networking).
- Determine how Centre will be governed, staffed, administered and operated.
- Support innovation and commercialization by local green companies and organizations through partnering on applied research and proof of concept pilots.
- Governance rules for the Centre of Excellence would need to be established to allow City staff to enter into financial transactions and partnerships subject to Council approval.

Potential Outcomes:

- Research and potential development of new waste diversion technologies.
- Promotion of innovative ideas.
- Development of waste diversion and environmental training and education programs.
- Established and well formed partnerships.

Option 9.14 – Establish a High Profile Circular Economy/Waste Reduction Committee To Inform On-going Waste Planning/Implementation Process

The current trend in waste reduction is the concept of a Circular Economy. There is considerable interest in how to move the economy from a linear model (in which natural resources and energy are extracted and made into goods that are then used and discarded as waste, that's either disposed of or recycled) toward a circular model in which everything is designed for reuse, disassembly and remanufacturing. This option would establish a high profile Committee that would address circular economy issues for Toronto and support City efforts to reduce waste and support innovation.

System Component: Overall System Considerations

Source of Option: City Staff

City of Toronto Experience:

- In 2001, the City of Toronto set up Task Force 2010 to outline a plan to reach zero waste by 2010. The Task Force plan called for a solid waste diversion rate of 30% by 2003, 60% by 2006 and 100% by 2010. In 2000, the City recycled, reused or composted 24% of the approximately 1 million tonnes of waste generated by Toronto households.
- In January, 2012, the Toronto Environmental Alliance (TEA) announced the formation of the Ontario Zero Waste Coalition (OZWC), a coalition of 22 environmental groups from across the province. OZWC recommended 5 Zero Waste priorities to the province: focusing on initiatives to reduce waste; implementing more extended producer responsibility (EPR) programs; standardizing recycling and organics collection across the province; setting municipal targets for recycling and improving diversion from the IC&I stream.

Municipal/Waste Industry Experience:

- The concept of Zero Waste is being slowly replaced with the concept of a Circular Economy with many of the same principles and objectives of Zero Waste movements.
- In March, 2015, the Dutch municipality of Haarlemmermeer, along with private partners in the Haarlemmermeer region, came together to create the world's first regional plan based on the principles of a

Case Studies/Examples:

- A recent Conference Board of Canada report identified that by moving to a more circular economy, where Ontario increasingly reuses and recycles the resources it already has, close to 13,000 new jobs could be supported in the province. This job estimate, which may be conservative, would also increase Ontario's gross domestic product by an estimated $1.5 billion.
- Metro Vancouver's 21 local councils have set a target for the Metro area of: reducing per capita generation of waste by 10% by 2010; increasing recycling rates from current 60% to 70% by 2015; and aiming for 80% recycling by 2020. In addition, in October 2013, Metro Vancouver – in collaboration with the Federation of Canadian Municipalities – established the National Zero Waste Council.
- Zero Waste Scotland is an organization funded by the Scottish Government to support the delivery of its Zero Waste Plan and other low carbon and resource efficiency policy priorities. Zero Waste Scotland supports 11 groups of local volunteers that work in a range of communities across Scotland to help households recycle more and save money by reducing recyclables and food waste.
- San Francisco Bay/Sierra Club Chapter Zero Waste Committee -A "blue ribbon" steering committee was established by the Sierra Club to actively support zero waste by keeping a watchful eye on legislation and providing technical assistance to local

Option 9.14 – Establish a High Profile Circular Economy/Waste Reduction Committee To Inform On-going Waste Planning/Implementation Process

circular economy, with support from Arizona State University (ASU).
- The Recycling Council of Ontario, Ontario Waste Management Association (OWMA) and others endorse the concept of the circular economy.
- In October 2013, the Federation of Canadian Municipalities (FCM) in collaboration with Metro Vancouver created the National Zero Waste Council.
- In October 2014, Zero Waste Canada and the Zero Waste International Alliance (ZWIA) sponsored its first conference in Nanaimo BC entitled "Alternatives to Incinerators and Landfills".
- Several dozen US municipalities have committed to actively pursue the goal of zero waste (including San Diego, Los Angeles, New York, San Francisco, San Jose, Oakland and Austin Texas).
- Examples of Canadian municipalities that have committed to zero waste include Nanaimo, BC and Greater Vancouver BC.
- The Zero Waste International Alliance (ZWIA) is an international support organization for national, regional, municipal and business zero waste plans, activities and conferences. The GrassRoots Recycling Network (GRRN) in the US is one of the more prominent members of ZWIA.

government agencies and Sierra Club committees and staff. The city of San Francisco has set a goal of zero waste by 2020. The city's Departments of the Environment, Public Works and the contract refuse hauler are responsible for all programs that work towards this goal.
- The Boston Zero Waste Task Force is a multi-stakeholder group made up of labor and business leaders, community and neighborhood groups, Zero Waste and recycling experts, and environmental and social justice advocates.

Considerations:
- Provides on-going feedback and support for the City in working to meet the challenges of reducing waste and creating local green jobs.
- The City of Toronto establishes itself as a leader and collaborator with other leading jurisdictions in reducing waste and creating local businesses using waste as a resource.
- The City establishes an on-going process to engage with leading businesses and interest groups to support the move towards a circular economy.
- Oversight from a relatively independent body to ensure that the circular economy vision is implemented over time.
- Could be a complex process to manage and ensure tangible results.
- Would require Council direction to support a circular economy philosophy.
- Could be part of the Port Lands redevelopment.