Technical Memorandum No. 4
Options Evaluation

LONG TERM WASTE STRATEGY

TORONTO

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1 Importance of Having a Waste Strategy

Waste management and diversion programs in the City of Toronto (the City) have evolved from simple garbage collection to a complex system of collecting source separated materials including Blue Bin materials, Green Bin organics, garbage, Oversized and Metal Items, Electronic Waste and Household Hazardous Waste, as well as a range of other items.

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

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

In 2013, Solid Waste Management Services (SWMS) presented a report to Public Works and Infrastructure Committee (PWIC), which provided a status update of the Target 70% initiatives; an explanation of why 70% diversion was not achieved. It also described plans for moving forward on diversion initiatives in 2013, including the development of a Long Term Waste Management Strategy.

Recognizing the need for an updated comprehensive long-term waste management plan to set the foundation for future planning and coordinated decision making, the City of Toronto commissioned the development of a Long Term Waste Management Strategy in 2013[1].

The draft Long Term Waste Management Strategy (the draft Waste Strategy) recommends waste reduction, reuse, recycling, recovery and residual disposal (the 5Rs) (see Figure 1-1 below for a more complete description of the 5Rs) policies and programs that are cost-effective, socially acceptable and environmentally sustainable for the long

[1] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.PW21.1

term. This is a "triple bottom line" approach that gives consideration to each component during the development of the draft Waste Strategy. The draft Waste Strategy anticipates the future needs of the City and identifies options to meet the needs for all of the City's customers.

Figure 1-1: 5Rs Waste Management Hierarchy

2 Developing the Waste Strategy

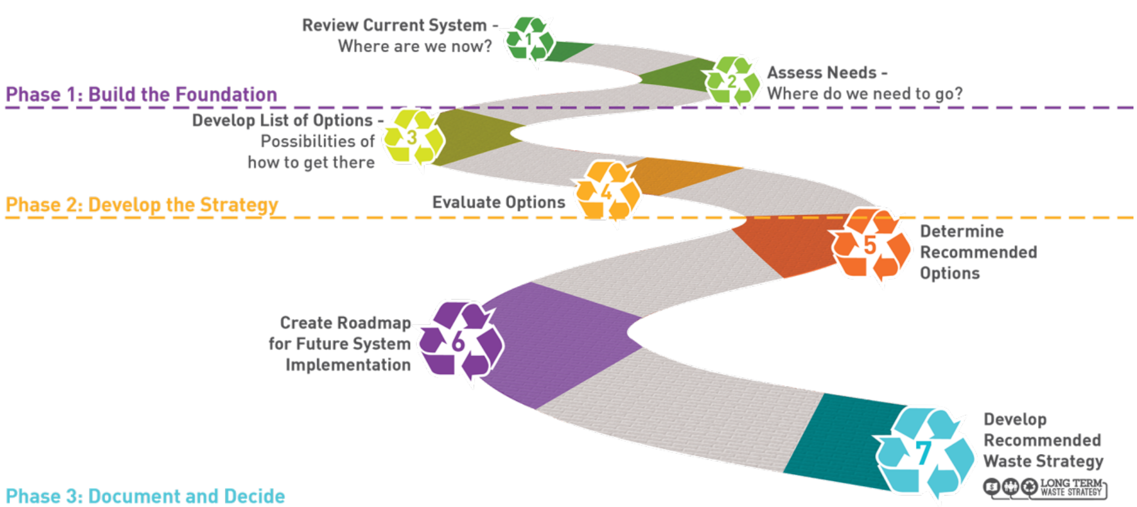
Development of a Long Term Waste Management Strategy is Strategic Action #7 in Council's 2013-2018 Strategic Action Plan. The Long Term Waste Management Strategy is to be developed in partnership with community and divisional stakeholders that are environmentally sustainable and economically viable. The intent of the draft Waste Strategy is to provide a high level decision making document to guide SWMS' policy decisions for the duration of the planning horizon of 30 to 50 years.

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

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

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

Figure 2-1: Waste Strategy Development Process



Phase 1 - BUILDING THE FOUNDATION

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

Deliverable 1 –"Where are we? Establishing a Comprehensive Baseline"
The purpose of this phase was to document the existing waste reduction, reuse, collection, transfer, processing, disposal and financial systems used to manage waste in the City. This baseline was used as the foundation upon which future programs, policies and facilities' recommendations are based. As part of the baseline, previous strategies that have been developed were taken into consideration, including outstanding recommendations for change such as development of a Mechanical Biological Treatment (MBT) facility. Phase 1 sets the baseline from which future options and recommendations were assessed in the Waste Strategy. The baseline has been documented in Technical Memorandum No. 1[2].

Deliverable 2 – "Where do we need to go? Identifying the Long-Term Needs"
Once a baseline had been established, projections for the future were developed in order to estimate requirements for waste management for the next 30 to 50 years. Variables that could impact the system including population growth, housing trends, economic growth, product design, packaging changes, City planning initiatives, and potential changes to legislation were reviewed in this phase. Technical Memorandum No. 2[3] documents the gaps, challenges and opportunities in Toronto's integrated waste management system. It includes projections for the future quantities of waste to be managed and the vision and guiding principles to guide the implementation of the Waste Strategy in the future.

Phase 2 - DEVELOP THE WASTE STRATEGY

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

Deliverable 3 – "How do we get there? Consideration of Options"
A range of policies, programs, and facility/technology options were reviewed to identify options the City could consider in the future. Options included additional

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

waste reduction and reuse programs and services, other waste diversion techniques and practices, renewable energy projects, waste technologies (e.g. Mixed Waste Processing (MWP)), Energy from Waste (EFW), alternative disposal options (e.g. redirecting waste to other landfills), and long-term opportunities for Green Lane Landfill. Where appropriate, separate options were identified to manage waste from the single family residential and multi-residential sectors since these two sectors have different waste management needs and in some cases may require different programs and infrastructure. Technical Memorandum No. 3[4] identifies and discusses a list of options available to the City and describes the evaluation methodology and criteria used to evaluate each option.

Deliverable 4 – "Evaluate the possibilities. Identifying the Best Options for the City" (SUBJECT OF THIS DOCUMENT)
During this phase, a detailed evaluation of the options identified in Phase 2 was conducted from an environmental, social and financial perspective to identify a series of recommended long-term options for the City. Technical Memorandum No. 4 (this document) provides an overview of the evaluation process and resulting recommended options for the City.

Phase 3 – DOCUMENT AND DECIDE
Once the recommendations for change have been determined, the Waste Strategy document will be prepared to identify what the new system will look like, the timing for any proposed changes, the financial requirements to support the new system and the roles and responsibilities of all those involved.

Deliverable 5 – "Prepare and draft the Long Term Waste Management Strategy document"
The Waste Strategy will be developed using the results of the evaluation process. It will include an implementation "roadmap" to help guide the City's integrated waste management system for the next 30 to 50 years. The final Waste Strategy will also include a consultation report documenting the consultation activities conducted during development of the Waste Strategy. Reports on consultation completed to date can be found on the City's website[5].

In parallel to the completion of the three phases, a comprehensive consultation plan has been, and will continue to be, implemented to present information, solicit feedback, and provide an opportunity for the community to help guide the development of their future waste management system. Throughout the process, City staff will provide regular updates to PWIC on the development of the Waste Strategy.

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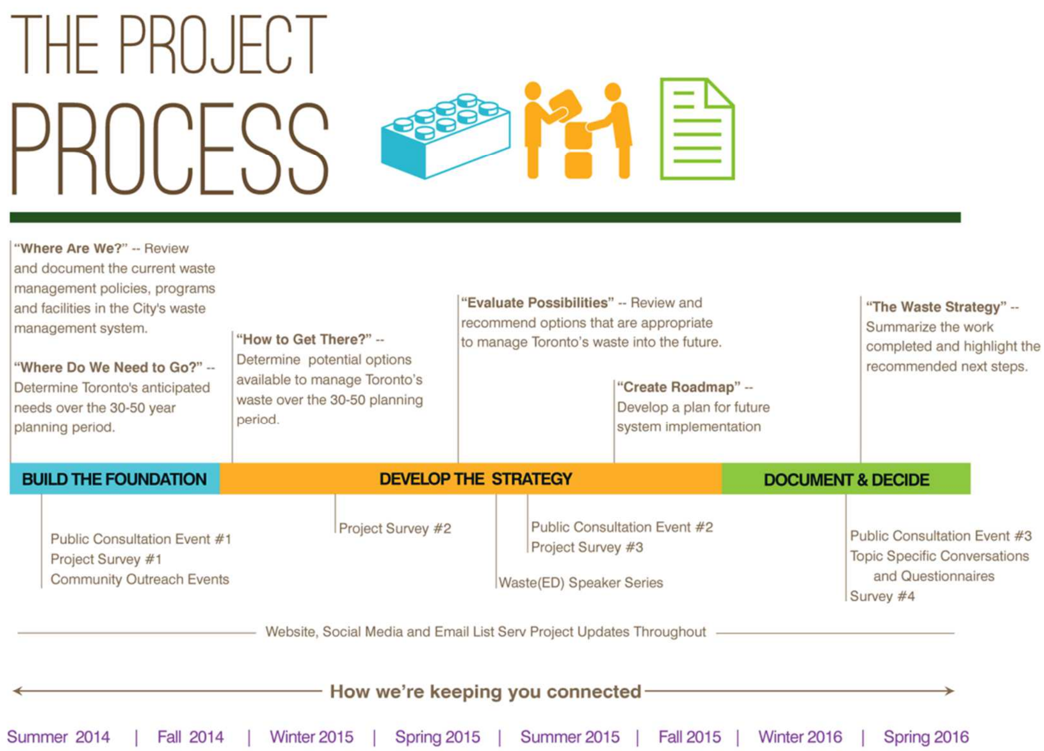
[4] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD
[5] http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=98fc8005b7ae7410VgnVCM10000071d60f89RCRD

The following Figure 2-2 shows how the Waste Strategy consultation plan was incorporated into the three phases described above.

Figure 2-2: The Project Process



3 Options Identification and Evaluation Methodology

As described above, Technical Memorandum No. 3 identifies and discusses a list of options available to the City that could be implemented in the future, as well as an evaluation methodology and criteria to be used to evaluate each option.

The evaluation of potential options followed a four phase approach that used both qualitative and quantitative data where available.

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

Phase 2: Grouping of Similar Options. For evaluation purposes, similar options that could address specific gaps and or challenges were grouped together into the following categories: Waste Reduction and Reuse; Drop-off Facilities; Commissioners Transfer Street Station; Recovery (new facilities); Residual Waste; Multi-residential; Industrial, Commercial & Institutional; Construction, Renovation, Demolition; Control, Bans & Enforcement; and Incentive Based Mechanisms. These categories were also important as they reflect the various components of the integrated waste management system. Within each category, like options were comparatively evaluated to determine the recommended options. Some of the options were identified as Future Considerations or Implementation Tools. These options will be considered in the context of what is recommended for implementation (e.g. an Implementation Tool option will be utilized to support the implementation of a recommended program or facility) or a Future Consideration where timing for a more detailed evaluation will be identified (e.g. future processing capacity needs to be considered where there is already capacity in the system for the foreseeable future, and a recommendation on how to proceed is best deferred to a more appropriate time in the future once the impact of recommended programs and facilities is better understood following their implementation).

Phase 3: Application of Evaluation Criteria and Identification of Relative Scoring. The defined evaluation criteria were applied to estimate the potential impacts and opportunities of the specific option, and relative scoring is applied to identify which options “score” higher within a particular grouping of options addressing a common need. For example, the potential impacts to air are identified and those options that help to reduce air emissions (and/or are less than other opportunities being identified) are advantaged over other options that may have greater air emissions.

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

It is important to note that through this evaluation process, multiple options could have been identified as preferred (i.e. options result in similar "scores") and in these circumstances, priority for implementation has been placed on those opportunities that are more advantaged over others.

The evaluation process concludes with a series of recommended options for implementation in the City of Toronto and have been identified as changes that either: a) have potential for improving the current system; or, b) will provide a potential replacement/ alternative/ substitute for a current component of the system.**Error! Reference source not found.**Table 3-1 presents the list of system components, and the options discussed in the following sections that were evaluated.

A complete description of all the options can be found in Technical Memo No. 3[6], including those classified as "Implementation Tools" or "Future Considerations". Technical Memorandum No. 3 also included and described the evaluation methodology and criteria used to evaluate each option.

Table 3-1: Summary of Options by System Component

System Component	Option Number and Title
Generation, Reduction and Reuse	Option 2.2: Food Waste Reduction Strategy.
	Option 2.3: Textile Collection and Reuse Strategy.
	Option 2.4: Sharing Library.
	Option 2.5: Support Reuse Events.
	Option 2.6: Explore Opportunities for Waste Exchange.
Collection & Drop-off Depots	Option 3.3: Stand Alone Drop-off and Reuse Centres.
	Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations.
	Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials.
Commissioners Street Transfer Station	Option 4.1: Relocation of Commissioners Street Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.
	Option 4.2: Redirecting Waste to an Existing Transfer Station(s).
	Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).
Materials &	Option 6.1: Mixed Waste Processing Facility Development.

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

System Component	Option Number and Title
Energy Recovery	Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development.
	Option 6.3: Direct Combustion Facility Development.
	Option 6.4: Emerging Technologies Facility Development.
	Option 6.5: Organics Recycling Biocell or Biomodule.
	Option 6.6: Refuse Derived Fuel Facility Development.
	Option 6.7: Waste to Liquid Fuel Technologies Facility Development.
Residual Waste Disposal	Option 7.1: Landfill Expansion.
	Option 7.3: Bio-reactor Landfill.
	Option 7.5: Adjust Tipping Fees or Customer Base.
	Option 7.6: Purchase a New Landfill.
	Option 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfill.
	Option 7.7b: Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity.
	Option 7.8: Greenfield Landfill.
Overall System Considerations: Multi-residential Services	**Organics Management**
	Option 2.7: Community/Mid-Scale Composting.
	Option 5.1: On-site Organics Processing.
	Option 5.2: In-Sink Disposal Units.
	Waste Collection Methods
	Option 3.1: Container Management.
	Option 9.1: Elimination of Collection Service to Multi-residential Buildings.
	Option 3.7: Multi-residential Collection using Alternative Vehicles.
	Option 3.2a: Alternative Collection Methods for Multi-residential Buildings – One Container System
	Option 3.2b: Alternative Collection Methods for Multi-residential Buildings – Vacuum System
	Planning, Policies and Enforcement
	Option 1.8 Multi-residential by-law and Enforcement.
	Option 1.9. Updates to Current Multi-residential Development Standards.
Overall System Considerations: Industrial, Commercial and Institutional Services	Option 9.3: Expand City of Toronto Share of Industrial, Commercial and Institutional Waste Management Market To Provide Diversion Opportunities to More Commercial Businesses in City of Toronto
	Option 9.4: Explore Mandatory Approaches to Industrial, Commercial and Institutional Waste Diversion
	Option 9.5: City of Toronto Exits the Industrial, Commercial and Institutional Waste Management Service.
Overall System Considerations:	Option 10.1: Depots, Processing, and Policies to Divert Construction, Renovation, Demolition Waste

System Component	Option Number and Title
Construction, Renovation, Demolition (CRD) Services	Option 10.2: Construction, Renovation, Demolition Material Disposal Ban.
Overall System Considerations: Incentive-based Mechanisms	Option 3.6: Incentive Based Drop-off System (e.g. Reverse Vending Machines).
	Option 9.8: Deposit-return System for City of Toronto for Selected Materials.
Control, Bans, & Enforcement	Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management.

For each of the options identified above, full descriptions were developed including: a summary; City of Toronto Experience; Municipal/Waste Industry Experience; Case Studies/Examples; Considerations; and Potential Outcomes. Full descriptions of these options can be found in Technical Memorandum No. 3. For those options undergoing evaluation, the descriptions form part of the evaluation tables and also form part of Appendix A to this Technical Memorandum (Technical Memorandum No. 4).

The following Table 3-2 contains the approved[7] evaluation criteria that were applied to the options identified. The criteria have been organized under three categories that represent the three fundamental pillars of sustainability (Environmental, Social and Financial) and support a triple bottom line analysis of each option. Beside each criterion are sets of indicators, which are the specific considerations or measures that were applied where appropriate to identify the potential net effects related to the respective criterion. It is important that evaluation criteria are appropriate to the options being evaluated and therefore adjustments to the criteria and their application have been undertaken as appropriate and depending on the options evaluated.

As described in Technical Memorandum No. 3, the criteria involving public health were specifically reviewed by Toronto Public Health (TPH) staff as well as an expert panel of professionals using a modified version of the TPH Health Impact Assessment (HIA) Screening Assessment Tool to score the health-related options. Each option was considered from the perspective of multiple determinants of health. Based on the information available, the direction of the potential impact (negative or positive) was predicted, as well as an estimate of the magnitude of the impact. This information was incorporated into the overall evaluation process for each option.

[7] Approved by Resolution of City Council on September 30, 2015.

Table 3-2: Approved Evaluation Criteria

Category	Criteria	Indicators
Environmental Impact/Benefit	Local Environmental Impact/Benefit	• Potential impacts/benefits to land resources • Potential impacts to local airshed • Potential impacts to local water sources • Potential water consumption requirements • Total land required and land use displacement
	Regional/Global Environmental Impact/Benefit	• Energy and fossil fuel generation / consumption • Greenhouse gas contributions
	Public Health Impact/Benefit	• Potential to impact human health • Potential to impact ecological health
	Potential to Increase Diversion	• Ability to recover additional reusable and/or recyclable materials
	Waste Hierarchy	• Consistency with the priorities of the waste hierarchy
Social Impact/Benefit	Approvals Complexity	• Complexity associated with approvals and permitting requirements
	Potential for Land Use Conflicts/Community Interruption	• Potential for traffic increase/reduction • Potential for litter increase/reduction • Potential odour emissions • Potential noise emissions • Potential for increased vector/vermin
	Collaboration	• Ability to partner with other municipalities/ organizations
	Complexity	• Program complexity to user
	Convenience	• Ease of participation
	Community Safety	• Potential for impacts to community safety
	Equity	• Potential for unequal impacts/benefits to specific groups
	Behaviour Change	• Potential to influence or encourage behaviour resulting in sustainable waste reduction choices
Financial Impact/Benefit	Cost	• Estimated net capital cost • Estimated net operating cost

Category	Criteria	Indicators
	Health Care Cost Implications	• Potential to increase health care costs
	Risk	• Potential for contractual risk • Schedule risk • Innovation risk
	Economic Growth	• Potential for local economic growth • Potential for regional/global economic growth
	Local Job Creation	• Potential for additional local job creation
	Flexibility	• Ability to accommodate future changes (e.g. Regulation, waste composition, etc.)

3.1 Purpose of this Technical Memorandum

Following the development of a list of potential options covering the full range of the waste management hierarchy, a detailed evaluation of each option was completed. Technical Memorandum No. 3[8] included a detailed evaluation methodology, including the evaluation process, criteria and priorities in the evaluation that was approved by City Council in October 2015. The purpose of this Technical Memorandum No. 4 is to document the evaluation of each of the program and facilities/infrastructure options identified, the results of the evaluation process to identify the recommended options and the implementation considerations for the recommended options.

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

4 Application of Evaluation Criteria

A successful Waste Strategy reflects the interests of the community that it serves now and in the future. It is driven by a Vision Statement and Guiding Principles that express a philosophy of what the Waste Strategy will strive to achieve. It is also supported by a review and evaluation of potential options for the future that reflects what is important to the community.

In order to ensure the evaluation process to be applied in the development of Waste Strategy was acceptable to the community and its many stakeholders, the proposed evaluation criteria were included in the Phase 2 consultation process.

The proposed evaluation criteria were developed to reflect the Vision and Guiding Principles set out for the Waste Strategy and have been revised where appropriate to reflect input received during the Phase 2 consultation process.

Section 3 above provides a summary of the evaluation process that was completed. For a more detailed overview of the evaluation methodology, please refer to Technical Memorandum No. 3[9].

4.1 Use of Scorecard

The following provides the comparative evaluation "scorecard" that was utilized in the evaluation of options to ensure the consistent application of criteria.

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

Table 4-1: Comparative Evaluation Scorecard

Criteria	Indicators	Low (1)	Medium (2)	High (3)
Environmental Impact/Benefit				
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources.	Potential to contaminate ground surface.	Minimal to no impact/benefit to land resources. No contact with ground surface.	End-product can benefit land (e.g. compost, digestate, biosolids).
	Potential impacts to local airshed.	Significant release of emissions to atmosphere.	Some release of emissions to atmosphere.	Minimal to no release of emissions to atmosphere
	Potential impacts to local water sources.	High potential to contaminate water.	Some potential to contaminate water.	Minimal to no release of potential contaminants to water.
	Potential water consumption requirements.	Large quantities of water required (e.g. for processing).	Some water required for cleaning, staff facilities, etc.	Minimal to no water required.
	Total land required and land use displacement.	Requires additional land for implementation and operation.	Minimal to no additional land required.	Potential to “free up” space/land. Located on existing site/building.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption.	More fuel used to haul materials a longer distance (i.e. more consumption). Increased in Power Consumption	Minimal to no energy and fossil fuel generation/consumption.	Energy generated to offset fuel/energy used.
	Greenhouse gas (GHG) contributions.	Option results in increased traffic/ vehicles and/or hauling material longer distances. Option results in more methane generating material going to landfill.	Minimal to no additional GHG emissions produced.	Production of biofuel/energy offsets GHG emissions or displaces uses of traditional fuel. Consolidation of facilities/vehicles. Minimal to no vehicle usage. Diverts methane generating material from landfill.
Public Health Impact/Benefit	Potential to impact human health	Potential for adverse impacts on public health.	Minimal to no potential for beneficial impact on public health.	Potential for beneficial impact on public health.
	Potential to impact	Potential for off-site	Minimal to no potential for off-	Benefit to ecological health by

Criteria	Indicators	Low (1)	Medium (2)	High (3)
	ecological health	release of potential contaminants.	site release of potential contaminants.	reducing potential contaminants to the environment.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	Minimal to no potential for diversion. (0-1%)	Some potential for diversion. (2-5%)	High potential for diversion. (>5%).
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Significant consistency with the priorities of the waste hierarchy. Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.
Social Impact/Benefit				
Approvals Complexity	Complexity associated with approvals and permitting requirements	Large complex multi-stakeholder approvals required (e.g. EA).	Medium complexity approvals required (e.g. ECA or amendment, Zoning by-law change).	No other approvals required.
Potential for Land Use Conflicts/ Community Interruption	Potential for traffic increase/reduction	Increase in potential for additional traffic.	Minimal to no increase/reduction in traffic.	Reduction in potential traffic.
	Potential for litter increase/reduction	Increase in potential for litter generation.	Minimal to no increase/reduction in litter.	Reduction in potential for litter generation.
	Potential odour emissions	Potential for increased odour emissions.	Minimal to no odour emissions.	Reduction in potential for odour emissions.
	Potential noise emissions	Potential for increased noise.	Minimal to no noise emissions.	Reduction in potential for noise emissions.
	Potential for increased vector/vermin	Potential for increased vector/vermin.	Minimal to no potential for vector/vermin.	Reduction in potential for vector/vermin.
Collaboration	Ability to partner with other municipalities/ organizations	No ability to partner with any municipality or organization.	Can only partner with a single group (e.g. municipalities) or limited ability to partner.	Ability to partner with a large number of municipalities or organizations.
Complexity	Program complexity to user	Program is complex and requires significant	Some complexity with need for some participant education.	Program is very easy to use and understand.

Criteria	Indicators	Low (1)	Medium (2)	High (3)
		participant education.		Option does not involve user.
Convenience	Ease of participation	Not convenient/easy to access, requires significant effort for customer to participate.	Relatively easy to access with limited effort required for customer participation.	No additional effort to participate. Program comes to user (e.g. mobile depot) or can be used in-home/on-site.
Community Safety	Potential for impacts to community safety	Potential to increase number and type of safety issues	Minimal to no potential to increase number and type of safety issues.	Potential for improvement to community safety
Equity	Potential for unequal impacts/benefits to specific groups	Option could have unequal impacts on residents/stakeholders.	Option is available to everyone equally.	Increased equality when compared to current situation.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Minimal to no potential to change behaviour as user is not connected with option (e.g. recovery facility, or landfill).	Some potential to change behaviour through promotion and education activities, campaigns, strategies.	Significant potential to change behaviour through by-law, act, fees, bans.
Financial Impact/Benefit				
Cost	Estimated net capital cost	Highest capital costs relative to other options.	Medium capital costs relative to other options.	Minimal to no capital costs relative to other options.
	Estimated net operating cost	Increases in operating costs.	Minimal to no change to current operating costs.	Potential to reduce operating costs.
Health Care Cost Implications	Potential to increase health care costs	Potential to result in increased health costs	Uncertain although unlikely that the option will result in increased health care costs	Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	Complex option with multiple suppliers/parties.	Limited risk with some reliance on implementation/operation by third-parties. Contract risk is manageable.	Minimal to no contractual risk with implementation/ operation with City Staff.
	Schedule risk	High schedule risk. Complex option with multiple suppliers/parties.	Some schedule risk, but manageable. Some risk with timing of approvals.	Minimal to no schedule risk. Option is relatively easy to implement.
	Innovation risk	Significant innovation risk since option involves	Some innovation risk with some aspects of known	Minimal to no innovation risk, option includes collection,

Criteria	Indicators	Low (1)	Medium (2)	High (3)
		collection, processing, disposal technology or equipment which is not proven or used in a similar scale as for City of Toronto waste management.	collection, processing, disposal technology or equipment which may not have been used at the same scale required for Toronto.	processing, disposal technology or equipment all well known and used at a similar scale as required for City of Toronto.
Economic Growth	Potential for local economic growth	Minimal to no potential for local economic growth. Option not situated in the City of Toronto.	Some potential for local economic growth. Short term option with limited potential for local economic growth.	Significant potential for local economic growth. Option involves multiple parties which can provide economic growth opportunities. Option results in end-products which require collection, processing, disposal. Option results in beneficial end-product which can be further processed and marketed (e.g. compost, compressed natural gas). Long term option with potential for economic growth in the future.
	Potential for regional/global economic growth	Minimal to no potential for regional/global economic growth.	Some potential for regional/global economic growth on a short term basis.	Significant potential for regional/global economic growth since option utilizes businesses, equipment or technology located in Canada or internationally on a long-term or ongoing basis.
Local Job Creation	Potential for additional local job creation	Option reduces potential for local job creation (e.g. situated outside City of Toronto). Option removes jobs.	Minimal to no potential for local job creation. Option run by volunteers. Option does not provide ability to generate jobs (e.g. reuse events).	Some or significant potential for local job creation. Option creates a number of local short or long-term jobs.

Criteria	Indicators	Low (1)	Medium (2)	High (3)
Flexibility	Ability to accommodate future changes	Minimal to no flexibility. Not flexible – can only be located in certain areas, cannot be re-located easily, specific to certain feedstocks, produces limited end-products. Would require significant permitting/approval changes to accommodate changes. Limited or fixed capacity.	Some flexibility. Somewhat flexible – can handle some changes in material or feedstock, could be relocated or sited elsewhere. Minor amendments required for approvals/permits. Somewhat easy to expand.	Significant flexibility. Very flexible - High ability to accommodate future changes in feedstock, materials accepted, location, produces a variety of products with many markets etc. Easily moved to different locations. Modular option, easily expanded.

5 Summary of Comparative Evaluations Results

The following sections provide an overview of the results of the comparative evaluation of the options. For each option undergoing evaluation, evaluation criteria (as approved by City Council on October 2, 2015) were applied to determine which options would be most appropriate for future implementation. Once the criteria had been applied, a comparative evaluation was completed whereby each option was compared to other options within the same grouping.

A comparative evaluation process was undertaken for each "group" of options (as shown in Table 3-1), including the development of a set of detailed evaluation tables and a comparative ranking table with scores. The detailed evaluation tables can be found in **Appendix A**.

The results have been organized by option group, which were developed to address a specific gap, challenge, or future opportunity. For each group of options, the following is presented:

- Gap, Challenge and/or Opportunity Addressed;
- Summary of Options Identified;
- Evaluation of Options;
- Comparative Evaluation;
- Recommended Options for Further Consideration; and,
- Implementation Considerations.

A comparative evaluation table is included in the discussion of the evaluation of each group of options. The table has been colour-coded to provide a comparison of each option for each indicator as follows:

- Green shading indicates the option scored High, compared to the other options;
- Yellow shading indicates the option scored Medium, compared to the other options;
- Red shading indicates the option scored Low, compared to the other options;
- N/A indicates the indicator was not applicable to the option.

Within each category (Environmental, Social and Financial) the score for each indicator was averaged to give an overall score for each category compared to other options within the same grouping. The average score for each category was totaled to give an overall score and ranking for each option.

The comparative evaluation tables, summarizing the scores and assessment for each grouping of options can be found in **Appendix B**.

Additional information on the gaps, challenges and/or opportunities can be found in Technical Memorandum No. 2: Needs Assessment: Vision & Guiding Principles; Gaps, Challenges and/or

Opportunities; and Long-Term Projections[10]. Further details about the each option and the evaluation process can be found in Technical Memorandum No. 3: Options Identification and Evaluation Process.

5.1 Reduction and Reuse Options – Preliminary Evaluation

The following sections provide an overview of the evaluation process for the reduction and reuse options resulting in the identification of recommended options and implementation considerations.

5.1.1 Reduction/Reuse: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified to address the following gaps, challenges and/or opportunities;

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

5.1.2 Summary of Reduction/Reuse Options Identified

The following Table 5-1 provides a summary of options identified within this group for evaluation.

Table 5-1: Summary of Reduction/Reuse Options Identified

Option	Brief Summary
Option 2.2: Food Waste Reduction Strategy	This option involves the development of a strategy that promotes reduction of food waste, (potentially up to 3% additional diversion from landfill) focusing on information and outreach programs to educate residents about the benefits of food waste reduction from an economic, environmental and social perspective. If successful, this option would reduce the need for new organics processing infrastructure, and would lower the amount of both Green Bin organics and garbage to be managed.
Option 2.3: Textile Collection and Reuse Strategy	This option involves the development of a textile diversion awareness campaign and the provision of 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 and potentially divert an

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

Option	Brief Summary
	additional 1% of waste from landfill.
Option 2.4: Sharing Library	Additional opportunities could be developed to allow the public to sign-out materials that are used infrequently. This could be accomplished by partnering with existing organizations within Toronto (e.g., tool sharing library, bike sharing) or establishing new sharing programs in different areas of the City and/or within multi-residential buildings. Materials can be donated to the libraries or organizations can purchase and cover expenses through user fees.
Option 2.5: Support Reuse Events	This City could support reuse events that allow residents to obtain gently used materials for reuse (e.g., furniture, toys) in a convenient, yet structured way so that the events do not contribute to litter or illegal dumping. The events could include garage sales, curbside giveaway events in common areas (for multi-residential buildings) or at curbside (for single-family households), swap events (e.g., parent-to-parent sales, jewelry or clothing exchanges).
Option 2.6: Explore Opportunities for Waste Exchange	This option involves the establishment of a waste exchange centre and/or partnership with existing organizations that collect gently used materials, such as arts and crafts supplies, school and office supplies, construction and demolition waste, plastic containers, etc.

5.1.3 Evaluation of Reduction/Reuse Options

Table 5-2 presents the comparative evaluation of the Reduction/Reuse options.

Table 5-2: Comparative Evaluation of Reduction/Reuse Options

Categories, Criteria & Indicators	**Option 2.2** Food Waste Reduction Strategy	**Option 2.3** Textile Collection and Reuse Strategy	**Option 2.4** Sharing Library	**Option 2.5** Support Reuse Events	**Option 2.6** Explore Opportunities for Waste Exchange
Environmental Impact/Benefit					
Local Environmental Impact/Benefit:	High (3)	High (3)	High (3)	High (3)	High (3)
Regional/Global Environmental Impact/Benefit:	High (3)	High (3)	High (3)	High (3)	High (3)
Public Health Impact/Benefit:	High (3)	High (3)	High (3)	Medium (2)	Medium (2)
Potential to Increase Diversion:	High (3)	Medium (2)	Low (1)	Low (1)	Medium (2)

Categories, Criteria & Indicators	Option 2.2 Food Waste Reduction Strategy	Option 2.3 Textile Collection and Reuse Strategy	Option 2.4 Sharing Library	Option 2.5 Support Reuse Events	Option 2.6 Explore Opportunities for Waste Exchange
Waste Hierarchy:	High (3)	High (3)	High (3)	High (3)	High (3)
Ranking	High	High	High	Medium/ High	High
Average Score	3.0	2.8	2.6	2.4	2.6
Social Impact/Benefit					
Approvals Complexity:	High (3)	High (3)	High (3)	Medium (2)	High (3)
Potential for Land Use Conflicts/Community Interruption:	Medium (2)	Medium (2)	Medium (2)	Low (1)	Medium (2)
Collaboration:	High (3)	High (3)	Medium (2)	High (3)	High (3)
Complexity:	Medium (2)	High (3)	Medium (2)	High (3)	Medium (2)
Convenience:	Medium (2)	Medium (2)	Medium (2)	High (3)	Medium (2)
Community Safety:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Equity:	High (3)	High (3)	High (3)	High (3)	Medium (2)
Behaviour Change:	High (3)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Ranking	Medium/ High	Medium/ High	Medium/ High	Medium/ High	Medium/ High
Average Score	2.5	2.5	2.3	2.4	2.3
Financial Impact/Benefit					
Cost:	Medium (2)	Medium (2)	Low (1)	Medium (2)	Medium (2)
Health Care Cost Implications:	High (3)	High (3)	High (3)	High (3)	High (3)
Risk:	High (3)	High (3)	High (3)	High (3)	High (3)
Economic Growth:	Low (1)	Medium (2)	Medium (2)	Low (1)	Medium (2)
Local Job Creation:	Medium (2)	Medium (2)	High (3)	Low (1)	Medium (2)
Flexibility:	Medium (2)	Medium (2)	High (3)	High (3)	High (3)
Ranking	Medium/ High	Medium/ High	Medium/ High	Medium/ High	Medium/ High
Average Score	2.2	2.4	2.5	2.2	2.5

Categories, Criteria & Indicators	Option 2.2 Food Waste Reduction Strategy	Option 2.3 Textile Collection and Reuse Strategy	Option 2.4 Sharing Library	Option 2.5 Support Reuse Events	Option 2.6 Explore Opportunities for Waste Exchange
Ranking	Medium/ High	Medium/ High	Medium/ High	Medium/ High	Medium/ High
Total Score	7.7	7.7	7.4	7.0	7.4

5.1.4 Discussion of Reduction/Reuse Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the five options within the evaluation categories.

- Within the Environmental Category, four out of the five options ranked High while the remaining option ranked Medium/High. Overall, Option 2.2: Food Waste Reduction Strategy scored the highest for all criteria. Option 2.5: Support Reuse Events ranked the lowest due to the lower potential to increase diversion and Public Health impact/benefit.
- In the Social Category, all options ranked Medium/High, with Options 2.2: Food Waste Reduction Strategy and 2.3: Textile Collection and Reuse Strategy scoring just slightly higher than Options 2.5: Support Reuse Events, 2.4: Sharing Library and 2.6: Explore Opportunities for Waste Exchange.
- In the Financial Category, all five options ranked Medium/High; however, their scores differed slightly. Option 2.5: Support Reuse Events ranked lower in the Financial Category due to lower economic growth, lower job creation and unpredictable costs while Option 2.2: Food Waste Reduction Strategy ranked lower due to less potential for economic growth, local job creation and flexibility.

5.1.5 Recommended Reduction/Reuse Options for Further Consideration

Based on the application of the approved evaluation criteria, all of the identified options are recommended for implementation in the future. They all contribute to waste reduction, which is the highest action on the waste hierarchy, and can all work together to become part of a comprehensive waste reduction strategy. It is recommended that the options be phased in over several years.

- Option 2.2: Develop a Food Waste Reduction Strategy
- Option 2.3: Textile Collection and Reuse Strategy
- Option 2.4: Sharing Library

- Option 2.5: Support Reuse Events
- Option 2.6: Explore Opportunities for Waste Exchange

5.1.6 Reduction/Reuse Implementation Considerations

For each of the recommended options identified above, the following should be considered when developing the best approach to implementation of;

- Option 2.2: Develop a Food Waste Reduction Strategy
    - The City will need to conduct pre and post waste audits focusing on gathering data on avoidable (edible food) and unavoidable (inedible foods such as fruit/vegetable peelings or egg shells) food waste to establish a baseline.
    - Establish an on-going monitoring program to measure results over time.
    - Design of a food waste reduction campaign tailored to meet Toronto's unique characteristics, targeting single family, multi-residential households and City-serviced commercial customers.
    - Review and revise any required City policies to ensure that the food waste reduction strategy and City policies are compatible.
    - Develop a business case which documents the benefits of long-term investment in a food waste reduction strategy and documents savings in collection, processing and disposal costs, as well as environmental benefits of lower food waste quantities over time.
    - Consider partnering with other municipalities on a comprehensive Greater Toronto Area (GTA) wide food waste reduction strategy.
    - Explore partnerships with various appropriate social service organizations, charities and not-for-profit organizations with an interest in food and food waste within City of Toronto.

- Option 2.3: Textile Collection and Reuse Strategy
    - Identify specific textiles within the waste stream that will be the focus of the textile collection and reuse program.
    - Develop a number of pilot projects 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.
    - Research market opportunities for these specific textiles to assess the potential for different collection methods (e.g. curbside or at collection bins at City-operated depots or other collection points e.g. community centres).
    - Use results of pilot projects to develop and plan a textile diversion program.

- Conduct market research and develop a messaging campaign, along with a dedicated website and promotional materials, specifically focused on reducing the amount of textiles in the waste stream, and focused on diverting textiles to productive uses, which is consistent with a Circular Economy approach[11].
- Consideration of partnerships with various social service organizations, charities and not-for-profit organizations already involved in textile collection and reuse.

- Option 2.4: Sharing Library
  - Decide if the City wants to develop separate events and/or promote/partner with existing organizations.
  - Research and verify existing or emerging organizations for potential partnerships.
  - Conduct a pilot project to identify suitable locations for sharing libraries; determine items to be shared (e.g. toys); and identify staffing requirements to support program.
  - Use results of pilots to decide on locations of sharing libraries and items to be shared.
  - Track number of items shared to determine success of program and potential impact on diversion.
  - Consider expansion of program to other materials (e.g. baking equipment, sporting goods equipment, board games).

- Option 2.5: Support Reuse Events
  - Review current by-laws that prohibit curbside giveaway events.
  - Identify types of events the City could support and what level of support would be needed.
  - Promote and educate on acceptable items and provide residents with enough notice to set out their reusable items on scheduled days.
  - Determine enforcement approach to manage materials remaining after events.
  - Develop a method to track the material diverted from landfill through the various reuse events.
  - Coordinate with non-profit groups to support collection of left-over reusable goods.

- Option 2.6: Explore Opportunities for Waste Exchange

[11] "A circular economy… aims for the elimination of waste through the superior design of materials, products, systems and business models." Towards the Circular Economy, Ellen MacArthur Foundation.

- 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.
- Advertise/promote waste exchange opportunities through partnerships with City businesses, institutions, non-profit organizations, etc.
- Link program to the Waste Wizard, maintain links, and update information regularly.

5.2 Collection & Drop-off Depots

The following sections provide an overview of the evaluation process for the collection and drop-off options resulting in the identification of recommended options and implementation considerations.

5.2.1 Collection & Drop-off Depots: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap(s), challenge(s) and/or opportunity(ies);

- Provide City customers with convenient options which promote greater diversion and that are flexible to accommodate changing waste streams and resident accessibility; and,
- The impact of intensification and the changes required to manage additional waste generated by housing units (multi-residential units) with typically lower waste diversion performance records and in areas that are more difficult to collect from using traditional methods.

5.2.2 Summary of Collection & Drop-off Depots Options Identified

The following Table 5-3 provides a summary of options identified within this group for evaluation.

Table 5-3: Summary of Collection & Drop-off Depots Options Identified

Option	Brief Summary
Option 3.3: Stand Alone Drop-off and Reuse Centres	This option calls for up to 10 large scale, one-stop drop off and re-use centres (i.e. about one depot to service a population base of about 200,000 residents). These depots would be City owned and could be operated by City staff or be contracted out to the private sector to own and/or operate on a competitive bid process. These stand alone facilities would replace existing City drop-off depots located at transfer stations and would collect the full range of materials with all of the permitting, volume and odour control requirements this entails. This is an important distinction as compared to neighbourhood waste

Option	Brief Summary
	diversion depots (see Option 3.4) that are not expected to serve as drop-offs for Green Bin organics or residential garbage because of permitting, volume and odour concerns.
Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations.	This option is based on establishing 10 to 20 staffed neighbourhood drop-off depots (over the next 10 to 15 years, generally to be located in accessible locations near transit). The facilities could be City owned and operated, privately contracted or some stations could be developed in partnership with local community based organizations (some of which already provide material specific drop-off and reuse services/locations to their customers). An important assumption regarding this option is that it would need to be considered as either a complement to or an alternative for the larger scale stand alone depot system described in Option 3.3. It is assumed, for example (unlike the larger, one-stop stand alone depots), for space, permitting and health and safety considerations, neighbourhood depots would not accept residential waste or organic materials. NOTE: The proposed *Waste-Free Ontario Act* considers different collection services, including depot type services. The City will need to better understand the potential implications of this new legislation on this option, prior to its implementation.
Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials	This option is based on creating a "fleet" of up to five dedicated mobile depots that would travel to locations across the City to collect small household items (pots and pans, etc.) and textiles (clothing, household linens), Household Hazardous Waste and other recyclable/reusable materials. An added benefit of the mobile depot service is that it could also be used to support and co-promote other sustainable environmental practices across the city (e.g. water conservation, energy conservation, alternative cleaners, food waste reduction, renewable energy, etc.). Priority would be placed on collection of high value, low volume materials which are easier to manage and store due to limited capacity in the vehicles. Collection vehicles could be the size of a tractor trailer suitable for larger locations, with one or more smaller vehicles available to access smaller locations. These mobile depots could be used to support community events (e.g. neighbourhood swap events), move-outs (student and/or multi-residential), and household clean-outs on a reservation basis, and/or could move to different areas of the City on a pre-determined basis. Non-profit groups could assist with collection/sorting of materials collected at larger events.

Option	Brief Summary
	NOTE: The proposed *Waste-Free Ontario Act* considers different collection services, including depot type services. The City will need to better understand the potential implications of this new legislation on this option, prior to its implementation.

5.2.3 Evaluation of Collection & Drop-off Depots Options

Table 5-4 presents the comparative evaluation of the Collection & Drop-off Depots options. Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials resulted in an overall ranking of Medium/High and therefore would be the preferred option.

Table 5-4: Comparative Evaluation of Collection & Drop-off Depots Options

Categories, Criteria & Indicators	Option 3.3 Develop Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Depots in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Environmental Impact/Benefit			
Local Environmental Impact/Benefit:	Medium (2)	High (3)	High (3)
Regional/Global Environmental Impact/Benefit:	Medium (2)	Medium (2)	Medium (2)
Public Health Impact/Benefit:	Medium (2)	Medium (2)	Medium (2)
Potential to Increase Diversion:	Medium (2)	Low (1)	Low (1)
Waste Hierarchy:	Medium (2)	Medium (2)	Medium (2)
Ranking	Medium	Medium	Medium
Average Score	2.0	2.0	2.0
Social Impact/Benefit			
Approvals Complexity:	Medium (2)	Medium (2)	Medium (2)
Potential for Land Use Conflicts/Community Interruption:	Low (1)	Medium (2)	Medium (2)
Collaboration:	High (3)	High (3)	High (3)
Complexity:	Medium (2)	Medium (2)	Medium (2)
Convenience:	Low (1)	Low (1)	Medium (2)
Community Safety:	Medium (2)	Medium (2)	Medium (2)
Equity:	Low (1)	High (3)	High (3)
Behaviour Change:	Low (1)	Low (1)	Medium (2)
Ranking	Medium/Low	Medium	Medium/High
Average Score	1.7	2.0	2.3
Financial Impact/Benefit			

Categories, Criteria & Indicators	Option 3.3 Develop Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Depots in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Cost:	Low (1)	Medium (2)	High (3)
Health Care Cost Implications:	High (3)	High (3)	High (3)
Risk:	High (3)	High (3)	High (3)
Economic Growth:	Medium (2)	Medium (2)	Low (1)
Local Job Creation:	Medium (2)	Medium (2)	Low (1)
Flexibility:	High (3)	High (3)	High (3)
Ranking	Medium/ High	Medium/High	Medium/High
Average Score	2.4	2.5	2.4
Overall Ranking	**Medium**	**Medium**	**Medium/High**
Total Score	**6.1**	**6.5**	**6.7**

5.2.4 Discussion of Collection & Drop-off Depots Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the three options within the evaluation categories.

- In the Environmental category, all three options ranked and scored equally (Medium).
- Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials ranked the highest in the Social Category because, as a mobile service that travels to locations throughout the city, it is the most convenient of all the options. The focus of Option 3.5: Mobile Drop-off Service on diverting more materials not collected curbside including textiles, durables and some municipal household and special waste from landfill is also a positive attribute.
- In the Financial Category, all options ranked and scored equally (Medium/High) however, Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Diversion Depots in Convenient Locations, scored one point higher than the other two options with a lower cost compared to Option 3.3: Stand Alone Drop-off and Reuse Centres and higher potential for economic and job growth compared to Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials.

5.2.5 Recommended Collection & Drop-off Depots Options for Further Consideration

Based on the application of the approved evaluation criteria, the following two options are recommended for implementation in the future.

- Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations
- Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials

There is a positive link between Options 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations and 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials. It has been recommended that Option 3.5 be planned and implemented first to support research to help locate the 10 or more Neighbourhood Drop-off Depots to be established across the city by 2026. This combination of a mobile service and locally based Neighbourhood Drop-off Depots provides the best complement to the City's extensive curbside programs (i.e. in terms of encouraging additional non-curbside, non Blue Bin material diversion from landfill). The convenience of this combination for city residents is the best option for cost effective and socially positive higher waste diversion, as well as providing the most options to divert materials not currently collected in the curbside or multi-residential services.

The following option is not being recommended for implementation in the future.

- Option 3.3: Develop a Series of Stand Alone Drop-off and Reuse Centres

Overall, this option scored the lowest of the three options. It is a high cost option and there is some concern that large scale stand alone drop-off and reuse centres may draw materials away from the very efficient and cost effective curbside services that the City already provides to its residents. Using the depots would involve travel, generally by car, and it would not be practical for residents to bring large amounts of materials long distance by transit if they did not already have access to a vehicle.

5.2.6 Collection & Drop-off Depots Implementation Considerations

For each of the recommended options identified above, the following should be considered when developing the best approach to implementation of:

- Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations
    - The development of 10 or more small Neighbourhood Drop-off Depots across the city reflects the changing nature of Toronto – with more multi-residential units and many residents choosing to not own vehicles - therefore convenient drop-off access close to transit at many locations across the city becomes a more important part of Toronto's future waste system.
    - The complexity of approvals for 10 or more Neighbourhood Drop-off Depots will depend on the range of materials collected at each Centre. For example, their

size, storage space and convenient location will restrict the amount of bulky material that can be received at the Centres.
    - Not allowing residential or small business waste (i.e. garbage and organic materials) will help simplify the approval process. Discouraging the drop-off of materials already collected at the curb will reserve space at the centres for targeted non Blue Bin materials.
    - This approach assumes that materials collected through the Neighbourhood Drop-off Depots will continue to be consolidated and processed at the City transfer stations (as is currently done).
    - In year 2026, a review of the Neighbourhood Drop-off Depots program should be conducted, including an assessment as to whether more Centres should be considered.
    - Over time, an integrated Drop-off depot approach will lead to eliminating public access to drop-off services at existing, large multi-use City transfer stations/drop-off depots.
- Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials
    - Once the mobile collection service is fully established (and assuming it has been successful at diverting more materials than the current Toxic Taxi service offerings), the City's existing Toxic Taxi and Environment Days programs will need to be modified/rationalized with the mobile service.
    - This approach assumes that materials collected through the new mobile depot service will be processed through the existing system (that services the current Toxic Taxi and Environment Days programs).

As mentioned above, it is recommended that Option 3.5 be planned and implemented first in order to help identify the best locations for the Neighbourhood Drop-off Depots.

5.3 Commissioners Street Transfer Station Options

The planning framework for the Toronto Port Lands has identified that the current usage of the Commissioners Street Transfer Station does not align with future redevelopment plans. A challenge facing the City is the decision needed about how to plan for existing and future services to be replaced.

5.3.1 Commissioners Street Transfer Station: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap, challenge and/or opportunity;

- A decision is needed about the future of the Commissioners Street Transfer Station; whether it should be relocated or closed. If the facility is relocated, there are options to construct a new facility that may or may not include a residential drop-off facility. If the facility is closed, the City will need to decide how the current services available at the Commissioners Street Transfer Station will be replaced.

5.3.2 Summary of Commissioners Street Transfer Station Options Identified

The following Table 5-5 provides a summary of options identified within this group for evaluation.

Table 5-5: Summary of Commissioners Street Transfer Station Options Identified

Option	Brief Summary
Option 4.1: Relocation of Commissioners Street 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. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential transfer capacity implications of these changes once more is understood about the new legislation.
Option 4.2: Redirecting Waste to an Existing City of Toronto 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.
Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area, if Available	The City would procure transfer capacity at a private transfer station located in the vicinity of the Port Lands Area. Private sector transfer station options are already approved and operating within the City; other facilities may be developed in response to a City identified need.

Option	Brief Summary
	Private transfer stations, existing or to be developed, are expected to have the capacity to manage garbage, primarily collected from multi-residential buildings in the downtown core. Drop-off facilities provided at Commissioners facility currently will be provided at a separate City location.

5.3.3 Evaluation of Commissioners Street Transfer Station Options

Table 5-6 presents the comparative evaluation of the Commissioner Street Transfer Station options. Both Options 4.1: Relocation Commissioners Street Transfer Station and 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available) resulted in an overall ranking of Medium; however, differed slightly in their overall average score. When considering the application of priorities, both options, Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available) and Option 4.1: Relocation Commissioners Street Transfer Station ranked equally (Medium) in the Environmental Category, in the Social Category (Medium/Low) and in the Financial Category (Medium). The application of priorities did not identify a preferred option; as a result, two options are being recommended for further consideration.

Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available) scored the highest of the three options evaluated. The difference between this option and the next highest scoring option, Option 4.1: Relocation Commissioners Street Transfer Station, relates to the Environmental Category. The evaluation of this option assumes that a private sector waste transfer station with the capacity to accommodate waste from City of Toronto already exists within proximity of the Port Lands area. Currently established and operating private transfer stations within this area are not specifically known to the City, but may exist. An inventory of such facilities and their ability to accept waste from the City needs to be established. In the event a private waste transfer facility or facilities does not exist in the Port Lands area, the interest of the private sector to develop and operate a transfer station in the area to serve the City could be assessed. In this case, the score for this option would be the same as for Option 4.1: Relocation of Commissioners Street Transfer Station, since it would be essentially the same as developing a new transfer station.

Option 4.1: Relocation of Commissioners Street Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation also provides for continuation of the City's existing waste transfer station service within the Port Lands area. The option focused on a site size that would be sufficient to provide a full suite of services over the long-term with intensification in the downtown core and Port Lands area. At this time it is not known if the City is able to acquire the necessary property, either in terms of location or size, to accommodate a transfer station in this area of the City. The potential exists to design the facility and its operations to a smaller site area or irregular lot shape, although this is expected to have an effect on:

- level of service (i.e. the transfer station may not be of sufficient size to manage all waste streams including garbage, Blue Bin materials, Green Bin organics, yard waste etc.);
- flexibility in managing waste from other City divisions such as street sweepings from Transportation Services;
- contingency capacity for other transfer stations;
- capacity for vehicle queuing on-site for both City collection vehicles and small private vehicles, including area for loading/unloading;
- logistics related to truck turning movements and storage for large transfer vehicles;
- future capacity to manage greater volumes and types of waste; and,
- capital and operating costs (e.g. would result in increased costs if more collections operations loads are managed or private/residential tipping).

Table 5-6: Comparative Evaluation of Commissioners Street Transfer Station Options

Categories, Criteria & Indicators	Option 4.1 Relocation of Commissioners Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.	Option 4.2 Redirecting Waste to an Existing Transfer Station(s).	Option 4.3 Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).
Environmental Impact/Benefit			
Local Environmental Impact/Benefit:	Medium (2)	Medium (2)	High (3)
Regional/Global Environmental Impact/Benefit:	High (3)	Medium (2)	High (3)
Public Health Impact/Benefit:	Low (1)	Low (1)	Low (1)
Potential to Increase Diversion:	Low (1)	Low (1)	Low (1)
Waste Hierarchy:	Medium (2)	Medium (2)	Medium (2)
Ranking	Medium	Medium/ Low	Medium
Average Score	1.8	1.6	2.0
Social Impact/Benefit			
Approvals Complexity:	Medium (2)	High (3)	High (3)
Potential for Land Use Conflicts/Community Interruption:	Medium (2)	Medium (2)	Medium (2)
Collaboration:	Low (1)	Low (1)	Low (1)
Complexity:	N/A	N/A	N/A
Convenience:	N/A	N/A	N/A
Community Safety:	Medium (2)	Low (1)	Low (1)
Equity:	Medium (2)	Medium (2)	Medium (2)

Categories, Criteria & Indicators	Option 4.1 Relocation of Commissioners Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.	Option 4.2 Redirecting Waste to an Existing Transfer Station(s).	Option 4.3 Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).
Behaviour Change:	Low (1)	Low (1)	Low (1)
Ranking	Medium/Low	Medium/ Low	Medium/Low
Average Score	1.7	1.7	1.7
Financial Impact/Benefit			
Cost:	Low (1)	High (3)	Medium (2)
Health Care Cost Implications	Medium (2)	Medium (2)	Medium (2)
Risk:	High (3)	High (3)	Medium (2)
Economic Growth:	Medium (2)	Low (1)	Low (1)
Local Job Creation:	Medium (2)	Low (1)	Medium (2)
Flexibility:	Medium (2)	Medium (2)	Medium (2)
Ranking	Medium	Medium	Medium
Average Score	2.0	2.0	1.9
Overall Ranking	Medium	Medium/ Low	Medium
Total Overall Score	5.5	5.3	5.6

5.3.4 Discussion of Commissioners Street Transfer Station Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the three options within the evaluation categories.

- Within the Environmental Category, Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available) scored the highest. The main difference between Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available) and Option 4.1: Relocation of Commissioners Street Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation was the Local Environmental Impact/Benefit criterion. Option 4.1 received a lower score due to the requirement for land area in the order of 56 hectares, to establish a new transfer station resulting in land use displacement whereas

Option 4.3 is based on an already existing facility. Option 4.2: Redirecting Waste to an Existing Transfer Station(s) scored the lowest in this evaluation category and specifically Local Environmental Impact and Regional/Global Environmental Impact associated with collection vehicles consuming more fuel and increased contributions to greenhouse gas emissions as a result of having to travel greater distances.

- In the Social Category, all three options received the same overall score with some minor differences in the scoring for the individual criteria. Option 4.1: Relocation of Commissioners Street Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation scored the lowest for Approvals Complexity largely since a new facility would need to be established. This option did however score higher for Community Safety as the other two options would increase the number of vehicles travelling to already existing transfer station locations.
- Within the Financial Category, Options 4.2: Redirecting Waste to an Existing City of Toronto Transfer Station(s). and 4.1: Relocation of Commissioners Street Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation scored the same, just slightly higher than Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area. Option 4.2 is expected to have the least impact on cost to the City, with Option 4.1 having the highest cost mainly due to development of a new facility and its ongoing operation. There is some contract risk for Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available) compared to the other two options since this involves a private facility not controlled by the City. Option 4.1 scored higher for economic growth with greater potential to provide convenient and cost effective support for the ongoing growth in the City's downtown core. Local job creation is expected to be comparable for Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available) and 4.1: Relocation of Commissioners Street Transfer Station, but lower for Option 4.2: Redirecting Waste to an Existing City of Toronto Transfer Station(s). based on the City's already existing transfer facilities.

5.3.5 Recommended Commissioners Street Transfer Station Options for Further Consideration

Based on the application of the approved evaluation criteria and utilizing priorities where applicable to identify differences between the options, the following are recommended for further consideration.

- Option 4.3: Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available)

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

However, based on an initial review of known waste transfer locations in the vicinity of the Port Lands area, it appears that Option 4.3 is not a currently available option for future consideration. As a result, only Option 4.1 is being recommended for implementation.

The following option is not being recommended for implementation in the future.

- Option 4.2: Redirecting Waste to an Existing City of Toronto Transfer Station(s)

This option scored the lowest of the three options evaluated and is not being recommended for further consideration. The lower score relates to the Environmental Impact/Benefit criteria category and the potential for increased impacts to the local airshed and additional greenhouse gas contributions due to the increased travel distance of collection vehicles to other City transfer stations. This option would result in additional travel distance for collection vehicles to an existing City transfer station, either the Bermondsey Transfer Station or Ingram Transfer Station, increasing the time required for a collection vehicle to complete its route and adding to any existing traffic congestion on City streets. An assessment of the ability for an existing transfer station to accommodate additional traffic and waste volumes and the need for any building or site modifications would also be required in order to give this option further consideration.

5.3.6 Commissioners Street Transfer Station Implementation Considerations

For the recommended option identified above, the following should be considered when developing the best approach to implementation of:

- Option 4.1: Relocation of Commissioners Street Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation
  - City to identify and confirm availability of an acceptable land parcel within the Port Lands area to develop a waste transfer station in consultation with SWMS.
  - A conceptual design and site plan to be developed to confirm operating capabilities and procedures for the identified site.
  - Preparation of Environmental Compliance Approval (ECA) and land use approvals applications and supporting documentation. Associated facility approvals are followed by construction.

5.4 Materials and Energy Recovery

The following sections provide an overview of the evaluation process for the materials and energy recovery options resulting in the identification of recommended option(s) and implementation considerations.

5.4.1 Materials and Energy Recovery: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap(s), challenge(s) and/or opportunity(ies);

- Alternative processing technologies could divert additional materials from disposal and extend the life of the Green Lane Landfill.
- The need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.

5.4.2 Summary of Materials and Energy Recovery Options Identified

The following Table 5-7 provides a summary of options identified within this group for evaluation.

Table 5-7: Summary of Materials and Energy Recovery Options Identified

Option	Brief Summary
Option 6.1: Mixed Waste Processing Facility Development	Development of a Mixed Waste Processing facility which uses mechanical based processing equipment to recover recyclable material from a mixed or unsorted waste stream.
Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development	Mixed Waste Processing with Organics Recovery is a combination of mechanical materials recovery and either mixed waste composting or anaerobic digestion (AD) as a subset technology. This option involves consideration of the development of a Mixed Waste Processing with Organics Recovery facility which would receive a mixed waste stream for mechanical processing followed by composting/digestion. This option is intended to support an increase in the overall waste diversion achieved and to extend the life of Green Lane Landfill. NOTE: The proposed *Waste-Free Ontario Act* considers different approaches to recycling related services. The City will need to better understand the potential implications of this new legislation on this option, prior to its implementation.
Option 6.3: Direct Combustion Facility Development	Development of a direct combustion facility to process residual wastes and recover recyclable materials and energy derived from heating water to create steam and/or electricity.
Option 6.4: Emerging Technologies Facility Development	Development of a facility utilizing a new and emerging technology (including gasification, pyrolysis, plasma arc) to process the City's residual waste and either produce additional materials (e.g. syngas, chemical by-products) or to 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.
Option 6.5: Organics Recycling Biocell or Biomodule	Development of a dedicated cell or controlled area at an existing landfill (i.e. Green Lane Landfill) to be used for

Option	Brief Summary
Development	the processing of a relatively high percentage organic content residual waste stream including a residual mixed waste stream or contaminated source separated organics stream from multi-residential buildings. Rapid biodegradation of organic material allows for enhanced capture and recovery of biogas and earlier stabilization of organic material suitable for alternative applications.
Option 6.6: Refuse Derived Fuel Facility Development	Development of a refuse derived fuel (RDF) facility to process 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. This technology can process the waste stream to either produce a RDF fluff, pellet or briquette.
Option 6.7: Waste to Liquid Fuel Technologies Facility Development	Development of a facility utilizing technologies such as hydrolysis, pyrolysis, gasification etc. to transform a mixed residual waste stream to a liquid fuel source.

5.4.3 Evaluation of Materials and Energy Recovery Options

Table 5-8 presents the comparative evaluation of the Materials and Energy Recovery options. Three options had an overall ranking of Medium; and four options had an overall ranking of Medium/Low. When considering the application of priorities, both Option 6.5: Organics Recycling Biocell or Biomodule and Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development ranked as Medium/High in the Environmental Category. In the Social Category, Option 6.5: Organics Recycling Biocell or Biomodule ranked the highest (Medium) and therefore, would be the preferred option by.

As discussed in the following sections, Option 6.5: Organics Recycling Biocell or Biomodule is only applicable to a small subset of the City's waste and does not fully meet the associated Gaps, Challenges and/or Opportunities associated with Materials and Energy Recovery. For this reason, Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development was the preferred option.

Table 5-8: Comparative Evaluation of Materials and Energy Recovery Options

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Environmental Impact/Benefit							
Local Environmental Impact/Benefit:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	High (3)	Medium (2)	Medium (2)
Regional/Global Environmental Impact/Benefit:	Medium (2)	High (3)	High (3)	High (3)	High (3)	High (3)	High (3)
Public Health Impact/Benefit:	Low (1)	Low (1)	Low (1)	Low (1)	Medium (2)	Low (1)	Low (1)
Potential to Increase Diversion:	Medium (2)	High (3)	Medium (2)	Medium (2)	Low (1)	Medium (2)	Medium (2)
Waste Hierarchy:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Ranking	Medium	Medium/ High	Medium	Medium	Medium/ High	Medium	Medium
Average Score	1.8	2.2	2.0	2.0	2.2	2.0	2.0
Social Impact/Benefit							
Approvals Complexity:	Medium (2)	Medium (2)	Low (1)	Low (1)	Medium (2)	Medium (2)	Low (1)
Potential for Land Use Conflicts/Community Interruption:	Low (1)	Low (1)	Medium (2)	Medium (2)	High (3)	Low (1)	Medium (2)
Collaboration:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Low (1)	Medium (2)	Medium (2)
Complexity:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Convenience:	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Community Safety:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Equity:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	High (3)	Medium (2)	Medium (2)
Behaviour Change:	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Ranking	Medium/ Low	Medium/ Low	Medium/ Low	Medium/ Low	Medium	Medium/ Low	Medium/ Low
Average Score	1.7	1.7	1.7	1.7	2.0	1.7	1.7
Financial Impact/Benefit							
Cost:	Medium (2)	Medium (2)	Low (1)	Low (1)	High (3)	Medium (2)	Low (1)
Health Care Cost Implications:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	High (3)	Medium (2)	Medium (2)
Risk:	Low (1)	Low (1)	Medium (2)	Low (1)	Low (1)	Low (1)	Low (1)
Economic Growth:	Medium (2)	Medium (2)	Medium (2)	Low (1)	Low (1)	Low (1)	Low (1)
Local Job Creation:	Low	Medium (2)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Flexibility:	High (3)	High (3)	Low (1)	Medium (2)	Low (1)	Low (1)	Medium (2)
Ranking	Medium	Medium	Medium/ Low	Medium/ Low	Medium/ Low	Medium/ Low	Medium/ Low
Average Score	2.0	2.0	1.5	1.4	1.7	1.4	1.4
Overall Ranking	**Medium**	**Medium**	**Medium/ Low**	**Medium/ Low**	**Medium**	**Medium/ Low**	**Medium/ Low**
Total Score	**5.5**	**5.9**	**5.2**	**5.1**	**5.9**	**5.1**	**5.1**

5.4.4 Discussion of Materials and Energy Recovery Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the seven options within the evaluation categories.

- In the Environmental Category, when the Environmental criteria were applied to all the options, only two options, Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development and Option 6.5: Organics Recycling Biocell or Biomodule ranked Medium/High; all the rest ranked Medium. Option 6.5 ranked higher due to local environmental impact/benefit; whereas Option 6.2 ranked higher for the potential to increase diversion. It should be noted however; that Option 6.5 is only applicable to a small portion of the waste stream and poses minimal environmental impacts at its location at Green Lane Landfill (GLL). All the other options would process a wider variety of materials and would be larger facilities, and thus would have the potential for greater impacts.
- In the Social Category, most of the options had similar scores (Medium or Medium/Low). Option 6.5: Organics Recycling Biocell or Biomodule scored very slightly higher due to less potential for land use disruption as the site would be existing (i.e. located at GLL) and higher for the equity criterion as there would be minimal to no impact to residents with processing a subset of waste at GLL.
- For the Financial Category, Options 6.1: Mixed Waste Processing Facility Development and 6.2: Mixed Waste Processing with Organics Recovery Facility Development were the highest ranking options, with a Medium ranking. This is due to a combination of cost, higher local economic growth and job creation potential, and the flexibility of the operation. The majority of the options in this category ranked Low due to risk and lack of economic growth and local job creation.

5.4.5 Recommended Materials and Energy Recovery Options for Further Consideration

Based on the application of the approved evaluation criteria, the identified option below is recommended for implementation in the future.

- Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development

Although Option 6.5: Organics Recycling Biocell or Biomodule was the highest ranking option, it does not meet the identified gap, challenge and /or opportunity as well as the next highest ranking option (Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development). Option 6.5 can only process a subset of Toronto's waste (e.g. organics) and does not offer as much waste diversion potential as the development of a processing facility. For this reason, Option 6.5 was not carried forward for further consideration. Options 6.3: Direct

Combustion Facility Development, 6.4: Emerging Technologies Facility Development, and 6.7: Waste to Liquid Fuels Technologies Facilities Development could be considered in the future following the successful establishment of the recommended option as a means to further process the residual material from the Mixed Waste Processing with Organics Recovery Facility.

5.4.6 Materials and Energy Recovery Implementation Considerations

For the recommended option identified above, the following should be considered when developing the best approach to implementation of;

- Option 6.2: Mixed Waste Processing with Organics Recovery Facility Development
    - The City would need to acquire assorted approvals and construction of a new Mixed Waste Processing with Organics Recovery Facility on a property located within an industrial zoned area.
    - The facility would 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.
    - The City will need to identify an end-market or end use for compost/digestate.

5.5 Residual Waste Disposal

The following sections provide an overview of the evaluation process for the residual waste disposal options resulting in the identification of recommended options and implementation considerations.

5.5.1 Residual Waste Disposal: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap(s), challenge(s) and/or opportunity(ies);

- extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Strategy.

5.5.2 Summary of Residual Waste Disposal Options Identified

The following Table 5-9 provides a summary of options identified within this group for evaluation.

Table 5-9: Summary of Residual Waste Options Identified

Option	Brief Summary
Option 7.1: Landfill Expansion	Consider the possibility of expanding the Green Lane

Option	Brief Summary
	Landfill (GLL) in the event that additional residual waste disposal capacity is required. This option is being evaluated as part of a future consideration and not as an immediate need. Expanding the current landfill site will involve an Individual Environmental Assessment (EA) during which time a range of alternatives would be identified and evaluated along with extensive consultation efforts.
Option 7.3: Bio-reactor Landfill	This option considers developing a bio-reactor landfill on both the closed and yet to be constructed landfill cells of the GLL site. A bio-reactor landfill accelerates the biological decomposition of organic wastes in a landfill by promoting conditions necessary for the microorganisms to degrade the waste. Liquids (i.e. leachate, gas condensate, water, storm water runoff, wastewater treatment sludges) must be added to the waste mass and recirculated to obtain optimal moisture for organics decomposition. The bio reactor allows for faster degradation and stabilization of the waste mass combined with generation of landfill gas. Additional disposal capacity is available within the approved landfill design contours prior to closure due to the resulting settlement of the waste.
Option 7.5: Adjust Tipping Fees or Customer Base	This option considers adjusting tipping fees to discourage acceptance of waste from paid private customers and/or adjust types of customers permitted to use City of Toronto waste facilities. An increase in tipping fees will discourage paid private customers increasing landfill life and potentially decreasing revenues for the City of Toronto. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential transfer capacity implications of these changes once more is understood about the new legislation.
Option 7.6: Purchase a New Landfill	This option looks at the possibility of purchasing another licensed landfill site with potential or available approved disposal capacity in Ontario when there is a need for additional residual waste disposal capacity or to preserve the life of the Green Lane Landfill.
Option 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane	This option looks at acquiring/securing residual waste disposal capacity from private/municipal landfill sites or at another facility (e.g. Energy from Waste) in order to preserve long-

Option	Brief Summary
Landfill	term landfill capacity at GLL. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential residual disposal capacity implications of these changes once more is understood about the new legislation.
Option 7.7b: Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity.	This option looks at acquiring/securing landfill airspace from private/municipal landfill sites or other disposal facilities (e.g. Energy from Waste) as a long-term solution to residual management once GLL has reached its approved disposal capacity.
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.

5.5.3 Evaluation of Residual Waste Disposal Options

Table 5-10 presents the comparative evaluation of the Residual Waste Disposal options. Three options had an overall ranking of Medium and the remaining four options each were ranked Medium/Low. When considering the application of priorities, Option 7.5: Adjust Tipping Fees or Customer Base ranked highest (Medium) overall in the Environmental Category, followed by 7.3: Bio-reactor Landfill, Option 7.6: Purchase a New Landfill, Option 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfill and 7.7b: Secure Capacity Once GLL Has Reached Capacity and (all tied for second with a ranking of Medium/Low). Options 7.5, 7.6 7.7a, and 7.7b all ranked Medium in the Social Category. In the financial category, Options 7.7a and 7.7b ranked the highest (High) compared to all other options. As a result of the application of these priorities, Option 7.5: Adjust Tipping Fees or Customer Base is preferred along with Options 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfill, and 7.7b: Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity.

Table 5-10: Comparative Evaluation of Residual Waste Options

	Near Term Options		Long Term Options				
Categories, Criteria & Indicators	**Option 7.1** Landfill Expansion	**Option 7.3** Bio-Reactor Landfill	**Option 7.5** Adjust Tipping Fees or Customer Base	**Option 7.6** Purchase a New Landfill	**Option 7.7a** Securing disposal capacity to preserve long-term landfill capacity at GLL	**Option 7.7b** Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	**Option 7.8** Greenfield Landfill
Environmental Impact/Benefit							
Local Environmental Impact/Benefit:	Low (1)	Medium (2)	High (3)	Medium (2)	Medium (2)	Medium (2)	Low (1)
Regional/Global Environmental Impact/Benefit:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Public Health Impact/Benefit:	Low (1)	Low (1)	Medium (2)	Low (1)	Low (1)	Low (1)	Low (1)
Potential to Increase Diversion:	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Waste Hierarchy:	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Ranking	Low	Medium/ Low	Medium	Medium/ Low	Medium/ Low	Medium/ Low	Low
Average Score	1.2	1.4	1.8	1.4	1.4	1.4	1.2
Social Impact/Benefit							
Approvals Complexity:	Low (1)	Medium (2)	High (3)	Medium (2)	High (3)	High (3)	Low (1)
Potential for Land Use Conflicts/Community Interruption:	Low (1)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Low (1)
Collaboration:	Medium (2)	Low (1)	Low (1)	Medium (2)	Low (1)	Low (1)	High (3)
Complexity:	N/A	N/A	Medium (2)	N/A	N/A	N/A	N/A
Convenience:	N/A	N/A	Low (1)	N/A	N/A	N/A	N/A

Categories, Criteria & Indicators	Near Term Options		Long Term Options				
	Option 7.1 Landfill Expansion	Option 7.3 Bio-Reactor Landfill	Option 7.5 Adjust Tipping Fees or Customer Base	Option 7.6 Purchase a New Landfill	Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Option 7.8 Greenfield Landfill
Community Safety:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Low (1)
Equity:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Behaviour Change:	Low (1)	Low (1)	Medium (2)	Low (1)	Low (1)	Low (1)	Low (1)
Ranking	Medium/ Low	Medium/ Low	Medium	Medium	Medium	Medium	Medium/ Low
Average Score	1.5	1.7	1.9	1.9	1.9	1.9	1.5
Financial Impact/Benefit							
Cost:	Low (1)	Medium (2)	High (3)	Low (1)	Medium (2)	Medium (2)	Low (1)
Health Care Cost Implications	Medium (2)	Medium (2)	High (3)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Risk:	Low (1)	Low (1)	Medium (2)	Medium (2)	High (3)	High (3)	Low (1)
Economic Growth:	Medium (2)	Low (1)	Low (1)	Medium (2)	Medium (2)	Medium (2)	Low (1)
Local Job Creation:	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)
Flexibility:	High (3)	Low (1)	Low (1)	High (3)	High (3)	High (3)	High (3)
Ranking	Medium/ Low	Medium/ Low	Medium	Medium	Medium/ High	Medium/ High	Medium/ Low
Average Score	1.7	1.4	1.9	1.9	2.2	2.2	1.7

	Near Term Options		Long Term Options				
	Option 7.1	Option 7.3	Option 7.5	Option 7.6	Option 7.7a	Option 7.7b	Option 7.8
Categories, Criteria & Indicators	Landfill Expansion	Bio-Reactor Landfill	Adjust Tipping Fees or Customer Base	Purchase a New Landfill	Securing disposal capacity to preserve long-term landfill capacity at GLL	Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Greenfield Landfill
Overall Ranking	Medium/ Low	Medium/ Low	Medium	Medium/ Low	Medium	Medium	Medium/ Low
Average Score	4.4	4.5	5.6	5.2	5.5	5.5	4.4

5.5.4 Discussion of Residual Waste Disposal Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three evaluation categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the five options within the evaluation categories.

- Within the Environmental Category, Option 7.5: Adjust Tipping Fees or Customer Base ranked the highest (Medium), primarily due to a reduced local environmental impact/benefit. Options 7.3: Bio-reactor Landfill, Option 7.6: Purchase a New Landfill, 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfilland 7.7b: Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity all ranked Medium/Low. The main difference between the options was that Option 7.5 has a higher potential to benefit the local environment due to the City disposing less waste on an annual basis at GLL. Options 7.1: Landfill Expansion and 7.8: Greenfield Landfill scored lowest due to potentially greater impacts on the local environment.
- When the Social impacts of the options were considered, all options ranked Medium or Medium/Low. Four options ranked Medium and scored the same (i.e. Options 7.5: Adjust Tipping Fees or Customer Base, 7.6: Purchase a New Landfill, 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfill, 7.7b: Secure Capacity once GLL has Reached Capacity), since they were less complex in terms of the approvals process and had lower potential for land use conflicts. Option 7.5: Adjust Tipping Fees or Customer Base had some additional impacts related to convenience and complexity for small private waste generators, which lowered its score. Options 7.1: Landfill Expansion, 7.3: Bio-reactor Landfill and 7.8: Greenfield Landfill scored lowest due to potential for increased impacts associated with most of the Social criteria.
- For Financial impacts, Options 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfill and 7.7b: Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity had the highest ranking (Medium/High) and scores. This is due to the low level of risk to the City with these options and the increased flexibility of the operation to accommodate future changes. Option 7.5: Adjust Tipping Fees or Customer Base and Option 7.6: Purchase a New Landfill both ranked Medium with all other options ranking Medium/Low.

5.5.5 Recommended Residual Waste Disposal Options for Further Consideration

The options considered and evaluated include options that can be implemented both in the near-term and over a longer period of time. These options are distinctly different and achieve residual disposal capacity either by extending the life of the Green Lane Landfill or by providing new future disposal capacity. Based on the application of the approved evaluation criteria, the identified options are recommended for implementation to address these timelines.

Near-Term Options

- Option 7.5: Adjust Tipping Fees or Customer Base
- Option 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at GLL

Long-Term Options for Future Consideration

- Option 7.1: Landfill Expansion
- Option 7.6: Purchase a New Landfill
- Option 7.7b: Securing Disposal Capacity for Residual Management Following GLL Reaching its Approved Disposal Capacity
- Option 7.8: Greenfield Landfill

Option 7.3: Bio-reactor Landfill is not recommended for implementation in the future. This option scored the lowest, providing only limited long-term residual disposal capacity with the highest risk and least benefits.

5.5.6 Residual Waste Disposal Implementation Considerations

For each of the recommended options identified above, the following should be considered when developing the best approach to implementation of;

Near-Term Options

- Option 7.5: Adjust Tipping Fees or Customer Base
    - Consideration needs to be given to a potential for a corresponding increase in GLL operating costs with a reduction in waste volumes.
    - An increase in tipping fee may not significantly lower the tonnage received by the City as small waste generators may have very limited access to alternatives available through the private sector.
    - Approval from City Council is required to adjust tipping fees.
- Option 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at GLL
    - Savings in landfill development, operations, closure and post-closure care costs which are extended over a longer time period. Reduced volumes at GLL may result in an increase in per tonne operating costs due to reduced equipment and resource efficiencies.
    - City already has in place contracts with private sector service providers to implement this option.
    - Need to determine minimum or baseline quantity of waste to continue to be disposed and landfilled at GLL to maintain the efficient operation of the landfill. Reduced volumes at GLL may result in an increase in per tonne operating costs due to reduced equipment and resource efficiencies.

Long-Term Options

- Four options have been identified for future consideration to provide the City with long-term residual waste disposal capacity. For each of these options (i.e. Options 7.1: Landfill Expansion. 7.6: Purchase a New Landfill, 7.7b: Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity, 7.8: Greenfield Landfill), the disposal capacity will require that an Environmental Assessment is completed. This will take a period of several years for Options 7.1: Landfill Expansion and 7.8: Greenfield Landfill, which would be undertaken by the City. Options 7.6: Purchase a New Landfill and 7.7b: Securing Disposal Capacity for Residual Management Following Green Lane Landfill Reaching its Approved Disposal Capacity require that the disposal capacity be developed by others (although some potential for partnerships may exist) and at this time it is not known to what extent these options will be available to the City in the future. When the City conducts its regular reviews and updates of the Waste Strategy, consideration should be given at that time to the remaining capacity available at the GLL and the potential to implement these four long-term residual waste disposal capacity options. For this reason, no one long-term option has been recommended for implementation at this time.

5.6 Multi-residential Services

The following sections provide an overview of the evaluation process for the multi-residential services options resulting in the identification of recommended option(s) and implementation considerations. It is important to note that these options specifically apply to the multi-residential sector, however, there are many other options being considered that apply to the entire system that would also impact the multi-residential sector (e.g. enforcement).

5.6.1 Multi-residential Services: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap(s), challenge(s) and/or opportunity(ies);

- Solid Waste Services for the IC&I Sector: identifying a mechanism to allow the City to influence greater waste diversion in the IC&I sector for waste materials being generated within the City of Toronto, but managed outside the City of Toronto waste management system.
- Multi-residential Waste Diversion: the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.
- Waste Reduction & Reuse: how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.
- Impacts of Intensification: the impacts of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods. Buildings that do not receive City collection services due to access limitations cannot participate in the variety of waste diversion services offered by the City.

- Enforcement: A challenge for the City is to maximize the effective and efficient use of its current programs, services and facilities. To date, significant effort and success has been realized through promotion and education; however, there are still areas of the system where voluntary compliance is not at the desired level, requiring strategic consideration of mandatory measures.

5.6.2 Summary of Multi-residential Services Options Identified

The following Table 5-11 provides a summary of options identified within this group for evaluation. The table is divided into three categories corresponding with organics management, waste collection methods, and planning, policies and enforcement.

Table 5-11: Summary of Multi-residential Services Options Identified

Option	Brief Summary
Organics Management	
Option 2.7: Community/Mid-Scale Composting	Consider composting operations in locations where community members can compost their garden or kitchen waste using low-technologies such as a large backyard composter or a three-bin wooden composter. Organic waste collection bins could be located at different participating sources, e.g., religious institutions, community gardens etc. Collected waste would be dropped off to the community composting area. Final compost could be used in community gardens or local landscaping needs.
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).
Option 5.2: In-Sink Disposal Units	Review the application 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 amendment to the current by-law to allow use in areas of the City that have combined sewers.
Waste Collection Methods	
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

Option	Brief Summary
	volumes, to better manage collection needs particularly in multi-residential buildings. A waste tracking technology, such as radio frequency identification (RFID), could be used with existing and new bins to provide data and statistics for each multi-residential building (e.g. weight of materials collected could be used to calculate diversion rates and potentially optimize collection frequency thereby reducing the number of collection trips in a given week). The City could require that the technology be used at properties that receive collection either through the City (through municipal or private collection forces) or investigate this as a future requirement for all multi-residential buildings in the City.
Option 3.2a: Alternative Collection Methods for Multi-residential Buildings - One Container System	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. An example is allowing residents to place source separated waste (e.g., Green Bin organics, Blue Bin materials, residual waste) into one collection location (e.g., bin, chute) using different coloured bags. Residents would not be required to take the three different streams of waste to potentially three different locations or containers thereby creating increased convenience. Sorting of waste is done optically at a facility according to the colour of the bag and the sorted waste is hauled to the appropriate disposal or processing facility.
Option 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System	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. An example includes placing waste in an inlet that is connected to an underground piping system that uses a vacuum to transport the waste to a central (possibly off-site) location.
Option 3.7: Multi-Residential Collection using Alternative Vehicles	The City of Toronto could address current service restrictions to some multi-residential buildings by using a fleet of smaller collection vehicles to access multi-residential developments with space restrictions. This option addresses a need for provision of collection service (e.g. garbage, Blue Bin materials, Green Bin organics, bulky wastes, electronic wastes) to multi-residential buildings, which currently do not receive City service due to service restrictions (e.g. narrow lanes, short turning radius, space restrictions). The smaller vehicles would be automated or semi-automated and capable of collecting two-thirds the volume of standard front end collection vehicles. Toronto would purchase and operate the small collection vehicles and require building owners to purchase special collection bins compatible with these vehicles.

Option	Brief Summary
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. With multi-residential buildings no longer a City customer, the City loses an opportunity for requiring recycling and source separated organics collection at these locations. However, this approach over time would simplify the utility and the City would focus on single family residential.
Planning, Policies and Enforcement	
Option 1.8: Multi-residential By-laws and Enforcement	City to consider increasing enforcement efforts of existing applicable waste diversion by-laws and/or enacting new, legally permissible by-laws to mandate City-wide waste diversion requirements (Blue Bin materials and Green Bin organics service, etc.) to all multi-residential buildings. For enforcement, focus is on more effective enforcement of existing City by-laws that apply to multi-residential customers and/or exploring joint enforcement efforts with the Province regarding O. Reg. 103/94 requirements. For potentially enacting new by-laws, the goal would be mandating diversion at the building level (with building owners responsible) and/or through mandatory requirements for haulers operating within the City and servicing multi-residential buildings. Enactment of the proposed *Waste-Free Ontario Act* and subsequent adoption of regulations under the Act might affect this analysis. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto, including for multi-residential buildings. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.
Option 1.9: Updates to Current Multi-residential Development Standards	City of Toronto would review and revise where appropriate, the multi-residential development standards and introduce new requirements such as common area drop-off depot requirements or flexible space requirements to allow for the addition of future programs. New standards could require that space be set aside for drop-off depots, space for sharing libraries and modifications to loading space in order to allow for collection by smaller vehicles. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.

5.6.3 Evaluation of Multi-residential Services Options

Table 5-12 presents the comparative evaluation of the multi-residential services options. The evaluation of multi-residential options has been divided into three categories of options:

- Organics management;
- Waste Collection methods; and
- Planning, policies and enforcement.

Organics Management

For the Organics management options, three options were compared against each other:

- Option 2.7: Community/Mid-Scale Composting
- Option 5.1: On-site Organics Processing
- Option 5.2: In-Sink Disposal Units

For managing organics, Table 5-12 shows that Option 2.7: Community/Mid-Scale Composting achieved an overall ranking of Medium/High, whereas the other two options, Option 5.1: On-site Organics Processing and Option 5.2: In-sink Disposal Units had an overall ranking of Medium Therefore, Option 2.7 ranked higher in all three categories, primarily due to Public Health benefits and opportunities for collaboration, and therefore would be the option carried forward for further consideration.

Waste Collection Methods

Five different collection method options were considered for multi-residential buildings:

- Option 3.1: Container Management (through technologies such as RFID on bins);
- Option 3.2a: Alternative Collection Methods for Multi-residential Buildings - One Container System
- Option 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System
- Option 3.7: Multi-residential Collection using Alternative Vehicles, and
- Option 9.1: Elimination of Collection service to Multi-residential Buildings.

Among the five options, Options 3.1: Container Management and 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System both had an overall ranking of Medium/High; Options 3.2a: Alternative Collection Methods for Multi-residential Buildings - One Container System and 3.7: Multi-residential Collection using Alternative Vehicles had an overall ranking of Medium, and Option 9.1: Elimination of Collection Service to Multi-residential Buildings scored Medium. Applying environmental priorities to the two highest ranking options (Options 3.1: Container Management and 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System), both options had the same ranking (Medium) with the same score. Applying the next sets of priorities, both options ranked as Medium/High for the social and financial categories. The application of priorities did not identify a preferred option; however, only Option 3.1: Container Management has been carried forward for further consideration. Option 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System may be an option considered by the private sector.

Planning, policies and enforcement.

The third set of multi-residential options relates to planning, policies and enforcement and includes:

- Option 1.8: Multi-residential By-laws and Enforcement
- Option 1.9: Updates to Current Multi-residential Development Standards

Option 1.9: Updates to Current Multi-residential Development Standards had an overall ranking of Medium/High, predominantly due to higher rankings for social impacts compared to Option 1.8: Multi-residential By-laws and Enforcement which had an overall ranking of Medium.

Table 5-12: Comparative Evaluation of Multi-residential Services Options

Categories, Criteria & Indicators	Organics Management			Waste Collection Methods					Planning, Policies & Enforcement	
	Option 2.7 Community/Mid-Scale Composting	Option 5.1 On-site Organics Processing	Option 5.2 In-Sink Disposal Units	Option 3.1 Container management	Option 3.2a Alternative Collection Methods for Multi-Residential Buildings – One Container System	Option 3.2b Alternative Collection Methods for Multi-Residential Buildings – Vacuum System	Option 3.7 Multi-Residential Collection using Alternative Vehicles	Option 9.1 Elimination of Collection Service to Multi-residential Buildings	Option 1.8 Multi-residential By-laws and Enforcement	Option 1.9 Updates to Current Multi-Residential Development Standards
Environmental Impact/Benefit										
Local Environmental Impact/Benefit:	High (3)	High (3)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)
Regional/Global Environmental Impact/Benefit:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Low (1)	Low (1)	Medium (2)	Medium (2)
Public Health Impact/Benefit:	High (3)	Medium (2)	Medium (2)	Medium (2)	High (3)	High (3)	Medium (2)	Low (1)	Medium (2)	Medium (2)
Potential to Increase Diversion:	Low (1)	Low (1)	Low (1)	Medium (2)	Medium (2)	Low (1)	Low (1)	Low (1)	Medium (2)	Low (1)
Waste Hierarchy:	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Low (1)	Low (1)	Medium (2)	Medium (2)
Ranking	Medium/ High	Medium	Medium	Medium	Medium/ High	Medium	Medium Low	Low	Medium	Medium
Average Score	2.2	2.0	1.8	2.0	2.2	2.0	1.4	1.2	2.0	1.8
Social Impact/Benefit										
Approvals Complexity:	High (3)	High (3)	High (3)	High (3)	High (3)	High (3)	High (3)	High (3)	Medium (2)	High (3)
Potential for Land Use Conflicts/Community	Low (1)	Low (1)	Medium (2)	Medium (2)	High (3)	High (3)	Medium (2)	Low (1)	Low (1)	Medium (2)

Categories, Criteria & Indicators	Organics Management			Waste Collection Methods					Planning, Policies & Enforcement	
	Option 2.7 Community/Mid-Scale Composting	Option 5.1 On-site Organics Processing	Option 5.2 In-Sink Disposal Units	Option 3.1 Container management	Option 3.2a Alternative Collection Methods for Multi-Residential Buildings – One Container System	Option 3.2b Alternative Collection Methods for Multi-Residential Buildings – Vacuum System	Option 3.7 Multi-Residential Collection using Alternative Vehicles	Option 9.1 Elimination of Collection Service to Multi-residential Buildings	Option 1.8 Multi-residential By-laws and Enforcement	Option 1.9 Updates to Current Multi-Residential Development Standards
Interruption:										
Collaboration:	High (3)	Medium (2)	Low (1)	Medium (2)	Low (1)	Low (1)	N/A	N/A	Low (1)	High (3)
Complexity:	Medium (2)	Medium (2)	Medium (2)	N/A	Low (1)	Medium (2)	Medium (2)	High (3)	Medium (2)	High (3)
Convenience:	Medium (2)	Medium (2)	Medium (2)	N/A	Low (1)	Medium (2)	N/A	Medium (2)	Medium (2)	High (3)
Community Safety:	Low (1)	Low (1)	Medium (2)	Medium (2)	Medium (2)	High (3)	Medium (2)	Low (1)	Low (1)	N/A
Equity:	High (3)	High (3)	Low (1)	High (3)	Low (1)	Medium (2)	High (3)	Low (1)	High (3)	High (3)
Behaviour Change:	Medium (2)	Medium (2)	Low (1)	Medium (2)	Low (1)	Low (1)	Low (1)	Low (1)	Medium (2)	Medium (2)
Ranking Average Score	Medium/ High 2.2	Medium 2.0	Medium 1.8	Medium/ High 2.4	Medium /Low 1.7	Medium/ High 2.2	Medium 2.0	Medium 1.8	Medium 1.8	High 2.8
Financial Impact/Benefit										
Cost:	Medium (2)	Medium (2)	Low (1)	Medium (2)	Medium (2)	High (3)	Medium (2)	Low (1)	Medium (2)	High (3)
Health Care Cost Implications	High (3)	High (3)	High (3)	High (3)	High (3)	High (3)	High (3)	Medium (2)	High (3)	High (3)

	Organics Management			Waste Collection Methods					Planning, Policies & Enforcement	
Categories, Criteria & Indicators	**Option 2.7** Community/Mid-Scale Composting	**Option 5.1** On-site Organics Processing	**Option 5.2** In-Sink Disposal Units	**Option 3.1** Container management	**Option 3.2a** Alternative Collection Methods for Multi-Residential Buildings – One Container System	**Option 3.2b** Alternative Collection Methods for Multi-Residential Buildings – Vacuum System	**Option 3.7** Multi-Residential Collection using Alternative Vehicles	**Option 9.1** Elimination of Collection Service to Multi-residential Buildings	**Option 1.8** Multi-residential By-laws and Enforcement	**Option 1.9** Updates to Current Multi-Residential Development Standards
Risk:	High (3)	High (3)	Medium (2)	High (3)	High (3)	High (3)	High (3)	High (3)	Medium (2)	Medium (2)
Economic Growth:	Low (1)	Low (1)	Medium (2)	Low (1)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Low (1)
Local Job Creation:	Medium (2)	Medium (2)	High (3)	High (3)	High (3)	High (3)	Medium (2)	Medium (2)	High (3)	Medium (2)
Flexibility:	Medium (2)	Low (1)	Low (1)	High (3)	Medium (2)	Low (1)	Medium (2)	Medium (2)	High (3)	High (3)
Ranking	Medium/ High	Medium	Medium	Medium /High	Medium/ High	Medium/ High	Medium/ High	Medium	Medium/ High	Medium/ High
Average Score	2.2	2.0	2.0	2.5	2.5	2.5	2.4	2.0	2.5	2.4
Overall Ranking	Medium/ High	Medium	Medium	Medium/ High	Medium	Medium/ High	Medium	Medium/ Low	Medium	Medium/ High
Total Score	6.6	6.0	5.6	6.9	6.4	6.7	5.8	5.0	6.3	7.0

5.6.4 Discussion of Multi-residential Services Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the three groupings of options within the evaluation categories.

Organics Management

When the Environmental criteria were applied to all the options, Option 2.7: Community/Mid-Scale Composting ranked highest (Medium/High), primarily due to the least impact to local environmental and public health. Option 2.7: Community/Mid-scale Composting ranked higher (Medium/High) than the other options in the Social category, predominantly due to greater opportunities for collaboration. For the Financial Category, Option 2.7: Community/Mid-Scale Composting ranked highest (Medium/High). For these reasons and with the application of priorities, Option 2.7: Community/Mid-Scale Composting will be carried forward for further consideration.

Waste Collection Methods

Option 3.2a: Alternative Collection Methods for Multi-residential Buildings - One Container System ranked the highest of options in the Environmental category, predominantly due to a beneficial impact on Public Health. Option 9.1: Elimination of Collection Service to Multi-residential Buildings ranked the lowest of all options for Environmental Impact/Benefit, primarily due to higher impacts to the Regional/Global Environment, Public Health, and low potential to increase diversion if the City eliminates collection service to multi-residential buildings. Option 3.7: Multi-residential Collection using Alternative Vehicles also received a relatively low score for Environmental Impact/Benefit.

For Social impact, two options, Option 3.1: Container Management, Option 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System were ranked as Medium/High, with two options (Option 3.7: Multi-residential Collection using Alternative Vehicles and Option 9.1: Elimination of Collection Service to Multi-residential Buildings ranked as Medium. Option 3.2a ranked lowest (Medium/Low), primarily due to being more complex and less convenient than other options.

For Financial impacts, four options ranked as Medium/High; Option 9.1: Elimination of Collection Service to Multi-residential Buildings ranked the lowest due to the loss of revenue from multi-residential service.,

Option 9.1: Elimination of Collection Service to Multi-residential Buildings was not carried forward for further consideration based on its low environmental scores. Generally it was felt that elimination of City service to multi-residential buildings would not be received favourably by residents who expect the City to provide the service and that there is the potential that residents would receive less diversion opportunities in the future if not receiving City service. Option 3.7: Alternative Vehicles was also not carried forward for further consideration based on its low environmental ranking.

Although the two alternative collection methods ranked fairly high overall, and within each category, they were not carried forward for further consideration. Option 3.2a: Alternative Collection Methods for Multi-residential Buildings - One Container System had a large social impact, predominantly due to the potential complexity of the system and equity issues including ongoing cost of purchasing bags. Option 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System is better suited for installation in new developments and is not a system the City is considering for full-scale implementation. For these reasons, these two alternative collection methods were not carried forward for further consideration.

Based on the above, and with the application of priorities, Option 3.1: Container Management will be carried forward for further consideration.

Planning, Policies and Enforcement

Options 1.8: Multi-residential By-laws and Enforcement and 1.9: Updates to Current Multi-residential Development Standards both ranked as Medium and scored very closely for Environmental impact/benefit. Option 1.8 scored higher with a greater potential to increase diversion compared to Option 1.9.

When the Social impacts of the options were considered, Option 1.9: Updates to Current Multi-residential Development Standards ranked higher than Option 1.8: Multi-residential By-laws and Enforcement. Option 1.9 had the highest score due to more benefits to the residents living in multi-residential buildings including greater equity, greater convenience and the opportunity for greater collaboration among community groups and organizations.

Both options scored very similarly for Financial Impact/Benefit. Both options will be carried forward for further consideration as both have potential to increase waste diversion.

5.6.5 Recommended Multi-residential Services Options for Further Consideration

Based on the application of the approved evaluation criteria, the following options are recommended for implementation in the future. These options were carried forward for further consideration as they each have potential to drive additional diversion.

- Option 1.8: Multi-Residential By-law and Enforcement
- Option 1.9: Updates to Current Multi-Residential Development Standards
- Option 2.7: Community/Mid-Scale Composting
- Option 3.1: Container Management

5.6.6 Multi-residential Services Implementation Considerations

For each of the recommended options identified above, the following should be considered when developing the best approach to implementation of;

- Option 1.8: Multi-residential By-law and Enforcement
    - The requirement for all multi-residential buildings to provide comprehensive waste diversion services, regardless of whether the buildings receive City or private collection services, may bring more customers back to the City since it may not be more cost effective to move to private sector collection services and provide only garbage collection services to tenants.
    - Existing by-laws must be amended or new by-laws created. Fines may need to be re-addressed.
    - Multi-residential property management/owners must be educated about the requirements of the new by-law.
    - Extensive enforcement by the City is critical to ensure compliance and success. Additional enforcement staff may need to be hired (temporarily or permanently) to address the needs of multi-residential buildings. Also, additional staff might be needed to address the larger number of City customers which might result from levelling the playing field with the private sector.
    - An increase in new City customers may result in the need for more collection vehicles and impact Blue Bin materials and Green Bin organics processing capacity.
    - Wording of the by-law is important to ensure that multi-residential building owners/property managers do not just put Blue and Green Bins in place but also promote the program – source separation requirements of tenants and targets will be important.

- Option 1.9: Updates to Current Multi-residential Development Standards
    - Collaboration will be required with City Planning and Engineering and Construction Services and other City Divisions.
    - Extensive consultation with and education of the development community will be important.
    - Potential resistance from the property development community who may be opposed to new requirements that reduce the potential number or size of future units for a given site footprint.

- Option 2.7: Community/Mid-Scale Composting
    - Requires dedicated staff (not necessarily City Staff) to maintain operations and monitor parameters such as feedstock quality and temperature.

- 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.
- Training of staff and volunteers is important to ensure the composting process is being followed and that quality compost is produced.
- 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.
- Determine end use of finished compost.

- Option 3.1: Container Management

    - The City has a committed multi-residential front-end collection contract in place until 2026. This provides sufficient time to test new and emerging container management approaches through a series of pilot tests.
    - Will need to monitor utility rates as they may be impacted by decreased waste set outs resulting from optimized container management.
    - Procurement of technology will need to be completed together with corporate information and technology.
    - Staff time required to input collection container, scheduling and routing information into database.
    - Training to waste collection drivers and staff on how to use the system where required.
    - May impact collection contract.

5.7 Industrial, Commercial and Institutional Services

The following sections provide an overview of the evaluation process for the industrial, commercial and institutional (IC&I) services options resulting in the identification of recommended options and implementation considerations.

5.7.1 IC&I Services: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap(s), challenge(s) and/or opportunity(ies);

- to provide the IC&I sector with options which promote greater diversion and are flexible to accommodate changing waste streams and customer accessibility.
- identifying a mechanism to allow the City to influence greater waste diversion in the IC&I sector for waste materials being generated within the City of Toronto, but managed outside the City of Toronto waste management system. This challenge will be addressed to some extent with future Provincial regulations.

5.7.2 Summary of IC&I Services Options Identified

The following Table 5-13 provides a summary of options identified within this group for evaluation.

Table 5-13: Summary of IC&I Services Options Identified

Option	Brief Summary
Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market To Provide Diversion Opportunities to More Commercial Businesses in City of Toronto	The City currently provides IC&I waste collection service to commercial businesses on City collection routes, and provides disposal options at City transfer stations, as well as at Green Lane Landfill. For waste collected at curbside, IC&I waste collection is financed through the waste utility. Eligible commercial establishments pay for garbage collection and disposal through the Yellow Bag program, and receive Green Bin organics and Blue Bin materials collection at no additional cost. At transfer station facilities and at Green Lane Landfill, IC&I customers are charged a tipping fee on a cost per tonne basis. In this option, the City would expand the number of commercial businesses that are eligible for City collection in order to provide Green Bin organics and Blue Bin materials collection to these businesses that may not have the opportunity to participate due to current eligibility requirements. All City IC&I customers would be required to also participate in Green Bin and Blue Bin service, thus increasing diversion in the IC&I sector. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.
Option 9.4: Explore Mandatory Approaches to IC&I Waste Diversion	The City considers whether IC&I waste diversion can occur more effectively through a combination of legally permissible City-wide mandatory recycling by-laws, other incentives or disincentives, and/or joint enforcement efforts with the Province. It should be noted that some IC&I establishments are supposed to source separate and divert waste under current regulations, but new regulations are expected in the next few years under the proposed *Waste-Free Ontario Act*. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.
Option 9.5: City of Toronto Exits the IC&I Waste Management Service	This option involves the City (to the extent practical, given the requirement to collect waste from Residential Units Above Commercial (RUAC)) transitioning out of the collection and management of IC&I waste, thereby eliminating influence over IC&I waste diversion unless other policy options are adopted. 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

Option	Brief Summary
	accept IC&I waste at transfer stations or at the Green Lane Landfill). All businesses in Toronto that currently receive City collection, and Blue Bin materials and Green Bin organics collection at no additional fees, only Yellow Bag program fees, will need to contract with private sector haulers for collection service.

5.7.3 Evaluation of IC&I Services Options

Table 5-14 presents the comparative evaluation of the IC&I Services options. Both Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market To Provide Diversion Opportunities to More Commercial Businesses in City of Toronto 9.4: Explore Mandatory Approaches to IC&I Waste Diversion had an overall ranking of Medium. When considering the application of priorities, Option 9.4: Explore Mandatory Approaches to IC&I Waste Diversion would be the preferred option as it the highest ranking of Medium/High in the Environmental Category, primarily due to the greater potential to increase diversion.

Table 5-14: Comparative Evaluation of IC&I Services

Categories, Criteria & Indicators	**Option 9.3** Expand City of Toronto Share of IC&I Waste Management Market	**Option 9.4** City Implements IC&I Waste Diversion Policies	**Option 9.5** City of Toronto Exits the IC&I Waste Management Service
Environmental Impact/Benefit			
Local Environmental Impact/Benefit:	Medium (2)	Medium (2)	Medium (2)
Regional/Global Environmental Impact/Benefit:	Medium (2)	Medium (2)	Medium (2)
Public Health Impact/Benefit:	Medium (2)	Medium (2)	Low (1)
Potential to Increase Diversion:	Medium (2)	High (3)	Low (1)
Waste Hierarchy:	Medium (2)	Medium (2)	Medium (2)
Ranking	Medium	Medium/High	Medium/Low
Average Score	2.0	2.2	1.6
Social Impact/Benefit			
Approvals Complexity:	High (3)	Medium (2)	High (3)
Potential for Land Use Conflicts/Community Interruption:	Medium (2)	Low (1)	Low (1)
Collaboration:	Low (1)	Low (1)	Low (1)
Complexity:	Medium (2)	Low (1)	Low (1)
Convenience:	Medium (2)	Low (1)	Low (1)
Community Safety:	Medium (2)	Low (1)	Low (1)
Equity:	Medium (2)	Low (1)	Low (1)

Categories, Criteria & Indicators	Option 9.3 Expand City of Toronto Share of IC&I Waste Management Market	Option 9.4 City Implements IC&I Waste Diversion Policies	Option 9.5 City of Toronto Exits the IC&I Waste Management Service
Behaviour Change:	Medium (2)	Medium (2)	Low (1)
Ranking	Medium	Low	Low
Average Score	2.0	1.3	1.3
Financial Impact/Benefit			
Cost:	Low (1)	Medium (2)	High (3)
Health Care Cost Implications:	High (3)	High (3)	Medium (2)
Risk:	High (3)	Medium (2)	High (3)
Economic Growth:	Medium (2)	Medium (2)	Low (1)
Local Job Creation:	High (3)	High (3)	Medium (2)
Flexibility:	Medium (2)	High (3)	High (3)
Ranking	Medium/ High	Medium/ High	Medium/ High
Average Score	2.4	2.5	2.4
Overall Ranking	**Medium**	**Medium**	**Medium/Low**
Total Score	**6.4**	**6.0**	**5.3**

5.7.4 Discussion of IC&I Services Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the three options within the evaluation categories.

- Within the Environmental Category, Option 9.4: Explore Mandatory Approaches to IC&I Waste Diversion ranked the highest, primarily for the potential to increase diversion. Option 9.5: City of Toronto Exits the IC&I Waste Management Service ranked the lowest due to the potential impacts to Public Health and less potential to divert waste.

- Within the Social Category, Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market To Provide Diversion Opportunities to More Commercial Businesses in City of Toronto ranked the highest (Medium). Options 9.4: Explore Mandatory Approaches to IC&I Waste Diversion and 9.5: City of Toronto Exits the IC&I Waste Management Service both ranked Low, primarily for potential for increased traffic, less convenience and greater complexity to the user.

- In the Financial Category, all options were ranked the same as Medium/High with very close scores. Option 9.4: Explore Mandatory Approaches to IC&I Waste Diversion scored slightly higher with an overall edge due to local job creation and economic growth. Option 9.3: Expand IC&I Services scored lower on cost due to the potential for increased cost associated with greater provision of service.

5.7.5 Recommended IC&I Services Options for Further Consideration

Based on the application of the approved evaluation criteria, the following options are recommended for implementation in the future:

- Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market To Provide Diversion Opportunities to More Commercial Businesses in City of Toronto
- Option 9.4: Explore Mandatory Approaches to IC&I Waste Diversion

Option 9.5: City of Toronto Exits the IC&I Waste Management Service was not carried forward for further consideration due to the potential environmental and social impacts.

5.7.6 IC&I Services Implementation Considerations

For each of the recommended options identified above, the following should be considered when developing the best approach to implementation of:

- Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market
    - Competition with private sector - City would be cutting into private sector hauler business, which potentially could result in strong resistance from waste management industry. There is also potential for small hauling business to lose hauling contracts.
    - Processing and disposal capacity requirements potentially 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 that 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.
    - More City trucks with implications for staffing, operating costs, management etc.
- Option 9.4: Explore Mandatory Approaches to IC&I Waste Diversion
    - Businesses may see this as one more item that they do not have resources or time to address, and potentially as unnecessary City interference.

- Haulers would not necessarily be supportive of policies that mandate service levels for diversion as a requirement to haul garbage.
- Potential new licensing requirements for haulers.
- Joint Provincial-Municipal enforcement efforts for existing Provincial regulatory requirements.
- Carry out an assessment of the potential impact of the IC&I policies and other instruments on integrated waste management system.
- Explore permissible legal mechanisms, if any, to increase IC&I diversion.
- Public consultation to identify attitudes and likely impacts of different policies on different stakeholders

5.8 Construction, Renovation and Demolition Services

The following sections provide an overview of the evaluation process for the construction, renovation and demolition (CRD) services options resulting in the identification of recommended option(s) and implementation considerations.

5.8.1 CRD Services: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap(s), challenge(s) and/or opportunity(ies);

- to address residential renovation waste and provide its renovator customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and accessibility.
- how to better promote and facilitate diversion of CRD materials generated by the CRD sector, which comprises a significant amount of the total waste stream generated in the city. To date, there has been no pressure placed on the CRD sector by the City to encourage diversion and ensure a level playing field for CRD companies. Private sector initiatives to construct and operate CRD recycling facilities in the GTA have failed, due to lack of business, as disposal remains the cheaper and preferred option.

5.8.2 Summary of CRD Services Options Identified

The following Table 5-15 provides a summary of options identified within this group for evaluation.

Table 5-15: Summary of CRD Services Options Identified

Option	Brief Summary
Option 10.1: Depots, Processing, and Policies to Divert CRD Waste	The City would establish dedicated CRD drop-off bins at each transfer station to enable easy diversion of CRD wastes. The drop-off depots would accept materials[12] such as clean wood,

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

Option	Brief Summary
	drywall, concrete, plastic piping, corrugated cardboard, Metal Items, ceramics and asphalt shingles for a lower tipping fee. Mixed CRD waste would be accepted for a higher fee. The City would be responsible for all aspects of designing, implementing and managing the drop-off bins located within existing transfer stations. The City established contracts to have the materials processed at licensed recycling facilities. The City would hire staff at each transfer station to oversee the CRD drop off depots, ensuring that the waste is properly sorted and help with other diversion programs. Alone or in partnership with other municipalities or companies, the City would establish a CRD Waste Processing Facility to process CRD materials for end markets. This would address the current barrier that markets cannot be found for many CRD materials without additional processing. This option assumes that the City will choose to construct a new facility but it could purchase an existing CRD recycling facility and retrofit if necessary, which could potentially expedite the implementation of a CRD diversion program. The City would develop policies and legislation as well as provide economic incentives to increase CRD waste diversion in Toronto's CRD industry. These initiatives would be analyzed to determine which were the most appropriate and effective to increase diversion. Toronto would take responsibility for consulting with industry, conducting a cost/benefit analysis on the approaches and developing a communication strategy, implementation plan and schedule. The policies could include mandatory source separation and processing requirements and economic incentives (e.g. differential tipping fees, CRD debris deposit, requirement of proof of recycling to get occupancy permit etc.) to encourage greater reuse and recycling of CRD waste, and use of the drop offs and processing facility. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.
Option 10.2: CRD Disposal Ban	Toronto would consider phased-in disposal bans on CRD materials at City transfer stations ensuring that well established and stable markets are available for the diverted materials. Bans will affect mostly small CRD companies. The

Option	Brief Summary
	City would work with GTA neighbours to encourage similar bans to ensure material does not get disposed in neighbouring jurisdictions. The bans would begin with a 10% contamination threshold and would target CRD wastes for which stable recycling markets exist (clean wood waste, drywall, cardboard, and shingle roofing). The City would work closely with CRD associations to gather input and help to educate members about the bans. In addition, the City would liaise with Ministry of the Environment and Climate Control (MOECC) to ensure that CRD bans are consistent with those under consideration by the Province at this time, and which are likely to be implemented Province wide over time through regulations under the proposed *Waste-Free Ontario Act*. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.

5.8.3 Evaluation of CRD Services Options

Table 5-16 presents the comparative evaluation of the CRD options. Both Option 10.1: Depots, Processing, and Policies to Divert CRD Waste and Option 10.2: CRD Disposal Ban had the same overall ranking of Medium/High, with Option 10.2 scoring slightly higher overall. When considering the application of priorities, both options ranked Medium/High in the Environmental Category and Social Category. Option 10.2 ranked higher in the Financial Category as Option 10.1: Depots, Processing, and Policies to Divert CRD Waste involved the cost of establishing depots and a CRD processing facility.

Table 5-16: Comparative Evaluation of CRD Services

Categories, Criteria & Indicators	Option 10.1	Option 10.2

	Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste	Construction, Renovation, Demolition (CRD) Disposal Ban
Environmental Impact/Benefit		
Local Environmental Impact/Benefit:	High (3)	Medium (2)
Regional/Global Environmental Impact/Benefit:	Medium (2)	Medium (2)
Public Health Impact/Benefit:	Medium (2)	Medium (2)
Potential to Increase Diversion:	High (3)	High (3)
Waste Hierarchy:	Medium (2)	Medium (2)
Ranking	Medium/High	Medium/High
Average Score	2.4	2.2
Social Impact/Benefit		
Approvals Complexity:	Medium (2)	Medium (2)
Potential for Land Use Conflicts/Community Interruption:	Medium (2)	Low (1)
Collaboration:	High (3)	High (3)
Complexity:	Medium (2)	Medium (2)
Convenience:	Low (1)	Low (1)
Community Safety:	Medium (2)	High (3)
Equity:	High (3)	High (3)
Behaviour Change:	High (3)	High (3)
Ranking	Medium/High	Medium/High
Average Score	2.3	2.3
Financial Impact/Benefit		
Cost:	Low (1)	Medium (2)
Health Care Cost Implications	High (3)	High (3)
Risk:	Medium (2)	High (3)
Economic Growth:	Medium (2)	Medium (2)
Local Job Creation:	Medium (2)	Medium (2)
Flexibility:	Medium (2)	High (3)
Ranking	Medium	Medium/High
Average Score	2.0	2.5
Overall Ranking	Medium/High	Medium/High
Total Score	6.7	7.0

5.8.4 Discussion of CRD Services Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the options within the evaluation categories.

When the Environmental criteria were applied to the two options, both ranked as Medium/High. Option 10.1: Depots, Processing, and Policies to Divert CRD Waste scored slightly better on Local Environmental Impact/Benefit as Option 10.2: CRD Disposal Ban has greater potential for illegal dumping.

When the Social Impacts of the options were considered, Option 10.1: Depots, Processing, and Policies ranked and scored the same as Option 10.2: CRD Disposal Ban. Both have the same potential for collaboration, creating equity, and encouraging behavioural changes. Both options were rated Low in terms of convenience.

For Financial impacts, Option 10.2: CRD Disposal Ban had the highest score. While this option had a low potential for economic growth, it has relatively low risk potential, and relatively high potential for local job creation, as well as being flexible to implement. Option 10.1: Depots, Processing, and Policies to Divert CRD Waste ranked lower on costs due to the higher costs of implementing this option with the potential construction or acquisition of a processing facility.

5.8.5 Recommended CRD Services Options for Further Consideration

Based on the application of the approved evaluation criteria, both identified options are recommended for implementation in the future.

- Option 10.1: Depots, Processing, and Policies to Divert CRD Waste
- Option 10.2: CRD Disposal Ban

Although based on the application of priorities, Option 10.1: Depots, Processing, and Policies to Divert CRD Waste would be the preferred option, both options will be carried forward for further consideration as there is a logical progression in moving forward with Option 10.2: CRD Disposal Ban after the implementation of 10.1: Depots, Processing, and Policies to Divert CRD Waste, depending on the status of Provincial regulations at the time. The Province of Ontario has announced that it plans to implement material disposal bans over time, through regulations under the proposed *Waste-Free Ontario Act*. The Draft Waste Strategy which accompanies the proposed *Waste-Free Ontario Act* specifically identifies CRD materials as potential candidates for a Provincial ban. Should the City implement CRD material bans, coordination with the Province would be required.

5.8.6 CRD Services Implementation Considerations

For each of the recommended options identified above, the following should be considered when developing the best approach to implementation of;

- Option 10.1: Depots, Processing, and Policies to Divert CRD Waste
    - Under the proposed *Waste-Free Ontario Act*, the Province may impose mandatory requirements to promote waste diversion in the CRD industry. This will have consequences for the management of CRD waste by generators, who may be interested in source separating and dropping off waste loads at City drop-offs.
    - Under the proposed *Waste-Free Ontario Act*, the Province may require municipalities to implement policies targeting materials including CRD wastes. The details will not be known until draft regulations are released for comment, which is not expected until after 2017.
    - There will be a need to ensure that CRD diversion depots are provided at the transfer stations or at large stand-alone depots (should any be constructed) to provide easy diversion options, especially for small contractors (e.g. renovation industry and do-it-yourself home renovators).
    - There will be a need to determine the availability and stability of markets for processed CRD materials so that processing requirements can be identified to meet end market specifications and increase the value of the collected CRD materials.
    - A business case would need to be developed to determine what support mechanisms would be needed to make the CRD processing facility a successful endeavour.
    - There will be a need to consider the potential for increased illegal dumping because of higher tipping fees. Enforcement is necessary to keep illegal dumping activity to a minimum.
    - Outreach will be necessary to identify potential public and/or private partnerships.
    - Education and outreach to the CRD industry will be required to notify them of new supporting policies and processing opportunities as well as accepted materials, etc.
    - The City of Toronto should work with other GTA municipalities to develop collaborative and consistent approaches to CRD waste management policies in order to ensure a level playing field is established among impacted CRD companies throughout the GTA.
    - Additional staff will be required to manage CRD waste at depots.

- Option 10.2: CRD Disposal Ban
    - Under the proposed *Waste-Free Ontario Act*, the Province may impose provincial disposal bans on CRD materials over time. The Province may require municipalities to implement policies targeting CRD wastes. The details will not be known until draft regulations are released for comment, which are not expected until after 2017.

- A phased-in schedule should be developed in consultation with the CRD industry.
- There will be a need to determine the availability and stability of markets and processing capacity within the GTA for targeted banned materials.
- A comprehensive promotion, education and outreach campaign will need to be developed to ensure that CRD companies understand the requirements of the new material bans.
- Amendments may be required to existing by-laws to accommodate the requirements of the CRD disposal bans.
- Technical assistance support would be valuable for small/medium sized companies.

5.9 Incentive Based Options

The following sections provide an overview of the evaluation process for the incentive based options resulting in the identification of a recommended option and implementation considerations.

5.9.1 Incentive Based Options: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The options evaluated have been specifically identified as options that address the following gap(s), challenge(s) and/or opportunity(ies);

- to provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility.
- the impact of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.

5.9.2 Summary of Incentive Based Options Identified

The following Table 5-17 provides a summary of options identified within this group for evaluation.

Table 5-17: Summary of Incentive Based Options Identified

Option	Brief Summary
Option 9.8: Deposit-return System for City of Toronto for Selected Materials	Toronto could consider establishing a deposit return system - within the limits of the City of Toronto - for targeted materials that would subsequently be removed from the waste stream. Targeted materials might include: non-alcoholic beverage containers (i.e. soft drinks, water bottles and potentially juices and milk) and/or household batteries.
Option 3.6: Incentive Based Drop-off System (e.g. Reverse Vending	Participation in a drop-off/donation centre is rewarded either through returning cash or coupons from the

Option	Brief Summary
Machines (RVMs))	company/retailer/association/product manufacturer sponsoring the reverse vending equipment. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.

5.9.3 Evaluation of Incentive Based Options

Table 5-18 presents the comparative evaluation of the Incentive Based options. Option 3.6: Incentive Based Drop-off System (e.g. RVMs) ranked higher overall than Option 9.8: Deposit-return System for City of Toronto for Selected Materials and will be carried forward for further consideration.

Table 5-18: Comparative Evaluation of Incentive Based Options

Categories, Criteria & Indicators	**Option 3.6** Incentive-based drop-off systems – Reverse Vending Machines	**Option 9.8** Deposit-return System for City of Toronto for Selected Materials
Environmental Impact/Benefit		
Local Environmental Impact/Benefit:	High (3)	High (3)
Regional/Global Environmental Impact/Benefit:	Medium (2)	Medium (2)
Public Health Impact/Benefit:	Medium (2)	Medium (2)
Potential to Increase Diversion:	Low (1)	Low (1)
Waste Hierarchy:	Medium (2)	Medium (2)
Ranking	Medium	Medium
Average Score	2.0	2.0
Social Impact/Benefit		
Approvals Complexity:	High (3)	Medium (2)
Potential for Land Use Conflicts/Community Interruption:	Medium (2)	Low (1)
Collaboration:	High (3)	Medium (2)
Complexity:	High (3)	Medium (2)
Convenience:	Medium (2)	Low (1)
Community Safety:	Medium (2)	Medium (2)
Equity:	High (3)	Medium (2)
Behaviour Change:	Low (1)	Low (1)

Categories, Criteria & Indicators	Option 3.6 Incentive-based drop-off systems – Reverse Vending Machines	Option 9.8 Deposit-return System for City of Toronto for Selected Materials
Ranking Average Score	Medium/High 2.4	Medium/Low 1.7
Financial Impact/Benefit		
Cost:	Medium (2)	Low (1)
Health Care Cost Implications:	High (3)	High (3)
Risk:	High (3)	High (3)
Economic Growth:	Low (1)	Medium (2)
Local Job Creation:	High (3)	High (3)
Flexibility:	Medium (2)	Medium (2)
Ranking Average Score	Medium/High 2.4	Medium/High 2.4
Overall Ranking **Total Score**	Medium/High 6.8	Medium 6.1

5.9.4 Discussion of Incentive Based Options Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for the two options within the evaluation categories.

With respect to the Environmental Category, the two options had identical scores. Both would be considered strong in terms of local impact, and would give the City the ability to locally retain benefits of implementation. Neither option will have a huge impact on diversion.

For Social Benefits/Impacts, Option 3.6: Incentive Based Drop-off System (e.g. RVMs) has a considerably higher score than Option 9.8: Deposit-return System for City of Toronto for Selected Materials. RVMs would be relatively simple for the City to help site and approve, and would provide opportunities for collaboration with other community organizations. As the RVMs could be located throughout the City, there would be a minimal impact on any specific group and underserved areas could easily see new machines added.

Comparably, a Toronto-only deposit system would be difficult to enforce and manage. New depots could have a significant impact on traffic, as they would need to be located in convenient, sometimes high traffic locations with adequate space to manage potentially large volumes (e.g.

in the case of non-alcoholic beverage containers) of deposit bearing materials. Further, some access via public transit would be required to meet the needs of a large portion of the population. It would be nearly impossible to prevent items purchased outside City boundaries from being redeemed for deposits. This same problem would apply to both non-alcoholic beverage containers and for household batteries (i.e. enforcing city boundaries).

Both options had the same score with respect to Financial criteria. While local jobs would be created (especially under a deposit-refund system for non-alcoholic beverage containers), a significant capital outlay would be required to implement either RVMs or new depots for items with a deposit.

5.9.5 Recommended Incentive Based Options for Further Consideration

Based on the application of the approved evaluation criteria, only Option 3.6 is recommended for implementation in the future.

- Option 3.6: Incentive Based Drop-off System (e.g. RVMs)

Option 3.6: Incentive Based Drop-off System (e.g. RVMs) is recommended for further consideration. This option, for targeted materials (such as cell phones, fluorescent bulbs, small and high value electronics), presents a novel approach using both proven technologies (i.e. reverse vending machines) and consumer incentives (e.g. cash rewards or coupons for participating) that could be a viable, supplementary approach to help meet material targets. It is recommended however that this approach be considered under specific conditions: that targeted materials are not achieving diversion targets through existing efforts; that the overall risk, planning and financing of a network of RVMs in the city be the primary responsibility of producers of the targeted materials; and that the city may choose to play only a supportive role (e.g. in terms of public education support and/or offering public space areas as potential locations for RVM installations) in the initiative.

Option 9.8: Deposit-return System for City of Toronto for Selected Materials was not recommended for further consideration. A Toronto-based deposit return system for either non-alcoholic beverage containers or for household batteries is not being recommended for two primary reasons (i.e. in addition to the low evaluation scores). The first reason is the challenge of enforcing only the return of materials for which deposits were paid by consumers within the City's boundary –i.e. the return of non-deposit paid materials to locations within the City would likely overwhelm the system. Secondly, stand-alone systems such as these tend to be less convenient for consumers (i.e. as compared to placing materials in the Blue Bin or – in the case of batteries – returning materials to drop off depots where a range of other materials are also accepted). It should be noted however, that the City – in collaboration with other Ontario municipalities – should encourage the province to keep open the option of province wide deposit-return systems in the future (i.e. under the anticipated 100% producer responsibility legislation being considered) as an alternate means to reach targets for under-performing products and materials.

5.9.6 Incentive Based Options Implementation Considerations

For each of the recommended options identified, the following should be considered when developing the best approach to implementation of;

- Option 3.6: Incentive Based Drop-off System (e.g. RVMs)
    - Investigate RVMs and other incentive opportunities materials such as cell phones, MP3 players, fluorescent lamps, batteries, etc.
    - Carry out pilot program to measure diversion performance for one year.
    - Potential partnerships and agreements with take back agencies and other organizations responsible for the materials that might be captured.
    - Develop partnerships with retailers willing to finance small incentives or coupons.
    - Identify sources of funding to finance the incentive approach.
    - Support the development of a business case to justify the RVM approach and compare to other approaches which would achieve same diversion at lower costs (e.g. payment of a "bounty" to consumers for returning high-value / environmentally sensitive recoverable materials).
    - Support the development of a business plan to include locations, number of RVMs, costs of incentives, likely diversion achieved, etc.

5.10 Controls, Bans and Enforcement

The following sections provide an overview of the evaluation process for the controls, bans and enforcement option resulting in the identification of a recommended option and implementation considerations.

5.10.1 Controls, Bans and Enforcement: Gap, Challenge and/or Opportunity Addressed

The following gap(s), challenge(s) and/or opportunity(ies) were identified early in the project as items to be addressed through the Waste Strategy. The option evaluated have been specifically identified as option that address the following gap(s), challenge(s) and/or opportunity(ies);

- Regulatory, Control and Role/Responsibility Challenges: having a system where some waste management responsibilities are outside of the City's control and therefore subject to uncertainty and risk with respect to external parties making changes that can impact the City's system.
- Impacts of Intensification: the impacts of intensification (i.e. increased urban density) and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.
- Solid Waste Services for the IC&I Sector: identifying a legally permissible mechanism to require greater waste diversion from the IC&I sector for waste materials being generated within the City of Toronto.

- Waste Reduction & Reuse: how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.
- Enhanced Enforcement Opportunities: to maximize the effective and efficient use of its current programs, services and facilities. To date, significant effort and success has been realized through promotion and education; however, there are still areas of the system where voluntary compliance is not at the desired level, requiring strategic consideration of mandatory measures.

5.10.2 Summary of Controls, Bans and Enforcement Option Identified

The following Table 5-19 provides a summary of the option identified within this group for evaluation. It should be noted that this option is a broad based option incorporating many mechanisms to achieve greater control of the waste stream and encourage waste reduction and waste diversion; however, these mechanisms have been rolled up into one option.

Table 5-19: Summary of Controls, Bans and Enforcement Option Identified

Option	Brief Summary
Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management	The City explores whether and how greater waste reduction and diversion might result from undertaking one or more of the following City-wide controls, where legally permissible: banning certain packaging and other material; mandating recycling separation and processing; imposing levies; implementing disposal bans (e.g. construction, renovation and demolition materials); developing local Extended Producer Responsibility measures; improving enforcement of existing City Waste by-laws; and coordinating with the Province on joint enforcement efforts. These instruments could apply to both residential and non-residential (e.g. IC&I) and CRD waste and would be designed to reduce the amount of waste disposed and increase diversion. Residential (single family and multi-residential) households already have comprehensive service but the policy would target the remaining waste stream and could lead to additional processing to achieve targets such as organics disposal bans. NOTE: The proposed *Waste-Free Ontario Act* could have a significant impact on how waste is managed in the future in the City of Toronto. The City will need to assess potential legal and technical implications of these changes once more is understood about the new legislation.

5.10.3 Evaluation of Controls, Bans and Enforcement Options

Given that there was only one option in this category, a comparative evaluation was not carried out. Rather the option was evaluated as a stand-alone option using evaluation. Table 5-20 presents the ranking of this option.

Table 5-20: Evaluation of Controls, Bans and Enforcement Options

Categories, Criteria & Indicators	Option 9.7 City Explores Control Mechanisms
Environmental Impact/Benefit	
Local Environmental Impact/Benefit:	Medium (2)
Regional/Global Environmental Impact/Benefit:	Medium (2)
Public Health Impact/Benefit:	Medium (2)
Potential to Increase Diversion:	High (3)
Waste Hierarchy:	Medium (2)
Ranking	Medium/High
Average Score	2.2
Social Impact/Benefit	
Approvals Complexity:	Medium (2)
Potential for Land Use Conflicts/Community Interruption:	Medium (2)
Collaboration:	Medium (2)
Complexity:	Medium (2)
Convenience:	Medium (2)
Community Safety:	High (3)
Equity:	Low (1)
Behaviour Change:	Medium (2)
Ranking	Medium
Average Score	2.0
Financial Impact/Benefit	
Cost:	High (3)
Health Care Cost Implications:	High (3)
Risk:	Medium (2)
Economic Growth:	Medium (2)
Local Job Creation:	Medium (2)
Flexibility:	High (3)
Ranking	Medium/High
Average Score	2.5
Ranking	Medium/High
Average Score	6.7

5.10.4 Discussion of Controls, Bans and Enforcement Evaluation Results

The comparative evaluation considered the potential impact or benefit each option would have associated with the criteria established for the three categories: Environmental; Social and Financial. The following provides a brief discussion of the results for this option within the evaluation categories.

In terms of Environmental Impacts, Option 9.7: City Explores Mechanisms to Introduce City-wide Controls Over Waste Management ranked Medium/High. This was largely due to the high potential for increased diversion and placement on the waste hierarchy. The option ranked Medium for Social Impacts and Benefits. While there was a high impact on community safety, the option scored low on equity, as different players involved in waste management (either as generators or service providers) will be impacted differently by various policies and approaches. In terms of Financial Impacts and Benefits, this option ranked Medium/High as impacts to cost, health care costs and flexibility were favourable.

5.10.5 Recommended Controls, Bans and Enforcement Options for Further Consideration

Based on the application of the approved evaluation criteria, the identified option below is recommended for implementation in the future.

- Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management is recommended for implementation as it provides significant benefits to waste diversion and better control over the waste stream.

5.10.6 Controls, Bans and Enforcement Implementation Considerations

For the recommended option identified above, the following should be considered when developing the best approach to implementation of;

- Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management
    - 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.
    - 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" is consistent with circular economy framework[13].

[13] 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)

- Additional City of Toronto resources required, depending on the options chosen.
- Consider impact of proposed *Waste Free Ontario Act.*

6 Summary of Recommended Options

The following Table 6-1 provides a summary of the options being recommended for implementation in the future:

Table 6-1: Summary of Recommended Options

System Component	Recommended Options
Reduction & Reuse	• Food Waste Reduction Strategy • Textile Collection and Reuse Strategy • Sharing Library • Support Reuse Events • Explore Opportunities for Waste Exchange
Collection & Drop-off Depot	• Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations. • Develop a Mobile Drop-off Service
Commissioners Transfer Station	• Relocation of Commissioners Street Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation
Materials & Energy Recovery	• Mixed Waste Processing with Organics Recovery Facility Development
Residual Waste Disposal	<u>Near Term Recommendations</u> • Adjust Tipping Fees or Customer Base • Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at GLL <u>Long Term Recommendations</u> A range of options have been provided with respect to the appropriate next steps and timing associated with the next steps to address these future considerations.
Overall System Recommendations – Multi-residential Services	• Multi-residential By-law and Enforcement • Updates to Current Multi-residential Development Standards • Community/Mid-Scale Composting • Container Management
Overall System Recommendations – Industrial, Commercial & Institutional	• Expand City of Toronto Share of IC&I Waste Management Market To Provide Diversion Opportunities to More Commercial Businesses in City of Toronto • Explore Mandatory Approaches to IC&I Waste Diversion
Overall System Recommendations – Construction, Renovation & Demolition	• Depots, Processing, and Policies to Divert CRD Waste • CRD Material Disposal Ban
Overall System Recommendations –	• Incentive Based Drop-off System (e.g. Reverse Vending Machines)

System Component	Recommended Options
Incentive Based Options	
Controls, Bans and Enforcement	• City Explores Mechanisms to Introduce City-wide Controls over Waste Management

7 Next Steps

Now that the more detailed evaluation of each option and group of options is complete, the phasing and implementation of each recommended option can be completed. The recommended options and proposed “Roadmap” for implementation will be documented in the Draft Long Term Waste Management Strategy document.

A

Evaluation Tables

REDUCTION AND REUSE

Option 2.2: Food Waste Reduction Strategy

Recently conducted food waste audits in the City of Guelph show that up to 53% of the food waste managed through Green Bin programs is considered avoidable.[1] This option involves the development of a strategy that promotes reduction of food waste, (potentially up to 3% additional diversion from landfill) focusing on information and outreach programs to educate residents about the benefits of food waste reduction from an economic, environmental and social perspective. If successful, this option would reduce the need for new organics processing infrastructure, and would lower the amount of both Green Bin organics and garbage to be managed.

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[2], 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-res 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.

Case Studies/Examples:

- The Love Food, Hate Waste (LFHW) 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

[1] Food Waste Audits: Synthesis of Guelph Residential Food Waste Audits 2014. August 2014. University of Guelph.
[2] Toronto's Food Strategy can be accessed at
http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=75ab044e17e32410VgnVCM10000071d60f89RCRD

Option 2.2: Food Waste Reduction Strategy

Municipal/Waste Industry Experience:

- Research is showing that residents purchase more food than they need resulting in edible food being wasted and ending up in the Green Bin or Garbage. It is estimated between field and table, 50% of unnecessary food waste occurs in the home.[3]
- The City of Guelph food waste audits showing up to 53% of the food waste put in the green bins is avoidable.
- 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.

encourages healthy eating and food waste reduction. The campaign is in the early stages of development with plans for pre 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, especially as the cost for groceries continues to increase.
- 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 focusing 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.

[3] Food Waste in Canada. November 2010. Value Chain Management Centre.

Option 2.2: Food Waste Reduction Strategy

- Measured financial savings to the City in reduced collection and processing operations.
- Measured financial savings in resident food bills.
- Increase in attention and participation in sustainable food movement and food security issues.

Details of Option Undergoing Evaluation: The City would need to assign staff to help in the design of the messaging to reduce food waste, organize the launch schedule, work with organizations in developing the demonstration activities (e.g. workshops, booths at food shows), and manage the communications and outreach strategy. The City could consider providing grants to organizations to rent space and conduct food waste demonstration activities.

The City will assume most of the responsibility for developing and implementing the outreach and education program associated with food waste reduction and partnering with non-profit organizations and other City divisions to help spread the message and demonstrate food waste reduction activities (such as making shopping lists before shopping, to ensure that only the right amount of food is purchased, using leftovers, etc.). If the City chooses to partner with other Greater Toronto Area (GTA) municipalities, they could share in the development of the messages and materials.

Gap/Challenge/Opportunity: A challenge facing the City is the need to 1) decrease the amount of food that is being wasted, and 2) increase the amount of food waste that is being captured for diversion. This option addresses the need to decrease the amount of food that is being wasted and should be managed by the City.

Ownership/Operation: This option is predominantly a food waste reduction education and outreach campaign. The City could purchase a license to use an existing food waste reduction promotional campaign (e.g. Love Food Hate Waste) or could develop its own campaign, which it could potentially sell the license for others to use.

Materials Collected/Diverted: Food waste.

Staffing: Requires some additional City of Toronto staff.

Consideration of Other Infrastructure/Programs: Option would be undertaken in addition to all other waste diversion operations. Existing programs would continue to operate; reduction in food waste may affect quantities of Green Bin organics requiring management and may affect the overall diversion rate as currently measured (i.e. a weight-based metric). Both the numerator and denominator of the diversion equation would change if this is successful, leading to an overall reduction in residential waste generation.

Land Requirements: No land requirements.

Option 2.2: Food Waste Reduction Strategy		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Minimal to no impact/benefit to land resources because there is no use of land resources with this option.
	Potential impacts to local airshed	• Minimal to no release of emissions to the atmosphere because there are no release of emissions to the airshed with this option.
	Potential impacts to local water sources	• Minimal to no release of potential contaminates to water because there are no releases to local water sources with this option.
	Potential water consumption requirements	• Minimal to no water required because there is no water consumed with this option.
	Total land required and land use displacement	• Minimal to no additional land required because no land is displaced with this option. Could result in optimal use of agricultural land by reducing food wastage.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Reduction in collection vehicles and fossil fuel consumption resulting from less wasted food requiring collection, transfer and disposal or composting over time.
	Greenhouse gas (GHG) contributions	• Potential to reduce some methane generation at landfills as less organic waste is disposed.
Public Health	Potential to impact human health	• Potential for beneficial impact on public health through food waste reduction, increased food literacy and reduction in monthly spending on food.

Option 2.2: Food Waste Reduction Strategy		
Impact/Benefit	Potential to impact ecological health	• Potential for minimal to no ecological impact and may improve ecological health from reduction of food waste requiring management and entering landfills which creates leachate and methane.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Some potential for increased diversion measured as pure waste reduction (4-5% reduction in residential waste generated as a result of less food purchases which is then wasted). [4]
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Significant consistency with the priorities of the waste hierarchy. • Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No approvals required.

[4] Potential for 3-4% residential waste reduction (assuming a target of 21-25% avoidable food waste reduction). An estimated 35-50% of green bin waste (food waste portion) considered avoidable food waste, which could be reduced over time by proper consumption and use of purchased food. Results from Food Waste Audits conducted in the City of Guelph in 2014 showed that 53% of organics in the Green Bin were classified as avoidable food waste. Results from 2013/2014 waste audits conducted in York Region show 35% of food waste is avoidable. Results from Metro Vancouver baseline research (food waste reduction) shows that 50% of food waste is considered avoidable.

UK's Love Food Hate Waste campaign has resulted in 21% reduction in avoidable food waste since 2007 (Source: Food Waste Briefing Paper to the House of Commons Library, United Kingdom. September 2, 2015. No. Number CBP07045) and Denmark has achieved 25% reduction in food waste generation (Source: Food Waste in Denmark down 25% at http://cphpost.dk/news/food-waste-in-denmark-down-by-25-percent.html).

Food waste is generally 25% to 40% of total waste reduction (before waste is put in Green Bin or garbage). A lower, more conservative value has been used for Toronto.

For Toronto, a 21% reduction in avoidable food waste, which is about 35% minimum of Green Bin material results in a potential 3% residential waste reduction. A 25% reduction in avoidable food waste results in a potential 4% residential waste reduction.

Option 2.2: Food Waste Reduction Strategy		
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Minimal to no reduction in traffic resulting from the reduction in food waste since remaining organics will still require transportation to composting or disposal facilities.
	Potential for litter increase/reduction	• Minimal to no increase/reduction in litter as no litter generated.
	Potential odour emissions	• Minimal to no change in odour emissions resulting from a reduction in food waste since organics will still require management.
	Potential noise emissions	• Minimal to no increase in noise emissions resulting from reduction in food waste since remaining organics will still require transportation to composting or disposal facilities.
	Potential for increased vector/vermin	• Minimal to no change in vector/vermin beyond current conditions as food waste will still be produced.
Collaboration	Ability to partner with other municipalities/ organizations	• Ability to partner with a large number of municipalities or organizations and possibly food retailers and municipalities and roll out a coordinated campaign throughout the GTA or Golden Horseshoe.
Complexity	Program complexity to user	• Potential for some complexity with need for some participant education and putting into practice food waste reduction activities such as consuming all food, making shopping lists before shopping, checking expiry labels, finding recipes for leftovers etc. There is strong motivation as food waste increases costs of food purchase.
Convenience	Ease of participation	• Relatively easy to use but requires some effort to participate as targeted audience is asked to make more effort to reduce food wasting habits.
Community Safety	Potential for impacts to community safety	• Minimal to no potential to increase number and type of safety issues as long as safeguards are in place to educate audience about food that has spoiled. No facilities or vehicles involved so impact on community safety is minimal.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for increased equity when compared to current situation as all groups will benefit from the strategy.

Option 2.2: Food Waste Reduction Strategy		
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Significant potential to change or influence behaviour by introducing strategies and activities to reduce food waste.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Minimal to no capital costs as no capital costs involved. Potential to extend life of current organics processing facilities, thereby delaying future capital costs.
	Estimated net operating cost	• Estimated $500,000 + for Toronto campaign design and launch as part of operating costs related to development of strategy. [5] • Potential for reduction in operating costs related to collection, disposal, and processing if food waste is reduced.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	• Minimal to no contractual risk with implementation/operation with the City Staff.

[5] Operating cost based on other programs: Metro Vancouver's 2014 "Create Memories not Garbage and Love Food not Waste" Christmas campaign cost $250,000 in external relations, tv, ads. Metro Vancouver's Love Food, Hate Waste Campaign launched May 2015, cost $27,000 to purchase License Fee for WRAP's UK LFHW promotional materials and $57,000 for outreach materials. (Source: Zero Waste Challenge: Fall 2014 Organics and Christmas 2014 Waste Reduction Campaigns staff report and Metro Vancouver Love Food Hate Waste Campaign Update to the Metro Vancouver, Zero Waste Committee, April 8, 2014) and West London UK, Love Food Hate Waste campaign (6 month) Cdn $700,000 (Source: A full report on the 2010-2013 Recycling for London Programme. September 2013. Recycle for London).

York Region's design and implementation of its Good Food campaign cost $450,000 (includes survey, waste audits and set out study, P&E design and consultant fees)Survey and Audits ($180,000) 2015 P&E budget ($180,000), consultant fees ($90,000) - Communications with Leslie Gilbert, York Region on September 29th, 2015

Metro Vancouver piloting food waste reduction in up to 22 restaurants – budget $25,000. Metro Vancouver launched Food Waste Reduction Pilot for Foodservice Industry in June 2015 with the intent of training up to 22 restaurants on the LeanPath food waste tracking system. Metro Vancouver has purchased six LeanPath tracking units and has budgeted $20,000 to 25,000 to hire a consultant to recruit and train volunteer restaurants, and pay a one year license fee for the LeanPath software. Does not include staff time.

Option 2.2: Food Waste Reduction Strategy		
	Potential for schedule risk	• Minimal to no schedule risk. • Option is relatively easy to implement.
	Potential for innovation risk	• Minimal to no innovation risk as there are other promotion and education and outreach campaigns that have been implemented and proven successful.
Economic Growth	Potential for local economic growth	• Minimal to no potential for local economic growth.
	Potential for regional/global economic growth	• Minimal to no potential regional/global economic growth.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for some part time job creation for organizations teaching residents how to use leftovers .
Flexibility	Ability to accommodate future changes	• Some ability to accommodate future changes by changing the message as it applies to food waste.

Option 2.3: Textile Collection and Reuse Strategy

This option involves the development of a textile diversion awareness campaign and the provision of 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 and potentially divert an additional 1% of waste from landfill.

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.

Municipal/Waste Industry Experience:

- It is estimated by the United States Environmental Protection Agency (USEPA) that only 15% of clothing is diverted through

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 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

Option 2.3: Textile Collection and Reuse Strategy

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.

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.
- Consider using pilot study to refine 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 the campaign and establish collaborative partnerships to assume roles in reuse and recycling.

Potential Outcomes:

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

Details of Option Undergoing Evaluation: This option assumes that the City will assume a stronger role in helping to divert textiles by establishing collection bins at City operated depots or other City facilities (e.g. libraries, community centres) where they can be monitored and having non-profits operate the collection, transport and management of the textiles. The City will develop an awareness campaign to support the collection of textiles, aimed at diversion of textiles that are being disposed of in the garbage. The option could also be added as a curbside collection program.

Gap/Challenge/Opportunity: A challenge facing the City is how to better promote and facilitate diversion of textile materials that could be reused or could be converted to rags in order to prevent waste from entering the system and requiring management through collection, processing and/or disposal. An additional key challenge facing the City is to provide its customers with convenient options, which promote greater diversion.

Option 2.3: Textile Collection and Reuse Strategy

Ownership/Operation: City-Owned, Operated by Non-profit/ private sector

Materials Collected/Diverted: Reusable clothing, shoes, curtains, sheets, towels, purses, knapsacks and textiles used for rags etc.

Staffing: Requires minimal City of Toronto staff

Consideration of Other Infrastructure/Programs: This option would be undertaken as part of the depot options being explored (Option 1.9 – Updates to Current Multi-Residential Development Standards, Option 2.5 – Reuse Events, 2.6 – Explore Opportunities for Waste Exchange, Option 3.1 – Container Management, Option 3.3 – Stand-alone Drop-off and Reuse Centres, and Option 3.4 –Permanent, Small Scale Neighbourhood Diversion stations) and could be added to curbside program in the form of a monthly collection at the curb.

Land Requirements: See depot options (collection could potentially occur at drop-off depots)

Option 2.3: Textile Collection and Reuse Strategy		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Minimal to no impact/benefit to land resources because there is no use of land resources with the development of a strategy.
	Potential impacts to local airshed	• Minimal to no release of emissions to the atmosphere because there are no release of emissions to the airshed with this option.
	Potential impacts to local water sources	• Minimal to no release of potential contaminates to water because there are no releases to local water sources with this option.
	Potential water consumption requirements	• Minimal to no water required because there is no water consumed with this option.
	Total land required and land use displacement	• Minimal to no additional land required because no land is displaced with this option.
Regional/Global Environmental	Energy and fossil fuel generation / consumption	• Reduction in fossil fuel consumption associated with the strategy that promotes reuse and recycling of textiles, especially when compared with manufacturing new textiles. Savings in energy requirements globally as a result of textile reuse.

Option 2.3: Textile Collection and Reuse Strategy		
Impact/Benefit	Greenhouse gas (GHG) contributions	• Reduced greenhouse gas contributions associated with a strategy that encourages reuse rather than manufacturing of new textiles.
Public Health Impact/Benefit	Potential to impact human health	• Potential for a beneficial impact on public health by reducing ecological impact associated with the production of manufacturing of new textile, and through greater access to low cost clothing for low income families.
	Potential to impact ecological health	• Benefit to ecological health from the strategy that encourages reuse and recycling of textiles thereby reducing the use of pesticides and water consumption associated with the production of cotton and manufacturing of new textiles.[6]
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Some potential for some additional diversion (2-5%). Potential for diversion of textiles (e.g. worn out clothing, shoes, etc.) that are thrown in the garbage because they are not considered good enough to be donated.[7]
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Significant consistency with the priorities of the waste hierarchy. • Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No other approvals required.

[6] For instance, the ecological impacts of growing cotton are high. Cotton, which is used in the manufacturing of textiles, consumes high amounts of water and pesticides/fertilizers. According to the World Wildlife Fund, 2.4% of the world's crop land is planted with cotton and cotton is used in about half of textile manufacturing world wide and 1 kg. of cotton uses 20,000 litres of water to grow and accounts for 24% insecticide and 11% pesticide of global sales at http://wwf.panda.org/about_our_earth/about_freshwater/freshwater_problems/thirsty_crops/cotton/. Every cotton T-shirt has used of 150g of pesticides in the production of the cotton Source: Advancing Resource Efficiency in Europe. March 2014. European Environmental Bureau.

[7] Textiles represent 4 -7% of the Single family & multi-residential waste streams. Based on 2011 (MF) and 2014 (SF) Toronto waste audits in which textiles represented 1.5% of the Single family waste stream and 5.1% of the multi-residential waste stream. Markham has identified that textiles are about 7 % of their stream. Achieving 50% capture rate of textiles would result in 1-3% additional diversion rate. This rate is conservative compared with San Francisco, which has a goal of 100% textile diversion. Communications with Alexa Kielty Zero Waste Specialist, San Francisco Environment, September 25th, 2015.

Option 2.3: Textile Collection and Reuse Strategy		
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Minimal to no increase/reduction in traffic increase resulting from the development of the strategy.
	Potential for litter increase/reduction	• Minimal to no increase/reduction in litter as no litter generated.
	Potential odour emissions	• Minimal to no increase/reduction in odour emissions as no odour associated with option.
	Potential noise emissions Potential for increased vector/vermin	• Minimal to no increase/reduction in noise emissions as no noise expected from the development of the strategy. • Minimal to no increase/reduction in vector/vermin associated with the development of the strategy.
Collaboration	Ability to partner with other municipalities/ organizations	• Ability to partner with a large number of municipalities or organizations to collaborate with organizations and charities involved in textile reuse and recycling.
Complexity	Program complexity to user	• Program is very easy to use and understand to the user as recycling textiles is easy to understand.
Convenience	Ease of participation	• Relatively easy to access with limited effort required for customer participation with goal of establishing easy to access collection points.
Community Safety	Potential for impacts to community safety	• Minimal to no potential to increase number and type of safety issues associated with development of the strategy.
Equity	Potential for unequal impacts/benefits to specific groups	• Minimal to no potential for unequal impacts/benefits to specific groups. • Potential for more textiles to be sent overseas for reuse by other groups.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Some potential to influence behaviour through awareness campaigns to make consumers more willing to donate used clothing and textiles and repair clothing rather than discarding.
Financial Impact/Benefit		

Option 2.3: Textile Collection and Reuse Strategy		
Cost	Estimated net capital cost	• Minimal to no capital costs associated with development of the strategy.[8]
	Estimated net operating cost	• Some operating costs associated with development of the strategy, awareness campaign and P&E materials. • Minimal operating cost if charities involved in collecting and sorting the textiles. [9]
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Minimal to no risk with reliance on implementation and operation by charities.
	Potential for schedule risk	• Minimal to no schedule risk. • Option is relatively easy to implement.
	Potential for innovation risk	• Minimal to no innovation risk as no new innovation involved, the approach is well proven and well understood.
Economic Growth	Potential for local economic growth	• Some potential for local economic growth in managing textiles at charities and through market development for reuse or recycling of textiles.[10]
	Potential for regional/global economic growth	• Minimal to no potential for regional/global economic growth.

[8] If the City chose to place collection bins at libraries and community centres then the estimated capital cost is $215,000 to purchase 100 GoBINs at unit cost of Cdn $2,149 (US$1,600) per Goodwill GoBIN. Goodwill in San Francisco has developed a GoBin, which collects and tracks the fullness of textile recycling bins and once the bin reach 75% fullness a signal is sent to Goodwill to empty the bins. The tracking bin cost US $1,600 (Cdn $2,149). There would be border taxes and transportation charges on top of the bin cost to ship from San Francisco. Other communities collect textiles curbside, e.g. San Jose collects textiles curbside by requiring that textiles be placed inside a clear plastic bag when setting out for recycling next to the recycling cart at the curb.

[9] Operating cost estimated at $250,000 initial investment for campaign and pilot is $465,000. San Francisco provided a grant of US $160,000 (Cdn $215,000) to Goodwill to develop a Promotion & Education (P&E) campaign and GoBIN pilot in select apartment buildings (focus on buildings with 100 units) Communications with Zero Waste Specialist, San Francisco Environment, September 25th, 2015. Goodwill purchases the bins and places them in high traffic locations (malls, commercial buildings, MR buildings with >100 units) and charges US $95/mth maintenance fee (Communications with Director of Sustainability and Partnerships, Goodwill San Francisco, October 1, 2015).

[10] Goodwill Industries of Toronto, Eastern, Central and Northern Ontario employs over 600 people (brochure at https://www.linkedin.com/company/goodwill-industries-of-toronto) and the Salvation Army has over 7,000 employees Canada-wide (Salvation Army Annual Review 2012/2013).

Option 2.3: Textile Collection and Reuse Strategy		
Potential for Additional Local Job Creation	Potential for additional local job creation	• Some potential for job creation associated with managing textiles.
Flexibility	Ability to accommodate future changes	• Some flexibility to accommodate future changes in material composition or quantities.

Option 2.4: Sharing Library

Additional opportunities could be developed to allow the public to sign-out materials that are used infrequently. This could be accomplished by partnering with existing organizations within Toronto (e.g., tool sharing library, bike sharing) or establishing new sharing programs in different areas of the City and/or within multi-residential buildings. Materials can be donated to the 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[11].

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[19].
- 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[12]. 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)[13] – For a small membership fee ($9/month), members can borrow kitchen appliances (e.g., juicer, dehydrator, pasta maker).
- North East 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[14].
- 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 with together[15]. 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 families with an opportunity to borrow or test out toys before purchasing them[16]. 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)[17].

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11 http://www.bikesharetoronto.com
12 http://torontotoollibrary.com/
13 http://thekitchenlibrary.ca/
14 http://neseattletoollibrary.org/
15 http://citystudiovancouver.com/projects/shareable-neighbourhood/
16 http://cvtoylibrary.weebly.com/
17 https://www.asparetoshare.com/

Option 2.4: Sharing Library

- 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[18].

Considerations:

- Provides cost savings to users of sharing libraries.
- Community development 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.

Details of Option Undergoing Evaluation: It is assumed that toy sharing libraries will be rolled out at City owned facilities such as Toronto Public Libraries (approximately 100 in Toronto) and/or community centres (approximately 148 in Toronto). The City will provide funding for purchasing new toys and cleaning/disinfecting supplies, which is approximately $4000[20] per location. It is assumed that one dedicated City staff member (e.g., toy librarian) is hired to be responsible for inspecting returned toys, cleaning/disinfecting returned toys, maintaining the online catalogue and educating parents on the safe and educational uses of the toy(s). The library will incorporate the checking in and out of toys into its regular database and updates to the system to accommodate new materials will be required. Toys purchased will be developmentally appropriate for different age groups. Only new toys are to be purchased to ensure a wide variety of toys for different age groups, quality control and sanitation. Following a similar approach to the Toronto Public Library system, patrons will have a library card to sign out toys and view an online catalogue.

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[19] http://localtools.org/find/#map_top

[18] http://www.shareable.net/blog/libraries-become-centers-for-sharing

[20] Costs derived from Oakland Public Library toy library pilot programs. Initial grant of $15,000 was received to implement pilot programs at four public libraries.

Option 2.4: Sharing Library

Depending on the success of this option, the City could expand the materials that can be borrowed from the sharing libraries (other potential materials in the future could include cake pans, sporting goods equipment, board games).

Gap/Challenge/Opportunity: A challenge facing the City is being able to reach out to a diverse community to educate its customers on program changes, good waste management practices, and where possible, how to better reduce and reuse.
Another challenge facing the City is how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

Ownership/Operation: City owned and operated.

Materials Collected/Diverted: Toys. Potential for future materials such as board games, sporting goods equipment, cake pans (not included in this evaluation).

Staffing: Significant numbers of City staff required (one additional staff member per location).

Consideration of Other Infrastructure/Programs: Would need to be promoted through advertising, annual collection calendar, etc. Potential for new toys to be donated through depots and local organizations.

Land Requirements: No additional land required. Toy sharing libraries are assumed to be located within existing City facilities (e.g., Toronto Public Libraries, community centres).

Option 2.4: Sharing Library		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources. • There is some local benefit as less waste will be generated and sent to the landfills.
	Potential impacts to local airshed	• Potential for minimal to no release of emissions to the atmosphere because there are no release of emissions to the airshed with this option.
	Potential impacts to local water sources	• Potential for minimal to no release of contaminates to water because there are no releases to local water sources with this option

Option 2.4: Sharing Library		
	Potential water consumption requirements	• Potential for minimal to no consumption of water to clean returned toys.
	Total land required and land use displacement	• Potential for no additional land required as the toy sharing library will be added to existing City-run facilities (e.g., Toronto Public Library, community centres).
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Supports reduction in energy consumption as fewer toys will need to be manufactured and distributed.
	Greenhouse gas contributions	• Supports reduction in greenhouse gas emissions by reducing the need to manufacture and distribute new toys.
Public Health Impact/Benefit	Potential to impact human health	• Potential for beneficial impact on public health through increased waste diversion from landfill, employment opportunities, and increased access to toys for low income families.
	Potential to impact ecological health	• Potential for some benefit on ecological health by reducing the need for primary extraction and any potential ecological impacts associated with the manufacturing and distributing of new toys. • Potential for some ecological benefit as a result of reduced materials going to recycling or disposal facilities.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Provides minimal opportunity to divert additional materials (<0.5%) however potential to reduce the quantity of residual waste sent for disposal.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Significant consistency with the priorities of the waste hierarchy. • Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for minimal complexity associated with approvals and permitting requirements. • Agreement required from City-facility partners (e.g., Toronto Public Library, community centres).

Option 2.4: Sharing Library		
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no increase in traffic since proposed locations would be accessible by walking or transit.
	Potential for litter increase/reduction	• Potential for minimal to no increase in litter.
	Potential odour emissions	• Potential for minimal to no increase in odour emissions because there are no odour emissions with this option.
	Potential noise emissions	• Potential for minimal to no increase in noise emissions because there are no noise emissions related to this option.
	Potential for increased vector/vermin	• Potential for minimal increase in vector/vermin there are no putrescible materials managed with this option.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities restricted to the City's Solid Waste Management Services division with other City facilities.
Complexity	Program complexity to user	• Program is easy to use and provides opportunity for reusing materials instead of buying new. • Concept will be similar to borrowing a book from a library which many residents are already familiar with. Promotion and education on the new material stream will be required.
Convenience	Ease of participation	• Increases convenience to share toys as the proposed locations are across the City. Many of the locations are accessible by walking or public transit. • Online catalogue will allow patrons to renew or place items on hold. • Proposed locations generally draw in children already and adding toy library to the facilities can increase participation.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact to community safety. Lead staff member will be responsible for disinfecting returned materials and explaining the safe use of toys to parents.
Equity	Potential for unequal impacts/benefits to specific groups	• Option provides increased equality to all residents given that proposed locations are distributed throughout the City and are accessible by public transit or walking. • Provides ability for all users to borrow toys for free regardless of income levels.

Option 2.4: Sharing Library		
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for some behavioral change from the potential savings from borrowing toys that children use for a short period of time. Option increases awareness to reduce waste and the purchasing of toys that will be used for a short period of time.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for some impact to net capital cost. Funding of $4,000 will be required per toy sharing library for purchasing new toys and cleaning/disinfecting products. Assuming that 100 locations are established over the planning period, this cost equates to approximately $400,000. • Minimal costs are associated with accommodating space within existing City facilities to establish toy sharing library and updating database and online catalogue.
	Estimated net operating cost	• It is assumed that one additional staff member is required to be hired for each toy sharing library[21] (e.g. Potentially 100 additional hires over the planning period if located in City libraries). This new staff member will need to be trained on procedures to sign out the toys, maintain the online catalogue and disinfect/clean returned toys. Assuming an annual salary of $85,000, this equates to an annual operating cost of $8.5 million for a fully implemented program across 100 locations.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contractual risk since the City is implementing the program within existing City facilities.
	Potential for schedule risk	• Potential for minimal to no schedule risk as option is expanding on the existing City facilities and is independent of other waste management programs and services.
	Potential for innovation risk	• Potential for minimal to no innovation risk as a similar concept has a proven track record at Toronto Public Libraries.

[21] Based on staffing resources for the Oakland Public Library toy library. There are 1-2 librarians in the toy room for supervision and safety and they also clean the toys and repack prior to redistribution.

Option 2.4: Sharing Library		
Economic Growth	Potential for local economic growth	• Potential for some benefit to local economic growth by additional hiring needs. • Option provides cost saving opportunities to all residents of the City.
	Potential for regional/global economic growth	• Potential for minimal to no regional/global growth with the potential reduction in the purchase of toys.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for significant additional local job creation to staff new toy sharing program across the City (100 potential new jobs).
Flexibility	Ability to accommodate future changes	• Option provides significant ability to accommodate future changes given that concept of a sharing library can be flexible to handle different material streams. Potential restriction with available space requirements to handle additional material streams.

Option 2.5: Support Reuse Events

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

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 By-law 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[22].

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, throughout 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[23]. 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[24].
- Stop 'N' Swap, various locations, NYC[25]. These community reuse events are put on by 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 By-laws, it is a community level example of residents exchanging unwanted items that could be applicable to the multi-residential sector.

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[22] http://www.toronto.ca/legdocs/municode/1184_844.pdf
[23] http://www.halifax.ca/mediaroom/pressrelease/pr2014/residentsencouragedtotakepartincurbsidegiveawayweekend.php
[24] https://localwiki.org/davis/Apartment_Move-Out_Waste_Reduction_Program
[25] http://www.grownyc.org/swap

Option 2.5: Support Reuse Events

	• Sustainable Move Out, McMaster University, Hamilton, ON[26]. 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 reduced 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 and 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 By-law 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.
- Creation of community events and increased social interactions.

Details of Option Undergoing Evaluation: This option considers the City promoting community-level giveaway events for Single family and multi-family households where residents can place unwanted, gently used materials at curbside or a designated location (e.g., portion of side street, park, common area in multi-residential building) over a certain time period (e.g., Saturdays, weekend). The City's role would be to promote the idea to community/neighbourhood

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

Option 2.5: Support Reuse Events

organizations, manage the event registration process, and provide guidance on how to setup such an event (including list of acceptable and unacceptable materials), provide promotional materials, provide direction on different non-profit organizations that would accept remaining items not given away and monitor events from time to time. The community/neighbourhood organizations would be responsible for registering the event with the City, selecting a suitable location (in collaboration with the City) and coordinating the event from start to finish. The organizational representative would also take responsibility to inform residents to remove items not collected at the end of the event. The option requires removal of the By-law condition that prohibits curbside giveaway events.

Gap/Challenge/Opportunity: A challenge facing the City is how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

Ownership/Operation: Community/neighbourhood organization to register the event with the City and operate the program. City to register events and provide guidance to organizations.

Materials Collected/Diverted: Unwanted, gently used items such as books, clothes, toys, electronics, furniture, etc. Hazardous waste materials will not be among the list of acceptable materials (e.g., used paints, stains).

Staffing: Some City staff required.

Consideration of Other Infrastructure/Programs: City to promote events to community/neighbourhood organizations and to collaborate with non-profit organizations to accept materials remaining following the events.

Land Requirements: No additional land required. The temporary events will be hosted in residential or public areas.

Option 2.5: Support Reuse Events		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources. Materials likely to be setout at events will have a low potential to contaminate the ground surface.
	Potential impacts to local airshed	• Minimal to no release of emissions to the atmosphere.
	Potential impacts to local water sources	• Potential for minimal to no release of contaminates to water. Materials likely to be setout at events will have a low potential to contaminate local water sources.
	Potential water consumption requirements	• Potential for minimal to no water required.
	Total land required and land use displacement	• No additional land required and potential to reduce quantity of residual waste sent to landfill.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Supports reduction in energy consumption as fewer products will need to be manufactured and distributed.
	Greenhouse gas contributions	• Supports reduction in greenhouse gas emissions by reducing the need to manufacture and distribute new products.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill, positive impacts on social inclusion and access to affordable reused goods for low income families.
	Potential to impact ecological health	• Potential for some benefit on ecological health by reducing the need for primary extraction and any potential ecological impacts associated with the manufacturing and distributing of materials. • Potential for some ecological benefit as a result of reduced materials going to recycling or disposal facilities.

Option 2.5: Support Reuse Events		
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for minimal opportunity to divert additional materials (<1%).
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Significant consistency with the priorities of the waste hierarchy. • Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for some complexity associated with approvals and permitting requirements. The City will have to remove Article V, 844-23 Prohibited Acts By-law condition that prohibits curbside giveaway events.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no increase in traffic as events would be located within walking distance from residential areas. Potential for short term traffic increase for those driving to the events.
	Potential for litter increase/reduction	• Potential for an increase in litter if material is left at curbside or common areas past the event period or gets blown away by wind. • Potential for some increase in litter generation if participants do not remove remaining items after the event.
	Potential odour emissions	• Potential for minimal to no increase in odour emissions because there are no odour emissions with this option.
	Potential noise emissions	• Potential for minimal to no increase in noise emissions because there are no noise emissions related to this option.
	Potential for increased vector/vermin	• Potential for minimal increase in vector/vermin there are no putrescible materials managed with this option.

Option 2.5: Support Reuse Events		
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities with non-profit organizations that could support events by taking materials remaining after giveaway events. Participants would be informed of non-profit organizations that could accept donations of any unsold/remaining items. The City can play a role by raising awareness about the collaboration opportunities between the organization and the residents. • Option has some potential to partner with local organizations but the main focus is supporting reuse events at the neighbourhood/community level.
Complexity	Program complexity to user	• Program is easy to use and understand, provided the City promotes the events and educates residents on acceptable materials for giveaway events. • Option is simple for residents to use as materials are setout for reuse at their own homes/buildings or in a nearby public location.
Convenience	Ease of participation	• As option provides reuse opportunities at the neighbourhood/community level, it is anticipated that it will be easy for users to participate in the events.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact to community safety. Residents are dealing with other residents in the neighbourhood and are taking items from curbside or common areas at their own risk.
Equity	Potential for unequal impacts/benefits to specific groups	• Option provides increased equality to all residents across the City since locations are at the community/neighbourhood level. • Provides the ability for users to purchase or obtain materials for low or no cost. • Provides an opportunity for users to access items throughout the City regardless of income levels or location of home.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for some behavioral change from the potential savings of obtaining materials for reuse that would otherwise be recycled or disposed. • Potential barrier associated with taking gently used goods.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for minimal to no impact to net capital cost since events will be organized by community/neighbourhood organizations.

Option 2.5: Support Reuse Events		
	Estimated net operating cost	• Potential for minimal to no impact to net operating cost since neighbourhood/community organizations will be organizing and hosting the events. The City will play a role in promoting and educating residents about the event via existing methods (e.g., creating promotional materials) and will require additional time to register events. • Potential for some increase to operating costs to cover the cost of by-law enforcement officers who will monitor/issue fines and potentially collection operators to clean up items left in the event area. It will be advertised that remaining items are to be managed by the participant organization and promote non-profit organizations that will accept items will be promoted.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	• Potential for minimal contractual risk.
	Potential for schedule risk	• Option is easy to implement given it is implemented at the neighbourhood level by residents.
	Potential for innovation risk	• Potential for minimal to no innovation risk associated with this option.
Economic Growth	Potential for local economic growth	• Potential for minimal to no local economic growth. • Option provides cost savings opportunities to all residents of the City.
	Potential for regional/global economic growth	• Potential for minimal to no regional or global economic growth. Option reduces the need to manufacture and distribute new products.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no additional local job creation.
Flexibility	Ability to accommodate future changes	• Ability to accommodate future changes given that concept of giveaway events can be flexible to handle different material streams.

Option 2.6: Explore Opportunities for Waste Exchange

This option involves the establishment of a waste exchange centre and/or partnership with existing organizations that collect gently used materials, such as arts and crafts supplies, 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 through ArtsJunktion. 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 Solid Waste Management Services (SWMS) website has an area called ReUseIt, which provides listings of not-for-profit agencies that accept donated items and organizations that loan, repair and reuse materials , 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[27]. 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.)[28]. 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)[29] – 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 waste generated by one industry by 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, Renovation & Demolition 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.

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[27] https://www.partnersinprojectgreen.com/your-needs/waste-management/
[28] https://www.scrapstoresuk.org/
[29] http://www.creativepitch.org/index.html

Option 2.6: Explore Opportunities for Waste Exchange

	• Homeless Homes Project, California[30]. 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.
- 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.
- Decrease garbage going to landfill

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

Details of Option Undergoing Evaluation: The City will promote and educate customers on opportunities for waste exchanges whereby residents, businesses, institutions, non-profit organizations, etc. within the City can sell or give away unwanted, gently used materials. The City's role would be to promote organizations that can use different material streams, provide grants to companies that want to create a market for waste not currently diverted, potentially provide storage space to organizations requiring temporary storage solutions (depending on City space availability). Transporting materials will be the responsibility of the users and not the City's responsibility. Participating organizations would be encouraged to report to the City on quantities of waste diverted through the waste exchange.

It is recommended that this program be linked to the Waste Wizard (i.e., acceptable materials entered into the Waste Wizard are promoted to be given away through the waste exchange program) but is set up and maintained separately.

Gap/Challenge/Opportunity: A challenge facing the City is how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

Ownership/Operation: Externally owned and operated. The City's role will be to advertise/promote waste exchange opportunities through partnerships with City businesses, institutions, non-profit organizations, etc.

Materials Collected/Diverted: Various materials including arts and crafts, school and office supplies, construction and demolition waste, textiles, etc.

Staffing: Minimal City staff required.

Consideration of Other Infrastructure/Programs: Tied to the City developing an enhanced online waste management tool (1.1), targeted group communications (1.6), developing a centre of excellence (9.13) and the City assuming a role of facilitator to encourage Industrial, Commercial & Institutional waste diversion (9.6).

Land Requirements: No additional land required.

Option 2.6: Explore Opportunities for Waste Exchange		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some local benefit as less waste will be generated and sent to the landfills.
	Potential impacts to local airshed	• Potential for minimal to no release of emissions to the atmosphere because there are no release of emissions to the airshed with this option.

Option 2.6: Explore Opportunities for Waste Exchange		
	Potential impacts to local water sources	• Potential for minimal to no impact to local water sources because there are no releases to local water sources with this option.
	Potential water consumption requirements	• Potential for minimal to no water consumption requirements because there is no water consumed with this option.
	Total land required and land use displacement	• Potential for no additional land requirements and potential to reduce the quantity of residual waste sent to landfill.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Supports reduction in energy consumption as fewer products will need to be manufactured and distributed.
	Greenhouse gas contributions	• Supports reduction in greenhouse gas emissions by reducing the need to manufacture and distribute new products.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill and access to affordable reused goods for low income families.
	Potential to impact ecological health	• Potential for some benefit on ecological health by reducing the need to extract virgin materials and any potential ecological impacts associated with the manufacturing and distributing of materials. • Potential for some ecological benefit as a result of less materials going to recycling or disposal facilities.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for some additional diversion of materials for reuse (2-5%[31]) such as construction and demolition waste, textiles, furniture, arts and school supplies, etc. • Potential to reduce the quantity of residual waste sent for disposal.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Significant consistency with the priorities of the waste hierarchy. • Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.
Social Impact/Benefit		

[31] Based on City of Toronto 2012-2013 single-family residual waste audits and professional judgment on additional quantities available for diversion among non-City customers.

Option 2.6: Explore Opportunities for Waste Exchange		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for minimal to no complexity associated with approvals and permitting.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no change in traffic is anticipated because of potential reduction in residual waste collected.
	Potential for litter increase/reduction	• Potential for minimal to no increase in litter since waste exchange program will be conducted from customer to customer.
	Potential odour emissions	• Potential for minimal to no increase in odour emissions because there are no odour emissions with this option.
	Potential noise emissions	• Potential for minimal to no increase in noise emissions because there are no noise emissions related to this option.
	Potential for increased vector/vermin	• Potential for minimal to no increase in vector/vermin there are no putrescible materials managed with this option.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for significant collaboration among the residential and non-residential sectors including non-profit organizations.
Complexity	Program complexity to user	• Potential for minimal to no complexity. Concept is similar to existing online waste exchange websites that many customers are familiar with. The City's role to promote the program will decrease complexity. • Users need access to the internet because many waste exchange programs occur online.
Convenience	Ease of participation	• Option provides relatively easy access with limited effort requirement for user participation. May require users to have access to the Internet and the ability to access materials available through the waste exchange system.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact to community safety but similar to existing waste exchange programs, users will have be cautious of meeting locations and quality of materials available for reuse.

Option 2.6: Explore Opportunities for Waste Exchange		
Equity	Potential for unequal impacts/benefits to specific groups	• Provides increased equality to all users of the program to access used materials at a low cost (or free) as waste exchange programs are typically accessible online provided that users have access to the Internet and are able to collect the desired materials. Free internet is available at select City facilities which can help alleviate this potential issue and be part of the promotion campaign. • Users without vehicles may be restricted to types of materials available for reuse/recycling.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for some behavioral change if users realize that their waste can be reused.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for minimal to no net increase in capital cost as a result of establishing a list of participating users/organizations and determining level of effort/funding available to implement this option.
	Estimated net operating cost	• Potential for minimal to no change to net operating costs. The City's role will be to promote, monitor and verify participating waste exchange programs/organizations. It is anticipated that this will require an average of two (2) hours per week[32], which equates to approximately 100 hours per year.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contractual risk since participating users/organizations are responsible for the items they giveaway/sell/buy online.
	Potential for schedule risk	• Potential for minimal to no schedule risk as this is option would not be managed by the City.
	Potential for innovation risk	• Potential for minimal to no innovation risk as this option is not being managed by the City and online material exchange programs have been in place for a number of years.

[32] Based on discussion with City of Toronto staff that currently manage the Waste Wizard website.

Option 2.6: Explore Opportunities for Waste Exchange		
Economic Growth	Potential for local economic growth	• Potential for some impact on local economic growth since users could receive money for items that would have otherwise been sent to disposal.
	Potential for regional/global economic growth	• Potential for some impact on regional or global economic growth as the website will be accessible to users outside of the City.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no impact on additional local job creation as existing City staff will maintain the program. Short term job creation to develop and launch the waste exchange program.
Flexibility	Ability to accommodate future changes	• Option provides the opportunity to exchange a wide range of materials.

COLLECTION AND DROP-OFF

Option 3.3: Stand Alone Drop-off and Reuse Centres

Establish large scale, stand-alone, one-stop, urban drop-off and reuse opportunities (i.e. separate from facilities that are also used to transfer waste and other materials).

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 Greater Toronto Area (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, for example, heavy materials such as 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 provide a variety of services and information and communication.
- 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).

Case Studies/Examples:

- Burnaby, BC – The City's EcoCentre a central transfer facility for recyclables and green waste collected through the city's curbside programs and is used by over 225,000 residents of the Metro Vancouver Area. The centre accepts up to 20 different types of recyclable materials including : green waste (yard trimmings) for $65/tonne; materials included under the province's extensive set of Extended Producer Responsibility (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) in 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. HHW and 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.

Option 3.3: Stand Alone Drop-off and Reuse Centres

• Some municipalities (see Markham's Neighbourhood Recycling Centres program in Option 3.4) complement larger scale one stop drop-off facilities.	• 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) Canada Wide Action Plan (CAP) 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 corrugated 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 compared to developing numerous small depots (Option 3.4).
- Establish/construct of one or more stand-alone, large scale drop off and reuse centres throughout the City in areas not well serviced by current drop-off at transfer stations.
- A reuse area or store allows residents to reclaim materials dropped off by others.

Potential Outcomes:

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

Details of Option Undergoing Evaluation: This option calls for up to 10 large scale, one-stop drop off and re-use centres to be rolled out over the next 3 -5 years (i.e. about one depot to service a population base of about 200,000 residents). These depots would be City owned and could be operated by City staff or be contracted out to the private sector to own and/or operate on a competitive bid process.

These stand alone facilities would replace existing City drop-off depots located at transfer stations and will collect all materials, taking into consideration all permitting, volume and odour control requirements. This is an important distinction as compared to neighbourhood waste diversion stations (see Option 3.4) that are not expected to serve as drop-offs for Green Bin Organics or residential garbage because of permitting, volume and odour concerns.

Gap/Challenge/Opportunity: A challenge facing the City is to provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility.

Another challenge facing the City is the impact of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.

Ownership/Operation: Assume City-Owned, City Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Blue Bin recycling materials (e.g. if someone wanted to clear out 20 years of magazines), Municipal Hazardous or Special Waste (MHSW), residential garbage, Green Bin Organics, yard waste, C&D (Construction and Demolition materials), furniture, textiles (Clothes, handbags, shoes, belts), durable goods (pots and pans, dishes, etc.) books, carpet, WEEE (Waste Electrical and Electronic Equipment), including kitchen appliances

Staffing: Some additional City staff required.

Consideration of Other Infrastructure/Programs: Stand alone facilities will replace existing City drop-off depots at transfer stations.

Land Requirements: Minimum 1.2 hectares but could be configured to available parcel of land..

Option 3.3: Stand Alone Drop-off and Reuse Centres		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All materials would be received by City staff/contractors and placed in containers/roll-off bins located within the drop-off site.

Option 3.3: Stand Alone Drop-off and Reuse Centres		
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all recovered materials are expected to be collected in containers/roll-off bins located within the drop-off site. Limited to no material processing would occur on site. • Potential for some impact on local airshed due to increased vehicle trips.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All materials are expected to be collected in containers/roll-off bins located within the drop-off site, in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Potential for some land use displacement. In large urban centres, “one stop”, stand-alone drop-off centres are generally designed to service populations of 200,000 or more residents and have a minimum of 1.2 hectares available for development in order to offer a full range of depot services.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Some on-site energy consumption is related to drop-off depot building systems, lighting, heating, etc. Some fossil fuel consumption is related to on-site equipment operation.
	Greenhouse gas contributions	• Supports reduction of greenhouse gas emissions by providing location in close proximity for numerous small vehicles and consolidation of materials into single larger vehicle for longer distance transport.
Public Health	Potential to impact human health	• Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill and access to affordable reused goods for low income families.

Option 3.3: Stand Alone Drop-off and Reuse Centres		
Impact/Benefit	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Some potential for diversion. • Estimate 0.5% additional diversion per large depot (3,600 tonnes/year) or up to 5% diversion for 10 depots[33] (36,500 tonnes/year, based on material remaining in waste stream from audit data).
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for some approval and permitting complexities due to the size and nature of sites being considered. Standard requirement for an Environmental Compliance Approval. Land use planning approvals will also be required depending on the specific site.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact on traffic, i.e. for drivers to drop off materials, particularly if drop-offs attract frequent residential and small business users and for pick up and transfer vehicle traffic.
	Potential for litter increase/reduction	• Potential for some impact on litter. Mitigating measures to be applied will need to include proper staffing and containers/roll-off bins will be used to contain materials.
	Potential odour emissions	• Potential for some impact on odour emissions. Mitigating measures to be applied will need to include regular transfer of collected materials.
	Potential noise emissions	• Potential for some impact on noise emissions. Drop-off sites will have rolling stock and heavy truck traffic to service bins and roll-offs throughout the day. Mitigating measures to be applied will need to include proper timing for deliveries/removal of containers.

[33] Peel's Community Recycling Centres (CRCs) and Hamilton's CRCs diverted about 1% of the waste stream per facility. The five CECs in the Region of Peel diverted 5.9% of Peel's municipal waste in 2009. Hamilton's three CRCs diverted 2.9% of Hamilton's municipal waste in 2009. (in house files) Assumes that diversion rate is augmented with diversion from neighbourhood depots (Option 3.4).

Option 3.3: Stand Alone Drop-off and Reuse Centres		
	Potential for increased vector/vermin	• Potential for some impact related to vector/vermin. Containers/roll-off bins will be covered/locked/fenced in when the site is closed. Mitigating measures to be applied will need to include appropriate vector/vermin control measures as required.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities especially with organizations that already operate re-use programs, or with neighbouring municipalities if depots located close to municipal borders.
Complexity	Program complexity to user	• Drop-off sites are not complicated for users as long as the locations and hours are well advertised and readily accessible and traffic flow is well managed.
Convenience	Ease of participation	• Very easy to participate for vehicle owners; but not for non-vehicle owners.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety provided traffic on-site is well managed during busy times. • Any risk related to traffic can be mitigated through good management practices.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for unequal benefits as some residents will be closer to facility than others and therefore will have greater accessibility. • Potential for some impact to residents living near facility from increased traffic, noise etc.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Minimal to no potential to influence or encourage behaviour change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Total capital cost of $100 - $140 million for 10 depots, excluding cost to purchase land. • Assumes capital costs $10 - $14 million for each depot,[34] excluding cost to purchase land. • Assumes a dedicated drop off for every 200,000+ residents, this would mean 10-12 stand alone depots (not co-located with transfer sites). [35]

[34] Capital costs for a Region of Peel Community Recycling Centres ranged from $10-14 million (Sources: Heart Lake Community Recycling Centre, Capital Project 12-6509. January 26, 2012. Report to Regional Council & City of Spruce Grove Eco Centre Review Project. May 2014. Prepared by Sonnevera). The capital costs for the York Region Elgin Mills Community Environmental Centre in 2014 was $14 million (communication with David Merriman, Cole Engineering who oversaw the construction of the Elgin Mills CEC).

Option 3.3: Stand Alone Drop-off and Reuse Centres		
	Estimated net operating cost	• Operating costs of $20 million (for 10 depots). Assumes $2 M per depot annual operating costs. [36] • Operating costs can be partially offset by tipping fees charged at the facilities and revenues from diverted materials, although these are expected to be low.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk as stand alone drop-off depots can be operated by City and/or contract staff. Contractual risk is manageable.
	Potential for schedule risk	• Potential for minimal to no schedule risk (mainly related to staffing hours/costs and transfer pick up schedules). • Potential for some siting and construction risk (mainly related to siting, approvals and potential number of facilities to be constructed).
	Potential for innovation risk	• Potential for minimal to no innovation risk. This is a comparatively "low tech approach" to expanding drop-off services for residents and small businesses across the City.
Economic Growth	Potential for local economic growth	• Potential for some impact on local economic growth; this is a labour intensive, mid-scale size waste management service.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth as amounts of waste handled are relatively small.
Local Job Creation	Potential for additional local job creation	• Potential for some additional local operational job creation at neighbourhood depots. • Potential for some additional local job creation at reuse organizations which use collected materials that are incremental to the tonnes currently collected.

[35] York Region has a policy of a developing dedicated CEC for every 200,000+ residents (Source: Community Environmental Centres and Public Drop-off Facilities Strategy. November 2013. SM4RT Living)

[36] The average operating costs for a Region of Peel Community Recycling Centre in 2014 was about $2 million per year. (Source: City of Spruce Grove Eco Centre Review Project. May 2014. Prepared by Sonnevera)

Option 3.3: Stand Alone Drop-off and Reuse Centres		
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility to change the materials accepted as needs change with different composition over time. • One benefit of stand alone drop–off depots is that depots can be cost effectively adapted over time to accept a wide range of new materials or can be used to pilot collection of new materials before rollout to curbside collection. However, the main constraint is that drop-off is inherently less convenient than curbside collection, so the ability to divert is less.

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations

Develop, implement and operate a network of permanent, small scale neighbourhood drop-off depots 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 in 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 Community Environment Day events, which are 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:

- 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 United Kingdom “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 British Columbia), one stop, multi-material depots are expanding from “deposit-only” drop offs to recover a wider range of both Extended Producer Responsibility (EPR) 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,

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 four neighbourhood recycling centres that each accept a wide range of materials–i.e. no waste is generated/disposed (thus no Environmental Compliance Approval (ECA) is required).

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations

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 small scale neighbourhood drop-off depots 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 drop-off depots support a move away from a car centric model (where appropriate), which coincides with Toronto's move towards better 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 drop-off depots 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, 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 the 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 provision of enhanced service to the public.

Details of Option undergoing Evaluation: This option is based on establishing 10 to 20 staffed neighbourhood drop-off depots (over the next 15 to 20 years, generally to be located in accessible locations near transit. The facilities could be City owned and operated, privately contracted or some stations could be developed in partnership with local community based organizations (some of which already provide material specific drop-off and reuse services/locations to their customers).

An important assumption regarding this option is that it would need to be considered as either a complement to or an alternative for the larger scale stand alone depot system described in Option 3.3[37]. It is assumed, for example (unlike the larger, one-stop stand alone depots), for space, permitting and health and safety considerations, neighbourhood depots would not accept residential waste or organic materials.

Gap/Challenge/Opportunity: A challenge facing the City is to provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility.

Another challenge facing the City is the impact of intensification and the changes required to manage additional waste generated by multi-residential housing units with typically lower waste diversion performance records and in areas that are more difficult to collect from using traditional methods.

Ownership/Operation: Assume City-Owned, City Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Municipal Hazardous or Special Waste (MHSW), Construction and Demolition (C&D) material, furniture, textiles, durable goods

[37] See Technical Memorandum No. 4

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations

such as small household goods (e.g. pots/pans, small appliances), carpets, and Waste Electrical and Electronic Equipment (WEEE). Where space permits, some depots could accept larger items and allow some reuse activities on-site.

Staffing: Additional City staff required.

Consideration of Other Infrastructure/Programs: Small Drop-off and Reuse depots would need to be considered as either a complement to or an alternative for the larger scale “stand alone” depot system described in Option 3.3 These depots would complement curbside collection, providing an alternative for diversion of some other materials that may not be collected curbside. Mobile drop-off depots could be used as pilot facilities to measure usage and performance and help identify best location for permanent drop-off depots.

Land Requirements: The size of the footprint required for neighbourhood drop-off depots depends on the size and number of depots (likely no more than 250 square metres; some locations would be smaller). Depots could be located inside existing buildings.

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All materials (which may vary according to the size of each diversion station) would be received by City staff/contractors and placed in containers/bins within the station or in parking areas adjacent to the station (depending on the location).
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all recovered materials are expected to be collected in containers/bins within or adjacent to the station. Limited to no material processing would occur on site. • Potential for minimal to no impact on local airshed due to increased vehicle trips, but these may not be incremental to other travel (e.g. depot may be visited on trip to a grocery or hardware store that would have happened anyway).
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All recovered materials are expected to be collected in containers/bins.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption, which is limited to on-site clean up.

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations		
Criteria	**Indicators**	**Assessment**
	Total land required and land use displacement	• Potential for minimum to no impact due to land displacement. All sites expected to be small and some to be potentially located in existing buildings. The size of the footprint required for waste diversion stations depends on the size and number deemed necessary (likely no more than 250 square metres; some locations would be smaller).
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• On-site electrical energy consumption is minimal (e.g. lights, computers, etc.). • Potential for some fuel consumption by vehicles used to collect materials from the network of drop-off depots.
	Greenhouse gas (GHG) contributions	• Potential for minimal to no negative GHG impacts from energy use; additional quantities of recyclables and reusables result in upstream GHG benefits. However, the potential for GHG impacts would be positive but low.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts through little to no change in environmental indicators. Potential for small positive impact on health through increased access to diversion services in underserviced areas.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations		
Criteria	**Indicators**	**Assessment**
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Based on experience in other communities, small scale depots divert a range of 2-7kg/cap/year[38], which translates to 5, 000 to 18,000 tonnes for a fully convenient comprehensive system for Toronto. Small depots would target textiles (curtains, towels, clothes) , durable goods (pots and pans, small household appliances, carpets, C&D (construction and demolition) materials, as well as some WEEE (waste electrical and electronic) materials. Estimates for Toronto indicate about 70,000 tonnes of potential divertible materials remain in the residential waste stream[39]. A system of 10-20 neighbourhood depots would be expected to divert about 5,000 tonnes/year (at the low end of the range), or about 250 to 500 tonnes/year per depot, depending on the number of depots and convenience of locations for large numbers of residents. Diversion 0.9%.Benefit is that small depots can target materials not readily collected through other means, providing a good diversion opportunity for non-traditional materials. • Potential for some ability to recover additional recyclable and reuseable materials such as working small appliances, old televisions, etc. (depending on the size, location and storage capacity of the stations).
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Low approvals complexity as dealing with simple design and construction and some depots may be located in existing buildings. • No garbage or Green Bin organics would be collected, thereby simplifying approvals. • Some potential for some approval and permitting complexities depending on the range of materials to be collected (e.g. hazardous waste, such as batteries) and outdoor storage requirements.
Potential for Land	Potential for traffic increase/reduction	• Potential for minimal to no impact on traffic (i.e. for users to drop off materials, particularly if stations are located in high traffic areas).

38 Based on information provided by City of Markham staff.
39 Based on SF (2012-2013) and MF (2014) audit data.

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations		
Criteria	**Indicators**	**Assessment**
Use Conflicts/Community Interruption	Potential for litter increase/reduction	• Potential for minimal to no impact on litter as sites will be staffed.
	Potential odour emissions	• Potential for minimal to no impact on odour emissions. Materials collected will be transferred to transfer and processing facilities on a regular basis (partly because of space constraints). • Green Bin organics and garbage are not expected to be collected, and other materials will be removed frequently because of anticipated space constraints; therefore odour potential is expected to be minimal.
	Potential noise emissions	• Potential for minimal to no impact on noise emissions. Stations will not have heavy equipment such as balers. • Low level noise from vehicles and truck traffic.
	Potential for increased vector/vermin	• Potential for minimal to no impact on vector/vermin. Containers/bins will be locked/fenced in when closed. • Organics and garbage will not be collected at neighbourhood drop-off depots therefore minimal attraction for vectors or vermin.
Collaboration	Ability to partner with other municipalities/ organizations	• Some potential for partnership opportunities especially with organizations that already operate neighbourhood reuse centres or collect reusable materials.
Complexity	Program complexity to user	• Drop-off depots are not complicated for users as long as the service locations and hours are well advertised.
Convenience	Ease of participation	• Easy and convenient for users who live locally. Would be located in areas accessible by transit, walking or biking. May require car travel because recyclable and re-useable materials can be bulky.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety assuming stations are located in well-lit parking areas and supervised by City staff. • Increased traffic could cause some concern but can be managed through good planning.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact on any specific group if waste diversion stations are located in diverse areas throughout the city. • Potential to increase service levels to those not well served by current system; greater number of stations improves equity for those not well served by existing drop-offs.

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations		
Criteria	**Indicators**	**Assessment**
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Minimal to no potential to influence or encourage behaviour change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Total capital costs of $5 to $10 million, which does not include any land cost, as depots are expected to be located in existing buildings, not new-build, based on 10 to 20 sites at $500,000 each. [40]
	Estimated net operating cost	• Given occupancy rates and labour costs in Toronto, a network of 10-20 waste diversion centres are estimated to cost $2 to4 million/year to operate (i.e. about $200,000 per centre per year (not including amortized capital). [41]
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk because drop-off depots can be operated by City and/or contract staff. Contractual risk is manageable.
	Potential for schedule risk	• Potential for minimal to no schedule risk (mainly related to staffing hours/costs and transfer pick up schedules). • Construction schedule risk is low as construction is not complex, and design is simple. A number of collection bins may be placed in existing buildings where industrial space is available for rent.
	Potential for innovation risk	• Potential for minimal to no innovation risk. This is a comparatively "low tech approach" to expanding drop-off services for residents and small businesses across the City.

[40] Based on information provided by City of Markham staff (July 14, 2015). City of Markham has a goal of 1 neighbourhood depot for every 50,000 residents. It is currently at 1 depot for every 80,000 residents.
[41] Based on information provided by City of Markham staff (July 14, 2015). The Operating costs for the neighbourhood recycling centres in Markham are about $125,000/centre/year (not including amortized capital).

Option 3.4: Develop a Network of Permanent, Small Scale Neighbourhood Drop-off Depots in Convenient Locations		
Criteria	**Indicators**	**Assessment**
Economic Growth	Potential for local economic growth	• Potential for some impact on local economic growth; this is a labour intensive but small-scale service which creates some jobs. • Potential for some additional employment in reuse organizations that take materials from depots.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth, as amounts of waste handled is relatively small.
Local Job Creation	Potential for additional local job creation	• Potential for some additional local operational job creation at neighbourhood drop-off depots. • Potential for some additional local job creation at reuse organizations which use collected materials that are incremental to the tonnes currently collected.
Flexibility	Ability to accommodate future changes	• High potential to be able to accommodate future changes. A benefit of a network of waste diversion centres service is that given some storage and receiving constraints, the service can be adapted to recover a wide variety of materials (and support waste re-use, recycling and public outreach/education functions at the same time).

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

A mobile drop-off 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 service 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, 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 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 WEEE (Waste Electrical and Electronic Equipment) 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 $715,000 in total or $16,000 per event. Community Environment Days also provide an opportunity 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), 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:

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 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

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

- 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.

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 depot 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 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.

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

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

Gap/Challenge/Opportunity: A key challenge facing the City is to provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility.

Another key challenge facing the City is the impact of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.

Ownership/Operation: Assume City-Owned, City Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Blue Bin recycling, Municipal Hazardous or Special Waste (MHSW), textiles (curtains, towels, clothes, shoes), durable goods (pots and pans, dishes, books), small household goods (small appliances, picture frames), carpets, and Waste Electrical and Electronic Equipment (WEEE).

Staffing: Some additional City staff required.

Consideration of Other Infrastructure/Programs: A new mobile drop-off service will not supplant either the current Toxic Taxi service or the City's Community Environment Days program (which collect/divert many of the same materials) at least in the short term, but use of this approach over the long term would be assessed. The mobile depot service will operate in tandem with, and complement, curbside collection.

Land Requirements: No additional land required. A few cubic metres may be required temporarily for the vehicle and bins at each stop.

Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials (miscellaneous and MHSW -Municipal Hazardous or Special Waste). Collected through a mobile depot service would be received by City staff/contractors and placed in secure containers/bins within or adjacent to the mobile depot.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all potential mobile depot collected materials are expected to be collected in secure containers/bins within or adjacent to the mobile depot.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All potential mobile depot collected materials are expected to be collected in secure containers/bins within or adjacent to the mobile depot.

Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials		
Criteria	**Indicators**	**Assessment**
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption.
	Total land required and land use displacement	• The footprint required for mobile depots is small (i.e. a number of cubic metres per mobile depot).
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• On-site electrical energy consumption is minimal (e.g. lights, computers, etc.) and expected to be supplied through a generator. There is some fuel consumption by mobile depot vehicles to travel to various locations.
	Greenhouse gas (GHG) contributions	• Potential for minimal to no GHG impacts as overall energy use and additional quantities of MHSW expected to be collected are small (i.e. with Community Environment Days and the Toxic Taxi services already in place). GHGs related to transportation of the depot would be considered limited due to the frequency of movement.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts through little to no change in environmental indicators. Potential for small positive impact on health through increased access to diversion services in underserviced areas.
	Potential to impact ecological health	• Potential for minimal to no impact on ecological heath as a small amount of hazardous materials are expected to be handled by staff and users and is expected to consist mostly of paints. All potential mobile depot collected materials will be collected in secure containers/bins within or adjacent to the mobile depot.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Some potential for diversion. • Potential to divert up to 6,000 tonnes or an additional 0.5% to 1% diversion. • Based on Community Environment Day events, 26-52 times per year could collect 350 to 700 tonnes of MHSW, WEEE and non-Blue Bin materials.[42] • Additional 10% capture rate of books, durable plastics, textiles, and toys generated in the residential sector could yield up to an additional 5,000 tonnes.

[42] In 2014, 43 Community Environment Days were held, collecting 562 tonnes of MHSW, WEEE and non-Blue Bin recycling materials. Each event averaged 13 tonnes. Source: Tech Memo #1 Appendix E: SWMS Program Information.

Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials		
Criteria	**Indicators**	**Assessment**
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Limited potential for approval complexities. Approvals expected to be similar to Toxic Taxi/Community Environment Days permitting.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no impact on traffic (i.e. for users to drop off materials), and mobile depot only has impacts at any given site for short periods of time.
	Potential for litter increase/reduction	• Potential for minimal to no impact on litter (i.e. carrying bags/boxes/other containers can be collected on site for recycling or disposal).
	Potential odour emissions	• Potential for minimal to no impact on odour emissions for most materials. Storage containers will be sealed as required during use.
	Potential noise emissions	• Potential for minimal to no impact on noise emissions, and only for short duration.
	Potential for increased vector/vermin	• Potential for minimal to no impact on vector/vermin, as no Green Bin organics or garbage collected.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities with local resident associations; some partnership potential also for non-profit groups if service were to be expanded to include – for example - waste electronics, textiles, etc. as part of the mobile service.
Complexity	Program complexity to user	• Drop off mobile service is not complicated for users as long as the service locations and hours of operation are well advertised.
Convenience	Ease of participation	• Easy and convenient for users; not as easy as the Toxic Taxi service; more like Community Environment Day services in the sense of bringing neighbourhoods together for an event.

Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials		
Criteria	**Indicators**	**Assessment**
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if located on well-lit parking areas, staffed by City staff and traffic is properly managed. • The mobile units will operate during the day and in highly public areas to encourage maximum participation and safety.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact on any specific group if the mobile service located in diverse areas throughout the city. • Mobile depots provide benefits to community members that may not have cars or have mobility issues; therefor it increases equity of service.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for some potential to influence or encourage behaviour if used to support and co-promote other sustainable environmental practices across the city (e.g. water conservation, energy conservation, alternative cleaners, food waste reduction, renewable energy, etc.).
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Capital costs are estimated at $150,000 for each mobile depot (includes cost of new 26' cargo van, signage and bins). [43] Assuming 5 mobile depots are purchased, the total capital cost is $750,000.
	Estimated net operating cost	• Estimated operating costs are $16,000 per site visit for set up, take down and MHSW management, based on Community Environment Day costs.[44] Each mobile depot could complete 26 to 52 stops per year. • For 26 site visits annually, estimated cost would be $416,000 per year per mobile depot, and for up to 5 mobile depots estimated costs approximately $2 million/year. • Operating costs include staff time (i.e. either City staff or contracted staff) and material processing. • The operating cost could be reduced by reducing the time at each site. This could potentially save up to one third of the costs (transport time does not change).

[43] New 2016 cargo van (26') with air brakes, liftgate, etc. costs about $110,000 to $125,000 (with taxes)

[44] Assumes similar order of magnitude of costs for existing Community Environment Day costs per event. It cost Toronto $715,000 to manage 43 Community Environment Days in 2014 or $16,600 per event. Source: Tech Memo #1 Appendix E: SWMS Program Information. The capital and operating cost in 2013 for Kings County, WA to provide a combined mobile and 3 fixed location service was USD$800,000 (Cdn$1 million).

Option 3.5: Develop a Mobile Drop-off Service for Targeted Divertible Materials		
Criteria	**Indicators**	**Assessment**
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk as mobile depots can be operated by City or contract staff. Contractual risk is manageable.
	Potential for schedule risk	• Potential for minimal to no schedule risk.
	Potential for innovation risk	• Potential for minimal to no innovation risk- approach is well proven and understood.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth; this is a labour intensive but small scale service comprised of a few collection vehicles and paid staff.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no additional job creation due to small number of mobile depots in operation and small amount of reuse/recyclable materials expected to be collected.
Flexibility	Ability to accommodate future changes	• A benefit of a mobile drop off service is that, given some storage and receiving constraints, the service can be adapted to recover other new materials (e.g. broader list of WEEE, textiles, etc.).

COMMISSIONER STREET TRANSFER STATION

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 to meet the timeline of Toronto Port Lands.
- Having a transfer station within the downtown core would allow for the continuation of existing level of service provided by the City.
- Convenient option for drop-off of waste and recyclables from downtown customer base.
- Transfer station must be compatible with local land uses and traffic patterns.
- Service the 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.
- Time required to obtain permits and approvals (as compared to the other options for Commissioners).

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

- 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.
- If paid private customers are able to utilize the transfer station, a large number of vehicles with a wide range of relatively small waste quantities will also access the site.
- Toronto staff will need to coordinate with the 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.
- 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.
- 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 curbside collection vehicles and potentially a number of small quantity paid private customers 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.

Details of Option undergoing Evaluation: This option evaluates replacement of the existing Commissioners Street Transfer Station. The facility would continue to primarily manage waste from multi-residential buildings in the downtown core. Currently, the existing facility manages approximately 71,000 tonnes per year, but the new facility would need to be sized to accommodate the ongoing growth and development in the downtown area. Associated approvals and construction of a new transfer station at a site are to be identified by the City.

Requires assorted approvals and construction of a new facility on a property approximately 5-6 ha in area, located within an industrial zoned area. Only City collection vehicles to be received at the facility. Sized to accommodate future growth in the downtown core, between 100,000 – 200,000 tonnes per year. Similar scale to existing transfer station including comparable equipment and staff requirements. Additional capacity expected to manage Green Bin and Blue Bin materials. No drop-off facilities would be provided at this new location (see Options 3.3, 3.4 and 3.5).

Gap/Challenge/Opportunity: The planning framework for the Toronto Port Lands has identified that the current usage of the Commissioners Street Transfer Station does not align with future redevelopment plans. A challenge facing the City is the decision needed about how to plan for existing and future services to be replaced. A challenge facing the City is the decision needed about the future of the Commissioners TS; whether it should be relocated or closed. If the facility is relocated, there are options to construct a new facility that may or may not include a residential drop-off facility. If the facility is closed and not relocated within the downtown core, the City will need to decide how the current services available at the Commissioners TS will be replaced.

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

Ownership/Operation: Assume City-Owned, City Operated.

Materials Collected/Diverted: Garbage, Blue Bin materials, Green Bin organics, Yard Waste.

Staffing: Minimal to no additional City staff required.

Consideration of Other Infrastructure/Programs: Curbside collection vehicles would haul materials to a new location in the Port Lands area, materials would be transferred to haulage vehicles for processing/disposal. The existing Commissioners Street Transfer Station would be closed.

Land Requirements: Optimal configuration requires approximately 5-6 ha to efficiently manage anticipated volume of trucks and waste streams. Can be configured to available land but may limit types/amounts of materials which can be managed and reduce efficiencies and future growth capacity.

Option 4.1: Relocation of transfer station within the Port Lands area or designation of land for long-term relocation

Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station, with appropriate drainage features.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station. Limited to no material processing would occur on site.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Can be designed to the available land parcel but ideal area is approximately 5-6 hectares. Compatible with existing industrial and commercial land uses in the area.
Regional/Global Environmental	Energy and fossil fuel generation / consumption	• Minimal to no change from current condition. Energy consumption is related to transfer station building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation.

Option 4.1: Relocation of transfer station within the Port Lands area or designation of land for long-term relocation		
Criteria	**Indicators**	**Assessment**
Impact/Benefit	Greenhouse gas (GHG) contributions	• Supports ongoing reduction of greenhouse gas emissions by providing location in close proximity for curbside collection trucks and numerous small paid private waste vehicles and consolidation into single larger vehicle for longer distance transport.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential environmental impacts and neighbourhood stigma.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Minimal to no ability to recover additional materials (only metals, wood and cardboard) from the floor of the transfer station due to health and safety concerns and related regulations.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Standard requirement for an Environmental Compliance Approval (ECA). Complexity of approval increases if daily tonnage is greater than 1,000 tonnes per day of residual waste, requiring approval under the Environmental Assessment Act. Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic within vicinity of relocated site.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter as all solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station. Appropriate operating procedures will be in place to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station which will minimize any odour combined with frequent removal of waste materials.

Option 4.1: Relocation of transfer station within the Port Lands area or designation of land for long-term relocation		
Criteria	**Indicators**	**Assessment**
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed transfer station. Noise emissions similar to current situation, but at a different location.
	Potential for increased vector/vermin	• Potential for some increase in vector/vermin at new location. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station combined with frequent removal of waste materials and appropriate operating procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities. Capable of serving residents through curbside collection and businesses within Toronto.
Complexity	Program complexity to user	• N/A – residents will not have access to facility.
Convenience	Ease of participation	• N/A– residents will not have access to facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if located on suitably zoned site within the Port Lands.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact on any specific group if located on suitably zoned site within the Port Lands. Use will be limited to curbside collection vehicles. No impact on social equity as residents will not access facility.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices and transfer station is only for wastes delivered by collection vehicles.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Estimated range of $16 - $20 million, not including land.[45] Approximately $1 million for cost of approvals.

[45] Estimates developed by HDR for Commissioners Replacement Transfer Station (Commissioners Replacement TS Estimate)

Option 4.1: Relocation of transfer station within the Port Lands area or designation of land for long-term relocation		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• Annual net operating costs comparable to existing transfer station ~ $2 - 2.5 million.[46]
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option with result in increased health care costs.
Risk	Potential for contractual risk	• Potential for minimal contract risk as transfer station can be operated by City staff or contract staff. Contractual risk is manageable.
	Potential for schedule risk	• Potential for minimal schedule risk with standard engineering and construction requirements.
	Potential for innovation risk	• Potential for minimal innovation risk due to standard engineering and construction requirements.
Economic Growth	Potential for local economic growth	• Potential for some impact on local economic growth by providing ongoing and convenient cost effective service to the growth and development in the downtown core.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth.
Local Job Creation	Potential for additional local job creation	• Some potential for local job creation related to construction of new facility.
Flexibility	Ability to accommodate future changes	• Internal configuration of facility and operations has some flexibility, as required, to accommodate changing material composition, market conditions, new legislation, etc.

[46] Estimates based on City of Toronto 2014 Approved Budget. Spreadsheet from City of Toronto (Processing Transfer Stations Disposal – Operating Budget Financial and FTEs, November 5, 2014)

Option 4.2: Redirecting Waste to an Existing City of Toronto 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 Transfer Station. 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:

- All waste related traffic would be redirected to an existing alternate City owned transfer station facility for collection vehicles and potentially all other small waste quantity generators.
- Redirecting waste to an existing transfer station(s) may require the facility(ies) to be updated/expanded to receive the additional materials.
- Must plan for continuation of existing levels of service to existing customers.
- Potential to improve traffic flow and separate collection vehicle traffic from small, paid private commercial traffic with modifications to transfer stations which may be accepting more waste.
- All Commissioners Street Transfer Station users would be required to drive greater distances, potentially leading to broader traffic conflicts at the existing receiving facility(ies).
- Reduced convenience for collection vehicles and small generators with potential longer haul distances and travel times requiring additional collection vehicles and staff to maintain collection service levels.
- Users of Commissioners Street Transfer Station may not be familiar with other facilities requiring a period of adjustment.
- Loss of transfer station capacity near downtown area would make it difficult to support future development growth.
- Existing waste transfer facilities already have Environmental Compliance Approval (ECA) in place from the Ministry of the Environment and Climate Change (MOECC). If modifications to the facility are required 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. This will require additional technical studies to be completed by independent consultant(s) plus requirements for City staff to lead mandated consultation activities.
- Land use approvals (e.g. Site Plan) may be required for the existing transfer station site depending on the modifications required. May require additional technical studies beyond those prepared for the ECA amendment. Coordination with City Planning Department is necessary to identify approval requirements and any studies

Potential Outcomes:

- All traffic would be redirected to an existing alternate City owned transfer station for 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.

Details of Option undergoing Evaluation: Approvals and alternative transfer station options are already in place within the City. Bermondsey and Ingram facilities are located in closest proximity to the existing Commissioners Street Transfer Station and the downtown core. Curbside and front end waste collection vehicles plus small paid private customers to be redirected to the existing facilities. Modifications to the existing facilities may be required to accommodate additional waste volumes and traffic; however, it is assumed that drop-off facilities would no longer be provided at other transfer stations but could be provided at a separate location at some future date (see Options 3.3, 3.4 and 3.5).

This option is intended to redirect waste from the existing Commissioners Street Transfer Station (TS). Residual waste collected primarily from multi-residential buildings in the downtown core would be redirected to an alternate existing City transfer station (i.e. Bermondsey or Ingram). Currently the Commissioners Street Transfer Station manages approximately 71,000 tonnes per year. The other City transfer stations are expected to have the capacity to manage this additional volume of waste, but some modifications may be necessary to manage the increased vehicle volume and to accommodate the ongoing growth and development in the downtown core.

Gap/Challenge/Opportunity: The planning framework for the Toronto Port Lands has identified that the current usage of the Commissioners Street Transfer Station does not align with future redevelopment plans. A challenge facing the City is the decision needed about how to plan for existing and future services to be replaced. If the facility is relocated, there are options to construct a new facility that may or may not include a residential drop-off facility. If the facility is closed, and not relocated within the downtown core, the City will need to decide how the current services available at the Commissioners Street TS will be replaced.

Ownership/Operation: City-Owned, City Operated.

Materials Collected/Diverted: Garbage, Yard Waste from collections operations (some quantities of other residential material currently managed at Commissioners Street Transfer Station including Blue Bin materials and Green Bin organics).

Staffing: Minimal to no additional City staff required.

Consideration of Other Infrastructure/Programs: Collection vehicles would haul materials which would have been delivered to Commissioners Street Transfer Station to an existing City transfer station (Bermondsey or Ingram) instead. Materials would be managed as per the current practice at existing transfer stations for processing/disposal. The existing Commissioners Street Transfer Station would be closed. Drop-off Depots at Bermondsey/Ingram would be closed and re-established elsewhere (see Options 3.3, 3.4 and 3.5).

Land Requirements: No additional land required.

Option 4.2: Redirect waste to an existing transfer station(s)		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station, with appropriate drainage features.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station. Limited to no material processing would occur on site. • Some potential impacts associated with collection vehicles being required to travel additional distances.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Minimal to no impact as transfer station(s) already exists and additional land not expected to be required.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• No energy will be generated. Overall energy consumption related to transfer station building systems, lighting, heating, etc. expected to decrease with closure of Commissioners Street Transfer Station. Fossil fuel consumption related to on-site equipment operation. Some overall fuel consumption increase with requirement for collection vehicles to travel further.

Option 4.2: Redirect waste to an existing transfer station(s)		
Criteria	**Indicators**	**Assessment**
	Greenhouse gas (GHG) contributions	• Supports reduction of greenhouse gas emissions by consolidating waste from numerous collection vehicles into single larger vehicle for longer distance transport. Some overall increase in contributions to greenhouse gas emissions as a result of collection vehicles being required to travel greater distances.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential environmental health impacts.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Minimal to no ability to recover additional materials (e.g. metals, wood, cardboard) from the tip floor of the transfer station due to health and safety concerns and related regulations.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Environmental Compliance Approval (ECA) and land use approvals already in place for existing transfer station. Approvals may be required if annual transfer limits are to be exceeded.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic to existing transfer station. Traffic will increase over current levels to the existing transfer station(s) due to the redirected traffic. Additional traffic can be split between the existing facilities.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter as all solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station. Appropriate operating procedures will be in place to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community related to increased waste volumes. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station which will minimize any odour combined with frequent removal of waste materials.

Option 4.2: Redirect waste to an existing transfer station(s)		
Criteria	**Indicators**	**Assessment**
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed transfer station. Noise emissions similar to current situation.
	Potential for increased vector/vermin	• Potential for some increase in vector/vermin at redirected locations. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station combined with frequent removal of waste materials and appropriate operating procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities. Capable of serving residents through curbside collection and businesses within Toronto.
Complexity	Program complexity to user	• N/A – residents will not have access to facility.
Convenience	Ease of participation	• N/A – residents will not have access to facility.
Community Safety	Potential for impacts to community safety	• Potential for some impact on community safety related to greater number of vehicles travelling to decentralized locations.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact on any specific group as existing transfer stations are established within industrial zoned areas of the City. No impact on social equity as residents will not access facility.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Minimal to no capital costs anticipated unless specific facility upgrades required. Potentially another piece of equipment (e.g. loader) required at approximately $500,000.

Option 4.2: Redirect waste to an existing transfer station(s)		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• Minimal incremental increase in annual net operating cost for existing transfer station (estimated at $2-2.5 million).[47] Additional costs could include trucking cost ~$260,000-$480,000 depending on location[48]. Closure of Commissioners Street Transfer Station reduces City's overall operating costs.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk as existing transfer stations operated by City staff. Contractual risk is manageable.
	Potential for schedule risk	• Potential for minimal to no schedule risk since facilities already exist.
	Potential for innovation risk	• Potential for minimal to no innovation risk since facilities already exist.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth with continued service provided to support the growth and development in the downtown core.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no job creation as this option is the continuation of an existing service at an already existing alternative City transfer station.
Flexibility	Ability to accommodate future changes	• Internal configuration of existing facility and operations has some flexibility, as required, to accommodate changing material composition, market conditions, new legislation, etc.

[47] Estimates based on City of Toronto 2014 Approved Budget. Spreadsheet from City of Toronto (Processing Transfer Stations Disposal – Operating Budget Financial and FTEs, November 5, 2014).

[48] Based on cost estimates developed by HDR.

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

The City would procure transfer capacity at a private transfer station located in the vicinity of the Port Lands Area. Private sector transfer station options are already approved and operating within the City; other facilities may be developed in response to a City identified need. Private transfer stations, existing or to be developed, are expected to have the capacity to manage garbage, primarily collected from multi-residential buildings in the downtown core. Drop-off facilities provided at Commissioners Street Transfer Station currently will be provided at a separate City location.

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, if private facilities exist in the Port Lands area.
- 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.
- Consider convenience for collection vehicles and small generators with potential longer haul distances and travel times requiring additional collection vehicles and staff to maintain service levels.
- Not a City-owned facility – the City would be restricted to private operator's operating conditions and limits.
- Limited number of private facilities in the 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

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

Climate Change (MOECC). If modifications are required to the facility or to the operations, the private sector operator will be required to obtain the necessary approvals from the MOECC. This would include the preparation of any technical studies by the facility owner.

- 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 all material types consolidated at the transfer station (i.e. recyclables, organics, residual waste) would need to be determined as part of the procurement process. This includes hauling and destination/market.
- All City-related traffic for collection vehicles and all other small waste quantity generators (if accepted) 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.

Details of Option undergoing Evaluation: Private sector transfer station options are already approved and operating within the City. Other facilities may be developed in response to a City identified need. Only garbage from waste collection vehicles to be redirected to the private facilities. Modifications to the existing private facilities may be required to accommodate additional waste volumes and traffic. Drop-off facilities provided at Commissioners Street Transfer Station currently will be provided at a separate City location (see Options 3.3, 3.4 and 3.5).

This option is intended to replace the existing Commissioners Street Transfer Station. Residual waste collected primarily from multi-residential buildings in the downtown core would be redirected to alternate private transfer station(s). Currently the Commissioners Street Transfer Station manages approximately 71,000 tonnes per year. Private transfer stations, existing or to be developed, are expected to have the capacity to manage this additional volume of waste but some modifications may be necessary to manage the increased vehicle volumes and to accommodate the ongoing growth and development in the downtown area.

Gap/Challenge/Opportunity: The planning framework for the Toronto Port Lands has identified that the current usage of the Commissioners Street Transfer Station does not align with future redevelopment plans. A challenge facing the City is the decision needed about how to plan for existing and future services to be replaced. If the facility is relocated, there are options to construct a new facility that may or may not include a residential drop-off facility. If the facility is closed, and not relocated within the downtown core, the City will need to decide how the current services available at the Commissioners TS will be replaced.

Ownership/Operation: Privately-Owned, Privately Operated.

Materials Collected/Diverted: Garbage, Yard Waste from collections operations (some quantities of other residential material currently managed at Commissioners Street Transfer Station including Blue Bin materials and Green Bin organics).

Staffing: No additional City staff required.

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

Consideration of Other Infrastructure/Programs: Collection vehicles would haul materials to a new location in the Port Lands area or downtown core, materials would be transferred to haul vehicles for disposal. The existing Commissioners Street Transfer Station would be closed.

Land Requirements: n/a, assume private sector has secured sufficient land for existing or future transfer station.

Option 4.3: Procure transfer capacity at a private transfer station in vicinity of the Port Lands area		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station, with appropriate drainage features.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station. Limited to no material processing would occur on site.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Minimal to no impact if transfer station already exists and additional land not expected to be required.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Minimal to no change from current condition. No energy generation. Overall energy consumption related to transfer station building systems, lighting, heating, etc. expected to decrease with closure of Commissioners Street Transfer Station. Fossil fuel consumption related to on-site equipment operation.
	Greenhouse gas contributions	• Supports reduction of greenhouse gas emissions by consolidating waste from numerous collection vehicles into single larger vehicle for longer distance transport.

Option 4.3: Procure transfer capacity at a private transfer station in vicinity of the Port Lands area		
Criteria	**Indicators**	**Assessment**
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential environmental impacts.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Minimal to no ability to recover additional materials from the floor of the transfer station due to health and safety concerns and related regulations.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Environmental Compliance Approval (ECA) and land use approvals already in place for existing private transfer station. Approvals may be required if annual transfer limits are to be exceeded.
Potential for Land Use Conflicts/ Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic to private transfer station. Traffic will increase over current levels to the private transfer station(s) due to the redirected traffic.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter as all solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station. Appropriate operating procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community related to increased waste quantities. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station which will minimize any odour combined with frequent removal of waste materials.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed transfer station. Noise emissions similar to current situation.

Option 4.3: Procure transfer capacity at a private transfer station in vicinity of the Port Lands area		
Criteria	**Indicators**	**Assessment**
	Potential for increased vector/vermin	• Potential for some increase in vector/vermin at private transfer station. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station combined with frequent removal of waste materials and appropriate operating procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities. Capable of serving residents through curbside collection and businesses within Toronto.
Complexity	Program complexity to user	• N/A – residents will not have access to facility.
Convenience	Ease of participation	• N/A – residents will not have access to facility.
Community Safety	Potential for impacts to community safety	• Potential for some impact on community safety is related to greater number of vehicles travelling to a single central location.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal impact on any specific group as existing private transfer stations are established within industrial zoned areas of the City.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• No capital costs incurred by the City. If specific capital upgrades are required this will be factored into the unit cost charged to the City.
	Estimated net operating cost	• City will procure use of private transfer station based on a unit cost (approximately $10-20 per tonne)[49] which includes operating costs as appropriate.

[49] HDR Communication with industry representative.

Option 4.3: Procure transfer capacity at a private transfer station in vicinity of the Port Lands area		
Criteria	**Indicators**	**Assessment**
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for some contract risk as existing facilities operated by private service provider. Risk can be managed through procurement and contracting processes.
	Potential for schedule risk	• Potential for minimal to no schedule risk since facilities already exist.
	Potential for innovation risk	• Potential for minimal to no innovation risk since facilities already exist.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth with continued service provided to support the growth and development in the downtown core.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth.
Local Job Creation	Potential for additional local job creation	• Potential for some job creation as this option is the continuation of an existing service but may require additional staff to support increased volumes of material managed.
Flexibility	Ability to accommodate future changes	• City procurement and contracting processes designed to require some operational flexibility, as necessary, to accommodate changing material composition, market conditions, etc.

MATERIALS & ENERGY RECOVERY

Option 6.1: Mixed Waste Processing Facility Development

Development of a Mixed Waste Processing facility which uses 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[50] (the Study), including an RFP (Request for Proposals) 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 due to the uncertainty about an end use for finished compost.

Municipal/Waste Industry Experience:

- Mixed waste processing facilities can be found throughout Europe (and there are 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 first stage of which in this process is a form of Mixed Waste Processing. The City processes approximately 220,000 tonnes per year (tpy) of residential municipal solid waste (MSW) and 30,000 tpy commercial waste (2012)[51].
- Montgomery, AL. – This facility is the newest mixed waste processing plant in the Eastern US and became operational in 2015[52]. Facility can process 300 tonnes per day (tpd) of Mixed Municipal Solid Waste (MSW), 100 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 compressed natural gas and compost.
- Sun Valley, CA. – An 7,432 m2 facility was opened in 2014 designed to process more than 300,000 tpy of mixed waste (1,360 tpd)[53]. The facility is a state-of-the art facility costing approximately $50 million (US).

Considerations:

- The primary inputs are typically a mixed waste stream, but can be also a heavily contaminated Blue Bin recycling stream.

[50] Planning Study for the Assessment of Mixed Solid Waste Processing Technology and Siting Options, City of Toronto (Aug 2009)
[51] http://www.cpans.org/assets/Uploads/Presentations/NewFolder/Session-35Jim-Schubert.pdf
[52] HDR, site visit
[53] http://www.bulkhandlingsystems.com/athens-services-opens-state-art-mixed-waste-mrf/

Option 6.1: Mixed Waste Processing Facility Development

- 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.
- Fewer recyclable materials can be recovered due to contamination with garbage.
- Whether or not the City continues to collect and manage a mixed waste or contaminated Blue Bin stream from the multi-residential sector may affect the feasibility of this type of facility.
- Can be coupled with a variety of technologies to generate outputs such as Refuse Derived Fuel (RDF), biogas and compost/digestate. RDF and biogas can be produced from the remaining residual waste stream, through further processing either at the mixed waste facility or another facility, and 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.
- 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.

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 or the residual waste can be further processed through some type of biological process.

Details of Option undergoing Evaluation: This option is intended to support an increase in the overall waste diversion achieved. A previous City study[54] suggested that a 150,000 tpy capacity facility would increase diversion in the City by 8-10%. The facility would primarily manage residual wastes from multi-residential buildings in the City. Associated approvals and construction of the facility at a site to be identified by the City. A previous study identified Green Lane Landfill as a potential location.

Gap/Challenge/Opportunity: A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.

Another challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.

[54] Based on the City's Mixed Waste Study completed in 2009.

Option 6.1: Mixed Waste Processing Facility Development

Ownership/Operation: Assume City-Owned, Privately Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Mixed waste stream or contaminated Blue Bin stream from multi-residential buildings for mechanical processing. Typically able to recover plastics and metals with residual suitable as a fuel source, or landfill disposal.

Staffing: Additional City staff required

Consideration of Other Infrastructure/Programs: Waste streams delivered by curbside collection vehicles or transfer trailers depending on location. Can be coupled with other technologies such as a refuse derived fuel facility (see Option 6.6) which can process remaining waste into a fuel, fluff or briquette.

Land Requirements: Requires assorted approvals and construction of a new facility on a property approximately 4 – 14 ha[55] in area, located within an industrial zoned area.

Option 6.1: Mixed Waste Processing Facility Development		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Solid waste materials are expected to be processed within enclosed building and on a paved surface. • Residual materials requiring landfill will have to be managed at properly designed and engineered landfill facilities.
	Potential impacts to local airshed	• Potential for minimal impact from dust and odours. Solid waste materials are expected to be processed within enclosed building and on a paved surface. Frequent removal of waste materials will occur to minimize potential for further impacts from odour.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are expected to be processed within enclosed building and on paved surface in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption if use is limited to periodic site and equipment cleaning requirements and site staff facilities.

[55] Based on the City of Toronto's mixed waste study completed in 2009

Option 6.1: Mixed Waste Processing Facility Development		
Criteria	**Indicators**	**Assessment**
	Total land required and land use displacement	• Can be designed to the available land parcel but ideal area could be in the order of 4 - 14 ha.[56] Compatible with existing industrial land uses.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption Greenhouse gas (GHG) contributions	• No potential for energy generation unless a RDF fuel is produced as a by-product or residual waste is further processed through an additional recovery option. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation. Depending on site location, no change or some reduction in overall transfer vehicle fuel consumption expected since currently transporting this waste stream to Green Lane Landfill. • Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. • Emissions are also reduced by providing facility location in closer proximity to source of waste generation to transfer vehicle haul distance. • Additional recyclables can be diverted, offsetting need for primary extraction.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential environmental health impacts.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Significant potential to recover additional recyclable materials from the mixed waste stream typically collected from multi-residential buildings depending on quality and available markets. Estimated increase of 8-10%[57] diversion overall with recovery mainly of plastics and metals.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		

[56] Based on the City of Toronto's mixed waste study completed in 2009
[57] Based on the City of Toronto's mixed waste study completed in 2009

Option 6.1: Mixed Waste Processing Facility Development		
Criteria	**Indicators**	**Assessment**
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic generated by the mixed waste facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.
	Potential for litter increase/reduction	• Potential for some impact of increased litter within the vicinity of the mixed waste facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community. Mixed waste materials will be processed inside enclosed facility which will minimize any odour combined with frequent removal of residual waste materials.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Processing equipment operated within enclosed facility. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.
	Potential for increased vector/vermin	• Potential for some increase in vector/vermin at facility location. All solid waste materials are expected to be managed inside enclosed facility combined with frequent removal of waste materials and appropriate housekeeping procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Other municipalities may be interested in serving multi-residential customers using mixed waste processing.
Complexity	Program complexity to user	• N/A. – Residents will not be able to access facility.
Convenience	Ease of participation	• N/A. - Residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if facility located on suitably zoned site.

Option 6.1: Mixed Waste Processing Facility Development		
Criteria	**Indicators**	**Assessment**
Equity	Potential for unequal impacts/benefits to specific groups	• No impact on social equity as residents will not access facility. • Potential for some impact to residents living near facility from increased traffic, noise etc.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Estimated capital cost is highly variable depending on processing capacity and technology utilized. Expected to be in the order of $50 million or greater based on comparable facilities in North America, not including land[58].
	Estimated net operating cost	• Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials and from sale of residual as a fuel source. Expected to be greater than $100 per tonne based on comparable facilities in North America[59]. • Operating costs offset by reduction in disposal costs achieved through diversion.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain althugh unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for some contract risk related to performance of the facility and level of diversion achieved. • Facility will be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or Industrial, Commercial and Institutional (IC&I)).
	Potential for schedule risk	• Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.

[58] http://www.bulkhandlingsystems.com/athens-services-opens-state-art-mixed-waste-mrf/

[59] Sunnyvale SMaRT Station in California reported $21 million per year cost net of recycling revenues to process 181,000 tons of mixed waste (about $116 per US ton, or $130 per metric tonne).

Option 6.1: Mixed Waste Processing Facility Development		
Criteria	**Indicators**	**Assessment**
	Potential for innovation risk	• Potential for significant innovation risk due to limited success of mixed waste processing technology in North America.
Economic Growth	Potential for local economic growth	• Potential for some impact on local economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.
	Potential for regional/global economic growth	• Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.
Local Job Creation	Potential for additional local job creation	• Potential for some local job creation related to initial facility construction and then ongoing operation depending on the location of the facility, processing capacity and the requirement for manual sorting of materials.
Flexibility	Ability to accommodate future changes	• Potential for significant ability to configure facility and operations, as required, to accommodate mixed waste including changing material composition, market conditions, etc.

Option 6.2: Mixed Waste Processing with Organics Recovery (Mechanical Biological Treatment or (MBT)) Facility Development

Mixed Waste Processing with Organics Recovery is a combination of mechanical materials recovery and either mixed waste composting or anaerobic digestion (AD) as a subset technology. This option involves consideration of the development of a Mixed Waste Processing with Organics Recovery facility which would receive a mixed waste stream for mechanical processing followed by composting/digestion. This option is intended to support an increase in the overall waste diversion achieved and to extend the life of Green Lane Landfill.

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[60] (the Study) which identified Mixed Waste Processing with Organics Recovery (or MBT) at Green Lane Landfill 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 Climate Change but can only be land applied for

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, AB 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[61].
- Ventspils, Latvia – Facility processes 30,000 tpy of Municipal Solid Waste (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.

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[60] Based on the City of Toronto's mixed waste study completed in 2009.

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

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 refuse derived fuel (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. Alternative uses for lower quality product may be required (i.e. site restoration) to achieve desired diversion.
- Requires an end-market or end use for compost.
- Primary feedstocks are municipal solid waste (typically fully mixed waste stream).
- Secondary feedstocks may include segregated Industrial, Commercial & Institutional (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.

Details of Option undergoing Evaluation: Requires assorted approvals and construction of a new MBT facility on a property located within an industrial zoned area. The facility is expected to receive a mixed waste stream for mechanical processing followed by digestion, consistent with analysis previously completed by the City. Typically able to recover plastics and metals with residual organics further processed to compost or as a fuel source.

This option is intended to support an increase in the overall waste diversion achieved. The Study[62] suggested that up to 65% of material processed may be diverted and 30% of material processed may be diverted if the compost does not meet quality standards and cannot be marketed. Associated approvals and construction of the facility at a site is to be identified by the City, with a previous City study identifying Green Lane Landfill as a potential location. For the purpose of this assessment, it is assumed the facility would be located within closer proximity to the City of Toronto for more efficient access to markets for recovered materials and compost product.

Gap/Challenge/Opportunity: A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.

Another challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.

Ownership/Operation: Assume City-Owned, Privately Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Residual waste, currently directly landfilled would be target material for processing. Diverted materials include **r**ecyclables (plastics and metal), and residual organics which can be further processed to compost or as a fuel source.

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: Waste streams delivered by curbside collection vehicles or transfer trailers depending on location. Intended to preserve capacity at Green Lane Landfill.

Land Requirements: Requires approximately 3 - 12[63] ha of land.

Option 6.2: Mixed Waste Processing with Organics Recovery (Mechanical Biological Treatment or (MBT)) Facility Development		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Solid waste materials are expected to be initially processed inside enclosed building and on paved surface, followed by digestion in a contained system. Outdoor composting only required for final stabilization of digestate. • Residual materials requiring landfill will have to be managed at properly designed and engineered landfill facilities.

[62] Based on the City's mixed waste study completed in 2009.
[63] Based on the City's mixed waste study completed in 2009.

Option 6.2: Mixed Waste Processing with Organics Recovery (Mechanical Biological Treatment or (MBT)) Facility Development		
Criteria	**Indicators**	**Assessment**
	Potential impacts to local airshed	• Potential for minimal to no impact from dust and odours as solid waste materials are expected to be initially processed inside enclosed building and on paved surface, followed by digestion with appropriate controls. Outdoor composting only required for final stabilization of digestate. Frequent removal of waste materials will occur to minimize potential for further impacts from odour.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are expected to be initially processed inside enclosed building and on paved surface, followed by digestion in a contained system. Outdoor composting only required for final stabilization of digestate. Overall site will have stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption if use is limited to periodic site and equipment cleaning requirements and site staff facilities. Potential for some increased consumption of water depending on requirements of anaerobic digestion and composting components.
	Total land required and land use displacement	• Can be designed to the available land parcel but significant land area (could be as large as 13-17 ha[64]) may be required for composting component. A mixed waste processing system with Anaerobic Digestion will require less land - in the order of 8-10 ha (based on 200,000 tonnes per year)).[65] • Compatible with existing industrial land uses.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Significant potential for energy generation in the form of biogas or fuel pellets depending on technology utilized. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation. No change or some decrease in overall transfer

[64] Based on the City of Toronto's mixed waste study completed in 2009
[65] City of Toronto Business Case for an MBT-AD Facility (2012).

Option 6.2: Mixed Waste Processing with Organics Recovery (Mechanical Biological Treatment or (MBT)) Facility Development		
Criteria	**Indicators**	**Assessment**
	Greenhouse gas (GHG) contributions	vehicle fuel consumption expected since currently transporting this waste stream to Green Lane Landfill. • Supports significant overall reduction of greenhouse gas emissions through collection and use of biogas and when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance.[66] • Additional recyclables can be diverted offsetting need for primary extraction.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential environmental health impacts and neighbourhood stigma.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for significant ability to recover additional recyclable materials from the mixed waste stream typically collected from multi-residential buildings depending on quality and available markets. Additional potential to increase diversion if finished compost or digestate is marketable (potentially up to 65% of material processed).
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.
Potential for Land Use	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic generated by the MBT facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.

[66] https://www.durhamyorkwaste.ca/Archive/pdfs/processing/Annex-E-5-Supplemental_Report.pdf

Option 6.2: Mixed Waste Processing with Organics Recovery (Mechanical Biological Treatment or (MBT)) Facility Development		
Criteria	**Indicators**	**Assessment**
Conflicts/Community Interruption	Potential for litter increase/reduction	• Potential for some impact of increased litter within the vicinity of the MBT facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community. Mixed waste materials will be processed inside enclosed facility which will minimize any odour combined with frequent removal of residual waste materials. Outdoor composting only required for final stabilization of digestate with minimal to no potential for impacts from odour.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and composting equipment. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed facility.
	Potential for increased vector/vermin	• Potential for some increase in vector/vermin at facility location. All solid waste materials are expected to be managed inside enclosed facility combined with frequent removal of waste materials and appropriate housekeeping procedures. Outdoor composting only required for final stabilization of digestate with minimal to no potential for increased attraction of vector/vermin.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Other municipalities may be interested in serving multi-residential customers using MBT.
Complexity	Program complexity to user	• N/A. – Residents will not be able to access facility.
Convenience	Ease of participation	• N/A. – Residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if facility located on suitably zoned site.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for some impact to residents living near facility from increased traffic, noise etc. • No impact on social equity as residents will not access facility.

Option 6.2: Mixed Waste Processing with Organics Recovery (Mechanical Biological Treatment or (MBT)) Facility Development		
Criteria	**Indicators**	**Assessment**
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Estimated capital cost is highly variable depending on processing capacity and technology utilized. An MBT-AD facility is estimated to have capital costs between $631-$825 per design tonne, excluding land and electrical connection. For a 200,000 tonne/year facility, this is equivalent to capital costs of $126-$165 million[67].
	Estimated net operating cost	• Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials/compost/digestate/fuel/biogas. Operating cost estimated to range between $55 and $75 per tonne for a 200,000 tonne/year MBT-AD facility. This does not include potential revenues from sale of recyclables or energy[68]. • Operating costs offset by reduction in disposal costs achieved through diversion.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for some contract risk related to performance of the facility and level of diversion achieved. • Facility will be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or IC&I).
	Potential for schedule risk	• Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.
	Potential for innovation risk	• Potential for significant innovation risk due to limited success of MBT processing for a mixed waste stream in North America.
Economic Growth	Potential for local economic growth	• Potential for some impact on local economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.

[67] City of Toronto Business Case for an MBT-AD Facility (2012)
[68] City of Toronto Business Case for an MBT-AD Facility (2012)

Option 6.2: Mixed Waste Processing with Organics Recovery (Mechanical Biological Treatment or (MBT)) Facility Development		
Criteria	**Indicators**	**Assessment**
	Potential for regional/global economic growth	• Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials/compost/digestate/fuel/biogas.
Local Job Creation	Potential for additional local job creation	• Potential for some local job creation related to initial facility construction and then ongoing operation depending on the location of the facility, processing capacity and the requirement for manual sorting and management of materials.
Flexibility	Ability to accommodate future changes	• Potential for significant ability to configure facility and operations, as required, to accommodate a mixed waste stream including changing material composition, market conditions, etc.

Option 6.3: Direct Combustion Facility Development

Development of a direct combustion facility to process residual wastes and recover recyclable materials and energy 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 400 operating facilities in Europe, over 80 operating facilities in the United States, six operating facilities in Canada, and over 400 operating facilities in Asia (mostly in Japan and China).
- Large-scale commercial end uses for ash have not occurred in North America.

Case Studies/Examples:

- Brampton, ON: Private facility processes approximately 150,000 tonnes per year (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 approximately 280,000 tpy of waste, generates electricity which is sold to BC Hydro. Metro Vancouver also initiated a process in 2012 to identify a new Waste to Energy Facility, however, in 2015 this project was cancelled.
- Durham/York Energy Centre, Durham, ON: Recently approved for full commercial operation, the facility 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) and sells up to 17 MW of electricity to Hydro One.

Considerations:

- Direct combustion of waste is the most widely used technology for thermal treatment of waste world-wide therefore there is 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 is required beyond removal of large oversized and metal items such as furniture and white goods).
- Can remove additional materials (e.g. ferrous and non-ferrous metals).
- Can generate energy – electricity, steam or heat.
- Reduces weight of waste by more than 70% and volume of waste by more 90%.
- Bottom ash residue can be used for daily cover and for other landfill uses. Bottom ash is used as construction aggregate in Europe, Asia and parts of United States. Pilot studies have also been undertaken to assess the use of bottom ash in road bed construction.
- Facility can be designed for zero discharge of water.

Option 6.3: Direct Combustion Facility Development

- 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 Environmental Assessment (EA). Depending on the potential effects identified; an Individual EA could still be required.
- Still requires landfill disposal of bottom ash if it cannot be beneficially reused.
- Requires disposal of fly ash, can be treated and stabilized, or may be disposed 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.
- 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.
- Several projects utilizing direct combustion in recent months have been cancelled in Canada. Should the City proceed with this option, a review of the specific circumstances leading to these projects being cancelled should be undertaken.
- In Ontario, the Ministry of the Environment and Climate Change does not consider direct combustion of waste as diversion, but rather disposal.

Potential Outcomes:

- Electricity and or heat energy, recovered metals, recoverable bottom ash.

Details of Option undergoing Evaluation: Requires identification of potential site location(s) and assessment through complex multi-stakeholder process to support Environmental Assessment Act and land use approvals. A period between eight – 10 years may be required to identify a site, select a technology and vendor, assess the potential impacts on the environment, and obtain approval for a direct combustion facility. The combustion facility will be designed, developed and operated in accordance with applicable standards including air emission control systems. Amount of energy generation will be dependent on facility capacity and nature of the waste stream. Sized based on residual waste quantities to be managed, assumed to range from 150,000 – 300,000 tonnes per year.

Gap/Challenge/Opportunity: A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.

Another challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.

Ownership/Operation: Assume City-Owned, Privately Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Residual waste, currently directly landfilled would be target material for processing. Diverted materials include recyclables (metal).

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: Waste streams delivered by transfer trailers depending on location. Intended to preserve capacity at Green Lane Landfill.

Land Requirements: Can be designed to the available land parcel but ideal area could be in the order of 9 - 14 ha[69] depending on facility capacity.

Option 6.3: Direct Combustion Facility Development		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Solid waste materials are managed within enclosed building and on paved surface. • Residual materials requiring landfill will have to be managed at properly designed and engineered landfill facilities.
	Potential impacts to local airshed	• Potential for some impacts to local airshed from contaminants released through combustion of waste. Solid waste materials are managed within enclosed building and on paved surface with minimal impact from dust and odours.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are managed within enclosed building and on paved surface in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for significant impact related to water consumption required to cool combustion gases. Additional water consumption for periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Can be designed to the available land parcel but ideal area could be in the order of 9 - 14 ha[70] depending on facility capacity. Compatible with existing industrial land uses.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for significant energy generation in the form of heat, steam or electricity from combustion of materials. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Limited fossil fuel consumption required to start and stop processing activities.

[69] Based on a review of current operating facilities and total site area (https://www.durhamyorkwaste.ca/Archive/pdfs/processing/FINAL_Draft_Steps_1-5_Report-March22-07.pdf)
[70] Based on a review of current operating facilities and total site area (https://www.durhamyorkwaste.ca/Archive/pdfs/processing/FINAL_Draft_Steps_1-5_Report-March22-07.pdf)

Option 6.3: Direct Combustion Facility Development		
Criteria	**Indicators**	**Assessment**
	Greenhouse gas (GHG) contributions	• Additional recyclables can be diverted, offsetting need for primary extraction. • Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance[71].
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential environmental health impacts and neighbourhood stigma.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for some ability to recover additional recyclable materials (mainly metals) from waste materials prior to combustion and potential end use for bottom ash.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for materials and energy recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Will require approval under the Environmental Assessment Act, either a screening or potentially an individual EA, increasing complexity and involving multiple stakeholders. Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic generated by the combustion facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter within the vicinity of the combustion facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.

[71] https://www.durhamyorkwaste.ca/Archive/pdfs/processing/Annex-E-5-Supplemental_Report.pdf

Option 6.3: Direct Combustion Facility Development		
Criteria	**Indicators**	**Assessment**
	Potential odour emissions	• Potential for minimal to no impact from odour to community. Waste materials will be processed inside enclosed facility which will minimize any odour and the wastes will be combusted.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Combustion equipment operated within enclosed facility, although external stack exhaust will generate noise within guidelines. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.
	Potential for increased vector/vermin	• Potential for minimal to no increase in vector/vermin at facility location. All solid waste materials are managed inside enclosed facility and combusted, with frequent removal of any residual waste materials and appropriate housekeeping procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.
Complexity	Program complexity to user	• N/A. - Residents will not be able to access facility.
Convenience	Ease of participation	• N/A. - Residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if facility located on suitably zoned site.
Equity	Potential for unequal impacts/benefits to specific groups	• No impact on social equity as residents will not access facility. • Potential for some impact to residents living near facility from increased traffic, noise etc.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		

Option 6.3: Direct Combustion Facility Development

Criteria	Indicators	Assessment
Cost	Estimated net capital cost	• Estimated capital cost is highly variable depending on processing capacity and technology utilized. Expected to be in the order of $350,000 to $500,000 per processed tonne per day or greater[72] based on comparable facilities in North America, not including land. For a 200,000 tonne/year facility, this is equivalent to capital costs in the order of $200-$300 million.
	Estimated net operating cost	• Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials and from energy generation. Expected to be in the range of $80 to $130 per tonne based on comparable facilities in North America[73]. Revenue from sale of energy can potentially offset operating costs significantly. Operating costs also offset by reduction in landfill disposal costs.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for some contract risk related to performance of the facility and long-term energy revenues. • Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or IC&I).
	Potential for schedule risk	• Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.
	Potential for innovation risk	• Potential for some innovation risk depending on technology(s) selected, with standard engineering and construction requirements.
Economic Growth	Potential for local economic growth	• Potential for some impact on local economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.
	Potential for regional/global economic growth	• Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and market demand for energy.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no local job creation since facility is unlikely to be located within the City of Toronto.

[72] Energy from Waste Sector Study, PPP Canada, September 2014.
[73] Energy from Waste Sector Study, PPP Canada, September 2014.

Option 6.3: Direct Combustion Facility Development		
Criteria	**Indicators**	**Assessment**
Flexibility	Ability to accommodate future changes	• Minimal ability to accommodate future increase in quantities while significant changes to waste composition could negatively impact the facility operations.

Option 6.4: Emerging Technologies Facility Development

Development of a facility utilizing a new and emerging technology (including gasification, pyrolysis, plasma arc) to process the City's residual 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[74].

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 – 982°C) and sub-stoichiometric or no oxygen. Following a cleaning process, the gas, called syngas (synthesis gas which is used to synthesize other chemicals, for example, methanol or ammonia), 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. A facility in Edmonton, AB has recently began operations. • Examples: United Kingdom, North America (Montgomery, NY), Europe (Germany). • Inputs: either Refuse Derived Fuel (RDF) 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, for example, methanol or ammonia). • To-date it has been applied to process municipal solid waste at a demonstration scale. A demonstration facility in Ottawa, ON recently ceased operation. • Examples: United Kingdom (Teesside), North America (Florida), Asia (Thailand, China, Japan, India). • Inputs: either Refuse Derived Fuel 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. • Outputs: Fuel-grade ethanol.

[74] Energy from Waste Sector Study, PPP Canada, September 2014.

Option 6.4: Emerging Technologies Facility Development

Pyrolysis	• Pyrolysis involves heating (400 – 450^{o}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 currently several pilot projects at various stages of development. • Torrefaction is a closely related process that happens at lower temperatures (250 – 400^{c}C) and produces a biochar. • Examples: Europe (Germany), North America (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, North America (Mexico, 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.

Details of Option undergoing Evaluation: Since this group of technologies continues to develop and be assessed in terms of their ability to manage municipal solid waste on a commercial scale, a specific technology is not identified for evaluation. It is anticipated that for any technology selected, it will require identification of potential site location(s) and assessment through complex multi-stakeholder process to support Environmental Assessment Act and land use approvals.

A period between eight – 10 years may be required to identify a site, select a technology and vendor, assess the potential impacts on the environment, and obtain approval for a full scale emerging technology facility. The emerging technology facility will be designed, developed and operated in accordance with applicable standards including air emission control systems. Sized based on residual waste quantities to be managed. Amount of materials/products/energy generation will be dependent on facility capacity and nature of the waste stream.

Gap/Challenge/Opportunity: A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.

Ownership/Operation: Assume City-Owned, Privately Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Residual waste, currently directly landfilled would be target material for processing. Feedstock may depend on technology.

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: Waste streams delivered by curbside collection vehicles or transfer trailers depending on location. Intended to preserve capacity at Green Lane Landfill.

Land Requirements: Can be designed to the available land parcel but ideal area could be in the order of 9 - 14 ha, consistent with a direct combustion facility, depending on the specific technology and capacity[75].

Option 6.4: Emerging Technologies Facility Development		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Solid waste materials are managed within enclosed building and on paved surface. • Residual materials requiring landfill will have to be managed at properly designed and engineered landfill facilities.

[75] Based on a review of current operating facilities and total site area (https://www.durhamyorkwaste.ca/Archive/pdfs/processing/FINAL_Draft_Steps_1-5_Report-March22-07.pdf).

Option 6.4: Emerging Technologies Facility Development		
Criteria	**Indicators**	**Assessment**
	Potential impacts to local airshed	• Potential for minimal to no impacts to local airshed as waste materials are primarily converted to alternative forms of gas/fuel and solids, and minimal release of contaminates through thermal processing of waste. Solid waste materials are managed within enclosed building and on paved surface with minimal impact from dust and odours.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are managed within enclosed building and on paved surface in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for some impact related to water consumption required to cool synthetic gases. Additional water consumption for periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Can be designed to the available land parcel but ideal area could be from 9 - 14 ha[76], similar to direct combustion facility, depending on facility technology and capacity. Compatible with existing industrial land uses.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for significant energy generation in the form of heat, steam or electricity from conversion of materials. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Limited fossil fuel consumption required to start and stop processing activities.
	Greenhouse gas (GHG) contributions	• Additional recyclables can be diverted, offsetting need for primary extraction. • Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance[77].
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential environmental health impacts.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.

[76] Based on a review of current operating facilities and total site area (https://www.durhamyorkwaste.ca/Archive/pdfs/processing/FINAL_Draft_Steps_1-5_Report-March22-07.pdf).
[77] https://www.durhamyorkwaste.ca/Archive/pdfs/processing/Annex-E-5-Supplemental_Report.pdf.

Option 6.4: Emerging Technologies Facility Development		
Criteria	**Indicators**	**Assessment**
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for some ability to recover additional recyclable materials (mainly metals) from waste materials prior to conversion and by utilizing the resulting syngas, slag and other products depending on the technology.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for materials and energy recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Standard requirement for an Environmental Compliance Approval (ECA). Will require approval under the Environmental Assessment Act, through either a screening or potentially an individual Environmental Assessment (EA) which increases complexity. Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic generated by the facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter within the vicinity of the facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for minimal to no impact from odour to community. Waste materials will be processed inside enclosed facility which will minimize any odour and wastes are then converted.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. The equipment is operated within an enclosed facility, although external processing equipment may generate noise within guidelines. There may be noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.
	Potential for increased vector/vermin	• Potential for minimal to no increase in vector/vermin at facility location. All solid waste materials are managed inside enclosed facility and processed, with frequent removal of any residual waste materials and appropriate housekeeping procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.

Option 6.4: Emerging Technologies Facility Development		
Criteria	**Indicators**	**Assessment**
Complexity	Program complexity to user	• N/A. – Residents will not be able to access facility.
Convenience	Ease of participation	• N/A. – Residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if facility located on suitably zoned site.
Equity	Potential for unequal impacts/benefits to specific groups	• No impact on social equity as residents will not access facility. • Potential for some impact to residents living near facility from increased traffic, noise etc.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Estimated capital cost is highly variable depending on processing capacity and technology utilized. For a 200,000 tonne/year facility, this is equivalent to capital costs in the order of $200-$300 million[78], based on very limited experience in North America.
	Estimated net operating cost	• Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials and from energy generation. Expected to range from $50 up to $190 per tonne processed based on very limited experience in North America[79]. Operating costs also offset by reduction in landfill disposal costs.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health costs.

[78] Energy from Waste Sector Study, PPP Canada, September 2014
[79] Energy from Waste Sector Study, PPP Canada, September 2014.

Option 6.4: Emerging Technologies Facility Development		
Criteria	**Indicators**	**Assessment**
Risk	Potential for contractual risk	• Potential for significant contract risk related to performance of the facility and long-term energy revenues. • Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or IC&I).
	Potential for schedule risk	• Potential for some schedule risk, depending on technology(s) selected and its proven commercial status, with standard engineering and construction requirements.
	Potential for innovation risk	• Potential for significant innovation risk since very few of these facilities operate at a commercial scale in North America.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth for construction and operation of facility since facility is not likely to be located within the City of Toronto.
	Potential for regional/global economic growth	• Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no local job creation as facility is unlikely to be located within the City of Toronto.
Flexibility	Ability to accommodate future changes	• Potential for some ability to accommodate future increase in quantities while significant changes to waste composition could negatively impact the facility operations.

Option 6.5: Organics Recycling Biocell or Biomodule Development

Development of a dedicated cell or controlled area at an existing landfill (i.e. Green Lane Landfill) to be used for the processing of a relatively high percentage of organic content residual waste stream including a residual mixed waste stream or contaminated source separated organics stream from multi-residential buildings. Rapid biodegradation of organic material allows for enhanced capture and recovery of biogas and earlier stabilization of organic material suitable for alternative applications.

System Component: Waste Recovery Technologies

Source of Option: 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[80,81].** 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 one hectare (ha) of an existing landfill and is designed to process over 50,000 tonnes of commercial and residential mixed solid waste over a six 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 and biogas is continuing to be generated and collected for the site's landfill gas (LFG) to electricity system. LFG generation/collection has been measured to be greater than if the materials had been landfilled. It is planned that once gas generation subsides, the biocell will be excavated and recharged with fresh material for continued future gas utilization.
- **Biocell/Biomodule Pilot – Leon County, FL[82].** Leon County 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).

[80] http://www.esaa.org/wp-content/uploads/2015/06/10-Davies.pdf
[81] City of Calgary
[82] HDR Engineering

Option 6.5: Organics Recycling Biocell or Biomodule Development

	Once the majority of the gas was generated (in approximately three 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. • **Biocell Pilot – Coimbatore, India[83].** 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 two month period and covered during and after the surcharging period to develop anaerobic conditions from which biogas was collected. The processing period was approximately four months. Processed materials were moved to a dedicated windrow composting pad adjacent to the landfill for reuse.

Considerations:

- Biodegradation of organic waste within a 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 compressed natural gas (CNG) for vehicle use, fuel for electricity, heat energy, recyclables recovery and compost.

[83] HDR Engineering

Details of Option undergoing Evaluation: Development of a dedicated cell or controlled area at an existing landfill site (i.e. Green Lane Landfill) to be used for the processing of a relatively high percentage organic content residual waste stream. The bottom of the cell is lined and engineered systems are developed within the cell, including leachate collection and recirculation, and gas collection, in order to create and maintain favorable conditions supporting rapid biodegradation of the organic portion of the waste stream. Following sufficient biodegradation, the processed material is removed, any potential contaminants or residual wastes can be screened out and a compost by-product is created for further processing/curing as required. The cell is then used again for the same purpose. A single biocell (or multiple biocells which can be developed at the same time) will be considerably smaller than the typical landfill cells in order to provide the necessary controls for biodegradation to occur more rapidly. The residual materials removed from the compost will be disposed in the landfill. Some potential for additional recovery of recyclables. Rapid biodegradation of organic material allows for enhanced capture and recovery of biogas and earlier stabilization of organic material suitable for alternative applications.

Development of a recycling biocell at Green Lane Landfill will require an amendment to the existing Environmental Compliance Approval. In addition, the location and operation of the biocell would need to be considered in the context of the overall development and operations plan for the landfill to avoid any conflicts with the regular landfilling operations.

Gap/Challenge/Opportunity: A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.

Ownership/Operation: Assume City-owned, City operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Residual mixed waste stream that has a high organics content or a relatively homogenous and clean source separated organic feedstock. Assumed to be sourced from multi-residential buildings.

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: Waste streams delivered by curbside collection vehicles or transfer trailers depending on location. Intended to preserve capacity at Green Lane Landfill. May reduce the need to develop/procure additional processing capacity for Green Bin organics.

Land Requirements: Depends on the quantity of material requiring processing; a one hectare cell can process approximately 50,000 tonnes[84] of organic waste materials. Assuming up to 200,000 tonnes per year of mixed solid waste or contaminated source separated organics stream from multi-residential buildings is available for processing, it may be required that two or more biocells are operated in parallel (based on City of Calgary experience).

[84] http://www.ucalgary.ca/mbf/calgary-biocell

Option 6.5: Organics Recycling Biocell or Biomodule Development		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Residual mixed waste or high organic content waste materials are placed within a landfill cell, typically lined with leachate collection system.
	Potential impacts to local airshed	• Potential for minimal to no impacts to local airshed as mixed/organic waste materials are placed in a landfill cell and covered, with a gas collection system. Compost by-product is removed from cell after biodegradation is completed with minimal to no release of odours.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Mixed/organic solid waste materials are placed within a landfill cell, typically lined with a leachate collection system. Site will also have appropriate stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption as leachate is recirculated to assist in biodegradation. Minimal water consumption for periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Additional land not expected to be required, typically developed at an existing landfill (i.e. Green Lane Landfill) in a series of small cells. Based on industry experience, a one hectare cell can process approximately 50,000 tonnes of organic waste materials over a timeline of approximately three to four months, or potentially longer.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for some energy generation in the form of a biogas collected from the cell which can be utilized as a renewable fuel source. There will be fossil fuel consumption related to on-site equipment operation.
	Greenhouse gas (GHG) contributions	• Supports overall reduction of greenhouse gas emissions by converting organic waste to biogas and capturing the gas for use as a fuel source. • Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential positive impact on public health. Unlikely to result in negative impacts as technology would be located at an existing landfill side. Potential for small positive impacts on health through the overall reduction of greenhouse gas emissions and through employment opportunities.

Option 6.5: Organics Recycling Biocell or Biomodule Development		
Criteria	**Indicators**	**Assessment**
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for some ability to recover compost material from the cell, dependent on the composition of the residual waste stream processed.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Expected to require an amendment to the existing Environmental Compliance Approval (ECA) for Green Lane Landfill. Will require modifications to site development and operations plans. No other approvals anticipated.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no impact due to traffic generated by the biocell, if it is located at Green Lane Landfill which has already been receiving the same waste stream for disposal.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter within the vicinity of the biocell. Appropriate housekeeping procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for minimal to no impact from odour to community. Organic waste materials will be processed anaerobically, covered within a controlled cell with gas collection.
	Potential noise emissions	• Potential for minimal to no nuisance noise emissions off-site. Equipment operated periodically for creation of cell and removing the processed materials after a period of time.
	Potential for increased vector/vermin	• Potential for minimal to no increase in vector/vermin at facility location. All organic waste materials are managed within a covered cell, and removed after biodegradation is complete. Ongoing appropriate housekeeping procedures undertaken at the site.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities as biocell would be intended to process residual mixed waste stream or contaminated source separated organics stream from multi-residential buildings in City of Toronto.

Option 6.5: Organics Recycling Biocell or Biomodule Development		
Criteria	**Indicators**	**Assessment**
Complexity	Program complexity to user	• N/A. - Residents will not be able to access facility.
Convenience	Ease of participation	• N/A. - Residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if facility located at existing Green Lane Landfill site.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact on residents living near Green Lane Landfill from increased traffice, noise etc. • Potential for minimal to no impact on social equity as residents will not access facility.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator largely maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Capital costs associated with liner, control and collection systems consistent with requirements for landfill cell. Variable depending on number of cells and capacity. Data not available for a comparable facility.
	Estimated net operating cost	• Estimated annual net operating cost is highly variable, with higher costs during material handling period and cell redevelopment. Data is not available for a comparable facility. • Costs may be offset by potential revenues for recovered compost and additional biogas.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for some contract risk related to performance of the biocell in producing marketable compost and long-term revenues.
	Potential for schedule risk	• Potential for some schedule risk if quantities of organics available exceed cell preparation and development, or if sufficient quantities are unavailable.

Option 6.5: Organics Recycling Biocell or Biomodule Development		
Criteria	**Indicators**	**Assessment**
	Potential for innovation risk	• Potential for significant innovation risk related to availability of organic waste stream in order to produce marketable compost and capture sufficient quantities of biogas.
Economic Growth	Potential for local economic growth	• Potential for minimal impact on local economic growth.
	Potential for regional/global economic growth	• Potential for some impact on regional economic growth depending on market demand for energy and compost.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no local job creation as located at existing landfill site.
Flexibility	Ability to accommodate future changes	• Potential for minimal ability to accommodate future increase in quantities unless additional cells can be constructed and utilized. Significant changes to waste composition could negatively impact the quality of the end product. • This system can also be used to accept/ anaerobically process/ treat sewage sludge. • Potential to adjust to changing economic growth and patterns, changing waste stream quality, and changing recycling methods and technologies.

Option 6.6: Refuse Derived Fuel Facility Development

Development of a refuse derived fuel (RDF) facility to process 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. This technology can process the waste stream to 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 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 residual waste. If it is combusted/incinerated, then the receiving facility must have gone through an Environmental Assessment (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.

Potential Outcomes:

Option 6.6: Refuse Derived Fuel Facility Development

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

Details of Option undergoing Evaluation: Requires assorted approvals and construction of a new facility to process solid waste into a refuse derived fuel on a property approximately 4 – 14 hectares[85] (ha) in area, consistent with that for a mixed waste processing facility, located within an industrial zoned area. Can be developed in conjunction with another recovery alternative such as mixed waste processing. Expected to receive a mixed residual waste stream for mechanical processing and preparation of a fuel product. Waste streams delivered by curbside collection vehicles or transfer trailers depending on location. Can recover some recyclables like metals and other non-combustibles with residual suitable as a renewable fuel source. Fuel pellets, fluff or briquettes can be shipped to appropriate facilities external to the City or markets for use.

Will require Environmental Compliance Approval and land use planning approvals. Access to the site will be limited to curbside collection or transfer haul vehicles from the City, depending on location. Sized based on residual waste quantities to be managed. A limited amount of pre-processing to recover recyclables is assumed.

Gap/Challenge/Opportunity: A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.

Ownership/Operation: Assume City-Owned, Privately Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Residual waste, currently directly landfilled would be target material for processing. Technology produces RDF fluff, pellet or briquette.

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: Waste streams delivered by curbside collection vehicles or transfer trailers depending on location. Intended to preserve capacity at Green Lane Landfill. End-products can be used with other technologies such as direct combustion facilities (see Option 6.3). This technology can also be coupled at the back end with a facility such as a mixed waste processing facility (see Option 6.1) to process the remaining waste.

Land Requirements: Can be designed to the available land parcel but ideal area could be in the order of approximately 4 - 14[86] ha for a dedicated RDF facility, consistent with that for a mixed waste processing facility.

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[85] Based on the City of Toronto's mixed waste study completed in 2009.
[86] Based on the City of Toronto's mixed waste study completed in 2009.

Option 6.6: Refuse Derived Fuel Facility Development		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Solid waste materials are expected to be processed within enclosed building and on paved surface. • Residual materials requiring landfill will have to be managed at properly designed and engineered landfill facilities.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust and odours. Solid waste materials are expected to be processed within enclosed building and on paved surface. Frequent removal of waste materials will occur to minimize potential for further impacts from odour.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are expected to be processed within enclosed building and on paved surface in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption if use is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Can be designed to the available land parcel but ideal area could be in the order of approximately 4 - 14[87] ha, consistent with a mixed waste processing facility. Compatible with existing industrial land uses.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation. • Depending on site location, no change or some reduction in overall transfer vehicle fuel consumption expected since currently transporting this waste stream to Green Lane Landfill. • Energy generation from RDF fuel realized by third party purchaser if high BTU[88] content RDF product which offsets need for fossil fuel consumption.

[87] Based on the City of Toronto's mixed waste study completed in 2009.
[88] BTU stands for British Thermal Unit.

Option 6.6: Refuse Derived Fuel Facility Development		
Criteria	**Indicators**	**Assessment**
	Greenhouse gas (GHG) contributions	• Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance.[89] • Reduction of emissions through combustion of fuel product realized by a third party purchaser.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through numerous environmental factors, need for additional land requirements and potential stigma and stress experienced by some local populations living in close proximity to facility.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for some ability to recover additional recyclable materials from the mixed waste stream being processed, depending on quality and available markets.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic generated by the RDF facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.
	Potential for litter increase/reduction	• Potential for some impact of increased litter within the vicinity of the RDF facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community. Mixed waste materials will be processed inside enclosed facility which will minimize any odour combined with frequent removal of RDF product.

[89] https://www.durhamyorkwaste.ca/Archive/pdfs/processing/Annex-E-5-Supplemental_Report.pdf.

Option 6.6: Refuse Derived Fuel Facility Development		
Criteria	**Indicators**	**Assessment**
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Processing equipment operated within enclosed facility. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.
	Potential for increased vector/vermin	• Potential for some increase in vector/vermin at facility location. All solid waste materials are expected to be managed inside enclosed facility combined with frequent removal of waste materials and appropriate housekeeping procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.
Complexity	Program complexity to user	• N/A - residents will not be able to access facility.
Convenience	Ease of participation	• N/A - residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if facility located on suitably zoned site.
Equity	Potential for unequal impacts/benefits to specific groups	• No impact on social equity as residents will not access facility. • Potential for some impact to residents living near facility from increased traffic, noise etc.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Estimated capital cost is highly variable depending on processing capacity and technology utilized. Expected to be in the order of $50 million[90] or greater based on comparable mixed waste processing facilities in North America, not including land.

[90] http://www.bulkhandlingsystems.com/athens-services-opens-state-art-mixed-waste-mrf

Option 6.6: Refuse Derived Fuel Facility Development		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for RDF product. Expected to be greater than $75 to $100 per tonne[91] based on comparable mixed waste processing facilities in North America. • Revenues from sale of fuel not expected to offset operating costs. • Operating costs also offset by reduction in landfill disposal costs.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for some contract risk related to performance of the facility and market for RDF fuel. • Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or Industrial, Commercial & Institutional).
	Potential for schedule risk	• Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.
	Potential for innovation risk	• Potential for significant innovation risk due to limited success of RDF facilities in North America.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth since facility is likely located outside City of Toronto.
	Potential for regional/global economic growth	• Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no local job creation since facility is likely located outside City of Toronto.
Flexibility	Ability to accommodate future changes	• Potential for minimal to no ability to configure facility and operations, as required, to accommodate mixed waste including changing material composition, market conditions, etc. Material composition must provide consistent thermal content for use as a fuel source.

[91] Sunnyvale SMaRT Station in California reported $21 million per year cost net of recycling revenues to process 181,000 tons of mixed waste (about $116 per US ton, or $130 per metric tonne).

Option 6.7: Waste to Liquid Fuel Technologies Facility Development

Development of a facility utilizing technologies such as hydrolysis, pyrolysis, gasification etc. to transform a mixed residual waste stream to a liquid fuel source.

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 tonnes per year (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 Industrial, Commercial & Institutional (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.
- Currently there is limited experience with commercial scale facilities utilizing municipal solid waste as a feedstock, although assorted pilot projects have been initiated or under demonstration.

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

Details of Option undergoing Evaluation: Development of a facility utilizing technologies such as hydrolysis, pyrolysis, gasification etc. to transform a mixed residual waste stream to a liquid fuel source. Application works best with high organic content material, mainly biomass or organic wastes.

It is anticipated that this type of facility will require identification of potential site location(s) and assessment through complex multi-stakeholder process to support Environmental Assessment Act and land use approvals. A period between eight – 10 years may be required to identify a site, select a technology and vendor, assess the potential impacts on the environment, and obtain approval for a full scale facility. The waste to liquid facility will be designed, developed and operated in accordance with applicable standards including air emission control systems. Sized based on residual waste quantities to be managed.

Gap/Challenge/Opportunity: A challenge the City is facing is diminishing landfill disposal capacity. Alternative processing technologies could divert additional materials from disposal and extend the life of Green Lane Landfill.

Option 6.6: Refuse Derived Fuel Facility Development		
Criteria	Indicators	Assessment

Ownership/Operation: Assume City-Owned, Privately Operated for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Residual mixed waste stream with high organic content material, mainly biomass or organic wastes. Can recover some recyclables like metals and other non-combustibles with residual suitable for conversion to liquid renewable fuel product.

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: Waste streams delivered by curbside collection vehicles or transfer trailers depending on location. Intended to preserve capacity at Green Lane Landfill.

Land Requirements: Can be designed to the available land parcel but ideal area could be in the order of 9 - 14 hectares (ha), consistent with a direct combustion facility, depending on the specific technology and capacity[92].

Option 6.7: Waste to Liquid Fuels Facility Development		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Solid waste materials are managed within enclosed building and on paved surface. • Residual materials requiring landfill will have to be managed at properly designed and engineered landfill facilities.
	Potential impacts to local airshed	• Potential for minimal to no impacts to local airshed as waste materials are primarily converted to liquid biofuel and solid residuals, and minimal release of contaminates through processing of waste. Solid waste materials are managed within enclosed building and on paved surface with minimal impact from dust and odours.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are managed within enclosed building and on paved surface in conjunction with stormwater management controls on-site.

[92] Based on a review of current operating facilities and total site area (https://www.durhamyorkwaste.ca/Archive/pdfs/processing/FINAL_Draft_Steps_1-5_Report-March22-07.pdf).

Option 6.7: Waste to Liquid Fuels Facility Development		
Criteria	**Indicators**	**Assessment**
	Potential water consumption requirements	• Potential for some impact related to water consumption required to cool synthetic gases. Additional water consumption for periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Can be designed to the available land parcel but ideal area could be from 9 - 14 ha[93], similar to direct combustion facility, depending on facility technology and capacity. Compatible with existing industrial land uses.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for significant energy generation in the form of heat, steam or electricity from the biofuel produced from the conversion of materials. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Limited fossil fuel consumption required to start and stop processing activities. • Fossil fuel consumption required to support material conversion processes and related to on-site equipment operation.
	Greenhouse gas (GHG) contributions	• Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance.[94]
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through numerous environmental factors, need for additional land requirements, and potential stigma and stress experienced by some local populations living in close proximity to facility.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for some ability to recover additional recyclable materials (mainly metals) from waste materials prior to conversion and by utilizing the resulting liquid fuel, slag and other products depending on the technology.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for materials and energy recovery, and conversion to liquid fuel and other materials.

93 Based on a review of current operating facilities and total site area (https://www.durhamyorkwaste.ca/Archive/pdfs/processing/FINAL_Draft_Steps_1-5_Report-March22-07.pdf
94 https://www.durhamyorkwaste.ca/Archive/pdfs/processing/Annex-E-5-Supplemental_Report.pdf.

Option 6.7: Waste to Liquid Fuels Facility Development		
Criteria	**Indicators**	**Assessment**
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Standard requirement for an Environmental Compliance Approval (ECA). May require approval under the Environmental Assessment Act, either a screening or potentially an individual Environmental Assessment (EA), increasing complexity. Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact due to increased traffic generated by the facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter within the vicinity of the facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for minimal to no impact from odour to community. Waste materials will be processed inside enclosed facility which will minimize any odour and wastes are then converted.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site. Equipment operated within enclosed facility, although external processing equipment may generate noise within guidelines. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.
	Potential for increased vector/vermin	• Potential for minimal to no increase in vector/vermin at facility location. All solid waste materials are managed inside enclosed facility and processed, with frequent removal of any residual waste materials and appropriate housekeeping procedures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.
Complexity	Program complexity to user	• N/A. – Residents will not be able to access facility.
Convenience	Ease of participation	• N/A. – Residents will not be able to access facility.

Option 6.7: Waste to Liquid Fuels Facility Development		
Criteria	**Indicators**	**Assessment**
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if facility located on suitably zoned site.
Equity	Potential for unequal impacts/benefits to specific groups	• No impact on social equity as residents will not access facility. • Potential for some impact to residents living near facility from increased traffic, noise etc.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Estimated capital cost is highly variable depending on processing capacity and technology utilized. For a 200,000 tonne/year facility, this is equivalent to capital costs in the order of $200-$300 million[95], not including land, based on very limited experience in North America.
	Estimated net operating cost	• Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials and from energy generation. Expected to range from $50 up to $190 per tonne processed based on very limited experience in North America[96]. Operating costs also offset by reduction in landfill disposal costs.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for significant contract risk related to performance of the facility and long-term fuel revenues. • Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or IC&I).
	Potential for schedule risk	• Potential for some schedule risk, depending on technology(s) selected and its proven commercial status, with standard engineering and construction requirements.

[95] Energy from Waste Sector Study, PPP Canada, September 2014.
[96] Energy from Waste Sector Study, PPP Canada, September 2014.

Option 6.7: Waste to Liquid Fuels Facility Development

Criteria	Indicators	Assessment
	Potential for innovation risk	• Potential for significant innovation risk depending on technology(s) selected, with standard engineering and construction requirements.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth since facility is likely located outside City of Toronto.
	Potential for regional/global economic growth	• Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials or liquid bio-fuels.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no local job creation since facility is likely located outside City of Toronto.
Flexibility	Ability to accommodate future changes	• Potential for some ability to accommodate future increase in quantities while significant changes to waste composition could negatively impact the facility operations.

RESIDUAL WASTE DISPOSAL

Near Term Options

Option 7.5: Adjust Tipping Fees or Customer Base

This option considers adjusting tipping fees to discourage acceptance of waste from paid private customers and/or adjust types of customers permitted to use City of Toronto waste facilities. An increase in tipping fees will discourage paid private customers increasing landfill life and potentially decreasing revenues for the City of Toronto.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Toronto manages approximately 90,000 tonnes in paid private loads annually at their Transfer Stations and at Green Lane Landfill. Approximately 15,000 tonnes is from generators local to GLL and 75,000 tonnes is from small generators at Toronto Transfer Stations. [97]
- 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[98].
- The tipping fee charged by Toronto at its Transfer Stations and Green Lane Landfill 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:

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 three 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[99] to more accurately reflect the true costs of managing waste from different

[97] Technical Memorandum #1 (including paid tonnes at Transfer Stations, and paid private waste at Green Lane Landfill (including displacing aggregates).)).
[98] http://www.toronto.ca/legdocs/mmis/2015/bu/bgrd/backgroundfile-74775.pdf

Option 7.5: Adjust Tipping Fees or Customer Base

- 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 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.

customers. Small residential drop-offs require more time and staff to process waste compared to large loads but 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.
- Increasing tipping fees will result in 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 including preserving long-term disposal capacity by increasing tipping fees for commercial and industrial waste tonnes.
- Private generators with small loads of waste may not be able to access comparable services through the private sector.
- Annual review of financial data to determine changes to tipping fees (potentially increase or decrease fees) at Green Lane Landfill and transfer stations.
- Consideration needs to be given to a potential for a corresponding increase in GLL operating costs, including any implications on put or pay aspects of the operating contract, with a reduction in waste volumes.

Potential Outcomes:

- Change in revenue if tipping fees are increased and less waste is received, combined with increased GLL operating costs.
- Small private waste generators may continue to bring waste to City Transfer Stations since they may not have access to comparable services from the private sector.

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

Option 7.5: Adjust Tipping Fees or Customer Base

- Potential increase in GLL site life with tipping fee increase.

Details of Option Undergoing Evaluation: Considers increasing disposal tipping fees to decrease or discontinue acceptance of paid private customers to preserve the remaining site life of Green Lane Landfill. Toronto manages approximately 90,000 tonnes annually of paid private customer waste at their transfer stations and at Green Lane Landfill.[100] Based on this tonnage, it is estimated that a 3% increase in the tipping fees charged to all other City customers (residential, non-residential) will help to offset the projected loss in revenue.

Increasing the tipping fees for residual waste would be expected to result in a decrease in the tonnage of waste brought to the site and to the City's transfer stations by private customers. However, it is anticipated that only a small portion of this tonnage may in fact go to a private service provider since they do not typically provide access by small quantity waste generators at their facilities.

Residual waste tipping fees increased by 3% in 2015 (and another 3% increase has been approved for 2016) based on the City's current recommended solid waste rates and are applicable to all customers using GLL[101]. With less waste landfilled at GLL, the annual operating costs for the landfill are also expected to increase slightly due to the less efficient use of equipment and resources, and if the operating contract put or pay minimum threshold is not met.

Gap/Challenge/Opportunity: A challenge facing the City is to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Strategy.

Ownership/Operation: City owned, may affect contracted landfill operations

Materials Collected/Diverted: Residual Waste

Staffing: Consistent with current practice, decrease in waste volumes may result in fewer contracted landfill staff.

Consideration of Other Infrastructure/Programs: May decrease the amount of waste managed at the City's transfer station and at Green Lane Landfill. Intended to extend the life of Green Lane Landfill. May have negative economic impacts on small quantity waste generators without the private sector providing access to comparable services.

Land Requirements: N/A.

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[100] Technical Memorandum #1 (including paid tonnes at transfer stations, and paid private waste at Green Lane Landfill (including displacing aggregates)).

[101] 2015 City of Toronto Solid Waste Rates and Fees.

Option 7.5: Adjust Tipping Fees or Customer Base		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources as mitigation measures will continue to be in place to protect the ground surface.
	Potential impacts to local airshed	• Potential for minimal to no impacts to local airshed due to reduction in customers using GLL.
	Potential impacts to local water sources	• Potential for minimal to no impact to water sources at the landfill since precipitation that is in contact with waste will be collected and treated as leachate.
	Potential water consumption requirements	• Potential for minimal to no additional water consumption requirements.
	Total land required and land use displacement	• Potential for some benefit related to land requirement as this will extend the remaining site life at GLL.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for minimal to no additional fossil fuel consumption with anticipated lower waste tonnages received at GLL and at the City Transfer Stations.
	Greenhouse gas (GHG) contributions	• Potential for minimal to no additional greenhouse gas emissions produced as less waste quantities are transported and managed at GLL.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health due to reducing traffic and extending life of existing Green Lane Landfill.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to off-site release of potential contaminates assuming that mitigation measures and engineering controls are in place.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Minimal to no potential to increase diversion. Not expected to influence diversion by small paid private customers who will have limited access to other options offered by the private sector service providers.

Option 7.5: Adjust Tipping Fees or Customer Base		
Criteria	**Indicators**	**Assessment**
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No additional approvals required.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some reduction in traffic with fewer paid private customers and less residual waste requiring disposal.
	Potential for litter increase/reduction	• Potential for minimal to no litter generation increase if tipping fees are increased since waste generators will continue to access City facilities or utilize private service provider options.
	Potential odour emissions	• Potential for minimal to no net impact on odour since odours will be controlled as part of the established landfill operating procedures.
	Potential noise emissions	• Potential for minimal to no reduction in noise emissions as landfill operations will continue but at a potentially lower rate.
	Potential for increased vector/vermin	• Potential for some reduction in attraction of vector/vermin with less waste disposed.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities as option is intended to preserve capacity for City of Toronto customers.
Complexity	Program complexity to user	• Existing user of City transfer stations may be forced to utilize private sector services and facilities due to tipping fee increase. If private facilities are not accessible, then small paid private waste generators will continue to use City facilities.
Convenience	Ease of participation	• Users of the City's transfer station may want to find alternative locations to dispose of waste as a result of the increased costs. There is a significant impact on participation for small private waste generators if private sector options are not readily accessible
Community Safety	Potential for impacts to community safety	• Minimal to no potential to increase the number and type of safety issues provided current health and safety procedures are in place.

Option 7.5: Adjust Tipping Fees or Customer Base		
Criteria	**Indicators**	**Assessment**
Equity	Potential for unequal impacts/benefits to specific groups	• Since an increase in tipping fees is applied to all transfer station customers, the option will have some impact on the small private waste generators if cost effective private sector options are not readily accessible.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for some behavioral change with residual waste tipping fees increasing which could be an incentive to reduce waste generation.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for minimal to no impact on net capital cost. Site life will be extended with the increase in tipping fees prolonging the need for additional waste disposal capacity.
	Estimated net operating cost	• Potential for some increase in net operating cost with the potential reduction in revenue as a result of lost customers and decreased quantity of residual waste being managed. Currently GLL manages about 90,000 tonnes per year of paid private waste. Associated tipping fee is $106.09 per tonne. Costs associated with operation and maintenance may require higher City budget allocation. In addition, reduced waste quantities managed at GLL are expected to increase the landfill operating costs on a per tonne basis if the operating contract put or pay minimum limit is not achieved.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no additional contractual risk as no construction activities are required and no changes to current operations are required.
	Potential for schedule risk	• Potential for minimal to no schedule risk. City Council will need to approve and adjust the new tipping fees.
	Potential for innovation risk	• Potential for some innovation risk if small private waste generators are not diverted elsewhere if no private sector options are accessible.

Option 7.5: Adjust Tipping Fees or Customer Base		
Criteria	**Indicators**	**Assessment**
Economic Growth	Potential for local economic growth	• Potential for minimal to no local economic growth as cost effective private options for disposal are available. • Potential for some impact on small local businesses that tip at the City's transfer stations with the increase in tipping fees as access to private sector options for disposal may be limited.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth as no changes to GLL are proposed. Potential benefit to other landfills with lower tipping fees that private customers may go to.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no potential for local job creation as no change in current operations and GLL is located outside of the City.
Flexibility	Ability to accommodate future changes	• Potential for minimal to no flexibility to accommodate changing composition and quantity of residual waste.

Option 7.7a: Securing Disposal Capacity to Preserve Long-Term Landfill Capacity at Green Lane Landfill

This option looks at acquiring/securing residual waste disposal capacity from private/municipal landfill sites or at another facility (e.g. Energy from Waste) in order to preserve long-term landfill capacity at GLL.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Prior to purchasing 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 three 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 manage all, or a portion of, 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 Greater Toronto Area (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 in that state for residential waste.

Case Studies/Examples:

- Municipalities throughout Ontario, Canada and North America 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:

- A minimum or baseline quantity of waste would continue to be disposed of and landfilled at Green Lane Landfill to maintain the efficient operation of the landfill. Any amount of waste above the baseline quantity would be directed to another facility.
- Savings in landfill development, operations, closure and post-closure care costs which are extended over a longer time period. Reduced volumes at GLL may result in an increase in the per tonne operating costs due to reduced equipment and resource efficiencies, or if the contracted operation put or pay minimum limit is not achieved.
- 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 waste disposal requirements which may require use of more than one facility.
- Potential for increased risk with disposal facilities located in US (border crossings, currency fluctuation, Superfund liability, etc.).
- 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:

- Cost competitive disposal price at other facilities for those waste quantities greater than an established operating baseline for GLL. Cost competitive disposal at other facilities offsets any potential increase in GLL operating costs.
- Extended operating life for Green Lane Landfill, approximately one year for every 450,000 tonnes of residual waste redirected elsewhere.

Details of Option Undergoing Evaluation: The City currently has the following contracts as a contingency for waste disposal: Lafleche Environmental for up to 75,000 tonnes per year (tpy), Waste Management (Twin Creeks Landfill) for up to 200,000 tpy and Walker Environmental (South Landfill) for up to 50,000 tpy. The five-year contract values range in tipping fees from $40 to $56 fee per tonne[102], excluding hauling fees for the provision of contingency final disposal in the event the City cannot dispose of its waste at GLL landfill or if the City wishes to re-direct limited quantities of waste. Contracts were scheduled to expire in 2016, but all have recently been extended for an additional five years ending August 31, 2021[103].

Other disposal facilities, including Energy from Waste facilities, exist in Ontario, Michigan and New York with the available capacity and service area to accept residual waste from Toronto for disposal.

[102] City of Toronto, Contract Award RFQ 6035-11-3030 for the Provisional of Contingency Final Disposal Capacity within Ontario, May 18. 2011.
[103] http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.PW9.4

For the purpose of evaluation, it is assumed that disposal capacity is purchased at one or more licensed disposal facility(ies) located some distance further from Toronto compared to GLL. Disposal capacity may be required for up to 325,000[104] tonnes per year at other facilities while the remaining quantity of residual waste will be managed at GLL (i.e., GLL will remain operational at a determined baseline volume of waste). It is assumed that standard infrastructure (e.g., scale house, administrative building), nuisance mitigation measures (e.g., dust, odour, noise) and engineering controls (e.g., leachate collection system, landfill gas collection system, stormwater management) are in place at the identified disposal facility. No changes to the disposal facility approvals are required to accommodate the City's waste.

Gap/Challenge/Opportunity: A challenge facing the City is to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Strategy. By utilizing available disposal capacity at other facilities in the short term, the life of GLL will be extended.

Ownership/Operation: Most of the available facilities are expected to be privately owned and operated.

Materials Collected/Diverted: Residual waste diverted through a third party-owned disposal facility.

Staffing: No new City staff required.

Consideration of Other Infrastructure/Programs: A portion of Toronto's residual waste would be hauled to a new location for residuals management, extending the life of GLL.

Land Requirements: No provision/purchase of land by the City of Toronto required.

Option 7.7a: Divert Waste to a Third-Party Owned Disposal Facility to Preserve Capacity at Green Lane Landfill		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources as mitigation measures will continue to be in place to protect the ground surface.

[104] Based on current contingency capacity.

Option 7.7a: Divert Waste to a Third-Party Owned Disposal Facility to Preserve Capacity at Green Lane Landfill		
Criteria	**Indicators**	**Assessment**
	Potential impacts to local airshed	• Potential for minimal to no impacts to local airshed as waste will be transported for disposal to another location. • Potential for some impact to local airshed at third party facilities related to release of landfill gas, dust and odours or combustion emissions. Implementation of appropriate control systems and operational best management practices minimize potential impacts.
	Potential impacts to local water sources	• Potential for minimal to no impact since precipitation that is in contact with waste will be collected and treated as leachate at a landfill or waste at EFW facility will be managed inside a building.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities. Some water consumption required at EFW for cooling of gases.
	Total land required and land use displacement	• Potential for minimal to no additional land required as Green Lane Landfill capacity will be preserved and third party facility is already developed and operating. • Potential for some benefit related to land requirement as lifespan of GLL will be extended or no future requirement to expand capacity of GLL will be required.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for fossil fuel consumption related to on-site equipment operation at more than one facility or to support combustion. • Potential for fossil fuel consumption related to haulage of materials.
	Greenhouse gas (GHG) contributions	• Potential for some increase in hauling distance and corresponding greenhouse gas contributions.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for minimal to no potential to increase diversion at landfills. • Some potential to recover additional recyclable materials at EFW facility (e.g. ferrous and non-ferrous materials).

Option 7.7a: Divert Waste to a Third-Party Owned Disposal Facility to Preserve Capacity at Green Lane Landfill		
Criteria	**Indicators**	**Assessment**
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No additional approval and permitting requirements.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some increase in traffic in the vicinity of the new disposal facility to which City of Toronto waste will be hauled. Traffic will be within allowable waste limits for the site and assessed as part of approvals. Mitigation measures in place expected to include designated route to the site with appropriate design standards.
	Potential for litter increase/reduction	• Potential for minimal to no increased litter. Appropriate litter management procedures will occur to minimize potential for litter at all disposal facilities. Potential reduction in litter generated at GLL with less waste being disposed.
	Potential odour emissions	• Potential for minimal to no net impact from odours since odours will be controlled as part of the facility operations and maintenance procedures. Potential reduction in odour emissions at GLL with less waste being disposed.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation. • Potential reduction in noise emissions at GLL with less waste being disposed.
	Potential for increased vector/vermin	• Potential for minimal to no net increase in attraction of vector/vermin as part of the operating and maintenance procedures for the disposal facility. • Potential reduction in the attraction of vector/vermin at GLL with less waste being disposed.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities with other municipalities or private sector companies as procurement of disposal capacity is likely to be on a contract basis.
Complexity	Program complexity to user	• N/A - residents will not be able to access facility.
Convenience	Ease of participation	• N/A - residents will not be able to access facility.

Option 7.7a: Divert Waste to a Third-Party Owned Disposal Facility to Preserve Capacity at Green Lane Landfill		
Criteria	**Indicators**	**Assessment**
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impacts to community safety as disposal facilities approved to accept waste to a specified limit.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impacts to residents/businesses located near the disposal facility accepting City of Toronto waste as facility is approved to receive waste to a specified limit.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for some impact on net capital cost associated with GLL development since the remaining site life at GLL may be extended, delaying capital expenditures. • No capital costs anticipated as part of utilizing capacity at a third party disposal facility.
	Estimated net operating cost	• Potential for some impact on net operating cost associated with decreased GLL operating costs since fewer tonnes will be managed, although per tonne costs may increase due to reduced efficiencies of equipment and resources, and if the operating contract put or pay minimum threshold is not met. Additional hauling and disposal costs associated with third-party residual waste disposal. • The estimated current disposal costs at third-party facilities ranges from $40 to $56 tipping fee per tonne, excluding hauling fees[105]. Assuming up to 325,000 tonnes is sent to third party facilities, it is estimated that the annual cost for disposal is $13 to $18 million, excluding hauling fees.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.

[105] City of Toronto, Contract Award RFQ 6035-11-3030 for the Provisional of Contingency Final Disposal Capacity within Ontario, May 18. 2011.

Option 7.7a: Divert Waste to a Third-Party Owned Disposal Facility to Preserve Capacity at Green Lane Landfill		
Criteria	**Indicators**	**Assessment**
Risk	Potential for contractual risk	• Potential for minimal to no risk with some reliance on ownership and operation by third parties. The contract risk is anticipated to be manageable.
	Potential for schedule risk	• Potential for minimal to no schedule risk. Changes to disposal facilities are not required to accommodate the City's waste.
	Potential for innovation risk	• Potential for minimal to no innovation risk as use of third party disposal facilities has been a previous and current practice by the City.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth as facility will be located outside City of Toronto.
	Potential for regional/global economic growth	• Potential for some regional economic growth for individuals and companies that could support the operation of the disposal facility (e.g., monitoring, equipment, technology).
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no creation of local jobs as the disposal facility will be located outside of the City.
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility to accommodate future changes in composition or tonnes of materials accepted based on the type and number of disposal facilities potentially available.

Long Term Options

Option 7.1: Landfill Expansion

Consider the possibility of expanding Green Lane Landfill (GLL) in the event that additional residual waste disposal capacity is required. This option is being evaluated as part of a future consideration and not as an immediate need. Expanding the current landfill site will involve an individual Environmental Assessment (EA) during which time, a range of alternatives would be identified and evaluated along with extensive consultation efforts.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- 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 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 m^3 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 landfills that have recently gone through the individual EA process to expand include:
  - ***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 Industrial, Commercial & Institution (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.

Considerations:

- Individual EA process considers a broad range of alternatives and incorporates extensive consultation with the public and Aboriginal communities.
- The Terms of Reference for the EA can be prepared in a manner to focus the consideration of alternatives based on previous planning studies including the City's Long Term Waste Management Strategy (LTWMS or Waste Strategy).
- Uncertainty regarding length of time required to obtain Terms of Reference (ToR) and EA approvals. Based on the case studies presented, and complexity of issues and consultation requirements, it is anticipated that the EA approval process will take between 5 – 10 years.
- 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 and EA would require approval by the Minister of Environment and Climate Change following consultation and review by all interested stakeholders.
- Official plan and zoning by-law amendments may be required.
- 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.
- Potential relocation of surface water drains and stormwater management pond associated with a potential horizontal expansion.

Potential Outcomes:

- Approved Terms of Reference which outline the alternatives to be assessed in an EA to provide residual waste disposal capacity, focused on expansion of 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 by expanding the landfill.
- Consultation and feedback from the public, Aboriginal communities and government agencies incorporated into the ToR and EA.

Details of Option Undergoing Evaluation: This option is based on expanding GLL to increase the disposal capacity by 10,000,000 cubic meters (m^3) and extend the site life by approximately 20 years based on 500,000 m^3 (approximately 500,000 tonnes) of waste disposed at the site per year.

A period between 5 – 10 years may be required to identify a preferred expansion alternative, assess the potential impacts on the environment, and obtain approval. Through a multi-stakeholder engagement process as part of the EA, this option assumes that, the local community is a willing host for the landfill expansion. It is assumed that the City owns the necessary lands adjacent to the current landfill to be able to expand the landfill horizontally and therefore land purchasing costs are not included. Official Plan and Zoning amendments will likely be required depending on the current land use. Leachate will be disposed and treated as per current practices and upgrades to the treatment facility are not included in this evaluation although studies will need to be conducted in the future to confirm this. It is assumed that landfill gas continues to be flared and is not converted to electricity however; it is recommended that the feasibility of doing this be looked at in the future. It is assumed that current mitigation measures would be in place for the expanded landfill cells.

Gap/Challenge/Opportunity: A challenge facing the City is to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Waste Strategy.

Ownership/Operation: City owned, could be City operated. Other arrangements are possible for execution of option, and operation of expansion. Existing landfill is operated by contractor.

Materials Collected/Diverted: Residual Waste

Staffing: Some Toronto staff required with contracted operations, consistent with current practice.

Consideration of Other Infrastructure/Programs: No impact on any other programs. Intended to extend the life of Green Lane Landfill.

Land Requirements: Approximately 80 – 120 ha of land (including waste footprint and buffer areas) would be required for the expansion, based on a waste depth of 30m. Assumed expansion takes place on land already owned by the City.

Option 7.1: Landfill Expansion		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some impact to land resources through contact with ground surface. Soils excavated at base of landfill will be below ground. Use of land resource after landfill closure is limited to passive use in the future. Implementation of proper design and landfill liner system, and operational best management practices minimize potential impacts.
	Potential impacts to local airshed	• Potential for some impact to local airshed related to release of landfill gas, dust and odours. Implementation of landfill gas collection system and operational best management practices minimize potential impacts.
	Potential impacts to local water sources	• Potential for some impact to local water sources with release of contaminants through leachate for extended period of time. Landfill liner and leachate collection systems minimize potential impacts.
	Potential water consumption requirements	• Potential for minimal impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Option would require additional land for implementation and operation. Estimated disposal area of 50 – 80 ha with total site area of 80 – 120 ha[106] anticipated to be adjacent to the existing landfill.

[106] Estimated preliminary conceptual calculations based on actual footprint and approved area at GLL, and future capacity required. Actual area will depend on available land, configuration and design.

Option 7.1: Landfill Expansion		
Criteria	**Indicators**	**Assessment**
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• At this time, energy will be consumed for ancillary equipment (e.g. pumps) and on-site facilities. In the future, there is potential for landfill gas from existing and future landfill cells to be converted to electricity for use onsite or sold to the electrical grid. • Potential for minimal to no additional fossil fuel consumption related to on-site equipment operation.
	Greenhouse gas (GHG) contributions	• Potential for minimal to no additional production of greenhouse gas emissions. Landfill gas will continue to be collected and flared as per current practice.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill for a longer period of time.
	Potential to impact ecological health	• Potential for some impact to ecological health due to introduction and release of contaminants to the local environment and removal/disruption of existing ecological features. Implementation of proper mitigating measures related to siting and design, releases to the environment, site operational controls, and management procedures minimize impact. Additional study is required to confirm.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for minimal to no potential to recover additional reusable and/or recyclable materials.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for significant complexity associated with environmental and land use approvals (including an Individual EA, Environmental Compliance Approval (ECA) amendments, Official Plan and zoning amendments). Multi-stakeholder involvement in the process increases complexity and lengthens timelines. Approvals also require various forms and levels of political acceptance and approval.

Option 7.1: Landfill Expansion		
Criteria	**Indicators**	**Assessment**
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Traffic associated with the landfill currently will occur over a longer period of time.
	Potential for litter increase/reduction	• Potential for some impact of increased litter. Appropriate litter management procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community related to waste and landfill gas. Odours will be minimized through site operations.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation.
	Potential for increased vector/vermin	• Potential for some increase in attraction of vector/vermin by introduction of putrescible waste food source to a new area. Daily covering of waste and other control measures will help minimize attractiveness of landfill to vector/vermin.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities with other municipalities and potentially the IC&I sector if they require access to long-term disposal capacity.
Complexity	Program complexity to user	• N/A - residents will not be able to access facility.
Convenience	Ease of participation	• N/A - residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Minimal to no potential to increase the number and type of safety issues provided current health and safety procedures are in place.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for local landowners surrounding GLL to be impacted by the landfill due to nuisance effects over a longer period of time. It is assumed that local landowners and community will continue to benefit from host community agreement programs for extended landfilling period.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		

Option 7.1: Landfill Expansion		
Criteria	**Indicators**	**Assessment**
Cost	Estimated net capital cost	• Significant capital costs associated with developing the lateral landfill expansion, environmental approval requirements, and zoning amendments. The estimated costs to expand the landfill site life by 20 years are in the order of $100 million, depending on the design and infrastructure requirements[107].
	Estimated net operating cost	• Potential for minimal to no impact since it is assumed the operating equipment and facilities from the existing landfill will be maintained and continued to be used for the landfill expansion. • The annual operation costs which includes landfill operation, leachate treatment plant and landfill gas flaring operation and maintenance is estimated to be around $15 million[108].
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for minimal contract risk as landfill can be operated by City staff or contract staff. Contractual risk is manageable.
	Potential for schedule risk	• Potential for significant schedule risk associated with the environmental and land use approval processes depending on the level and engagement of stakeholders. Standard engineering and construction requirements for the landfill otherwise.
	Potential for innovation risk	• Potential for minimal to no innovation risk as the City is experienced with operating GLL.

[107] The costs associated with environmental approvals are based on similar projects recently undertaken by the County of Northumberland to expand the Brighton landfill and Niagara Region to expand the Humberstone Landfill, which are around $1M. Capital cost associated to construct a landfill cell is assumed to be $4M based on the Amendment of the Capital Plan for Green Lane Landfill to Accelerate Cell Excavation and Base Construction minutes. Assuming a landfill cell needs to be constructed annually during the 20 year period, engineering fees are estimated to be 10% of the capital costs and a 15% contingency has been added to the total estimate for unforeseen expenditures.

[108] The costs associated with net operating cost are based on the City's 2015 Recommended Operating Budget for Residual Management.

Option 7.1: Landfill Expansion		
Criteria	**Indicators**	**Assessment**
Economic Growth	Potential for local economic growth	• Potential for minimal to no potential for local economic growth since GLL is located outside of the City.
	Potential for regional/global economic growth	• Potential for some regional economic growth for individuals and companies that could support the operation of GLL (e.g., monitoring, equipment, technology, construction) over a longer period of time.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no creation of local jobs as GLL is located outside of the City.
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility to accommodate future changes in materials accepted. • Landfill cells can be constructed on an as-needed basis.

Option 7.3: Bioreactor Landfill

A bioreactor landfill accelerates the biological decomposition of organic wastes in a landfill by promoting conditions necessary for the microorganisms to degrade the waste. Liquids (i.e. leachate, gas condensate, water, storm water runoff, wastewater treatment sludges) must be added to the waste mass and recirculated to obtain optimal moisture for organics decomposition. The bioreactor allows for faster degradation and stabilization of the waste mass combined with generation of landfill gas. Additional disposal capacity is available within the approved landfill design contours prior to closure due to the resulting settlement of the waste. This option looks at developing a bioreactor landfill on both the closed and yet to be constructed landfill cells of Green Lane Landfill site.

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.
- 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[111], 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 20 - 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[109].** 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[110]**. Leachate recirculation in three hydraulically 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:

[109] http://www.solidwastemag.com/features/bioreactor/
[110] http://www.epa.gov/projectxl/yolo/895oper5.pdf
[111] 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

- Accelerated decomposition of the organic fraction of the landfilled waste allows the remaining waste to stabilize in a shorter time period.
- Recovery of landfill airspace as waste decomposes quicker 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.
- 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. No air is added.

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.
- Enhanced landfill gas recovery in the short term.

Details of Option undergoing Evaluation: This option looks at developing a bioreactor landfill on both the closed and yet to be constructed landfill cells of Green Lane Landfill (GLL) site.

It is assumed that leachate is collected and then recirculated to obtain optimal moisture levels within the waste mass and costs are associated with installing the necessary piping and pumps to support leachate and air recirculation within a cell and to tie the bioreactor to the existing leachate collection system. Although this option enhances production of landfill gas for collection and energy production, it is assumed that landfill gas continues to be flared and not converted to energy. An additional 20%[112] of landfill capacity within the approved landfill contours, during the landfill operating life, is assumed to be gained as a result of the faster stabilization and settlement of the waste mass.

Gap/Challenge/Opportunity: A challenge facing the City is to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Waste Strategy. This option may provide the City with additional disposal capacity within the existing footprint of GLL.

Ownership/Operation: City owned, would need to become part of the contracted landfill operations.

Materials Collected/Diverted: Residual Waste.

[112] Municipal Solid Waste Options: Integrating Organics Management and Residual Treatment/Disposal (March 2006), Municipal Waste Integration Network/Recycling Council of Alberta.

Option 7.3: Bioreactor Landfill

Staffing: Some Toronto staff required but would become part of contracted GLL operations.

Consideration of Other Infrastructure/Programs: No impact on any other programs. Intended to extend the life of Green Lane Landfill.

Land Requirements: None. This would be developed within the existing GLL footprint potentially in those cells already closed and cells yet to be constructed.

Option 7.3: Bioreactor Landfill		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some impact to land resources with increased leachate volumes in the landfill although mitigation measures will continue to be in place to protect the ground surface.
	Potential impacts to local airshed	• Potential for some release of emissions in the form of odours to the atmosphere related to recirculating leachate.
	Potential impacts to local water sources	• Potential for some impacts associated with the release of potential contaminants to water sources. Water that has been in contact with waste will be managed as leachate.
	Potential water consumption requirements	• Potential for minimal to no additional water required as the bioreactor landfill will use leachate.
	Total land required and land use displacement	• Potential for some benefit by increasing disposal capacity within the bioreactor landfill cells by up to 20%[113] with the enhanced degradation of waste. No additional land area required.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for some increase in energy consumption associated with installing and operating the leachate recirculation system.
	Greenhouse gas (GHG) contributions	• Potential for minimal to no additional contribution of greenhouse gas emissions. Landfill gas will be generated quicker than in a traditional landfill and for a shorter time period, and continue to be collected and flared as per current practice.

[113] Municipal Solid Waste Options: Integrating Organics Management and Residual Treatment/Disposal (March 2006), Municipal Waste Integration Network/Recycling Council of Alberta.

Option 7.3: Bioreactor Landfill		
Criteria	**Indicators**	**Assessment**
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through potential for odours and impacts on water quality.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for minimal to no potential to recover additional reusable and/or recyclable materials.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use..
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for some complexity associated with approvals and permitting. The ECA for the site will need to be amended to allow a change to the landfill design and operations. Design changes may be significant, requiring extensive analysis and consultation.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no impact to traffic since all operations will be performed within the property.
	Potential for litter increase/reduction	• Potential for minimal to no increase in litter since the excavation required is performed within compacted waste or a recirculation system is installed as part of cell development.
	Potential odour emissions	• Potential for some odour emissions related to leachate recirculation which can be mitigated as part of the operations and maintenance plan for the site.
	Potential noise emissions	• Potential for some temporary increase in noise emissions due to heavy-duty vehicles on site during the construction of the recirculation system.
	Potential for increased vector/vermin	• Potential for minimal to no increased attraction of vector/vermin.
Collaboration	Ability to partner with other municipalities/ organizations	• Option provides no ability to partner with municipalities or organizations since this would be implemented only at the City's landfill.

Option 7.3: Bioreactor Landfill		
Criteria	**Indicators**	**Assessment**
Complexity	Program complexity to user	• N/A - residents will not be able to access facility.
Convenience	Ease of participation	• N/A - residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact to community safety as operations will take place within the landfill premises.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact to those living/working around GLL as all work and operations remain within the existing GLL site.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behaviour change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for some impact on net capital cost associated with leachate recirculation. Assuming up to 45 hectares of GLL footprint are suitable for conversion to a bioreactor, additional capital costs of up to $11.5M[114] are estimated. Specific costs will be dependent on those areas of GLL suitable for conversion (closed or yet to be constructed) and the detailed design requirements.
	Estimated net operating cost	• Potential for some impact on net operating cost. Operational costs will increase to manage leachate recirculation, increased landfill gas generation, equipment maintenance and monitoring activities.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for Contractual risk	• Potential for minimal to no risk with some reliance on operation by third parties. The contract risk is anticipated to be manageable.

[114] Cost estimates derived from online article (http://waste360.com/mag/waste_landfill_bioreactor_landfills).

Option 7.3: Bioreactor Landfill		
Criteria	**Indicators**	**Assessment**
	Potential for Schedule risk	• Potential for some schedule risk associated with the environmental approval processes and the acceptability of this approach to the Ministry of the Environment and Climate Change.
	Potential for Innovation risk	• Potential for significant innovation risk as the process has not been used in Ontario at the same scale required for GLL, and further for closed landfill cells. Bioreactors can become unstable if not properly managed and monitored.
Economic Growth	Potential for local economic growth	• Potential for minimal to no potential for local economic growth since GLL is located outside of the City.
	Potential for regional/global economic growth	• Potential for minimal to no regional economic growth.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no creation of local jobs as GLL is located outside of the City.
Flexibility	Ability to accommodate future changes	• Potential for minimal to no flexibility to accommodate future changes.

Option 7.6: Purchase a New Landfill

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

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City acquired Green Lane Landfill in 2007 in response to its commitment to eliminate the shipping of municipal waste to Michigan for disposal by the end of 2010.

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)**[115]**.** 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**[116]**.** 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**[117]. 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**[118] 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:

- City controls and retains the waste disposal revenue (tipping fees).
- Existing landfill with available approved disposal capacity or ability to develop additional capacity since approvals to increase the landfill capacity within

115 http://www.solidwastemag.com/recycling/newalta-sells-waste-recycling-assets-toronto-firm-300m/1003278326/
116 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
117 http://www.transforcecompany.com/media-center/press-releases/2010/transforce-inc-acquires-100-lafleche-environmental-complex
118 http://maine.gov/decd/meocd/landfills/index.shtml

Option 7.6: Purchase a New Landfill

approved landfill area may be less time consuming.

- Secure long-term landfill capacity with financial certainty for the City in terms of future residual waste disposal costs.
- Haulage costs dependent 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 financially sustainable 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.

Details of Option undergoing Evaluation: Currently, it is estimated that Green Lane Landfill has approximately 14 - 19 years of capacity remaining. The City would purchase a new landfill located in Ontario intended to replace GLL once it reaches capacity. It is anticipated that a landfill would be purchased approximately three (3) years before GLL is expected to reach capacity and would commence operation near or at the time GLL has reached capacity. The City purchased GLL approximately three years prior to its existing disposal contract expiring.

It is assumed that the site to be purchased is an active landfill. The landfill site, as permitted, would have adequate remaining capacity to accommodate the City's long-term residual waste disposal requirements for approximately 20 years and is located within Ontario. The new City landfill site would begin receiving Toronto's waste near or at the time GLL has reached capacity. It is assumed that standard landfill infrastructure (e.g., scale house, administrative building), nuisance mitigation measures (e.g., dust, odour, noise) and engineering controls (e.g., leachate collection system, landfill gas collection system, stormwater management) are in place as required by Ontario standards. Landfill gas is flared and not converted to electricity. The landfill's permitted annual rate of fill is sufficient for the City and no additional increases are required. It is also assumed that the site purchased currently manages waste volumes similar to the City's residual waste disposal requirements.

Gap/Challenge/Opportunity: A challenge facing the City is to extend the life of GLL and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Strategy. Purchasing a new landfill provides the City with ongoing disposal capacity once GLL has reached its approved disposal capacity.

Ownership/Operation: City Owned, Privately Operated. Other arrangements are possible.

Materials Collected/Diverted: Residual Waste

Staffing: Level of staff required consistent with current GLL operation assuming landfill is operated under a private contract.

Consideration of Other Infrastructure/Programs: Residual waste would need to be hauled to a new location.

Land Requirements: Assume landfill already exists and no additional land is required.

Option 7.6: Purchase a New Landfill		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources as mitigation measures will continue to be in place to protect the ground surface.
	Potential impacts to local airshed	• Potential for some impact to local airshed related to release of landfill gas, dust and odours. Implementation of landfill gas collection system and operational best management practices minimize potential impacts.
	Potential impacts to local water sources	• Potential for minimal to no impact since precipitation that is in contact with waste will be collected and treated as leachate.
	Potential water consumption requirements	• Potential for minimal to no additional water consumption requirements.
	Total land required and land use displacement	• Potential for minimal to no additional land required assuming that the existing approved disposal capacity and footprint area meets the City's long-term needs.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for some fossil fuel consumption related to on-site equipment operation and haulage of materials.
	Greenhouse gas contributions (GHG)	• Potential for some increase to greenhouse gas contributions if hauling greater distance than GLL.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for minimal to no potential to recover additional reusable and/or recyclable materials.

Option 7.6: Purchase a New Landfill		
Criteria	**Indicators**	**Assessment**
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for minimal to no complexity associated with approvals and permitting given that the landfill being purchased is already licensed. It is assumed that the landfill is approved to receive a similar quantity of waste and from a similar service area. An Environmental Compliance Approval (ECA) amendment will be required to change ownership. Multi-stakeholder engagement process may be required as part of the purchase. • If changes to size, service area, design and operations are required, additional complex approvals will be required.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no increase in traffic since no change to waste hauling is expected at site purchased or follows designated route to the site.
	Potential for litter increase/reduction	• Potential for minimal to no net increase in litter since it will be controlled as part of the landfill operations and maintenance procedures.
	Potential odour emissions	• Potential for minimal to no net impact from odours since odours will be controlled as part of the landfill operations and maintenance procedures.
	Potential noise emissions	• Potential for minimal to no net impact from noise since noise emissions are expected to remain the same and will be controlled as part of the landfill operations and maintenance procedures.
	Potential for increased vector/vermin	• Potential for minimal to no net increase in attraction of vector/vermin given that daily cover will be applied and landfill will be maintained as part of the operating and maintenance procedures.

Option 7.6: Purchase a New Landfill		
Criteria	**Indicators**	**Assessment**
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities with other municipalities and the private sector. Waste from the local communities in the landfill area may be accepted as per the City's contract when purchasing the landfill. Another municipality may be interested in purchasing a new landfill jointly with Toronto. A private company may also be interested in developing a new landfill in conjunction with the City.
Complexity	Program complexity to user	• N/A - residents will not be able to access facility.
Convenience	Ease of participation	• N/A - residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Minimal to no potential to increase safety issues health and safety procedures already established at the landfill.
Equity	Potential for unequal impacts/benefits to specific groups	• Some potential for local landowners surrounding the landfill to be impacted by the landfill due to nuisance effects. Local landowners and community may benefit from host community agreement.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behaviour change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Costs to acquire a new landfill are site specific including remaining approved capacity and based on the City's purchase of GLL in 2007 and other more recent acquisitions, the cost may range from $200 to $300 million[119]. An additional $10 - $12 million per year in capital construction costs for the landfill will also be required.[120]

[119] The City purchased Green Lane Landfill in 2007, which cost approximately $220 million and provided a waste disposal capacity of 15.2 million cubic metres (Mm^3). In December 2004, BFI acquired the Ridge Landfill from Waste Management for $110 million which had an annual permitted capacity of 680,000 tonnes and an estimated site life of 19 years. In 2015, Newalta Stoney Creek landfill was acquired by a Toronto firm as part of the waste and recycling operations sale which cost $300 million and has an approved annual disposal capacity of 750,000 tonnes.

[120] Based on Contract Award for Green Lane Landfill Development RFP No. 3907-12-3192, April 22, 2013

Option 7.6: Purchase a New Landfill		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• Potential for some impact on net operating cost relative to GLL based on proximity to Toronto and landfill design. Contracted operations will generally be comparable with expected additional hauling costs. • The annual operation costs at GLL, which includes landfill operation, leachate treatment plant and landfill gas flaring operation and maintenance, is estimated to be approximately $15 million[121]. It is expected that the new landfill would have similar costs. Additional costs are associated with perpetual care, community funds, reserves, debt repayment and borrowing costs, etc. The City's annual budget for net operating costs is approximately $34 million.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for minimal to no risk with some reliance on operation by third parties. The contract risk is anticipated to be manageable.
	Potential for schedule risk	• Potential for some schedule risk depending on the time length required to identify a site, close the negotiations to acquire the site and amend environmental approvals.
	Potential for innovation risk	• Potential for minimal to no innovation risk as the City is familiar with operating landfills.
Economic Growth	Potential for local economic growth	• Potential for minimal to no potential for local economic growth since the new landfill site will be outside of the City.
	Potential for regional/global economic growth	• Potential for some regional economic growth for individuals and companies that could support the operation of the landfill (e.g., monitoring, equipment, technology).
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no creation of local jobs as the landfill is located outside of the City.

[121] The costs associated with net operating costs for GLL are based on the City's 2015 Recommended Operating Budget for Residual Management.

Option 7.6: Purchase a New Landfill		
Criteria	**Indicators**	**Assessment**
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility to accommodate future changes in materials accepted. • Landfill cells can be constructed on an as-needed basis.

Option 7.7b: Securing Disposal Capacity for Residual Management following Green Lane Landfill Reaching its Approved Disposal Capacity.

This option looks at acquiring/securing landfill airspace from private/municipal landfill sites or other disposal facilities (e.g. Energy from Waste) as a long-term solution to residual management once Green Lane Landfill has reached its approved disposal capacity.

System Component: Residual Waste Disposal Capacity

Source of Option: City Staff & Consultants

City of Toronto Experience:

- Prior to purchasing 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 three 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 manage 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 Great Toronto Area (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 in that state for residential waste.

Case Studies/Examples:

- Municipalities throughout Ontario, Canada and North America 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:

- 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 and/or disposal facilities, both public and private, with enough airspace to secure the City's waste disposal requirements which may require use of more than one facility.
- Potential for increased risk with disposal facilities located in US (border crossings, currency fluctuation, Superfund liability, etc.).
- 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.

Option 7.7b: Securing Disposal Capacity for Residual Management following Green Lane Landfill Reaching its Approved Disposal Capacity.

- Arrange for hauling of residual waste from transfer stations to landfill site(s) or EFW facilities.

Potential Outcomes:

- Cost competitive disposal price at disposal facilities owned and operated by private service providers or other municipalities.

Details of Option Undergoing Evaluation: Once Green Lane Landfill has reached its approved disposal capacity, the City could acquire/secure disposal capacity at a landfill or other disposal facility (e.g. energy from waste (EFW) facility). Other disposal facilities, including energy-from-waste facilities, exist in Ontario, Michigan and New York with the available capacity and service area to accept residual waste from Toronto for disposal. For the purpose of evaluation, it is assumed that disposal capacity is purchased at one or more licensed landfill sites or disposal facilities located some distance further from Toronto compared to GLL. Disposal capacity will be required for up to 500,000 tonnes per year. It is assumed that standard infrastructure (e.g., scale house, administrative building), nuisance mitigation measures (e.g., dust, odour, noise) and engineering controls (e.g., leachate collection system, landfill gas collection system, stormwater management) are in place are in place at the identified disposal facility. No changes to the disposal facility approvals are required to accommodate the City's waste. No changes to facility approvals are required to accommodate the City's waste.

Gap/Challenge/Opportunity: A challenge facing the City is to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Strategy.

Ownership/Operation: Most of the available facilities are expected to be privately owned and operated.

Materials Collected/Diverted: Residual Waste

Staffing: No new City staff required.

Consideration of Other Infrastructure/Programs: Residual waste would need to be hauled to a new location.

Land Requirements: No provision/purchase of land by the City of Toronto required.

Option 7.7b: Divert Waste to a Third-Party Owned Disposal Facility Once Green Lane has Reached Approved Capacity		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources as mitigation measures would continue to be in place to protect the ground surface.
	Potential impacts to local airshed	• Potential for minimal to no impacts to local airshed as waste would be transported for disposal to another location. • Potential for some impact to local airshed at third party facilities related to release of landfill gas, dust and odours or combustion emissions. Implementation of appropriate control systems and operational best management practices minimize potential impacts.
	Potential impacts to local water sources	• Potential for minimal to no impact since precipitation that is in contact with waste would be collected and treated as leachate at a landfill or waste at EFW facility would be managed inside a building.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities. Some water consumption required at EFW for cooling of gases.
	Total land required and land use displacement	• Potential for minimal to no additional land required assuming that the facility's existing footprint meets the City's long-term needs.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for fossil fuel consumption related to on-site equipment operation at more than one facility or to support combustion. • Potential for fossil fuel consumption related to haulage of materials.
	Greenhouse gas (GHG) contributions	• Potential for some increase to corresponding greenhouse gas contributions if hauling greater distance than GLL
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.

Option 7.7b: Divert Waste to a Third-Party Owned Disposal Facility Once Green Lane has Reached Approved Capacity		
Criteria	**Indicators**	**Assessment**
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for minimal to no potential to increase diversion at landfills. • Some potential to recover additional recyclable materials at EFW facility (e.g. ferrous and non-ferrous materials).
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No additional approval and permitting requirements.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some increase in traffic in the vicinity of the new disposal facility to which City of Toronto waste would be hauled.
	Potential for litter increase/reduction	• Potential for some impact of increased litter due to the additional waste volume to be managed. Appropriate litter management procedures would occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community related to the additional waste volume to be managed. Odours would be minimized through site operations and maintenance procedures.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation.
	Potential for increased vector/vermin	• Potential for some increase in attraction of vector/vermin with increased waste quantities managed which would be mitigated as part of the operating and maintenance procedures for the disposal facility.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities with other municipalities or private sector companies as procurement of disposal capacity would likely to be on a contract basis.
Complexity	Program complexity to user	• N/A - residents will not be able to access facility.

Option 7.7b: Divert Waste to a Third-Party Owned Disposal Facility Once Green Lane has Reached Approved Capacity		
Criteria	**Indicators**	**Assessment**
Convenience	Ease of participation	• N/A - residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impacts to community safety as disposal facilities approved to accept waste to a specified limit.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impacts to residents/businesses located near the disposal facility accepting City of Toronto waste as facility would be approved to receive wastes to a specified limit.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• No capital costs anticipated as part of utilizing capacity at a third party disposal facility.
	Estimated net operating cost	• The estimated current disposal costs at third-party facilities range from $40 to $56 tipping fee per tonne, excluding hauling fees[122]. Assuming up to 500,000 tonnes would be sent to third party facilities, it is estimated that the annual cost for disposal would be $20 to $28 million, excluding hauling fees.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for minimal to no risk with some reliance on ownership and operation by third parties. The contract risk is anticipated to be manageable.
	Potential for schedule risk	• Potential for minimal to no schedule risk. Changes to disposal facilities are not required to accommodate the City's waste.
	Potential for innovation risk	• Potential for minimal to no innovation risk as use of third party disposal facilities has been a previous and current practice by the City.

[122] City of Toronto, Contract Award RFQ 6035-11-3030 for the Provision of Contingency Final Disposal Capacity within Ontario, May 18. 2011.

Option 7.7b: Divert Waste to a Third-Party Owned Disposal Facility Once Green Lane has Reached Approved Capacity		
Criteria	**Indicators**	**Assessment**
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth as facility would be located outside City of Toronto.
	Potential for regional/global economic growth	• Potential for some regional economic growth for individuals and companies that could support the operation of the disposal facility (e.g., monitoring, equipment, technology).
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no creation of local jobs as the facility would be located outside of the City.
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility to accommodate future changes in composition or tonnes of materials accepted based on the type and number of disposal facilities potentially available.

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:

- There is currently one private sector greenfield landfill in Ontario awaiting approval of an Environmental Assessment Terms of Reference in order to proceed[123]. There is also another private sector greenfield landfill in Ontario for which the EA has been submitted for formal review and approval.

Considerations:

- Approval of a new greenfield landfill site must first be completed within the context of an individual 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.
- 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.

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[123] www.ontario.ca

Option 7.8: Greenfield Landfill

- Proceed with preparation of the EA following ToR approval. Will require a wide range of extensive technical studies to be completed. 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.
- 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.

Details of Option undergoing Evaluation: Requires identification of potential site location(s) and assessment through complex multi-stakeholder process to support Environmental Assessment Act and land use approvals. Site should be sized to accept approximately 500,000 tonnes per year of residual waste over a planning period of 20 – 25 years. Based on the land requirements, potential for impacts and perceptions of potential stakeholders, any potential greenfield site will be remote from Toronto.

A period between eight – 12 years may be required to identify a preferred site, assess the potential impacts on the environment, and obtain approval for a greenfield landfill. Through a multi-stakeholder engagement process, the local community is assumed to be a willing host for the landfill. Access to the site will be limited to transfer haul vehicles from the City. The landfill will be designed, developed and operated in accordance with applicable standards including a base liner system, leachate collection/treatment, and gas collection/utilization systems.

Gap/Challenge/Opportunity: A challenge facing the City is to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Strategy.

Ownership/Operation: City Owned, Privately Operated. Other arrangements are possible.

Materials Collected/Diverted: Residual Waste

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: Residual waste would need to be hauled to a new location.

Land Requirements: Estimated disposal area of 50 – 80 ha with total site area of 80 – 120 ha anticipated.

Option 7.8: Greenfield Landfill		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some impact to land resources through contact with ground surface. Soils excavated as base of landfill will be below ground. Use of land resource after landfill closure is limited to passive use in the future.
	Potential impacts to local airshed	• Potential for some impact to local airshed related to release of landfill gas, dust and odours. Implementation of landfill gas collection system and operational best management practices minimize potential impacts.
	Potential impacts to local water sources	• Potential for some impact to local water sources with release of contaminants through leachate for extended period of time. Landfill liner and leachate collection systems minimize potential impacts.
	Potential water consumption requirements	• Potential for minimal impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Land required will depend on the required disposal capacity, design and buffer area. Estimated disposal area of 50 – 80 ha with total site area of 80 – 120 ha[124] anticipated. Will displace current land use.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption Greenhouse gas (GHG) contributions	• Potential for fossil fuel consumption related to on-site equipment operation and haulage of materials. • Potential for some increase to greenhouse gas contributions if hauling greater distance than GLL.
Public Health	Potential to impact human health	• Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.

[124] Estimated preliminary conceptual calculations based on actual footprint and approved area at GLL, and future capacity required. Actual area will depend on available land, configuration and design.

Option 7.8: Greenfield Landfill		
Criteria	**Indicators**	**Assessment**
Impact/Benefit	Potential to impact ecological health	• Potential for some impact to ecological health due to introduction and release of contaminants to the local environment and removal/disruption of exiting ecological features. Implementation of proper mitigating measures related to siting and design, releases to the environment, site operational controls, and management procedures minimize impact. Additional study is required to confirm.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Minimal to no potential to increase diversion.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for significant complexity associated with environmental and land use approvals. Multi-stakeholder involvement in the process increases complexity and lengthens timelines. Approvals also require various forms of political acceptance and approval.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for significant impact due to increased traffic (both volume and large trucks) within vicinity of greenfield site and along haul routes depending on location of new facility.
	Potential for litter increase/reduction	• Potential for some impact of increased litter. Appropriate litter management procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community related to waste and landfill gas. Odours will be minimized through site operations.
	Potential noise emissions	• Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation.
	Potential for increased vector/vermin	• Potential for some increase in attraction of vector/vermin by introduction of putrescible waste food source to a new area. Daily covering of waste and other control measures will help minimize attractiveness of landfill to vector/vermin. City's organics program helps limit the amount of organic waste to be landfilled.

Option 7.8: Greenfield Landfill		
Criteria	**Indicators**	**Assessment**
Collaboration	Ability to partner with other municipalities/ organizations	• Significant potential for partnership opportunities with other municipalities may exist due to current limited disposal capacity within Ontario.
Complexity	Program complexity to user	• N/A - residents will not be able to access facility.
Convenience	Ease of participation	• N/A - residents will not be able to access facility.
Community Safety	Potential for impacts to community safety	• Potential for significant impacts to community due to increase in vehicle traffic and size of trucks, creating potential conflicts with community traffic patterns.
Equity	Potential for unequal impacts/benefits to specific groups	• Depending on the local community hosting the greenfield landfill, there may be a significant financial benefit through a host agreement to the local municipality and/or the community may be unwilling to accept the impacts associated with the disposal of waste from Toronto.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behaviour change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Significant capital costs associated with approvals depending on level of stakeholder engagement and concern (estimated in the range of $5M - $10M)[125] and size/design of landfill to be constructed. • Construction capital costs (expected to be greater than $200M[126]) will be spread out over the life of the landfill. • Land purchase costs are in addition.

[125] Based on HDR previous experience with similar projects of similar scope.
[126] Based on potential costs for landfill expansion, however, have estimated that costs may double due to developing necessary supporting infrastructure.

Option 7.8: Greenfield Landfill		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• Operating costs expected to range between $30 - $50 per tonne[127] depending on the landfill design and waste volumes to be managed. Perpetual care costs, community funds, etc. are in addition.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Potential for minimal contract risk as landfill can be operated by City staff or contract staff. Contractual risk is manageable.
	Potential for schedule risk	• Potential for significant schedule risk associated with the environmental and land use approval processes depending on the level and engagement of stakeholders. Standard engineering and construction requirements for the landfill otherwise.
	Potential for innovation risk	• Potential for some innovation risk related to the landfill design. Site specific design may be required dependent on the characteristics and setting of the greenfield site (e.g. soil and groundwater conditions).
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth as facility will be located outside City of Toronto.
	Potential for regional/global economic growth	• Potential for some impact on regional/global economic growth by providing landfill disposal capacity to local community at lower rates and operational staff will likely live in proximity to site.
Potential for Additional Local Job Creation	Additional local job creation	• Potential for minimal to no local job creation as site will be located outside City of Toronto.
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility to accommodate future changes in composition or tonnes of materials (either greater or less) received for disposal.

[127] Range based on City's 2015 Recommended Operating Budget for Residual Management and future operational requirements.

Overall System Recommendations:

Multi-residential Services

Organics Management

Option 2.7: Community/Mid-Scale Composting

Consider composting operations in locations where community members can compost their garden or kitchen waste using low-technologies such as a large backyard composter or a three-bin wooden composter. Organic waste collection bins could be located at different participating sources, e.g., religious institutions, community gardens etc. 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 education about composting and sells 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 which provides information to those wishing to start and maintain a community composting program, including problem solving techniques.
- Through Toronto Public Health (Toronto Food Strategy), the City of Toronto provides core funding to FoodShare, a non-profit food security organization, which 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.

Case Studies/Examples:

- FoodShare, Toronto[128] works with communities and schools to produce healthy food and deliver food education across Toronto. Foodshare promotes urban agriculture initiatives which encourage the growing of produce within cities. The organization 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 buildings and growing resident compost knowledge.
- The New York City Department of Sanitation started the NYC Compost Project in 1993[129]. 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 three 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).

[128] http://foodshare.net/program/compost/

[129] http://www.biocycle.net/2013/11/18/community-composting-in-new-york-city/

Option 2.7: Community/Mid-Scale Composting

• 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).	• Wyecycle Community Composting, UK[130] is a not-for-profit community business which operates acommunity composting program which has been in place since 1990. Garden waste is composted in a static pile/aerated windrow system and kitchen waste is first placed in a secondhand shipping container (to partially degrade) before being added to the garden waste system. • Food Scraps Drop Spot, Vancouver, BC[131]. is a 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 Food Scraps 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 the high cost of tests. Contamination of feedstock, (e.g. with 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.
- Trained staff and volunteers are required to ensure the composting process is being followed and that quality compost is produced.
- City to promote the program and provide educational resources to the targeted groups.
- Determine end use of finished compost.

Potential Outcomes:

- Increase in community collaboration opportunities and in awareness of value of compost.

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130 http://ec.europa.eu/environment/waste/publications/pdf/compost_en.pdf
131 http://foodscrapsdropspot.ca/

Option 2.7: Community/Mid-Scale Composting

- Finished compost can be used in community gardens, local landscaping projects, etc.

Details of Option Undergoing Evaluation: This option looks at the City collaborating with various organizations and communities to encourage community composting. Volunteers will be responsible for building/purchasing a low-technology composter(s) (e.g., large backyard composter, three-bin wooden composter) and composting operations. The finished compost will be used in the community gardens or used for local landscaping needs.

It is assumed that local organizations (e.g., religious institutions, community gardens, local small businesses such as coffee shops, etc.) will allow community/mid-scale composting operations on or near their locations and that operations will be busiest in the growing season (April through October). The City's role will be to promote the onsite management of organics, to direct volunteers to community partners, or other composting facilities, for educational material and training on how to operate a composter, consider partially funding the training for volunteers (if required), and subsidize the cost of the composting unit(s). It is assumed that the finished product will be used for local needs and will not be sold for profit. Volunteers will be responsible for operating the site appropriately and monitoring that the feedstock consists of acceptable items (e.g., leaves, plant trimmings, fruit and vegetable scraps, egg shells, etc.) which will aid in the reduction of potential environmental and nuisance impacts (e.g., odour, attraction of pests, etc.).

Gap/Challenge/Opportunity: A challenge facing the City is how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

Ownership/Operation: Owned and operated by volunteers through local organizations.

Materials Collected/Diverted: Vegetative organic materials that are rich in carbon and nitrogen (e.g., leaves, plant trimmings, fruit and vegetable scraps, egg shells, etc.).

Staffing: Assumed that one additional City staff member will be needed to develop and coordinate the programs with community partners.

Consideration of Other Infrastructure/Programs: This program is unlikely to have a significant impact the City's existing Green Bin program due to the relatively low quantities of materials anticipated to be diverted.

Land Requirements: It is assumed that composters will be situated on existing land near local organizations.

Option 2.7: Community/Mid-Scale Composting		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some benefit as the end-product can be used as a fertilizer in community gardens or local landscaping needs. • Potential for minimal to no impact to land resources through contact with ground surface. It is anticipated that processing will occur in enclosed bins/containers.
	Potential impacts to local airshed	• Potential for minimal to no impacts to local airshed since organics processing operations will be small in scale and anticipated to be in enclosed bins/containers. • Potential for minimal to no additional release of emissions associated with reduced need to collect a small fraction of Green Bin organic material (vegetative materials only).
	Potential impacts to local water sources	• Potential for minimal to no impact from release of potential contaminants to water sources. It is assumed that composting operations will be protected from precipitation and be contained to withhold potential leakage of leachate.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption as small scale process would not require the addition of water.
	Total land required and land use displacement	• Potential for minimal to no impact related to land requirement since the composter unit(s) will have a small footprint and will be located on existing land near local organizations.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for minimal to no impact on energy consumption as this is a low technology operation which would not require use of electricity. • Minimal to no increase in consumption of fossil fuel used for collection vehicles as organics will continue to be collected in the Green Bin program.
	Greenhouse gas (GHG) contributions	• Potential for minimal to no additional contributions to greenhouse gas emissions provided operations are well operated and maintained especially during active composting phase to reduce potential methane production.
Public Health	Potential to impact human health	• Potential for beneficial impact on public health through impacts on social cohesion, community engagement and increased soil quality.

Option 2.7: Community/Mid-Scale Composting		
Impact/Benefit	Potential to impact ecological health	• Potential for minimal to no impact to ecological health as organic materials are expected to be processed in enclosed bins/containers.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Ability to divert some additional organic waste at locations that do not have access to the City's Green Bin program (e.g., community gardens) and minimal to no additional organic waste for locations that currently do have access to the Green Bin program.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Approvals and permits are likely not required for community/mid-scale composting operations if the compost produced is from on-site waste, such as a community garden, as opposed to centralized composting facilities.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no impact on traffic as it is anticipated that users of facilities will be located within walking distance. • Potential for minimal to no reduction in traffic associated with collection vehicles. Organics will continue to be collected through the Green Bin program.
	Potential for litter increase/reduction	• Potential for minimal to no litter increase. It is assumed that the operations will be well maintained and protected from weather conditions (e.g., wind).
	Potential odour emissions	• Potential for some increase in odour emissions. Although it is assumed that the composter will be well operated, maintained and only acceptable materials will be added to the composter and the City will not have control over this operation and will be relying on the volunteers. • Potential for some earthy odour emissions if processed compost is matured/stored on site.
	Potential noise emissions	• Potential for minimal to no noise emissions as it is assumed the operations will use low technology equipment and most participants will walk to drop off organic waste.

Option 2.7: Community/Mid-Scale Composting		
	Potential for increased vector/vermin	• Potential for some attraction of vector/vermin. Although it is assumed that the composter will be well operated, maintained, and only acceptable materials enter the system, the City will not have control over this operation and will be relying on volunteers.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for significant partnership opportunities with community organizations (e.g., religious institutions, community gardens). • Potential for some partnership opportunities with small commercial establishments. • Finished product could be used for community purposes (e.g., community gardens).
Complexity	Program complexity to user	• Potential for some complexity as participants will have to separate their organic waste and take it to a designated location (feedstock will also differ from what is accepted in the Green Bin program). • Potential for some complexity for operators of mid-scale composting operations as the level of commitment and training may vary with having many mid-scale composters instead of central, City-run facilities. • Noted that community composting operations would target certain groups and environments that are typically keen to have their own composter.
Convenience	Ease of participation	• Assumed that operations are targeted to certain groups and environments (e.g., community gardens) that are typically keen to produce their own compost and therefore anticipate significant convenience to users. • Promotion and education will be required for users of the composter to encourage effective participation.
Community Safety	Potential for impacts to community safety	• Potential for some increased impact to community safety due to the City's lack of control of what goes into the composter and how it is operated. Unacceptable materials, such as sharp objects and metals, can impose safety concerns. • Mid-scale composting operations will likely target users within walking distance therefore, no potential impact to community safety due to changes in traffic.

Option 2.7: Community/Mid-Scale Composting		
Equity	Potential for unequal impacts/benefits to specific groups	• Provides equal opportunities for specific groups that work near facilities to use or participate in the program. • Increased equality by providing opportunities to users that may not have access to the Green Bin program.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for some behavioral change if users are aware of the closed loop system of organics management and/or the financial benefit of using the finished compost in their community gardens and local landscaping needs. In addition, there will be increased awareness among the users of the composter on the amount of food waste being generated.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for some impact on net capital cost for the City to provide grants to organizations to subsidize the cost of the composters. It is assumed that organizations will select the composter and request a grant from the City. • City staff will partially fund training programs to volunteers, guide interested participants to community partners for composting guidelines, and prepare promotional materials for targeted groups. Potential for sharing of materials and resources for Option 5.1 (Onsite Composting).
	Estimated net operating cost	• Potential for some increases to net operating costs. Assumed that one FTE will be required to develop and coordinate the programs with community partners at an estimated cost of $85,000[132]. Potential for sharing of materials and resources for Option 5.1 (Onsite Composting).
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contractual risk as the process will be operated by the community volunteers.
	Potential for schedule risk	• Potential for minimal to no impact at the City level.

[132] Average salary including benefits for Research Analyst provided by Solid Waste Management Services.

Option 2.7: Community/Mid-Scale Composting		
	Potential for innovation risk	• Potential for minimal to no innovation risk as community composting operations are currently operating successfully in the City[133].
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on economic growth. Finished compost can be used in community gardens or for local landscaping.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no impact on additional local job creation. Community operations are intended to be operated by volunteers. • The City will hire one new staff member for program operation, maintenance and site inspection.
Flexibility	Ability to accommodate future changes	• Potential for minimal to no impact on flexibility as changes to organic waste composition are not expected. • Low technology and modular nature of operations could allow for capacity expansion provided within the maximum capacity limits.

[133] Examples of small scale composting operations in the City include FoodShare, The Stop Community Food Centre and at some community gardens.

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 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 U.S. 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,

Case Studies/Examples:

- City of Coquitlam, (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 three to four weeks for a unit to get full and then it is locked and cured for three to four 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 greenhouse plants; and an opportunity to teach others about composting.

Oregon).

Considerations:

- Compost created on-site can be used on-site for 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.
- 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 foundational requirements or hook-ups.
- Ongoing education on how to participate in the program will be required.
- Assurance that the quality of the compost meets Canadian Council of Ministers of Environment (CCME) 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).
- 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, or 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, if highly contaminated.

Details of Option Undergoing Evaluation: This option looks at implementing on-site organics processing technologies in multi-residential buildings to manage organic material. The City's role would be to support the onsite management of organics, provide a listing of different types of technologies available to building management, develop guidance material (including estimating the capacity a building requires) and partially subsidize the cost of the composting unit(s) through a grant. Building management will be responsible for selecting the type and size of the technology that is suitable for their building, find volunteers/staff to inspect feedstock and test the end product, procure the unit, operate and maintain the process and find uses for finished compost (e.g., landscaping, planters, given away to residents).

This option looks at implementing aerobic composting technologies at 20[134] multi-residential buildings (approximate average of 120 units per building[135]) regardless of whether the buildings receive City or private waste collection. The estimated quantity of organics being diverted from the 20 buildings is estimated to be 130[136] tonnes per year. The maximum capacity of the organics processing technologies per building is estimated to be 10 tonnes per year and it is assumed that Ministry of the Environment and Climate Change approval is not required given the small capacity (liaison with MOECC is recommended). The types of technologies range from simplistic (e.g., dual compartment tumblers) to more advanced (e.g., automated systems). It is assumed that any technology recommended will be enclosed (including curing phase) and covered to protect from precipitation and potential nuisance impacts. The acceptable feedstock will be fruit and vegetable waste, soiled paper products and wood chips. The City will continue to provide Green Bin organics collection services to collect organics that are not suitable for on-site organics processing (e.g., pet waste, diapers) from participating buildings.

[134] Sample size (number of buildings who may participate) suggested by City Staff.
[135] City of Toronto, Long Term Waste Management Strategy, Technical Memorandum No. 1– Current System Summary (August 2015).
[136] Based on City of Toronto 2010-2011 Multi-Family Waste Audit Data. Assumes that 25% of the food waste generated in participating buildings is managed through onsite organics processing technology.

The evaluation focuses on the simplistic approach (described below) however information on the advanced option is also provided but is not evaluated as it is anticipated that more buildings would choose a simplistic approach.

Simplistic – Acceptable organic waste will be placed in the first of two compartment tumbling composter units until it reaches capacity (unit capacity can range from 90 to 190 L or four to eight tonnes per year). Then the second compartment will fill while the first compartment undergoes active composting and curing. Operationally, the system requires inspection of feedstock, rotation of the tumblers and monitoring of moisture and temperature. This process does not require the use of electricity and assumes it can operate throughout the year. The estimated curing time can be between two to eight weeks[137]. The estimated cost to purchase a tumbler system is between $130 and $400 (assuming no subsidy from the City)[138].

Advanced - This system consists of a stainless steel vessel with automated controls that is placed on a concrete pad and connected to utilities. Acceptable organic waste will be placed in the vessel that has an estimated capacity of 10 tonnes per year. The process uses automation to raise the temperature to kill any pathogens and accelerate the composting process. Operationally, the system requires inspection of feedstock and monitoring of moisture and temperature. It is recommended that the compost area is fenced-in and includes an additional, covered space for compost curing. The estimated time to cure the compost is 21-30 days. The capital investment is approximately $18,000 and the annual operating costs are estimated to be $400[139.]

Gap/Challenge/Opportunity: A challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.

Ownership/Operation: Owned and operated by multi-residential building owners.

Materials Collected/Diverted: Vegetative organic waste (i.e., leaves, plant trimmings, fruit and vegetable scraps, soiled paper products, etc.).

Staffing: City resources required to promote the onsite management of organics, provide a listing of different types of technologies available to building management, develop guidance material (including estimating the capacity a building requires), and provide a grant to partially subsidize the cost of the composting unit(s).

Consideration of Other Infrastructure/Programs: Option would operate along with the City's Green Bin organics program.

Land Requirements: Units will be situated on the property of multi-residential buildings (e.g., parking space, green area).

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137 http://www.homedepot.com/p/Unbranded-Tumbling-Composter-with-Two-Chambers-for-Efficient-Batch-Composting-IM-4000/202672114.

138 Based on local retail prices. Note that costs may be lower with a City tender. The City currently provides a subsidy of $10 per backyard composter and sells to residents for $15 per backyard composter.

139 On-Site Organic Management Options Review Report (2014): http://www.metrovancouver.org/events/community-breakfasts/Presentations/MVReport-On-siteOrganicsManagementOptionsReview.pdf

Option 5.1: On-site Organics Processing		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources through contact with ground surface. It is anticipated that processing will occur in enclosed bins/containers. • Potential for some benefit from end-product. Finished compost that meets compost standards will be used for local landscaping needs.
	Potential impacts to local airshed	• Potential for minimal to no impact to local airshed since operations may generate odours during active composting and maturation phases. However, units will be small in scale and anticipated to be in enclosed units. • Potential for minimal reduction of emissions associated with reduced need to collect.
	Potential impacts to local water sources	• Potential for minimal to no impact from release of potential contaminants to water sources. It is assumed that composting operations will be protected from precipitation and be contained to withhold potential leakage of leachate.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption as small scale processes would not require addition of water, except for minor routine cleaning.
	Total land required and land use displacement	• Potential for minimal to no impact related to land requirement since operations can be placed in a common area inside or outside of a multi-residential building. Composter unit(s) will require a relatively small amount of space.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption Greenhouse gas (GHG) contributions	• Potential for minimal to no impact on energy consumption as the proposed system requires rotation of the containers, which will be done manually. Minimal energy may be required to maintain the temperature of the compost. • Potential for minimal to no contributions to greenhouse gas emissions provided operations are well operated and maintained especially during active composting phase. • Potential for minimal to no reduction in greenhouse gases given that collection vehicles will still be required to collect Green Bin organics not accepted in the on-site organics processing unit.

Option 5.1: On-site Organics Processing		
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased soil quality due to increase in available and applied compost.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health as organic materials are expected to be processed in enclosed units.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Ability to divert minimal to no additional organic waste. Diversion rates are anticipated to be higher for locations that do not currently have access to the City's Green Bin organics program. In locations that have the City's Green Bin organics program, residents may find it more convenient to place organics in the Green Bin rather than further separating it for on-site composting. • Ability to recover minimal to no additional reusable material with the production of compost.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Approvals and permits are not required for community composting operations such as ones located at multi-residential buildings that are managing organics generated on-site. • The City will need to establish guidelines for on-site operations and conduct site visits to verify that facilities are operating accordingly.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no impact on traffic as it is anticipated that users of facilities will be located on-site and collection vehicles will still be required for Green Bin organics collection.
	Potential for litter increase/reduction	• Potential for minimal to no litter impact since the process will be enclosed.

Option 5.1: On-site Organics Processing		
	Potential odour emissions	• Potential for some increase in odour emissions. Although it is assumed that the unit will be well operated, maintained and only acceptable materials enter the system, the City will not have control over its operations and will be relying on volunteers and/or building staff. • Potential for some earthy odour emissions since the processed compost is matured on-site.
	Potential noise emissions	• Potential for minimal to no noise emissions as low-technology will be used and participants live on-site.
	Potential for increased vector/vermin	• Potential for some attraction of vector/vermin. Although it is assumed that the unit(s) will be well operated, maintained and only acceptable materials enter the system, the City will not have control over its operations and will be relying on volunteers and/or building staff.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some opportunity to collaborate with multi-residential building owners, staff and residents. • Finished product could be used for building landscaping, given to residents or donated to/used for community purposes (e.g., community gardens).
Complexity	Program complexity to user	• Potential for some complexity as participants will have to separate their organic waste (as some locations currently may not have City's Green Bin organics program) and those that have access to the Green Bin organics program will have to separate organic waste into two streams (acceptable in on-site composter and acceptable in Green Bin). • Potential for some complexity for operators of facilities as some level of commitment and training will be required.
Convenience	Ease of participation	• Potential for some inconvenience to users but for those willing to participate, option provides an opportunity manage organic waste in the user's own backyard. • Option requires user to source separate their waste and bring it to central location area (the inconvenience is a barrier to existing diversion programs in the multi-residential sector). • Potential for some inconvenience since the responsibility of operations are on volunteers. • Promotion and education will be required to achieve effective participation.

Option 5.1: On-site Organics Processing		
Community Safety	Potential for impacts to community safety	• Potential for some impact to community safety due to lack of control of what goes into the composter. Unacceptable material, such as sharp objects and metals, can impose safety concerns. • Units will be located within walking distance in of multi-residential buildings therefore, no potential impact to community safety due to changes in traffic.
Equity	Potential for unequal impacts/benefits to specific groups	• Provides increased equality compared to the current situation as the option allows the multi-residential buildings who currently do not have a Green Bin program to participate in some organics diversion.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no behavioral change resulting in sustainable waste reduction choices in participating buildings. There may be increased awareness among the users of the composter on the amount of food waste being generated resulting in behavioural change to reduce waste. • Making users aware of the closed loop system of organics management and/or the use of finished compost at their building may help to encourage behavior change.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for some impact on net capital cost for purchasing the composter and equipment. Capital cost for a dual-compartment tumbling composter ranges from $130 to $400[140] (depending on capacity). It would cost $2,600 to $8,000 to purchase the composters for 20 buildings (assuming no City subsidy). If the City provides a subsidy equivalent to backyard composters[141] (i.e. 40% of cost), the capital cost to the City could be in the range of $1,000 to $3,200. • Operational equipment will also be required (e.g., thermometer, shovel) which is estimated to cost between $50 and $100 per building. • The cost to the City involves developing requirements for on-site composting operations, and training the volunteers. The City may choose to subsidize the composters.

[140] Based on retail prices. Note that costs may be lower with a City tender.
[141] Based on current subsidy that Solid Waste Management Services covers for backyard composters ($10/unit) which works out to 40% of the cost of a unit. Assume a similar subsidy.

Option 5.1: On-site Organics Processing		
	Estimated net operating cost	• City staff will visit each operation twice per year to inspect. Additional visits may be required if building management contacts the City for further assistance or if a complaint is filed.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contractual risk as the process will be operated by volunteers.
	Potential for schedule risk	• Potential for minimal to no schedule risk since the process is easy to implement.
	Potential for innovation risk	• Potential for minimal to no innovation risk as composting is a proven method to manage organic waste and is used at different scales (e.g., backyard composter, vermi-composters, mid to large scale facilities).
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on economic growth. Finished compost can be donated to/used in community gardens or for local landscaping needs.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth.
Local Job Creation	Potential for additional local job creation	• Potential for minimal to no impact on additional local job creation. On-site processing operations are intended to be operated by the residents and volunteers. • The City may hire additional staff (2-3 people) to inspect the operations.
Flexibility	Ability to accommodate future changes	• The characteristics of organic waste are not expected to change significantly. Option can be designed to manage slight fluctuations in quantity but will remain specific to certain feedstock.

Option 5.2: In-Sink Disposal Units

Review the application 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 organics program, particularly for multi-residential buildings. This would include an amendment to 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 that will discharge directly or indirectly into a storm or combined sewer (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[145,146]. 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 water and wastewater systems.

Case Studies/Examples:

- Vancouver, BC: Ongoing debates within Metro Vancouver where there is a large population of residents living in multi-residential buildings[142]. 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, NY: 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[143].
- Chartered Institution of Water and Environmental Management (CIWEM) UK[144]. A Policy Position Statement on the use of food waste disposers was issued in February 2011. CIWEM concluded that the evidence demonstrates that food

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

Option 5.2: In-Sink Disposal Units

	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:

- Reduced collection and storage requirements since a portion of Green Bin organics would be diverted through the in-sink disposal 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.
- Determine if Green Bin organics should still be collected from 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 if biosolids generated from wastewater treatment plants are beneficially used.
- Increased quantity of organic material to be handled at the City's wastewater treatment plant.

Details of Option Undergoing Evaluation: This option reviews the potential for waste diversion of some organic materials through purchasing and installing in-sink disposal units in multi-residential units as a means for residents to manage food waste instead of participating in the Green Bin program. The disposal unit breaks down the food waste where it is transported through the sewer system to the City's Wastewater Treatment Plants (WWTPs). The organic waste is chemically treated at the WWTPs, biosolids are generated and beneficially reused or landfilled (quantity landfilled depends on available capacity at facilities for beneficial use) with some being hauled over 100 km away for the end-use.

There are approximately 622,000[147] multi-residential units in Toronto. Multi-residential buildings are connected to either a sanitary and storm sewer or a combined sewer. Toronto's Municipal Code, Chapter 681, Sewers, Section 10 E prohibits the use of any garbage grinding devices for domestic purposes in areas of the City that would directly or indirectly discharge into a storm or combined sewer. Chapter 681, Sewers, Section 2 (4) of the Toronto Municipal Code sets water quality limits for sanitary and combined sewer discharge which is enforced for multi-residential buildings on a complaint basis.

[147] City of Toronto, Long Term Waste Management Strategy, Technical Memorandum No. 1 – Current System Summary (August 2015).

Option 5.2: In-Sink Disposal Units

For the evaluation of this option, it is assumed that in-sink disposal units are installed, for the purposes of a pilot program, in 10,000 multi-residential building units (representing approximately 25 of the City's buildings[148]) and the implementation and impacts are studied throughout the pilot program. The buildings selected will be connected to sanitary sewers and the impact on the City's WWTPs can be monitored by the anticipated increase in organics loading and biosolids production once the in-sink disposal units have been installed. The estimated quantity of organics ground and entering the sewer system from the 10,000 units is estimated to be 530[149] tonnes per year. Pending the outcome of the pilot, a future consideration can be to roll out the installation of in-sink disposal units to additional multi-residential buildings (not included in this evaluation). The property manager and/or developer will assume the cost to purchase and install the in-sink disposal units which ranges between $235 and $500[150] per unit. The current Green Bin program will operate as-is to collect materials not suitable for in-sink disposal units, however the City will liaise with participating buildings and Toronto Water, monitor source-separated organics waste quantities/volumes collected by the Green Bin program and coordinate the completion of waste audits on the Green Bin and residual waste streams before and after installation of the in-sink disposal units. No changes to the WWTPs (assumed to be operating in accordance with regulatory approvals and permits) and biosolids management practices are proposed and it is assumed that biosolids are hauled over 100 km from the City for beneficial use (e.g. land application). Alternative opportunities for beneficial use options for biosolids will need to be researched and established which are anticipated to have higher management costs than those currently in place[151]. Training and education materials for multi-residential building stakeholders will be developed by the City and delivered by building management.

Gap/Challenge/Opportunity: A challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.

Ownership/Operation: Property manager/developer to purchase and coordinate installation of the in-sink disposal units and building management to provide the necessary education and training to residents.

Materials Collected/Diverted: Food waste (e.g., fruit and vegetable waste).

Staffing: City staff to develop education materials for building management and assessing ongoing impact to Green Bin program and WWTPs.

Consideration of Other Infrastructure/Programs: Impact of increased organics on the Waste Water Treatment Plants (WWTPs) and reduction in Green Bin organics collected in participating buildings.

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[148] Assuming participating buildings have an estimated 400 units per building.
[149] Based on City of Toronto 2010-2011 Multi-Family Waste Audit Data. Assumes that 25% of the food waste generated in participating buildings is managed through in-sink disposal units and sent to WWTPs.
[150] Based on local retail prices. Note that costs may be lower with a City tender.
[151] Based on discussion with Toronto Water staff in November 2015.

Option 5.2: In-Sink Disposal Units

Land Requirements: No additional land required to implement the option.

Option 5.2: In-Sink Disposal Units		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some benefit with the beneficial use of biosolids (e.g., use as fertilizer or soil amendment).
	Potential impacts to local airshed	• Potential for minimal to no impact to local airshed through increased organics being managed at WWTPs. • Potential for some increase in emissions to atmosphere with additional vehicles hauling biosolids from WWTPs for beneficial use.
	Potential impacts to local water sources	• Potential for minimal to no impact from release of potential contaminants to local water sources aside from wet weather overflow events.
	Potential water consumption requirements	• Potential for significant increase in water consumption as more water will be required to flush the organic waste from in-sink disposal units through building and municipal pipes to WWTPs. • Additional increase in water consumption requirements to clean and/or unclog pipes in the event of excess accumulation of fats, oils and grease in the pipes.
	Total land required and land use displacement	• Potential for minimal to no impact on land required.

Option 5.2: In-Sink Disposal Units		
Criteria	**Indicators**	**Assessment**
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for some increase in energy consumption with the increased quantity of organic waste being sent to WWTPs and transportation of additional biosolids from WWTPs. • Potential for some additional energy requirements within multi-residential buildings to power the in-sink disposal units. • Potential for minimal reduction in Green Bin collection frequency with only food scraps component being managed in in-sink disposal units. City will continue to provide Green Bin organics collection services for organics that cannot be placed in the unit (e.g. diapers, bones, sanitary products).
	Greenhouse gas (GHG) contributions	• Potential for an increase in fuel consumption for vehicles hauling biosolids longer distances compared to sending organic waste to City Organic Processing Facilities. • Potential for some reduction in the greenhouse gas emissions as the use of methane to produce electricity at the WWTPs will divert methane generating material from landfill.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through reduction in odour. Potential for small positive impact on health through increased soil quality due to increase in available and applied biosolids
	Potential to impact ecological health	• Potential for impacts to ecological health with increased organics in sanitary sewers aside from wet weather overflow.

Option 5.2: In-Sink Disposal Units		
Criteria	**Indicators**	**Assessment**
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Ability to divert minimal to no additional food waste (<1%) from participating buildings. • Tracking the quantity of food waste managed by WWTPs will be challenging and waste audits are suggested prior to and after installation of in-sink disposal units. • Option may decrease recovery of other materials accepted in the Green Bin program (e.g., animal bones, diapers, soiled paper products) as users may not want to source separate this smaller waste stream.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for minimal to no complexity associated with approvals and permitting requirements. Additional studies will be required to confirm buildings connected to sanitary sewer system.
Potential for Land Use Conflicts /Community Interruption	Potential for traffic increase/reduction	• Potential for some increase in traffic due to transportation of biosolids from the WWTPs in addition to Green Bin collection. • Potential for minimal to no increase in Green Bin collection frequency since Green Bin collection will still be offered to participating buildings.
	Potential for litter increase/reduction	• Potential for minimal to no reduction in litter as less material will travel from individual units to central collection points.
	Potential odour emissions	• Potential for some reduction in odour emissions as organic waste is flushed down the drain instead of being temporarily stored in units and at central collection points.
	Potential noise emissions	• Potential for minimal to no additional noise emissions with additional vehicles hauling biosolids for beneficial use.

Option 5.2: In-Sink Disposal Units		
Criteria	**Indicators**	**Assessment**
	Potential for increased vector/vermin	• Potential for some decrease in vector/vermin activity since organic waste will be flushed down the drain immediately and will not need temporary storage in units or central collection points.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership with other municipalities or organizations. Collaboration with Toronto Water will be required.
Complexity	Program complexity to user	• In-sink disposal units are easy to use however there may be complexity associated with continuing participation in Green Bin program for materials not suitable for in-sink disposal units.
Convenience	Ease of participation	• In-sink disposal units are convenient to use as organic waste is managed right away and doesn't require temporary storage. • Potential for some inconvenience associated with blockage/clogging in parts of the City with older, small diameter piping.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact to community safety. Residents will require training and education on how to safely use the in-sink disposal unit.
Equity	Potential for unequal impacts/benefits to specific groups	• Option is available to buildings selected to participate in the program but not initially to all multi-residential buildings or to single-family households.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no behavioral change as resident may not realize the use of in-sink disposal units as a means of recycling organic waste and does not see the accumulation of food waste generated at the household level.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for minimal to no capital cost as it is assumed the capital costs will be borne by the property manager and/or developer of participating buildings.

Option 5.2: In-Sink Disposal Units		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• Potential for some impact on net operating cost. The additional organics load from food waste (estimated to be 530 tonnes per year) will have to be processed at the WWTPs and the biosolids hauled for beneficial use. The average price of managing biosolids is $116/wet tonne and the current highest price is $157/wet tonne[152] which brings the annual cost to manage biosolids from $60,000 to $85,000. • Additional annual operating costs are anticipated for cleaning out fats, oils and grease from the wastewater treatment systems[153]. • Tracking of building-specific Green Bin data by City staff estimated to take 75 hours per year[154]. • Some staff time required to coordinate waste audits on the Green Bin organics and residual waste streams to be completed by private sector at select participating buildings before and after in-sink disposal units are installed[155].
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal risk as property manager/developer to coordinate installation of in-sink disposal units with third party companies.
	Schedule risk	• Potential for some schedule risk. Coordination with multi-residential buildings is required for installation of in-sink disposal units. However, residents will still have access to the Green Bin program.
	Innovation risk	• Potential for some innovation risk as the use of in-sink disposal units are banned in many jurisdictions and the City's infrastructure is aging.

[152] Biosolids management costs provided by Toronto Water.
[153] CBC article: *Garburators cost Metro Vancouver $2M a year in clogged up sewers (*June 26, 2015). *http://www.cbc.ca/news/canada/british-columbia/garburators-cost-metro-vancouver-2m-a-year-in-clogged-up-sewers-1.3128519.*
[154] Assuming it takes a Research Analyst 2 75 hours to monitor building data on Green Bin program once before and twice after in-sink disposal units are installed.
[155] Estimated industry cost per waste audit of $5,000 to be completed by the private sector.

Option 5.2: In-Sink Disposal Units		
Criteria	**Indicators**	**Assessment**
Economic Growth	Potential for local economic growth	• Potential for some short term impact on economic growth with provision and installation of in-sink disposal units.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth. The sale of biosolids may benefit users outside of the City.
Local Job Creation	Potential for additional local job creation	• Potential for some additional short-term local job creation associated with installation requirements of the in-sink disposal units.
Flexibility	Ability to accommodate future changes	• Option allows for management of food scraps only and will not be impacted by other changes to waste composition.

Waste Collection Methods

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. A waste tracking technology, such as radio frequency identification (RFID), could be used with existing and new bins to provide data and statistics for each multi-residential building (e.g. weight of materials collected could be used to calculate diversion rates and potentially optimize collection frequency thereby reducing the number of collection trips in a given week). The City could require that the technology be used at properties that receive collection either through the City (through municipal or private collection forces) or investigate this as a future requirement for all multi-residential buildings in the City.

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.
- All City issued curbside bins for garbage and Blue Bin materials have RFID installed.
- In 2015, the City awarded a 10-year contract (to begin July 1, 2016) to a private sector company for the collection of waste from all City-serviced multi-residential buildings on front-end collection (approximately 2,750[156] buildings). The contract includes the provision of RFID tags on bins for the three major waste streams (Green Bin organics, Blue Bin materials, residual waste).

Municipal/Waste Industry Experience:

- RFID chips are gaining popularity as a method for tracking waste performance and improving waste collection services in the

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

[156] Information obtained from City of Toronto staff in March 2015.

Option 3.1: Container Management

residential and Industrial, Commercial &Institutional 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.	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: Using new technology to create hotspots by installing Wi-Fi units inside the public waste containers in order to improve Wi-Fi access through the city.

Considerations:

- Can provide building-specific data on waste management performance and increase accessibility for on-demand billing information.
- Allows for the capability to monitor waste material generation. As a result, the City may be able to geographically target education campaigns.
- With building owner's permission may be able to provide 3Rs Ambassadors with access to 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.
- Will need to monitor utility rates as they may be impacted by decreased waste set out.
- Procurement of technology will need to be completed together with corporate information and technology.
- Staff time required to input into a database the collection container, scheduling and routing information.
- Training waste collection drivers on how to use the system where required.

Potential Outcomes:

- On demand building-specific data on waste management statistics (e.g., quantities collected, building specific performance rates).
- Real-time optimized collection routes that collect from only containers that are full.

Details of Option Undergoing Evaluation: The option looks to utilize a tracking system for all City multi-residential building customers (approximately 2,750 buildings[1]) using front-end containers to acquire waste performance data on a per multi-residential building basis and allow for more efficient container management. The system consists of a RFID tag that supports the City's billing and customer service tracking (e.g., when containers were collected, taking photos if there were obstructions to collection) and transfers the data to the City's system for billing purposes. The installation and maintenance of the RFID tags on the front-end containers is the responsibility of the contractor and will take effect in July 2016.

This option looks to use the data acquired on the RFID tag to obtain multi-residential building-specific data on waste performance metrics such as waste generation rates, weight/volumes of wastes collected (waste densities may be required to estimate weights), number of containers collected (including estimated fullness of bins) and waste diversion rates. This building-specific data can be used by the City for targeted waste diversion goals, to assist building management and/or 3Rs Ambassadors in their communication and program efforts, and to compare performance amongst similar size buildings. The data related to the estimated fullness of bins could be used to help educate building management and superintendents on setting out bins only when full which could potentially reduce the number of containers required and/or the frequency of the collection service. It is assumed that this data is consolidated in a report card provided to each multi-residential building twice a year to coincide with the City's billing cycle.

When the front-end collection contract nears expiration (before 2026), the City could assess and consider the use of the technology for collection route optimization (excluded from this evaluation). Sensors installed on the waste containers can estimate the fullness of containers prior to collection and building staff (e.g., superintendent) would then set out full or nearly full bins for collection. A custom and optimized route can be generated each day that plans a route based on the number of full bins set out for collection. This has the potential to reduce the number of containers per multi-residential building and/or decrease the collection frequency. The City could also determine if the future use of this technology would be appropriate for multi-residential buildings in the City not currently serviced by the City, which could be enforced through municipal by-laws (excluded from this evaluation).

Gap/Challenge/Opportunity: This option addresses a number of gaps, challenges and/or opportunities including:

- Having a more robust group of performance metrics that will more accurately measure waste management system performance and account for changing waste streams, composition, community demographics, etc.
- The need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled.
- The system is heavily dependent on energy, in particular for the collection of waste, and energy costs are expected to continue to increase in the future.

Ownership/Operation: Under the current contract the collection contractor owns, installs and maintains the of RFID tags. The City is responsible for acquiring, analyzing, and distributing data.

Materials Collected/Diverted: Green Bin organics, Blue Bin recyclables and residual waste.

Staffing: Additional staffing will be required for business requirements definition, development of reports, distribution of data etc.

Option 3.1: Container Management

Consideration of Other Infrastructure/Programs: This option presents an opportunity to develop performance measures for multi-residential building waste diversion and provides information to help property managers, building staff and/or 3Rs Ambassadors to deliver building-specific promotion and education to building tenants.

Land Requirements: No additional land required.

Option 3.1: Container Management		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources. Waste will continue to be temporarily stored in containers.
	Potential impacts to local airshed	• Potential for minimal to no additional release of emissions to the atmosphere as the option will gather data electronically.
	Potential impacts to local water sources	• Potential for minimal to no release of potential contaminants to water as the waste will continue to be placed in containers.
	Potential water consumption requirements	• Potential for minimal to no requirements for additional water consumption. Option does not require the use of water consumption.
	Total land required and land use displacement	• Potential for minimal to no additional land requirements with increased knowledge of setting bins out when full.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for minimal to no additional energy consumption as the waste collection frequency will remain similar to the current scenario.
	Greenhouse gas (GHG) contributions	• Potential for minimal to no additional impact to greenhouse gases. There is a potential to divert more organic waste and recycling from residual waste collection through enhanced building-specific data and increased awareness of staff and residents.

Option 3.1: Container Management		
Criteria	**Indicators**	**Assessment**
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through some employment opportunities.
	Potential to impact ecological health	• Potential for minimal to no off-site release of potential contaminates as all waste will be enclosed in containers prior to collection.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Option provides some opportunity to divert additional recyclable materials by targeted education to building management and tenants on waste management performance. The use of the technology will enable the City to estimate diversion rates by building.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Option does not require additional approvals or permits.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Option under evaluation has potential for minimal to no net increase in traffic.
	Potential for litter increase/reduction	• Potential for minimal to no net increase in litter generation as the method for users to manage waste will not change.
	Potential odour emissions	• Potential for minimal to no net increase in odour emissions as option is not anticipated to change the generation of waste set out for collection.
	Potential noise emissions	• Potential for minimal to no net increase in noise emissions as significant changes to waste collection frequency are not anticipated at this stage.
	Potential for increased vector/vermin	• Potential for minimum to no increase in attraction of vector/vermin as waste will continue to be stored in containers until collection.
Collaboration	Ability to partner with other municipalities/ organizations	• Option will require City to collaborate with the private sector contractor and their technology provider to obtain necessary building-specific data.

Option 3.1: Container Management		
Criteria	**Indicators**	**Assessment**
Complexity	Program complexity to user	• N/A
Convenience	Ease of participation	• N/A
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact to community safety as option will not significantly change the number of times collection vehicles access buildings.
Equity	Potential for unequal impacts/benefits to specific groups	• Option will be rolled out to all City-collected, front-end multi-residential buildings.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for some behavior change since targeted education can be developed through acquisition of building-specific data (e.g., waste generation rates). • Data could be compared between similarly sized buildings and used to develop targeted educational materials and inform and/or challenge tenants using tools like community-based social marketing. Performance metrics could be developed and measured with the implementation of this tool.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for minimal to no impact on net capital cost since technology will be installed by the contractor.
	Estimated net operating cost	• Potential for some impact on the net operating cost. It is estimated that one FTE will be required for the first year to develop business requirements at a cost of $65,500 and three FTE[157] will be required to develop bi-annual reports and distribute building-specific data for each of the 2,750 buildings at an additional annual cost of $175,000[158]. • No other annual cost is anticipated as maintenance costs of the tracking system are the responsibility of the contractor.

[157] Based on 2,750 buildings receiving two report cards per year and assuming it takes one hour to generate and distribute reports per building.
[158] Based on 2015 Toronto SWMS employee salary schedule for a Research Analyst 2.

Option 3.1: Container Management		
Criteria	**Indicators**	**Assessment**
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contractual risk as City has included provision of similar technology in current contracts.
	Potential for schedule risk	• Potential for minimal to no schedule risk as City staff will be responsible for generating bi-annual report cards with no reliance on third parties.
	Potential for innovation risk	• Potential for minimal to no innovation risk as the use of RFID has been in place for several years.
Economic Growth	Potential for local economic growth	• Potential for minimal to no local economic growth as 10-year collection contract is in place with private sector.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional/ global economic growth.
Local Job Creation	Potential for additional local job creation	• Potential for some local job creation for reporting on building performance.
Flexibility	Ability to accommodate future changes	• Option is very flexible to accommodate some changes in the Green Bin, Blue Bin and residual waste collection programs.

Option 3.2a: Alternative Collection Methods for Multi-Residential Buildings - One Container System

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. An example is allowing residents to place source separated waste (e.g., Green Bin organics, Blue Bin materials, residual waste) into one collection location (e.g., bin, chute) using different coloured bags. Residents would not be required to take the three different streams of waste to potentially three different locations or containers thereby creating increased convenience. Sorting of waste is done optically at a facility according to the colour of the bag and the sorted waste is hauled to the appropriate disposal or processing facility.

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, oversized 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:

- The coloured bag system is used in a number of 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.

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.

Option 3.2a: Alternative Collection Methods for Multi-Residential Buildings - One Container System

Considerations:

- Potential for some reduction in collection costs and traffic with fewer vehicles collecting from buildings since all streams are combined.
- Greater convenience to users as all waste can go into bags and be dropped off in one location. This can lead to increased participation in waste diversion programs.
- Still potential for residents to contaminate the waste streams within the bags.
- 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 (i.e., Blue Bin materials, Green Bin organics, garbage).
- Material Recovery Facility (MRF) will require a bag breaker to open the bags before being processed.
- Initial distribution or provision/sale of acceptable coloured bags to residents and potential future additional costs 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.
- Installation of optical sorting equipment at receiving processing plant to sort out different colours of bags.

Potential Outcomes:

- Sorted material streams.
- Increased convenience for users of the system.
- Additional space available for non-waste related purposes at multi-residential buildings with reduced collection points.

Details of Option Undergoing Evaluation: The option involves source separation of waste by tenants in multi-residential buildings into different coloured bags for the different waste streams (e.g., green bag for Green Bin organics, blue bag for Blue Bin materials, black bag for garbage, etc.). The bags will be placed by residents down a single chute or in waste containers located in a common area; thus no additional infrastructure or retrofitting is required at each building. Once collected, the waste will be taken to facilities where the bags will be optically sorted into the different waste streams and then hauled to the appropriate processing or disposal facilities. It is assumed that two facilities will need to be built (both located within the City and assumed to be located in two ends of the City to minimize transportation distances) to each have an annual capacity of 120,000 tonnes per year (240,000 tonnes per year total[159]), environmental approvals and building permits would need to be obtained and the facilities will be operated to mitigate potential nuisance impacts such as dust, odour and

[159] Total estimated quantity of residual waste, Blue Bin materials and Green Bin organics collected from multi-residential buildings in 2014. City of Toronto, Long Term Waste Management Strategy, Technical Memorandum No. 1 – Current System Summary (August 2015).

litter. Dual-compartment or multiple collection vehicles will not be required since all waste will be captured within one vehicle thus potentially reducing the number of vehicles collecting from multi-residential buildings. This system would be implemented in all the 4,500[160] buildings currently serviced by the City.

The City's role will be to develop and provide education and promotional materials about the new collection program, make changes to the collection fleet and future contracts, conduct waste composition studies to identify buildings which may require additional education or enforcement and haul sorted waste to the appropriate processing or disposal facilities. The private sector will be responsible for developing, constructing, operating and maintaining the new sorting facilities. Building management will be responsible for promoting and distributing educational materials to the tenants. The City may choose to provide a set of bags to residents to kick off the program; however, residents will be responsible for purchasing coloured bags over the long term. The costs for land acquisition are not included and the area estimates are for the building only and not additional site features.

Gap/Challenge/Opportunity: A challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled. Another challenge facing the City is the impacts of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.

Ownership/Operation: Owned and operated by the City. Other arrangements are possible.

Materials Collected/Diverted: Residual waste, Green Bin organics, Blue Bin materials.

Staffing: City staffing will be required for developing promotion and educational materials and enforcing the new sorting program. Private sector staffing will be required for new waste sorting facilities.

Consideration of Other Infrastructure/Programs: Significant consultation will be required with multi-residential building stakeholders on new collection program (e.g., use of coloured bags). Collection contracts, collection fleet and waste containers will need to be modified or changed to accommodate new program. Waste composition pilots may need to be conducted to determine effectiveness of material diversion (i.e., residents properly sorting recyclable and organic waste from garbage).

Land Requirements: Additional land required to develop a sorting facility estimated at approximately 0.15 hectares[161], therefore potentially 0.3 hectares required for two facilities.

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[160] City of Toronto, Long Term Waste Management Strategy, Technical Memorandum No. 1 – Current System Summary (August 2015).
[161] Estimated area requirement provided from private sector company in December 2015.

Option 3.2a: Alternative Collection Methods for Multi-Residential Buildings-One Container System		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact to land resources for one container system as waste will be in bags and temporarily stored in bins.
	Potential impacts to local airshed	• Potential benefit from fewer emissions from collection vehicles since one vehicle can collect all three streams although collection frequency may be increased with reduced compaction and all streams in one container. • Will require vehicles to haul sorted materials (three streams) from sorting facilities to processing and disposal facilities. However, additional materials are anticipated to be diverted to local processing facilities instead of being hauled to landfill. • Potential for temporary increase in dust generation during construction of processing facilities. • Potential for some release of emissions to atmosphere with the addition of two new processing facilities. However, emissions are assumed to be mitigated through standard operating procedures.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. No change to how waste is temporarily stored or collected.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements.
	Total land required and land use displacement	• Potential reduction in land displaced at multi-residential buildings since there will not be multiple containers required for the different waste streams. • Additional land would be required to receive, sort and temporarily store the different material streams prior to being shipped for processing/disposal. It is estimated that approximately 0.15 ha of land3 would be required to accommodate a building with a capacity of 120,000 tonnes per year facility. Therefore, 0.3 ha of land would be required for both facilities.

Option 3.2a: Alternative Collection Methods for Multi-Residential Buildings-One Container System		
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for some decrease in fossil fuel consumption with reduced number of collection vehicles transporting waste from multi-residential buildings to sorting facilities. • Potential for some increase in energy consumption associated with sorting facilities. • Potential for minimal to no additional fuel requirements to haul sorted waste from sorting facilities to processing or disposal facilities as the majority of waste received at City transfer stations would also have to be hauled to processing or disposal facilities.
	Greenhouse gas (GHG) contributions	• Potential for some reduction in GHG contributions as option reduces the number of collection vehicles required and potentially increases diversion of waste from disposal.
Public Health Impact/Benefit	Potential to impact human health	• Potential for beneficial impact on public health through potential to increase diversion from landfill, reduction in odour, vermin, litter, greenhouse gas emissions, some employment opportunities and increased access to municipal services (solid waste management).
	Potential to impact ecological health	• Potential for minimal to no impact on ecological health.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Provides some potential to divert additional Blue Bin materials and Green Bin organics since all materials are managed in the same manner which could increase convenience and therefore participation in waste diversion programs. Option still relies on user source separating the waste. • Generation of plastic bags will increase with allowance of recyclables to be placed in bags.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for minimal to no approvals complexity given that the private sector will be responsible for securing the necessary approvals and permits. Some liaison with City staff will be required.

Option 3.2a: Alternative Collection Methods for Multi-Residential Buildings-One Container System		
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some reduction in traffic as a result of fewer collection vehicles on City streets since one collection vehicle can collect all three waste streams. However, potential for increased collection frequency to service buildings since containers may fill faster. • Potential for some increase in traffic associated with hauling sorted waste from sorting facility to processing or disposal facilities. • Collection vehicles would still be required to collect other waste streams (e.g., oversized items, household hazardous waste, electronic waste).
	Potential for litter increase/reduction	• Potential for a reduction in litter generation since all waste (including Blue Bin materials) would be collected in bags.
	Potential odour emissions	• Potential for some reduction in odour emissions at collection points in multi-residential buildings since all waste would be collected in bags. • Potential for increased odour emissions at sorting facility which is assumed to be mitigated by standard operating procedures.
	Potential noise emissions	• Potential for some reduction in noise emissions associated with collection of waste at multi-residential buildings with fewer collection vehicles requiring access to the buildings to collect different waste streams. • Potential for some increase in noise associated with new sorting facility.
	Potential for increased vector/vermin	• Potential for some reduction in attraction of vector/vermin since all waste would be collected in bags.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities as option caters to multi-residential buildings within Toronto.
Complexity	Program complexity to user	• Potential for significant complexity associated with the user being responsible for purchasing the appropriate bags and source separating the waste. Significant initial and ongoing building management, staff and residential education required. • Option reduces complexity about where to place bags of different waste streams since all bags can be placed in a single chute or a single container.

Option 3.2a: Alternative Collection Methods for Multi-Residential Buildings-One Container System		
Convenience	Ease of participation	• Option requires significant additional effort for user to participate with purchasing and source separating coloured bags for each of the three major waste streams over the long term. • Greater convenience associated with placing the three major waste streams in a single chute or bin.
Community Safety	Potential for impacts to community safety	• Potential minimal to no change to community safety as number of collection vehicles may not change.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact on any specific group since access to common chutes or bins is available to all occupants of multi-residential buildings. • Option requires all users to purchase coloured bags which could have unequal impacts to residents with lower incomes.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no behavioural change as option does not change how waste is collected (i.e., same waste streams source separated) and requires the use of bags to participate in the programs.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• No capital costs for City as private sector responsible for sorting facility.
	Estimated net operating cost	• City staff time for liaising with private sector in the planning and approvals of facilities. • City staff time required for developing educational materials. Potential reduction in collection costs as option reduces the need for separate compartments/vehicles to collect separate waste streams from multi-residential buildings and the need for different types of waste containers. However, collection frequency may have to be increased to accommodate faster filling of containers. • Estimated cost to residents purchase 300 coloured bags per year (100 bags per waste stream) is approximately $65[162]. City may choose to provide a limited number of bags upon rollout; however, residents will be responsible for purchasing bags over the long term.

[162] Based on local retail prices for garbage kitchen catchers, large blue recycling bags and small kitchen catcher bin liners.

Option 3.2a: Alternative Collection Methods for Multi-Residential Buildings-One Container System		
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contractual risk as City will be relying on third party contractor to design, construct and commission facilities before program is launched to multi-residential buildings. City responsibility will only involve collecting waste.
	Potential for schedule risk	• Potential for minimal to no schedule risk to associated with private sector completing sorting facilities prior to promotion and education program roll-out and launch date.
	Potential for innovation risk	• Potential for minimal to no innovation risk associated with the option since technology (optical sorting) is proven elsewhere.
Economic Growth	Potential for local economic growth	• Potential for some local economic growth associated with construction and operation of the waste sorting facility.
	Potential for regional/global economic growth	• Potential for some regional/global economic growth. Contractors outside of the City may be retained for construction, maintenance and facility services and technology may come from global service provider.
Local Job Creation	Potential for additional local job creation	• Potential for significant impact on creating temporary local jobs as a result of construction activities. • Potential for some impact on creating local long-term jobs with operations and maintenance.
Flexibility	Ability to accommodate future changes	• Option provides some opportunity to accommodate future changes in waste given that systems focus on the way waste is collected and not on what is collected. The number of material streams may be limited with the infrastructure and facility.

Option 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System

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. An example includes placing waste in an inlet that is connected to an underground piping system 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 Bin materials and Green Bin organics 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, oversize 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:

- 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 3.2b: Alternative Collection Methods for Multi-residential Buildings - Vacuum System

Considerations:

- Reduced collection costs and traffic with fewer vehicles collecting from buildings since fewer number of collection points.
- Savings in on-site operating and maintenance costs and space at buildings since there is no requirement to collect, store and set out containers for collection.
- Still potential for residents to contaminate the waste streams.
- High installation costs and disruption due to construction.
- System installation needs to be considered and sequenced with other utility installations.
- 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 into three streams which has been an ongoing challenge for multi-residential buildings.
- 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).

Potential Outcomes:

- Additional space available for non-waste related purposes at multi-residential buildings since fewer collection points.
- Increased convenience for users of the system.

Details of Option Undergoing Evaluation: This option considers the installation of underground vacuum waste collection systems in future multi-residential buildings to collect the three major waste streams (residual waste, Green Bin organics and Blue Bin materials). Residents will source separate their waste into three streams using bags and place each stream in the appropriate inlet (i.e., three separate inlets in total). It is assumed that each building has one central location that contains three inlets. Inlets will be connected to three waste valves (located below grade) and when sensor detects the valve is full, the system will vacuum the waste to the central terminal (located in proximity to the participating buildings) through underground piping infrastructure. The waste collected at the terminal will be collected and hauled to processing or disposal facilities. It is assumed that the terminal will be located underground to reduce clutter and collection vehicles will be able to access the underground terminal.

This evaluation is based on implementing a pilot program and installing the underground vacuum waste collection system to a cluster of 10[163] new multi-residential buildings assuming each building has between 400 and 600[164] units that are connected to a central terminal. The vacuum system will be installed

[163] Estimated number of buildings for pilot level program.

while the buildings are being constructed. The City would be involved in the approval of the design and location of the piped infrastructure since it would be installed in City right-of-ways[165] and collecting waste from the collection terminal. It is assumed that the developer, property manager and/or technology provider will be responsible for the design, construction, operation and maintenance of the system (i.e., inlets, piping, collection terminal, etc.) Building management will be responsible for educating residents on how to use the system and maintaining the inlet areas. Residents will be responsible for source separating waste in to bags and placing their waste in appropriate inlets.

It is assumed that the pilot program will be implemented in buildings that are on City collection. City collection services will continue for the participating buildings for items that are not accepted in the vacuum system (e.g., household hazardous waste, oversized, items, etc.).

Gap/Challenge/Opportunity: A challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled. Another challenge facing the City is the impacts of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.

Ownership/Operation: System owned and operated by private sector (technology provider, developer and/or property manager)

Materials Collected/Diverted: Residual waste, Green Bin organics, Blue Bin materials.

Staffing: Minimal levels of City staffing resources required for approval of design and location of system. Significant levels of private sector staffing required for construction, operation and maintenance activities.

Consideration of Other Infrastructure/Programs: Option impacts City collection routes and the number of collection vehicles required.

Land Requirements: Inlet to be located on ground floor and waste valves to be located below ground floor (both indoors) requiring approximately 13 m^2 to accommodate three streams[166]. Outdoor storage will be required for other items such as oversized, household hazardous waste and electrical items. Piping and collection terminal will be underground. Terminal will require approximately 700 m^2.

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164 Based on estimated number of units per large multi-residential building as provided from City of Toronto staff in November 2015.
165 Staff report on vacuum waste collection systems, March 2008. (www.toronto.ca/legdocs/mmis/2008/ex/bgrd/backgroundfile-11780.pdf)
166 Estimated area requirements provided from private sector in November 2015.

Option 3.2b: Alternative Collection Methods for Multi-residential Buildings-Vacuum System		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some contamination to ground surface between inlet and terminal since vacuum system will be installed below grade.
	Potential impacts to local airshed	• Potential benefit from fewer emissions from collection vehicles since vehicles will collect waste from one location instead of from 10 buildings. • Potential for minimal to no additional impact to local airshed as waste will be collected through underground vacuum system to a central location reducing the number of collection vehicles accessing the participating multi-residential buildings. • Potential for some impact to the local airshed from exhaust generated through vacuum collection system which will need to be filtered at the terminal. • Potential for temporary increase in dust generation during construction of vacuum system piping.
	Potential impacts to local water sources	• Potential for minimal to no impact to local water sources.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic equipment cleaning requirements.
	Total land required and land use displacement	• Potential for minimal to no additional land requirement for inlets (estimated at 13 square metres3) when compared to space requirements for storage of and access to collection containers at multi-residential buildings. • Potential for minimal additional land requirements (approximately 700 square meters required for the collection terminal.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption Greenhouse gas (GHG) contributions	• Potential for significant energy consumption to operate the vacuum system to transport waste from multi-residential buildings to collection terminal. • Potential for reduction in fossil fuel consumption with fewer collection vehicles. • Potential benefit associated with consolidation of collection vehicles since vehicles will access one location (collection terminal) instead of 10 multi-residential buildings.

Option 3.2b: Alternative Collection Methods for Multi-residential Buildings-Vacuum System		
Criteria	**Indicators**	**Assessment**
Public Health Impact/Benefit	Potential to impact human health	• Potential for beneficial impact on public health through some potential to reduce truck collection vehicle traffic (air quality and green house gas reductions), odours, vermin, litter and some potential for increase in employment.
	Potential to impact ecological health	• Potential for minimal to no impact on ecological health.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Provides minimal to no potential to divert additional recyclable materials. Option can enable electronic cards for user to access inlets by material stream. This information could be shared with building management to increase waste diversion.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No approvals required for City to collect waste from collection terminal. • For the private sector, there is potential for some complexity associated with approvals and permitting requirements to install underground vacuum system that connects multi-residential buildings to collection terminal (e.g., Ministry of Transportation Ontario permits for road closures and underground construction) and Environmental Compliance Approval (ECA) for the collection terminal.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some reduction in traffic as a result of fewer collection vehicles on City streets (one stop at collection terminal versus 10 stops at participating buildings). • Collection vehicles would still be required to collect other waste streams (e.g., oversized items, electronic waste, and household hazardous waste).
	Potential for litter increase/reduction	• Potential for some litter reduction if waste is to be vacuumed instead of being placed in temporary storage bins, as well, no outdoor storage of waste required.
	Potential odour emissions	• Potential for some reduction in odour emissions given that waste will no longer require temporary outdoor storage at multi-residential buildings and will be managed through indoor inlets located on ground floors which will vacuum the source separated waste to the collection terminal.

Option 3.2b: Alternative Collection Methods for Multi-residential Buildings-Vacuum System		
Criteria	**Indicators**	**Assessment**
	Potential noise emissions	• Potential reduction in noise emissions given that fewer collection vehicles will be on City streets and bins do not require emptying at each building.
	Potential for increased vector/vermin	• Potential for some reduction of vector/vermin given that waste will no longer require temporary outdoor storage at multi-residential buildings.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no ability to partner with other organizations as City is not involved in the designing, building, operating and maintaining the system.
Complexity	Program complexity to user	• As option will be implemented in new buildings, residents are anticipated to adapt quickly to waste collection program and therefore there is minimal to no potential for program complexity. • System can be implemented to require the use of an access card to access the inlets, in which case residents will have to remember to bring their cards. • Option requires users to source separate their waste which presents the same challenges as the status quo.
Convenience	Ease of participation	• As option will be implemented in new buildings and access to inlets will be indoors only, it is anticipated that there will be no additional effort to participate in waste collection programs. Participation levels should be similar to buildings that sort all three streams in one location (e.g., chute on each floor) and slightly better for buildings that have one to two chutes on each floor (e.g., garbage, recycling) and a central location for other divertible waste streams (e.g., recycling, organics).
Community Safety	Potential for impacts to community safety	• Potential for some improvement to community safety as a result of fewer collection vehicles on City streets.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for equal opportunity to users residing in participating buildings.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no behavioural change to reduce waste. Option may be able to allow for waste tracking technologies which could assist in developing targeted education on building-specific performance.

Option 3.2b: Alternative Collection Methods for Multi-residential Buildings-Vacuum System		
Criteria	**Indicators**	**Assessment**
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Potential for minimal to no capital cost to the City to implement. City resources will be required during planning of infrastructure.
	Estimated net operating cost	• Technology provider, developer and/or property owners will be responsible for operations, repair and maintenance. • Operating costs for City to collect waste from collection terminal and transport to transfer stations and/or processing facilities.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs and some potential for reduction in health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contractual risk as City will only be responsible for waste collection once a third party contractor constructs the system. A contractor will be responsible to operate and maintain the system.
	Potential for schedule risk	• Potential for minimal to no schedule risk as a third party contractor will be responsible for designing, constructing and maintaining the system.
	Potential for innovation risk	• Potential for minimal to no innovation risk as the option requires City staff for waste collection purposes only.
Economic Growth	Potential for local economic growth	• Potential for some local economic growth as a result of construction, maintenance of vacuum system and terminal.
	Potential for regional/global economic growth	• Potential for some regional/global economic growth. Contractors outside of the City may be retained for construction and maintenance services and technology may be provided by companies located outside Toronto.
Local Job Creation	Potential for additional local job creation	• Potential for some temporary local jobs as a result of construction activities. • Potential for some long-term jobs with operations and maintenance.
Flexibility	Ability to accommodate future changes	• Option is limited to accommodate three waste streams and presents restrictions if a waste stream is added or removed from the City's collection program.

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:

- As single family residential diversion programs are more mature, municipalities are focusing on increasing diversion in multi-residential buildings by implementing development standards and 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). May 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 to determine whether this is a barrier for Toronto and whether it would actually result in increased waste diversion and be an efficient and cost effective alternative.
- Municipalities can address future developments with stringent development restrictions, although owners can contract privately for

Case Studies/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[167].
- Meaford, Ontario has recently tendered for collection service using smaller vehicles for private and seasonal roads.[168]
- Hertsmere, UK collection contract included one small vehicle to address locations where access was restricted[169]. 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[170] who uses specialized waste bins and smaller vehicles to collect waste from the curb in dense neighbourhoods.

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

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

[169] 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

[170] http://www.nola.com/politics/index.ssf/2014/01/recycling_collection_returns_t.html

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.

Considerations:
- More diversion from multi-residential buildings that can be serviced by the City and will provide better access to more diversion services.
- Some redevelopments may be able to accommodate City service to multi-residential buildings resulting in better data collection and management of more multi-residential buildings that the City cannot currently service.
- Will require update to waste management design by-law.
- 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.
- Need to consider criteria for how and when these would be used in order to balance out collection efficiencies with those buildings that should actually be considered for these vehicles
- Also need to consider risk as some buildings may leave City service and it may no longer be efficient or cost effective to service a small amount of buildings across the City

Potential Outcomes:
- Two separate collection fleets – larger and smaller vehicles.
- Access to challenging collection areas (e.g., narrow streets, back alleys, future densification in the City).

Details of Option undergoing Evaluation: This option addresses a need for provision of collection service (e.g. garbage, Blue Bin materials, Green Bin organics, oversized items, electronic wastes) to multi-residential buildings, which currently do not receive City service due to service restrictions (e.g. short turning radius, space restrictions*)*. Toronto would purchase small collection vehicles and would require building owners to purchase special collection bins (e.g. 1,100 litre rear load bins) compatible with these vehicles. With the City providing this service to inaccessible multi-residential buildings (estimated 240 to 400 multi-residential buildings not currently receiving garbage, Blue Bin material or Green Bin organics collection) there is greater opportunity to offer waste diversion services (i.e. recycling and organics, electronic waste, household hazardous waste diversion) that may not be provided to the buildings under their current service provider.

Gap/Challenge/Opportunity: A challenge facing the City is the impacts of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods. These buildings that do not receive City collection services due to access limitations cannot participate in the variety of waste diversion services offered by the City.

Ownership/Operation: The City would purchase and operate a fleet of small collection vehicles and would require building owners to purchase the bins (as is currently required for the multi-residential front-end bins) compatible with these vehicles.

Materials Collected/Diverted: Garbage, Blue Bin materials, Green Bin organics, electronic waste and oversized items

Staffing: Requires some additional City of Toronto staff.

Consideration of Other Infrastructure/Programs: Option will have some impact on collection fleet, transfer stations, processing facilities for Blue Bin materials and Green Bin organics and on Green Lane Landfill.

Land Requirements: No additional land requirements.

Option 3.7: Multi-Residential Collection using Alternative Vehicles		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Minimal to no impacts/ benefit to land resources as collection vehicles are already used to collect from multi-residential buildings.
	Potential impacts to local airshed	• Minimal to no release of emission to atmosphere as collection vehicles are already used to collect from multi-residential buildings, and will be replacing existing trucks or enhancing existing fleet.
	Potential impacts to local water sources	• Minimal to no impacts to local water sources as no release into waterways.
	Potential water consumption requirements	• Minimal to no water required, except for routine vehicle cleaning.
	Total land required and land use displacement	• Minimal to no impacts on land use displacement as no additional land use requirements.
Regional/Global Environmental	Energy and fossil fuel generation / consumption	• Some additional fuel consumption may result from smaller storage capacity of the smaller collection vehicle which may require more trips to the transfer station, although it is expected that the trucks will be more fuel efficient.

Option 3.7: Multi-Residential Collection using Alternative Vehicles		
Criteria	**Indicators**	**Assessment**
Impact/Benefit	Greenhouse gas (GHG) contributions	• Option may result in increased traffic/vehicles resulting in greenhouse gas contributions if smaller collection vehicles need to make more trips to unload contents at the transfer stations.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public. Unlikely to result in negative impacts. Potential for small positive impact on health through some employment opportunities.
	Potential to impact ecological health	• Minimal to no additional impact on ecological health since collection already occurs at multi-residential buildings.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Minimal to no potential for increasing diversion (0.1%) as this option only affects a reported 5-10 buildings across the whole city. [171]
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No other approvals required.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Minimal to no increase in traffic as multi-residential buildings are already receiving garbage service. Some additional traffic may occur if building does not provide waste diversion services and additional collection service required. However, smaller vehicles may have little impact on traffic due to the fact that collection vehicles are still being used.

[171] Approximately 5,800 multi residential buildings in Toronto (City Planning Department estimates based on Municipal Property Assessment Corporation (MPAC) data) of which the City services 4,500. From this, it is estimated that approximately 1,300 buildings use private garbage collection services. Estimated that 500 buildings left City service over levy system, therefore, remaining 800 multi-residential buildings either have chosen private sector or cannot be accessed by City. City staff indicate that only 5-10 buildings are affected by an issue which could be resolved by buying small vehicles, as they cannot be accessed by City services. Multi-residential generation rate of 650kg/hhld (2010/2011 multi-residential waste audits) and achieve 26% diversion (based on 2013 multi-residential diversion rate from TM1 - Appendix C– Historical Tonnes Managed and Diverted). Overall impact on diversion is minimal as only 5-10 buildings are involved.

Option 3.7: Multi-Residential Collection using Alternative Vehicles		
Criteria	**Indicators**	**Assessment**
	Potential for litter increase/reduction	• Minimal to no increase in litter as multi-residential buildings are already receiving garbage service.
	Potential odour emissions	• Minimal to no increase in odour emissions as multi-residential buildings generate same volume of waste. Odour may be a more of a concern if City services are less frequent then existing collection service provided by private sector.
	Potential noise emissions	• Minimal to no increase in noise as multi-residential buildings are already receiving garbage service. Some additional noise may occur if building does not provide waste diversion services and requires additional collection service.
	Potential for increased vector/vermin	• Minimal to no increase in in vector/ vermin as multi-residential buildings generate same volume of waste. Vector/ vermin may be a more of a concern if City services are less frequent then existing collection service provided by private sector.
Collaboration	Ability to partner with other municipalities/ organizations	• N/A
Complexity	Program complexity to user	• Program is very easy to understand if the building already provides all the services • If waste diversion services have not already been provided, then the user must adapt to new waste diversion services.
Convenience	Ease of participation	• May require more effort to participate if source separation is required.
Community Safety	Potential for impacts to community safety	• Minimal to no potential to increase number and type of safety issues with change in size of truck.
Equity	Potential for unequal impacts/benefits to specific groups	• Increase in equity when compared to current situation if buildings currently do not receive waste diversion services.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Financial Impact/Benefit		

Option 3.7: Multi-Residential Collection using Alternative Vehicles		
Criteria	**Indicators**	**Assessment**
Cost	Estimated net capital cost	• Capital costs estimated at $300,000.[172]
	Estimated net operating cost	• Increase in operating costs estimated at $120,000.[173] • Costs offset by revenue from user fees from multi-residential units and sale of additional Blue Bin materials.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Contract risk is manageable and only related to truck delivery. Operation of trucks same as existing trucks.
	Potential for schedule risk	• Minimal to no schedule risk related to truck delivery depending on procurement conditions.
	Potential for innovation risk	• Minimal to no innovation risk as the vehicles are well proven in the North American market.
Economic Growth	Potential for local economic growth	• Minimal to no potential for local economic growth since equipment not produced in Ontario and there is not enough demand to warrant local manufacturing.
	Potential for regional/global economic growth	• Some potential for regional growth since the vehicles and bins can be purchased from manufacturers based in Quebec and in the United States.

[172] Collection vehicles range from $170,000 (rear loader) to $300,000 (side loader) per small vehicle. Cost for one new small vehicle approximately $300,000 (may be affected by U.S. exchange rate). One vehicle can service 13-15 buildings per day (each truck has about 2/3[rd] capacity of standard front end loader). The smaller collection vehicles can hold a legal pay load of six tonnes, compared with 10 tonnes for a standard collection vehicle, which is the equivalent of one truck. Existing small vehicles in City fleet can act as spare (currently used to service parks).
City of Lethbridge, Alberta has purchased five collection vehicles (16 yd^3) that can be adapted to collect one to 1.5 cubic yards (rear load) which cost CDN $158,000 each + $8,000 attachment to accommodate collection of one cubic yard bins therefore cost to operate is $50,000 annually. Storage capacity is about half of a regular packer truck (Communications with Waste and Recycling Specialist, City of Lethbridge, September 30, 2015). Town of Taber, Alberta has approval to purchase Haul All CompPak25 side loader for the amount of $300,000 (Communications with Director of Engineering & Public Works, Town of Taber, September 30, 2015). City of Calgary uses similar side loader, Wayne Autocat, to access tight spaces.
Some vehicles can handle maximum 1,100 litre bins (cost for each is approximately $500) (Communications with Waste and Recycling Specialist, City of Lethbridge, October 2, 2015)
[173] Operating costs $120,000 (two collection crew and maintenance) annually for maximum one additional vehicles is $120,000 additional/incremental to existing costs.

Option 3.7: Multi-Residential Collection using Alternative Vehicles		
Criteria	**Indicators**	**Assessment**
Local Job Creation	Potential for additional job creation	• Minimal to no potential for job creation since collection jobs displaced from other services.
Flexibility	Ability to accommodate future changes	• Some flexibility to accommodate changes in operations since equipment will have been purchased.

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. With multi-residential buildings no longer a City customer, the City loses an opportunity for requiring recycling and source separated organics collection at these locations. However, this approach over time would simplify the utility and the City would focus on single family residential.

System Component: Overall System Considerations

Source of Option: City Staff & Consultants

City of Toronto Experience:

- The City of Toronto provides garbage and Blue Bin materials 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 loader service and 1,781 small multi-residential buildings (43,242 units) use 360 litre carts.
- The City's waste collection by-laws require all customers, including multi-residential buildings, to participate in the Blue Bin materials and Green Bin organics programs to receive garbage collection.
- 55,776 tonnes of Blue Bin materials 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 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.
- Some municipalities ensure that the infrastructure is available for recycling through by-laws or policies applied at different stages in

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 institution, 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[174].
- Examples of cities in Canada that do not provide waste collection include Halifax and Regina. The City of Vancouver collects waste 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 garbage collection include Portland, OR, Sacramento, CA, Houston, TX, Dallas, TX, Chicago, IL, San Diego, CA, and Washington, DC.
- New York City, NY provides garbage and recycling services to all residents, most of whom reside in multi-residential buildings.
- Many large European cities provide garbage and diversion services to the

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

building development • Some municipalities ensure multi-residential waste recycling through licensing of haulers.	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. Would result in much lower funding/revenue to the City's Solid Waste Utility.
- Simplified solid waste management system for the City.
- 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.
- Under the proposed *Waste-Free Ontario Act*, the City may have the option to leave the majority of collection of Blue Bin materials to producers who may be obligated under the legislation and any subsequent regulations.

Potential Outcomes:

- There could 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 in a decreased customer base and reduction in revenue, but also a reduction in costs.
- Less contamination in the recycling and organics streams, which tends to be higher in the multi-residential sector, if they are managed in private sector facilities after City no longer involved.

Details of Option Undergoing Evaluation: The main assumption for this option is that all multi-residential buildings in Toronto that currently receive City collection (including Blue Bin materials and Green Bin organics collection), and pay for this through the utility, will need to contract with private sector haulers for waste management services for garbage and Green Bin materials. There may be an option to negotiate with printed paper and packaging stewards for separate collection of Blue Bin materials after the proposed *Waste-Free Ontario Act* regulations are promulgated. This option assumes that the City will cease to provide service to the multi-residential sector when the current contract with the City's collections service provider expires in 2026, but that no policies would be implemented that require multi-residential buildings to source separate and divert waste. Multi-residential buildings would need to obtain collection services from the private sector. Option 1.8 (Mandatory Source Separation for Multi-Residential Buildings) would be a logical pairing with this option to ensure that diversion continues, but is not part of this evaluation.

Gap/Challenge/Opportunity: This option narrows the City involvement in service provision to multi-residential buildings. It will considerably simplify the utility, and require less City staff. In addition, it would significantly reduce the waste going to Green Lane Landfill from multi-residential buildings as this would be managed through the private sector infrastructure.

Ownership/Operation: The City would cease to be involved in contracts providing service to multi-residential buildings in the City.

Materials Collected/Diverted: Collection of garbage from multi-residential buildings would continue. Collection of Blue Bin materials, Green Bin organics, and electronic waste, which are currently collected by the City, would likely continue at some but not all multi-residential buildings as it would not be mandatory to do so.

Staffing: No additional staff required.

Consideration of Other Infrastructure/Programs: Option will have some impact on transfer stations and processing facilities for Blue Bin materials and Green Bin organics and on Green Lane Landfill, as private sector haulers, which will replace the City's role in service provision, may use different processing and disposal facilities.

Land Requirements: No additional land requirements.

Option 9.1: Elimination of Collection Service to Multi-residential Buildings		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Some impacts to land resources as the same amount of waste materials will be managed by different service providers, although there may be an increase in landfilled garbage as Blue Bin materials and Green Bin organics diversion might not continue at the same pace as when the multi-residential sector were City customers.
	Potential impacts to local airshed	• Some release of emissions to atmosphere as there will be more collection vehicles in use by more service providers to deliver the same service.
	Potential impacts to local water sources	• Minimal to no impacts to local water sources as no release into waterways.
	Potential water consumption requirements	• Minimal to no water required.

Option 9.1: Elimination of Collection Service to Multi-residential Buildings		
Criteria	**Indicators**	**Assessment**
	Total land required and land use displacement	• Some impacts on land use displacement as the amount of material managed remains the same, but more may be landfilled when diversion not provided. •
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Some impact on fossil fuel consumption as increased fossil fuel use with more trucks. Given that this would occur in ten years, e fleets may be powered by non-fossil fuel but assumption is that fuel remains the same.
	Greenhouse gas (GHG) contributions	• GHG impacts may be greater, as less material may be diverted.
Public Health Impact/Benefit	Potential to impact human health	• Potential for an adverse impact on public health through a reduction in waste diverted from landfill, some potential for additional trucks on roads, some potential for increase in vermin and odour.
	Potential to impact ecological health	• Minimal to no additional impact on ecological health since collection already occurs at multi-residential buildings.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for lower diversion as follow-through on the processing of source separated Blue Bin materials and Green Bin organics are no longer assured as compared to City collection. Each building will make arrangements with local haulers for which diversion follow-through may not always be as complete.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Minimal to no consistency with the priorities of the waste hierarchy. • Option manages waste with little to no value or beneficial use.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No approvals required.
Potential for Land Use	Potential for traffic increase/reduction	• Some increase in traffic as more service providers are involved with more trucks to same areas.

Option 9.1: Elimination of Collection Service to Multi-residential Buildings		
Criteria	**Indicators**	**Assessment**
Conflicts/Community Interruption	Potential for litter increase/reduction	• Minimal to no increase in litter as multi-residential buildings are already receiving garbage service.
	Potential odour emissions	• Potential for some odour emissions if multi-residential buildings cut collection service to save money.
	Potential noise emissions	• Potential for some increase in noise with more trucks on the road as multiple service providers replace one coordinated City fleet.
	Potential for increased vector/vermin	• Some potential for increased vector/vermin if collection frequency is reduced to save money.
Collaboration	Ability to partner with other municipalities/ organizations	• N/A
Complexity	Program complexity to user	• Program is easy to understand for the resident. Set out frequency will either be the same or less with new service providers. Program is easier for user if Green Bin organics are not collected.
Convenience	Ease of participation	• May be easier to participate if source separation is not required.
Community Safety	Potential for impacts to community safety	• Potential for some safety issues with more truck traffic, but this can be mitigated.
Equity	Potential for unequal impacts/benefits to specific groups	• Less equity than current situation as some multi-residential buildings may no longer receive diversion programs.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no influence or behaviour change as waste generator maintains current practices.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• No capital costs.

Option 9.1: Elimination of Collection Service to Multi-residential Buildings		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• No operating costs. • Significant reduction in revenue.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Reduction in contractual risk as the City is giving service responsibility to private sector with no direct involvement in contracts.
	Potential for schedule risk	• Minimal to no schedule risk for the City. Service responsibility is being given over to private sector.
	Potential for innovation risk	• Minimal to no innovation risk as the approach is well proven in the North American market.
Economic Growth	Potential for local economic growth	• Some potential for local economic growth with additional private sector collection/processing/disposal.
	Potential for regional/global economic growth	• Some potential for regional/global economic growth, depending on where processing/disposal facilities are located.
Local Job Creation	Potential for additional job creation	• Minimal to no potential for job creation since collection jobs will be similar to existing system.
Flexibility	Ability to accommodate future changes	• Good flexibility to adapt to changing circumstances, as multiple service providers will likely offer wide range of options to multi-residential buildings.

Planning, Policies and Enforcement

Option 1.8: Multi-residential By-laws and Enforcement

City to consider increasing enforcement efforts of existing applicable waste diversion by-laws and/or enacting new, legally permissible by-laws to mandate City-wide waste diversion requirements (Blue Bin materials and Green Bin organics service, etc.) to all multi-residential buildings. For enforcement, focus is on more effective enforcement of existing City by-laws that apply to multi-residential customers and/or exploring joint enforcement efforts with the Province regarding O. Reg. 103/94 requirements. For potentially enacting new by-laws, the goal would be mandating diversion at the building level (with building owners responsible) and/or through mandatory requirements for haulers operating within the City and servicing multi-residential buildings. Enactment of the proposed *Waste-Free Ontario Act* and subsequent adoption of regulations under the Act might affect this analysis.

System Component: Overall System Considerations

Source of Option: City Staff & Consultation

City of Toronto Experience:

- The City of Toronto provides garbage, Blue Bin materials and Green Bin organics collection services to all multi-residential building locations eligible for City collection. All new multi-residential developments and redevelopments must meet Solid Waste Management Services (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 be mixed use (i.e. residential combined with commercial).
- The City Solid Waste Utility charges garbage rates for multi-residential units that finance garbage, Blue Bin materials and Green Bin organics and all other services through the user fee combined with a rebate from property taxes. Private haulers compete to service multi-residential buildings but can charge much lower garbage rates as the garbage rate only covers garbage collection and disposal, with no

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

diversion in some cases.

Municipal/Waste Industry Experience:

- Many municipalities have mandatory requirements that address waste collection 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.
- Some municipalities are not involved in waste management for multi-residential buildings and do not have policies targeting multi-residential building waste management.
- The Ontario Government introduced legislation in 1994 (Ontario Regulation 103/94), which requires, among other IC&I actors, 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 owners 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:

- Multi-residential (MR) waste diversion for larger multi-residential buildings is currently captured under Provincial 3Rs (Reduce, Reuse, Recycle) regulations for IC&I waste, and the multi-residential building owner (not the City) is responsible. The regulations are not routinely enforced and most multi-residential building owners are often not aware that they exist. The regulations do not capture smaller multi-residential buildings.
- The proposed *Waste-Free Ontario Act* and its regulations may address many components of the multi-residential waste stream over time. City measures would be in addition to any of these new regulations and any existing Provincial regulations.
- Multi-residential customers are highly price sensitive and also contribute significant revenue to support the integrated waste management utility, therefore any financial implications of the new by-laws due to a loss of City customers need to be carefully evaluated.
- Having this option in place would guarantee that diversion services would be in place for all multi-residential customers regardless of the service provider

thereby ensuring environmental sustainability.

- Multi-residential property management/owners must be educated about the requirements of the new by-law.
- Extensive City enforcement of municipal measures and Provincial enforcement of Provincial measures is critical to facilitate compliance and ensure success. Additional enforcement staff may need to be hired (temporary or permanent) to address the needs of multi-residential buildings. Also, additional City staff might be needed to address the larger number of City customers.
- Wording of by-law important to ensure that multi-residential building owners/property managers properly promote the program – source separation requirements of tenants and targets will be important.
- Ensures that all multi-residential buildings receive diversion service, 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 provides the multi-residential sector with the same waste diversion services that the single family residential sector currently receives.
- Potential for apartment and condominium associations and haulers to challenge by-law in court.

Potential Outcomes:

- If adequately 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.

Details of Option undergoing Evaluation: In this option, the City would require all multi-residential buildings, including those that receive private collection services in the city to source separate Blue Bin materials and Green Bin organics for diversion through new mandatory source separation and diversion by-laws, policies and enforcement. This is to ensure that multi-residential buildings that do not receive City service have the same diversion opportunities as buildings that do receive City service. Alternatively, or in conjunction with mandatory source separation, the City would require service providers to provide source separated Blue Bin material and Green Bin organics collection service and annual quantity reporting as a condition of licensing. Both provisions would be implemented through new by-laws.

Gap/Challenge/Opportunity: A challenge facing the City is to maximize the effective and efficient use of its current programs, services and facilities. To date, significant effort and success has been realized through promotion and education; however, there are still areas of the system where voluntary compliance is not at the desired level, requiring strategic consideration of mandatory measures.

Ownership/Operation: Assume City would continue to provide collection, processing and disposal of multi-residential waste to its current customers. Administration and enforcement of policies would be the responsibility of the City to all multi-residential buildings regardless of service provider.

Materials Collected/Diverted: Garbage, Blue Bin materials, and Green Bin organics.

Staffing: Additional staff required, including ML&S (Municipal Licensing and Standards) and enforcement staff.

Option 1.8: Multi-residential By-laws and Enforcement

Consideration of Other Infrastructure/Programs: Option will have a significant impact on by-law enforcement staff, if it results in additional multi-residential buildings which require inspection and haulers which need to be monitored. Also will lead to need for more recyclables and organics processing (either City or private sector). Implications of proposed *Waste-Free Ontario Act* on waste flow will not be clear until new regulations are promulgated. The Provincial strategy is considering material bans which would require more recycling and organics processing infrastructure.

Land Requirements: Potential for some land use displacement depending on the quantities and types of materials requiring processing.

Option 1.8: Multi-residential By-laws and Enforcement		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station.

Option 1.8: Multi-residential By-laws and Enforcement		
Criteria	**Indicators**	**Assessment**
	Potential impacts to local airshed	• Potential for some impacts to local airshed as more trucks are needed to collect source separated material streams, particularly if multiple service providers are not involved in garbage, Green Bin organics and Blue Bin materials or other recyclables collection[175]. • Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. • Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing) as a result of more multi-residential buildings participating in Green Bin program.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities, as well as washing Green Bin organics containers periodically.

[175] One truck driving for three hours does not equal three trucks driving for one hour each because each truck would likely need more than one hour each to collect from the same number of customers. There is an impact on traffic with a move to multiple service providers because there are three trucks where there was only one. There is an increased concern from residents about safety with an increased number of trucks on the road (whether on the same day or on three different days).

This is one of the reasons some cities in U.S. go to franchising – to control truck traffic from multiple service providers. Franchising involves competitive bidding process to select a small group of haulers to collect waste in specific zones in a city.

Option 1.8: Multi-residential By-laws and Enforcement		
Criteria	**Indicators**	**Assessment**
	Total land required and land use displacement	• Potential for some land use displacement. Additional system-wide processing capacity for Blue Bin materials and more Green Bin organics processing capacity may be needed.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Some additional fossil fuel energy for more separate collection of Blue Bin materials and Green Bin organics from multi-residential buildings not currently diverting these materials. These buildings are currently serviced by one set of trucks for garbage only, but will now be serviced by three trucks – one for each stream, where only one truck was required in the past. • Some on-site energy consumption is related to the impact of increased multi-residential tonnages diverted (either City or private sector facilities). • Energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. • Some additional fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles.
	Greenhouse gas (GHG) contributions	• Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill, as well as "upstream GHG"[176] benefit of more recycling.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increase waste diversion from landfill, some employment opportunities, increased access to municipal services (solid waste services), and potential for greenhouse gas reductions.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.

[176] Upstream GHG benefit refers to the resources that do not need to be processed (e.g. trees for paper; bauxite mining and smelting for aluminum; petroleum for plastic, etc.) because recycled feedstock is used rather than virgin feedstock, thereby reducing the need to extract resources to produce products.

Option 1.8: Multi-residential By-laws and Enforcement		
Criteria	**Indicators**	**Assessment**
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Some potential for higher multi-residential waste diversion above existing levels at multi-residential buildings not serviced by the City that do not currently receive diversion services. Additional diversion estimated to be 23,000 tonnes/year[177], or 2.3% of residential waste.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Option requires new mandatory source separation by-laws and/or hauler licencing requirements, which although they may be contentious and require consultation, are not particularly complex.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact on traffic depending on how different quantities of the three streams of material from multi-residential buildings (waste, recyclables and Green Bin organics) are collected and by whom (more trucks/service providers may be servicing multi-residential buildings not currently diverting waste).
	Potential for litter increase/reduction	• Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more multi-residential recyclables) can be managed by requiring proper collection containers and collection schedules.

[177]Approximately 416,815 multi-residential units receive City service (TM#1, page 60). Data provided by the City's Planning Department indicates that there are 5,000 to 6,000 multi-residential buildings in the City. Based on this, and information in the 2015 tax roll, it is assumed that between 500 and 1500 buildings, or approximately 200,000 units utilize private waste management services instead of City services. The diversion rate for non-City serviced buildings is not known or tracked. Based on recent waste audits (2014), approximately 163 kilograms of Blue Bin materials and 67 kilograms of Green Bin materials are recovered annually through participation in the City's diversion programs. If half of the units not serviced by the City, or an additional 100,000 units, start diverting Blue Bin materials and Green Bin materials at similar rates, then an additional 23,000 tonnes of material could be diverted (162.7 kg/unit/year * 100,000=16,270 tonnes of Blue Bin material and 67.3 kg/unit/year *100,000 = 6730 tonnes of Green Bin material). This works out to an additional 2.3% diversion as a percentage of the total residential waste generated.

Option 1.8: Multi-residential By-laws and Enforcement		
Criteria	**Indicators**	**Assessment**
	Potential odour emissions	• Potential for some impact on odour emissions. Increased separated multi-residential Green Bin organics collection, transfer and processing will require odour control diligence (and it is likely that these facilities may not be City owned and controlled).
	Potential noise emissions	• Potential for some impacts on noise emissions as increased quantities of multi-residential recyclable materials and Green Bin organics are collected from 1,300 multi-residential buildings across City.
	Potential for increased vector/vermin	• Potential for some impact on vector/vermin. Increased separated multi-residential Green Bin organics (and to a lesser extent increased multi-residential recyclables materials diversion) may attract additional vectors and vermin (partly offset by the collection and transfer of less waste).
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities with other municipalities or organizations regarding collection. • Potential for minimal to no partnership opportunities with other municipalities and organizations on new processing facilities as private sector likely to establish these independently from City (the City role is to establish and enforce the policies, the private sector will implement).
Complexity	Program complexity to user	• Although service is provided at the multi-residential building level, new source separation requirements for Green Bin organics in particular, may increase complexity for user.
Convenience	Ease of participation	• Easy to participate, as diversion service will be provided at the multi-residential building level.
Community Safety	Potential for impacts to community safety	• Potential for some impact on community safety with increased numbers of collection vehicles collecting different waste streams.
Equity	Potential for unequal impacts/benefits to specific groups	• Increased equity as all multi-residential buildings will receive diversion collection.

Option 1.8: Multi-residential By-laws and Enforcement		
Criteria	**Indicators**	**Assessment**
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Some ability to influence behavior. Consumption or generation of waste could potentially decrease if residents or program users are regularly exposed to source separation programs causing them to think about the amount of and effort that is required to manage the waste that is generated.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Capital cost required for legal and consultation to establish policies and by-laws. An allowance of $150,000 for one full time equivalent (FTE) staff member to address these issues over two years. Legal costs are absorbed in other budgets.
	Estimated net operating cost	• Operating cost will involve expenditures of about $250,000/year on enforcement staff[178].
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk this option is focused on policies and enforcement only.
	Potential for schedule risk	• Potential for some schedule risk related to implementation and enforcement of new by-laws.
	Potential for innovation risk	• Potential for minimal to no innovation risk – this approach is proven in existing City multi-residential buildings.
Economic Growth	Potential for local economic growth	• Potential for some local economic growth since three stream collection and recyclable and Green Bin organics material processing are more facility (and labour) intensive than waste collection and landfilling.
	Potential for regional/global economic growth	• Potential for some impact on regional or global economic growth if additional processing facilities are required to manage source separated materials.

[178] 1,300 multi-residential buildings should be inspected four times per year. At 50 inspections per week; would need 26 person-weeks to do all once or 104 person-weeks to do all four times per year. Staffing costs include two enforcement staff with an average cost of $90k ($70k/year average +23% payroll burden) and one-fifth allocation of one unit manager ($100k plus 23%) as well as $500k for miscellaneous legal, promotion and education and other costs.

Option 1.8: Multi-residential By-laws and Enforcement		
Criteria	**Indicators**	**Assessment**
Local Job Creation	Potential for additional local job creation	• Potential for some additional local job creation as a result of three stream collection and processing.
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility. Private contractors will compete by offering different three stream collection and processing services to the City's multi-residential sector not serviced by City at this time.

Option 1.9: Updates to Current Multi-residential New Development Standards

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

System Component: Promotion & Education

Source of Option: City Staff

City of Toronto Experience:

- City Of Toronto's *Requirements For Garbage, Recycling And Organics Collection Services For New Developments And Redevelopments (revised 2012)* stipulates requirements to receive City collection service and requires a dedicated footprint for container management for garbage, Blue Bin materials and Green Bin organics. 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 (electronics, oversized and metal items), Blue Box materials, 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:

- Design requirements will include reserved space which will be available possibly outside to develop small scale neighbourhood depots (similar to public arts requirements or greenspace), as well as internal to the building for flex space.
- Potential resistance from development community who may be opposed to new requirements that reduce the potential number or size of future units.

Option 1.9: Updates to Current Multi-residential New Development Standards

- Collaboration will be required with City Planning and Engineering and Construction services and other City Divisions.
- Producers subject to the collection requirements of the regulatory system that may result from the proposed *Waste-Free Ontario Act* may also want to establish a depot collection system.

Potential Outcomes:

- Space needed for small neighbourhood drop-off depot infrastructure is set aside on a go-forward basis, and is designated for this use.
- Updated multi-residential development by-law standards, which would require set-asides 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.

Details of Option undergoing Evaluation: The evaluation addresses the impacts of the flex space only, as the impacts of the neighbourhood drop-offs which this option would facilitate are covered in Option 3.4. The City would be responsible for updating multi-residential development by-law standards and for reviewing plans at the permitting stage to ensure that plans meet the new requirements to provide flex space and a set-aside for potential future small scale neighbourhood depots. Architects and developers would need to incorporate requirements into building designs and construction plans thereby assuming the capital cost associated with the construction of the depot and reuse space. Collection, transfer and processing service for future neighbourhood depots addressed in Options 3.4. The reuse component would be managed by volunteers at the building through efforts facilitated by City staff initially, but eventually would be a self-sustaining activity.

A business case is required to look at the potential costs to the developer to set aside space and construct components and the potential cost to the City.

Gap/Challenge/Opportunity: A challenge facing the City is the need for increased waste diversion in the multi-residential sector to support its diversion goals, and reduce the amount of material currently being landfilled. Another challenge is how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

Ownership/Operation: Assume the developer would include space provisions for common areas to support reuse initiatives and repair of goods which would be managed by building superintendent or volunteer residents. City collects and diverts material, where appropriate (covered in Option 3.4).

Materials Collected/Diverted: Textiles, shoes, books, housewares, bikes, hard plastics (e.g. toys, plastic furniture, carpets,) etc.

Staffing: Requires some minor additional staff time to review development plans.

Consideration of Other Infrastructure/Programs: Option would be undertaken in addition to all other waste diversion operations. Existing programs would continue to operate with the depot augmenting the existing programs by targeting reusable and recyclable materials that are not being collected curbside.

Land Requirements: Minimal land requirements as the depots would be incorporated into the existing land set aside for the multi-residential development.

Option 1.9: Updates to Current Multi-Residential New Development Standards		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Minimal to no impact to land resources as all solid waste materials collected at a new small depot or drop off area located at "shared space" designated in new standards at the multi residential complex would be placed in secured bins and serviced by City staff/contractors.
	Potential impacts to local airshed	• Minimal to no impact on local airshed because there should be no release of emissions to the airshed through the depot or space for reuse purposes. Collection is addressed in Option 3.4.
	Potential impacts to local water sources	• Minimal to no releases of potential contaminants to local water sources from the collection of waste materials at the depot or space for reuse/recycling purposes as waste collected will be inert.
	Potential water consumption requirements	• Minimal to no water required because there is minimal water consumed other than to occasionally clean out the bins at the depot.
	Total land required and land use displacement	• Potential for minimal additional land required because flex space is part of new multi-residential building.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption Greenhouse gas (GHG) contributions	• Minimal to no energy and fossil fuel consumption although some vehicles will be required to collect and transfer the diverted materials. • Reuse and recycling of materials could offset GHGs from collection and transfer.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for positive impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increase waste diversion from landfill, increased access to municipal services (solid waste services), and potential for greenhouse gas reductions.
	Potential to impact ecological health	• Minimal to no potential to impact ecological health as the depots will take up a small footprint and all activities will be contained in a secure space.

Option 1.9: Updates to Current Multi-Residential New Development Standards		
Criteria	**Indicators**	**Assessment**
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Diversion resulting from the neighbourhood drop-off part of this measure is already captured in Option 3.4. The flex space component of this option has the potential to facilitate a small amount of diversion - <2% of multi-residential waste, therefore <1% of residential waste as multi-residential comprises over half of all residential waste. [179]
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No approvals required. [180]
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Minimal to no increase in potential for additional traffic resulting from collection vehicles which need to service the depots/drop-off areas in shared spaces.
	Potential for litter increase/reduction	• Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more recyclables) can be managed by requiring proper collection containers and collection schedules.
	Potential odour emissions	• Minimal to no odour emission as no putrescible waste is involved.
	Potential noise emissions	• Minimal to no potential for increased noise from collection vehicles servicing the depots or users of space set aside for sharing libraries etc.

[179] The flex space would focus on reuse activities, mostly as small neighbourhood depots (addressed in Option 3.4). They would handle materials such as textiles which represent about 5-6% of the multi-residential waste stream. Should the flex-space be used for reusing and swapping textiles and reusable items such as pots and pans, and if 20% participation is achieved, then 1% of multi-residential waste could be diverted. Depends on what materials are targeted, e.g. textiles, reusable goods, books. Estimates are based on Toronto 2008 and 2010/2011 multi-residential waste audits.

[180] The approval process will require City Council approval only; however, the changes to the standard itself will elicit resistance from developers. The development standards would need to go through a review, amendment and approval process and then the revision will need to be communicated to developers and integrated into the permitting process. Obtaining approvals for the "flex space" itself is not complex because it will be included with the building permit.

Option 1.9: Updates to Current Multi-Residential New Development Standards		
Criteria	Indicators	Assessment
	Potential for increased vector/vermin	• Some potential for vector/vermin (e.g. bedbugs) depending on what materials may be diverted or shared. There is an on-going concern regarding bed bugs in clothing as well as all textiles which would be reused or shared.
Collaboration	Ability to partner with other municipalities/ organizations	• Significant ability to partner with organizations involved in reuse, swap and repair activities.
Complexity	Program complexity to user	• Program is very easy to understand and concepts of reduction and reuse are easy to understand.
Convenience	Ease of participation	• Significant convenience to the user as the services will be provided on-site rather than at another location.
Community Safety	Potential for impacts to community safety	• N/A as evaluation only addresses putting standard in place.
Equity	Potential for unequal impacts/benefits to specific groups	• Increased equity with significant benefits to groups using the services, especially those users that do not have access to vehicles.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Some potential to influence or encourage behavior change, depending on use of space (e.g. a sharing library would encourage waste reduction because of materials being shared).
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Minimal to no capital costs for the City. [181]
	Estimated net operating cost	• Minimal to no operating costs to City as option only addresses putting standard in place.

[181] It is assumed that the capital cost will be met by the developer who will be expected to construct the depot and reuse space as part of the permitting process; therefore, the capital cost assumed by the City will be minimal. A business case is required to look at the potential costs to the developer to set aside space and construct components and to look at the potential cost to the City to provide collection, transfer and processing services.

Option 1.9: Updates to Current Multi-Residential New Development Standards		
Criteria	**Indicators**	**Assessment**
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Minimal to no contractual risk.
	Schedule risk	• Minimal to no schedule risk as any construction and installation is part of multi-residential building development and construction.
	Innovation risk	• Some innovation risk as this has never been attempted before and the City will need to consult with developers.
Economic Growth	Potential for local economic growth	• Potential for minimal to no local economic growth as option is only related to developing a standard.
	Potential for regional/global economic growth	• Minimal to no regional/global economic growth.
Potential for Additional Local Job Creation	Additional local job creation	• Minimal to no local job creation as sharing space is likely to be managed by volunteers.
Flexibility	Ability to accommodate future changes	• Significant flexibility to accommodate future changes in markets and materials collected.

Overall System Recommendations – Industrial, Commercial & Institutional

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market to Provide Diversion Opportunities to More Commercial Businesses in City of Toronto

The City currently provides IC&I waste collection service to commercial businesses on City collection routes, and provides disposal options at City transfer stations, as well as at Green Lane Landfill. For waste collected at curbside, IC&I waste collection is financed through the waste utility. Eligible commercial establishments pay for garbage collection and disposal through the Yellow Bag program, and receive Green Bin organics and Blue Bin materials collection at no additional cost. At transfer station facilities and at Green Lane Landfill, IC&I customers are charged a tipping fee on a cost per tonne basis. In this option, the City would expand the number of commercial businesses that are eligible for City collection in order to provide Green Bin organics and Blue Bin materials collection to these businesses that may not have the opportunity to participate due to current eligibility requirements. All City IC&I customers would be required to also participate in Green Bin and Blue Bin service, thus increasing diversion in the IC&I sector.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants. Note: City Strategic Actions #7 is to look at increasing diversion in the IC&I sector.

City of Toronto Experience:

- The City of Toronto currently provides collection service to about 19,000 IC&I customers, consisting of 14,000 business collected at night, and an additional 5,000 businesses collected during the day[182]. Green Bin organics 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. There is a strong financial incentive to minimize garbage, which has a fee, compared Green Bin and Blue Bin collection, which are free.
- Over the past decade, the City has increased tipping fees at its transfer stations and at Green Lane Landfill 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 the feeling is that this market is well serviced by private haulers. Some municipalities have particular

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 sites. 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 $998.71 for an 8-yard container,

[182] Information provided by City staff and Sept 2015 PWIC report – Curbside Waste Collection Services Review.

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market to Provide Diversion Opportunities to More Commercial Businesses in City of Toronto

reasons for getting involved in the IC&I market (tax payer request, to keep private sector rates in line, etc.), but the general trend is towards less involvement.

- 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 Business Improvement Areas (BIAs) 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.

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, 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.
- City is competing with private sector hauler business therefore there is potential for small hauling business to lose hauling contracts which could lead to a strong resistance from waste management industry.
- Uses up disposal capacity more quickly.
- Processing and disposal capacity requirements potentially 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 recyclables and organics processing capacity.
- More City trucks which has 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.

Details of Option undergoing Evaluation: The existing City criteria for providing commercial collection service could be broadened to take account of changing building uses and allow more commercial establishments to use city collection and affordable diversion services, particularly Green Bin organics. In this option,

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market to Provide Diversion Opportunities to More Commercial Businesses in City of Toronto

the City would broaden the criteria for receiving City service and thereby increase the number of businesses[183] that have the option to use City collection services, within existing service areas, up to a limit of potentially doubling the number of commercial businesses serviced. All City IC&I customers would be required to also participate in Green Bin organics and Blue Bin material collection service, thus increasing diversion from the IC&I sector; however, recycling/source separation would not be mandatory for the remaining IC&I sector in the City of Toronto not receiving City collection service. This option would start with a pilot to evaluate the level of interest among the commercial business community, criteria would be developed to receive collection and progress would be reviewed every two years to make sure it still makes sense once implemented. With existing customers, SWMS would need to document the size of the facility, waste streams set out for collection etc., so that approval is not just based on square footage. To better manage the existing customer base, City staff would require an annual renewal process by the customer to confirm the service is still required.

The option assumes that the City will provide collection service (either contracted out or with own forces) and will plan for increased transfer capacity (for IC&I waste, Blue Bin materials and Green Bin organics), increased landfill capacity (for IC&I waste) and expanded processing capacity (for Blue Bin material and Green Bin organics). The amounts of material requiring management could only be determined after the two-year initial pilot period.

This option assumes that the City IC&I collection services will be expanded to provide affordable diversion opportunities to a greater number of commercial customers that do not have City service and are not currently eligible to participate due to current eligibility requirements. The City facilitates higher IC&I waste diversion through direct control during collection by enforcing source separation and more diversion by serviced commercial accounts.

Gap/Challenge/Opportunity: A challenge facing the City is to provide the IC&I sector with options which promote greater diversion and are flexible to accommodate changing waste streams and customer accessibility.

Another challenge facing the City is to find a mechanism to allow the City to influence greater waste diversion in the IC&I sector for waste materials being generated within the City of Toronto, but managed outside the City of Toronto waste management system.

Ownership/Operation: The City will manage service provision, but collection may be by private sector under contract or done internally.

Materials Collected/Diverted: Garbage, Blue Bin materials, Green Bin organics.

Staffing: Additional staff required to create and manage increase of commercial accounts serviced

[183] The City currently provides IC&I waste collection service to 14,254 small commercial businesses during night collection and to 4,782 small commercial businesses during day collection (172 daytime in District 1; 1,951 in District 2; 911 in District 3 and 1,576 in District 4 (Reference: Appendix A to Sept 2015 PWIC report – Curbside Waste Collection Services Review)). Many of these commercial stops are part of the Residential Unit Above Commercial service route, therefore there may only be about 3,000 stand-alone commercial IC&I stops (Technical Memorandum #1, pages 58, 59, 75). A reported 13,586 tonnes of Blue Bin materials, 10,255 tonnes of Green Bin organics (from 6,000 participating IC&I establishments) and 5,206 tonnes of corrugated cardboard (from the night collection) are diverted as a result of the mandatory City source separation policy (garbage is not picked up unless Blue Bin materials are set out). The amount of garbage collected from participating IC&I commercial establishments was 13,470 tonnes in 2014, resulting in high diversion from the commercial stops serviced. The City also provides disposal options for IC&I waste at City transfer stations as well as at Green Lane landfill (74,000 tonnes in 2014 (Technical Memorandum #1, page 75)). Businesses pay for garbage collection through the Yellow Bag program. At transfer station facilities and at Green Lane Landfill, IC&I customers are charged a tipping fee on a cost per tonne basis.

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market to Provide Diversion Opportunities to More Commercial Businesses in City of Toronto

Consideration of Other Infrastructure/Programs: Option will impact collection services under City control; transfer stations; processing facilities for Blue Bin materials and other recyclables and Green Bin organics; and Green Lane Landfill.

Land Requirements: Unlikely to require additional land. Assume current processing and disposal capacity is sufficient to manage additional quantities which may be collected.

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed facilities/transfer station.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. • Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing).
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in bins and Yellow Bags on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Minimal to no additional land required. Assume current processing and disposal capacity is sufficient to manage additional quantities which may be collected. A better estimate of the amount of material involved will be identified through pilot projects.

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market		
Criteria	**Indicators**	**Assessment**
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Some additional on-site energy consumption is related to the impact of increased IC&I tonnages managed at City facilities – e.g. building systems, lighting, heating, etc. Potential for some/significant increase in the City's fossil fuel consumption if additional IC&I material collection is expanded (but potentially less than current private sector fuel consumption as fewer total vehicles may be required through increased City IC&I route efficiencies). • Energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. • Fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles. • Potentially less fossil fuel consumption as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector.
	Greenhouse gas (GHG) contributions	• Potentially less GHG emissions as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector. • Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill and potentially convert to biogas with capture for use as a fuel source.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through potential to increase diversion from landfill and some employment opportunities.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for some ability to increase diversion through exerting direct control over set outs by IC&I establishments.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market		
Criteria	**Indicators**	**Assessment**
Approvals Complexity	Complexity associated with approvals and permitting requirements	• No other approvals appear to be required. Confirm no zoning law issues. Environmental Compliance Approval (ECA) and land use approvals already in place for existing waste management facilities.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some reduction in truck traffic in vicinity of IC&I establishments with efficiencies in City collection. • Potential for some impact at waste management facilities due to increased number of collection vehicles required for additional material.
	Potential for litter increase/reduction	• Potential for minimal to no impact of increased litter as all solid waste materials are expected to be managed inside enclosed buildings. Appropriate operating procedures will occur to minimize potential for litter.
	Potential odour emissions	• Potential for some impact from odour to community. All solid waste materials are expected to be managed inside enclosed facilities which will minimize any odour combined with frequent removal of waste materials.
	Potential noise emissions	• Potential for minimal to no impacts on noise emissions.
	Potential for increased vector/vermin	• Potential for some impact on vector/vermin. Increased IC&I waste and, in particular increased IC&I Green Bin organics, may risk attracting additional vectors and vermin.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities. Capable of serving residents and businesses within Toronto.
Complexity	Program complexity to user	• Program is not complex, some requirement for participant education.
Convenience	Ease of participation	• Relatively easy to access with limited effort required for customer participation.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety. City trucks would displace private sector collection vehicles and City transfer facilities will receive some additional traffic.

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market		
Criteria	**Indicators**	**Assessment**
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for greater equity overall to the IC&I sector as they will have greater access to a broader range of services. • Minimal to no impact on any specific group as service will be offered equally to all eligible IC&I establishments. • Potential for some impact to residents in vicinity of transfer/processing/disposal facilities with increased traffic. Could be offset by a reduction in the number of collection vehicles in the neighbourhood with provision of City service.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Some potential to change behaviour through provision of additional range of collection and support services.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Capital investment will depend on whether City delivers service directly or contracts out. If provided internally, capital costs include purchase of trucks to double fleet size. Potential for capital costs associated with expansion of transfer/processing and disposal costs associated with managing more material, but this may be relatively modest and will not be known until pilots complete.
	Estimated net operating cost	• Operating costs could potentially double depending on uptake and changing eligibility criteria. • Overall operating costs would increase for collection, processing and disposal. • Revenue from Yellow Bag program and premium organics may increase. • Two full time equivalent (FTE) staff members required for pilots and also to assess additional interest in City service and changing servicing standards. Allow $180,000/year for two years, then $90,000/year for one full FTE after third year.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk as services could be provided by City staff or form part of existing contracts with service providers (for collection, processing and disposal).

Option 9.3: Expand City of Toronto Share of IC&I Waste Management Market		
Criteria	**Indicators**	**Assessment**
	Potential for schedule risk	• Potential for minimal to no schedule risk since relatively few additional IC&I facilities would require servicing and would require some additional fleet, staff and modifications to facilities.
	Potential for innovation risk	• Potential for minimal to no innovation risk since service is already provided by the City.
Economic Growth	Potential for local economic growth	• Potential for some local economic growth because three stream collection and recyclable and compostable material processing are more facility (and labour) intensive than waste collection and landfilling.
	Potential for regional/global economic growth	• Potential for some impact on regional or global economic growth if additional processing facilities are required to manage source separated materials.
Local Job Creation	Potential for additional local job creation	• Potential for some additional local job creation in three stream collection and processing.
Flexibility	Ability to accommodate future changes	• Some potential to accommodate future changes to material composition or quantities.

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies

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

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants - Note: City Strategic Actions #7 is to look at increasing diversion in the IC&I sector.

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%[184].
- Pro-rating provincial figures, 900,000 tonnes of IC&I waste is disposed by Toronto IC&I waste generators[185].
- 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 U.S. (as low as $8 to $10 U.S./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 (reduce, reuse, recycle) 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

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 that all IC&I properties 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 needed 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

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[184] Statistics Canada: Waste Management Industry Survey: Business and Government Sectors (2010). Catalogue # 16F0023X

[185] Statistics Canada (2010) report that approximately 6 million tonnes (6,043,151 tonnes – see Table 1.2, Page 16) of non-residential waste was disposed from Ontario sources in 2010. About 1 million of 6 million tonnes disposed is CRD (personal communication with Statistics Canada staff), therefore 5 million are IC&I. Pro-rating these numbers to Toronto by population (2.6 million of 13.5 million Ontario population = 18.5%) about 900,000 tonnes of IC&I waste is disposed from City of Toronto businesses. A relatively small amount is managed by the City. The remainder is currently managed by the private sector. Composition of disposed ICI waste in other jurisdictions indicates that 22% is food and additional 22% is paper based materials. Some of this material will be addressed with future provincial policies.

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies

extents, from no involvement, to some service involvement, to implementing policies to encourage or force diversion. The reasons for different approaches vary locally.

- 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 which is voluntary.

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

- As of July 1, 2012, California state law requires that businesses that generate four cubic yards or more of commercial solid waste per week are required to establish and maintain recycling service.
- In 2008, a City ordinance was passed in Boston, MA 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 would be seen as a leader for diverting waste it is not responsible for (IC&I waste) through innovative policies and by-laws.
- Less IC&I waste would be sent 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 a burden 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.
- Potential new licensing 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 the residential sector or not), including collection fleets and processing facilities.
- 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.

Potential Outcomes:

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

Details of Option undergoing Evaluation: In this option, the City would require that all IC&I establishments in the city source separate recyclables and Green Bin organics for separate management and diversion through new by-laws, policies and enforcement to achieve IC&I waste diversion objectives. Alternatively, or in conjunction with mandatory source separation, the City would require service providers to provide source separated recyclable and organics collection service and annual quantity reporting as a condition of licensing. Both provisions would be implemented through new by-laws.

Gap/Challenge/Opportunity: A challenge facing the City is trying to find a mechanism to allow the City to influence greater waste diversion in the IC&I sector for waste materials being generated within the City of Toronto, but managed outside the City of Toronto waste management system.

Ownership/Operation: Assume City would continue to provide collection, processing and disposal of IC&I waste to its current customers. Administration and enforcement of policies would be the responsibility of the City.

Materials Collected/Diverted: Garbage, Blue Bin materials and potentially other IC&I recyclables, Green Bin organics.

Staffing: Additional staff required, including additional enforcement staff.

Consideration of Other Infrastructure/Programs: Option will have a significant impact on by-law enforcement staff, and if it results in additional IC&I waste being managed by the City, could affect processing facilities for Green Bin organics.

Land Requirements: No additional land required.

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies and By-Laws		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. • Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing).
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies and By-Laws		
Criteria	**Indicators**	**Assessment**
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Potential for minimal to no land use displacement. The total amount of IC&I waste collected does not change. It would simply be separated into different sized streams (e.g. less IC&I waste, more Blue Bin materials and more Green Bin organics). Additional system-wide processing capacity for Blue Bin materials and more Green Bin organics may be needed (but offset by less capacity needed for un-processed IC&I waste).
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Some additional on-site energy consumption is related to the impact of increased IC&I tonnages managed at City facilities – e.g. building systems, lighting, heating, etc. • Minimal to no change in overall fossil fuel consumption. There may be some increase in the City's fossil fuel consumption if additional IC&I material collection is expanded but will be offset by the reduction of current private sector fuel consumption as fewer total vehicles may be required through increased City IC&I route efficiencies). • Fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles. • Potentially less fossil fuel consumption as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector.
	Greenhouse gas (GHG) contributions	• Potentially less GHG emissions as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector. • Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill and potentially conversion to biogas with capture for use as a fuel source.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public. Unlikely to result in negative impacts. Potential for small positive impact on health through potential to increase diversion of waste from landfill and some employment opportunities.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies and By-Laws		
Criteria	**Indicators**	**Assessment**
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for significant IC&I waste diversion above existing levels. Assuming 20% of Toronto IC&I waste which is currently landfilled (900,000 tonnes/year) would be diverted as a result of the policies (if properly enforced). Incremental diversion could be up to 225,000 tonnes/year[186]. This estimate does not consider potential impacts of Waste Free Ontario Act regulations, which may include an organics disposal ban over time.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Option requires further consideration of what new by-laws might be legally permissible and which ones may be contentious and, therefore require further consideration.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact on traffic depending on how different quantities of the three streams of IC&I material (waste, recyclables and Green Bin organics) are collected and by whom (e.g. in a totally free market scenario, more trucks/service providers might be servicing less densely located IC&I establishments).
	Potential for litter increase/reduction	• Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more IC&I recyclables) can be managed by requiring proper collection containers and collection schedules.
	Potential odour emissions	• Potential for some impact on odour emissions. Increased separated IC&I Green Bin organics collection, transfer and processing will require odour control diligence (and some of these facilities may not be City owned and controlled).
	Potential noise emissions	• Potential for minimal to no impacts on noise emissions. Increased quantities of IC&I recyclables and Green Bin organics managed should not increase noise emissions provided the three streams are efficiently collected (i.e. no significant increase in truck traffic) and efficiently processed at properly licensed and inspected facilities.

[186] Approximately 900,000 tonnes of ICI waste generated in City of Toronto are currently disposed (Statistics Canada 2010 WMIS Survey).

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies and By-Laws

Criteria	Indicators	Assessment
	Potential for increased vector/vermin	• Potential for some impact on vector/vermin. Increased separated IC&I Green Bin organics (and to a lesser extent increased IC&I Blue Bin materials diversion) may attract additional vectors and vermin (partly offset by the collection and transfer of less waste).
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities with other municipalities or organizations regarding collection. • Potential for minimal to no partnership opportunities with other municipalities and organizations on new processing facilities as private sector likely to establish these independently from City (the City role is to establish and enforce the policies, and the private sector will implement).
Complexity	Program complexity to user	• Program is complex and requires significant participant education, depending on the policy chosen. If hauler licencing approach is used, then significant hauler, as well as IC&I customer, education will be needed, as more source separation will be needed at each location.
Convenience	Ease of participation	• Not convenient for IC&I generator who currently does not separate Blue Bin materials and Green Bin organics.
Community Safety	Potential for impacts to community safety	• Potential for some impact on community safety with increased numbers of collection vehicles collecting different waste streams.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for some impact on specific groups, for example, smaller collection contractors with limited capacity in terms of number of trucks will have difficulty offering three-stream source separation collection to their existing customer base in a cost efficient manner. Three stream collection, transfer and processing services will cost more than current garbage only service. Larger companies are better set up to provide these services.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Some potential to change behaviour and raise awareness of purchasing choices through the act of source separation of the waste stream, which raises awareness of what is being wasted. Also promotion and education activities, campaigns, strategies, and policy enforcement raise awareness of the waste issue and in some cases may lead to behaviour change.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• No direct on-going capital cost to City as policies will push implementation to private sector haulers. Additional staffing costs include internal legal and program implementation. • Additional capital costs may be incurred by the City if provision of service to more IC&I locations is required (e.g. fleet, expansions to processing facilities etc.).

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies and By-Laws		
Criteria	**Indicators**	**Assessment**
	Estimated net operating cost	• Operating cost will involve expenditure of about $1.3 million/year on enforcement staff[187]. • Additional operating costs may be incurred by the City if provision of service to more IC&I locations is required (e.g. collection and processing operational costs).
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk as services could be provided by City staff or form part of existing contracts with service providers (for collection, processing and disposal). Contractual risk is manageable.
	Potential for schedule risk	• Potential for some schedule risk related to implementing enforcement of new by-laws requiring additional IC&I waste diversion.
	Potential for innovation risk	• Potential for minimal to no innovation risk because this approach is proven in other locations.
Economic Growth	Potential for local economic growth	• Potential for some local economic growth because three stream collection and recyclable and compostable material processing are more facility (and labour) intensive than waste collection and landfilling.
	Potential for regional/global economic growth	• Potential for some impact on regional or global economic growth if additional processing facilities are required to manage source separated materials.
Local Job Creation	Potential for additional local job creation	• Potential for some additional local job creation in three stream collection and processing.
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility. Private contractors will compete by offering different three stream collection and processing services to the City's IC&I sector.

[187] It would cost $900,000 for 10 enforcement officers (assuming there are 100,000 businesses and that one enforcement officer for each 10,000 businesses would be required, with an average salary of $90,000 ($70,000/year average +23% payroll pressure)), plus the salary for one unit manager ($100,000 plus 23%) and $100,000 for miscellaneous legal, promotional, educational and other costs.

Option 9.5: City of Toronto Exits the Industrial, Commercial and Institutional (IC&I) Waste Management Service Business To Simplify Its Service Offering and Potentially Preserve Landfill Capacity

The City currently provides IC&I (Industrial, Commercial and Institutional) waste collection service to over 19,000 commercial businesses on City routes, and provides disposal options at City transfer stations as well as at Green Lane Landfill. For waste collected at curbside, IC&I waste collection is financed through the Solid Waste Utility. Participants pay for garbage service through the Yellow Bag program. Green Bin and Blue Bin service are provided at no additional cost. At transfer station facilities and at Green Lane landfill, IC&I customers are charged a tipping fee on a cost per tonne basis. This option involves the City (to the extent practical, given the requirement to collect waste from Residential Units Above Commercial (RUAC)) transitioning out of the collection and management of IC&I waste, thereby eliminating influence over IC&I waste diversion unless other policy options are adopted. 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. 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, and Blue Bin materials and Green Bin organics collection at no additional fees, only Yellow Bag program fees, will need to contract with private sector haulers for collection service.

System Component: Overall System Considerations

Source of Option: Consultation, City Staff & Consultants.

City of Toronto Experience:

- There are an estimated 100,000 businesses in the City. About 19,000 of these are served by City collection.
- Over the past decade, the City has increased tipping fees at its transfer stations and at Green Lane Landfill which has provided a disincentive for IC&I loads which are utilizing alternative 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.
- Some cities have exited the market after many years of involvement in IC&I waste management.
- 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.

Case Studies/Examples:

- Ottawa, ON tried unsuccessfully to fully exit the 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 U.S. 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 IC&I customers and will be penalized if they do not achieve and maintain these goals. Examples include:
  - Santa Clarita, CA (hauler must achieve 50% diversion)
  - Boston, MA (hauler must provide diversion services)
  - Seattle, WA (must provide diversion services)

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies and By-Laws		
Criteria	**Indicators**	**Assessment**
		◦ Elk Grove, CA (haulers must prove that they achieve 30% diversion to be allowed to service the IC&I sector). • Portland, OR has franchising for residential services, but not for IC&I services as businesses don't want it because 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:

- IC&I waste generators above a certain size are currently regulated under O. Reg. 103/94 to source separate some recyclables (but not organics). The regulations are not enforced and they apply to relatively few businesses. They are likely to be replaced with the proposed *Waste-Free Ontario Act*, which over time will implement new regulations to reduce IC&I waste disposal.
- Residents and businesses may expect City to have a role and provide service to IC&I sector, as well as to keep City streets clean.
- Option is not consistent with City Strategic Action #7: Look at Increasing ICI waste Diversion.
- May not be viable as most commercial collection is linked to residential collection from Residential Units Above Commercial, and truck has to provide residential collection in either case, so incremental ICI collection is practical. Trucks likely need to go down most routes anyway to service residential.
- 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 needed for City union staff currently on night collection, as well as day collection, which include 4,000 IC&I stops; reduced number of vehicles will be required to collect the remaining Residential Units Above Commercial waste.

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.

Option 9.4: City Implements Industrial, Commercial and Institutional (IC&I) Waste Diversion Policies and By-Laws		
Criteria	Indicators	Assessment

- City no longer accepts private loads at transfer stations.
- Fewer City trucks (elimination of night collection) mean implications for staffing, reduced maintenance requirements, reduction in size of city fleet, garages, maintenance staff.

Details of Option undergoing Evaluation: In this option, the City would exit the IC&I waste collection, processing and disposal market, which in turn would require the private sector 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, 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) and would eliminate influence over IC&I waste diversion unless other policy options are adopted.

The main assumption for this option is that all businesses in Toronto that currently receive City collection (including Blue Bin materials and Green Bin organics collection), and pay for this through the Yellow Bag program, will need to contract with private sector haulers for all waste management services. This option assumes that City service to the IC&I sector would be phased out over time (i.e. three to five years), but that no policies are implemented by the City to force IC&I establishments to source separate and divert waste. Option 9.4 (City Implements Industrial, Commercials and Institutional Waste Diversion Policies and By-laws) would be a logical pairing with this option to ensure that diversion continues, but is not evaluated in this evaluation. It is assumed that the City would undertake extensive public and stakeholder consultation to inform the change process if this direction were to be considered. A business case may discover that this is not a practical option as City trucks need to service all IC&I routes to collect from Residential Units Above Commercial businesses. Regulations are anticipated under the proposed *Waste-Free Ontario Act* (likely within the next five years) which will address IC&I waste diversion through disposal bans as well as possibly mandatory source separation. The Province plans extensive consultation on development of these regulations, therefore the content is not known at this time. These regulations will require at least some or most IC&I establishments to divert waste in the future.

Gap/Challenge/Opportunity: A challenge facing the City is trying to find a mechanism to allow the City to influence greater waste diversion in the IC&I sector for waste materials being generated within the City of Toronto, but managed outside the City of Toronto waste management system. This challenge will be addressed to some extent with future Provincial regulations.

Ownership/Operation: No City involvement, the private sector would be responsible for management of IC&I waste.

Materials Collected/Diverted: Garbage, Blue Bin materials and other recyclables, Green Bin organics.

Staffing: May result in a reduction in staff with less material collected/processed.

Consideration of Other Infrastructure/Programs: Option will have a significant impact on collection (fleet and staff), processing (Blue Bin materials and Green Bin organics), hauling and disposal at Green Lane Landfill (which may extend life of landfill), less traffic at transfer stations and waste being managed.

Land Requirements: No additional land required.

Option 9.5: City Exits the Industrial, Commercial and Institutional (IC&I) Waste Management Service (and Does Not Implement Mandatory Diversion Policies)		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities. Water consumption requirements would be (marginally) reduced at City facilities.
	Total land required and land use displacement	• Potential for minimal to no land use displacement related to City operations.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Reduced energy consumption is related to City processing facility/transfer station building systems, lighting, heating, etc. • Reduced fossil fuel consumption related to City on-site equipment operation and collection/transfer vehicles.
	Greenhouse gas (GHG) contributions	• Potentially more GHG emissions related to increase in number of private sector collection vehicles. • Potentially more GHG emissions if Green Bin organics are no longer diverted (if private sector does not offer source separated collection of this material).
Public Health	Potential to impact human health	• Potential for an adverse impact on public health through a potential for reduction in waste diversion from landfill, job losses due to less waste being collected.

Option 9.5: City Exits the Industrial, Commercial and Institutional (IC&I) Waste Management Service (and Does Not Implement Mandatory Diversion Policies)		
Criteria	**Indicators**	**Assessment**
Impact/Benefit	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• The City currently achieves good diversion of the waste from the IC&I businesses it services.[188] There may be reduced potential to divert reusable or recyclable material if private sector service provider does not offer collection of source separated waste. • A disadvantage of the elimination of the City's collection of IC&I waste is that the City would have a reduced ability to measure overall IC&I waste diversion system performance.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for minimal to no complexity associated with approvals and permitting requirements, as City is no longer involved with IC&I waste management.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact on traffic depending on how different quantities of the three streams (IC&I waste, Blue Bin materials and Green Bin organics) are collected and by whom (e.g. in a totally free market scenario, more trucks/service providers might be servicing less densely located IC&I establishments).
	Potential for litter increase/reduction	• Potential for some impact on litter. The replacement of City services with a range of different private collection service providers could lead to additional litter if proper bin systems are not utilized.

[188] A reported 13,586 tonnes of Blue Bin material, 10,255 tonnes of Green Bin organics (from 6,000 participating IC&I establishments) and 5,206 tonnes of corrugated cardboard (from the night collection) are diverted as a result of the mandatory City source separation policy (garbage is not picked up unless Blue Bins are set out) (Technical Memorandum #1, pages 58, 59, 75). Garbage collected from participating IC&I establishments was 13,470 tonnes in 2014.

Option 9.5: City Exits the Industrial, Commercial and Institutional (IC&I) Waste Management Service (and Does Not Implement Mandatory Diversion Policies)		
Criteria	**Indicators**	**Assessment**
	Potential odour emissions	• Potential minimal to no impact on odour emissions. Private collection fleets, transfer, processing and landfill facilities will still require proper permitting and approvals and be subject to current and enhanced enforcement measures (i.e. additional by-laws and enforcement staff).
	Potential noise emissions	• Potential for minimal to no impacts on noise emissions. Private collection fleets, transfer, processing and landfill facilities will still require proper permitting and approvals and be subject to current and enhanced enforcement measures (i.e. additional by-laws and enforcement staff).
	Potential for increased vector/vermin	• Potential for some impact on vector/vermin. The replacement of City services with a range of different private collection service providers could lead to increased vector/vermin issues if proper bin systems are not utilized.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities with other municipalities or other organizations.
Complexity	Program complexity to user	• Program is complex and requires significant participant education.
Convenience	Ease of participation	• Not convenient/easy to access, requires significant effort for customer to participate.
Community Safety	Potential for impacts to community safety	• Potential for some impact on community safety with increased numbers of private collection vehicles collecting different waste streams.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for some impact on specific groups, especially small and medium sized businesses as private service may be more expensive.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for negative behavior change as waste generator access to current range of services could be reduced.
Financial Impact/Benefit		

Option 9.5: City Exits the Industrial, Commercial and Institutional (IC&I) Waste Management Service (and Does Not Implement Mandatory Diversion Policies)		
Criteria	**Indicators**	**Assessment**
Cost	Estimated net capital cost	• Reduction in capital costs associated with IC&I collection and management from utility budget.
	Estimated net operating cost	• Reduction in operating costs of for IC&I waste management. • Reduction in revenue from Yellow Bags and sale of Blue Bin materials.
Health Care Cost Implications	Potential to increase health care costs	• Uncertain although unlikely that the option will result in increased health care costs.
Risk	Potential for contractual risk	• Minimal to no contractual risk since private sector assuming all waste management services.
	Potential for schedule risk	• Minimal to no schedule risk since private sector assuming all waste management services.
	Potential for innovation risk	• Minimal to no innovation risk since private sector assuming all waste management services.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth because the same amount of waste is handled, it is just managed differently.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth because the same amount of waste is handled, just by different providers..
Local Job Creation	Potential for additional local job creation	• Minimal to no change to local job creation because the same amount of waste is handled, just by different providers.
Flexibility	Ability to accommodate future changes	• Potential for significant flexibility. Private contractors will compete by offering different collection and processing service options to the City's IC&I sector.

Overall System Recommendations – Construction, Renovation & Demolition

Option 10.1: Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste

City of Toronto establishes drop-off depots for Construction, Renovation and Demolition (CRD) waste (mixed and source separated) and a CRD Waste Processing Facility to process CRD wastes for end markets. The CRD processing facility could be established alone or in partnership with other municipalities or companies to provide mixed CRD waste processing. CRD policies such as mandatory separation and economic incentives for developers and CRD companies (e.g. deposit/return programs to encourage CRD waste recycling) would be implemented to encourage CRD waste generators to bring their materials to the drop-offs and processing facility.

System Component: Overall System Considerations

Source of Option: City Staff and Council

City of Toronto Experience:

- It is estimated that there are approximately 360,000 tonnes of CRD waste generated annually within the City of Toronto.[189]
- In 2014, Toronto diverted 2,733 tonnes of scrap metal from paid private loads at its depots and curbside collection programs.
- Currently, the City diverts limited quantities of drywall (less than one tonne per customer permitted) and scrap metal at three of its seven transfer stations for a fee.
- The City accepts other CRD waste from smaller renovation companies for a fee at transfer stations but it is treated as garbage.
- The current barrier to higher CRD diversion is that markets cannot be found for many dropped off materials (e.g. asphalt shingles are dropped off with nails and wood attached; markets want clean asphalt).
- The City has developed the Toronto Green Development Standard for public and private construction projects. These standards set requirements for Tier 1 (mandatory) and Tier 2 (voluntary) performance measures. There are no CRD waste diversion requirements under Tier 1 and 75% diversion under Tier 2.

Municipal/Waste Industry Experience:

Case Studies/Examples:

- The Region of Peel has six Community Recycling Centres (CRCs). Each CRC accepts CRD waste, including shingles at no cost and carpet, drywall, rubble (i.e. concrete and aggregate), insulation and clean wood for a fee. The CRCs target the small home renovation market.
- York Region's two Community Environmental Centres (CECs) accept CRD materials (drywall, scrap metal, clean fill, corrugated cardboard (CC), concrete, clean wood) and until 2014 had partnered with Habitat for Humanity to divert reusable CRD materials. From 2009, Habitat for Humanity had collected approximately 166 tonnes of reusable material at the CECs. Due to staffing issues, Habitat for Humanity chose not to renew its lease at the CECs after 2014.[190]
- The Region of Waterloo offers drop-off for CRD materials (drywall, scrap metal, clean fill, CC, concrete, clean wood) at its two waste management centres and has partnered with Habitat for Humanity to establish a drop-off for reusable CRD materials. The Region has piloted a diversion program for asphalt shingles.
- Wales is establishing Trade Waste Bring Sites to enable small builders to bring CRD materials for recycling and re-use.
- The European Union has introduced targets for the diversion of non-hazardous CRD waste through the European Waste Framework Directive,

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[189] Toronto Tech Memo #1 prepared by HDR, Final 15th August, 2015.

[190] Ending Occupancy Agreements with Habitat For Humanity At Community Environmental Centres. February 26, 2014 from the Commissioner of Environmental Services, York Region

Option 10.1: Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste

- In Metro Vancouver it is estimated that 25% of CRD waste generated comes from the renovation sector.[191]
- It is estimated that 35% of the CRD waste generated in Canada is from the residential renovation sector.[192]
- Most municipalities do not accept CRD waste at the curb and small contractors or home renovators must find alternative disposal or diversion outlets. Much CRD waste is sent for disposal.
- Most CRD companies are considered small/medium enterprises. In Canada, nearly 70% of construction/renovation firms working in the residential sector have fewer than five employees. [193]
- The CRD waste stream in Canada is mainly comprised of the following materials: clean wood (19.5%), asphalt roofing (10%), engineered wood (9%), drywall (9%), painted wood (8%), plastic (5%), and concrete (3%). It contains very little metal as good markets provide incentives to recycle the metals. [194]
- Two CRD processing facilities located in the Greater Toronto Area (GTA) (Vaughan and Etobicoke) closed in 2014/2015 due to low disposal tipping fees at Ontario and U.S. landfills, making it uneconomical to run CRD processing facilities at higher tipping fees. One facility was open for less than two years.
- Many CRD processing facilities claim to divert 70% to 85% of the CRD waste they receive.[195],[196]
- Municipalities in the Western U.S. states have policies and programs in place to divert CRD waste using regulatory and economic incentives to drive diversion. which requires 70% diversion by 2020.
- Denmark and Germany require the source separation of designated CRD materials.
- Oxford County, ON imposes differential tipping fees for separated recyclable CRD loads and offers diversion bins for recyclable CRD wastes. The CRD waste depot, open to the public and businesses six days a week, diverts: asphalt, concrete and masonry, metal, untreated wood, wood scrap, pallets/crates, drywall, asphalt shingles, and porcelain/toilets.
- In January 2012, the City of Edmonton opened its new construction and demolition (C&D) waste recycling facility at the Edmonton Waste Management Centre. The $4.3 million facility uses both mechanical and manual sorting to separate loads of mixed material and is expected to process 100,000 tonnes of mixed construction and demolition material per year, recovering up to 70% of the material for recycling.
- The City of San Francisco implemented its Construction and Demolition Debris Recovery Ordinance on July 1, 2006 requiring all contractors in the city to send their CRD debris to a certified facility for recycling.
- In the Netherlands, mixed CRD loads are separated at government certified CRD sorting plants and landfills can accept waste only from certified operators, who sort and certify loads.
- Massachusetts is the only U.S. state with CRD material bans. These state-wide bans have helped foster the recycling industry, and the state now has 21 CRD processing facilities. CRD processors have lower tipping fees than landfills.
- San Francisco enacted an ordinance in 2006 requiring that all mixed CRD

[191] Market Analysis of Used Building Materials in Metro Vancouver. February 2012. Prepared by Kane Consulting. Prepared for Metro Vancouver

[192] Characterization and Management of Construction and Demolition (CRD) Waste in Canada. March 2015. Prepared for Environment Canada. Prepared by Kelleher Environmental and Guy Perry and Associates in association with Robins Environmental and SAMI Environmental.

[193] Source: Build Force Canada (Government of Canada) fast facts at http://www.buildforce.ca/en/media/facts

[194] Characterization and Management of Construction and Demolition (CRD) Waste in Canada. March 2015. Prepared for Environment Canada. Prepared by Kelleher Environmental and Guy Perry and Associates in association with Robins Environmental and SAMI Environmental.

[195] Source: Report on Demolition, Land Clearing and Construction Material Recovery Facilities Study. March 2015. Prepared for Metro Vancouver.

[196] Communications with owner of Countrywide Recycling. September 17, 2014.

Option 10.1: Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste

- Regulatory requirements may include requirements to send CRD wastes to approved recycling facilities, mandatory diversion targets and waste diversion plans.
- Economic incentives may include diversion deposit/refunds (a deposit is paid with the building permit application and is refunded when diversion is proven), higher development density levels for high diversion projects, elimination of sales tax on used CRD materials, differential tipping fees and tax credits for donations of reusable materials.

debris be transported off-site by a registered transporter and taken to a registered CRD recycling facility that processes the mixed CRD debris for recycling.

- Legislation enacted 2008 in Spain requires CRD waste separation on-site and prohibits the disposal of CRD waste without prior treatment (processing), to discourage the disposal of recyclable CRD waste.
- San Diego has a CRD Debris Deposit Program in which CRD developers must pay a $/ft^2 deposit that will be fully returned if they can provide proof of achieving at least 50% of the waste was diverted from disposal.

Considerations:

- Under the proposed *Waste-Free Ontario Act*, the Province may impose Provincial disposal bans on many CRD materials over time. This will have a number of consequences for the management of CRD waste by generators, who may be more interested in source separating and dropping off waste loads at City drop-offs.
- The Province may also require municipalities to implement a range of policies targeting various materials including CRD wastes. The details will not be known until draft regulations are released for comment which are not expected until after 2017.
- Ability for the City to demonstrate leadership in helping the renovation industry and do-it-yourself (DIY) home renovators address diversion.
- City helps a sector that does not currently have easy access to diversion opportunities.
- Potential opportunity to develop local jobs and green economy with policies that drive diversion.
- Need to determine availability and stability of markets for processed CRD materials, and plan for market volatility and periods of low demand for the materials produced.
- An education/outreach program will be needed to notify CRD industry and small renovation companies of policies as well as opportunities at City transfer stations.
- A business case would need to be developed to determine what support mechanisms would be needed to make the CRD processing facility a successful endeavour.
- Need to consider potential for increased illegal dumping.
- Outreach to determine potential public and/or private partnerships.
- There may be concern from the CRD industry about the City's involvement in CRD processing.
- Education and outreach to the CRD industry, focusing on small companies that do residential renovations, as well as directly to do-it-yourself renovators to notify them of new supporting policies and processing opportunities.

Potential Outcomes:

- The option is consistent with the circular economy which is a Provincial policy objective under the proposed *Waste-Free Ontario Act*.
- City becomes involved in diverting CRD waste generated as part of the residential waste stream.

Option 10.1: Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste

- The City provides diversion options for DIY home renovators and small/medium enterprise renovators, which would otherwise not be viable.
- The City helps to drive diversion of CRD materials for which markets are directly available, and prepares other CRD materials to create a quality suitable for sale to available end markets.
- The City helps to boost existing CRD recycling markets and encourage the development of new markets for materials.
- City shows commitment to diversion of CRD waste.
- Creation of new jobs and development of a local green economy.

Details of Option undergoing Evaluation:

The City would establish dedicated CRD drop-off bins at each transfer station to enable easy diversion of CRD wastes. The drop-off depots would accept materials[197] such as clean wood, drywall, concrete, plastic piping, corrugated cardboard, Metal Items, ceramics and asphalt shingles for a lower tipping fee. Mixed CRD waste would be accepted for a higher fee. The City would be responsible for all aspects of designing, implementing and managing the drop-off bins located within existing transfer stations. The City established contracts to have the materials processed at licensed recycling facilities. The City would hire staff at each transfer station to oversee the CRD drop off depots, ensuring that the waste is properly sorted and help with other diversion programs.

Alone or in partnership with other municipalities or companies, the City would establish a CRD Waste Processing Facility to process CRD materials for end markets. This would address the current barrier that markets cannot be found for many CRD materials without additional processing. This option assumes that the City will choose to construct a new facility but it could purchase an existing CRD recycling facility and retrofit if necessary, which could potentially expedite the implementation of a CRD diversion program.

The City would develop policies and legislation as well as provide economic incentives to increase CRD waste diversion in Toronto's CRD industry. These initiatives would be analyzed to determine which were the most appropriate and effective to increase diversion. Toronto would take responsibility for consulting with industry, conducting a cost/benefit analysis on the approaches and developing a communication strategy, implementation plan and schedule. The policies could include mandatory source separation and processing requirements and economic incentives (e.g. differential tipping fees, CRD debris deposit, requirement of proof of recycling to get occupancy permit etc.) to encourage greater reuse and recycling of CRD waste, and use of the drop offs and processing facility.

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

Gap/Challenge/Opportunity: A challenge facing the City is how to manage residential renovation waste and provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and accessibility[198]. Another challenge facing the City is how to better promote and facilitate diversion of CRD materials generated by the CRD sector, which comprises a significant amount[199] of the total waste stream generated in the City. To date, there has been no pressure placed on the CRD sector by the City to encourage diversion and ensure a level playing field for CRD companies. Private sector initiatives to construct and operate CRD recycling facilities in the GTA have failed due to lack of business as disposal remains the cheaper option.

Ownership/Operation: Assume drop-off depots and also CRD processing facility are all City-owned. Operation can be by City staff or contracted out under City supervision. Policies are developed, implemented and enforced by the City.

Materials Collected/Diverted: Mixed CRD loads which would contain various types of wood (clean and treated) asphalt shingles, drywall, plastic, concrete and small amounts of rubble and metal, as well as source separated loads of clean wood, drywall, cardboard, concrete and masonry, metal, pallets/crates, asphalt shingles, paper, porcelain/toilets and plastic piping. that would be source separated at sites where viable, if tipping fees provide sufficient incentives.

Staffing: Additional staff required to run depots and also CRD processing facility and implement promotion and outreach strategy. Additional enforcement staff needed for policies.

Consideration of Other Infrastructure/Programs: Drop-off element would be undertaken at transfer stations. CRD processing could be at an existing City property (re-developed), or at a CRD recycling facility purchased by the City.

Land Requirements: No additional land required if located at existing transfer stations. Minimal additional land required for some roll-off bins at future drop-off depots. A CRD recycling facility needs one to two hectares[200] for a stand-alone site, or 6,000 square meters if it can be located at an existing City property.

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Minimal to no impact/benefit to land as all recyclable CRD materials would be received by City staff and placed in bins located at the transfer stations, and would be processed indoors. Policies would support the operation of both transfer station drop-offs and processing facility.

[198] Note that this option was added at the direction from Committee and was not part of the gaps, challenges and/or opportunities identified in Technical Memorandum #2.
[199] See details in chart "Potential to Increase Diversion".
[200] Based on size of Countrywide Recycling facility (construction and demolition recycling facility in Hamilton, ON) which is 60,000 square feet (building only) or 0.5 hectares, with additional four hectares for outside infrastructure, roads, parking, scales, etc.

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
	Potential impacts to local airshed	• Some additional air emissions related to more trucks going to and from transfer stations and also to processing facility. • Minimal to no release of emission to the atmosphere, such as dust, as all recovered materials are collected in bins at the transfer stations, and processing will occur indoors.
	Potential impacts to local water sources	• Minimal to no release of potential contaminants to water as recycled CRD materials would be collected in bins located at the transfer station (or other drop off site) with stormwater management controls on-site, and processing facility would have stormwater management on site.
	Potential water consumption requirements	• Minimal to no water required except for periodic bin cleaning requirements, and some water required for processing of CRD materials (minimal) and for dust management inside the building.
	Total land required and land use displacement	• Minimal to no additional land use displacement for drop off as bins will be located within the footprint of the existing transfer stations (or other planned drop-off depot). Minimal additional space (for 6,000 sq. m or 60,000 square foot building) if located at existing Toronto location. If new site, some land displacement for up to two hectare site. Minimal displacement if existing facility purchased.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Some energy and fossil fuel generation/consumption as more trucks will be driving to the drop-off bins will be located at the transfer stations (or other potential drop-off sites) and a small amount of additional transportation required to dispose of left-over materials by generator. • Some energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. • Some fossil fuel consumption associated with transfer of materials. Minimal additional energy associated with lighting or equipment expected.
	Greenhouse gas (GHG) contributions	• Positive GHG impact as wood waste, a methane generating material, would be diverted from landfill. • Positive upstream GHG benefit of recycling materials and preserving resources, avoiding the need for some material extraction (wood, aggregate, sand).
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through potential to increase diversion from landfill and some potential for increase in jobs and access to City services (waste management services).

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures at both drop-off and processing facilities.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• High potential for diversion. After CRD waste has been processed and made suitable for end markets, there is potential for diversion of up to 110,000 tonnes or more of CRD waste as long as CRD generators bring their materials to the drop-off or processing facilities, and adhere to requirements of new policies. Enforcement by City essential to success of policies.[201],[202] Most of this CRD waste does not currently enter the City system and is managed, predominantly as waste, at a series of private sector transfer stations throughout the GTA.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		

201 It is estimated that the drop off depots could potentially divert 4-6% (34,000 -52,000 tonnes at 50% and 75% capture rate, respectively) of residentially generated renovation waste targeting clean wood waste, drywall, asphalt roofing, carpet, plastics and cardboard). It is estimated that there are approximately 360,000 tonnes of C&D (Construction and Demolition) waste generated annually within the City of Toronto (Toronto Tech Memo #1 prepared by HDR).
In Metro Vancouver it is estimated that 25% of CRD waste generated comes from the residential renovation sector (Source: Market Analysis of Used Building Materials in Metro Vancouver. February 2012. Prepared for Metro Vancouver). It is estimated that 35% of the CRD waste generated in Canada is from the residential renovation sector (Source: Characterization and Management of Construction and Demolition (CRD) Waste in Canada. March 2015. Prepared for Environment Canada by Kelleher Environmental and Guy Perry Associates, in association with Robins Environmental and SAMI Environmental).
The residential renovation waste stream contains up to 40% recyclable wood waste, 10% asphalt roofing, 9% drywall, 5% plastic/carpet and 1% Cardboard (Source: Characterization and Management of Construction and Demolition (CRD) Waste in Canada. March 2015. Prepared for Environment Canada).

202 It is estimated that there are approximately 360,000 tonnes of C&D (Construction and Demolition) waste generated annually within the City of Toronto (Toronto Tech Memo #1 prepared by HDR). If Toronto was to enact legislation requiring source separation of CRD waste and/or landfill bans of designated CRD waste then it should potentially capture at least 50% of available CRD material of which 75 - 80% could be diverted (based on Edmonton's C&D Recycling facility) with the remaining 20-25% disposed as waste and residue.

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Minimal to no approvals required for transfer station drop-off depots. • Standard requirement for an Environmental Compliance Approval and land use planning approvals will be required for CRD processing facility. Approvals could be simpler if Toronto chose to take over existing closed CRD recycling facility. • Approvals for policies and new by-laws, which although may be contentious and require consultation, are not particularly complex.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Minimal to no increase in traffic related to drop-off component as renovation companies would be coming to the transfer stations to drop off waste for disposal anyway, but may make more trips with source separated loads (considered unlikely due to time constraints). • Potential for additional traffic from haulers collecting mixed CRD waste from CRD sites and transporting to the CRD recycling facility for processing.
	Potential for litter increase/reduction	• Minimum to no increase/decrease in litter as the materials will be contained in the bins and processing occurs in a covered facility. • Some potential for increased illegal dumping for those that do not want to adhere to source separation and recycling requirements.
	Potential odour emissions	• Minimal to no increase/reduction in odour emission as no putrescible waste is involved.
	Potential noise emissions	• Some potential for increase in noise emissions as more trucks going to transfer station drop-offs and processing facility, and may cause some additional noise related to the saw tooth arrangement. • Potential for some noise from the CRD recycling facility but should be mitigated through good management practices.
	Potential for increased vector/vermin	• Minimal to no increase/reduction in vector/vermin problems as no putrescible waste is involved.

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
Collaboration	Ability to partner with other municipalities/ organizations	• Some ability to partner with reuse organizations as bins will be managed at the transfer stations, but reuse organizations could take some of the dropped off materials. • Some potential to collaborate with neighbouring municipalities or the private sector to jointly own or operate the processing facility • Some potential to develop waste diversion policies with GTA municipalities to ensure level playing field.
Complexity	Program complexity to user	• Some complexity with the need for some participant education as not all DIY and renovation companies may be aware of the diversion opportunities at the transfer stations. • Minimal complexity for those dropping off mixed loads for processing.
Convenience	Ease of participation	• Additional effort to participate as the source separated recycling bins are located at the transfer stations where the DIY and renovation companies will come to dispose their waste. • Convenient for those who drop off mixed CRD loads. • May require significant effort for CRD companies to adjust to policy requirements.
Community Safety	Potential for impacts to community safety	• Potential for minimal impact on community safety if facility located on suitably zoned site. • Some potential for impact on community safety due to additional truck traffic.
Equity	Potential for unequal impacts/benefits to specific groups	• Minimal to no potential for unequal impacts as policies will apply to all generators of CRD waste. Option is available to everyone so no equity issues. • Potential for minimal impact on any specific group if CRD processing facility located on suitably zoned site.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Significant potential for behaviour change at CRD work sites, developments and projects throughout City of Toronto by imposing waste diversion policies.
Financial Impact/Benefit		

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
Cost	Estimated net capital cost	• Capital costs estimated at $7 to $10 million for transfer station modifications.[203] • High capital costs estimated at $14 to $16 million excluding land purchase if City constructs its own facility.[204] • Allowance of $150,000 for initial set up of policies (legal, etc).
	Estimated net operating cost	• Increases in operating costs estimated at $2.2 million to $3.2 million for drop off facilities.[205] • Operating costs of $7 million/year for a newly constructed CRD recycling facility.[206] • Increases in operating costs of an estimated $300,000 of which $150,000 is for consultation with industry and on-going promotion and education and$150,000 is for enforcement of the policies. [207]

[203] Capital costs in the range of $1 to $1.5 million to establish basic bin drop offs at each of the transfer stations equal $7 to $10 million. Assuming five or six 40 cubic yard bins at the seven transfer stations at $10,000 per bin, cost would range from $350,000 to $420,000. Saw-tooth bin walls for each transfer station would cost $500,000. (Source: CIF depot report, 2015)

[204] Capital costs range from $14 to $16 million (including purchase of land for the building and purchase and installation of the technology). Costs are based on the construction of a private sector CRD recycling facility in the city of Vaughan, Ontario in 2013 (Source: Progressive Waste opens $14-million waste diversion facility in Ontario at http://www.solidwastemag.com/recycling/progressive-waste-opens-14-million-waste-diversion-facility-in-ont/1002422225/) and cost estimates provided in a report prepared for Metro Vancouver titled "Report on Demolition, Land Clearing and Construction Material Recovery Facilities Study" in March 2015.

[205] Operating costs are estimated in the range of $2.2 million to $3.2 million. Toronto would hire at least 0.5 full time equivalent (FTE) staff member for each transfer station or 3.5 FTE at a total cost of $200,000 annually. Cost to process recyclable material estimated at $2 to $3 million based on wood costing $57/tonne, drywall costing $78/tonne, asphalt roofing costing $70/tonne. (Source: Construction and Demolition Recycling Program. June 26, 2012. Presentation to the Waste Management Advisory Committee by Niagara Region staff.)

[206] Operating costs – assume 100,000 tonnes/year at $70/tonne equals $7 million quoted for private sector facility. Request for Edmonton C&D recycling facility operating costs went unanswered (call and email).

[207] Assume $100,000 for consultation process and information sessions with the CRD industry. This budget would be shared with Option 10.4 CRD Disposal Bans, which would be included in the consultation and information sessions. Promotion and education costs budgeted at $200,000 based on a 2015 promotion and education budget by Metro Vancouver of $190,000 to develop an educational and communications initiatives and partnerships to increase waste diversion from businesses (Source: 2015 Business Plans and Budget – Solid Waste Services. October 1, 2014. Prepared for the Zero Waste Committee). The promotion and education budget would be shared with Option 10.4 CRD Disposal Bans, which would be covered by the budget as well. Toronto would hire at least 1 FTE to develop and implement the policies and then the time would be split among the various divisions (e.g. Toronto Building Division, Solid Waste Management Services Division) to manage the policies). Assumes hiring of two inspection officers at $150,000 per year (Source: 2014 Disposal Ban Inspection Program Update. May 28, 2015. Report prepared for the Zero Waste Committee). This works out to $75,000 per inspection officer.

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Minimal to no contractual risk with implementation/operation of drop-off facilities at transfer stations. • Some contractual risks related to design, construction and operation of the CRD processing facility, particularly if multiple partners are involved. • Some contractual risk related to material markets, as prices and demand for end materials from CRD processing vary with economic cycles.
	Schedule risk	• Minimal to no schedule risk on drop-off depots. • Some schedule risk for CRD processing facility related to construction, procuring equipment etc. but manageable, particularly if an existing facility is purchased.
	Innovation risk	• Minimal to no innovation risk related to drop-off depots as CRD depot programs have been effectively implemented in numerous other jurisdictions. • Minimal innovation risk related to the CRD waste processing equipment as there are numerous CRD recycling facilities operating throughout Canada with varying degrees of success. Closure of some facilities is related to difficult market conditions rather than equipment performance issues. • Minimal innovation risk related to CRD waste diversion policies as various CRD policies have been effectively implemented in a number of other jurisdictions in Canada and the U.S., but not in cities as large as Toronto.
Economic Growth	Potential for local economic growth	• Some potential for economic growth associated with recycling the targeted materials, CRD recycling opportunities and potential growth of CRD recycling markets, depending on location of facility. • Some potential to impact contractors through increased costs to manage materials.
	Potential for regional/global economic growth	• Some potential for regional/global economic growth if other GTA municipalities also implement the policies to divert CRD materials, and large quantities are available as feedstock for new or existing industries.

Option 10.1: Depots, Processing and Policies to divert Construction, Renovation and Demolition Waste		
Local Job Creation	Potential for additional local job creation	• Some potential for local job creation associated with recycling of the diverted CRD materials, as well as with using diverted CRD materials as feedstock to local industries. • Some potential for additional local job creation to manage diversion of the materials at the construction sites and to operate the recycling facility, depending on location of facility. [208]
Flexibility	Ability to accommodate future changes	• Some flexibility to adjust drop off system to changing markets and to make adjustments to diversion policies. Some flexibility to adjust processing operations to accommodate new markets and materials. Good flexibility to adjust policies to changing conditions.

[208] Research shows that a CRD recycling facility will result in 40 to 60 new FTE jobs created (Source: Report on Demolition, Land Clearing and Construction Material Recovery Facilities Study. March 2015. Prepared for Metro Vancouver)

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban

Toronto would consider phased in disposal bans on construction, renovation and demolition materials (CRD) at City transfer stations ensuring that well established and stable markets are available for the diverted materials. Bans will affect mostly small CRD companies. The City works with GTA (Greater Toronto Area) neighbours to encourage similar bans to ensure material does not get disposed in a neighbouring jurisdiction. The bans would begin with a 10% contamination threshold and would target CRD wastes for which stable recycling markets exist (e.g. clean wood waste, drywall, cardboard, and asphalt shingles).

System Component: Overall System Considerations

Source of Option: City Staff and Council

City of Toronto Experience:

- It is estimated that there are approximately 360,000 tonnes of CRD waste generated annually within the City of Toronto[209]. The City does not accept this material at curbside and receives quantities as paid tonnes through transfer stations.
- Currently, the City diverts limited quantities of drywall (less than one tonne per customer permitted) and scrap metal at three of its seven transfer stations for a fee.
- Toronto does not charge differential tipping fees for CRD materials diverted at the transfer stations other than scrap metal. All waste is charged a tip fee of $106.09 per tonne and scrap metal is charged $79.57 per tonne (considered a recyclable material)[210].

Municipal/Waste Industry Experience:

- The CRD sector typically produces a waste stream where 61%-72% falls into five material categories: clean and treated/painted/composite wood, drywall, asphalt roofing, plastic and concrete/aggregates.[211]Over 40% of the CRD waste stream consists of wood waste, most of which is clean wood waste and can be easily recycled.[212]
- Municipalities are beginning to address the fact that much of the CRD waste stream can be effectively recycled by introducing disposal bans

Case Studies/Examples:

- Halifax Regional Municipality (HRM) enacted the C&D (Construction & Demolition) Licensing By-law in 2001,which establishes recycling targets for C&D wastes and prohibits the disposal of easily divertible C&D material including: asphalt paving, aggregate and soil, concrete, milled wood free of adhesives, coatings and preservatives, porcelain and ceramic, scrap metal, and window glass.
- On January 1, 2015, Metro Vancouver introduced a Clean Wood Disposal Ban at all Regional Facilities with a 50% surcharge applied to all loads of garbage containing more than 10% clean wood.
- Since 1991, the Capital Regional District in British Columbia, has introduced materials bans at its Regional landfill including the following C&D material bans: asphalt paving, aggregate and soil, concrete, scrap metal, drywall and corrugated cardboard.
- Massachusetts is the only U.S. state with C&D material bans. These statewide bans have helped foster the recycling industry, and the state now has 21 C&D processing facilities. C&D processors have lower tipping fees than landfills.
- Germany's Waste Wood Ordinance, enacted in 2003, requires all wood waste to be either recycled or used to generate energy (energy from waste), and bans wood waste from landfill.

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[209] Toronto Tech Memo #1 prepared by HDR.
[210] Toronto City Council Approved 2015 Solid Waste Rates
[211] Source: Characterization and Management of Construction, Renovation and Demolition (CRD) Waste in Canada. March 2015. Prepared for Environment Canada
[212] Source: Characterization and Management of Construction, Renovation and Demolition (CRD) Waste in Canada. March 2015. Prepared for Environment Canada

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban

for materials that have viable recycling markets and recycling industry.

- Municipalities in BC have recognized the need to have well-established markets in place before introducing landfill bans.

Considerations:

- Under the proposed *Waste-Free Ontario Act*, the Province may impose provincial disposal bans on many CRD materials over time. The Province may also require municipalities to implement a range of policies targeting various materials including CRD wastes. The details will not be known until draft regulations are released for comment which are not expected until after 2017.
- A phased in CRD waste disposal ban would only be fully effective if it applied to all transfer stations within the City, including private sector transfer stations. A city-wide by-law needs a municipal purpose (environmental, economic, health and safety) and needs to avoid any conflicts with federal or provincial legislation.
- Disposal bans at City transfer stations will mostly affect small CRD companies and residents that use City transfer stations and may be seen as unfair.
- Need to ensure that CRD diversion depots are provided at the transfer stations or at large stand alone depots to provide easy diversion alternatives.
- Development of a phased in schedule in consultation with CRD industry.
- Need to determine availability and stability of markets for the targeted materials to be banned as well as to establish that suitable CRD waste processing capacity exists within the GTA, or within a reasonable distance from the GTA, for targeted banned materials.
- Need to develop a comprehensive promotion and education and outreach campaign to notify all players within the CRD industry and covering the different target audiences affected by the bans.
- Amendments to existing by-laws.
- Strategy for introducing phased in disposal bans.
- A need to develop stable end markets for the materials produced by the CRD bans, to ensure the long-term viability of CRD waste diversion. Some market development can be achieved through procurement specifications by the City (e.g. requiring recycled wood or drywall in particular for City projects).

Potential Outcomes:

- Opportunity to use bans to drive diversion of easy to recycle materials such as clean wood waste, corrugated cardboard, drywall and asphalt shingles.
- Bans can help to drive further development of markets and create jobs.
- City shows commitment to diversion of CRD waste.
- Amendments to existing by-laws.

Details of Option undergoing Evaluation: Toronto would consider phased-in disposal bans on CRD materials at City transfer stations ensuring that well established and stable markets are available for the diverted materials. Bans will affect mostly small CRD companies. The City would work with GTA neighbours to encourage similar bans to ensure material does not get disposed in neighbouring jurisdictions. The bans would begin with a 10% contamination threshold and would target CRD wastes for which stable recycling markets exist (clean wood waste, drywall, cardboard, and shingle roofing).

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

Gap/Challenge/Opportunity: A challenge facing the City is how to better promote and facilitate diversion of CRD materials generated by the CRD sector, which comprises up to 40%[213] of the total waste stream generated in the City. To date, there has been no pressure placed on the CRD sector by the City to encourage diversion and ensure a level playing field for CRD companies. Private sector initiatives to construct and operate CRD recycling facilities in the Greater Toronto Area have failed due to lack of business as disposal remains the cheaper option.

Ownership/Operation: This option involves the development and enforcement of by-laws which ban the disposal of CRD wastes at City facilities (and possibly all facilities in the City) and needs to be supported by strict enforcement by City staff, as well as an extensive outreach and education campaign run by the City.

Materials Collected/Diverted: The policies would focus on easy to recycle CRD materials for which stable markets exist such as clean wood, drywall, plastic, concrete and masonry, metal, pallets/crates, asphalt shingles, and porcelain/toilets

Staffing: Some additional staff required. Additional enforcement staff required at transfer stations.

Consideration of Other Infrastructure/Programs: This option would need to be paired with Option 10.1: Drop off Depot, Processing Facility, Policies for CRD Waste to provide the motivation to have CRD waste diverted by either source separation at the recycling depots or sent as mixed CRD waste to be processed at the CRD recycling facility. This option would impact the tonnes of waste managed at the transfer stations and at Green Lane Landfill.

Land Requirements: No land requirements.

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban		
Criteria	Indicators	Assessment
Environmental Impact/Benefit		

[213] See details in in chart "Potential to Increase Diversion".

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for some impact to land if disposal ban results in illegal dumping. Much of the CRD waste would move out of City system to private sector transfer stations.
	Potential impacts to local airshed	• Minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building.
	Potential impacts to local water sources	• Minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
	Total land required and land use displacement	• Minimal to no land use displacement.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Some energy and fossil fuel consumption with vehicles delivering material to processing facilities and from processing facilities. • Energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. • Fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles.
	Greenhouse gas (GHG) contributions	• The outcome of the policies will assist with diverting methane generating materials (e.g. wood waste) from landfill. • Some potential for increased GHG emissions associated with vehicles delivering various streams to processing facilities.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increase waste diversion from landfill and some employment opportunities..
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban		
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• High potential for diversion of CRD waste.[214] Depending on ability to harmonize approach across all City transfer stations (private and public), the option could divert an estimated 110,000 tonnes/year or more of CRD waste. • Some risk that CRD waste will go elsewhere or illegally dumped.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Option requires new by-laws, which require consultation, but are not particularly complex. By-laws targeting bans at all transfer stations in the City (not just City managed transfer stations) would be more complex.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact on traffic, particularly around processing facilities.
	Potential for litter increase/reduction	• Potential for illegal dumping, primarily upon implementation of the ban.
	Potential odour emissions	• Minimal to no increase/reduction in odour emissions as no putrescible waste is being managed.
	Potential noise emissions	• Some potential for increased noise emissions from processing facilities required as a result of the ban. Mitigated somewhat through siting in appropriately zoned areas.

[214] Placing a ban on wood waste, asphalt roofing, and drywall and coupling the ban with other CRD diversion policies (discussed in Option 10.1) could potentially achieve 110,000 to 160,000 tonnes diversion (at 50% and 75% capture rate, respectively). This assumes that Toronto can work with private transfer stations to impose bans at all transfer stations.
It is estimated that there are approximately 360,000 tonnes of CRD waste generated annually within the City of Toronto (Toronto Tech Memo #1 prepared by HDR) although it is unclear how much flows through Toronto's transfer stations.
Construction and demolition waste contains up to 40% recyclable wood waste, 10% asphalt roofing, 9% drywall and Cardboard 1% (Source: Characterization and Management of Construction and Demolition (CRD) Waste in Canada. March 2015. Prepared for Environment Canada by Kelleher Environmental in association with Guy Perry Associates, Robins Environmental and Sonnevera Inc).

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban		
	Potential for increased vector/vermin	• Minimal to no increase in vector/vermin problems as no putrescible waste is managed.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential to partner with other GTA municipalities and waste management industry, to impose similar bans and create more effective level playing field, and with organizations to provide training and technical assistance to industry members.
Complexity	Program complexity to user	• Some complexity with the need for some participant education as not all CRD companies may be aware of the bans and options available to divert the targeted waste streams.
Convenience	Ease of participation	• Not convenient and may require significant effort for the CRD industry to adjust to the ban requirements.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety with implementation of a CRD disposal ban.
Equity	Potential for unequal impacts/benefits to specific groups	• Minimal to no potential for unequal impacts as policies will apply to all generators of CRD waste.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Significant potential to change behaviour at CRD work sites, developments and projects by imposing the CRD waste disposal bans. This will lead to CRD waste generators trying to minimize the waste they produce, although opportunities will be limited at renovation and demolition sites where the waste is determined by construction practices from years earlier.
Financial Impact/Benefit		

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban		
Cost	Estimated net capital cost	• Minimal capital costs associated with legal and consultation support to develop and implement and the diversion policies. Allowance of $150,000 for initial set up of policies (legal, etc.).[215]
	Estimated net operating cost	• Increases in operating costs of an estimated $150,000 (which is half of the operating costs shared with Option 10.1 but some investment in start-up and development activities (legal, consultation) also required.[216] • Increases in operating costs – 3.5 to 7 FTE at $265k to $530k/year.[217]
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Minimal to no contractual risk with implementation/operation by City staff.
	Schedule risk	• Minimal to no schedule risk.

[215] It is assumed that there would be some small capital cost associated with initially setting up the diversion policies as any costs associated with renting additional bins to separate materials would be paid by the CRD companies. Diversion options could be provided under the Option 10.1: Comprehensive Diversion Drop-Off for Construction, Renovation and Demolition Waste.

[216] It is assumed that there would be nominal capital cost associated with the bans. While diversion options would need to be provided, it is assumed these would be covered under the Option 10.1: Drop-Off Depots for Construction, Renovation and Demolition Waste.

[217] Assume $100,000 for consultation process and information sessions with the CRD industry. This budget would be shared with Option 10.1 Depots, Processing, and Policies to Divert CRD Waste, which would be included in the consultation and information sessions.
Promotion and education costs budgeted at $200,000 based on a 2015 promotion and education budget by Metro Vancouver of $190,000 to develop an educational and communications initiatives and partnerships to increase waste diversion in businesses (Source: 2015 Business Plans and Budget – Solid Waste Services. October 1, 2014. Prepared for the Zero Waste Committee). The promotion and education budget would be shared with Option 10.1 Depots, Processing, and Policies to Divert CRD Waste, which would be covered by the budget as well.
Toronto would hire at least 0.5 FTE (and up to one FTE) for each transfer station or 3.5 to 7FTE at a total cost of $265,000 to $530,000 annually. In 2014, Metro Vancouver contracted seven enforcement officers who rotated among the seven regional transfer stations and one disposal facility to inspect loads of waste containing banned materials (drywall, cardboard, recyclable papers and blue box materials). Wood waste and food waste were banned in 2015. The total cost for the inspection contract for 2014 was $529,808 (Source: 2014 Disposal Ban Inspection Program Update. May 28, 2015. Report prepared for the Zero Waste Committee). This works out to $75,000 per inspection officer.

Option 10.2: Construction, Renovation, Demolition (CRD) Disposal Ban		
	Innovation risk	• Minimal to no innovation risk related to the bans themselves as CRD bans have been effectively implemented in other jurisdictions. • Some market risk related to weak demand and low revenues for the commodities produced by a CRD ban.
Economic Growth	Potential for local economic growth	• Some potential for economic growth associated with recycling the targeted materials, depending on locations of processing facilities. • Some potential to impact contractors through increased costs to manage materials.
	Potential for regional/global economic growth	• Some potential for regional/global economic growth if other GTA municipalities also implement the policies to divert CRD materials, and depending on locations of processing facilities.
Local Job Creation	Potential for additional local job creation	• Some potential for local job creation associated with recycling of the banned CRD materials depending on locations of processing facilities.
Flexibility	Ability to accommodate future changes	• Significant flexibility to increase types of materials banned as markets develop for CRD materials.

Overall System Recommendations – Incentive Based Options

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 from the company/retailer/association/product manufacturer sponsoring the reverse vending equipment.

System Component: Collection & Drop-Off

Source of Option: Consultants

City of Toronto Experience:

- There is no recent experience of reverse vending machines (RVMs) for recyclable materials managed by the City of Toronto Solid Waste Management Services Division. The City carried out a three month pilot project testing three RVMs for beverage containers in 2000[218]

Municipal/Waste Industry Experience:

- Reverse vending machines (RVMs) have been used in deposit jurisdictions, particularly in the U.S., 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 (i.e. less than 20) are installed in BC. There are over 16,000 RVMs throughout U.S. 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 Liquor Control Board of Ontario (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).
- Beverage Recovery in Canada (BRINC), 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

Case Studies/Examples:

- A private recycling company has 1,890 ATM-like machines in shopping malls and retailers in the U.S. 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 light 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 three UK locations. A similar system of five 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.
- 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

[218] http://www.toronto.ca/legdocs/2000/agendas/council/cc/cc000411/wks6rpt/cl004.pdf

Option 3.6: Incentive Based Drop-off System (e.g. Reverse Vending Machines)

ran for a short period of time and was not deemed promising – recovery rates were very low and the technology was deemed too expensive. Participants were rewarded with store/product coupons, not cash.	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 Cooperative (OBRC) 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 for local stores based on recycling performance. It was implemented in 300 U.S. 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:

- An approach to recover new, non-deposit materials, as well as for deposit materials with agreement of LCBO, Beer Store and possibly through agreements with Industry Funding Organizations (IFOs), which will be established to respond to extended producer responsibility regulations under the proposed *Waste-Free Ontario Act* to meet collection targets for various materials which will include small electronics, bulbs, batteries, etc.
- Automated systems minimize staffing and labour costs.
- 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.
- Requires active participation of interested producers with obligated materials to be collected.
- Significant effort to collect small amounts of material from multiple sites.
- Reverse vending machine technologies can have a capital cost of about $15,000-$20,000 per machine, 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. small electronics).
- Investigate RVMs and other incentive opportunities for materials such as cell phones, MP3 players, fluorescent lamps, batteries, etc.
- 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.
- A business plan is necessary to include locations, number of RVMs, costs of incentives, and the estimated diversion rate achieved.
- A business case is necessary to justify the RVM approach and to compare it to other approaches which would achieve same diversion at lower costs.
- Potential conflict and accommodation issues with any forthcoming collection regulatory scheme under the proposed *Waste-Free Ontario Act*.
- Procurement and liability considerations for certain programs and locations.
- Zoning considerations for certain RVM locations.

Option 3.6: Incentive Based Drop-off System (e.g. Reverse Vending Machines)

Potential Outcomes:

- Higher participation and potentially 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 such as Parks, also TTC, on likely RVM locations.

Details of Option Undergoing Evaluation: This option is based on a reverse vending machine technology that is well established in the U.S. (though not across Canada, only in Quebec) as part of the recovery system for a number of specific materials including: non-alcoholic deposit beverage containers, and some small electronics such as mobile phones. One potential application of the technology is to extend reverse vending machines (RVMs) into appropriate locations to supplement the recovery of deposit on beer, wine and/or spirit containers in Toronto. Another potential application of this option could be to recover small electronic products (e.g. cell phones), light bulbs, batteries, and /or other materials that will need to meet collection and recovery targets under the proposed *Waste-Free Ontario Act* regulations. In each of these cases, the City would partner with other organizations, for example, with LCBO/the Beer Store and/or with obligated producers or brand holders for specific regulated materials such as small electronics, bulbs, batteries, etc. as a full program roll out – in each of these "proof of concept" ideas. This option would benefit the partners more than the City because they will receive the material directly.

This option is based on two key assumptions. First, that the City support piloting 80 reverse vending machine units[219] across the City in locations such as multi-residential buildings, TTC locations, and public spaces, such as parks and arenas, at a capital cost of $1.6 million. They would be rolled out over three years. Secondly, if the pilot program proves to be successful, it is assumed that a full program roll out would be the responsibility of the major beneficiary (i.e. LCBO, Beer Store, obligated producers and/or brand holders) as the main benefit of RVMs will accrue to these partners, not only to the City.

Gap/Challenge/Opportunity: A challenge facing the City is to provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility.

Another challenge facing the City is the impact of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.

Ownership/Operation: Assume City-Owned, partnership for operation of RVMs depending on material being managed.

Materials Collected/Diverted: A variety of materials targeted under the proposed *Waste-Free Ontario Act* regulations**,** existing deposit beverage containers (e.g. beer, wine and/or spirit containers), small electronic products (e.g. cell phones) and /or light bulbs and batteries.

Staffing: Minimal City staff required.

Consideration of Other Infrastructure/Programs: RVMs would complement existing programs, providing more convenient diversion options for some residents. No programs would be replaced by this option.

[219] 80 RVMs is estimated minimum number of RVMs required across the City to evaluate use/effectiveness of technology. Up to 200 would be ideal for proof of concept but would require an expenditure of $4 million.

Option 3.6: Incentive Based Drop-off System (e.g. Reverse Vending Machines)

Land Requirements: The footprint required for these systems would be very small (i.e. less than five cubic metres per machine). RVMs could be located inside existing buildings. Partnerships with retailers (e.g. grocery and hardware) to locate RVMs inside their front doors of large retail and drive traffic could increase use of the RVMs.

Option 3.6: Incentive-Based Drop-off Systems (e.g. Reverse Vending Machines)		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. Any materials deposited into reverse vending machines (RVMs) would be collected in containers/bins on paved/concrete surfaces and/or managed within dedicated and enclosed interior spaces.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all potential RVM materials are expected to be collected in containers/bins on paved surfaces and/or managed within dedicated and enclosed interior spaces. Potential for minimal to no impacts to local air quality due to additional trucks collecting from RVMs but increased truck traffic is minor.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All potential RVM materials are expected to be collected in containers/bins on paved/concrete surfaces and/or managed within dedicated and enclosed interior spaces.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which would be limited to periodic site and equipment cleaning requirements.
	Total land required and land use displacement	• Depending on the number of RVMs to be deployed, the footprint required for these systems would be very small (i.e. less than five cubic metres per machine).
Regional/Global Environmental	Energy and fossil fuel generation / consumption	• Minimal consumption of energy as machines are highly energy efficient. There is some fuel consumption by vehicles used to service/collect from RVMs.

Option 3.6: Incentive-Based Drop-off Systems (e.g. Reverse Vending Machines)		
Criteria	**Indicators**	**Assessment**
Impact/Benefit	Greenhouse gas (GHG) contributions	• Potential for minimal to no GHG impacts as overall energy use and quantities expected to be collected are small. • Potential for minimal reduction in greenhouse gas emissions as a result of increased recovery of aluminum, glass, plastic, aseptic beverage containers and some other materials.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through employment opportunities.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, unit operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Minimal to no impact on diversion (less than 1%) as tonnage of specifically targeted materials would be small. • Diversion impact likely < 0.2%, as they target specific smaller materials such as mobile phones, beverage containers and batteries which together make up < 1% of the disposed waste stream[220].
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Limited potential for approval complexities for materials other than beer bottles/LCBO bottles that have a deposit (as an incentive to return). • Likely on public (City) property or private (retail) property where property owner approval is sufficient. • Zoning considerations for some locations.

[220] Diversion estimates are based on the quantities of various materials remaining in the single family and multi-residential waste streams based on multi-residential (2014) audits for a full year and single family 2012-2013 full year audit data , and an assessment of the potential recovery % for each material (20%, 35%, 50% recovery of what is currently discarded).

Option 3.6: Incentive-Based Drop-off Systems (e.g. Reverse Vending Machines)		
Criteria	**Indicators**	**Assessment**
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for minimal to no impact on traffic (i.e. for users to drop off materials and for material collectors), as drop-off will likely be incremental to a trip that would have taken place anyway.
	Potential for litter increase/reduction	• Potential for some impact on litter (i.e. for rejected materials and/or carrying bags from transporting materials to RVM).
	Potential odour emissions	• Potential for minimal to no impact on odour emissions for most materials; some minor/negligible potential for odours if RVMs are used for deposit containers containing liquids.
	Potential noise emissions	• Potential for minimal to no impact on noise emissions. RVMs are compact and sound proofed.
	Potential for increased vector/vermin	• Potential for minimal to no impact on vector/vermin. Bins/storage containers are contained within the built metal structures.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for partnership opportunities with organizations looking for an innovative ways to collect targeted materials. With the proposed *Waste-Free Ontario Act* regulations, brand holders may need additional approaches to meet diversion targets set in the regulations.
Complexity	Program complexity to user	• Equipment is high tech but easy to use with clear directions which can be programmed to address various target audience needs.
Convenience	Ease of participation	• Easy and convenient for users; also novel and fun to use as RVMs and often offer immediate rewards (i.e. cash or coupons).
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety if located on well-lit parking areas and/or retail-like interior spaces.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for minimal to no impact on any specific group if RVMs are located in diverse areas throughout the City. • Potential to increase service levels to those not well served by current system; greater number of RVMs improves equity for those not well served by programs/facilities.
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no potential to influence or encourage reduction behaviour.

Option 3.6: Incentive-Based Drop-off Systems (e.g. Reverse Vending Machines)		
Criteria	**Indicators**	**Assessment**
Financial Impact/Benefit		
Cost	Estimated net capital cost	• High capital cost ($15,000-$20,000/unit)[221]. Assuming 80 machines around the City, total capital cost could be $1.6 million, if purchased by the City. However, longer term financing of this capital cost could be through business arrangements and not involve a cost to the City.
	Estimated net operating cost	• Low operating cost – i.e. reduced labour but equipment requires maintenance and dedicated material collection service. Operating costs would be borne by the private partners in any pilots/roll out.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal contract/liability risk as RVMs can be operated by businesses targeting specific materials.
	Potential for schedule risk	• Potential for minimal to no schedule risk, only delivery date involved.
	Potential for innovation risk	• Potential for some innovation risk; technology is widely used but primarily for deposit, non-alcoholic beverage container system applications.
Economic Growth	Potential for local economic growth	• Potential for minimal to no impact on local economic growth.
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional or global economic growth, except for equipment suppliers (currently located in Quebec).
Local Job Creation	Potential for Additional Local Job Creation	• Potential for some additional job creation to collect from 80 RVMs on a daily or twice weekly cycle.
Flexibility	Ability to accommodate future changes	• RVM technologies can be adapted to recover some limited new materials.

[221] Communication with RVM vendor based in Quebec.

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

Toronto could consider establishing a deposit return system - within the limits of the City of Toronto - for targeted materials that would subsequently be removed from the waste stream. Targeted materials might include: non-alcoholic beverage containers (i.e. soft drinks, water bottles and potentially juices and milk) and/or household batteries.

System Component: Overall System Considerations

Source of Option: Consultation & Consultants

City of Toronto Experience:

- Toronto residents' current deposit-return experience is with the alcoholic beverage container systems for beer, wine and liquor containers that have been established Province-wide, as well as deposits on specific containers established by specific vendors (e.g. 10 gallon reusable water bottles). Some stores offer milk in jugs or refillable glass bottles for which a deposit is paid.

Municipal/Waste Industry Experience:

- The Ontario Deposit Return Program (ODRP) has been accepting both wine and liquor containers since 2007. The Beer Store serves as the collection/deposit return location for all materials. The overall collection rate for wine and liquor containers sold in LCBO stores in 2013-14 was 80%. The overall recovery rate for the LCBO and all The Beer Store's packaging (mainly re-usable beer bottles) in 2014 was reported as 98.7%[226].
- Similar systems are 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.
- 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

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 (three 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 U.S. "bottle bill" - has reported that its redemption rate for bottled water, soda, beer and malt liquor has fallen to 68%[222] (with a five 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 U.S. 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%[223]. 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 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

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[222] Resource Recycling Magazine article; August 4, 2015

[223] Container Recycling Institute; Container Recycling Rates by State, March 2015 Update

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

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.

700 employees in the system[224].

- Alberta also operates an extensive network system collecting over 128,000 tonnes of deposit materials at 216 depots; in 2013 Alberta reported almost 82%[225] return rate for non-refillable beverage containers - the highest in Canada.
- The Nova Scotia deposit program 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:

- Challenges of only implementing at municipal level.
- 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 a potential non-alcoholic beverage industry-led and funded depot network.
- May impact recyclable 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.
- Procurement and liability considerations for certain programs and locations.
- Zoning considerations for certain RVM locations.
- Potential conflict and accommodation issues with any forthcoming collection regulatory scheme under the proposed *Waste-Free Ontario Act*.
- Confirm no conflict issues with existing Provincial programs.

Potential Outcomes:

- Would also include deposit material recovery from the small business and Industrial, Commercial and Institutional (IC&I) sectors.

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[226] Ontario Deposit Return Program description; 2013
[224] Encorp Pacific 2014 Annual Report
[225] Alberta Beverage Container Recycling Corporation, 2013 Sustainability Report

Details of Option undergoing Evaluation: Under this option, non-alcoholic beverage containers would be removed from the City's Blue Bin recycling program; however, the Blue Bin program would continue to operate to capture other materials. Non-alcoholic beverage containers would be recovered in one of two ways: either a return to retail program and/or a dedicated drop-off system (with an estimated 100 locations). Toronto would also advocate for a province-wide deposit/return system for products such as soft drink and other containers that are amenable to deposit return systems as are in place in other provinces in Canada and in many U.S. states.

The main assumption for this option is that while Ontario Deposit Return Program could serve as a potential model for non-alcoholic beverage containers, it is assumed that system could not manage (in addition to its current material flows) receiving, transferring and processing all non-alcoholic containers across the City because of the quantities involved. Therefore a new stand-alone drop-off system would need to be established (but perhaps including some City-owned or contracted multi-material drop-off depots as described in Options 3.3 (Stand alone Drop-off Depots) and 3.4 (Permanent Neighbourhood Drop-off Depots)). The assumption has been evaluated assuming the City would establish 100 staffed deposit/return sites, possibly in partnership with private sector businesses. The depots would be operated by the private sector or not for profits, as is done in other jurisdictions.

Gap/Challenge/Opportunity: A challenge facing the City is to provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility.

Another challenge is the impacts of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods.

Ownership/Operation: Assume City-Owned, Privately Operated (including not for profit) for the purposes of evaluation. Other arrangements are possible.

Materials Collected/Diverted: Non-alcoholic beverage containers.

Staffing: Significant levels of staff required.

Consideration of Other Infrastructure/Programs: This option would impact the City's Blue Bin recycling program with the removal of non-alcoholic beverage containers and associated revenue. This option could be implemented in conjunction with the other drop-off depot options, other mechanisms to introduce additional controls over waste management (Option 9.7) and implementation tools such as a developing an advocacy strategy.

Land Requirements: Each depot could occupy 100-150 square metres, could be sited within existing facilities.

Option 9.8: Deposit Return System for City of Toronto for Selected materials		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with the ground surface. Non alcoholic beverages containers (and other potential items such as household batteries) would be dropped off by consumers at drop-off sites (that might also include retail stores) designed to redeem, count, sort, store and ship containers to processors and/or end markets.

Option 9.8: Deposit Return System for City of Toronto for Selected materials		
Criteria	**Indicators**	**Assessment**
	Potential impacts to local airshed	• Potential for minimal to no impact from dust or odour. Drop-off establishments/in-store stations would be designed and built to minimize any impacts to the local airshed. If milk containers were to be included in the program, consideration would need to be given to approaches for managing odours. Potential for minimal to no additional airshed impacts from trips to return locations as it is general experience that these trips are not additional, but are combined with trips to grocery store, etc.
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. Drop-off establishments/in-store stations would be designed and built to minimize any impacts to the local water sources. On-site safeguards need to be in place to manage returned containers that still contain some liquid.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption. The only water consumption at drop-off establishments/stations would be for staff facilities and clean up requirements.
	Total land required and land use displacement	• Potential for some land use displacement. Assuming 100 dedicated depots (1 per 25,000 residents, based on Vancouver system[227]) required for the City of Toronto (each occupying 100-150 square metres), there would be some land displacement impacts from this option.
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for minimal to no energy consumption for newly established drop-off depots and in-store stations –e.g. lights, heating/cooling systems, scales, computers, etc. There would be some fuel consumption from residents driving to depots and from vehicles transferring materials from depots to processors.
	Greenhouse gas (GHG) contributions	• Potential for minimal reduction in greenhouse gas emissions as a result of increased recovery of aluminum, glass, plastic and aseptic beverage containers. • Potential for minimal to no GHG impacts as overall energy use and quantities expected to be collected are small.

[227] Metro Vancouver with population 2.4 million and 950,000 households has 99 Encorp depots servicing the city. Many of these also take beer and wine containers, paint, e – waste and some PPP materials since the inception of MMBC. Toronto has a population of about 2.65 million with 1,047,880 hhlds (in 2012) –therefore a planning estimate of 100 depots for Toronto – virtually same size as Metro Vancouver.

Option 9.8: Deposit Return System for City of Toronto for Selected materials		
Criteria	**Indicators**	**Assessment**
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts; however, some potential impact on increased traffic. Potential for small positive impact on health through employment opportunities.
	Potential to impact ecological health	• Potential for minimal to no impact on ecological heath provided proper safeguards are in place to manage returned containers that still contain some liquid.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential for minimal to no impact on diversion as total anticipated increase in diversion is estimated at 4,200 tonnes per year. Curbside collection already recovers up to 90% [228] or more in some cases of beverage containers from single family homes. Additional recovery which could be achieved by a deposit return system would be approximately 4,200 tonnes[229] or <1%. While the recovery rate for targeted materials in deposit/return systems is high, the targeted materials generally make up a very small percentage of the waste stream.
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Potential for significant (likely Provincial) approval complexity as local beverage container deposit systems are new to the Province. A legal opinion would be required to determine whether the City of Toronto Act would allow the City to establish a Toronto only deposit/return system for non-alcoholic beverage containers. Some local siting related approval complexity, but more siting-related complexity in permitting 100 new stand-alone drop-off depots, although approval is not complex because no garbage collection is involved. • Zoning considerations.

[228] Results of SF waste audits 2012-2013, which are most recent set of full year audit data available

[229] From multi-residential full year 2014 audits and single family 2012-2013 full year of audit data. Multi-residential generation of targeted materials 17.53kg/hh/year; Current diversion 9.27kg/hh/year (53%) ; garbage 8.00kg/hh/year (some glass is in Green Bin). Assume could get 90% recovery in deposit system. Total recovery (Blue Box and deposit) =15.78. Additional in deposit system (15.78-9.27=6.51kg/hh/year) multi-residential: 6.51kg/ multi-residential households * 615k multi-residential households = 4,000 tonnes. Single family generation of targeted materials 15.05kg/hh/year; in garbage 0.795kg/hh/year (95% diversion rate already). Most realistic estimate: 0.4kg/hh/year * 500k Single family = 200 tonnes from Single family. Total is approximately 4,200 tonnes additional material recovered.

Option 9.8: Deposit Return System for City of Toronto for Selected materials		
Criteria	**Indicators**	**Assessment**
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for significant impact on traffic. Customer travel to drop-off depots to redeem containers is a traffic intensive exercise (and depots would need to be located in convenient, sometimes high traffic locations).
	Potential for litter increase/reduction	• Potential for some reduction of litter. Litter reduction is one of the commonly cited benefits of deposit/return systems (although deposits do little to reduce other forms of litter).
	Potential odour emissions	• Potential minimal to no impact on odour emissions.
	Potential noise emissions	• Potential for minimal to no impacts on noise emissions.
	Potential for increased vector/vermin	• Potential for some impact on vector/vermin. Beverage containers returned with some liquid remaining present a vector/vermin concern.
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for minimal to no partnership opportunities with other municipalities (i.e. if Toronto pursues "go alone" deposit return program). Potential for some partnerships with non-profit organizations (e.g. to organize bottle/container drives for charitable causes).
Complexity	Program complexity to user	• Deposit/return depots are not complex to use, but having a deposit system parallel to existing Blue Bin may initially be confusing for residents.
Convenience	Ease of participation	• Deposit/return depots are less easy to use than curbside programs.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential of some impact on specific groups depending on location of depots. Some inequity in higher prices for beverage containers to consumer (which is returned when deposit container is returned).
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Potential for minimal to no potential to influence or encourage behaviour.

Option 9.8: Deposit Return System for City of Toronto for Selected materials		
Criteria	**Indicators**	**Assessment**
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Capital costs $40 million[230] based on capital cost of $400,000 per new deposit return site excluding land costs.
	Estimated net operating cost	• Net operating costs approximately $200,000 per depot[231]. • Would result in less revenue from the Blue Bin program, as valuable materials such as aluminum, PET and steel which result in good revenues would be recovered through the deposit system.
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract/liability risk to the City as it is anticipated that – as in all other jurisdictions in North America – the system would be likely operated by private sector business interests.
	Potential for schedule risk	• Potential for minimal to no schedule risk to the City as it is anticipated that the system would likely be operated by private sector business interests.
	Potential for innovation risk	• Potential for minimal to no innovation risk to the City as the approach is well proven in other locations.
Economic Growth	Potential for local economic growth	• Potential for some local economic growth by establishing a network of 100 (mainly new, purpose-built) drop-off depots to recover primarily non-alcoholic beverage containers (but could also include other products for which the depot operator is paid a stewardship fee – e.g. paints, electronic products, batteries, etc.)

[230] The capital cost for the Cochrane, AB Eco-Centre was about $2 million by the time the Eco Centre opened in December 2005 (Source City of Spruce Grove Eco Centre Review Project. May 2014. Prepared by Sonnevera). CIF Project #726 – Cochrane Transfer Station Construction and Annual Operation Cost Analysis

[231] Estimates based on operating costs for City of Markham depots.

Option 9.8: Deposit Return System for City of Toronto for Selected materials		
Criteria	**Indicators**	**Assessment**
	Potential for regional/global economic growth	• Potential for minimal to no impact on regional growth because deposit/return system is only local to Toronto and not established province–wide; potential for minimal to no impact on global economic growth.
Local Job Creation	Potential for additional local job creation	• Potential for some local job creation – i.e. 100 drop-off facilities requiring mainly new staff.
Flexibility	Ability to accommodate future changes	• Potential for some flexibility. Deposit return depots can be adapted to accept additional materials which will be obligated and have specific diversion targets in future regulations under the *Waste - Free Ontario Act* (and for which producer payments could potentially be negotiated).

Controls, Bans and Enforcement

Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management

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

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

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.
- City has not attempted to impose City-wide recycling or other requirements on IC&I sector not receiving City service.
- Mandatory Provincial recycling requirements already exist but more effective, comprehensive enforcement is needed.

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 the amount of sent 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.

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.
- Metro Vancouver, BC 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 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.

Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management

- Where landfill/disposal bans are implemented, it is important to have ensured/created end markets for the materials diverted to ensure sustainability of the policy/by-law/regulation. This can be done in part through aggressive Green Procurement policies.
- 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:

- Regulations promulgated over the next two to five years (2017 to 2021) pursuant to the Province's proposed *Waste-Free Ontario Act* may address several components of the residential and IC&I/CRD waste streams over time. Possible amendments to the City of Toronto Act could provide an opportunity for additional local diversion measures.
- 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" is consistent with circular economy framework[232].
- Potential that green jobs and local employment are created by higher diversion rates.
- Significant time and effort on advocacy efforts to change provincial legislation.
- Resistance from waste generators and haulers affected by any proposed levies or bans.
- Enforcement is key to success of any measures chosen, and strong enforcement is an element of each of these options. Additional City enforcement staff will be needed at transfer stations and to monitor compliance with new measures by residential and non-residential waste generators.
- Public consultation programs to identify attitudes and likely impacts of different policies on different stakeholders should be included in implementation of the option.

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.

Details of Option Undergoing Review: The City explores whether and how greater waste reduction and diversion might occur through policy instruments such as packaging and material bans, mandatory recycling by-laws, levies and other economic instruments or mechanisms to promote waste reduction, extended

[232] 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)

producer responsibility (EPR) legislation, disposal bans and regulations or acts. These instruments could apply to both residential and non-residential (i.e. Industrial, Commercial and Institutional (IC&I)) and Construction, Renovation, and Demolition (CRD) waste and would be designed to reduce the amount of waste disposed and increase diversion. Residential (single family and multi-residential) households already receive comprehensive waste diversion services but the policies would target the remaining waste stream. Some policies (such as organics bans) might lead to additional processing to achieve higher diversion rates.

To be effective, the instruments selected could address all waste generated by both residential and non-residential sources, regardless of their collection service provider. The new *Waste-Free Ontario Act* (introduced November, 2015 and expected to pass in 2016) and its corresponding Strategy for a Waste-Free Ontario contemplates a number of provincial disposal bans over time, likely starting with organics. Since the City owns its own landfill, it does have the ability to place landfill/disposal bans on the waste it controls and manages, depending on any potential bans resulting from the new legislation. Any bans would be for materials additional to those imposed by the Province over time. But mandatory recycling by-laws and/or extended producer responsibility legislation may be required to extend the City's influence over IC&I and CRD waste materials so both approaches are expected to be needed to achieve new reduction, reuse, and/or diversion. Success of the policies could lead to the need for more processing facilities (either City or private sector owned and operated). The evaluation is focussed on City efforts to implement and enforce the policies. Many of these policy instruments need to be implemented and supported at the Provincial level, and would require advocacy efforts coordinated with other stakeholders. For all policies, extensive enforcement by the City is critical to ensure compliance and success.

Gap/Challenge/Opportunity: This option addresses a number of challenges the City is facing including;

- having a system where some waste management responsibilities are outside of the City's control and therefore subject to uncertainty and risk with respect to external parties making changes that can impact the City's system;
- the impacts of intensification and the changes required to manage additional waste generated by housing units with typically lower waste diversion performance records and in areas that are more difficult to collect using traditional methods;
- trying to find a legally permissible mechanism to require greater waste diversion from the IC&I sector for waste materials being generated within the City of Toronto;
- to extend the life of Green Lane Landfill and find new waste disposal options to cover the disposal needs for the 30 to 50 year planning period of the Strategy;
- to provide its customers with convenient options which promote greater diversion and are flexible to accommodate changing waste streams and resident accessibility; and,
- how to better promote and facilitate the reduction and reuse of waste materials to prevent waste from entering the system and requiring management through collection, processing and/or disposal.

Ownership/Operation: N/A

Materials Collected/Diverted: Applies to all waste materials currently managed by the City and reducible, reusable and/or divertible materials managed by the private sector in the City of Toronto.

Staffing: Requires significant levels of staff, primarily for enforcement activities.

Consideration of Other Infrastructure/Programs: Option could affect all current City infrastructure and programs, requiring more waste to be managed at processing facilities and less waste disposed. Option could be implemented in conjunction with any of the options targeting multi-residential, IC&I and CRD waste.

Land Requirements: Potential for some land requirements for transfer and processing depending on level of increase in waste being managed.

Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management		
Criteria	**Indicators**	**Assessment**
Environmental Impact/Benefit		
Local Environmental Impact/Benefit	Potential impacts/benefits to land resources	• Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed facilities/transfer station.
	Potential impacts to local airshed	• Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. • Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing).
	Potential impacts to local water sources	• Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
	Potential water consumption requirements	• Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities and potentially additional waste facilities required for processing (e.g. anaerobic digestion, depending on technology).
	Total land required and land use displacement	• Potential for some land use displacement. Increased IC&I and CRD waste, recyclables and Green Bin organics may require additional transfer and processing facilities capacity and space in the City.

Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management		
Criteria	**Indicators**	**Assessment**
Regional/Global Environmental Impact/Benefit	Energy and fossil fuel generation / consumption	• Potential for some additional on-site energy consumption related to increased total waste diversion and processing. • Potential for some increase in overall fuel use if additional vehicles are required to collect, and process additional materials.
	Greenhouse gas (GHG) contributions	• Supports reduction in greenhouse gas emissions by increasing material diversion through recycling and, more particularly, through processing more organic materials. • Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill, as well as upstream benefits of more material recycling.
Public Health Impact/Benefit	Potential to impact human health	• Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill and some employment opportunities.
	Potential to impact ecological health	• Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Potential to Increase Diversion	Ability to recover additional reusable and/or recyclable materials	• Potential to increase diversion in residential[233], IC&I and CRD waste streams, with varying degrees of success depending on the option(s) implemented by the Province over the next 5+ years as part of the proposed *Waste-Free Ontario Act*.

[233] Approximately 350,000 tonnes of residential garbage is currently disposed (see Tech Memo #1). In 2013, 137,154 tonnes of residential garbage from single family; 189,582 tonnes from large multi-residential and 22,970 tonnes from small multi-residential, for a total of 349,706 tonnes of residential garbage. New policies would mostly target waste from multi-residential buildings and IC&I establishments not currently collected by the City as those collected by City have Blue Bin, Green Bin policies and services in place. Some additional organics and recyclables would be diverted. Estimates need to factor future potential Provincial material bans and other legislation into consideration.
For IC&I and CRD estimates pro-rating Statistics Canada 2010 data to City of Toronto by proportion of population of City vs Province (18.5%) , an estimated 1.1 million tonnes of IC&I and CRD wastes are disposed from City of Toronto IC&I and CRD sources.
About 1 million of 6 million tonnes disposed is CRD (personal communication with Statistics Canada staff), therefore 5 million tonnes can be attributed to IC&I. Pro-rating these numbers to Toronto about 900,000 tonnes of IC&I waste is disposed from City of Toronto businesses. A relatively small amount is managed by the City. The remainder is currently managed by the private sector.

At least 18.5% of 960,000 tonnes disposed CRD Waste in Ontario (estimated from Statistics Canada 2010 data) is from Toronto sources (likely more because of economic activity and construction and demolition activity in Toronto). Composition of disposed IC&I waste in other jurisdictions indicates that 22% is food and additional 22% is paper based materials. Some of this material will be addressed with future provincial policies. The additional Toronto measures would focus on the remainder.

Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management		
Criteria	**Indicators**	**Assessment**
Waste Hierarchy	Consistency with the priorities of the waste hierarchy	• Some consistency with the priorities of the waste hierarchy. • Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Social Impact/Benefit		
Approvals Complexity	Complexity associated with approvals and permitting requirements	• Option focuses on new by-laws and/or more effective enforcement efforts for existing by-laws and applicable Provincial regulations, which may require consultation, but are not particularly complex.
Potential for Land Use Conflicts/Community Interruption	Potential for traffic increase/reduction	• Potential for some impact on traffic depending on how different quantities of separate waste streams from IC&I and CRD sectors (waste, Blue Bin materials and Green Bin organics) are collected and by whom (e.g. more trucks/service providers might be servicing more multi-residential buildings and less densely located IC&I establishments and CRD areas).
	Potential for litter increase/reduction	• Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more recyclables) can be managed through proper collection containers and collection schedules.
	Potential odour emissions	• Potential for some impact on odour emissions. Increased separated multi-residential and IC&I Green Bin organics collection, transfer and processing will require odour control diligence.
	Potential noise emissions	• Potential for minimal to no impacts on noise emissions. Increased non-City serviced multi-residential and IC&I Blue Bin materials and Green Bin organics tonnes diverted should not increase noise emissions to a great extent provided the three streams are collected and processed efficiently at properly licensed and inspected facilities.
	Potential for increased vector/vermin	• Potential for some impact on vector/vermin. Increased source separated organics from multi-residential and IC&I sectors (and to a lesser extent, increased residential, IC&I and CRD Blue Bin materials diversion) may attract additional vectors and vermin (partly offset by the collection and transfer of less residential, IC&I and CRD waste).

CRD waste quantities and composition are taken from Kelleher/Perry Report to Environment Canada: Characterization and Management of Construction, Renovation and Demolition Waste in Canada – Foundation Document, March, 2015, and indicate that disposed CRD waste includes clean wood, drywall, asphalt shingles and other materials that could be diverted with sufficient infrastructure and policies. The proposed *Waste-Free Ontario Act* as well as CCME Phase 2 EPR Plan both tackle CRD wastes, therefore the role for the City to fill gaps in these two policies will need to be determined over time.

Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management		
Criteria	**Indicators**	**Assessment**
Collaboration	Ability to partner with other municipalities/ organizations	• Potential for some partnership opportunities with other municipalities (e.g. on Green Bin organics processing capacity).
Complexity	Program complexity to user	• Harmonizing diversion policies and programs across residential and non-residential sectors should reduce confusion as messaging is then the same at home, work or play.
Convenience	Ease of participation	• Option requires residents to be more diligent about sorting and disposal of certain waste streams (e.g. renovation waste); however, continues to be relatively easy provided collection/drop-off facilities are accessible.
Community Safety	Potential for impacts to community safety	• Potential for minimal to no impact on community safety. Any risk related to traffic increase (e.g. from increased three stream collection) can be mitigated through good management practices.
Equity	Potential for unequal impacts/benefits to specific groups	• Potential for some impact on specific groups such as small businesses and owners of small multi-residential buildings, particularly those that do not participate in source separation programs who would have to arrange for collection of more waste streams and smaller collection contractors (with limited capacity to offer efficient three stream collection, transfer and processing services).
Behaviour Change	Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	• Consumption or generation of waste could potentially decrease if residents or program users are regularly exposed to source separation programs causing them to think about the amount of and effort that is required to manage the waste that is generated.
Financial Impact/Benefit		
Cost	Estimated net capital cost	• Capital cost required for legal and consultation to establish policies and regulations. An allowance of $150,000 for one FTE to address these issues over two years. Legal costs are absorbed in other budgets.
	Estimated net operating cost	• Operating costs related to 10-15 FTE needed for on-going enforcement (at seven transfer stations and three to eight additional on streets to monitor businesses and residences). Additional $1 to $1.5 million/year in staffing costs[234].

[234] Based on staffing required to monitor/enforce 100,000 businesses and 5,500 multi-residential buildings.

Option 9.7: City Explores Mechanisms to Introduce City-wide Controls over Waste Management		
Criteria	**Indicators**	**Assessment**
Health Care Cost Implications	Potential to increase health care costs	• Unlikely to result in increased health costs.
Risk	Potential for contractual risk	• Potential for minimal to no contract risk this option is focused on policies and enforcement only.
	Potential for schedule risk	• Potential for some schedule risk related to implementation and enforcement of new by-laws.
	Potential for innovation risk	• Potential for minimal to no innovation risk – this approach is proven in other locations.
Economic Growth	Potential for local economic growth	• Potential for some local economic growth, depending on location of processing facilities, since three stream collection and Blue Bin materials and Green Bin organics processing are more facility (and labour) intensive than landfilling residual waste.
	Potential for regional/global economic growth	• Potential for some regional or global economic growth, depending on location of processing facilities.
Local Job Creation	Potential for additional local job creation	• Potential for some additional local job creation in three stream collection and processing, depending on location of processing facilities.
Flexibility	Ability to accommodate future changes	• Potential for good flexibility. Measures such as mandatory recycling by-laws, landfill bans and/or EPR programs can be adapted to meet changing targets.

B

Comparative Evaluation Tables

REDUCTION AND REUSE OPTIONS

REDUCTION AND REUSE OPTIONS

Categories, Criteria & Indicators	Option 2.2 Food Waste Reduction Strategy	Option 2.3 Textile Collection and Reuse Strategy	Option 2.4 Sharing Library	Option 2.5 Support Reuse Events	Option 2.6 Explore Opportunities for Waste Exchange
Environmental Impact/Benefit	High	High	High	Medium/High	High
Score	3.0	2.8	2.6	2.4	2.6
Local Environmental Impact/Benefit:					
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impacts to land resources.	Potential for minimal to no impacts to land resources.	Potential for minimal to no impacts to land resources.	Potential for minimal to no impacts to land resources.	Potential for some local benefit as less waste will be generated and sent to the landfills.
Potential Impacts to Local Airshed	Potential for minimal to no impacts to local airshed.	Potential for minimal to no impacts to local airshed.	Potential for minimal to no impacts to local airshed.	Potential for minimal to no impacts to local airshed.	Potential for minimal to no impacts to local airshed.
Potential Impacts to Local Water Sources	Potential for minimal to no impacts to local water sources.	Potential for minimal to no impacts to local water sources.	Potential for minimal to no impacts to local water sources.	Potential for minimal to no impacts to local water sources.	Potential for minimal to no impacts to local water sources.
Potential Water Consumption Requirements	Potential for minimal to no impact as it relates to water consumption.	Potential for minimal to no impact as it relates to water consumption.	Potential for minimal to no impact as it relates to water consumption.	Potential for minimal to no impact as it relates to water consumption.	Potential for minimal to no impact as it relates to water consumption.
Total Land Required and Land Use Displacement	Minimal to no land required.	Minimal to no land required.	Minimal to no land required.	Minimal to no land required.	Potential for no additional land requirements and potential to reduce the quantity of residual waste sent to landfill.
Ranking	High	High	High	High	High
Score	3	3	3	3	3
Regional/Global Environmental Impact/Benefit:					
Energy and Fossil Fuel Generation / Consumption	Reduction in collection vehicles and fossil fuel consumption resulting from less wasted food requiring collection, transfer and disposal or composting over time.	Reduction on fossil fuel consumption associated with the strategy that promotes reuse and recycling of textiles, compared to manufacturing new textiles. Savings in energy requirements globally as a result of textile reuse.	Supports reduction in energy consumption as fewer toys will need to be manufactured and distributed.	Supports reduction in energy consumption as fewer products will need to be manufactured and distributed.	Supports reduction in energy consumption as fewer products will need to be manufactured and distributed.
Greenhouse Gas (GHG) Contributions	Potential to reduce some methane generation at landfills as less organic waste is disposed.	Reduced greenhouse gas contributions associated with a strategy that encourages reuse rather than manufacturing of new textiles.	Supports reduction in greenhouse gas emissions by reducing the need to manufacture and distribute new toys.	Supports reduction in greenhouse gas emissions by reducing the need to manufacture and distribute new products.	Supports reduction in greenhouse gas emissions by reducing the need to manufacture and distribute new products.
Ranking	High	High	High	High	High
Score	3	3	3	3	3
Public Health Impact/Benefit:					
Potential to impact Human Health	Potential for beneficial impact on public health through food waste reduction, increased food literacy and reduction in monthly spending on food.	Potential for a beneficial impact on public health by reducing ecological impact associated with the production of manufacturing of new textile, and through greater access to low cost clothing for low income families.	Potential for beneficial impact on public health through increased waste diversion from landfill, employment opportunities, and increased access to toys for low income families	Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill, positive impacts on social inclusion and access to affordable reused goods for low income families.	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill and access to affordable reused goods for low income families.
Potential to impact Ecological Health	Potential for minimal to no ecological impact and may improve ecological health from reduction of food waste requiring management and entering landfills which creates leachate and methane.	Benefit to ecological health from the strategy that encourages reuse and recycling of textiles thereby reducing the use of pesticides and water consumption associated with the production of cotton and manufacturing of new textiles.	Potential for some benefit on ecological health by reducing the need for primary extraction and any potential ecological impacts associated with the manufacturing and distributing of new toys. Potential for some ecological benefit as a result of reduced materials going to recycling or disposal facilities.	Potential for some benefit on ecological health by reducing the need for primary extraction and any potential ecological impacts associated with the manufacturing and distributing of new toys. Potential for some ecological benefit as a result of reduced materials going to recycling or disposal facilities.	Potential for some benefit on ecological health by reducing the need for primary extraction and any potential ecological impacts associated with the manufacturing and distributing of new toys. Potential for some ecological benefit as a result of reduced materials going to recycling or disposal facilities.
Ranking	High	High	High	Medium	Medium
Score	3	3	3	2	2
Potential to Increase Diversion:					
Ability to recover additional reusable and/or recyclable materials	Some potential for increased diversion measured as pure waste reduction (4-5% reduction in residential waste generated as a result of less food purchases which is then wasted).	Some potential for some additional diversion (2-5%). Potential for diversion of textiles (e.g. worn out clothing, shoes, etc.) that are thrown in the garbage because they are not considered good enough to be donated.	Provides minimal opportunity to divert additional materials (<0.5%) however potential to reduce the quantity of residual waste sent for disposal.	Potential for minimal opportunity to divert additional materials (<1%).	Potential for some additional diversion of materials for reuse (2-5%) such as construction and demolition waste, furniture, arts and school supplies, etc. Potential to reduce the quantity of residual waste sent for disposal.
Ranking	High	Medium	Low	Low	Medium
Score	3	2	1	1	2

Categories, Criteria & Indicators	Option 2.2 Food Waste Reduction Strategy	Option 2.3 Textile Collection and Reuse Strategy	Option 2.4 Sharing Library	Option 2.5 Support Reuse Events	Option 2.6 Explore Opportunities for Waste Exchange
Waste Hierarchy:					
Consistency with the priorities of the Waste Hierarchy	Significant consistency with the priorities of the waste hierarchy. Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.	Significant consistency with the priorities of the waste hierarchy. Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.	Significant consistency with the priorities of the waste hierarchy. Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.	Significant consistency with the priorities of the waste hierarchy. Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.	Significant consistency with the priorities of the waste hierarchy. Option places emphasis on the reduction and/or reuse of materials to prevent their entering the waste stream.
Ranking	High	High	High	High	High
Score	3	3	3	3	3
Social Impact/Benefit	Medium/High	Medium/High	Medium/High	Medium/High	Medium/High
Score	2.5	2.5	2.3	2.4	2.3
Approvals Complexity:					
Complexity associated with approvals and permitting requirements	No approvals required.	No approvals required.	Potential for minimal complexity associated with approvals and permitting requirements. Agreement required from City-facility partners.	Potential for some complexity associated with approvals and permitting requirements. The City will have to remove Article V, 844-23 Prohibited Acts By-law condition that prohibits curbside giveaway events.	Potential for minimal to no complexity associated with approvals and permitting.
Ranking	High	High	High	Medium	High
Score	3	3	3	2	3
Potential for Land Use Conflicts/Community Interruption:					
Potential for Traffic increase/Reduction	Minimal to no impact on traffic.	Minimal to no impact on traffic.	Minimal to no impact on traffic.	Minimal to no impact on traffic.	Minimal to no impact on traffic.
Potential for Litter increase/Reduction	Minimal to no impact on litter.	Minimal to no impact on litter.	Minimal to no impact on litter.	Potential for an increase in litter if material is left at curbside or common areas past the event period or gets blown away by wind.	Minimal to no impact on litter.
Potential Odour Emissions	Minimal to no impact on odour.	Minimal to no impact on odour.	Minimal to no impact on odour.	Minimal to no impact on odour.	Minimal to no impact on odour.
Potential Noise Emissions	Minimal to no impact on noise .	Minimal to no impact on noise .	Minimal to no impact on noise .	Minimal to no impact on noise .	Minimal to no impact on noise .
Potential for Increased Vector/Vermin	Minimal to no impact on vector/vermin.	Minimal to no impact on vector/vermin.	Minimal to no impact on vector/vermin.	Minimal to no impact on vector/vermin.	Minimal to no impact on vector/vermin.
Ranking	Medium	Medium	Medium	Low	Medium
Score	2	2	2	1	2
Collaboration:					
Ability to partner with other municipalities/ organizations	Ability to partner with a large number of municipalities or organizations to roll out campaign throughout the GTA or Golden Horseshoe.	Ability to partner with a large number of municipalities or organizations to collaborate with organizations and charities involved in textile reuse and recycling.	Potential for minimal to no partnership opportunities restricted to the City's Solid Waste Management Services division with other City facilities.	Potential for some partnership opportunities with non-profit organizations that could support events by taking materials remaining after giveaway events. Participants would be informed of non-profit organizations that could accept donations of any unsold/remaining items. The City can play a role by raising awareness about the collaboration opportunities between the organization and the residents.	Potential for significant collaboration among the residential and non-residential sectors including non-profit organizations.
Ranking	High	High	Medium	High	High
Score	3	3	2	3	3
Complexity:					
Program complexity to user	Potential for some complexity with need for some participant education and putting into practice food waste reduction activities.	Program is very easy to use and understand, as recycling textiles is easy to understand.	Program is easy to use and provides opportunity for reusing materials instead of buying new. Concept will be similar to borrowing a book from a library which many residents are already familiar with. Promotion and education on the new material stream will be required.	Program is easy to use and understand provided the City promotes the events and educates residents on acceptable materials for giveaway events. Option is simple for residents to use as materials are setout for reuse at their own homes/buildings or in a nearby public location.	Potential for minimal to no complexity. Concept is similar to existing online waste exchange websites that many customers are familiar with. The City's role to promote the program will decrease complexity. Users need access to the internet because many waste exchange programs occur online.
Ranking	Medium	High	Medium	High	Medium
Score	2	3	2	3	2

Categories, Criteria & Indicators	Option 2.2 Food Waste Reduction Strategy	Option 2.3 Textile Collection and Reuse Strategy	Option 2.4 Sharing Library	Option 2.5 Support Reuse Events	Option 2.6 Explore Opportunities for Waste Exchange
Convenience:					
Ease of participation	Relatively easy to use but requires some effort to participate as targeted audience is asked to make more effort to reduce food wasting habits.	Relatively easy to access with limited effort required for customer participation with goal of establishing easy to access collection points.	Increases convenience to share toys as the proposed locations are across the City. Many of the locations are accessible by walking or public transit. Online catalogue will allow patrons to renew or place items on hold. Proposed locations generally draw in children already and adding toy library to the facilities can increase participation.	As option provides reuse opportunities at the neighbourhood/community level, it is anticipated that it will be easy for users to participate in the events.	Option provides relatively easy access with limited effort requirement for user participation. Requires users to have access to the internet and the ability to access materials available through the waste exchange system.
Ranking	Medium	Medium	Medium	High	Medium
Score	2	2	2	3	2
Community Safety:					
Potential for impacts to Community Safety	Minimal to no potential to increase number and type of safety issues as long as safeguards are in place to educate audience about food that has spoiled. No technology, equipment, facilities or vehicles involved so impact on community safety is minimal.	Minimal to no potential to increase number and type of safety issues associated with development of strategy.	Potential for minimal to no impact to community safety. Lead staff member will be responsible for disinfecting returned materials and explaining the safe use of toys to parents.	Potential for minimal to no impact to community safety. Residents are dealing with other residents in the neighbourhood and are taking items from curbside or common areas at their own risk.	Potential for minimal to no impact to community safety but similar to existing waste exchange programs, users will have be cautious of meeting locations and quality of materials available for reuse.
Ranking	Medium	Medium	Medium	Medium	Medium
Score	2	2	2	2	2
Equity:					
Potential for unequal impacts/benefits to specific groups	Potential for increased equity when compared to current situation as all groups will benefit from the strategy.	Minimal to no potential for unequal impacts/benefits to specific groups. Potential for more textiles to be sent overseas for use by other groups.	Option provides increased equality to all residents given that locations are distributed throughout the City and are accessible by public transit or walking. Provides ability for all users to borrow toys for free regardless of income levels.	Option provides increased equality to all residents across the City since locations are at the community/neighbourhood level. Provides the ability for users to purchase or obtain materials at for low or no cost. Provides an opportunity for users to access items throughout the City regardless of income levels or location of home.	Provides increased equality to all users of the program to access used materials at a low cost (or free) as waste exchange programs are typically accessible online provided that users have access to the Internet and are able to collect the desired materials. Free internet is available at select City facilities which can help alleviate this potential issue and be part of the promotion campaign. Users without vehicles may be restricted to types of materials available for reuse/recycling.
Ranking	High	High	High	High	Medium
Score	3	3	3	3	2
Behaviour Change:					
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Significant potential to change or influence behaviour by introducing strategies and activities to reduce waste.	Some potential to influence behaviour through awareness campaigns to make consumers more willing to donate used clothing and textiles and repair clothing rather than discarding.	Potential for some behavioral change from the potential savings from borrowing toys that children use for a short period of time. Option increases awareness to reduce waste and the purchasing of toys that will be used for a short period of time.	Option provides the potential to encourage the reduction of waste and increases the awareness of and participation in reuse events.Potential for some behavioral change from the potential savings of obtaining materials for reuse that would otherwise be recycled or disposed. Potential barrier associated with taking gently used goods.	Potential for some behavioral change if users realize that their waste can be reused.
Ranking	High	Medium	Medium	Medium	Medium
Score	3	2	2	2	2
Financial Impact/Benefit	Medium/High	Medium/High	Medium/High	Medium/High	Medium/High
Score	2.2	2.4	2.5	2.2	2.5
Cost:					
Estimated Net Capital Cost	Minimal to no capital costs as no capital costs involved. Potential to extend life of current organics processing facilities, thereby delaying future capital costs.	Minimal to no capital costs.	Potential for some impact to net capital cost. Funding of $4,000 will be required per toy sharing library for purchasing new toys and cleaning/disinfecting products. Assuming that 100 locations are established over the planning period, this cost equates to approximately $400,000. Minimal costs are associated with accommodating space within existing City facilities to establish toy sharing library and updating database and online catalogue.	Potential for minimal to no impact to net capital cost since events will be organized by community/neighbourhood organizations.	Potential for minimal to no net increase in capital cost as a result of establishing a list of participating users/organizations and determining level of effort/funding available to implement this option.

Categories, Criteria & Indicators	Option 2.2 Food Waste Reduction Strategy	Option 2.3 Textile Collection and Reuse Strategy	Option 2.4 Sharing Library	Option 2.5 Support Reuse Events	Option 2.6 Explore Opportunities for Waste Exchange
Estimated Net Operating Cost	Estimated $500,000 + for Toronto campaign design and launch as part of operating costs related to development of strategy. Potential for reduction in operating costs related to collection, disposal, and processing if food waste is reduced.	Some operating costs associated with development of the strategy, awareness campaign and P&E materials. Minimal operating cost if charities involved in collecting and sorting the textiles.	It is assumed that one additional staff member is required to be hired for each toy sharing library (Potentially 100 additional hires over the planning period if located in City libraries). This new staff member will need to be trained on procedures to sign out the toys, maintain the online catalogue and disinfect/clean returned toys. Assuming an annual salary of $85,000, this equates to an annual operating cost of $8.5 million for a fully implemented program across 100 locations.	Potential for minimal to no impact to net operating cost since neighbourhood/community organizations will be organizing and hosting the events. The City will play a role in promoting and educating residents about the event via existing methods (e.g., creating promotional materials) and will require additional time to register events. Potential for some increase to operating costs to cover the cost of by-law enforcement officers who will monitor/issue fines and potentially collection operators to clean up items left in the event area. It will be advertised that remaining items are to be managed by the participant organization and promote non-profit organizations that will accept items will be promoted.	Potential for minimal to no change to net operating costs. The City's role will be to promote, monitor and verify participating waste exchange programs/organizations. It is anticipated that this will require an average of two (2) hours per week, which equates to approximately 100 hours per year.
Ranking	Medium	Medium	Low	Medium	Medium
Score	2	2	1	2	2
Health Care Cost Implications:					
Potential to increase health care costs	Unlikely to result in increased health costs and some potential for reduction in health costs.	Unlikely to result in increased health costs.	Unlikely to result in increased health costs and some potential for reduction in health costs.	Unlikely to result in increased health costs and some potential for reduction in health costs.	Unlikely to result in increased health costs and some potential for reduction in health costs.
Ranking	High	High	High	High	High
Score	3	3	3	3	3
Risk:					
Potential for Contractual Risk	Potential for minimal to no contractual risk with implementation/operation with the City Staff.	Potential for minimal to no contractual risk with reliance on implementation and operation by charities.	Potential for minimal to no contractual risk since the City is implementing the program within existing City facilities.	Potential for minimal contractual risk.	Potential for minimal to no contractual risk since participating users/organizations are responsible for the items they giveaway/sell/buy online.
Schedule Risk	Potential for minimal to no schedule risk. Option is relatively easy to implement.	Potential for minimal to no schedule risk. Option is relatively easy to implement.	Potential for minimal to no schedule risk as option is expanding on the existing City facilities and is independent of other waste management programs and services.	Potential for minimal to no schedule risk as option is easy to implement given it is implemented at the neighbourhood level by residents.	Potential for minimal to no schedule risk as this is option would not be managed by the City.
Innovation Risk	Potential for minimal to no innovation risk as there are other promotion and education and outreach campaigns that have been implemented and proven successful.	Potential for minimal to no innovation risk as no new innovation involved, the approach is well proven and well understood.	Potential for minimal to no innovation risk as a similar concept has a proven track record at Toronto Public Libraries.	Potential for minimal to no innovation risk associated with this option.	Potential for minimal to no innovation risk as this option is not being managed by the City and online material exchange programs have been in place for a number of years.
Ranking	High	High	High	High	High
Score	3	3	3	3	3
Economic Growth:					
Potential for Local Economic Growth	Potential for minimal to no local economic growth.	Potential for some potential local economic growth in managing textiles at charities and through market development for reuse or recycling of textiles.	Potential for some benefit to local economic growth by additional hiring needs. Option provides cost saving opportunities to all residents of the City.	Potential for minimal to no local economic growth. Option may provide cost saving opportunities to all residents of the City.	Potential for some impact in local economic growth since users could receive money for items that would have otherwise been sent to disposal.
Potential for Regional/Global Economic Growth	Potential for minimal to no regional or global economic growth.	Potential for minimal to no regional or global economic growth.	Potential for minimal to no regional/global growth with the potential reduction in the purchase of toys.	Potential for minimal to no regional or global economic growth. Option reduces the need to manufacture and distribute new products.	Potential for some impact on regional or global economic growth as the website will be accessible to users outside of the City.
Ranking	Low	Medium	Medium	Low	Medium
Score	1	2	2	1	2
Local Job Creation:					
Potential for Additional Local Job Creation	Potential for some local job creation.	Potential for some job creation associated with managing textiles.	Potential for significant additional local job creation to staff new toy sharing program across the City (100 potential new jobs).	Potential for minimal to no additional local job creation.	Potential for minimal to no impact on additional local job creation as existing City staff will maintain the program. Short term job creation to develop and launch the waste exchange program.
Ranking	Medium	Medium	High	Low	Medium
Score	2	2	3	1	2

Categories, Criteria & Indicators	Option 2.2 Food Waste Reduction Strategy	Option 2.3 Textile Collection and Reuse Strategy	Option 2.4 Sharing Library	Option 2.5 Support Reuse Events	Option 2.6 Explore Opportunities for Waste Exchange
Flexibility:					
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Some ability to accommodate future changes by changing the message as it applies to food waste.	Some ability to accommodate future changes in material composition or quantities.	Significant ability to accommodate future changes given that concept of a sharing library can be flexible to handle different material streams. Potential restriction with available space requirements to handle additional material streams.	Significant ability to accommodate future changes given that concept of giveaway events can be flexible to handle different material streams.	Option provides signficant opportunity to exchange a wide range of materials.
Ranking	Medium	Medium	High	High	High
Score	2	2	3	3	3
Total Score and Ranking					
Environmental Impact/Benefit:					
Ranking	High	High	High	Medium/High	High
Score	3	2.8	2.6	2.4	2.6
Social Impact/Benefit:					
Ranking	Medium/High	Medium/High	Medium/High	Medium/High	Medium/High
Score	2.5	2.5	2.3	2.4	2.3
Financial Impact/Benefit:					
Ranking	Medium/High	Medium/High	Medium/High	Medium/High	Medium/High
Score	2.2	2.4	2.5	2.2	2.5
Summary					
Ranking	**Medium/High**	**Medium/High**	**Medium/High**	**Medium/High**	**Medium/High**
Score	**7.7**	**7.7**	**7.4**	**7.0**	**7.4**

COLLECTION AND DROP-OFF OPTIONS

Categories, Criteria & Indicators	Option 3.3 Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Environmental Impact/Benefit	Medium	Medium	Medium
Score	2.0	2.0	2.0
Local Environmental Impact/Benefit:			
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impacts to land resources.	Potential for minimal to no impacts to land resources.	Potential for minimal to no impacts to land resources.
Potential Impacts to Local Airshed	Potential for minimal to no impacts to local airshed. Potential for some impact on local airshed due to increased vehicle trips.	Potential for minimal to no impacts to local airshed.	Potential for minimal to no impacts to local airshed.
Potential Impacts to Local Water Sources	Potential for minimal to no impacts to local water sources.	Potential for minimal to no impacts to local water sources.	Potential for minimal to no impacts to local water sources.
Potential Water Consumption Requirements	Potential for minimal to no impact as it relates to water consumption.	Potential for minimal to no impact as it relates to water consumption.	Potential for minimal to no impact as it relates to water consumption.
Total Land Required and Land Use Displacement	Potential for some land use displacement. In large urban centres, "one stop", stand-alone drop-off centres are generally designed to service populations of 200,000 or more residents and have a minimum of 1.2 hectares available for development in order to offer a full range of depot services.	Potential for minimum to no impact due to land displacement. All sites expected to be small and some to be potentially located in existing buildings. The size of the footprint required for waste diversion stations depends on the size and number deemed necessary (likely no more than 250 square metres; some locations would be smaller).	The footprint required for mobile depots is small (i.e. a number of cubic metres per mobile depot).
Ranking	Medium	High	High
Score	2	3	3
Regional/Global Environmental Impact/Benefit:			
Energy and Fossil Fuel Generation / Consumption	Some on-site energy consumption is related to drop-off depot building systems, lighting, heating, etc. Some fossil fuel consumption is related to on-site equipment operation.	Minimal on-site electrical energy consumption (e.g. lights, computers, etc.). Potential for some fuel consumption by vehicles used to collect materials from the network of drop-off depots.	Minimal on-site electrical energy consumption (e.g. lights, computers, etc.) and expected to be supplied through a generator. There is some fuel consumption by mobile depot vehicles to travel to various locations.
Greenhouse Gas (GHG) Contributions	Supports reduction of greenhouse gas emissions by providing location in close proximity for numerous small vehicles and consolidation of materials into single larger vehicle for longer distance transport.	Potential for minimal to no negative GHG impacts from energy use; additional quantities of recyclables and reusables result in upstream GHG benefits. However, the potential for GHG impacts would be positive but low.	Potential for minimal to no GHG impacts as overall energy use and additional quantities of MHSW expected to be collected are small (i.e. with Community Environment Days and the Toxic Taxi services already in place). GHGs related to transportation of the depot would be considered limited due to the frequency of movement.
Ranking	Medium	Medium	Medium
Score	2	2	2

Categories, Criteria & Indicators	Option 3.3 Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Public Health Impact/Benefit:			
Potential to impact Human Health	Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill and access to affordable reused goods for low income families.	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts through little to no change in environmental indicators. Potential for small positive impact on health through increased access to diversion services in underserviced areas.	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts through little to no change in environmental indicators. Potential for small positive impact on health through increased access to diversion services in underserviced areas.
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact on ecological heath as a small amount of hazardous materials are expected to be handled by staff and users and is expected to consist mostly of paints. All potential mobile depot collected materials will be collected in secure containers/bins within or adjacent to the mobile depot.
Ranking	Medium	Medium	Medium
Score	2	2	2
Potential to Increase Diversion:			
Ability to recover additional reusable and/or recyclable materials	Some potential for diversion. Estimate 0.5% additional diversion per large depot or up to 5% diversion for 10 depots	A system of 10-20 neighbourhood depots would be expected to divert about 5,000 tonnes/year (at the low end of the range), or about 250 to 500 tonnes/year per depot, depending on the number of depots and convenience of locations for large numbers of residents. Diversion estimated at 0.9%. Potential for some ability to recover additional recyclable and reuseable materials such as working small appliances, old televisions, etc. (depending on the size, location and storage capacity of the stations).	Some potential for diversion. Potential to divert up to 6,000 tonnes or an additional 0.5% to 1% diversion. Based on Community Environment Day events, 26-52 times per year could collect 350 to 700 tonnes of MHSW, WEEE and non-Blue Bin materials. Additional 10% capture rate of books, durable plastics, textiles, and toys generated in the residential sector could yield up to an additional 5,000 tonnes.
Ranking	Medium	Low	Low
Score	2	1	1
Waste Hierarchy:			
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Ranking	Medium	Medium	Medium
Score	2	2	2

Categories, Criteria & Indicators	Option 3.3 Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Social Impact/Benefit	Medium/Low	Medium	Medium/High
Score	1.7	2.0	2.3
Approvals Complexity:			
Complexity associated with approvals and permitting requirements	Potential for some approval and permitting complexities due to the size and nature of sites being considered. Standard requirement for an Environmental Compliance Approval. Land use planning approvals will also be required depending on the specific site.	Low approvals complexity as dealing with simple design and construction and some depots may be located in existing buildings. No garbage or Green Bin organics would be collected, thereby simplifying approvals. Some potential for some approval and permitting complexities depending on the range of materials to be collected (e.g. hazardous waste, such as batteries) and outdoor storage requirements.	Limited potential for approval complexities. Approvals expected to be similar to Toxic Taxi/Community Environment Days permitting.
Ranking	Medium	Medium	Medium
Score	2	2	2
Potential for Land Use Conflicts/Community Interruption:			
Potential for Traffic increase/Reduction	Potential for some impact on traffic.	Minimal to no impact on traffic.	Minimal to no impact on traffic.
Potential for Litter increase/Reduction	Potential for some impact on litter.	Minimal to no impact on litter.	Minimal to no impact on litter.
Potential Odour Emissions	Potential for some impact on odour emissions.	Minimal to no impact on odour.	Minimal to no impact on odour.
Potential Noise Emissions	Potential for some impact on noise emissions.	Minimal to no impact on noise.	Minimal to no impact on noise.
Potential for Increased Vector/Vermin	Potential for some impact related to vector/vermin.	Minimal to no impact on vector/vermin.	Minimal to no impact on vector/vermin.
Ranking	Low	Medium	Medium
Score	1	2	2
Collaboration:			
Ability to partner with other municipalities/ organizations	Potential for some partnership opportunities especially with organizations that already operate re-use programs, or with neighbouring municipalities if depots located close to municipal borders.	Potential for some partnership opportunities especially with organizations that already operate neighbourhood reuse centres or collect reusable materials.	Potential for some partnership opportunities with local resident associations; some partnership potential also for non-profit groups if service were to be expanded to include – for example - waste electronics, textiles, etc. as part of the mobile service.
Ranking	High	High	High
Score	3	3	3
Complexity:			
Program complexity to user	Drop-off sites are not complicated for users as long as the locations and hours are well advertised and readily accessible and traffic flow is well managed.	Drop-off depots are not complicated for users as long as the service locations and hours are well advertised.	Drop off mobile service is not complicated for users as long as the service locations and hours of operation are well advertised.
Ranking	Medium	Medium	Medium
Score	2	2	2

Categories, Criteria & Indicators	Option 3.3 Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Convenience:			
Ease of participation	Very easy to participate for vehicle owners; but not for non-vehicle owners.	Easy and convenient for users who live locally. Would be located in areas accessible by transit, walking or biking. May require car travel because recyclable and re-useable materials can be bulky.	Easy and convenient for users; not as easy as the Toxic Taxi service; more like Community Environment Day services in the sense of bringing neighbourhoods together for an event.
Ranking	Low	Low	Medium
Score	1	1	2
Community Safety:			
Potential for impacts to Community Safety	Potential for minimal to no impact on community safety provided traffic on-site is well managed during busy times. Any risk related to traffic can be mitigated through good management practices.	Potential for minimal to no impact on community safety assuming stations are located in well-lit parking areas and supervised by City staff. Increased traffic could cause some concern but can be managed through good planning.	Potential for minimal to no impact on community safety if located on well-lit parking areas, staffed by City staff and traffic is properly managed. The mobile units will operate during the day and in highly public areas to encourage maximum participation and safety.
Ranking	Medium	Medium	Medium
Score	2	2	2
Equity:			
Potential for unequal impacts/benefits to specific groups	Potential for unequal benefits as some residents will be closer to facility than others and therefore will have greater accessibility. Some impact to residents living near facility.	Potential for minimal to no impact on any specific group if waste diversion stations are located in diverse areas throughout the city. Potential to increase service levels to those not well served by current system; greater number of stations improves equity for those not well served by existing drop-offs.	Potential for minimal to no impact on any specific group if the mobile service located in diverse areas throughout the city. Mobile depots provide benefits to community members that may not have cars or have mobility issues; therefor it increases equity of service.
Ranking	Low	High	High
Score	1	3	3
Behaviour Change:			
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Minimal to no potential to influence or encourage behaviour change as waste generator maintains current practices.	Minimal to no potential to influence or encourage behaviour change as waste generator maintains current practices.	Potential for some potential to influence or encourage behaviour if used to support and co-promote other sustainable environmental practices across the city (e.g. water conservation, energy conservation, alternative cleaners, food waste reduction, renewable energy, etc.).
Ranking	Low	Low	Medium
Score	1	1	2

Categories, Criteria & Indicators	Option 3.3 Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Financial Impact/Benefit	Medium/High	Medium/High	Medium/High
Score	2.4	2.5	2.4
Cost:			
Estimated Net Capital Cost	Total capital cost of $100 - $140 million for 10 depots. Assumes capital costs $10 - $14 million for each depot. Assumes a dedicated drop off for every 200,000+ residents, this would mean 10-12 stand alone depots (not co-located with transfer sites).	Total capital costs of $5 to $10 million. Capital costs from $500,000 each. Estimate 10-20 neighbourhood depots in Toronto. No cost of land needed, as will be located in existing industrial buildings.	Capital costs are estimated at $150,000 for each mobile depot (includes cost of new 26' cargo van, signage and bins). Assuming 5 mobile depots are purchased, the total capital cost is $750,000.
Estimated Net Operating Cost	Operating costs of $20 million (for 10 depots). Assumes $2 M per depot annual operating costs. Operating costs can be partially offset by tipping fees charged at the facilities and revenues from diverted materials, although these are expected to be low.	Given occupancy rates and labour costs in Toronto, a network of 10-20 waste diversion centres are estimated to cost $2-4 million/year to operate (i.e. about $200,000 per centre per year (not including amortized capital).	Estimated operating costs are $16,000 per site visit for set up, take down and MHSW management, based on Community Environment Day costs. Each mobile depot could complete 26 to 52 stops per year. For 26 site visits annually, estimated cost would be $416,000 per year per mobile depot, and for up to 5 mobile depots estimated costs approximately $2 million/year. Operating costs include staff time (i.e. either City staff or contracted staff) and material processing. The operating cost could be reduced by reducing the time at each site. This could potentially save up to one third of the costs (transport time does not change).
Ranking	Low	Medium	High
Score	1	2	3
Health Care Cost Implications:			
Potential to increase health care costs	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.
Ranking	High	High	High
Score	3	3	3
Risk:			
Potential for Contractual Risk	Potential for minimal to no contract risk as stand alone drop-off depots can be operated by City and/or contract staff. Contractual risk is manageable.	Potential for minimal to no contract risk because drop-off depots can be operated by City and/or contract staff. Contractual risk is manageable.	Potential for minimal to no contract risk as mobile depots can be operated by City or contract staff. Contractual risk is manageable.
Schedule Risk	Potential for minimal to no schedule risk (mainly related to staffing hours/costs and transfer pick up schedules). Potential for some siting and construction risk (mainly related to siting, approvals and potential number of facilities to be constructed).	Potential for minimal to no schedule risk (mainly related to staffing hours/costs and transfer pick up schedules). Construction schedule risk is low as construction is not complex, and design is simple. A number of collection bins may be placed in existing buildings where industrial space is available for rent.	Potential for minimal to no schedule risk.

Categories, Criteria & Indicators	Option 3.3 Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Innovation Risk	Potential for minimal to no innovation risk. This is a comparatively "low tech approach" to expanding drop-off services for residents and small businesses across the City.	Potential for minimal to no innovation risk. This is a comparatively "low tech approach" to expanding drop-off services for residents and small businesses across the City.	Potential for minimal to no innovation risk- approach is well proven and understood.
Ranking	High	High	High
Score	3	3	3
Economic Growth:			
Potential for Local Economic Growth	Potential for some impact on local economic growth; this is a labour intensive, mid-scale size waste management service.	Potential for some impact on local economic growth; this is a labour intensive but small-scale service which creates some jobs. Potential for some additional employment in reuse organizations that take materials from depots.	Potential for minimal to no impact on local economic growth; this is a labour intensive but small scale service comprised of a few collection vehicles and paid staff.
Potential for Regional/Global Economic Growth	Potential for minimal to no impact on regional or global economic growth, as amounts of waste handled are relatively small.	Potential for minimal to no impact on regional or global economic growth, as amount of waste handled is relatively small.	Potential for minimal to no impact on regional or global economic growth.
Ranking	Medium	Medium	Low
Score	2	2	1
Local Job Creation:			
Potential for Additional Local Job Creation	Potential for some additional local operational job creation at neighbourhood depots. Potential for some additional local job creation at reuse organizations which use collected materials that are incremental to the tonnes currently collected.	Potential for some additional local operational job creation at neighbourhood drop-off depots. Potential for some additional local job creation at reuse organizations which use collected materials that are incremental to the tonnes currently collected.	Potential for minimal to no additional job creation due to small number of mobile depots in operation and small amount of reuse/recyclable materials expected to be collected.
Ranking	Medium	Medium	Low
Score	2	2	1
Flexibility:			
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	High potential for flexibility to change the materials accepted as needs change with different composition over time. One benefit of stand alone drop–off depots is that depots can be cost effectively adapted over time to accept a wide range of new materials or can be used to pilot collection of new materials before rollout to curbside collection. However, the main constraint is that drop-off is inherently less convenient than curbside collection, so the ability to divert is less.	High potential to be able to accommodate future changes. A benefit of a network of waste diversion centres service is that given some storage and receiving constraints, the service can be adapted to recover a wide variety of materials (and support waste re-use, recycling and public outreach/education functions at the same time).	High flexibility to adapt to changing waste stream and materials requiring diversion. A benefit of a mobile drop off service is that, given some storage and receiving constraints, the service can be adapted to recover other new materials (e.g. broader list of WEEE, textiles, etc.).
Ranking	High	High	High
Score	3	3	3

Categories, Criteria & Indicators	Option 3.3 Stand Alone Drop-off and Reuse Centres	Option 3.4 Develop a Network of Permanent, Small Scale Neighbourhood Diversion Stations in Convenient Locations	Option 3.5 Develop a Mobile Drop-off Service for Targeted Divertible Materials
Total Score and Ranking			
Environmental Impact/Benefit:			
Ranking	Medium	Medium	Medium
Score	2.0	2.0	2.0
Social Impact/Benefit:			
Ranking	Medium/Low	Medium	Medium/High
Score	1.7	2.0	2.3
Financial Impact/Benefit:			
Ranking	Medium/High	Medium/High	Medium/High
Score	2.4	2.5	2.4

Summary

Ranking	**Medium**	**Medium**	**Medium/High**
Score	**6.1**	**6.5**	**6.7**

COMMISSIONER STREET TRANSFER STATION OPTIONS

Categories, Criteria & Indicators	Option 4.1 Relocation of Commissioners Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.	Option 4.2 Redirecting Waste to an Existing Transfer Station(s).	Option 4.3 Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).
Environmental Impact/Benefit	Medium	Medium/Low	Medium
Score	1.8	1.6	2.0
Local Environmental Impact/Benefit:			
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station, with appropriate drainage features.	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station, with appropriate drainage features.	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station, with appropriate drainage features.
Potential Impacts to Local Airshed	Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station. Limited to no material processing would occur on site.	Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station. Limited to no material processing would occur on site. Some potential impacts associated with collection vehicles being required to travel additional distances.	Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station. Limited to no material processing would occur on site.
Potential Impacts to Local Water Sources	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station in conjunction with stormwater management controls on-site.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station in conjunction with stormwater management controls on-site.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station in conjunction with stormwater management controls on-site.
Potential Water Consumption Requirements	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
Total Land Required and Land Use Displacement	Can be designed to the available land parcel but ideal area is approximately 5-6 hectares. Compatible with existing industrial and commercial land uses in the area .	Minimal to no impact as transfer station(s) already exists and additional land not expected to be required.	Minimal to no impact if transfer station already exists and additional land not expected to be required.
Ranking	Medium	Medium	High
Score	2	2	3
Regional/Global Environmental Impact/Benefit:			
Energy and Fossil Fuel Generation / Consumption	Minimal to no change from current condition. Energy consumption is related to transfer station building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation.	No energy will be generated. Overall energy consumption related to transfer station building systems, lighting, heating, etc. expected to decrease with closure of Commissioners Street Transfer Station. Fossil fuel consumption related to on-site equipment operation. Some overall fuel consumption increase with requirement for collection vehicles to travel further.	Minimal to no change from current condition. No energy generation. Overall energy consumption related to transfer station building systems, lighting, heating, etc. expected to decrease with closure of Commissioners Street Transfer Station. Fossil fuel consumption related to on-site equipment operation.
Greenhouse Gas (GHG) Contributions	Supports ongoing reduction of greenhouse gas emissions by providing location in close proximity for curbside collection trucks and numerous small paid private waste vehicles and consolidation into single larger vehicle for longer distance transport.	Supports reduction of greenhouse gas emissions by consolidating waste from numerous collection vehicles into single larger vehicle for longer distance transport. Some overall increase in contributions to greenhouse gas emissions as a result of collection vehicles being required to travel greater distances.	Supports reduction of greenhouse gas emissions by consolidating waste from numerous collection vehicles into single larger vehicle for longer distance transport.
Ranking	High	Medium	High
Score	3	2	3

Categories, Criteria & Indicators	Option 4.1 Relocation of Commissioners Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.	Option 4.2 Redirecting Waste to an Existing Transfer Station(s).	Option 4.3 Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).
Public Health Impact/Benefit:			
Potential to impact Human Health	Potential for an adverse impact on public health through potential environmental impacts and neighbourhood stigma.	Potential for an adverse impact on public health through potential environmental health impacts.	Potential for an adverse impact on public health through potential environmental impacts.
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Ranking	Low	Low	Low
Score	1	1	1
Potential to Increase Diversion:			
Ability to recover additional reusable and/or recyclable materials	Minimal to no ability to recover additional materials (only metals, wood and cardboard) from the floor of the transfer station due to health and safety concerns and related regulations.	Minimal to no ability to recover additional materials (e.g. metals, wood, cardboard) from the tip floor of the transfer station due to health and safety concerns and related regulations.	Minimal to no ability to recover additional materials from the floor of the transfer station due to health and safety concerns and related regulations.
Ranking	Low	Low	Low
Score	1	1	1
Waste Hierarchy:			
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Ranking	Medium	Medium	Medium
Score	2	2	2
Social Impact/Benefit	**Medium/Low**	**Medium/Low**	**Medium/Low**
Score	**1.7**	**1.7**	**1.7**
Approvals Complexity:			
Complexity associated with approvals and permitting requirements	Standard requirement for an Environmental Compliance Approval (ECA). Complexity of approval increases if daily tonnage is greater than 1,000 tonnes per day of residual waste, requiring approval under the Environmental Assessment Act. Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.	Environmental Compliance Approval (ECA) and land use approvals already in place for existing transfer station. Approvals may be required if annual transfer limits are to be exceeded.	Environmental Compliance Approval (ECA) and land use approvals already in place for existing transfer station. Approvals may be required if annual transfer limits are to be exceeded.
Ranking	Medium	High	High
Score	2	3	3
Potential for Land Use Conflicts/Community Interruption:			
Potential for Traffic increase/Reduction	Potential for some impact due to increased traffic within vicinity of relocated site.	Potential for some impact due to increased traffic to existing transfer station. Traffic will increase over current levels to the existing transfer station(s) due to the redirected traffic. Additional traffic can be split between the existing facilities.	Potential for some impact due to increased traffic to private transfer station. Traffic will increase over current levels to the private transfer station(s) due to the redirected traffic.
Potential for Litter increase/Reduction	Potential for minimal to no impact of increased litter as all solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station. Appropriate operating procedures will be in place to minimize potential for litter.	Potential for minimal to no impact of increased litter as all solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station. Appropriate operating procedures will be in place to minimize potential for litter.	Potential for minimal to no impact of increased litter as all solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station. Appropriate operating procedures will occur to minimize potential for litter.

Categories, Criteria & Indicators	Option 4.1 **Relocation of Commissioners Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.**	Option 4.2 **Redirecting Waste to an Existing Transfer Station(s).**	Option 4.3 **Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).**
Potential Odour Emissions	Potential for some impact from odour to community. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station which will minimize any odour combined with frequent removal of waste materials.	Potential for some impact from odour to community related to increased waste volumes. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station which will minimize any odour combined with frequent removal of waste materials.	Potential for some impact from odour to community related to increased waste quantities. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station which will minimize any odour combined with frequent removal of waste materials.
Potential Noise Emissions	Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed transfer station. Noise emissions similar to current situation, but at a different location.	Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed transfer station. Noise emissions similar to current situation.	Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed transfer station. Noise emissions similar to current situation.
Potential for Increased Vector/Vermin	Potential for some increase in vector/vermin at new location. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station combined with frequent removal of waste materials and appropriate operating procedures.	Potential for some increase in vector/vermin at redirected locations. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station combined with frequent removal of waste materials and appropriate operating procedures.	Potential for some increase in vector/vermin at private transfer station. All solid waste materials are expected to be collected in containers/bins and/or managed inside enclosed transfer station combined with frequent removal of waste materials and appropriate operating procedures.
Ranking	Medium	Medium	Medium
Score	2	2	2
Collaboration:			
Ability to partner with other municipalities/ organizations	Potential for minimal to no partnership opportunities. Capable of serving residents through curbside collection and businesses within Toronto.	Potential for minimal to no partnership opportunities. Capable of serving residents through curbside collection and businesses within Toronto.	Potential for minimal to no partnership opportunities. Capable of serving residents through curbside collection and businesses within Toronto.
Ranking	Low	Low	Low
Score	1	1	1
Complexity:			
Program complexity to user	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.
Ranking	N/A	N/A	N/A
Score			
Convenience:			
Ease of participation	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.
Ranking	N/A	N/A	N/A
Score			
Community Safety:			
Potential for impacts to Community Safety	Potential for minimal to no impact on community safety if located on suitably zoned site within the Port Lands.	Potential for some impact on community safety related to greater number of vehicles travelling to decentralized locations.	Potential for some impact on community safety is related to greater number of vehicles travelling to a single central location.
Ranking	Medium	Low	Low
Score	2	1	1
Equity:			
Potential for unequal impacts/benefits to specific groups	Potential for minimal to no impact on any specific group if located on suitably zoned site within the Port Lands. Use will be limited to curbside collection vehicles. No impact on social equity as residents will not access facility.	Potential for minimal to no impact on any specific group as existing transfer stations are established within industrial zoned areas of the City. No impact on social equity as residents will not access facility.	Potential for minimal impact on any specific group as existing private transfer stations are established within industrial zoned areas of the City.
Ranking	Medium	Medium	Medium
Score	2	2	2

Categories, Criteria & Indicators	Option 4.1 Relocation of Commissioners Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.	Option 4.2 Redirecting Waste to an Existing Transfer Station(s).	Option 4.3 Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).
Behaviour Change:			
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Potential for minimal to no influence or behavior change as waste generator maintains current practices and transfer station is only for waste delivered by collection vehicles.	Potential for minimal influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Ranking	Low	Low	Low
Score	1	1	1
Financial Impact/Benefit	**Medium**	**Medium**	**Medium**
Score	**2.0**	**2.0**	**1.9**
Cost:			
Estimated Net Capital Cost	Estimated range of $16 - $20 million, not including land. Cost of approvals approximately $1 million.	Minimal to no capital costs anticipated unless specific facility upgrades required. Potentially another piece of equipment (e.g. loader) required at approximately $500,000.	No capital costs incurred by the City. If specific capital upgrades are required this will be factored into the unit cost charged to the City.
Estimated Net Operating Cost	Annual net operating costs comparable to existing transfer station. ~ $2 - 2.5 million	Minimal incremental increase in annual net operating cost for existing transfer station (estimated at $2-2.5 million). Additional costs could include trucking cost ~$260,000-$480,000 depending on location. Closure of Commissioners Street Transfer Station reduces City's overall operating costs.	City will procure use of private transfer station based on a unit cost (approximately $10-20 per tonne) which includes operating costs as appropriate.
Ranking	Low	High	Medium
Score	1	3	2
Health Care Cost Implications			
Potential to increase health care costs	Uncertain although unlikely that the option with result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.
Ranking	Medium	Medium	Medium
Score	2	2	2
Risk:			
Potential for Contractual Risk	Potential for minimal contract risk as transfer station can be operated by City staff or contract staff. Contractual risk is manageable.	Potential for minimal to no contract risk as existing transfer stations operated by City staff. Contractual risk is manageable.	Potential for some contract risk as existing facilities operated by private service provider. Risk can be managed through procurement and contracting processes.
Schedule Risk	Potential for minimal schedule risk with standard engineering and construction requirements.	Potential for minimal to no schedule risk since facilities already exist.	Potential for minimal to no schedule risk since facilities already exist.
Innovation Risk	Potential for minimal innovation risk due to standard engineering and construction requirements.	Potential for minimal to no innovation risk since facilities already exist.	Potential for minimal to no innovation risk since facilities already exist.
Ranking	High	High	Medium
Score	3	3	2
Economic Growth:			
Potential for Local Economic Growth	Potential for some impact on local economic growth by providing ongoing and convenient cost effective service to the growth and development in the downtown core.	Potential for minimal to no impact on local economic growth with continued service provided to support the growth and development in the downtown core.	Potential for minimal to no impact on local economic growth with continued service provided to support the growth and development in the downtown core.
Potential for Regional/Global Economic Growth	Potential for minimal to no impact on regional or global economic growth.	Minimal to no potential for regional or global economic growth.	Potential for minimal to no impact on regional or global economic growth.
Ranking	Medium	Low	Low
Score	2	1	1

Categories, Criteria & Indicators	Option 4.1 Relocation of Commissioners Transfer Station within the Port Lands Area or Designation of Land for Long-Term Relocation.	Option 4.2 Redirecting Waste to an Existing Transfer Station(s).	Option 4.3 Procure Transfer Capacity at a Private Transfer Station in Vicinity of the Port Lands Area (if available).
Local Job Creation:			
Potential for Additional Local Job Creation	Some potential for local job creation related to construction of new facility.	Potential for minimal to no job creation as this option is the continuation of an existing service at an already existing alternative City transfer station.	Potential for some job creation as this option is the continuation of an existing service but may require additional staff to support increased volumes of material managed.
Ranking	Medium	Low	Medium
Score	2	1	2
Flexibility:			
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Internal configuration of facility and operations has some flexibility, as required, to accommodate changing material composition, market conditions, new legislation, etc.	Internal configuration of facility and operations are flexible, as required, to accommodate changing material composition, market conditions, etc.	City procurement and contracting processes designed to require some operational flexibility, as necessary, to accommodate changing material composition, market conditions, etc.
Ranking	Medium	Medium	Medium
Score	2	2	2

Total Score and Ranking

Environmental Impact/Benefit:			
Ranking	Medium	Medium/Low	Medium
Score	1.8	1.6	2.0
Social Impact/Benefit:			
Ranking	Medium/Low	Medium/Low	Medium/Low
Score	1.7	1.7	1.7
Financial Impact/Benefit:			
Ranking	Medium	Medium	Medium
Score	2.0	2.0	1.9

Summary

Ranking	**Medium**	**Medium/Low**	**Medium**
Score	**5.5**	**5.3**	**5.6**

MATERIAL AND ENERGY RECOVERY OPTIONS

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Environmental Impact/Benefit	Medium	Medium/High	Medium	Medium	Medium/High	Medium	Medium
Score	1.8	2.2	2.0	2.0	2.2	2.0	2.0
Local Environmental Impact/Benefit:							
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impact through contact with ground surface. Solid waste materials are expected to be processed within enclosed building and on	Potential for minimal to no impact through contact with ground surface. Solid waste materials are expected to be initially processed inside enclosed building	Potential for minimal to no impact through contact with ground surface. Solid waste materials are managed within enclosed building and on paved surface.	Potential for minimal to no impact through contact with ground surface. Solid waste materials are managed within enclosed building and on paved surface.	Potential for minimal to no impact through contact with ground surface. Residual mixed waste or high organic content waste materials are placed within	Potential for minimal to no impact through contact with ground surface. Solid waste materials are expected to be processed within enclosed building and on	Potential for minimal to no impact through contact with ground surface. Solid waste materials are managed within enclosed building and on paved surface.
Potential Impacts to Local Airshed	Potential for minimal impact from dust and odours. Solid waste materials are expected to be processed within enclosed building and on a paved surface. Frequent removal of waste materials will occur to minimize potential for further impacts from odour.	Potential for minimal to no impact from dust and odours as solid waste materials are expected to be initially processed inside enclosed building and on paved surface, followed by digestion with appropriate controls. Outdoor composting only required for final stabilization of digestate. Frequent removal of waste materials will occur to minimize potential for further impacts from odour.	Potential for some impacts to local airshed from contaminates released through combustion of waste.	Potential for minimal to no impacts to local airshed as waste materials are primarily converted to alternative forms of gas/fuel and solids, and minimal release of contaminates through thermal processing of waste. Solid waste materials are managed within enclosed building and on paved surface with minimal impact from dust and odours.	Potential for minimal to no impacts to local airshed as mixed/organic waste materials are placed in a landfill cell and covered, with a gas collection system. Compost by-product is removed from cell after biodegradation is completed with minimal to no release of odours.	Potential for minimal to no impact from dust and odours. Solid waste materials are expected to be processed within enclosed building and on paved surface. Frequent removal of waste materials will occur to minimize potential for further impacts from odour.	Potential for minimal to no impacts to local airshed as waste materials are primarily converted to liquid biofuel and solid residuals, and minimal release of contaminates through processing of waste. Solid waste materials are managed within enclosed building and on paved surface with minimal impact from dust and odours.
Potential Impacts to Local Water Sources	Potential for minimal to no impact from off-site release of potential contaminants to water sources.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are expected to be initially processed inside enclosed building and on paved	Potential for minimal to no impact from off-site release of potential contaminants to water sources.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are managed within enclosed building and on paved surface in conjunction with	Potential for minimal to no impact from off-site release of potential contaminants to water sources. Mixed/organic solid waste materials are placed within a landfill cell, typically lined with a leachate	Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are expected to be processed within enclosed building and on paved surface in	Potential for minimal to no impact from off-site release of potential contaminants to water sources. Solid waste materials are managed within enclosed building and on paved surface in conjunction with
Potential Water Consumption Requirements	Potential for minimal to no impact related to water consumption if use is limited to periodic site and equipment cleaning requirements and site staff facilities.	Potential for minimal to no impact related to water consumption if use is limited to periodic site and equipment cleaning requirements and site staff facilities. Potential for some increased consumption of water depending on requirements of anaerobic digestion and composting	Potential for significant impact related to water consumption required to cool combustion gases. Additional water consumption for periodic site and equipment cleaning requirements and site staff facilities.	Potential for some impact related to water consumption required to cool synthetic gases. Additional water consumption for periodic site and equipment cleaning requirements and site staff facilities.	Potential for minimal to no impact related to water consumption as leachate is recirculated to assist in biodegradation. Minimal water consumption for periodic site and equipment cleaning requirements and site staff facilities.	Potential for minimal to no impact related to water consumption if use is limited to periodic site and equipment cleaning requirements and site staff facilities.	Potential for some impact related to water consumption required to cool synthetic gases. Additional water consumption for periodic site and equipment cleaning requirements and site staff facilities.
Total Land Required and Land Use Displacement	Can be designed to the available land parcel but ideal area could be in the order of 4 - 14 ha. Compatible with existing industrial land uses.	Can be designed to the available land parcel but significant land area (could be as large as 13-17 ha) may be required for composting component. A mixed waste processing system with Anaerobic Digestion will require less land - in the order of 8-10 ha (based on 200,000 tonnes per year)). Compatible with existing industrial land uses.	Can be designed to the available land parcel but ideal area could be in the order of 9-14 ha depending on facility capacity, plus buffer lands. Compatible with existing industrial land uses.	Can be designed to the available land parcel but ideal area could be from 9 - 14 ha[1], similar to direct combustion facility, depending on facility technology and capacity. Compatible with existing industrial land uses.	Additional land not expected to be required, typically developed at an existing landfill (i.e. Green Lane Landfill) in a series of small cells. Based on industry experience, a one hectare cell can process approximately 50,000 tonnes of organic waste materials over a timeline of approximately three to four months, or potentially longer.	Can be designed to the available land parcel but ideal area could be in the order of approximately 4 - 14[1] ha, consistent with a mixed waste processing facility. Compatible with existing industrial land uses.	Can be designed to the available land parcel but ideal area could be from 9 - 14 ha[1], similar to direct combustion facility, depending on facility technology and capacity. Compatible with existing industrial land uses.
Ranking	Medium	Medium	Medium	Medium	High	Medium	Medium
Score	2	2	2	2	3	2	2

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Regional/Global Environmental Impact/Benefit:							
Energy and Fossil Fuel Generation / Consumption	No potential for energy generation unless a RDF fuel is produced as a by-product or residual waste is further processed through an additional recovery option. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation. Depending on site location, no change or some reduction in overall transfer vehicle fuel consumption expected since currently transporting this waste stream to Green Lane Landfill.	Significant potential for energy generation in the form of biogas or fuel pellets depending on technology utilized. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation. No change or some decrease in overall transfer vehicle fuel consumption expected since currently transporting this waste stream to Green Lane Landfill.	Potential for significant energy generation in the form of heat, steam or electricity from combustion of materials. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Limited fossil fuel consumption required to start and stop processing activities. Additional recyclables can be diverted, offsetting need for primary extraction.	Potential for significant energy generation in the form of heat, steam or electricity from conversion of materials. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Limited fossil fuel consumption required to start and stop processing activities.	Potential for some energy generation in the form of a biogas collected from the cell which can be utilized as a renewable fuel source. There will be fossil fuel consumption related to on-site equipment operation.	Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation. Depending on site location, no change or some reduction in overall transfer vehicle fuel consumption expected since currently transporting this waste stream to Green Lane Landfill. Energy generation from RDF fuel realized by third party purchaser if high BTU content RDF product which offsets need for fossil fuel consumption.	Potential for significant energy generation in the form of heat, steam or electricity from the biofuel produced from the conversion of materials. Energy consumption is related to mechanical processing equipment, building systems, lighting, heating, etc. Limited fossil fuel consumption required to start and stop processing activities. Fossil fuel consumption required to support material conversion processes and related to on-site equipment operation.
Greenhouse Gas (GHG) Contributions	Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and by providing facility location in closer proximity to source of waste generation. Additional recyclables can be diverted offsetting need for primary extraction.	Supports significant overall reduction of greenhouse gas emissions through collection and use of biogas and when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance. Additional recyclables can be diverted offsetting need for primary extraction.	Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance.	Additional recyclables can be diverted, offsetting need for primary extraction. Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance.	Supports overall reduction of greenhouse gas emissions by converting organic waste to biogas and capturing the gas for use as a fuel source.	Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance. Reduction of emissions through combustion of fuel product realized by a third party purchaser.	Supports overall reduction of greenhouse gas emissions when considering corresponding decrease in landfilling and associated potential for methane generation. Emissions are also reduced by providing facility location in closer proximity to source of waste generation to minimize collection vehicle haul distance.
Ranking	Medium	High	High	High	High	High	High
Score	2	3	3	3	3	3	3
Public Health Impact/Benefit:							
Potential to impact Human Health	Potential for an adverse impact on public health through potential environmental health impacts.	Potential for an adverse impact on public health through potential environmental health impacts and neighbourhood stigma.	Potential for an adverse impact on public health through potential environmental health impacts and neighbourhood stigma.	Potential for an adverse impact on public health through potential environmental health impacts.	Minimal to no potential positive impact on public health. Unlikely to result in negative impacts as technology would be located at an existing landfill side. Potential for small positive impacts on health through the overall reduction of greenhouse gas emissions and through employment opportunities.	Potential for an adverse impact on public health through numerous environmental factors, need for additional land requirements and potential stigma and stress experienced by some local populations living in close proximity to facility.	Potential for an adverse impact on public health through numerous environmental factors, need for additional land requirements, and potential stigma and stress experienced by some local populations living in close proximity to facility.
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.
Ranking	Low	Low	Low	Low	Medium	Low	Low
Score	1	1	1	1	2	1	1

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Potential to Increase Diversion:							
Ability to recover additional reusable and/or recyclable materials	Significant potential to recover additional recyclable materials from the mixed waste stream typically collected from multi-residential buildings depending on quality and available markets. Estimated increase of 8-10% diversion overall with recovery mainly of plastics and metals.	Potential for significant ability to recover additional recyclable materials from the mixed waste stream typically collected from multi-residential buildings depending on quality and available markets. Additional potential to increase diversion if finished compost or digestate is marketable (potentially up to 65% of material processed).	Potential for some ability to recover additional recyclable materials (mainly metals) from waste materials prior to combustion and potential end use for bottom ash.	Potential for some ability to recover additional recyclable materials (mainly metals) from waste materials prior to conversion and by utilizing the resulting syngas, slag and other products depending on the technology.	Potential for some ability to recover compost material from the cell, dependent on the composition of the residual waste stream processed.	Potential for some ability to recover additional recyclable materials from the mixed waste stream being processed, depending on quality and available markets.	Potential for some ability to recover additional recyclable materials (mainly metals) from waste materials prior to conversion and by utilizing the resulting liquid fuel, slag and other products depending on the technology.
Ranking	Medium	High	Medium	Medium	Low	Medium	Medium
Score	2	3	2	2	1	2	2
Waste Hierarchy:							
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for materials and energy recovery, and conversion to liquid fuel and other materials.
Ranking	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Score	2	2	2	2	2	2	2
Social Impact/Benefit	Medium/Low	Medium/Low	Medium/Low	Medium/Low	Medium	Medium/Low	Medium/Low
Score	1.7	1.7	1.7	1.7	2.0	1.7	1.7
Approvals Complexity:							
Complexity associated with approvals and permitting requirements	Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.	Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.	Will require approval under the Environmental Assessment Act, either a screening or potentially an individual EA, increasing complexity and involving multiple stakeholders. Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.	Standard requirement for an Environmental Compliance Approval (ECA). Will require approval under the Environmental Assessment Act, through either a screening or potentially an individual Environmental Assessment (EA) which increases complexity. Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.	Expected to require an amendment to the existing Environmental Compliance Approval (ECA) for Green Lane Landfill. Will require modifications to site development and operations plans. No other approvals anticipated.	Standard requirement for an Environmental Compliance Approval (ECA). Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site.	Standard requirement for an Environmental Compliance Approval (ECA). May require approval under the Environmental Assessment Act, either a screening or potentially an individual Environmental Assessment (EA), increasing complexity. Land use planning (e.g. Official Plan, Zoning, Site Plan) approvals will also be required depending on the specific site
Ranking	Medium	Medium	Low	Low	Medium	Medium	Low
Score	2	2	1	1	2	2	1
Potential for Land Use Conflicts/Community Interruption:							
Potential for Traffic increase/Reduction	Potential for some impact due to increased traffic generated by the facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.	Potential for some impact due to increased traffic generated by the MBT facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.	Potential for some impact due to increased traffic generated by the combustion facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.	Potential for some impact due to increased traffic generated by the facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.	Potential for minimal to no impact due to traffic generated by the biocell, if it is located at Green Lane Landfill which has already been receiving the same waste stream for disposal.	Potential for some impact due to increased traffic generated by the RDF facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.	Potential for some impact due to increased traffic generated by the facility within the vicinity of the site, either from smaller curbside vehicles or larger transfer vehicles.
Potential for Litter increase/Reduction	Potential for some impact of increased litter within the vicinity of the facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.	Potential for some impact of increased litter within the vicinity of the MBT facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.	Potential for minimal to no impact of increased litter within the vicinity of the combustion facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.	Potential for minimal to no impact of increased litter within the vicinity of the facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.	Potential for minimal to no impact of increased litter within the vicinity of the biocell. Appropriate housekeeping procedures will occur to minimize potential for litter.	Potential for some impact of increased litter within the vicinity of the RDF facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.	Potential for minimal to no impact of increased litter within the vicinity of the facility site. Appropriate housekeeping procedures will occur to minimize potential for litter.

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Potential Odour Emissions	Potential for some impact from odour to community. Mixed waste materials will be processed inside enclosed facility which will minimize any odour combined with frequent removal of residual waste materials.	Potential for some impact from odour to community. Mixed waste materials will be processed inside enclosed facility which will minimize any odour combined with frequent removal of residual waste materials. Outdoor composting only	Potential for minimal to no impact from odour to community. Waste materials will be processed inside enclosed facility which will minimize any odour and the wastes will be combusted.	Potential for minimal to no impact from odour to community. Waste materials will be processed inside enclosed facility which will minimize any odour and wastes are then converted.	Potential for minimal to no impact from odour to community. Organic waste materials will be processed anaerobically, covered within a controlled cell with gas collection.	Potential for some impact from odour to community. Mixed waste materials will be processed inside enclosed facility which will minimize any odour combined with frequent removal of RDF product.	Potential for minimal to no impact from odour to community. Waste materials will be processed inside enclosed facility which will minimize any odour and wastes are then converted.
Potential Noise Emissions	Potential for some nuisance noise emissions off-site.	Potential for some nuisance noise emissions off-site. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and composting equipment. Other site equipment, waste collection vehicles and large transfer trailers will operate inside enclosed facility.	Potential for some nuisance noise emissions off-site. Combustion equipment operated within enclosed facility, although external stack exhaust will generate noise within guidelines. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.	Potential for some nuisance noise emissions off-site. The equipment is operated within an enclosed facility, although external processing equipment may generate noise within guidelines. There may be noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.	Potential for minimal to no nuisance noise emissions off-site. Equipment operated periodically for creation of cell and removing the processed materials after a period of time.	Potential for some nuisance noise emissions off-site. Processing equipment operated within enclosed facility. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.	Potential for some nuisance noise emissions off-site. Equipment operated within enclosed facility, although external processing equipment may generate noise within guidelines. Noise emissions from on-site equipment operation related to moving outdoor collection containers/bins and movement of waste collection vehicles and large haulage vehicles.
Potential for Increased Vector/Vermin	Potential for some increase in vector/vermin at new location.	Potential for some increase in vector/vermin at facility location. All solid waste materials are expected to be managed inside enclosed facility combined with frequent removal of waste materials and appropriate housekeeping procedures. Outdoor composting only required for final stabilization of digestate with minimal to no potential for increased attraction of vector/vermin.	Potential for minimal to no increase in vector/vermin at facility location. All solid waste materials are managed inside enclosed facility and combusted, with frequent removal of any residual waste materials and appropriate housekeeping procedures.	Potential for minimal to no increase in vector/vermin at facility location. All solid waste materials are managed inside enclosed facility and processed, with frequent removal of any residual waste materials and appropriate housekeeping procedures.	Potential for minimal to no increase in vector/vermin at facility location. All organic waste materials are managed within a covered cell, and removed after biodegradation is complete. Ongoing appropriate housekeeping procedures undertaken at the site.	Potential for some increase in vector/vermin at facility location. All solid waste materials are expected to be managed inside enclosed facility combined with frequent removal of waste materials and appropriate housekeeping procedures.	Potential for minimal to no increase in vector/vermin at facility location. All solid waste materials are managed inside enclosed facility and processed, with frequent removal of any residual waste materials and appropriate housekeeping procedures.
Ranking	Low	Low	Medium	Medium	High	Low	Medium
Score	1	1	2	2	3	1	2
Collaboration:							
Ability to partner with other municipalities/ organizations	Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Other municipalities may be interested in serving multi-residential customers using mixed waste processing.	Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Other municipalities may be interested in serving multi-residential customers using MBT.	Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.	Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.	Potential for minimal to no partnership opportunities as biocell would be intended to process residual mixed waste stream or contaminated source separated organics stream from multi-residential buildings in City of Toronto.	Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.	Potential for some partnership opportunities by sizing facility to accommodate wastes from other municipalities and organizations. Will likely require partnership with Private Sector for Design, Build, Operate and Maintain; in part due to proprietary nature of technology.
Ranking	Medium	Medium	Medium	Medium	Low	Medium	Medium
Score	2	2	2	2	1	2	2
Complexity:							
Program complexity to user	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.
Ranking	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Score							
Convenience:							
Ease of participation	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.
Ranking	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Score							
Community Safety:							
Potential for impacts to Community Safety	Potential for minimal to no impact on community safety if facility located on suitably zoned site.	Potential for minimal to no impact on community safety if facility located on suitably zoned site.	Potential for minimal to no impact on community safety if facility located on suitably zoned site.	Potential for minimal to no impact on community safety if facility located on suitably zoned site.	Potential for minimal to no impact on community safety if facility located at existing Green Lane Landfill site.	Potential for minimal to no impact on community safety if facility located on suitably zoned site.	Potential for minimal to no impact on community safety if facility located on suitably zoned site.
Ranking	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Score	2	2	2	2	2	2	2

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Equity:							
Potential for unequal impacts/benefits to specific groups	Potential for some impact to residents living near facility from increased traffic, noise etc. No impact on social equity as residents will not access facility.	Potential for some impact to residents living near facility from increased traffic, noise etc. No impact on social equity as residents will not access facility.	Potential for some impact to residents living near facility from increased traffic, noise etc. No impact on social equity as residents will not access facility.	Potential for some impact to residents living near facility from increased traffic, noise etc. No impact on social equity as residents will not access facility.	Potential for miminal to no impact on residents living near Green Lane Landfill from increased traffice, noise etc. No impact on social equity as residents will not access facility.	Potential for some impact to residents living near facility from increased traffic, noise etc. No impact on social equity as residents will not access facility.	Potential for some impact to residents living near facility from increased traffic, noise etc. No impact on social equity as residents will not access facility.
Ranking	Medium	Medium	Medium	Medium	High	Medium	Medium
Score	2	2	2	2	3	2	2
Behaviour Change:							
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behavior change as waste generator largely maintains current practices.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.
Ranking	Low	Low	Low	Low	Low	Low	Low
Score	1	1	1	1	1	1	1
Financial Impact/Benefit	Medium	Medium	Medium/Low	Medium/Low	Medium/Low	Medium/Low	Medium/Low
Score	2.0	2.0	1.5	1.4	1.7	1.4	1.4
Cost:							
Estimated Net Capital Cost	Estimated capital cost is highly variable depending on processing capacity and technology utilized. Expected to be in the order of $50 million or greater based on comparable facilities in North America, not including land.	Estimated capital cost is highly variable depending on processing capacity and technology utilized. An MBT-AD facility is estimated to have capital costs between $631-$825 per design tonne, excluding land and electrical connection. For a 200,000 tonne/year facility, this is equivalent to capital costs of $126-$165 million .	Estimated capital cost is highly variable depending on processing capacity and technology utilized. Expected to be in the order of $350,000 to $500,000 per processed tonne per day or greater based on comparable facilities in North America, not including land. For a 200,000 tonne/year facility, this is equivalent to capital costs in the order of $200-$300 million.	Estimated capital cost is highly variable depending on processing capacity and technology utilized. For a 200,000 tonne/year facility, this is equivalent to capital costs in the order of $200-$300 million[1], based on very limited experience in North America.	Capital costs associated with liner, control and collection systems consistent with requirements for landfill cell. Variable depending on number of cells and capacity. Data not available for a comparable facility.	Estimated capital cost is highly variable depending on processing capacity and technology utilized. Expected to be in the order of $50 million or greater based on comparable mixed waste processing facilities in North America, not including land.	Estimated capital cost is highly variable depending on processing capacity and technology utilized. For a 200,000 tonne/year facility, this is equivalent to capital costs in the order of $200-$300 million[1], not including land, based on very limited experience in North America.
Estimated Net Operating Cost	Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials. Expected to be greater than $100 per tonne based on comparable facilities in North America. Operating costs offset by reduction in disposal costs achieved through diversion.	Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials/compost/digestate/fuel/biogas. Operating cost estimated to range between $55 and $75 per tonne for a 200,000 tonne/year MBT-AD facility. This does not include potential revenues from sale of recyclables or energy . Operating costs offset by reduction in disposal costs achieved through diversion.	Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials and from energy generation. Expected to be in the range of $80 to $130 per tonne based on comparable facilities in North America . Revenue from sale of energy can potentially offset operating costs significantly. Operating costs also offset by reduction in landfill disposal costs.	Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials and from energy generation. Expected to range from $50 up to $190 per tonne processed based on very limited experience in North America[2]. Operating costs also offset by reduction in landfill disposal costs.	Estimated annual net operating cost is highly variable, with higher costs during material handling period and cell redevelopment. Data is not available for a comparable facility. Costs may be offset by potential revenues for recovered compost and additional biogas.	Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for RDF product. Expected to be greater than $75 to $100 per tonne based on comparable mixed waste processing facilities in North America. Revenues from sale of fuel not expected to offset operating costs. Operating costs also offset by reduction in landfill disposal costs.	Estimated annual net operating cost is highly variable depending on technology utilized and potential revenues for recovered materials and from energy generation. Expected to range from $50 up to $190 per tonne processed based on very limited experience in North America[2]. Operating costs also offset by reduction in landfill disposal costs.
Ranking	Medium	Medium	Low	Low	High	Medium	Low
Score	2	2	1	1	3	2	1
Health Care Cost Implications:							
Potential to increase health care costs	Uncertain althugh unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health costs.	Unlikely to result in increased health costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.
Ranking	Medium	Medium	Medium	Medium	High	Medium	Medium
Score	2	2	2	2	3	2	2

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Risk:							
Potential for Contractual Risk	Potential for some contract risk related to performance of the facility and level of diversion achieved. Facility will be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or Industrial, Commercial and Institutional (IC&I)).	Potential for some contract risk related to performance of the facility and level of diversion achieved. Facility will be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or IC&I).	Potential for some contract risk related to performance of the facility and long-term energy revenues. Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or IC&I).	Potential for significant contract risk related to performance of the facility and long-term energy revenues. Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or IC&I).	Potential for some contract risk related to performance of the biocell in producing marketable compost and long-term revenues.	Potential for some contract risk related to performance of the facility and market for RDF fuel. Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. multi-residential or Industrial, Commercial & Institutional).	Potential for significant contract risk related to performance of the facility and long term fuel revenues. Facility may be designed to manage a portion of the waste stream over which the City has no control (e.g. Multi-residential or IC&I).
Schedule Risk	Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.	Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.	Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.	Potential for some schedule risk, depending on technology(s) selected and its proven commercial status, with standard engineering and construction	Potential for some schedule risk if quantities of organics available exceed cell preparation and development, or if sufficient quantities are unavailable.	Potential for some schedule risk, depending on technology(s) selected, with standard engineering and construction requirements.	Potential for some schedule risk, depending on technology(s) selected and its proven commercial status, with standard engineering and construction
Innovation Risk	Potential for significant innovation risk due to limited success of mixed waste processing technology in North America.	Potential for significant innovation risk due to limited success of MBT processing of a mixed waste stream in North America.	Potential for some innovation risk depending on technology(s) selected, with standard engineering and construction requirements.	Potential for significant innovation risk since very few of these facilities operate at a commercial scale in North America.	Potential for significant innovation risk related to availability of organic waste stream in order to produce marketable compost and capture sufficient quantities of biogas.	Potential for significant innovation risk due to limited success of RDF facilities in North America.	Potential for significant innovation risk depending on technology(s) selected, with standard engineering and construction requirements.
Ranking	Low	Low	Medium	Low	Low	Low	Low
Score	1	1	2	1	1	1	1
Economic Growth:							
Potential for Local Economic Growth	Potential for some impact on local economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.	Potential for some impact on local economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.	Potential for some impact on local economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.	Potential for minimal to no impact on local economic growth for construction and operation of facility since facility is not likely to be located within the City of Toronto.	Potential for minimal impact on local economic growth.	Potential for minimal to no impact on local economic growth since facility is likely located outside City of Toronto.	Potential for minimal to no impact on local economic growth since facility is likely located outside City of Toronto.
Potential for Regional/Global Economic Growth	Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.	Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials/compost/digestate/fuel/biogas.	Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and market demand for energy.	Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.	Potential for some impact on regional economic growth depending on market demand for energy and compost.	Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials.	Potential for some impact on regional economic growth for construction and operation of facility depending on location of facility and markets for recovered materials or liquid bio-fuels.
Ranking	Medium	Medium	Medium	Low	Low	Low	Low
Score	2	2	2	1	1	1	1
Local Job Creation:							
Potential for Additional Local Job Creation	Potential for some local job creation related to initial facility construction and then ongoing operation depending on the location of the facility, processing capacity and the requirement for manual sorting of materials.	Potential for some local job creation related to initial facility construction and then ongoing operation depending on the location of the facility, processing capacity and the requirement for manual sorting and management of materials.	Potential for minimal to no local job creation since facility is unlikely to be located within the City of Toronto.	Potential for minimal to no local job creation as facility unlikely to be located within the City of Toronto.	Potential for minimal to no local job creation as located at existing landfill site.	Potential for minimal to no local job creation as facility unlikely to be located within the City of Toronto.	Potential for minimal to no local job creation since facility is likely located outside City of Toronto.
Ranking	Medium	Medium	Low	Low	Low	Low	Low
Score	2	2	1	1	1	1	1
Flexibility:							
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Potential for significant ability to configure facility and operations, as required, to accommodate mixed waste including changing material composition, market conditions, etc.	Potential for significant ability to configure facility and operations, as required, to accommodate a mixed waste stream including changing material composition, market conditions, etc.	Minimal ability to accommodate future increase in quantities while significant changes to waste composition could negatively impact the facility operations.	Potential for some ability to accommodate future increase in quantities while significant changes to waste composition could negatively impact the facility operations.	Potential for minimal ability to accommodate future increase in quantities unless additional cells can be constructed and utilized. Significant changes to waste composition could negatively impact the quality of the end product. This system can also be used to accept/ anaerobically process/ treat sewage sludge.	Potential for minimal to no ability to configure facility and operations, as required, to accommodate mixed waste including changing material composition, market conditions, etc. Material composition must provide consistent thermal content for use as a fuel source.	Potential for some ability to accommodate future increase in quantities while significant changes to waste composition could negatively impact the facility operations.
Ranking	High	High	Low	Medium	Low	Low	Medium
Score	3	3	1	2	1	1	2

Categories, Criteria & Indicators	Option 6.1 Mixed Waste Processing Facility Development.	Option 6.2 Mixed Waste Processing with Organics Recovery Facility Development.	Option 6.3 Direct Combustion Facility Development.	Option 6.4 Emerging Technologies Facility Development.	Option 6.5 Organics Recycling Biocell or Biomodule.	Option 6.6 Refuse Derived Fuel Facility Development.	Option 6.7 Waste to Liquid Fuel Technologies Facility Development.
Total Score and Ranking							
Environmental Impact/Benefit:							
Ranking	Medium	Medium/High	Medium	Medium	Medium/High	Medium	Medium
Score	1.8	2.2	2.0	2.0	2.2	2.0	2.0
Social Impact/Benefit:							
Ranking	Medium/Low	Medium/Low	Medium/Low	Medium/Low	Medium	Medium/Low	Medium/Low
Score	1.7	1.7	1.7	1.7	2.0	1.7	1.7
Financial Impact/Benefit:							
Ranking	Medium	Medium	Medium/Low	Medium/Low	Medium/Low	Medium/Low	Medium/Low
Score	2.0	2.0	1.5	1.4	1.7	1.4	1.4
Summary							
Ranking	**Medium**	**Medium**	**Medium/Low**	**Medium/Low**	**Medium**	**Medium/Low**	**Medium/Low**
Score	**5.5**	**5.9**	**5.2**	**5.1**	**5.9**	**5.1**	**5.1**

RESIDUAL WASTE DISPOSAL OPTIONS

	Near Term Options		Long Term Options				
Categories, Criteria & Indicators	Option 7.5 Adjust Tipping Fees or Customer Base	Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Option 7.1 Landfill Expansion	Option 7.3 Bio-Reactor Landfill	Option 7.6 Purchase a New Landfill	Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Option 7.8 Greenfield Landfill
Environmental Impact/Benefit	Medium	Medium/Low	Low	Medium/Low	Medium/Low	Medium/Low	Low
Score	1.8	1.4	1.2	1.4	1.4	1.4	1.2
Local Environmental Impact/Benefit:							
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impact to land resources as mitigation measures will continue to be in place to protect the ground surface.	Potential for minimal to no impact to land resources as mitigation measures will continue to be in place to protect the ground surface.	Potential for some impact to land resources through contact with ground surface. Soils excavated at base of landfill will be below ground. Use of land resource after landfill closure is limited to passive use in the future. Implementation of proper design and landfill liner system, and operational best management practices minimize potential impacts.	Potential for some impact to land resources with increased leachate volumes in the landfill although mitigation measures will continue to be in place to protect the ground surface.	Potential for minimal to no impact to land resources as mitigation measures will continue to be in place to protect the ground surface.	Potential for minimal to no impact to land resources as mitigation measures would continue to be in place to protect the ground surface.	Potential for some impact to land resources through contact with ground surface. Soils excavated as base of landfill will be below ground. Use of land resource after landfill closure is limited to passive use in the future.
Potential Impacts to Local Airshed	Potential for minimal to no impacts to local airshed due to reduction in customers using GLL.	Potential for minimal to no impacts to local airshed as waste will be transported for disposal to another location. Potential for some impact to local airshed at third party facilities related to release of landfill gas, dust and odours or combustion emissions. Implementation of appropriate control systems and operational best management practices minimize potential impacts.	Potential for some impact to local airshed related to release of landfill gas, dust and odours. Implementation of landfill gas collection system and operational best management practices minimize potential impacts.	Potential for some release of emissions in the form of odours to the atmosphere related to recirculating leachate.	Potential for some impact to local airshed related to release of landfill gas, dust and odours. Implementation of landfill gas collection system and operational best management practices minimize potential impacts.	Potential for minimal to no impacts to local airshed as waste would be transported for disposal to another location.	Potential for some impact to local airshed related to release of landfill gas, dust and odours. Implementation of landfill gas collection system and operational best management practices minimize potential impacts.
Potential Impacts to Local Water Sources	Potential for minimal to no impact to water sources at the landfill since precipitation that is in contact with waste will be collected and treated as leachate.	Potential for minimal to no impact since precipitation that is in contact with waste will be collected and treated as leachate at a landfill or waste at EFW facility will be managed inside a building.	Potential for some impact to local water sources with release of contaminants through leachate for extended period of time. Landfill liner and leachate collection systems minimize potential impacts.	Potential for some impacts associated with the release of potential contaminants to water sources. Water that has been in contact with waste will be managed as leachate.	Potential for minimal to no impact since precipitation that is in contact with waste will be collected and treated as leachate.	Potential for some impact to local airshed at third party facilities related to release of landfill gas, dust and odours or combustion emissions. Implementation of appropriate control systems and operational best management practices minimize potential impacts.	Potential for some impact to local water sources with release of contaminants through leachate for extended period of time. Landfill liner and leachate collection systems minimize potential impacts.
Potential Water Consumption Requirements	Potential for minimal to no additional water consumption requirements.	Potential for minimal to no impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities. Some water consumption required at EFW for cooling of gases.	Potential for minimal impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities.	Potential for minimal to no additional water required as the bioreactor landfill will use leachate.	Potential for minimal to no additional water consumption requirements.	Potential for minimal to no impact since precipitation that is in contact with waste would be collected and treated as leachate at a landfill or waste at EFW facility would be managed inside a building.	Potential for minimal impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities.

	Near Term Options		Long Term Options				
	Option 7.5	Option 7.7a	Option 7.1	Option 7.3	Option 7.6	Option 7.7b	Option 7.8
Categories, Criteria & Indicators	**Adjust Tipping Fees or Customer Base**	**Securing disposal capacity to preserve long-term landfill capacity at GLL**	**Landfill Expansion**	**Bio-Reactor Landfill**	**Purchase a New Landfill**	**Securing disposal capacity for residual management following GLL reaching its approved disposal capacity**	**Greenfield Landfill**
Total Land Required and Land Use Displacement	Potential for some benefit related to land requirement as this will extend the remaining site life at GLL.	Potential for minimal to no additional land required as Green Lane Landfill capacity will be preserved and third party facility is already developed and operating. Potential for some benefit related to land requirement as lifespan of GLL will be extended or no future requirement to expand capacity of GLL will be required.	Option would require additional land for implementation and operation. Estimated disposal area of 50 – 80 ha with total site area of 80 – 120 ha anticipated to be adjacent to the existing landfill.	Potential for some benefit by increasing disposal capacity within the bioreactor landfill cells by up to 20% with the enhanced degradation of waste. No additional land area required.	Potential for minimal to no additional land required assuming that the existing approved disposal capacity and footprint area meets the City's long-term needs.	Potential for minimal to no impact related to water consumption which is limited to site dust control, equipment cleaning requirements and site staff facilities. Some water consumption required at EFW for cooling of gases.	Land required will depend on the required disposal capacity, design and buffer area. Estimated disposal area of 50 – 80 ha with total site area of 80 – 120 ha anticipated. Will displace current land use.
Ranking	High	Medium	Low	Medium	Medium	Medium	Low
Score	3	2	1	2	2	2	1
Regional/Global Environmental Impact/Benefit:							
Energy and Fossil Fuel Generation / Consumption	Potential for minimal to no additional fossil fuel consumption with anticipated lower waste tonnages received at GLL and at the City Transfer Stations.	Potential for fossil fuel consumption related to on-site equipment operation at more than one facility or to support combustion. Potential for fossil fuel consumption related to haulage of materials.	At this time, energy will be consumed for ancillary equipment (e.g. pumps) and on-site facilities. In the future, there is potential for landfill gas from existing and future landfill cells to be converted to electricity for use onsite or sold to the electrical grid. Potential for minimal to no additional fossil fuel consumption related to on-site equipment operation.	Potential for some fossil fuel consumption related to on-site equipment operation and haulage of materials.	Potential for fossil fuel consumption related to on-site equipment operation and haulage of materials.	Potential for fossil fuel consumption related to on-site equipment operation at more than one facility or to support combustion. Potential for fossil fuel consumption related to haulage of materials.	Potential for some fossil fuel consumption related to on-site equipment operation and haulage of materials.
Greenhouse Gas (GHG) Contributions	Potential for minimal to no additional greenhouse gas emissions produced as less waste quantities are transported and managed at GLL.	Potential for some increase in hauling distance and corresponding greenhouse gas contributions.	Potential for minimal to no additional production of greenhouse gas emissions. Landfill gas will continue to be collected and flared as per current practice.	Potential for minimal to no additional contribution of greenhouse gas emissions. Landfill gas will be generated quicker than in a traditional landfill and for a shorter time period, and continue to be collected and flared as per current practice.	Potential for some increase to greenhouse gas contributions if hauling greater distance than GLL.	Potential for some increase to greenhouse gas contributions if hauling greater distance than GLL	Potential for some increase to greenhouse gas contributions if hauling greater distance than GLL.
Ranking	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Score	2	2	2	2	2	2	2
Public Health Impact/Benefit:							
Potential to impact Human Health	Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health due to reducing traffic and extending life of existing Green Lane Landfill.	Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.	Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill for a longer period of time.	Potential for an adverse impact on public health through potential for odours and impacts on water quality.	Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.	Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.	Potential for an adverse impact on public health through numerous environmental factors, negligible waste diversion opportunities, need for significant additional land requirements and potential stigma of living in close proximity to a landfill.

	Near Term Options		Long Term Options				
Categories, Criteria & Indicators	Option 7.5 Adjust Tipping Fees or Customer Base	Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Option 7.1 Landfill Expansion	Option 7.3 Bio-Reactor Landfill	Option 7.6 Purchase a New Landfill	Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Option 7.8 Greenfield Landfill
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to off-site release of potential contaminates assuming that mitigation measures and engineering controls are in place.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.	Potential for some impact to ecological health due to introduction and release of contaminants to the local environment and removal/disruption of existing ecological features. Implementation of proper mitigating measures related to siting and design, releases to the environment, site operational controls, and management procedures minimize impact. Additional study is required to confirm.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures. Additional study required to confirm.	Potential for some impact to ecological health due to introduction and release of contaminants to the local environment and removal/disruption of exiting ecological features. Implementation of proper mitigating measures related to siting and design, releases to the environment, site operational controls, and management procedures minimize impact. Additional study is required to confirm.
Ranking	Medium	Low	Low	Low	Low	Low	Low
Score	2	1	1	1	1	1	1
Potential to Increase Diversion:							
Ability to recover additional reusable and/or recyclable materials	Minimal to no potential to increase diversion. Not expected to influence diversion by small paid private customers who will have limited access to other options offered by the private sector service providers.	Potential for minimal to no potential to increase diversion at landfills. Some potential to recover additional recyclable materials at EFW facility (e.g. ferrous and non-ferrous materials).	Potential for minimal to no potential to recover additional reusable and/or recyclable materials.	Potential for minimal to no potential to recover additional reusable and/or recyclable materials.	Potential for minimal to no potential to recover additional reusable and/or recyclable materials.	Potential for minimal to no potential to increase diversion at landfills. Some potential to recover additional recyclable materials at EFW facility (e.g. ferrous and non-ferrous materials).	Minimal to no potential to increase diversion.
Ranking	Low	Low	Low	Low	Low	Low	Low
Score	1	1	1	1	1	1	1
Waste Hierarchy:							
Consistency with the priorities of the Waste Hierarchy	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use..	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.
Ranking	Low	Low	Low	Low	Low	Low	Low
Score	1	1	1	1	1	1	1
Social Impact/Benefit	Medium	Medium	Medium/Low	Medium/Low	Medium	Medium	Medium/Low
Score	1.9	1.9	1.5	1.7	1.9	1.9	1.5
Approvals Complexity:							
Complexity associated with approvals and permitting requirements	No additional approvals required.	No additional approval and permitting requirements.	Potential for significant complexity associated with environmental and land use approvals (including an Individual EA, Environmental Compliance Approval (ECA) amendments, Official Plan and zoning amendments). Multi-stakeholder involvement in the process increases complexity and lengthens timelines. Approvals also require various forms and levels of political acceptance and approval.	Potential for some complexity associated with approvals and permitting. The ECA for the site will need to be amended to allow a change to the landfill design and operations. Design changes may be significant, requiring extensive analysis and consultation.	Potential for minimal to no complexity associated with approvals and permitting given that the landfill being purchased is already licensed. It is assumed that the landfill is approved to receive a similar quantity of waste and from a similar service area. An Environmental Compliance Approval (ECA) amendment will be required to change ownership. Multi-stakeholder engagement process may be required as part of the purchase. If changes to size, service area, design and operations are required, additional complex approvals will be required.	No additional approval and permitting requirements.	Potential for significant complexity associated with environmental and land use approvals. Multi-stakeholder involvement in the process increases complexity and lengthens timelines. Approvals also require various forms of political acceptance and approval.
Ranking	High	High	Low	Medium	Medium	High	Low
Score	3	3	1	2	2	3	1

Categories, Criteria & Indicators	Near Term Options: Option 7.5 Adjust Tipping Fees or Customer Base	Near Term Options: Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Long Term Options: Option 7.1 Landfill Expansion	Long Term Options: Option 7.3 Bio-Reactor Landfill	Long Term Options: Option 7.6 Purchase a New Landfill	Long Term Options: Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Long Term Options: Option 7.8 Greenfield Landfill
Potential for Land Use Conflicts/Community Interruption:							
Potential for Traffic increase/Reduction	Potential for some reduction in traffic with fewer paid private customers and less residual waste requiring disposal.	Potential for some increase in traffic in the vicinity of the new disposal facility to which City of Toronto waste will be hauled. Traffic will be within allowable waste limits for the site and assessed as part of approvals. Mitigation measures in place expected to include designated route to the site with appropriate design standards.	Traffic associated with the landfill currently will occur over a longer period of time.	Potential for minimal to no impact to traffic since all operations will be performed within the property.	Potential for minimal to no increase in traffic since no change to waste hauling is expected at site purchased or follows designated route to the site.	Potential for some increase in traffic in the vicinity of the new disposal facility to which City of Toronto waste would be hauled.	Potential for significant impact due to increased traffic (both volume and large trucks) within vicinity of greenfield site and along haul routes depending on location of new facility.
Potential for Litter increase/Reduction	Potential for minimal to no litter generation increase if tipping fees are increased since waste generators will continue to access City facilities or utilize private service provider options.	Potential for minimal to no increased litter. Appropriate litter management procedures will occur to minimize potential for litter at all disposal facilities. Potential reduction in litter generated at GLL with less waste being disposed.	Potential for some impact of increased litter. Appropriate litter management procedures will occur to minimize potential for litter.	Potential for minimal to no increase in litter since the excavation required is performed within compacted waste or a recirculation system is installed as part of cell development.	Potential for minimal to no net increase in litter since it will be controlled as part of the landfill operations and maintenance procedures.	Potential for some impact of increased litter due to the additional waste volume to be managed. Appropriate litter management procedures would occur to minimize potential for litter.	Potential for some impact of increased litter. Appropriate litter management procedures will occur to minimize potential for litter.
Potential Odour Emissions	Potential for minimal to no net impact on odour since odours will be controlled as part of the established landfill operating procedures.	Potential for minimal to no net impact from odours since odours will be controlled as part of the facility operations and maintenance procedures. Potential reduction in odour emissions at GLL with less waste being disposed.	Potential for some impact from odour to community related to waste and landfill gas. Odours will be minimized through site operations.	Potential for some odour emissions related to leachate recirculation which can be mitigated as part of the operations and maintenance plan for the site.	Potential for minimal to no net impact from odours since odours will be controlled as part of the landfill operations and maintenance procedures.	Potential for some impact from odour to community related to the additional waste volume to be managed. Odours would be minimized through site operations and maintenance procedures.	Potential for some impact from odour to community related to waste and landfill gas. Odours will be minimized through site operations.
Potential Noise Emissions	Potential for minimal to no reduction in noise emissions as landfill operations will continue but at a potentially lower rate.	Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation. Potential reduction in noise emissions at GLL with less waste being disposed.	Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation.	Potential for some temporary increase in noise emissions due to heavy-duty vehicles on site during the construction of the recirculation system.	Potential for minimal to no net impact from noise since noise emissions are expected to remain the same and will be controlled as part of the landfill operations and maintenance procedures.	Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation.	Potential for some nuisance noise emissions off-site within regulatory limits. Noise emissions related to on-site equipment operation.
Potential for Increased Vector/Vermin	Potential for some reduction in attraction of vector/vermin with less waste disposed.	Potential for minimal to no net increase in attraction of vector/vermin as part of the operating and maintenance procedures for the disposal facility. Potential reduction in the attraction of vector/vermin at GLL with less waste being disposed.	Potential for some increase in attraction of vector/vermin by introduction of putrescible waste food source to a new area. Daily covering of waste and other control measures will help minimize attractiveness of landfill to vector/vermin.	Potential for minimal to no increased attraction of vector/vermin.	Potential for minimal to no net increase in attraction of vector/vermin given that daily cover will be applied and landfill will be maintained as part of the operating and maintenance procedures.	Potential for some increase in attraction of vector/vermin with increased waste quantities managed which would be mitigated as part of the operating and maintenance procedures for the disposal facility.	Potential for some increase in attraction of vector/vermin by introduction of putrescible waste food source to a new area. Daily covering of waste and other control measures will help minimize attractiveness of landfill to vector/vermin. City's organics program helps limit the amount of organic waste to be landfilled.
Ranking	Medium	Medium	Low	Medium	Medium	Medium	Low
Score	2	2	1	2	2	2	1

	Near Term Options		Long Term Options				
Categories, Criteria & Indicators	Option 7.5 Adjust Tipping Fees or Customer Base	Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Option 7.1 Landfill Expansion	Option 7.3 Bio-Reactor Landfill	Option 7.6 Purchase a New Landfill	Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Option 7.8 Greenfield Landfill
Collaboration:							
Ability to partner with other municipalities/ organizations	Potential for minimal to no partnership opportunities as option is intended to preserve capacity for City of Toronto customers.	Potential for minimal to no partnership opportunities with other municipalities or private sector companies as procurement of disposal capacity is likely to be on a contract basis.	Potential for some partnership opportunities with other municipalities and potentially the IC&I sector if they require access to long-term disposal capacity.	Option provides no ability to partner with municipalities or organizations since this would be implemented only at the City's landfill.	Potential for some partnership opportunities with other municipalities and the private sector. Waste from the local communities in the landfill area may be accepted as per the City's contract when purchasing the landfill. Another municipality may be interested in purchasing a new landfill jointly with Toronto. A private company may also be interested in developing a new landfill in conjunction with the City.	Potential for minimal to no partnership opportunities with other municipalities or private sector companies as procurement of disposal capacity would likely to be on a contract basis.	Significant potential for partnership opportunities with other municipalities may exist due to current limited disposal capacity within Ontario.
Ranking	Low	Low	Medium	Low	Medium	Low	High
Score	1	1	2	1	2	1	3
Complexity:							
Program complexity to user	Existing user of City transfer stations may be forced to utilize private sector services and facilities due to tipping fee increase. If private facilities are not accessible, then small paid private waste generators will continue to use City facilities.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.
Ranking	Medium	N/A	N/A	N/A	N/A	N/A	N/A
Score	2						
Convenience:							
Ease of participation	Users of the City's transfer station may want to find alternative locations to dispose of waste as a result of the increased costs. There is a significant impact on participation for small private waste generators if private sector options are not readily accessible	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.	N/A - residents will not be able to access facility.
Ranking	Low	N/A	N/A	N/A	N/A	N/A	N/A
Score	1						
Community Safety:							
Potential for impacts to Community Safety	Minimal to no potential to increase the number and type of safety issues provided current health and safety procedures are in place.	Potential for minimal to no impacts to community safety as disposal facilities approved to accept waste to a specified limit.	Minimal to no potential to increase the number and type of safety issues provided current health and safety procedures are in place.	Potential for minimal to no impact to community safety as operations will take place within the landfill premises.	Minimal to no potential to increase safety issues health and safety procedures already established at the landfill.	Potential for minimal to no impacts to community safety as disposal facilities approved to accept waste to a specified limit.	Potential for significant impacts to community due to increase in vehicle traffic and size of trucks, creating potential conflicts with community traffic patterns.
Ranking	Medium	Medium	Medium	Medium	Medium	Medium	Low
Score	2	2	2	2	2	2	1
Equity:							
Potential for unequal impacts/benefits to specific groups	Since an increase in tipping fees is applied to all transfer station customers, the option will have some impact on the small private waste generators if cost effective private sector options are not readily accessible.	Potential for minimal to no impacts to residents/businesses located near the disposal facility accepting City of Toronto waste as facility is approved to receive waste to a specified limit.	Potential for local landowners surrounding GLL to be impacted by the landfill due to nuisance effects over a longer period of time. It is assumed that local landowners and community will continue to benefit from host community agreement programs for extended landfilling period.	Potential for minimal to no impact to those living/working around GLL as all work and operations remain within the existing GLL site.	Some potential for local landowners surrounding the landfill to be impacted by the landfill due to nuisance effects. Local landowners and community may benefit from host community agreement.	Potential for minimal to no impacts to residents/businesses located near the disposal facility accepting City of Toronto waste as facility would be approved to receive wastes to a specified limit.	Depending on the local community hosting the greenfield landfill, there may be a significant financial benefit through a host agreement to the local municipality and/or the community may be unwilling to accept the impacts associated with the disposal of waste from Toronto.
Ranking	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Score	2	2	2	2	2	2	2

Categories, Criteria & Indicators	Near Term Options		Long Term Options				
	Option 7.5 Adjust Tipping Fees or Customer Base	Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Option 7.1 Landfill Expansion	Option 7.3 Bio-Reactor Landfill	Option 7.6 Purchase a New Landfill	Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Option 7.8 Greenfield Landfill
Behaviour Change:							
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Potential for some behavioral change with residual waste tipping fees increasing which could be an incentive to reduce waste generation.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behaviour change as waste generator maintains current practices.	Potential for minimal to no influence or behaviour change as waste generator maintains current practices.	Potential for minimal to no influence or behaviour change as waste generator maintains current practices.	Potential for minimal to no influence or behaviour change as waste generator maintains current practices.
Ranking	Medium	Low	Low	Low	Low	Low	Low
Score	2	1	1	1	1	1	1
Financial Impact/Benefit	Medium	Medium/High	Medium/Low	Medium/Low	Medium	Medium/High	Medium/Low
Score	1.9	2.2	1.7	1.4	1.9	2.2	1.7
Cost:							
Estimated Net Capital Cost	Potential for minimal to no impact on net capital cost. Site life will be extended with the increase in tipping fees prolonging the need for additional waste disposal capacity.	Potential for some impact on net capital cost associated with GLL development since the remaining site life at GLL may be extended, delaying capital expenditures. No capital costs anticipated as part of utilizing capacity at a third party disposal facility.	Significant capital costs associated with developing the lateral landfill expansion, environmental approval requirements, and zoning amendments. The estimated costs to expand the landfill site life by 20 years are in the order of $100 million, depending on the design and infrastructure requirements.	Potential for some impact on net capital cost associated with leachate recirculation. Assuming up to 45 hectares of GLL footprint are suitable for conversion to a bioreactor, additional capital costs of up to $11.5M are estimated. Specific costs will be dependent on those areas of GLL suitable for conversion (closed or yet to be constructed) and the detailed design requirements.	Costs to acquire a new landfill are site specific including remaining approved capacity and based on the City's purchase of GLL in 2007 and other more recent acquisitions, the cost may range from $200 to $300 million. An additional $10 - $12 million per year in capital construction costs for the landfill will also be required.	No capital costs anticipated as part of utilizing capacity at a third party disposal facility.	Significant capital costs associated with approvals depending on level of stakeholder engagement and concern (estimated in the range of $5M - $10M) and size/design of landfill to be constructed. Construction capital costs (expected to be greater than $200M) will be spread out over the life of the landfill. Land purchase costs are in addition.
Estimated Net Operating Cost	Potential for some increase in net operating cost with the potential reduction in revenue as a result of lost customers and decreased quantity of residual waste being managed. Currently GLL manages about 90,000 tonnes per year of paid private waste. Associated tipping fee is $106.09 per tonne. Costs associated with operation and maintenance may require higher City budget allocation. In addition, reduced waste quantities managed at GLL are expected to increase the landfill operating costs on a per tonne basis if the operating contract put or pay minimum limit is not achieved.	Potential for some impact on net operating cost associated with decreased GLL operating costs since fewer tonnes will be managed, although per tonne costs may increase due to reduced efficiencies of equipment and resources, and if the operating contract put or pay minimum threshold is not met. Additional hauling and disposal costs associated with third-party residual waste disposal. The estimated current disposal costs at third-party facilities ranges from $40 to $56 tipping fee per tonne, excluding hauling fees . Assuming up to 325,000 tonnes is sent to third party facilities, it is estimated that the annual cost for disposal is $13 to $18 million, excluding hauling fees.	Potential for minimal to no impact since it is assumed the operating equipment and facilities from the existing landfill will be maintained and continued to be used for the landfill expansion. The annual operation costs which includes landfill operation, leachate treatment plant and landfill gas flaring operation and maintenance is	Potential for some impact on net operating cost. Operational costs will increase to manage leachate recirculation, increased landfill gas generation, equipment maintenance and monitoring activities.	Potential for some impact on net operating cost relative to GLL based on proximity to Toronto and landfill design. Contracted operations will generally be comparable with expected additional hauling costs. The annual operation costs at GLL, which includes landfill operation, leachate treatment plant and landfill gas flaring operation and maintenance, is estimated to be approximately $15 million . It is expected that the new landfill would have similar costs. Additional costs are associated with perpetual care, community funds, reserves, debt repayment and borrowing costs, etc. The City's annual budget for net operating costs is approximately $34 million.	The estimated current disposal costs at third-party facilities range from $40 to $56 tipping fee per tonne, excluding hauling fees . Assuming up to 500,000 tonnes would be sent to third party facilities, it is estimated that the annual cost for disposal would be $20 to $28 million, excluding hauling fees.	Operating costs expected to range between $30 - $50 per tonne depending on the landfill design and waste volumes to be managed. Perpetual care costs, community funds, etc. are in addition.
Ranking	High	Medium	Low	Medium	Low	Medium	Low
Score	3	2	1	2	1	2	1
Health Care Cost Implications							
Potential to increase health care costs	Unlikely to result in increased health costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.	Uncertain although unlikely that the option will result in increased health care costs.
Ranking	High	Medium	Medium	Medium	Medium	Medium	Medium
Score	3	2	2	2	2	2	2

Categories, Criteria & Indicators	Near Term Options: Option 7.5 Adjust Tipping Fees or Customer Base	Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Long Term Options: Option 7.1 Landfill Expansion	Option 7.3 Bio-Reactor Landfill	Option 7.6 Purchase a New Landfill	Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Option 7.8 Greenfield Landfill
Risk:							
Potential for Contractual Risk	Potential for minimal to no additional contractual risk as no construction activities are required and no changes to current operations are required.	Potential for minimal to no risk with some reliance on ownership and operation by third parties. The contract risk is anticipated to be manageable.	Potential for minimal contract risk as landfill can be operated by City staff or contract staff. Contractual risk is manageable.	Potential for minimal to no risk with some reliance on operation by third parties. The contract risk is anticipated to be manageable.	Potential for minimal to no risk with some reliance on operation by third parties. The contract risk is anticipated to be manageable.	Potential for minimal to no risk with some reliance on ownership and operation by third parties. The contract risk is anticipated to be manageable.	Potential for minimal contract risk as landfill can be operated by City staff or contract staff. Contractual risk is manageable.
Schedule Risk	Potential for minimal to no schedule risk. City Council will need to approve and adjust the new tipping fees.	Potential for minimal to no schedule risk. Changes to disposal facilities are not required to accommodate the City's waste.	Potential for significant schedule risk associated with the environmental and land use approval processes depending on the level and engagement of stakeholders. Standard engineering and construction requirements for the landfill otherwise.	Potential for some schedule risk associated with the environmental approval processes and the acceptability of this approach to the Ministry of the Environment and Climate Change.	Potential for some schedule risk depending on the time length required to identify a site, close the negotiations to acquire the site and amend environmental approvals.	Potential for minimal to no schedule risk. Changes to disposal facilities are not required to accommodate the City's waste.	Potential for significant schedule risk associated with the environmental and land use approval processes depending on the level and engagement of stakeholders. Standard engineering and construction requirements for the landfill otherwise.
Innovation Risk	Potential for some innovation risk if small private waste generators are not diverted elsewhere if no private sector options are accessible.	Potential for minimal to no innovation risk as use of third party disposal facilities has been a previous and current practice by the City.	Potential for minimal to no innovation risk as the City is experienced with operating GLL.	Potential for significant innovation risk as the process has not been used in Ontario at the same scale required for GLL, and further for closed landfill cells. Bioreactors can become unstable if not properly managed and monitored.	Potential for minimal to no innovation risk as the City is familiar with operating landfills.	Potential for minimal to no innovation risk as use of third party disposal facilities has been a previous and current practice by the City.	Potential for some innovation risk related to the landfill design. Site specific design may be required dependent on the characteristics and setting of the greenfield site (e.g. soil and groundwater conditions).
Ranking	Medium	High	Low	Low	Medium	High	Low
Score	2	3	1	1	2	3	1
Economic Growth:							
Potential for Local Economic Growth	Potential for minimal to no local economic growth as cost effective private options for disposal are available. Potential for some impact on small local businesses that tip at the City's transfer stations with the increase in tipping fees as access to private sector options for disposal may be limited.	Potential for minimal to no impact on local economic growth as facility will be located outside City of Toronto.	Potential for minimal to no potential for local economic growth since GLL is located outside of the City.	Potential for minimal to no potential for local economic growth since GLL is located outside of the City.	Potential for minimal to no potential for local economic growth since the new landfill site will be outside of the City.	Potential for minimal to no impact on local economic growth as facility would be located outside City of Toronto.	Potential for minimal to no impact on local economic growth as facility will be located outside City of Toronto.
Potential for Regional/Global Economic Growth	Potential for minimal to no impact on regional or global economic growth as no changes to GLL are proposed. Potential benefit to other landfills with lower tipping fees that private customers may go to.	Potential for some regional economic growth for individuals and companies that could support the operation of the disposal facility (e.g., monitoring, equipment, technology).	Potential for some regional economic growth for individuals and companies that could support the operation of GLL (e.g., monitoring, equipment, technology, construction) over a longer period of time.	Potential for minimal to no regional economic growth.	Potential for some regional economic growth for individuals and companies that could support the operation of the landfill (e.g., monitoring, equipment, technology).	Potential for some regional economic growth for individuals and companies that could support the operation of the disposal facility (e.g., monitoring, equipment, technology).	Potential for some impact on regional/global economic growth by providing landfill disposal capacity to local community at lower rates and operational staff will likely live in proximity to site.
Ranking	Low	Medium	Medium	Low	Medium	Medium	Medium
Score	1	2	2	1	2	2	2
Local Job Creation:							
Potential for Additional Local Job Creation	Potential for minimal to no potential for local job creation as no change in current operations and GLL is located outside of the City.	Potential for minimal to no creation of local jobs as the disposal facility will be located outside of the City.	Potential for minimal to no creation of local jobs as GLL is located outside of the City.	Potential for minimal to no creation of local jobs as GLL is located outside of the City.	Potential for minimal to no creation of local jobs as the landfill is located outside of the City.	Potential for minimal to no creation of local jobs as the facility would be located outside of the City.	Potential for minimal to no local job creation as site will be located outside City of Toronto.
Ranking	Low	Low	Low	Low	Low	Low	Low
Score	1	1	1	1	1	1	1

	Near Term Options		Long Term Options				
Categories, Criteria & Indicators	Option 7.5 Adjust Tipping Fees or Customer Base	Option 7.7a Securing disposal capacity to preserve long-term landfill capacity at GLL	Option 7.1 Landfill Expansion	Option 7.3 Bio-Reactor Landfill	Option 7.6 Purchase a New Landfill	Option 7.7b Securing disposal capacity for residual management following GLL reaching its approved disposal capacity	Option 7.8 Greenfield Landfill
Flexibility:							
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Potential for minimal to no flexibility to accommodate changing composition and quantity of residual waste.	Potential for significant flexibility to accommodate future changes in composition or tonnes of materials accepted based on the type and number of disposal facilities potentially available.	Potential for significant flexibility to accommodate future changes in materials accepted. Landfill cells can be constructed on an as-needed basis.	Potential for minimal to no flexibility to accommodate future changes.	Potential for significant flexibility to accommodate future changes in materials accepted. Landfill cells can be constructed on an as-needed basis.	Potential for significant flexibility to accommodate future changes in composition or tonnes of materials accepted based on the type and number of disposal facilities potentially available.	Potential for significant flexibility to accommodate future changes in composition or tonnes of materials (either greater or less) received for disposal.
Ranking	Low	High	High	Low	High	High	High
Score	1	3	3	1	3	3	3
Total Score and Ranking							
Environmental Impact/Benefit:							
Ranking	Medium	Medium/Low	Low	Medium/Low	Medium/Low	Medium/Low	Low
Score	1.8	1.4	1.2	1.4	1.4	1.4	1.2
Social Impact/Benefit:							
Ranking	Medium	Medium	Medium/Low	Medium/Low	Medium	Medium	Medium/Low
Score	1.9	1.9	1.5	1.7	1.9	1.9	1.5
Financial Impact/Benefit:							
Ranking	Medium	Medium/High	Medium/Low	Medium/Low	Medium	Medium/High	Medium/Low
Score	1.9	2.2	1.7	1.4	1.9	2.2	1.7
Summary							
Ranking	**Medium**	**Medium**	**Medium/Low**	**Medium/Low**	**Medium/Low**	**Medium**	**Medium/Low**
Score	**5.6**	**5.5**	**4.4**	**4.5**	**5.2**	**5.5**	**4.4**

OVERALL SYSTEM RECOMMENDATIONS: MULTI-RESIDENTIAL SERVICES OPTIONS

Categories, Criteria & Indicators	Organics Collection			Waste Collection Methods					Planning, Policies and Enforcement	
	Option 2.7	**Option 5.1**	**Option 5.2**	**Option 3.1**	**Option 3.2a**	**Option 3.2b**	**Option 3.7**	**Option 9.1**	**Option 1.8**	**Option 1.9**
	Community/Mid-Scale Composting	**On-site Organics Processing**	**In-Sink Disposal Units**	**Container management**	**Alternative Collection Methods for Multi-Residential Buildings - One Container System**	**Alternative Collection Methods for Multi-Residential Buildings - Vacuum System**	**Multi-Residential Collection using Alternative Vehicles**	**Elimination of Collection Service to Multi-residential Buildings**	**Multi-residential By-laws and Enforcement**	**Updates to Current Multi-Residential Development Standards**
Environmental Impact/Benefit	Medium/High	Medium	Medium	Medium	Medium/High	Medium	Medium/Low	Low	Medium	Medium
Score	2.2	2.0	1.8	2.0	2.2	2.0	1.4	1.2	2.0	1.8
Local Environmental Impact/Benefit:										
Potential Impacts/Benefits to Land Resources	Potential for some benefit as the end-product can be used as a fertilizer in community gardens or local landscaping needs. Potential for minimal to no impact to land resources through contact with ground surface. It is anticipated that processing will occur in enclosed bins/containers.	Potential for minimal to no impact to land resources through contact with ground surface. It is anticipated that processing will occur in enclosed bins/containers. Potential for some benefit from end-product. Finished compost that meets compost standards will be used for local landscaping needs.	Potential for some benefit with the beneficial use of biosolids (e.g., use as fertilizer or soil amendment).	Potential for minimal to no impact to land resources. Waste will continue to be temporarily stored in containers.	Potential for minimal to no impact to land resources for one container system as waste will be in bags and temporarily stored in bins.	Potential for some contamination to ground surface between inlet and terminal since vacuum system will be installed below grade.	Minimal to no impacts/ benefit to land resources as collection vehicles are already used to collect from multi-residential buildings.	Some impacts to land resources as the same amount of waste materials will be managed by different service providers, although there may be an increase in landfilled garbage as Blue Bin materials and Green Bin organics diversion might not continue at the same pace as when the multi-residential sector were City customers.	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station.	Minimal to no impact to land resources as all solid waste materials collected in the flex space (i.e. space set aside for depot or drop-off area) would be placed in secured bins and serviced by City staff/contractors.
Potential Impacts to Local Airshed	Potential for minimal to no impacts to local airshed since organics processing operations will be small in scale and anticipated to be in enclosed bins/containers. Potential for minimal to no additional release of emissions associated with reduced need to collect a small fraction of Green Bin organic material (vegetative materials only).	Potential for minimal to no impact to local airshed since operations may generate odours during active composting and maturation phases. However, units will be small in scale and anticipated to be in enclosed units. Potential for minimal reduction of emissions associated with reduced need to collect.	Potential for minimal to no impact to local airshed through increased organics being managed at WWTPs. Potential for some increase in emissions to atmosphere with additional vehicles hauling biosolids from WWTPs for beneficial use.	Potential for minimal to no additional release of emissions to the atmosphere as the option will gather data electronically.	Potential benefit from fewer emissions from collection vehicles since one vehicle can collect all three streams although collection frequency may be increased with reduced compaction and all streams in one container. Will require vehicles to haul sorted materials (three streams) from sorting facilities to processing and disposal facilities. However, additional materials are anticipated to be diverted to local processing facilities instead of being hauled to landfill. Potential for temporary increase in dust generation during construction of processing facilities. Potential for some release of emissions to atmosphere with the addition of two new processing facilities. However, emissions are assumed to be mitigated through standard operating procedures.	Potential benefit from fewer emissions from collection vehicles since vehicles will collect waste from one location instead of from 10 buildings. Potential for minimal to no additional impact to local airshed as waste will be collected through underground vacuum system to a central location reducing the number of collection vehicles accessing the participating multi-residential buildings. Potential for some impact to the local airshed from exhaust generated through vacuum collection system which will need to be filtered at the terminal. Potential for temporary increase in dust generation during construction of vacuum system piping.	Minimal to no release of emission to atmosphere as collection vehicles are already used to collect from multi-residential buildings, and will be replacing existing trucks or enhancing existing fleet.	Some release of emissions to atmosphere as there will be more collection vehicles in use by more service providers to deliver the same service.	Potential for some impacts to local airshed as more trucks are needed to collect source separated material streams, particularly if multiple service providers are not involved in garbage, Green Bin organics and Blue Bin materials or other recyclables collection . Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing) as a result of more multi-residential buildings participating in Green Bin program.	Minimal to no impact on release of emissions to atmosphere because there should be no release of emissions to the airshed through the depot or space for reuse purposes. Collection is addressed in Option 3.4.
Potential Impacts to Local Water Sources	Potential for minimal to no impact from release of potential contaminants to water sources. It is assumed that composting operations will be protected from precipitation and be contained to withhold potential leakage of leachate.	Potential for minimal to no impact from release of potential contaminants to water sources. It is assumed that composting operations will be protected from precipitation and be contained to withhold potential leakage of leachate.	Potential for minimal to no impact from release of potential contaminants to local water sources aside from wet weather overflow events.	Potential for minimal to no release of potential contaminants to water as the waste will continue to be placed in containers.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. No change to how waste is temporarily stored or collected.	Potential for minimal to no impact to local water sources.	Minimal to no impacts to local water sources as no release into waterways.	Minimal to no impacts to local water sources as no release into waterways.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.	Minimal to no releases of potential contaminants to local water sources from the collection of waste materials at the depot or space for reuse/recycling purposes as waste collected will be inert.
Potential Water Consumption Requirements	Potential for minimal to no impact related to water consumption as small scale process would not require the addition of water.	Potential for minimal to no impact related to water consumption as small scale processes would not require addition of water, except for minor routine cleaning.	Potential for significant increase in water consumption as more water will be required to flush the organic waste from in-sink disposal units through building and municipal pipes to WWTPs. Additional increase in water consumption requirements to clean and/or unclog pipes in the event of excess accumulation of fats, oils and grease in the pipes.	Potential for minimal to no requirements for additional water consumption. Option does not require the use of water consumption.	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements.	Potential for minimal to no impact related to water consumption which is limited to periodic equipment cleaning requirements.	Minimal to no water required, except for routine vehicle cleaning.	Minimal to no water required.	Potential for minimal to no water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities, as well as washing Green Bin organics containers periodically.	Minimal to no water required because there is minimal water consumed other than to occasionally clean out the bins at the depot.
Total Land Required and Land Use Displacement	Potential for minimal to no impact related to land requirement since the composter unit(s) will have a small footprint and will be located on existing land near local organizations.	Potential for minimal to no impact related to land requirement since operations can be placed in a common area inside or outside of a multi-residential building. Composter unit(s) will require a relatively small amount of space.	Potential for minimal to no impact on land required.	Potential for minimal to no additional land requirements with increased knowledge of setting bins out when full.	Potential reduction in land displaced at multi-residential buildings since there will not be multiple containers required for the different waste streams. Additional land would be required to receive, sort and temporarily store the different material streams prior to being shipped for processing/disposal. It is estimated that approximately 0.15 ha of land would be required to accommodate a building with a capacity of 120,000 tonnes per year facility. Therefore, 0.3 ha of land would be required for both facilities.	Potential for minimal to no additional land requirement for inlets (estimated at 13 square metres3) when compared to space requirements for storage of and access to collection containers at multi-residential buildings. Potential for minimal additional land requirements (approximately 700 square meters required for the collection terminal.	Minimal to no impacts on land use displacement as no additional land use requirements.	Some impacts on land use displacement as the amount of material managed remains the same, but more may be landfilled when diversion not provided.	Potential for some land use displacement. Additional system-wide processing capacity for Blue Bin materials and more Green Bin organics processing capacity may be needed.	Potential for minimal additional land required because flex space is part of new multi-residential building.
Ranking	High	High	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Score	3	3	2	2	2	2	2	2	2	2

HDR

Categories, Criteria & Indicators	Organics Collection			Waste Collection Methods					Planning, Policies and Enforcement	
	Option 2.7	Option 5.1	Option 5.2	Option 3.1	Option 3.2a	Option 3.2b	Option 3.7	Option 9.1	Option 1.8	Option 1.9
	Community/Mid-Scale Composting	On-site Organics Processing	In-Sink Disposal Units	Container management	Alternative Collection Methods for Multi-Residential Buildings - One Container System	Alternative Collection Methods for Multi-Residential Buildings - Vacuum System	Multi-Residential Collection using Alternative Vehicles	Elimination of Collection Service to Multi-residential Buildings	Multi-residential By-laws and Enforcement	Updates to Current Multi-Residential Development Standards
Regional/Global Environmental Impact/Benefit:										
Energy and Fossil Fuel Generation / Consumption	Potential for minimal to no impact on energy consumption as this is a low technology operation which would not require use of electricity. Minimal to no increase in consumption of fossil fuel used for collection vehicles as organics will continue to be collected in the Green Bin program.	Potential for minimal to no impact on energy consumption as the proposed system requires rotation of the containers, which will be done manually. Minimal energy may be required to maintain the temperature of the compost.	Potential for some increase in energy consumption with the increased quantity of organic waste being sent to WWTPs and transportation of additional biosolids from WWTPs. Potential for some additional energy requirements within multi-residential buildings to power the in-sink disposal units. Potential for minimal reduction in Green Bin collection frequency with only food scraps component being managed in in-sink disposal units. City will continue to provide Green Bin organics collection services for organics that cannot be placed in the unit (e.g. diapers, bones, sanitary products).	Potential for minimal to no additional energy consumption as the waste collection frequency will remain similar to the current scenario.	Potential for some decrease in fossil fuel consumption with reduced number of collection vehicles transporting waste from multi-residential buildings to sorting facilities. Potential for some increase in energy consumption associated with sorting facilities. Potential for minimal to no additional fuel requirements to haul sorted waste from sorting facilities to processing or disposal facilities as the majority of waste received at City transfer stations would also have to be hauled to processing or disposal facilities.	Potential for significant energy consumption to operate the vacuum system to transport waste from multi-residential buildings to collection terminal. Potential for reduction in fossil fuel consumption with fewer collection vehicles.	Some additional fuel consumption may result from smaller storage capacity of the smaller collection vehicle which may require more trips to the transfer station, although it is expected that the trucks will be more fuel efficient.	Some impact on fossil fuel consumption as increased fossil fuel use with more trucks. Given that this would occur in ten years, fleets may be powered by non-fossil fuel but assumption is that fuel remains the same.	Some additional fossil fuel energy for more separate collection of Blue Bin materials and Green Bin organics from multi-residential buildings not currently diverting these materials. These buildings are currently serviced by one set of trucks for garbage only, but will now be serviced by three trucks – one for each stream, where only one truck was required in the past. Some on-site energy consumption is related to the impact of increased multi-residential tonnages diverted (either City or private sector facilities). Energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. Some additional fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles.	Minimal to no energy and fossil fuel consumption although some vehicles will be required to collect and transfer the diverted materials.
Greenhouse Gas (GHG) Contributions	Potential for minimal to no additional contributions to greenhouse gas emissions provided operations are well operated and maintained especially during active composting phase to reduce potential methane production.	Potential for minimal to no contributions to greenhouse gas emissions provided operations are well operated and maintained especially during active composting phase. Potential for minimal to no reduction in greenhouse gases given that collection vehicles will still be required to collect Green Bin organics not accepted in the on-site organics processing unit.	Potential for an increase in fuel consumption for vehicles hauling biosolids longer distances compared to sending organic waste to City Organic Processing Facilities. Potential for some reduction in the greenhouse gas emissions as the use of methane to produce electricity at the WWTPs will divert methane generating material from landfill.	Potential for minimal to no additional impact to greenhouse gases. There is a potential to divert more organic waste and recycling from residual waste collection through enhanced building-specific data and increased awareness of staff and residents.	Potential for some reduction in GHG contributions as option reduces the number of collection vehicles required and potentially increases diversion of waste from disposal.	Potential benefit associated with consolidation of collection vehicles since vehicles will access one location (collection terminal) instead of 10 multi-residential buildings.	Option may result in increased traffic/vehicles resulting in greenhouse gas contributions if smaller collection vehicles need to make more trips to unload contents at the transfer stations.	GHG impacts may be greater, as less material may be diverted.	Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill, as well as "upstream GHG" benefit of more recycling.	Reuse and recycling of materials could offset GHGs from collection and transfer.
Ranking	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low	Medium	Medium
Score	2	2	2	2	2	2	1	1	2	2
Public Health Impact/Benefit:										
Potential to impact Human Health	Potential for beneficial impact on public health through impacts on social cohesion, community engagement and increased soil quality.	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased soil quality due to increase in available and applied compost.	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through reduction in odour. Potential for small positive impact on health through increased soil quality due to increase in available and applied biosolids	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through some employment opportunities.	Potential for beneficial impact on public health through potential to increase diversion from landfill, reduction in odour, vermin, litter, greenhouse gas emissions, some employment opportunities and increased access to municipal services (solid waste management).	Potential for beneficial impact on public health through some potential to reduce truck collection vehicle traffic (air quality and green house gas reductions), odours, vermin, litter and some potential for increase in employment.	Minimal to no potential for beneficial impact on public. Unlikely to result in negative impacts. Potential for small positive impact on health through some employment opportunities.	Potential for an adverse impact on public health through a reduction in waste diverted from landfill, some potential for additional trucks on roads, some potential for increase in vermin and odour.	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increase waste diversion from landfill, some employment opportunities, increased access to municipal services (solid waste services), and potential for greenhouse gas reductions.	Minimal to no potential for positive impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increase waste diversion from landfill, increased access to municipal services (solid waste services), and potential for greenhouse gas reductions.
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health as organic materials are expected to be processed in enclosed bins/containers.	Potential for minimal to no impact to ecological health as organic materials are expected to be processed in enclosed units.	Potential for impacts to ecological health with increased organics in sanitary sewers aside from wet weather overflow.	Potential for minimal to no off-site release of potential contaminates as all waste will be enclosed in containers prior to collection.	Potential for minimal to no impact on ecological health.	Potential for minimal to no impact on ecological health.	Minimal to no additional impact on ecological health since collection already occurs at multi-residential buildings.	Minimal to no additional impact on ecological health since collection already occurs at multi-residential buildings.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Minimal to no potential to impact ecological health as the depots will take up a small footprint and all activities will be contained in a secure space.
Ranking	High	Medium	Medium	Medium	High	High	Medium	Low	Medium	Medium
Score	3	2	2	2	3	3	2	1	2	2
Potential to Increase Diversion:										
Ability to recover additional reusable and/or recyclable materials	Ability to divert some additional organic waste at locations that do not have access to the City's Green Bin program (e.g., community gardens) and minimal to no additional organic waste for locations that currently do have access to the Green Bin program.	Ability to divert minimal to no additional organic waste. Diversion rates are anticipated to be higher for locations that do not currently have access to the City's Green Bin organics program. In locations that have the City's Green Bin organics program, residents may find it more convenient to place organics in the Green Bin rather than further separating it for on-site composting. Ability to recover minimal to no additional reusable material with the production of compost.	Ability to divert minimal to no additional food waste (<1%) from participating buildings. Tracking the quantity of food waste managed by WWTPs will be challenging and waste audits are suggested prior to and after installation of in-sink disposal units. Option may decrease recovery of other materials accepted in the Green Bin program (e.g., animal bones, diapers, soiled paper products) as users may not want to source separate this smaller waste stream.	Option provides some opportunity to divert additional recyclable materials by targeted education to building management and tenants on waste management performance. The use of the technology will enable the City to estimate diversion rates by building.	Provides some potential to divert additional Blue Bin materials and Green Bin organics since all materials are managed in the same manner which could increase convenience and therefore participation in waste diversion programs. Option still relies on user source separating the waste. Generation of plastic bags will increase with allowance of recyclables to be placed in bags.	Provides minimal to no potential to divert additional recyclable materials. Option can enable electronic cards for user to access inlets by material stream. This information could be shared with building management to increase waste diversion.	Minimal to no potential for increasing diversion (0.1%) as this option only affects a reported 5-10 buildings across the whole city.	Potential for lower diversion as follow-through on the processing of source separated Blue Bin materials and Green Bin organics are no longer assured as compared to City collection. Each building will make arrangements with local haulers for which diversion follow-through may not always be as complete.	Some potential for higher multi-residential waste diversion above existing levels at multi-residential buildings not serviced by the City that do not currently receive diversion services. Additional diversion estimated to be 23,000 tonnes/year, or 2.3% of residential waste.	Diversion resulting from the neighbourhood drop-off part of this measure is already captured in Option 3.4. The flex space component of this option has the potential to facilitate a small amount of diversion - <2% of multi-residential waste, therefore <1% of residential waste as multi-residential comprises over half of all residential waste.
Ranking	Low	Low	Low	Medium	Medium	Low	Low	Low	Medium	Low
Score	1	1	1	2	2	1	1	1	2	1
Waste Hierarchy:										
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Minimal to no consistency with the priorities of the waste hierarchy. Option manages waste with little to no value or beneficial use.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Ranking	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low	Medium	Medium
Score	2	2	2	2	2	2	1	1	2	2

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	Community/Mid-Scale Composting	On-site Organics Processing	In-Sink Disposal Units	Container management	Alternative Collection Methods for Multi-Residential Buildings - One Container System	Alternative Collection Methods for Multi-Residential Buildings - Vacuum System	Multi-Residential Collection using Alternative Vehicles	Elimination of Collection Service to Multi-residential Buildings	Multi-residential By-laws and Enforcement	Updates to Current Multi-Residential Development Standards
Social Impact/Benefit	Medium/High	Medium	Medium	Medium/High	Medium/Low	Medium/High	Medium	Medium	Medium	High
Score	2.2	2.0	1.8	2.4	1.7	2.2	2.0	1.8	1.8	2.8
Approvals Complexity:										
Complexity associated with approvals and permitting requirements	Approvals and permits are likely not required for community/mid-scale composting operations if the compost produced is from on-site waste, such as a community garden, as opposed to centralized composting facilities.	Approvals and permits are not required for community composting operations such as ones located at multi-residential buildings that are managing organics generated on-site. The City will need to establish guidelines for on-site operations and conduct site visits to verify that facilities are operating accordingly.	Potential for minimal to no complexity associated with approvals and permitting requirements. Additional studies will be required to confirm buildings connected to sanitary sewer system.	Option does not require additional approvals or permits.	Potential for minimal to no approvals complexity given that the private sector will be responsible for securing the necessary approvals and permits. Some liaison with City staff will be required.	No approvals required for City to collect waste from collection terminal. For the private sector, there is potential for some complexity associated with approvals and permitting requirements to install underground vacuum system that connects multi-residential buildings to collection terminal (e.g., Ministry of Transportation Ontario permits for road closures and underground construction) and Environmental Compliance Approval (ECA) for the collection terminal.	No other approvals required.	No approvals required.	Option requires new mandatory source separation by-laws and/or hauler licencing requirements, which although they may be contentious and require consultation, are not particularly complex.	No approvals required.
Ranking	High	High	High	High	High	High	High	High	Medium	High
Score	3	3	3	3	3	3	3	3	2	3
Potential for Land Use Conflicts/Community Interruption:										
Potential for Traffic increase/Reduction	Potential for minimal to no impact on traffic as it is anticipated that users of facilities will be located within walking distance. Potential for minimal to no reduction in traffic associated with collection vehicles. Organics will continue to be collected through the Green Bin program.	Potential for minimal to no impact on traffic as it is anticipated that users of facilities will be located on-site and collection vehicles will still be required for Green Bin organics collection.	Potential for some increase in traffic due to transportation of biosolids from the WWTPs in addition to Green Bin collection. Potential for minimal to no increase in Green Bin collection frequency since Green Bin collection will still be offered to participating buildings.	Option under evaluation has potential for minimal to no net increase in traffic.	Potential for some reduction in traffic as a result of fewer collection vehicles on City streets since one collection vehicle can collect all three waste streams. However, potential for increased collection frequency to service buildings since containers may fill faster. Potential for some increase in traffic associated with hauling sorted waste from sorting facility to processing or disposal facilities. Collection vehicles would still be required to collect other waste streams (e.g., oversized items, household hazardous waste, electronic waste).	Potential for some reduction in traffic as a result of fewer collection vehicles on City streets (one stop at collection terminal versus 10 stops at participating buildings). Collection vehicles would still be required to collect other waste streams (e.g., oversized items, electronic waste, and household hazardous waste).	Minimal to no increase in traffic as multi-residential buildings are already receiving garbage service. Some additional traffic may occur if building does not provide waste diversion services and additional collection service required. However, smaller vehicles may have little impact on traffic due to the fact that collection vehicles are still being used.	Some increase in traffic as more service providers are involved with more trucks to same areas.	Potential for some impact on traffic depending on how different quantities of the three streams of material from multi-residential buildings (waste, recyclables and Green Bin organics) are collected and by whom (more trucks/service providers may be servicing multi-residential buildings not currently diverting waste).	Minimal to no increase in potential for additional traffic resulting from collection vehicles which need to service the depots/drop-off areas in shared spaces.
Potential for Litter increase/Reduction	Potential for minimal to no litter increase. It is assumed that the operations will be well maintained and protected from weather conditions (e.g., wind).	Potential for minimal to no litter impact since the process will be enclosed.	Potential for minimal to no reduction in litter as less material will travel from individual units to central collection points.	Potential for minimal to no net increase in litter generation as the method for users to manage waste will not change.	Potential for a reduction in litter generation since all waste (including Blue Bin materials) would be collected in bags.	Potential for some litter reduction if waste is to be vacuumed instead of being placed in temporary storage bins, as well, no outdoor storage of waste required.	Minimal to no increase in litter as multi-residential buildings are already receiving garbage service.	Minimal to no increase in litter as multi-residential buildings are already receiving garbage service.	Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more multi-residential recyclables) can be managed by requiring proper collection containers and collection schedules.	Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more recyclables) can be managed by requiring proper collection containers and collection schedules.
Potential Odour Emissions	Potential for some increase in odour emissions. Although it is assumed that the composter will be well operated, maintained, and only acceptable materials will be added to the composter and the City will not have control over this operation and will be relying on the volunteers. Potential for some earthy odour emissions if processed compost is matured/stored on site.	Potential for some increase in odour emissions. Although it is assumed that the unit will be well operated, maintained and only acceptable materials enter the system, the City will not have control over its operations and will be relying on volunteers and/or building staff. Potential for some earthy odour emissions since the processed compost is matured on-site.	Potential for some reduction in odour emissions as organic waste is flushed down the drain instead of being temporarily stored in units and at central collection points.	Potential for minimal to no net increase in odour emissions as option is not anticipated to change the generation of waste set out for collection.	Potential for some reduction in odour emissions at collection points in multi-residential buildings since all waste would be collected in bags. Potential for increased odour emissions at sorting facility which is assumed to be mitigated by standard operating procedures.	Potential for some reduction in odour emissions given that waste will no longer require temporary outdoor storage at multi-residential buildings and will be managed through indoor inlets located on ground floors which will vacuum the source separated waste to the collection terminal.	Minimal to no increase in odour emissions as multi-residential buildings generate same volume of waste. Odour may be a more of a concern if City services are less frequent then existing collection service provided by private sector.	Potential for some odour emissions if multi-residential buildings cut collection service to save money.	Potential for some impact on odour emissions. Increased separated multi-residential Green Bin organics collection, transfer and processing will require odour control diligence (and it is likely that these facilities may not be City owned and controlled).	Minimal to no odour emission as no putrescible waste is involved.
Potential Noise Emissions	Potential for minimal to no noise emissions as it is assumed the operations will use low technology equipment and most participants will walk to drop off organic waste.	Potential for minimal to no noise emissions as low-technology will be used and participants live on-site.	Potential for minimal to no additional noise emissions with additional vehicles hauling biosolids for beneficial use.	Potential for minimal to no net increase in noise emissions as significant changes to waste collection frequency are not anticipated at this stage.	Potential for some reduction in noise emissions associated with collection of waste at multi-residential buildings with fewer collection vehicles requiring access to the buildings to collect different waste streams. Potential for some increase in noise associated with new sorting facility.	Potential reduction in noise emissions given that fewer collection vehicles will be on City streets and bins do not require emptying at each building.	Minimal to no increase in noise as multi-residential buildings are already receiving garbage service. Some additional noise may occur if building does not provide waste diversion services and requires additional collection service.	Potential for some increase in noise with more trucks on the road as multiple service providers replace one coordinated City fleet.	Potential for some impacts on noise emissions as increased quantities of multi-residential recyclable materials and Green Bin organics are collected from 1,300 multi-residential buildings across City.	Minimal to no potential for increased noise from collection vehicles servicing the depots, drop-off areas or flex space used for activities like sharing library.
Potential for Increased Vector/Vermin	Potential for some attraction of vector/vermin. Although it is assumed that the composter will be well operated, maintained, and only acceptable materials enter the system, the City will not have control over this operation and will be relying on volunteers.	Potential for some attraction of vector/vermin. Although it is assumed that the unit(s) will be well operated, maintained and only acceptable materials enter the system, the City will not have control over its operations and will be relying on volunteers and/or building staff.	Potential for some decrease in vector/vermin activity since organic waste will be flushed down the drain immediately and will not need temporary storage in units or central collection points.	Potential for minimum to no increase in attraction of vector/vermin as waste will continue to be stored in containers until collection.	Potential for some reduction in attraction of vector/vermin since all waste would be collected in bags.	Potential for some reduction of vector/vermin given that waste will no longer require temporary outdoor storage at multi-residential buildings.	Minimal to no increase in in vector/ vermin as multi-residential buildings generate same volume of waste. Vector/ vermin may be a more of a concern if City services are less frequent then existing collection service provided by private sector.	Some potential for increased vector/vermin if collection frequency is reduced to save money.	Potential for some impact on vector/vermin. Increased separated multi-residential Green Bin organics (and to a lesser extent increased multi-residential recyclables materials diversion) may attract additional vectors and vermin (partly offset by the collection and transfer of less waste).	Some potential for vector/vermin (e.g. bedbugs) depending on what materials may be diverted or shared. There is an on-going concern regarding bed bugs in clothing as well as all textiles which would be reused or shared.
Ranking	Low	Low	Medium	Medium	High	High	Medium	Low	Low	Medium
Score	1	1	2	2	3	3	2	1	1	2
Collaboration:										
Ability to partner with other municipalities/ organizations	Potential for significant partnership opportunities with community organizations (e.g., religious institutions, community gardens). Potential for some partnership opportunities with small commercial establishments. Finished product could be used for community purposes (e.g., community gardens).	Potential for some opportunity to collaborate with multi-residential building owners, staff and residents. Finished product could be used for building landscaping, given to residents or donated to/used for community purposes (e.g., community gardens).	Potential for minimal to no partnership with other municipalities or organizations. Collaboration with Toronto Water will be required.	Option will require City to collaborate with the private sector contractor and their technology provider to obtain necessary building-specific data.	Potential for minimal to no partnership opportunities as option caters to multi-residential buildings within Toronto.	Potential for minimal to no ability to partner with other organizations as City is not involved in the designing, building, operating and maintaining the system.	N/A	N/A	Potential for minimal to no partnership opportunities with other municipalities or organizations regarding collection. Potential for minimal to no partnership opportunities with other municipalities and organizations on new processing facilities as private sector likely to establish these independently from City (the City role is to establish and enforce the policies, the private sector will implement).	Significant ability to partner with organizations involved in reuse, swap and repair activities.
Ranking	High	Medium	Low	Medium	Low	Low	N/A	N/A	Low	High
Score	3	2	1	2	1	1			1	3
Complexity:										

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	Community/Mid-Scale Composting	**On-site Organics Processing**	**In-Sink Disposal Units**	**Container management**	**Alternative Collection Methods for Multi-Residential Buildings - One Container System**	**Alternative Collection Methods for Multi-Residential Buildings - Vacuum System**	**Multi-Residential Collection using Alternative Vehicles**	**Elimination of Collection Service to Multi-residential Buildings**	**Multi-residential By-laws and Enforcement**	**Updates to Current Multi-Residential Development Standards**
Program complexity to user	Potential for some complexity as participants will have to separate their organic waste and take it to a designated location (feedstock will also differ from what is accepted in the Green Bin program). Potential for some complexity for operators of mid-scale composting operations as the level of commitment and training may vary with having many mid-scale composters instead of central, City-run facilities. Noted that community composting operations would target certain groups and environments that are typically keen to have their own composter.	Potential for some complexity as participants will have to separate their organic waste (as some locations currently may not have City's Green Bin organics program) and those that have access to the Green Bin organics program will have to separate organic waste into two streams (acceptable in on-site composter and acceptable in Green Bin). Potential for some complexity for operators of facilities as some level of commitment and training will be required.	In-sink disposal units are easy to use however there may be complexity associated with continuing participation in Green Bin program for materials not suitable for in-sink disposal units.	N/A - does not involve resident.	Potential for significant complexity associated with the user being responsible for purchasing the appropriate bags and source separating the waste. Significant initial and ongoing building management, staff and residential education required. Option reduces complexity about where to place bags of different waste streams since all bags can be placed in a single chute or a single container.	As option will be implemented in new buildings, residents are anticipated to adapt quickly to waste collection program and therefore there is minimal to no potential for program complexity. System can be implemented to require the use of an access card to access the inlets, in which case residents will have to remember to bring their cards. Option requires users to source separate their waste which presents the same challenges as the status quo.	Program is very easy to understand if the building already provides all the services If waste diversion services have not already been provided, then the user must adapt to new waste diversion services.	Program is easy to understand for the resident. Set out frequency will either be the same or less with new service providers. Program is easier for user if Green Bin organics are not collected.	Although service is provided at the multi-residential building level, new source separation requirements for Green Bin organics in particular, may increase complexity for user.	Program is very easy to understand and use as the concepts of reduction and reuse are easy to understand.
Ranking	Medium	Medium	Medium	N/A	Low	Medium	Medium	High	Medium	High
Score	2	2	2		1	2	2	3	2	3
Convenience:										
Ease of participation	Assumed that operations are targeted to certain groups and environments (e.g., community gardens) that are typically keen to produce their own compost and therefore anticipate significant convenience to users. Promotion and education will be required for users of the composter to encourage effective participation.	Potential for some inconvenience to users but for those willing to participate, option provides an opportunity manage organic waste in the user's own backyard. Option requires user to source separate their waste and bring it to central location area (the inconvenience is a barrier to existing diversion programs in the multi-residential sector). Potential for some inconvenience since the responsibility of operations are on volunteers. Promotion and education will be required to achieve effective participation.	In-sink disposal units are convenient to use as organic waste is managed right away and doesn't require temporary storage. Potential for some inconvenience associated with blockage/clogging in parts of the City with older, small diameter piping.	N/A - does not involve resident.	Option requires significant additional effort for user to participate with purchasing and source separating coloured bags for each of the three major waste streams over the long term. Greater convenience associated with placing the three major waste streams in a single chute or bin.	As option will be implemented in new buildings and access to inlets will be indoors only, it is anticipated that there will be no additional effort to participate in waste collection programs. Participation levels should be similar to buildings that sort all three streams in one location (e.g., chute on each floor) and slightly better for buildings that have one to two chutes on each floor (e.g., garbage, recycling) and a central location for other divertible waste streams (e.g., recycling, organics).	May require more effort to participate if source separation is required.	May be easier to participate if source separation is not required.	Easy to participate, as diversion service will be provided at the multi-residential building level.	Significant convenience to the user as the services will be provided on-site rather than at another location.
Ranking	Medium	Medium	Medium	N/A	Low	Medium	Low	Medium	Medium	High
Score	2	2	2		1	2	1	2	2	3
Community Safety:										
Potential for impacts to Community Safety	Potential for some increased impact to community safety due to the City's lack of control of what goes into the composter and how it is operated. Unacceptable materials, such as sharp objects and metals, can impose safety concerns. Mid-scale composting operations will likely target users within walking distance therefore, no potential impact to community safety due to changes in traffic.	Potential for some impact to community safety due to lack of control of what goes into the composter. Unacceptable material, such as sharp objects and metals, can impose safety concerns. Units will be located within walking distance in of multi-residential buildings therefore, no potential impact to community safety due to changes in traffic.	Potential for minimal to no impact to community safety. Residents will require training and education on how to safely use the in-sink disposal unit.	Potential for minimal to no impact to community safety as option will not significantly change the number of times collection vehicles access buildings.	Potential minimal to no change to community safety as number of collection vehicles may not change.	Potential for some improvement to community safety as a result of fewer collection vehicles on City streets.	Minimal to no potential to increase number and type of safety issues with change in size of truck.	Potential for some safety issues with more truck traffic, but this can be mitigated.	Potential for some impact on community safety with increased numbers of collection vehicles collecting different waste streams.	N/A - evaluation only addresses putting standard in place.
Ranking	Low	Low	Medium	Medium	Medium	High	Medium	Low	Low	N/A
Score	1	1	2	2	2	3	2	1	1	
Equity:										
Potential for unequal impacts/benefits to specific groups	Provides equal opportunities for specific groups that work near facilities to use or participate in the program. Increased equality by providing opportunities to users that may not have access to the Green Bin program.	Provides increased equality compared to the current situation as the option allows the multi-residential buildings who currently do not have a Green Bin program to participate in some organics diversion.	Option is available to buildings selected to participate in the program but not initially to all multi-residential buildings or to single-family households.	Option will be rolled out to all City-collected, front-end multi-residential buildings.	Potential for minimal to no impact on any specific group since access to common chutes or bins is available to all occupants of multi-residential buildings. Option requires all users to purchase coloured bags which could have unequal impacts to residents with lower incomes.	Potential for equal opportunity to users residing in participating buildings.	Increase in equity when compared to current situation if buildings currently do not receive waste diversion services.	Less equity than current situation as some multi-residential buildings may no longer receive diversion programs.	Increased equity as all multi-residential buildings will receive diversion collection.	Increased equity with significant benefits to groups using the services, especially those users that do not have access to vehicles.
Ranking	High	High	Low	High	Low	Medium	High	Low	High	High
Score	3	3	1	3	1	2	3	1	3	3
Behaviour Change:										
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Potential for some behavioral change if users are aware of the closed loop system of organics management and/or the financial benefit of using the finished compost in their community gardens and local landscaping needs. In addition, there will be increased awareness among the users of the composter on the amount of food waste being generated.	Potential for minimal to no behavioral change resulting in sustainable waste reduction choices in participating buildings. There may be increased awareness among the users of the composter on the amount of food waste being generated resulting in behavioural change to reduce waste. Making users aware of the closed loop system of organics management and/or the use of finished compost at their building may help to encourage behavior change.	Potential for minimal to no behavioral change as resident may not realize the use of in-sink disposal units as a means of managing organic waste and does not see the accumulation of food waste generated at the household level.	Potential for some behavior change since targeted education can be developed through acquisition of building-specific data (e.g., waste generation rates). Data could be compared between similarly sized buildings and used to develop targeted educational materials and inform and/or challenge tenants using tools like community-based social marketing. Performance metrics could be developed and measured with the implementation of this tool.	Potential for minimal to no behavioural change as option does not change how waste is collected (i.e., same waste streams source separated) and requires the use of bags to participate in the programs.	Potential for minimal to no behavioural change to reduce waste. Option may be able to allow for waste tracking technologies which could assist in developing targeted education on building-specific performance.	Potential for minimal to no influence or behavior change as waste generator maintains current practices.	Potential for minimal to no influence or behaviour change as waste generator maintains current practices.	Some ability to influence behavior. Consumption or generation of waste could potentially decrease if residents or program users are regularly exposed to source separation programs causing them to think about the amount of and effort that is required to manage the waste that is generated.	Some potential to influence or encourage behavior change, depending on use of space (e.g. a sharing library would encourage waste reduction because of materials being shared).
Ranking	Medium	Medium	Low	Medium	Low	Low	Low	Low	Medium	Medium
Score	2	2	1	2	1	1	1	1	2	2

Categories, Criteria & Indicators	Organics Collection			Waste Collection Methods					Planning, Policies and Enforcement	
	Option 2.7	Option 5.1	Option 5.2	Option 3.1	Option 3.2a	Option 3.2b	Option 3.7	Option 9.1	Option 1.8	Option 1.9
	Community/Mid-Scale Composting	On-site Organics Processing	In-Sink Disposal Units	Container management	Alternative Collection Methods for Multi-Residential Buildings - One Container System	Alternative Collection Methods for Multi-Residential Buildings - Vacuum System	Multi-Residential Collection using Alternative Vehicles	Elimination of Collection Service to Multi-residential Buildings	Multi-residential By-laws and Enforcement	Updates to Current Multi-Residential Development Standards
Financial Impact/Benefit	Medium/High	Medium	Medium	Medium/High	Medium/High	Medium/High	Medium/High	Medium	Medium/High	Medium/High
Score	2.2	2.0	2.0	2.5	2.5	2.5	2.4	2.0	2.5	2.4
Cost:										
Estimated Net Capital Cost	Potential for some impact on net capital cost for the City to provide grants to organizations to subsidize the cost of the composters. It is assumed that organizations will select the composter and request a grant from the City. City staff will partially fund training programs to volunteers, guide interested participants to community partners for composting guidelines, and prepare promotional materials for targeted groups. Potential for sharing of materials and resources for Option 5.1 (Onsite Composting).	Potential for some impact on net capital cost for purchasing the composter and equipment. Capital cost for a dual-compartment tumbling composter ranges from $130 to $400 (depending on capacity). It would cost $2,600 to $8,000 to purchase the composters for 20 buildings (assuming no City subsidy). If the City provides a subsidy equivalent to backyard composters (i.e. 40% of cost), the capital cost to the City could be in the range of $1,000 to $3,200. Operational equipment will also be required (e.g., thermometer, shovel) which is estimated to cost between $50 and $100 per building. The cost to the City involves developing requirements for on-site composting operations, and training the volunteers. The City may choose to subsidize the composters.	Potential for minimal to no capital cost as it is assumed the capital costs will be borne by the property manager and/or developer of participating buildings.	Potential for minimal to no impact on net capital cost since technology will be installed by the contractor.	No capital costs for City as private sector responsible for sorting facility.	Technology provider, developer and/or property owners will be responsible for operations, repair and maintenance.	Capital costs estimated at $300,000.	No capital costs.	Capital cost required for legal and consultation to establish policies and by-laws. An allowance of $150,000 for one full time equivalent (FTE) staff member to address these issues over two years. Legal costs are absorbed in other budgets.	Minimal to no capital costs for the City.
Estimated Net Operating Cost	Potential for some increases to net operating costs. Assumed that one FTE will be required to develop and coordinate the programs with community partners at an estimated cost of $85,000 . Potential for sharing of materials and resources for Option 5.1 (Onsite Composting).	City staff will visit each operation twice per year to inspect. Additional visits may be required if building management contacts the City for further assistance or if a complaint is filed.	Potential for some impact on net operating cost. The additional organics load from food waste (estimated to be 530 tonnes per year) will have to be processed at the WWTPs and the biosolids hauled for beneficial use. The average price of managing biosolids is $116/wet tonne and the current highest price is $157/wet tonne which brings the annual cost to manage biosolids from $60,000 to $85,000. Additional annual operating costs are anticipated for cleaning out fats, oils and grease from the wastewater treatment systems . Tracking of building-specific Green Bin data by City staff estimated to take 75 hours per year. Some staff time required to coordinate waste audits on the Green Bin organics and residual waste streams to be completed by private sector at select participating buildings before and after in-sink disposal units are installed.	Potential for some impact on the net operating cost. It is estimated that one FTE will be required for the first year to develop business requirements at a cost of $65,500 and three FTE will be required to develop bi-annual reports and distribute building-specific data for each of the 2,750 buildings at an additional annual cost of $175,000 . No other annual cost is anticipated as maintenance costs of the tracking system are the responsibility of the contractor.	City staff time for liaising with private sector in the planning and approvals of facilities. City staff time required for developing educational materials. Potential reduction in collection costs as option reduces the need for separate compartments/vehicles to collect separate waste streams from multi-residential buildings and the need for different types of waste containers. However, collection frequency may have to be increased to accommodate faster filling of containers. Estimated cost to residents purchase 300 coloured bags per year (100 bags per waste stream) is approximately $65 . City may choose to provide a limited number of bags upon rollout; however, residents will be responsible for purchasing bags over the long term.	Technology provider, developer and/or property owners will be responsible for operations, repair and maintenance. Operating costs for City to collect waste from collection terminal and transport to transfer stations and/or processing facilities.	Increase in operating costs estimated at $120,000. Costs offset by revenue from user fees from multi-residential units and sale of additional Blue Bin materials.	No operating costs. Significant reduction in revenue.	Operating cost will involve expenditures of about $250,000/year on enforcement staff.	Minimal to no operating costs to City as option only addresses putting standard in place.
Ranking	Medium	Medium	Low	Medium	Medium	High	Medium	Low	Medium	High
Score	2	2	1	2	2	3	2	1	2	3
Health Care Cost Implications										
Potential to increase health care costs	Unlikely to result in increased health costs and some potential for reduction in health costs.	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.	Unlikely to result in increased health costs and some potential for reduction in health costs.	Unlikely to result in increased health costs and some potential for reduction in health costs.	Unlikely to result in increased health costs.	Uncertain although unlikely that the option will result in increased health care costs.	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.
Ranking	High	High	High	High	High	High	High	Medium	High	High
Score	3	3	3	3	3	3	3	2	3	3
Risk:										
Potential for Contractual Risk	Potential for minimal to no contractual risk as the process will be operated by the community volunteers.	Potential for minimal to no contractual risk as the process will be operated by volunteers.	Potential for minimal to no risk as property manager/developer to coordinate installation of in-sink disposal units with third party companies.	Potential for minimal to no contractual risk as City has included provision of similar technology in current contracts.	Potential for minimal to no contractual risk as City will be relying on third party contractor to design, construct and commission facilities before program is launched to multi-residential buildings. City responsibility will only involve collecting waste.	Potential for minimal to no contractual risk as City will only be responsible for waste collection once a third party contractor constructs the system. A contractor will be responsible to operate and maintain the system.	Contract risk is manageable and only related to truck delivery. Operation of trucks same as existing trucks.	Reduction in contractual risk as the City is giving service responsibility to private sector with no direct involvement in contracts.	Potential for minimal to no contract risk this option is focused on policies and enforcement only.	Minimal to no contractual risk.
Schedule Risk	Potential for minimal to no impact at the City level.	Potential for minimal to no schedule risk since the process is easy to implement.	Potential for some schedule risk. Coordination with multi-residential buildings is required for installation of in-sink disposal units. However, residents will still have access to the Green Bin program.	Potential for minimal to no schedule risk as City staff will be responsible for generating bi-annual report cards with no reliance on third parties.	Potential for minimal to no schedule risk to associated with private sector completing sorting facilities prior to promotion and education program roll-out and launch date.	Potential for minimal to no schedule risk as a third party contractor will be responsible for designing, constructing and maintaining the system.	Minimal to no schedule risk related to truck delivery depending on procurement conditions.	Minimal to no schedule risk for the City. Service responsibility is being given over to private sector.	Potential for some schedule risk related to implementation and enforcement of new by-laws.	Minimal to no schedule risk as any construction and installation is part of multi-residential building development and construction.
Innovation Risk	Potential for minimal to no innovation risk as community composting operations are currently operating successfully in the City.	Potential for minimal to no innovation risk as composting is a proven method to manage organic waste and is used at different scales (e.g., backyard composter, vermi-composters, mid to large scale facilities).	Potential for some innovation risk as the use of in-sink disposal units are banned in many jurisdictions and the City's infrastructure is aging.	Potential for minimal to no innovation risk as the use of RFID has been in place for several years.	Potential for minimal to no innovation risk associated with the option since technology (optical sorting) is proven elsewhere.	Potential for minimal to no innovation risk as the option requires City staff for waste collection purposes only.	Minimal to no innovation risk as the vehicles are well proven in the North American market.	Minimal to no innovation risk as the approach is well proven in the North American market.	Potential for minimal to no innovation risk – this approach is proven in existing City multi-residential buildings.	Some innovation risk as this has never been attempted before and the City will need to consult with developers.
Ranking	High	High	Medium	High	High	High	High	High	Medium	Medium
Score	3	3	2	3	3	3	3	3	2	2
Economic Growth:										
Potential for Local Economic Growth	Potential for minimal to no impact on economic growth. Finished compost can be used in community gardens or for local landscaping.	Potential for minimal to no impact on economic growth. Finished compost can be donated to/used in community gardens or for local landscaping needs.	Potential for some short term impact on economic growth with provision and installation of in-sink disposal units.	Potential for minimal to no local economic growth as 10-year collection contract is in place with private sector.	Potential for some local economic growth associated with construction and operation of the waste sorting facility.	Potential for some local economic growth as a result of construction, maintenance of vacuum system and terminal.	Minimal to no potential for local economic growth since equipment not produced in Ontario and there is not enough demand to warrant local manufacturing.	Some potential for local economic growth with additional private sector collection/processing/disposal.	Potential for some local economic growth since three stream collection and recyclable and Green Bin organics material processing are more facility (and labour) intensive than waste collection and landfilling.	Potential for minimal to no local economic growth as option is only related to developing a standard.
Potential for Regional/Global Economic Growth	Potential for minimal to no impact on regional or global economic growth.	Potential for minimal to no impact on regional or global economic growth.	Potential for minimal to no impact on regional or global economic growth. The sale of biosolids may benefit users outside of the City.	Potential for minimal to no impact on regional/ global economic growth.	Potential for some regional/global economic growth. Contractors outside of the City may be retained for construction, maintenance and facility services and technology may come from global service provider.	Potential for some regional/global economic growth. Contractors outside of the City may be retained for construction and maintenance services and technology may be provided by companies located outside Toronto.	Some potential for regional growth since the vehicles and bins can be purchased from manufacturers based in Quebec and in the United States.	Some potential for regional/global economic growth, depending on where processing/disposal facilities are located.	Potential for some impact on regional or global economic growth if additional processing facilities are required to manage source separated materials.	Minimal to no regional/global economic growth.

	Organics Collection			Waste Collection Methods					Planning, Policies and Enforcement	
	Option 2.7	**Option 5.1**	**Option 5.2**	**Option 3.1**	**Option 3.2a**	**Option 3.2b**	**Option 3.7**	**Option 9.1**	**Option 1.8**	**Option 1.9**
Categories, Criteria & Indicators	**Community/Mid-Scale Composting**	**On-site Organics Processing**	**In-Sink Disposal Units**	**Container management**	**Alternative Collection Methods for Multi-Residential Buildings - One Container System**	**Alternative Collection Methods for Multi-Residential Buildings - Vacuum System**	**Multi-Residential Collection using Alternative Vehicles**	**Elimination of Collection Service to Multi-residential Buildings**	**Multi-residential By-laws and Enforcement**	**Updates to Current Multi-Residential Development Standards**
Ranking	Low	Low	Medium	Low	Medium	Medium	Medium	Medium	Medium	Low
Score	1	1	2	1	2	2	2	2	2	1
Local Job Creation:										
Potential for Additional Local Job Creation	Potential for minimal to no impact on additional local job creation. Community operations are intended to be operated by volunteers. The City will hire one new staff member for program operation, maintenance and site inspection.	Potential for minimal to no impact on additional local job creation. On-site processing operations are intended to be operated by the residents and volunteers. The City may hire additional staff (2-3 people) to inspect the operations.	Potential for some additional short-term local job creation associated with installation requirements of the in-sink disposal units.	Potential for some local job creation for reporting on building performance.	Potential for significant impact on creating temporary local jobs as a result of construction activities. Potential for some impact on creating local long-term jobs with operations and maintenance.	Potential for some temporary local jobs as a result of construction activities. Potential for some long-term jobs with operations and maintenance.	Minimal to no potential for job creation since collection jobs displaced from other services.	Minimal to no potential for job creation since collection jobs will be similar to existing system.	Potential for some additional local job creation as a result of increased three stream collection and processing.	Minimal to no local job creation as sharing space is likely to be managed by volunteers.
Ranking	Medium	Medium	High	High	High	High	Medium	Medium	High	Medium
Score	2	2	3	3	3	3	2	2	3	2
Flexibility:										
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Potential for minimal to no impact on flexibility as changes to organic waste composition are not expected. Low technology and modular nature of operations could allow for capacity expansion provided within the maximum capacity limits.	The characteristics of organic waste are not expected to change significantly. Option can be designed to manage slight fluctuations in quantity but will remain specific to certain feedstock.	Option allows for management of food scraps only and will not be impacted by other changes to waste composition.	Option is very flexible to accommodate some changes in the Green Bin, Blue Bin and residual waste collection programs.	Option provides some opportunity to accommodate future changes in waste given that systems focus on the way waste is collected and not on what is collected. The number of material streams may be limited with the infrastructure and facility.	Option is limited to accommodate three waste streams and presents restrictions if a waste stream is added or removed from the City's collection program.	Some flexibility to accommodate changes in operations since equipment will have been purchased.	Good flexibility to adapt to changing circumstances, as multiple service providers will likely offer wide range of options to multi-residential buildings.	Potential for significant flexibility. Private contractors will compete by offering different three stream collection and processing services to the City's multi-residential sector not serviced by City at this time.	Significant flexibility to accommodate future changes in markets and materials collected.
Ranking	Medium	Low	Low	High	Medium	Low	Medium	Medium	High	High
Score	2	1	1	3	2	1	2	2	3	3
Total Score and Ranking										
Environmental Impact/Benefit:										
Ranking	Medium/High	Medium	Medium	Medium	Medium/High	Medium	Medium/Low	Low	Medium	Medium
Score	2.2	2.0	1.8	2.0	2.2	2.0	1.4	1.2	2.0	1.8
Social Impact/Benefit:										
Ranking	Medium/High	Medium	Medium	Medium/High	Medium/Low	Medium/High	Medium	Medium	Medium	High
Score	2.2	2.0	1.8	2.4	1.7	2.2	2.0	1.8	1.8	2.8
Financial Impact/Benefit:										
Ranking	Medium/High	Medium	Medium	Medium/High	Medium/High	Medium/High	Medium/High	Medium	Medium/High	Medium/High
Score	2.2	2.0	2.0	2.5	2.5	2.5	2.4	2.0	2.5	2.4
Summary										
Ranking	**Medium/High**	**Medium**	**Medium**	**Medium/High**	**Medium**	**Medium/High**	**Medium**	**Medium/Low**	**Medium**	**Medium/High**
Score	**6.6**	**6.0**	**5.6**	**6.9**	**6.4**	**6.7**	**5.8**	**5.0**	**6.3**	**7.0**

OVERALL SYSTEM RECOMMENDATIONS: INDUSTRIAL, COMMERCIAL & INSTITUTIONAL OPTIONS

Categories, Criteria & Indicators	Option 9.3 Expand City of Toronto Share of IC&I Waste Management Market	Option 9.4 City Implements IC&I Waste Diversion Policies	Option 9.5 City of Toronto Exits the IC&I Waste Management Service
Environmental Impact/Benefit	Medium	Medium/High	Medium/Low
Score	2.0	2.2	1.6
Local Environmental Impact/Benefit:			
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed facilities/transfer station.	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station.	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station.
Potential Impacts to Local Airshed	Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing).	Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing).	Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building.
Potential Impacts to Local Water Sources	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in bins and Yellow Bags on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
Potential Water Consumption Requirements	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities. Water consumption requirements would be (marginally) reduced at City facilities.
Total Land Required and Land Use Displacement	Minimal to no additional land required. Assume current processing and disposal capacity is sufficient to manage additional quantities which may be collected. A better estimate of the amount of material involved will be identified through pilot projects.	Potential for minimal to no land use displacement. The total amount of IC&I waste collected does not change. It would simply be separated into different sized streams (e.g. less IC&I waste, more Blue Bin materials and more Green Bin organics). Additional system-wide processing capacity for Blue Bin materials and more Green Bin organics may be needed (but offset by less capacity needed for un-processed IC&I waste).	Potential for minimal to no land use displacement related to City operations.
Ranking	Medium	Medium	Medium
Score	2	2	2

Categories, Criteria & Indicators	Option 9.3 Expand City of Toronto Share of IC&I Waste Management Market	Option 9.4 City Implements IC&I Waste Diversion Policies	Option 9.5 City of Toronto Exits the IC&I Waste Management Service
Regional/Global Environmental Impact/Benefit:			
Energy and Fossil Fuel Generation / Consumption	Some additional on-site energy consumption is related to the impact of increased IC&I tonnages managed at City facilities – e.g. building systems, lighting, heating, etc. Potential for some/significant increase in the City's fossil fuel consumption if additional IC&I material collection is expanded (but potentially less than current private sector fuel consumption as fewer total vehicles may be required through increased City IC&I route efficiencies). Energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles. Potentially less fossil fuel consumption as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector.	Some additional on-site energy consumption is related to the impact of increased IC&I tonnages managed at City facilities – e.g. building systems, lighting, heating, etc. Minimal to no change in overall fossil fuel consumption. There may be some increase in the City's fossil fuel consumption if additional IC&I material collection is expanded but will be offset by the reduction of current private sector fuel consumption as fewer total vehicles may be required through increased City IC&I route efficiencies). Fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles. Potentially less fossil fuel consumption as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector.	Reduced energy consumption is related to City processing facility/transfer station building systems, lighting, heating, etc. Reduced fossil fuel consumption related to City on-site equipment operation and collection/transfer vehicles.
Greenhouse Gas (GHG) Contributions	Potentially less GHG emissions as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector. Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill and potentially convert to biogas with capture for use as a fuel source.	Potentially less GHG emissions as City routes may be more efficient than numerous private collection/haul vehicles servicing IC&I sector. Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill and potentially conversion to biogas with capture for use as a fuel source.	Potentially more GHG emissions related to increase in number of private sector collection vehicles. Potentially more GHG emissions if Green Bin organics are no longer diverted (if private sector does not offer source separated collection of this material).
Ranking	Medium	Medium	Medium
Score	2	2	2
Public Health Impact/Benefit:			
Potential to impact Human Health	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through potential to increase diversion from landfill and some employment opportunities.	Minimal to no potential for beneficial impact on public. Unlikely to result in negative impacts. Potential for small positive impact on health through potential to increase diversion of waste from landfill and some employment opportunities.	Potential for an adverse impact on public health through a potential for reduction in waste diversion from landfill, job losses due to less waste being collected.
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Ranking	Medium	Medium	Low
Score	2	2	1
Potential to Increase Diversion:			
Ability to recover additional reusable and/or recyclable materials	Potential for some ability to increase diversion through exerting direct control over set outs by IC&I establishments.	Potential for significant IC&I waste diversion above existing levels. Assuming 20% of Toronto IC&I waste which is currently landfilled (900,000 tonnes/year) would be diverted as a result of the policies (if properly enforced). Incremental diversion could be up to 225,000 tonnes/year . This estimate does not consider potential impacts of Waste Free Ontario Act regulations, which may include an organics disposal ban over time.	The City currently achieves good diversion of the waste from the IC&I businesses it services. There may be reduced potential to divert reusable or recyclable material if private sector service provider does not offer collection of source separated waste. A disadvantage of the elimination of the City's collection of IC&I waste is that the City would have a reduced ability to measure overall IC&I waste diversion system performance.
Ranking	Medium	High	Low
Score	2	3	1

Categories, Criteria & Indicators	Option 9.3 Expand City of Toronto Share of IC&I Waste Management Market	Option 9.4 City Implements IC&I Waste Diversion Policies	Option 9.5 City of Toronto Exits the IC&I Waste Management Service
Waste Hierarchy:			
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Ranking	Medium	Medium	Medium
Score	2	2	2
Social Impact/Benefit	Medium	Low	Low
Score	2.0	1.3	1.3
Approvals Complexity:			
Complexity associated with approvals and permitting requirements	No other approvals appear to be required. Confirm no zoning law issues. Environmental Compliance Approval (ECA) and land use approvals already in place for existing waste management facilities.	Option requires further consideration of what new by-laws might be legally permissible and which ones may be contentious and, therefore require further consideration.	Potential for minimal to no complexity associated with approvals and permitting requirements, as City is no longer involved with IC&I waste management.
Ranking	High	Medium	High
Score	3	2	3
Potential for Land Use Conflicts/Community Interruption:			
Potential for Traffic increase/Reduction	Potential for some reduction in truck traffic in vicinity of IC&I establishments with efficiencies in City collection. Potential for some impact at waste management facilities due to increased number of collection vehicles required for additional material.	Potential for some impact on traffic depending on how different quantities of the three streams of IC&I material (waste, recyclables and Green Bin organics) are collected and by whom (e.g. in a totally free market scenario, more trucks/service providers might be servicing less densely located IC&I establishments).	Potential for some impact on traffic depending on how different quantities of the three streams (IC&I waste, Blue Bin materials and Green Bin organics) are collected and by whom (e.g. in a totally free market scenario, more trucks/service providers might be servicing less densely located IC&I establishments).
Potential for Litter increase/Reduction	Potential for minimal to no impact of increased litter as all solid waste materials are expected to be managed inside enclosed buildings. Appropriate operating procedures will occur to minimize potential for litter.	Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more IC&I recyclables) can be managed by requiring proper collection containers and collection schedules.	Potential for some impact on litter. The replacement of City services with a range of different private collection service providers could lead to additional litter if proper bin systems are not utilized.
Potential Odour Emissions	Potential for some impact from odour to community. All solid waste materials are expected to be managed inside enclosed facilities which will minimize any odour combined with frequent removal of waste materials.	Potential for some impact on odour emissions. Increased separated IC&I Green Bin organics collection, transfer and processing will require odour control diligence (and some of these facilities may not be City owned and controlled).	Potential minimal to no impact on odour emissions. Private collection fleets, transfer, processing and landfill facilities will still require proper permitting and approvals and be subject to current and enhanced enforcement measures (i.e. additional by-laws and enforcement staff).
Potential Noise Emissions	Potential for minimal to no impacts on noise emissions.	Potential for minimal to no impacts on noise emissions. Increased quantities of IC&I recyclables and Green Bin organics managed should not increase noise emissions provided the three streams are efficiently collected (i.e. no significant increase in truck traffic) and efficiently processed at properly licensed and inspected facilities.	Potential for minimal to no impacts on noise emissions. Private collection fleets, transfer, processing and landfill facilities will still require proper permitting and approvals and be subject to current and enhanced enforcement measures (i.e. additional by-laws and enforcement staff).
Potential for Increased Vector/Vermin	Potential for some impact on vector/vermin. Increased IC&I waste and, in particular increased IC&I Green Bin organics, may risk attracting additional vectors and vermin.	Potential for some impact on vector/vermin. Increased separated IC&I Green Bin organics (and to a lesser extent increased IC&I Blue Bin materials diversion) may attract additional vectors and vermin (partly offset by the collection and transfer of less waste).	Potential for some impact on vector/vermin. The replacement of City services with a range of different private collection service providers could lead to increased vector/vermin issues if proper bin systems are not utilized.
Ranking	Medium	Low	Low
Score	2	1	1

Categories, Criteria & Indicators	Option 9.3 Expand City of Toronto Share of IC&I Waste Management Market	Option 9.4 City Implements IC&I Waste Diversion Policies	Option 9.5 City of Toronto Exits the IC&I Waste Management Service
Collaboration:			
Ability to partner with other municipalities/ organizations	Potential for minimal to no partnership opportunities. Capable of serving residents and businesses within Toronto.	Potential for minimal to no partnership opportunities with other municipalities or organizations regarding collection. Potential for minimal to no partnership opportunities with other municipalities and organizations on new processing facilities as private sector likely to establish these independently from City (the City role is to establish and enforce the policies, and the private sector will implement).	Potential for minimal to no partnership opportunities with other municipalities or other organizations.
Ranking	Low	Low	Low
Score	1	1	1
Complexity:			
Program complexity to user	Program is not complex, some requirement for participant education.	Program is complex and requires significant participant education, depending on the policy chosen. If hauler licencing approach is used, then significant hauler, as well as IC&I customer, education will be needed, as more source separation will be needed at each location.	Program is complex and requires significant participant education.
Ranking	Medium	Low	Low
Score	2	1	1
Convenience:			
Ease of participation	Relatively easy to access with limited effort required for customer participation.	Not convenient for IC&I generator who currently does not separate Blue Bin materials and Green Bin organics.	Not convenient/easy to access, requires significant effort for customer to participate.
Ranking	Medium	Low	Low
Score	2	1	1
Community Safety:			
Potential for impacts to Community Safety	Potential for minimal to no impact on community safety. City trucks would displace private sector collection vehicles and City transfer facilities will receive some additional traffic.	Potential for some impact on community safety with increased numbers of collection vehicles collecting different waste streams.	Potential for some impact on community safety with increased numbers of private collection vehicles collecting different waste streams.
Ranking	Medium	Low	Low
Score	2	1	1
Equity:			
Potential for unequal impacts/benefits to specific groups	Potential for greater equity overall to the IC&I sector as they will have greater access to a broader range of services. Minimal to no impact on any specific group as service will be offered equally to all eligible IC&I establishments. Potential for some impact to residents in vicinity of transfer/processing/disposal facilities with increased traffic. Could be offset by a reduction in the number of collection vehicles in the neighbourhood with provision of City service.	Potential for some impact on specific groups, for example, smaller collection contractors with limited capacity in terms of number of trucks will have difficulty offering three-stream source separation collection to their existing customer base in a cost efficient manner. Three stream collection, transfer and processing services will cost more than current garbage only service. Larger companies are better set up to provide these services.	Potential for some impact on specific groups, especially small and medium sized businesses as private service may be more expensive.
Ranking	Medium	Low	Low
Score	2	1	1

Categories, Criteria & Indicators	Option 9.3 Expand City of Toronto Share of IC&I Waste Management Market	Option 9.4 City Implements IC&I Waste Diversion Policies	Option 9.5 City of Toronto Exits the IC&I Waste Management Service
Behaviour Change:			
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Some potential to change behaviour through provision of additional range of collection and support services.	Some potential to change behaviour and raise awareness of purchasing choices through the act of source separation of the waste stream, which raises awareness of what is being wasted. Also promotion and education activities, campaigns, strategies, and policy enforcement raise awareness of the waste issue and in some cases may lead to behaviour change.	Potential for negative behavior change as waste generator access to current range of services could be reduced.
Ranking	Medium	Medium	Low
Score	2	2	1
Financial Impact/Benefit	Medium/High	Medium/High	Medium/High
Score	2.4	2.5	2.4
Cost:			
Estimated Net Capital Cost	Capital investment will depend on whether City delivers service directly or contracts out. If provided internally, capital costs include purchase of trucks to double fleet size. Potential for capital costs associated with expansion of transfer/processing and disposal costs associated with managing more material, but this may be relatively modest and will not be known until pilots complete.	No direct on-going capital cost to City as policies will push implementation to private sector haulers. Additional staffing costs include internal legal and program implementation. Additional capital costs may be incurred by the City if provision of service to more IC&I locations is required (e.g. fleet, expansions to processing facilities etc.).	Reduction in capital costs associated with IC&I collection and management from utility budget.
Estimated Net Operating Cost	Operating costs could potentially double depending on uptake and changing eligibility criteria. Overall operating costs would increase for collection, processing and disposal. Revenue from Yellow Bag program and premium organics may increase. Two full time equivalent (FTE) staff members required for pilots and also to assess additional interest in City service and changing servicing standards. Allow $180,000/year for two years, then $90,000/year for one full FTE after third year.	Operating cost will involve expenditure of about $1.3 million/year on enforcement staff . Additional operating costs may be incurred by the City if provision of service to more IC&I locations is required (e.g. collection and processing operational costs).	Reduction in operating costs of for IC&I waste management. Reduction in revenue from Yellow Bags and sale of Blue Bin materials.
Ranking	Low	Medium	High
Score	1	2	3
Health Care Cost Implications:			
Potential to increase health care costs	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.	Uncertain although unlikely that the option will result in increased health care costs.
Ranking	High	High	Medium
Score	3	3	2
Risk:			
Potential for Contractual Risk	Potential for minimal to no contract risk as services could be provided by City staff or form part of existing contracts with service providers (for collection, processing and disposal).	Potential for minimal to no contract risk as services could be provided by City staff or form part of existing contracts with service providers (for collection, processing and disposal). Contractual risk is manageable.	Minimal to no contractual risk since private sector assuming all waste management services.
Schedule Risk	Potential for minimal to no schedule risk since relatively few additional IC&I facilities would require servicing and would require some additional fleet, staff and modifications to facilities.	Potential for some schedule risk related to implementing enforcement of new by-laws requiring additional IC&I waste diversion.	Minimal to no schedule risk since private sector assuming all waste management services.

Categories, Criteria & Indicators	Option 9.3 Expand City of Toronto Share of IC&I Waste Management Market	Option 9.4 City Implements IC&I Waste Diversion Policies	Option 9.5 City of Toronto Exits the IC&I Waste Management Service
Innovation Risk	Potential for minimal to no innovation risk since service is already provided by the City.	Potential for minimal to no innovation risk because this approach is proven in other locations.	Minimal to no innovation risk since private sector assuming all waste management services.
Ranking	High	Medium	High
Score	3	2	3
Economic Growth:			
Potential for Local Economic Growth	Potential for some local economic growth because three stream collection and recyclable and compostable material processing are more facility (and labour) intensive than waste collection and landfilling.	Potential for some local economic growth because three stream collection and recyclable and compostable material processing are more facility (and labour) intensive than waste collection and landfilling.	Potential for minimal to no impact on local economic growth because the same amount of waste is handled, it is just managed differently.
Potential for Regional/Global Economic Growth	Potential for some impact on regional or global economic growth if additional processing facilities are required to manage source separated materials.	Potential for some impact on regional or global economic growth if additional processing facilities are required to manage source separated materials.	Potential for minimal to no impact on regional or global economic growth because the same amount of waste is handled, just by different providers..
Ranking	Medium	Medium	Low
Score	2	2	1
Local Job Creation:			
Potential for Additional Local Job Creation	Potential for some additional local job creation in three stream collection and processing.	Potential for some additional local job creation in three stream collection and processing.	Minimal to no change to local job creation because the same amount of waste is handled, just by different providers.
Ranking	High	High	Medium
Score	3	3	2
Flexibility:			
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Some potential to accommodate future changes to material composition or quantities.	Potential for significant flexibility. Private contractors will compete by offering different three stream collection and processing services to the City's IC&I sector.	Potential for significant flexibility. Private contractors will compete by offering different collection and processing service options to the City's IC&I sector.
Ranking	Medium	High	High
Score	2	3	3
Total Score and Ranking			
Environmental Impact/Benefit:			
Ranking	Medium	Medium/High	Medium/Low
Score	2.0	2.2	1.6
Social Impact/Benefit:			
Ranking	Medium	Low	Low
Score	2.0	1.3	1.3
Financial Impact/Benefit:			
Ranking	Medium/High	Medium/High	Medium/High
Score	2.4	2.5	2.4
Summary			
Ranking	**Medium**	**Medium**	**Medium/Low**
Score	**6.4**	**6.0**	**5.3**

OVERALL SYSTEM RECOMMENDATIONS:CONSTRUCTION, RENOVATION AND DEMOLITION OPTIONS

CRD Options		
Categories, Criteria & Indicators	**Option 10.1** **Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste**	**Option 10.2** **Construction, Renovation, Demolition (CRD) Disposal Ban**
Environmental Impact/Benefit	Medium/High	Medium/High
Score	2.4	2.2
Local Environmental Impact/Benefit:		
Potential Impacts/Benefits to Land Resources	Minimal to no impact/benefit to land as all recyclable CRD materials would be received by City staff and placed in bins located at the transfer stations, and would be processed indoors. Policies would support the operation of both transfer station drop-offs and processing facility.	Potential for some impact to land if disposal ban results in illegal dumping. Much of the CRD waste would move out of City system to private sector transfer stations.
Potential Impacts to Local Airshed	Some additional air emissions related to more trucks going to and from transfer stations and also to processing facility. Minimal to no release of emission to the atmosphere, such as dust, as all recovered materials are collected in bins at the transfer stations, and processing will occur indoors.	Minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building.
Potential Impacts to Local Water Sources	Minimal to no release of potential contaminants to water as recycled CRD materials would be collected in bins located at the transfer station (or other drop off site) with stormwater management controls on-site, and processing facility would have stormwater management on site.	Minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
Potential Water Consumption Requirements	Minimal to no water required except for periodic bin cleaning requirements, and some water required for processing of CRD materials (minimal) and for dust management inside the building.	Minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities.
Total Land Required and Land Use Displacement	Minimal to no additional land use displacement for drop off as bins will be located within the footprint of the existing transfer stations (or other planned drop-off depot). Minimal additional space (for 6,000 sq. m or 60,000 square foot building) if located at existing Toronto location. If new site, some land displacement for up to two hectare site. Minimal displacement if existing facility purchased.	Minimal to no land use displacement.
Ranking	High	Medium
Score	3	2

Categories, Criteria & Indicators	Option 10.1 Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste	Option 10.2 Construction, Renovation, Demolition (CRD) Disposal Ban
Regional/Global Environmental Impact/Benefit:		
Energy and Fossil Fuel Generation / Consumption	Some energy and fossil fuel generation/consumption as more trucks will be driving to the drop-off bins will be located at the transfer stations (or other potential drop-off sites) and a small amount of additional transportation required to dispose of left-over materials by generator. Some energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. Some fossil fuel consumption associated with transfer of materials. Minimal additional energy associated with lighting or equipment expected.	Some energy and fossil fuel consumption with vehicles delivering material to processing facilities and from processing facilities. Energy consumption is related to processing facility/transfer station building systems, lighting, heating, etc. Fossil fuel consumption related to on-site equipment operation and collection/transfer vehicles.
Greenhouse Gas (GHG) Contributions	Positive GHG impact as wood waste, a methane generating material, would be diverted from landfill. Positive upstream GHG benefit of recycling materials and preserving resources, avoiding the need for some material extraction (wood, aggregate, sand).	The outcome of the policies will assist with diverting methane generating materials (e.g. wood waste) from landfill. Some potential for increased GHG emissions associated with vehicles delivering various streams to processing facilities.
Ranking	Medium	Medium
Score	2	2
Public Health Impact/Benefit:		
Potential to impact Human Health	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through potential to increase diversion from landfill and some potential for increase in jobs and access to City services (waste management services).	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increase waste diversion from landfill and some employment opportunities..
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures at both drop-off and processing facilities.	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Ranking	Medium	Medium
Score	2	2
Potential to Increase Diversion:		
Ability to recover additional reusable and/or recyclable materials	High potential for diversion. After CRD waste has been processed and made suitable for end markets, there is potential for diversion of up to 110,000 tonnes or more of CRD waste as long as CRD generators bring their materials to the drop-off or processing facilities, and adhere to requirements of new policies. Enforcement by City essential to success of policies. Most of this CRD waste does not currently enter the City system and is managed, predominantly as waste, at a series of private sector transfer stations throughout the GTA.	High potential for diversion of CRD waste. Depending on ability to harmonize approach across all City transfer stations (private and public), the option could divert an estimated 110,000 tonnes/year or more of CRD waste. Some risk that CRD waste will go elsewhere or illegally dumped.
Ranking	High	High
Score	3	3
Waste Hierarchy:		
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Ranking	Medium	Medium
Score	2	2

Categories, Criteria & Indicators	Option 10.1 Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste	Option 10.2 Construction, Renovation, Demolition (CRD) Disposal Ban
Social Impact/Benefit	Medium/High	Medium/High
Score	2.3	2.3
Approvals Complexity:		
Complexity associated with approvals and permitting requirements	Minimal to no approvals required for transfer station drop-off depots. Standard requirement for an Environmental Compliance Approval and land use planning approvals will be required for CRD processing facility. Approvals could be simpler if Toronto chose to take over existing closed CRD recycling facility. Approvals for policies and new by-laws, which although may be contentious and require consultation, are not particularly complex.	Option requires new by-laws, which require consultation, but are not particularly complex. By-laws targeting bans at all transfer stations in the City (not just City managed transfer stations) would be more complex.
Ranking	Medium	Medium
Score	2	2
Potential for Land Use Conflicts/Community Interruption:		
Potential for Traffic increase/Reduction	Minimal to no approvals required for transfer station drop-off depots. Standard requirement for an Environmental Compliance Approval and land use planning approvals will be required for CRD processing facility. Approvals could be simpler if Toronto chose to take over existing closed CRD recycling facility. Approvals for policies and new by-laws, which although may be contentious and require consultation, are not particularly complex.	Potential for some impact on traffic, particularly around processing facilities.
Potential for Litter increase/Reduction	Minimum to no increase/decrease in litter as the materials will be contained in the bins and processing occurs in a covered facility. Some potential for increased illegal dumping for those that do not want to adhere to source separation and recycling requirements.	Potential for illegal dumping, primarily upon implementation of the ban.
Potential Odour Emissions	Minimal to no increase/reduction in odour emission as no putrescible waste is involved.	Minimal to no increase/reduction in odour emissions as no putrescible waste is being managed.
Potential Noise Emissions	Some potential for increase in noise emissions as more trucks going to transfer station drop-offs and processing facility, and may cause some additional noise related to the saw tooth arrangement. Potential for some noise from the CRD recycling facility but should be mitigated through good management practices.	Some potential for increased noise emissions from processing facilities required as a result of the ban. Mitigated somewhat through siting in appropriately zoned areas.
Potential for Increased Vector/Vermin	Minimal to no increase/reduction in vector/vermin problems as no putrescible waste is involved.	Minimal to no increase in vector/vermin problems as no putrescible waste is managed.
Ranking	Medium	Low
Score	2	1

Categories, Criteria & Indicators	Option 10.1 Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste	Option 10.2 Construction, Renovation, Demolition (CRD) Disposal Ban
Collaboration:		
Ability to partner with other municipalities/ organizations	Some ability to partner with reuse organizations as bins will be managed at the transfer stations, but reuse organizations could take some of the dropped off materials. Some potential to collaborate with neighbouring municipalities or the private sector to jointly own or operate the processing facility Some potential to develop waste diversion policies with GTA municipalities to ensure level playing field.	Potential to partner with other GTA municipalities and waste management industry, to impose similar bans and create more effective level playing field, and with organizations to provide training and technical assistance to industry members.
Ranking	High	High
Score	3	3
Complexity:		
Program complexity to user	Some complexity with the need for some participant education as not all DIY and renovation companies may be aware of the diversion opportunities at the transfer stations. Minimal complexity for those dropping off mixed loads for processing.	Some complexity with the need for some participant education as not all CRD companies may be aware of the bans and options available to divert the targeted waste streams.
Ranking	Medium	Medium
Score	2	2
Convenience:		
Ease of participation	Additional effort to participate as the source separated recycling bins are located at the transfer stations where the DIY and renovation companies will come to dispose their waste. Convenient for those who drop off mixed CRD loads. May require significant effort for CRD companies to adjust to policy requirements.	Not convenient and may require significant effort for the CRD industry to adjust to the ban requirements.
Ranking	Low	Low
Score	1	1
Community Safety:		
Potential for impacts to Community Safety	Potential for minimal impact on community safety if facility located on suitably zoned site. Some potential for impact on community safety due to additional truck traffic.	Potential for minimal to no impact on community safety with implementation of a CRD disposal ban.
Ranking	Medium	High
Score	2	3
Equity:		
Potential for unequal impacts/benefits to specific groups	Minimal to no potential for unequal impacts as policies will apply to all generators of CRD waste. Option is available to everyone so no equity issues. Potential for minimal impact on any specific group if CRD processing facility located on suitably zoned site.	Minimal to no potential for unequal impacts as policies will apply to all generators of CRD waste.
Ranking	High	High
Score	3	3

Categories, Criteria & Indicators	Option 10.1 Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste	Option 10.2 Construction, Renovation, Demolition (CRD) Disposal Ban
Behaviour Change:		
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Significant potential for behaviour change at CRD work sites, developments and projects throughout City of Toronto by imposing waste diversion policies.	Significant potential to change behaviour at CRD work sites, developments and projects by imposing the CRD waste disposal bans. This will lead to CRD waste generators trying to minimize the waste they produce, although opportunities will be limited at renovation and demolition sites where the waste is determined by construction practices from years earlier.
Ranking	High	High
Score	3	3
Financial Impact/Benefit	Medium	Medium/High
Score	2.0	2.5
Cost:		
Estimated Net Capital Cost	Capital costs estimated at $7 to $10 million for transfer station modifications. High capital costs estimated at $14 to $16 million excluding land purchase if City constructs its own facility. Allowance of $150,000 for initial set up of policies (legal, etc).	Minimal capital costs associated with legal and consultation support to develop and implement and the diversion policies. Allowance of $150,000 for initial set up of policies (legal, etc.).
Estimated Net Operating Cost	Increases in operating costs estimated at $2.2 million to $3.2 million for drop off facilities. Operating costs of $7 million/year for a newly constructed CRD recycling facility. Increases in operating costs of an estimated $300,000 of which $150,000 is for consultation with industry and on-going promotion and education and$150,000 is for enforcement of the policies.	Increases in operating costs of an estimated $150,000 (which is half of the operating costs shared with Option 10.1 but some investment in start-up and development activities (legal, consultation) also required. Increases in operating costs – 3.5 to 7 FTE at $265k to $530k/year.
Ranking	Low	Medium
Score	1	2
Health Care Cost Implications		
Potential to increase health care costs	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.
Ranking	High	High
Score	3	3
Risk:		
Potential for Contractual Risk	Minimal to no contractual risk with implementation/operation of drop-off facilities at transfer stations. Some contractual risks related to design, construction and operation of the CRD processing facility, particularly if multiple partners are involved. Some contractual risk related to material markets, as prices and demand for end materials from CRD processing vary with economic cycles.	Minimal to no contractual risk with implementation/operation by City staff.
Schedule Risk	Minimal to no schedule risk on drop-off depots. Some schedule risk for CRD processing facility related to construction, procuring equipment etc. but manageable, particularly if an existing facility is purchased.	Minimal to no schedule risk.

Categories, Criteria & Indicators	Option 10.1 Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste	Option 10.2 Construction, Renovation, Demolition (CRD) Disposal Ban
Innovation Risk	Minimal to no innovation risk related to drop-off depots as CRD depot programs have been effectively implemented in numerous other jurisdictions. Minimal innovation risk related to the CRD waste processing equipment as there are numerous CRD recycling facilities operating throughout Canada with varying degrees of success. Closure of some facilities is related to difficult market conditions rather than equipment performance issues. Minimal innovation risk related to CRD waste diversion policies as various CRD policies have been effectively implemented in a number of other jurisdictions in Canada and the U.S., but not in cities as large as Toronto.	Minimal to no innovation risk related to the bans themselves as CRD bans have been effectively implemented in other jurisdictions. Some market risk related to weak demand and low revenues for the commodities produced by a CRD ban.
Ranking	Medium	High
Score	2	3
Economic Growth:		
Potential for Local Economic Growth	Some potential for economic growth associated with recycling the targeted materials, CRD recycling opportunities and potential growth of CRD recycling markets, depending on location of facility. Some potential to impact contractors through increased costs to manage materials.	Some potential for economic growth associated with recycling the targeted materials, depending on locations of processing facilities. Some potential to impact contractors through increased costs to manage materials.
Potential for Regional/Global Economic Growth	Some potential for regional/global economic growth if other GTA municipalities also implement the policies to divert CRD materials, and large quantities are available as feedstock for new or existing industries.	Some potential for regional/global economic growth if other GTA municipalities also implement the policies to divert CRD materials, and depending on locations of processing facilities.
Ranking	Medium	Medium
Score	2	2
Local Job Creation:		
Potential for Additional Local Job Creation	Some potential for local job creation associated with recycling of the diverted CRD materials, as well as with using diverted CRD materials as feedstock to local industries. Some potential for additional local job creation to manage diversion of the materials at the construction sites and to operate the recycling facility, depending on location of facility.	Some potential for local job creation associated with recycling of the banned CRD materials depending on locations of processing facilities.
Ranking	Medium	Medium
Score	2	2
Flexibility:		
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Some flexibility to adjust drop off system to changing markets and to make adjustments to diversion policies. Some flexibility to adjust processing operations to accommodate new markets and materials. Good flexibility to adjust policies to changing conditions.	Significant flexibility to increase types of materials banned as markets develop for CRD materials.
Ranking	Medium	High
Score	2	3

Categories, Criteria & Indicators	Option 10.1 Depots, Processing, and Policies to Divert Construction, Renovation and Demolition (CRD) Waste	Option 10.2 Construction, Renovation, Demolition (CRD) Disposal Ban
Total Score and Ranking		
Environmental Impact/Benefit:		
Ranking	Medium/High	Medium/High
Score	2.4	2.2
Social Impact/Benefit:		
Ranking	Medium/High	Medium/High
Score	2.3	2.3
Financial Impact/Benefit:		
Ranking	Medium	Medium/High
Score	2.0	2.5
Summary		
Ranking	**Medium/High**	**Medium/High**
Score	**6.7**	**7.0**

OVERALL SYSTEM RECOMMENDATIONS: INCENTIVE BASED OPTIONS

Categories, Criteria & Indicators	Option 3.6 Incentive-based drop-off systems	Option 9.8 Deposit-return System for City of Toronto for Selected Materials
Environmental Impact/Benefit	Medium	Medium
Score	2.0	2.0
Local Environmental Impact/Benefit:		
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impact through contact with ground surface. Any materials deposited into reverse vending machines (RVMs) would be collected in containers/bins on paved/concrete surfaces and/or managed within dedicated and enclosed interior spaces.	Potential for minimal to no impact through contact with the ground surface. Non alcoholic beverages containers (and other potential items such as household batteries) would be dropped off by consumers at drop-off sites (that might also include retail stores) designed to redeem, count, sort, store and ship containers to processors and/or end markets.
Potential Impacts to Local Airshed	Potential for minimal to no impact from dust as all potential RVM materials are expected to be collected in containers/bins on paved surfaces and/or managed within dedicated and enclosed interior spaces. Potential for minimal to no impacts to local air quality due to additional trucks collecting from RVMs but increased truck traffic is minor.	Potential for minimal to no impact from dust or odour. Drop-off establishments/in-store stations would be designed and built to minimize any impacts to the local airshed. If milk containers were to be included in the program, consideration would need to be given to approaches for managing odours. Potential for minimal to no additional airshed impacts from trips to return locations as it is general experience that these trips are not additional, but are combined with trips to grocery store, etc.
Potential Impacts to Local Water Sources	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All potential RVM materials are expected to be collected in containers/bins on paved/concrete surfaces and/or managed within dedicated and enclosed interior spaces.	Potential for minimal to no impact from off-site release of potential contaminants to water sources. Drop-off establishments/in-store stations would be designed and built to minimize any impacts to the local water sources. On-site safeguards need to be in place to manage returned containers that still contain some liquid.
Potential Water Consumption Requirements	Potential for minimal to no impact related to water consumption which would be limited to periodic site and equipment cleaning requirements.	Potential for minimal to no impact related to water consumption. The only water consumption at drop-off establishments/stations would be for staff facilities and clean up requirements.
Total Land Required and Land Use Displacement	Depending on the number of RVMs to be deployed, the footprint required for these systems would be very small (i.e. less than five cubic metres per machine).	Potential for some land use displacement. Assuming 100 dedicated depots (1 per 25,000 residents, based on Vancouver system) required for the City of Toronto (each occupying 100-150 square metres), there would be some land displacement impacts from this option.
Ranking	High	High
Score	3	3

Categories, Criteria & Indicators	Option 3.6 Incentive-based drop-off systems	Option 9.8 Deposit-return System for City of Toronto for Selected Materials
Regional/Global Environmental Impact/Benefit:		
Energy and Fossil Fuel Generation / Consumption	Minimal consumption of energy as machines are highly energy efficient. There is some fuel consumption by vehicles used to service/collect from RVMs.	Potential for minimal to no energy consumption for newly established drop-off depots and in-store stations –e.g. lights, heating/cooling systems, scales, computers, etc. There would be some fuel consumption from residents driving to depots and from vehicles transferring materials from depots to processors.
Greenhouse Gas (GHG) Contributions	Potential for minimal to no GHG impacts as overall energy use and quantities expected to be collected are small. Potential for minimal reduction in greenhouse gas emissions as a result of increased recovery of aluminum, glass, plastic, aseptic beverage containers and some other materials.	Potential for minimal reduction in greenhouse gas emissions as a result of increased recovery of aluminum, glass, plastic and aseptic beverage containers. Potential for minimal to no GHG impacts as overall energy use and quantities expected to be collected are small.
Ranking	Medium	Medium
Score	2	2
Public Health Impact/Benefit:		
Potential to impact Human Health	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through employment opportunities.	Minimal to no potential for beneficial impact on public health. Unlikely to result in negative impacts; however, some potential impact on increased traffic. Potential for small positive impact on health through employment opportunities.
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, unit operational controls, and management procedures.	Potential for minimal to no impact on ecological heath provided proper safeguards are in place to manage returned containers that still contain some liquid.
Ranking	Medium	Medium
Score	2	2
Potential to Increase Diversion:		
Ability to recover additional reusable and/or recyclable materials	Minimal to no impact on diversion (less than 1%) as tonnage of specifically targeted materials would be small. Diversion impact likely < 0.2%, as they target specific smaller materials such as mobile phones, beverage containers and batteries which together make up < 1% of the disposed waste stream .	Potential for minimal to no impact on diversion as total anticipated increase in diversion is estimated at 4,200 tonnes per year. Curbside collection already recovers up to 90% or more in some cases of beverage containers from single family homes. Additional recovery which could be achieved by a deposit return system would be approximately 4,200 tonnes or <1%. While the recovery rate for targeted materials in deposit/return systems is high, the targeted materials generally make up a very small percentage of the waste stream.
Ranking	Low	Low
Score	1	1
Waste Hierarchy:		
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Ranking	Medium	Medium
Score	2	2

Categories, Criteria & Indicators	Option 3.6 Incentive-based drop-off systems	Option 9.8 Deposit-return System for City of Toronto for Selected Materials
Social Impact/Benefit	Medium/High	Medium/Low
Score	2.4	1.7
Approvals Complexity:		
Complexity associated with approvals and permitting requirements	Limited potential for approval complexities for materials other than beer bottles/LCBO bottles that have a deposit (as an incentive to return). Likely on public (City) property or private (retail) property where property owner approval is sufficient. Zoning considerations for some locations.	Potential for significant (likely Provincial) approval complexity as local beverage container deposit systems are new to the Province. A legal opinion would be required to determine whether the City of Toronto Act would allow the City to establish a Toronto only deposit/return system for non-alcoholic beverage containers. Some local siting related approval complexity, but more siting-related complexity in permitting 100 new stand-alone drop-off depots, although approval is not complex because no garbage collection is involved. Zoning considerations.
Ranking	High	Medium
Score	3	2
Potential for Land Use Conflicts/Community Interruption:		
Potential for Traffic increase/Reduction	Potential for minimal to no impact on traffic (i.e. for users to drop off materials and for material collectors), as drop-off will likely be incremental to a trip that would have taken place anyway.	Potential for significant impact on traffic. Customer travel to drop-off depots to redeem containers is a traffic intensive exercise (and depots would need to be located in convenient, sometimes high traffic locations).
Potential for Litter increase/Reduction	Potential for some impact on litter (i.e. for rejected materials and/or carrying bags from transporting materials to RVM).	Potential for some reduction of litter. Litter reduction is one of the commonly cited benefits of deposit/return systems (although deposits do little to reduce other forms of litter).
Potential Odour Emissions	Potential for minimal to no impact on odour emissions for most materials; some minor/negligible potential for odours if RVMs are used for deposit containers containing liquids.	Potential minimal to no impact on odour emissions.
Potential Noise Emissions	Potential for minimal to no impact on noise emissions. RVMs are compact and sound proofed.	Potential for minimal to no impacts on noise emissions.
Potential for Increased Vector/Vermin	Potential for minimal to no impact on vector/vermin. Bins/storage containers are contained within the built metal structures.	Potential for some impact on vector/vermin. Beverage containers returned with some liquid remaining present a vector/vermin concern.
Ranking	Medium	Low
Score	2	1
Collaboration:		
Ability to partner with other municipalities/ organizations	Potential for partnership opportunities with organizations looking for an innovative ways to collect targeted materials. With the proposed Waste-Free Ontario Act regulations, brand holders may need additional approaches to meet diversion targets set in the regulations.	Potential for minimal to no partnership opportunities with other municipalities (i.e. if Toronto pursues “go alone” deposit return program). Potential for some partnerships with non-profit organizations (e.g. to organize bottle/container drives for charitable causes).
Ranking	High	Medium
Score	3	2

Categories, Criteria & Indicators	Option 3.6 Incentive-based drop-off systems	Option 9.8 Deposit-return System for City of Toronto for Selected Materials
Complexity:		
Program complexity to user	Equipment is high tech but easy to use with clear directions which can be programmed to address various target audience needs.	Deposit/return depots are not complex to use, but having a deposit system parallel to existing Blue Bin may initially be confusing for residents.
Ranking	High	Medium
Score	3	2
Convenience:		
Ease of participation	Easy and convenient for users; also novel and fun to use as RVMs often offer immediate "rewards" (i.e. cash or coupons).	Deposit/return depots are less easy to use than curbside programs.
Ranking	Medium	Low
Score	2	1
Community Safety:		
Potential for impacts to Community Safety	Potential for minimal to no impact on community safety if located on well-lit parking areas and/or retail-like interior spaces.	Potential for minimal to no impact on community safety.
Ranking	Medium	Medium
Score	2	2
Equity:		
Potential for unequal impacts/benefits to specific groups	Potential for minimal to no impact on any specific group if RVMs are located in diverse areas throughout the City. Potential to increase service levels to those not well served by current system; greater number of RVMs improves equity for those not well served by programs/facilities.	Potential of some impact on specific groups depending on location of depots. Some inequity in higher prices for beverage containers to consumer (which is returned when deposit container is returned).
Ranking	High	Medium
Score	3	2
Behaviour Change:		
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Potential for minimal to no potential to influence or encourage reduction behaviour.	Potential for minimal to no potential to influence or encourage behaviour.
Ranking	Low	Low
Score	1	1

Categories, Criteria & Indicators	Option 3.6 Incentive-based drop-off systems	Option 9.8 Deposit-return System for City of Toronto for Selected Materials
Financial Impact/Benefit	Medium/High	Medium/High
Score	2.4	2.4
Cost:		
Estimated Net Capital Cost	High capital cost ($15,000-$20,000/unit). Assuming 80 machines around the City, total capital cost could be $1.6 million, if purchased by the City. However, longer term financing of this capital cost could be through business arrangements and not involve a cost to the City.	Capital costs $40 million based on capital cost of $400,000 per new deposit return site excluding land costs.
Estimated Net Operating Cost	Low operating cost – i.e. reduced labour but equipment requires maintenance and dedicated material collection service. Operating costs would be borne by the private partners in any pilots/roll out.	Net operating costs approximately $200,000 per depot . Would result in less revenue from the Blue Bin program, as valuable materials such as aluminum, PET and steel which result in good revenues would be recovered through the deposit system.
Ranking	Medium	Low
Score	2	1
Health Care Cost Implications:		
Potential to increase health care costs	Unlikely to result in increased health costs.	Unlikely to result in increased health costs.
Ranking	High	High
Score	3	3
Risk:		
Potential for Contractual Risk	Potential for minimal contract/liability risk as RVMs can be operated by businesses targeting specific materials.	Potential for minimal to no contract/liability risk to the City as it is anticipated that – as in all other jurisdictions in North America – the system would be likely operated by private sector business interests.
Schedule Risk	Potential for minimal to no schedule risk, only delivery date involved.	Potential for minimal to no schedule risk to the City as it is anticipated that the system would likely be operated by private sector business interests.
Innovation Risk	Potential for some innovation risk; technology is widely used but primarily for deposit, non-alcoholic beverage container system applications.	Potential for minimal to no innovation risk to the City as the approach is well proven in other locations.
Ranking	High	High
Score	3	3
Economic Growth:		
Potential for Local Economic Growth	Potential for minimal to no impact on local economic growth.	Potential for some local economic growth by establishing a network of 100 (mainly new, purpose-built) drop-off depots to recover primarily non-alcoholic beverage containers (but could also include other products for which the depot operator is paid a stewardship fee – e.g. paints, electronic products, batteries, etc.)
Potential for Regional/Global Economic Growth	Potential for minimal to no impact on regional or global economic growth, except for equipment suppliers (currently located in Quebec).	Potential for minimal to no impact on regional growth because deposit/return system is only local to Toronto and not established province–wide; potential for minimal to no impact on global economic growth.
Ranking	Low	Medium
Score	1	2

Categories, Criteria & Indicators	Option 3.6 Incentive-based drop-off systems	Option 9.8 Deposit-return System for City of Toronto for Selected Materials
Local Job Creation:		
Potential for Additional Local Job Creation	Potential for some additional job creation to collect from 80 RVMs on a daily or twice weekly cycle.	Potential for some local job creation – i.e. 100 drop off facilities requiring mainly new staff.
Ranking	High	High
Score	3	3
Flexibility:		
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	RVM technologies can be adapted to recover some limited new materials.	Potential for some flexibility. Deposit return depots can be adapted to accept additional materials which will be obligated and have specific diversion targets in future regulations under the proposed *Waste-Free Ontario Act* (and for which producer payments could potentially be negotiated).
Ranking	Medium	Medium
Score	2	2

Total Score and Ranking

Environmental Impact/Benefit:		
Ranking	Medium	Medium
Score	2.0	2.0
Social Impact/Benefit:		
Ranking	Medium/High	Medium/Low
Score	2.4	1.7
Financial Impact/Benefit:		
Ranking	Medium/High	Medium/High
Score	2.4	2.4

Summary

Ranking	**Medium/High**	**Medium**
Score	**6.8**	**6.1**

CONTROLS, BANS AND ENFORCEMENT

Categories, Criteria & Indicators	Option 9.7 City Explores Control Mechanisms
Environmental Impact/Benefit	Medium/High
Score	2.2
Local Environmental Impact/Benefit:	
Potential Impacts/Benefits to Land Resources	Potential for minimal to no impact through contact with ground surface. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed facilities/transfer station.
Potential Impacts to Local Airshed	Potential for minimal to no impact from dust as all solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/building. Some potential for increased odour from greater quantities of Green Bin organics requiring management (transfer/processing).
Potential Impacts to Local Water Sources	Potential for minimal to no impact from off-site release of potential contaminants to water sources. All solid waste materials are expected to be collected in containers/bins on paved surface and/or managed inside enclosed transfer station/facilities in conjunction with stormwater management controls on-site.
Potential Water Consumption Requirements	Potential for minimal to no impact related to water consumption which is limited to periodic site and equipment cleaning requirements and site staff facilities and potentially additional waste required for processing (e.g. anaerobic digestion, depending on technology).
Total Land Required and Land Use Displacement	Potential for some land use displacement. Increased IC&I and CRD waste, recyclables and Green Bin organics may require additional transfer and processing facilities capacity and space in the City.
Ranking	Medium
Score	2
Regional/Global Environmental Impact/Benefit:	
Energy and Fossil Fuel Generation / Consumption	Potential for some additional on-site energy consumption related to increased total waste diversion and processing. Potential for some increase in overall fuel use if additional vehicles are required to collect, and process additional materials.
Greenhouse Gas (GHG) Contributions	Supports reduction in greenhouse gas emissions by increasing material diversion through recycling and, more particularly, through processing more organic materials. Supports overall reduction of greenhouse gas emissions by diverting greater quantities of organic waste from landfill, as well as upstream benefits of more material recycling.
Ranking	Medium
Score	2
Public Health Impact/Benefit:	
Potential to impact Human Health	Minimal to no potential beneficial impact on public health. Unlikely to result in negative impacts. Potential for small positive impact on health through increased waste diversion from landfill and some employment opportunities.
Potential to impact Ecological Health	Potential for minimal to no impact to ecological health due to implementation of proper mitigating measures related to releases to the environment, site operational controls, and management procedures.
Ranking	Medium
Score	2

Categories, Criteria & Indicators	Option 9.7 City Explores Control Mechanisms
Potential to Increase Diversion:	
Ability to recover additional reusable and/or recyclable materials	Potential to increase diversion in residential , IC&I and CRD waste streams, with varying degrees of success depending on the option(s) implemented by the Province over the next 5+ years as part of the proposed *Waste-Free Ontario Act.*
Ranking	High
Score	3
Waste Hierarchy:	
Consistency with the priorities of the Waste Hierarchy	Some consistency with the priorities of the waste hierarchy. Option recognizes resource value of waste and provides opportunities for recycling, materials recovery, and beneficial use of materials.
Ranking	Medium
Score	2
Social Impact/Benefit	Medium
Score	2.0
Approvals Complexity:	
Complexity associated with approvals and permitting requirements	Option focuses on new by-laws and/or more effective enforcement efforts for existing by-laws and applicable Provincial regulations, which may require consultation, but are not particularly complex.
Ranking	Medium
Score	2
Potential for Land Use Conflicts/Community Interruption:	
Potential for Traffic increase/Reduction	Potential for some impact on traffic depending on how different quantities of separate waste streams from IC&I and CRD sectors (waste, Blue Bin materials and Green Bin organics) are collected and by whom (e.g. more trucks/service providers might be servicing more multi-residential buildings and less densely located IC&I establishments and CRD areas).
Potential for Litter increase/Reduction	Potential for minimal to no impact on litter. Potential litter concerns (e.g. from the set out of more recyclables) can be managed through proper collection containers and collection schedules.
Potential Odour Emissions	Potential for some impact on odour emissions. Increased separated multi-residential and IC&I Green Bin organics collection, transfer and processing will require odour control diligence.
Potential Noise Emissions	Potential for minimal to no impacts on noise emissions. Increased non-City serviced multi-residential and IC&I Blue Bin materials and Green Bin organics tonnes diverted should not increase noise emissions to a great extent provided the three streams are collected and processed efficiently at properly licensed and inspected facilities.
Potential for Increased Vector/Vermin	Potential for some impact on vector/vermin. Increased source separated organics from multi-residential and IC&I sectors (and to a lesser extent, increased residential, IC&I and CRD Blue Bin materials diversion) may attract additional vectors and vermin (partly offset by the collection and transfer of less residential, IC&I and CRD waste).
Ranking	Medium
Score	2

Categories, Criteria & Indicators	Option 9.7 City Explores Control Mechanisms
Collaboration:	
Ability to partner with other municipalities/ organizations	Potential for some partnership opportunities with other municipalities (e.g. on Green Bin organics processing capacity).
Ranking	Medium
Score	2
Complexity:	
Program complexity to user	Harmonizing diversion policies and programs across residential and non-residential sectors should reduce confusion as messaging is then are the same at home, work or play.
Ranking	Medium
Score	2
Convenience:	
Ease of participation	Option requires residents to be more diligent about sorting and disposal of certain waste streams (e.g. renovation waste); however, continues to be relatively easy provided collection/drop-off facilities are accessible.
Ranking	Medium
Score	2
Community Safety:	
Potential for impacts to Community Safety	Potential for minimal to no impact on community safety. Any risk related to traffic increase (e.g. from increased three stream collection) can be mitigated through good management practices.
Ranking	High
Score	3
Equity:	
Potential for unequal impacts/benefits to specific groups	Potential for some impact on specific groups such as small businesses and owners of small multi-residential buildings, particularly those that do not participate in source separation programs who would have to arrange for collection of more waste streams and smaller collection contractors (with limited capacity to offer efficient three stream collection, transfer and processing services).
Ranking	Low
Score	1
Behaviour Change:	
Potential to influence or encourage behaviour resulting in sustainable waste reduction choices	Consumption or generation of waste could potentially decrease if residents or program users are regularly exposed to source separation programs causing them to think about the amount of and effort that is required to manage the waste that is generated.
Ranking	Medium
Score	2

Categories, Criteria & Indicators	Option 9.7 City Explores Control Mechanisms
Financial Impact/Benefit	Medium/High
Score	2.5
Cost:	
Estimated Net Capital Cost	Capital cost required for legal and consultation to establish policies and regulations. An allowance of $150,000 for one FTE to address these issues over two years. Legal costs are absorbed in other budgets.
Estimated Net Operating Cost	Operating costs related to 10-15 FTE needed for on-going enforcement (at 7 Transfer stations and 3-8 additional on streets to monitor businesses and residences). Additional $1 to $1.5 million/year in staffing costs.
Ranking	High
Score	3
Health Care Cost Implications:	
Potential to increase health care costs	Unlikely to result in increased health costs.
Ranking	High
Score	3
Risk:	
Potential for Contractual Risk	Potential for minimal to no contract risk this option is focused on policies and enforcement only.
Schedule Risk	Potential for some schedule risk related to implementation and enforcement of new by-laws.
Innovation Risk	Potential for minimal to no innovation risk – this approach is proven in other locations.
Ranking	Medium
Score	2
Economic Growth:	
Potential for Local Economic Growth	Potential for some local economic growth, depending on location of processing facilities, since three stream collection and Blue Bin materials and Green Bin organics processing are more facility (and labour) intensive than landfilling residual waste.
Potential for Regional/Global Economic Growth	Potential for some regional or global economic growth, depending on location of processing facilities.
Ranking	Medium
Score	2
Local Job Creation:	
Potential for Additional Local Job Creation	Potential for some additional local job creation in three stream collection and processing, depending on location of processing facilities.
Ranking	Medium
Score	2
Flexibility:	
Ability to accommodate future changes (e.g. regulation, waste composition, etc.)	Potential for good flexibility. Measures such as mandatory recycling by-laws, landfill bans and/or EPR programs can be adapted to meet changing targets.
Ranking	High
Score	3

Categories, Criteria & Indicators	Option 9.7 City Explores Control Mechanisms

Total Score and Ranking

Environmental Impact/Benefit:	
Ranking	Medium/High
Score	2.2
Social Impact/Benefit:	
Ranking	Medium
Score	2.0
Financial Impact/Benefit:	
Ranking	Medium/High
Score	2.5
Summary	
Ranking	**Medium/High**
Score	**6.7**