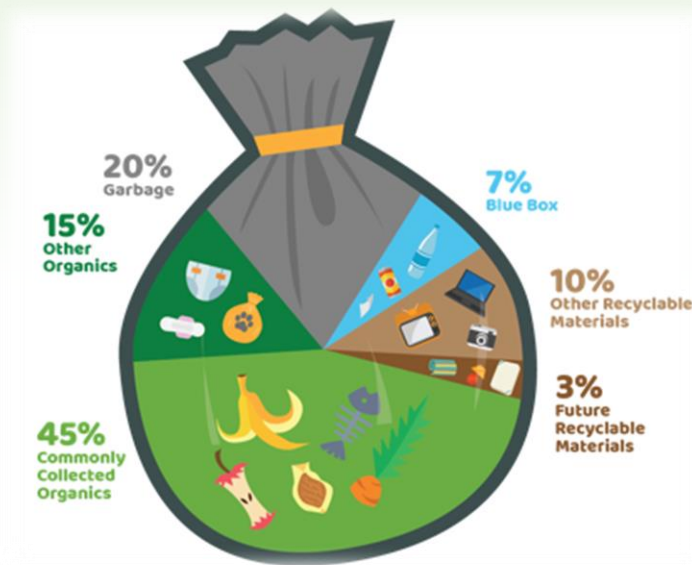
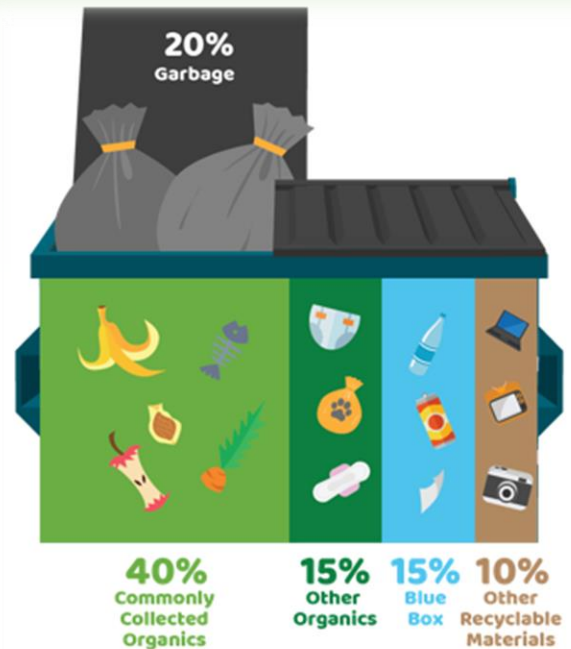


60% Waste Diversion Action Plan

What's in the garbage?



Single Family Homes



Apartments

Waste Management Working Group: July 13, 2018

Civic Works Committee: July 17, 2018

Municipal Council: July 24, 2018

Community Engagement: July 25 – September 27, 2018



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Table of Contents

EXECUTIVE SUMMARY	1
1) INTRODUCTION	1
1.1 Background.....	1
1.2 Council Direction.....	5
1.3 Provincial Direction.....	7
1.4 Guiding Principles.....	9
1.5 How this Report was Prepared.....	10
2) COMMUNITY ENGAGEMENT	15
2.1 OVERVIEW.....	15
2.2 Activities and Feedback to Draft 60% Waste Diversion Action plan.....	15
2.3 Public Opinion Survey.....	20
2.4 Community Engagement on the 60% Waste Diversion Action Plan.....	22
3) RESIDENTIAL GARBAGE COMPOSITION	23
3.1 Overview.....	23
3.2 Current Garbage Composition.....	23
3.3 Future Garbage Composition.....	26
4) ANALYSIS AND PROPOSED ACTIONS	27
4.1 Blue Box (Blue Cart) Program.....	27
4.2 New (or expanded) Recycling Programs and Initiatives.....	29
4.3 Curbside Organics Management Program.....	39
4.4 Multi-Residential Organics Management Program.....	48
4.5 Other New Organics Management Programs.....	50
4.6 Waste Reduction and Reuse Initiatives and Policies.....	53
4.7 Environmental, Social and Cost Summary.....	57
5) RESOURCE RECOVERY STRATEGY	65
5.1 Definitions and Terminology.....	66
5.2 Overview of Steps to Develop a Resource Recovery Strategy.....	71
5.3 Current Timetable & Proposed Direction for Resource Recovery Strategy.....	74
6) SUMMARY OF KEY IMPLEMENTATION REQUIREMENTS	75

List of Tables

Table 1 - Key Waste Diversion Programs and Initiatives.....	4
Table 2 - Guiding Principles	11
Table 3 - Community Engagement Activities.....	15
Table 4 - Feedback on First Round of Questions	17
Table 5 - Feedback on Key Second Round of Questions.....	18
Table 6 - Popular Comments and Suggestions from the Community.....	19
Table 7 - Results of Ipsos Public Affairs Survey	20
Table 8 - Community Engagement for 60% Waste Diversion Action Plan	22
Table 9 – Summary of Proposed Recycling Programs and Initiatives	29
Table 10 - Status of Potential Materials to Recycle	31
Table 11 - Summary of Mixed Waste Processing Pilot.....	42
Table 12 - Comparison of Green Bin and Mixed Waste Processing Programs	43
Table 13 - Garbage Collection Frequency for Large Municipalities with Green Bin	47
Table 14 - Green Bin Operational Decisions	47
Table 15 - Draft Green Bin Implementation Schedule	48
Table 16 - Comparison of Typical Curbside & Multi-Residential Green Bin Programs ..	49
Table 17 - Proposed Actions to Achieve 60% Residential Waste Diversion.....	58
Table 18 - Summary of Diversion, Estimated Operating Costs and Schedule	61
Table 19 - 2016 Municipal Waste Management Costs	62
Table 20 - Summary of Estimated Costs and Potential Funding	64
Table 21 - Proposed Activities & Timetable to Complete Resource Recovery Strategy	74

List of Figures

Figure 1 – Diversion Rate.....	5
Figure 2 - What Are We Throwing Away? (single family homes)	24
Figure 3 - What Are We Throwing Away? (multi-residential homes)	25
Figure 4 - Recycling Volume and Quantities	26
Figure 5 – Organics Breakdown	39

List of Appendices

Appendix A – Residential Waste Diversion Programs	
Appendix B – Community Engagement Activities	
Appendix C – Community Engagement Feedback	
Appendix D – Ipsos Survey Report	
Appendix E – Residential Waste Composition	
Appendix F – Overview of Key Environmental, Social, Financial and Technical Considerations for Various Diversion Programs/Initiatives	
Appendix G – Summary of Ontario Green Bin Programs	
Appendix H – Mixed Waste Processing Pilot	

EXECUTIVE SUMMARY

Background

In London more than one tonne of waste is produced annually per person. This includes waste generated at home as well as waste generated by businesses. About a third of this waste is diverted through numerous waste reduction, reuse, recycling and composting programs. The overall waste diversion rate for London is between 30% and 35%. The residential (household) diversion rate is 45%.

To plan for the future, the City is developing a long term Resource Recovery Strategy. The Strategy involves the development of a plan to maximize waste reduction, reuse, recycling and resource recovery in an economical viable and environmentally responsible manner. The Resource Recovery Strategy includes a commitment by City council to increase the household waste diversion rate from 45% to 60% by the end of 2022. This report, 60% Waste Diversion Action Plan, details the actions required to meet this commitment. Work on the broader Resource Recovery Strategy continues with a focus on how to go beyond 60% diversion. Both projects also address the Strategic Plan for the City of London (2015-2019) and The London Plan (2016-2035).

Development of the Action Plan draws on a variety of sources of information, experience and insight from other waste management and environmental professionals. This included a review of other Ontario and other municipalities in Canada and the United States; consideration of regional resource recovery opportunities; engagement and feedback from the public; consideration and alignment with provincial strategies, direction and legislation; updating local waste composition data for curbside and multi-residential homes; and gathering information from the waste management and resource recovery industry.

Waste Composition

Single families make up about 70% of London's households and generate about 61,000 tonnes of the residential garbage each year that is collected and landfilled. A large percentage of this waste could be composted or recycled. About 7% is material that should have been placed in the Blue Box. A further 13% of the garbage, including textiles, scrap metal, electronics, renovation materials and plastic bags, which could have been dropped off at a depot, taken to a store for recycling or are materials that have been identified in the province's Strategy for a Waste-Free Ontario for future diversion programs.

About 60% of landfill garbage is primarily organic matter and is compostable/digestible. The organics are made up of food scraps (36% of all waste), non-recyclable paper like paper towel & paper napkins, yard waste, pet waste and sanitary products (e.g., diapers). About 30% of London's households live in multi-residential (apartment/condominium) buildings and generate approximately 23,000 tonnes of garbage per year. The garbage composition from multi-residential buildings is similar to the garbage from single family households with some key differences (e.g., more recyclables, less food and organic waste).

Action Plan

This report proposes the following set of actions to achieve this goal (Table ES-1):

Table ES-1 Proposed Actions to Achieve 60% Residential Waste Diversion

Blue Box (Blue Cart) Programs
1. Increase capture of recyclables from 63% to 75% (less placed in the garbage)
New (or Expanded) Recycling Programs and Initiatives
2. Bulky Plastics <ul style="list-style-type: none"> a) Continue with existing pilot project b) Consider implementation of an expanded program once long term stable markets have developed
3. Carpets <ul style="list-style-type: none"> a) Wait to see if the Province develops a provincial program for carpets under the <i>Waste-Free Ontario Act</i> as there are limited markets for recycling carpets in the province b) If no provincial program exists by 2021, implement a pilot project
4. Ceramics <ul style="list-style-type: none"> a) Provide a drop-off location for ceramics at no cost at the City's EnviroDepots b) Ban toilets from curbside garbage collection
5. Clothing and Textiles <ul style="list-style-type: none"> a) develop a textile awareness strategy to promote existing reuse opportunities b) pilot depot collection at select multi-residential buildings
6. Small Metal (Small Appliances/Electrical Tools/Scrap Metal) <ul style="list-style-type: none"> a) implement semi-annual curbside collection of small metal items b) pilot depot collection at select multi-residential buildings
7. Furniture <ul style="list-style-type: none"> a) Begin semi-annual collection of wooden furniture b) Provide a drop-off location at W12A EnviroDepot for wooden furniture c) Ban wooden furniture from curbside garbage collection
8. Mattresses <ul style="list-style-type: none"> a) Wait to see if the Province develops a provincial program for mattresses under the <i>Waste-Free Ontario Act</i> as there are limited markets for recycling mattresses in the province b) If no provincial program exists by 2021, implement a pilot project
Curbside Organics Management Program
9. Implement a curbside Green Bin program
10. Implement bi-weekly garbage collection
Multi-Residential Organics Management Program
11. Implement a mixed waste processing pilot (to recover organics and other materials) on a portion of the waste from multi-residential homes

Table continues

Table ES-1 Proposed Actions to Achieve 60% Residential Waste Diversion

Other New Organics Management Programs
<ul style="list-style-type: none"> 12. Develop and implement a food waste avoidance strategy 13. Reduce the cost of composters at the EnviroDepots and undertake additional sale events at select community locations 14. Provide financial support to community groups or environmental organizations that want to set up a community composting program
Waste Reduction and Reuse Initiatives and Policies
<ul style="list-style-type: none"> 15. Create a Waste Reduction and Reuse Coordinator position within the Solid Waste Management Division 16. Provide financial support for community waste reduction and reuse initiatives 17. Reduce the container limit to two or three containers per collection when the Green Bin program with bi-weekly garbage collection is operational 18. Further explore the use of clear bags for garbage collection if London does not move to a roll-out cart based garbage collection system 19. Further explore a full user pay garbage system if London moves to a roll-out cart based garbage collection system 20. Further examine other incentive and disincentive initiatives (best practices) from other municipalities (e.g., mandatory recycling by-law, reward systems, user fees, etc.) 21. Provide additional feedback approaches to residents (including how waste reduction and waste diversion are calculated when providing waste management progress reports)

Benefits and Costs

By taking the steps outlined in this Action Plan, a number of environmental, social and financial benefits will be achieved. These include increased waste diversion (33% more diversion); creation of jobs (between 125 and 170 direct and indirect; within and outside London); reduced greenhouse gas emissions (equivalent of removing 4,200 to 6,800 cars from the road); reduced landfill impacts; better use of material and resources; residents will feel satisfaction or pride of living in an environmentally progressive community; and short-term landfill cost savings.

It is expected that approval of any expansion of the landfill by the Ministry of Environment, Conservation and Parks (MOECP) would be unlikely unless the City has programs in place to achieve 60% waste diversion. The increase in waste disposal costs will be significant if the City must export its waste to a private landfill elsewhere in Ontario. The increase in disposal costs for the City to export its waste is estimated to be approximately \$5 to \$7 million per year.

The approximate cost, expected diversion and timeline for implementation for the actions listed above are summarized in Table ES-2.

Table ES-2 - Summary of Diversion, Estimated Operating Costs and Schedule

Program Category	Diversion Rate		Annual Estimated Operating Cost			Schedule
	Range	Likely	Range	Likely	\$/Hhld ^a	
Blue Box Recycling Improvements	1% - 3%	2%	\$0	\$0	\$0	Likely not under City control ^b in the future
New Recycling Programs and Initiatives	0.4% - 0.8%	0.6%	\$350,000 - \$550,000	\$450,000	\$2.00 - \$3.00	2019 ^c - 2021
Curbside Organics Management Program	8% - 12%	10%	\$3,900,000 - \$5,500,000	\$5,000,000	\$21.75 - \$30.50	2020 - 2022
Multi-Residential Organics Management Pilot Program	0.5% - 0.7%	0.6%	\$400,000 - \$700,000	\$500,000	\$2.25 - 4.00	2020
Other Organic Management Programs	0.3%-0.6%	0.4%	\$250,000 - \$350,000	\$300,000	\$1.50 - \$2.00	2019 ^c - 2021
Waste Reduction, Reuse Initiatives and Policies	1% - 4%	1.4%	\$150,000 - \$350,000	\$250,000	\$0.50 - \$2.00	2019 ^c - 2021
Total^d	11% - 21%	15%	\$5,050,000 - \$7,450,000	\$6,500,000 (\$36.00)	\$28.00 - \$41.50	2019^c - 2022

Notes:

a) Based on 180,000 households.

b) The provincial Waste-Free Ontario Strategy calls for a transition from the current Blue Box program, which is municipally managed and co-funded by industry and municipalities, toward a full extended producer responsibility (EPR) and/or individual responsibility (IPR) program by 2023. The EPR program will require producers to take full financial and operational responsibility for all Ontario municipal Blue Box programs.

c) 2019 Multi-year budget has \$140,000 assigned to new waste diversion initiatives.

d) Totals may not add due to rounding.

Financial Considerations – Funding 60% Waste Diversion

Potential funding sources to lower the annual cost of \$5.05 - \$7.45 million by \$1.8 to \$3 million per year are highlighted below.

Operating Costs

As shown in Table ES-2, annual operating costs for the 60% Waste Diversion Action Plan will range from \$5.05 million to \$7.45 million and will depend on final program design, market competition, etc. The most likely annual operating cost is estimated to be \$6.5 million.

City staff continue to examine a number of financing approaches. The change in government in Ontario has created additional uncertainty as a number of potential revenue sources for waste diversion are on hold. Besides taxes, potential sources of revenue currently include:

- Additional recycling program costs paid by industry - potential cost savings from expected transition from the current Blue Box program, which is municipally managed and co-funded by industry and municipalities, toward a full EPR program paid 100% by industry by 2023. This is expected to reduce the City's current waste diversion program costs by \$1.5 to \$1.8 million. In addition there is the potential of one time capital funding for recycling infrastructure. It is not clear when full funding would be paid to the City.
- Other extended producer responsibility revenues - for items such as branded organics (e.g., diapers, soiled paper, tissues/toweling) carpets, textiles, furniture and other consumer goods. These sources could range between \$50,000 and \$150,000 per year.
- W12A Landfill levy to support diversion - a specific amount charged per tonne of garbage disposed of at the landfill that is placed in a dedicated fund for waste reduction and diversion. The amount that could be collected is based on many factors (e.g., which garbage is it applied to, what fee, etc.). Levies between \$2 and \$20 per tonne are in place in some jurisdictions. Revenue from this source could range between \$250,000 and \$1 million per year.
- Greenhouse gas offset credits associated with organics diversion – the Government of Ontario was working on introducing an emissions offset protocol for aerobic composting into Ontario's Cap & Trade program, based on an existing protocol used in Alberta (e.g., five composting projects currently listed on the Alberta Emissions Offset Registry). The value of these offsets would have been between \$100,000 and \$500,000 per year based on an assumed value of around \$20 per tonne of GHG emissions offset (and increasing over time). It is unclear at this time how/if this funding opportunity will be replaced by the current provincial government.

A summary of estimated operating costs and potential annual funding is identified on Table ES-3.

Table ES-3 – Summary of Estimated Costs and Potential Funding

	Low	High	Likely (Anticipated)
Costs (Table ES-2)	\$5,050,000	\$7,450,000	\$6,500,000
Revenues	\$1,800,000	\$2,950,000	\$2,000,000
Total Estimated Costs			\$4,500,000

Capital

Capital costs for the 60% Waste Diversion Action Plan will depend on program design, technology considerations, etc. The largest capital expenditure will be for the Green Bin Program. A capital cost of \$12 million for the Green Bin program had previously been estimated (January 2016, Multi-year Budget deliberations). Other waste diversion initiatives listed in the Action Plan may require new investment in the order of \$500,000 to \$3 million for a total of \$12.5 to \$15 million in capital expenditures.

It is expected that capital costs for the 60% Waste Diversion Action Plan will be able to be funded from the existing capital budget. The current ten-year capital program includes \$35 million in 2020 for new solid waste diversion technologies to increase diversion. After allocating up to \$15 million for the Action Plan, there would be \$20 million left for advanced waste diversion and/or resource recovery technologies.

Additional Community Engagement

The community engagement proposed for the 60% Waste Diversion Action Plan is presented in Table ES-4.

Table ES-4 – Community Engagement for 60% Waste Diversion Action Plan

Date	Event	Comments
July 17, 2018	CWC Meeting	<ul style="list-style-type: none"> • Approve in Principle Draft Action Plan to achieve 60% waste diversion by 2022 • Approve to circulate and receive feedback on the 60% Waste Diversion Action Plan
July 24	Council	
July 25 to September 10	Provide feedback opportunities on WhyWaste Resource Recovery Strategy website	<ul style="list-style-type: none"> • Advertise in the London Free Press, The Londoner and on social media
	Circulate to Community Stakeholder Groups	<ul style="list-style-type: none"> • Circulate and ask for feedback from Waste Management Community Liaison, Committee (WMCLC), W12A Landfill Public Liaison Committee, Urban League and Advisory Committee on the Environment (ACE)

Table ES-4 – Community Engagement for 60% Waste Diversion Action Plan

Date	Event	Comments
	Circulate to Waste Management/ Recycling Companies	<ul style="list-style-type: none"> • Circulate and ask for feedback from local companies including Emterra, Green Valley Recycling, Miller Waste, Orgaworld, StormFisher, Try Recycling, Waste Connections and Waste Management
	Community Festival	<ul style="list-style-type: none"> • Attend Gathering on the Green II, Sunday August 19, 2018
	Presentations	<ul style="list-style-type: none"> • Present to WMCLC in early August (TBD) • Present to ACE on September 5, 2018
September 27	Public Participation Meeting	<ul style="list-style-type: none"> • CWC receives comments from the public and other stakeholders
January/ February 2019	CWC Meeting	<ul style="list-style-type: none"> • Approval of 60% Waste Diversion Action Plan • Implementation details and final cost estimates to be provided at this time

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1) INTRODUCTION

1.1 BACKGROUND

General

In London more than one tonne of waste is produced annually per person. This includes waste generated at home as well as waste generated by businesses. About a third of this waste is diverted through numerous waste reduction, reuse, recycling and composting programs. The overall waste diversion rate for London is between 30% and 35%. The residential (household) diversion rate is 45%.

To plan for the future, the City is developing a long term Resource Recovery Strategy. The Resource Recovery Strategy involves the development of a plan to maximize waste reduction, reuse, recycling and resource recovery in an economically viable and environmentally responsible manner.

The Resource Recovery Strategy will identify:

- areas of continuous improvement to maximize waste diversion and resource recovery including increasing the current London household waste diversion rate to 60% by the end of 2022 from the current rate of 45%;
- opportunities for advanced resource recovery and increased waste diversion through new, emerging and next generation technologies and where these technologies may play a role in London and area;
- areas to reduce or maintain current costs of City programs;
- ways in which to support local job creation efforts;
- ways in which to maximize program convenience to Londoners; and,
- methods to align with Provincial direction and the *Waste Free Ontario Act, 2016*.

This report addresses the portion of the Resource Recovery Strategy dealing with increasing London's household waste diversion rate to 60% by the end of 2022.

60% Waste Diversion Goal for Household Waste

- Was approved by City Council in the Fall 2017
- Consistent with Waste-Free Ontario Strategy
- Considered practical limit for a large Ontario municipality
- Average diversion rate for large municipalities in Ontario with a Green Bin was 53% in 2016 (Resource Productivity & Recovery Authority)
- Three municipalities have a diversion rate of about 60% (Simcoe County, Dufferin County, City of Kingston) and only the Region of York (including Markham at 71%) has exceeded 60%

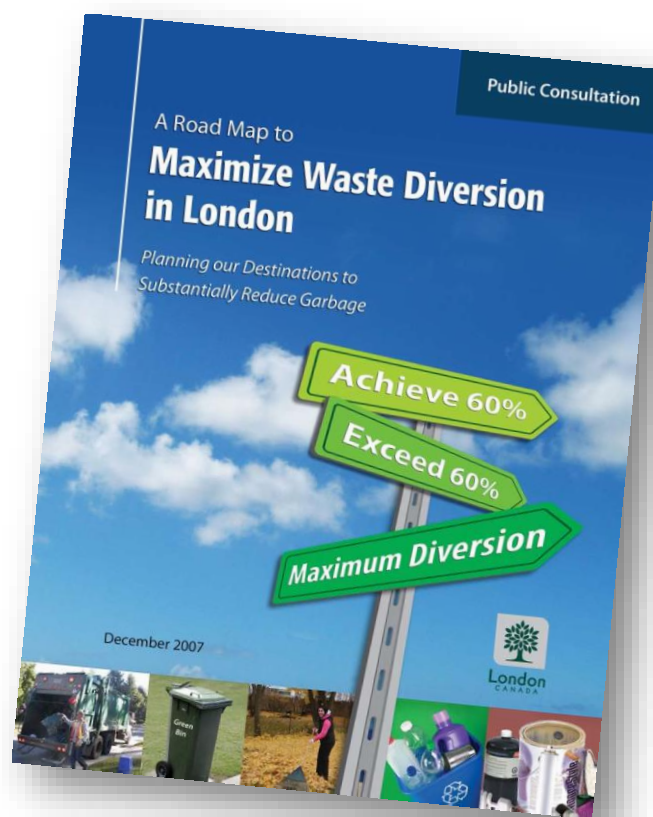
Increasing waste diversion is consistent with the *Strategic Plan for the City of London (2015 - 2019)* goals of “Building a Sustainable City” and Growing our Economy and *The London Plan (December 28, 2016)* direction to “Become one of the greenest cities in Canada” which includes “Minimize waste generation, maximize resource recovery, and responsibly dispose of residual waste”.

Previous Planning Exercises

Since the mid-1990s, the City’s Waste Management System has been based on a Continuous Improvement Strategy (management philosophy) and Sustainable Waste Management. This strategy, which was approved by Municipal Council in 1997, has been the foundation for going forward. It uses an active framework that recognizes integrated waste management as an important environmental service in the community. By effectively allocating financial and human resources, this environmental service contributes to the protection of human health and the environment. By supporting an integrated system of waste reduction (i.e., not producing waste in the first place), recovery of materials that can be recycled and composted, and ensuring that what remains is handled in an environmentally responsible manner, this strategy provides the mechanism for continuous improvement of the waste management system. Since this strategy was approved over twenty years ago, London has steadily increased its performance to the current level of 45% waste diversion while having one of the lowest total waste management costs in Ontario for urban centres (based on statistics compiled by the Municipal Benchmarking Network Canada).

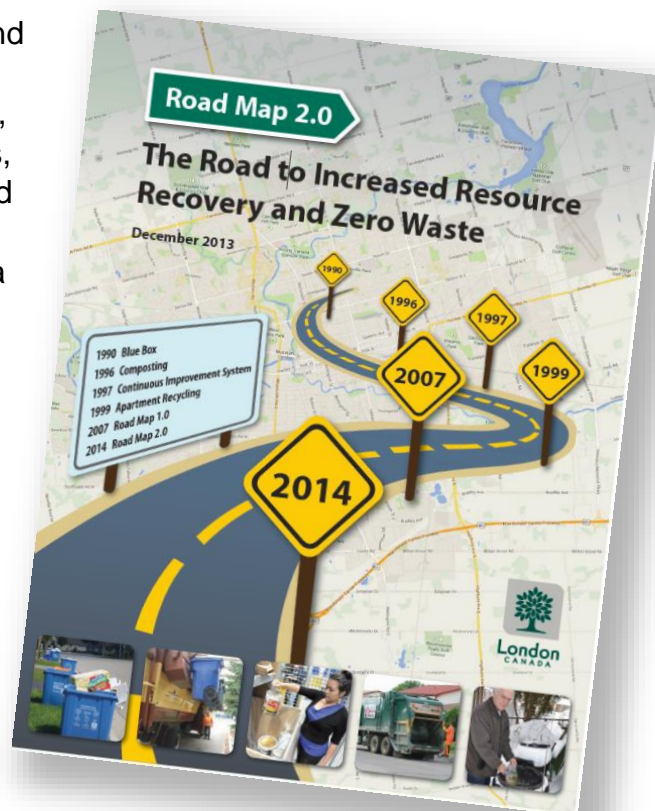
The 60% Waste Diversion Action Plan builds on previous waste diversion planning documents; *A Road Map to Maximize Waste Diversion in London (2007)* and *Road Map 2.0 The Road to Increased Resource Recovery and Zero Waste (2013)*.

A Road Map to Maximize Waste Diversion in London (2007) outlined a number of options to achieve higher diversion rates and asked for feedback from the public. Diversion measures implemented as a result of this process included new materials added to the Blue Box program (e.g., milk and juice cartons, drinking boxes, mixed plastics, steel paint cans, aerosol cans and cardboard cans), new materials



added to the EnviroDepots (e.g., tires, appliances, fluorescent tubes and bulbs), second Blue Box provided to single family homes, reusable blue bags provided to apartment units, more blue carts supplied to apartment buildings, expansion of the Oxford EnviroDepot, increased days open at the Household Special Waste depot from one to five days and completion of a Green Bin pilot study.

Road Map 2.0 The Road to Increased Resource Recovery and Zero Waste (2013) also outlined a number of options to achieve higher diversion rates and asked for feedback from the public. Diversion measures implemented as a result of this process included the reduction in the garbage container limit from 4 to 3 containers per collection, construction of a fourth EnviroDepot to serve the north end of the city, new materials added to the Blue Box program (mixed polycoat), completed community composting pilot projects, completed food reduction awareness pilot projects and instituted the curbside collection and composting of Christmas trees.



Current Diversion

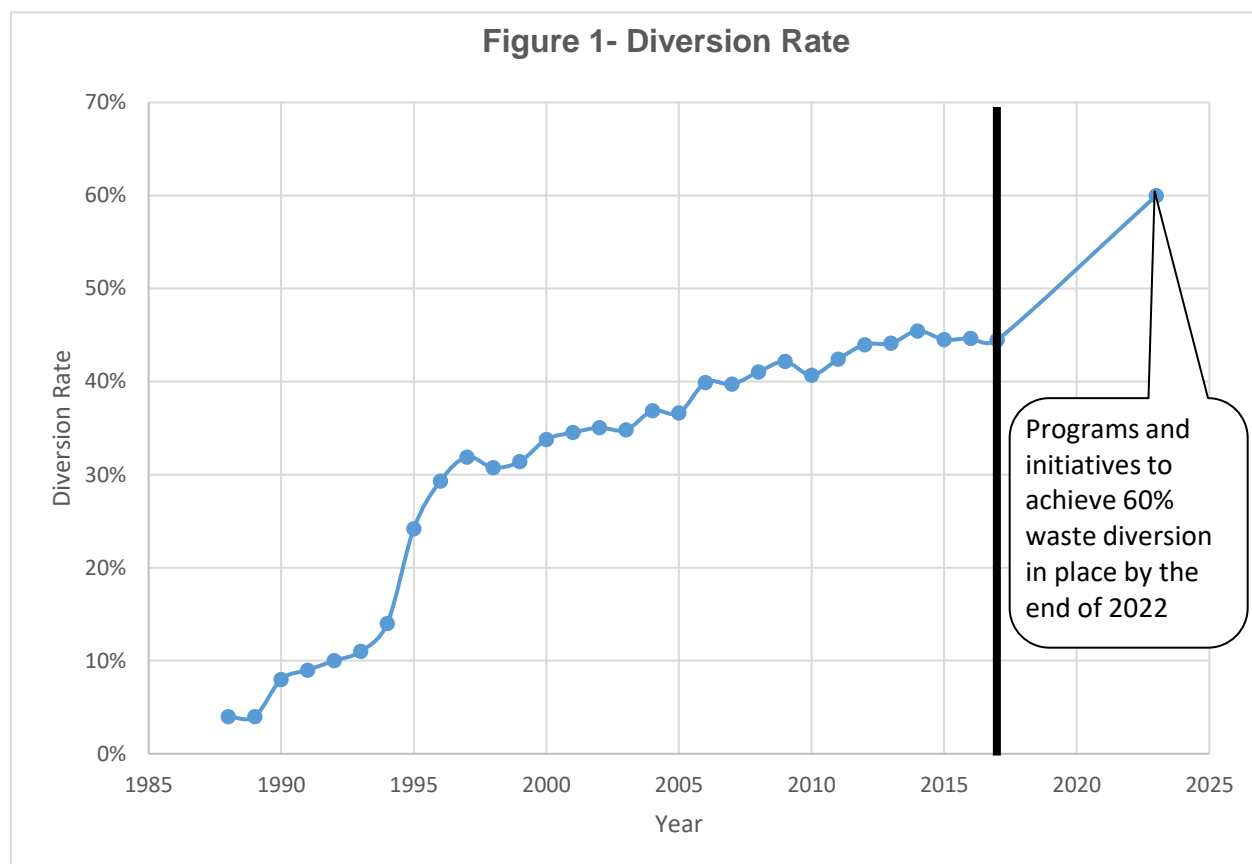
Since 1990 with the introduction of the curbside Blue Box program, the City has continuously implemented new programs and initiatives and improved existing programs to help residents divert waste away from disposal. Key changes are listed in Table 1 and their effect on waste diversion is shown in Figure 1.

As shown in Figure 1, London's average household diversion rate was 45% in 2017. This was achieved by diverting approximately 72,000 tonnes of materials through various existing recycling, reuse, reduction and composting programs. Approximately 67,000 tonnes were diverted from single family (curbside) homes for a waste diversion rate of 50% while approximately 5,000 tonnes were diverted from multi-residential (apartment) homes for a waste diversion rate of 20%.

In 2017, 23,000 tonnes (15% of all waste) of Blue Box recyclables, 36,000 tonnes (22% of all waste) of yard waste organics and 13,000 (8% of all waste) from other diversion programs (e.g., electronics recycling, tire recycling, etc.) were diverted from disposal. A detailed breakdown of the amount diverted and a description of these programs is presented in Appendix A.

Table 1 - Key Waste Diversion Programs and Initiatives

Year	Program/Initiatives
1990	<ul style="list-style-type: none"> • Curbside Blue Box pickup introduced city-wide
1994	<ul style="list-style-type: none"> • Appliances banned from garbage collection
1995	<ul style="list-style-type: none"> • Added new items to Blue Box • Grass clippings banned from garbage collection
1996	<ul style="list-style-type: none"> • Curbside pickup of yard materials (waste)
2000	<ul style="list-style-type: none"> • Multi-Residential Building Recycling Program started
2002	<ul style="list-style-type: none"> • Electronics Recycling introduced at the EnviroDepots
2003	<ul style="list-style-type: none"> • Public Space Recycling started
2005	<ul style="list-style-type: none"> • Renovation Material accepted for recycling at the EnviroDepots
2006	<ul style="list-style-type: none"> • 4 Container Limit for Garbage introduced for curbside collection
2009	<ul style="list-style-type: none"> • Added more items to Blue Box Program • Tires, propane tanks and batteries accepted for recycling at the EnviroDepots
2010	<ul style="list-style-type: none"> • Fluorescent tubes and bulbs accepted for recycling at the EnviroDepots
2011	<ul style="list-style-type: none"> • Added more items to Blue Box Program • Provided residents with a second larger Blue Box • Completed construction and started operations of London Regional Materials Recovery Facility (MRF), increasing scale, efficiency and recovery of collected Blue Box Materials • Started signing agreements with a number of neighbouring municipalities to send recyclables to the MRF
2014	<ul style="list-style-type: none"> • Added more items to the Blue Box Program
2016	<ul style="list-style-type: none"> • 3 Container Limit for Garbage introduced for curbside collection
2017	<ul style="list-style-type: none"> • Curbside Christmas Tree collection for composting started



1.2 COUNCIL DIRECTION

The Resource Recovery Strategy includes a commitment by City council to increase the residential waste diversion rate to 60% by 2022. This commitment was made at the October 30, 2017 City Council meeting by passing the following resolution:

“The W12A Landfill expansion be sized assuming the residential waste diversion rate is 60% by 2022 noting this does not prevent increasing London’s residential waste diversion rate above 60% between 2022 and 2050.”

Other key documents that highlight waste diversion and resource recovery and provide further context for the 60% Waste Diversion Action Plan include:

- Strategic Plan for the City of London (2015-2019) – next page
- The London Plan (December 28, 2016) – next page

The 60% waste diversion goal will be included in the environmental assessment as part of the commitments made by the City. It will be a key consideration in the Ministry of the Environment, Conservation and Parks (MOECP formerly called the Ministry of the Environment and Climate Change - MOECC) approval of the environmental assessment for expansion of the W12A Landfill.

City Council – Strategic Plan (2015-2019) and The London Plan

[Extracts from]

Strategic Plan for the City of London (2015-2019)

Building a Sustainable City

1. Robust Infrastructure

What are we doing?

Increase efforts on more resource recovery, long-term disposal capacity, and reducing community impacts of waste management.

How are we doing it?

Long-Term Waste Management Plan

Growing our Economy

3. Local, regional, and global innovation

What are we doing?

Lead the development of new ways to resource recovery, energy recovery, and utility and resource optimization with our local and regional partners to keep our operating costs low and assist businesses with commercialization to help grow London's economy.

How are we doing it?

London Waste to Resources Innovation Centre

[Extracts from]

The London Plan

London 2035: Exciting Exceptional, Connected

Key Directions

Direction #4 *Become one of the greenest cities in Canada*

#12 *Minimize waste generation, maximize resource recovery, and responsibly dispose of residual waste.*

Solid Waste Management

479_ The following policies are separated into two primary areas: Diversion and Disposal.

>>DIVERSION - REDUCING, REUSING, RECYCLING, COMPOSTING AND RECOVERY

480_ The City will promote the reduction, re-use, recycling, composting, and recovery of materials from solid waste, wherever possible, through the use of innovative means, new technology, conservation measures, and public education and community engagement programs.

continued

City Council – Strategic Plan (2015-2019) and The London Plan

481_ The City will support the reduction, re-use, recycling, composting and recovery of materials by:

- 1. Initiating, participating and collaborating in public education, awareness, and community engagement programs with residents, Londoners, businesses and other agencies and organizations.*
- 2. Collaborating with other municipalities to develop long-term strategies to reduce, reuse, recycle, and recover materials from the waste stream.*
- 3. Encouraging development proposals to provide adequate recycling and composting facilities, and support innovative waste collection and diversion programs.*
- 4. Increasing waste diversion through existing technologies and new, emerging and next-generation technologies as they become available, practical, and financially feasible for London.*
- 5. Exploring energy from waste opportunities.*

482_ In addition to municipal waste management facilities within the Waste Management Resource Recovery Area Place Type, City Council will support the adequate provision of lands for solid waste diversion and resource recovery within the Heavy Industrial Place Type or on lands with specific policies.

1.3 PROVINCIAL DIRECTION

Waste-Free Ontario Strategy

The Province approved a road map for resource recovery and waste reduction known as the *Strategy for a Waste-Free Ontario: Building the Circular Economy* in February 2017. The Strategy:

- has a long term goal of zero waste and zero greenhouse gas emissions from the waste sector,
- sets interim waste diversion goals for 2020 (30%), 2030 (50%) and 2050 (80%) for combined waste streams; and,
- lists a number of objectives and actions to achieve long term and interim goals.

One of the key proposed actions was to make companies that produce or import products responsible for managing their end-of-life requirements. This is called full Extended Producer Responsibility (EPR). Initially EPR will be applied to products and packages that have existing mandated recycling programs such as tires, municipal hazardous and

special waste, electronics and Blue Box materials. Other materials such as carpets, mattresses and furniture will be considered in the future. A second key proposed action was the development of a *Food and Organic Waste Action Plan* by the Province which will contain actions directed at reducing and diverting food and organic waste away from disposal facilities. The complete Waste-Free Ontario Strategy can be found at: www.ontario.ca/page/strategy-waste-free-ontario-building-circular-economy.

Full EPR and the Blue Box Program

The Waste-Free Ontario Strategy calls for a transition from the current Blue Box program, which is municipally managed and co-funded by industry and municipalities, toward a full EPR program by 2023. The EPR program will require producers to take full financial and operational responsibility for all Ontario municipal Blue Box programs.

Current Blue Box Funding

- ✓ Net cost of the Blue Box program split approximately 50/50 between municipalities and industry.
- ✓ In 2017 London received \$3.1 million from industry funding to cover operating and long term capital costs of \$6.2 million.

Industry and municipalities have been working on a transition plan (known as the amended Blue Box Program Plan) to gradually shift the full financial and operational responsibility of the Blue Box Program to industry. This transition plan, prepared by Stewardship Ontario (i.e., businesses responsible for items collected in the Blue Box) is expected to establish goals and targets aimed at improving environmental performance and program experience for Ontario residents by:

- Including new materials;
- Setting a general provincial capture rate of 75% of Blue Box materials (currently 63% of Blue Box materials are captured province wide);
- Looking at how to develop end-markets and collection systems for difficult to recycle materials (e.g., chip bags); and
- Standardizing the program across the province to attempt to achieve a consistent experience for all Ontario residents.

Details of the proposed plan can be found at rpra.ca/amended-blue-box-program. The transition plan is currently on hold until further details are provided by Stewardship Ontario, Resource Productivity & Recovery Authority (RPRA), and the Ministry of the Environment, Conservation and Parks (MOECP) (formerly the Ministry of the Environment and Climate Change).

Food and Organic Waste Action Plan

The Strategy for a Waste-Free Ontario called for implementation of an action plan to reduce the volume of food and organic wastes going to landfill. This resulted in development of the Food and Organic Waste Framework which was released on April 30, 2018.

Highlights of the Framework include:

- Ontario Food Recovery Hierarchy that consists of the following steps in order of importance:
 1. Reduce: prevent or reduce food and organic waste at the source.
 2. Feed People: safely rescue and redirect surplus food before it becomes waste.
 3. Recover Resources: recover food and organic waste to develop end-products for a beneficial use.
- Organizations (entities) identified must meet the targets assigned to them.
- A 70% target for waste reduction and resource recovery of food and organic waste for municipalities (like London), educational institutions and hospitals by 2025.
- A 50% target for waste reduction and resource recovery of food and organic waste for multi-residential buildings by 2025.
- Larger retail shopping establishments, office buildings, restaurants, hotels and manufacturing establishments are responsible for having source separated food and organic waste programs by 2025.

Food and Organics Waste Framework

The Framework consists of two complementary components:

- ✓ *Food and Organic Waste Action Plan*, which outlines strategic commitments to be taken by the province to address food and organic waste.
- ✓ *Food and Organic Waste Policy Statement*, which provides direction to the province, municipalities, producers, businesses and others to further the provincial interest in waste reduction and resource recovery as it relates to food and organic waste.

The complete Food and Organic Waste Framework can be found at:

www.ontario.ca/page/food-and-organic-waste-framework

1.4 GUIDING PRINCIPLES

Guiding principles have been developed by the City and approved by City Council to direct the development of the Resource Recovery Strategy and the 60% Waste Diversion Action Plan.

Over the last ten years, there have been numerous community engagement activities with respect to solid waste management in London including:

- 2006 to 2009 – W12A Landfill Area Plan and W12A Landfill Site Community Enhancement and Mitigative Measures Program
- 2007 – *A Road Map to Maximize Waste Diversion in London*
- 2013 – *Road Map 2.0: The Road to Increased Resource Recovery and Zero Waste (and the Interim Waste Diversion Plan 2014 – 2015)*
- 2014 – Public Feedback on Different Garbage and Recycling Collection Frequency Schedules
- 2015 to 2016 – Streamlined EA (Environmental Screening) for Waste Disposal regarding service area expansion
- 2016 – Garbage Container Limits

Based on these previous community engagement activities and ongoing input received from City Council, a number of Council Advisory Committees, community and business groups, and the W12A Landfill Public Liaison Committee (PLC), the eleven guiding principles (Table 2) were identified that reflect community values, concerns and priorities at this point in time.

Community and stakeholder input on the guiding principles was completed as part of the community engagement processes. Various community engagement tools (e.g., traditional media, social media, getinvolved.london.ca website, the City's website, open houses, etc.) were used and the final guiding principles were approved in October 2017.

All guiding principles received general support from the public with the following ones receiving the most support:

- Make waste reduction the first priority
- Be socially responsible
- Ensure financial sustainability

1.5 HOW THIS REPORT WAS PREPARED

The 60% Waste Diversion Action Plan outlines the steps that the City and residents of London will need to take in order to reach 60% waste diversion by the end of 2022. The Action Plan is part of a broader Resource Recovery Strategy. Both projects are being led by City staff with most reports prepared internally. Technical expertise has been obtained in areas where City staff have less familiarity and/or additional advice is key.

Both projects draw on a variety of sources of information, experience and insight from others in the activity areas listed below. It is important to note that many of these initiatives are ongoing as the fields of waste diversion, resource recovery and waste management continue to evolve.

Table 2 - Guiding Principles

<p><i>Be Socially Responsible</i> – Develop socially acceptable and fair solutions that minimize social impacts, encourage participating and maximize social benefits for residents and businesses and take into account input from residents and businesses.</p>
<p><i>Ensure Financial Sustainability</i> – Develop financially sustainable solutions that are easy and affordable to maintain by current and future generations and also help to stimulate economic growth within the community.</p>
<p><i>Ensure Responsibility for Waste Management</i> – Waste management is a fundamental service provided by municipal governments. London should manage residential waste and resources generated within its boundaries. London should ensure that local businesses have access to competitive resource recovery and residual waste disposal options.</p>
<p><i>Ensure Impacts of Residual Waste Disposal are Minimized</i> – Waste disposal facilities must meet, and if possible, exceed all applicable regulatory standards. London will make all reasonable efforts to reduce and address negative effects of any future residual waste disposal facility through proper design and operation of the facility, as well as providing appropriate mitigation measures to the surrounding community.</p>
<p><i>Implement more Resource Recovery Solutions</i> – Residual waste needs to be minimized and any waste that is generated needs to be treated as a resource, when practical. Resource recovery includes reuse, recycling, composting, anaerobic digestion and waste conversion to create energy and energy products. Resource recovery will balance environmental, social and financial needs along the road to a waste-free Ontario in the future.</p>
<p><i>Make the Future System Transparent</i> – Future decisions on the implementation of the Resource Recovery Strategy and Residual Waste Disposal Strategy will continue to be open, accessible, based on best practices and facts, and follow the Corporation of the City of London by-laws, policies and practices to find solutions.</p>
<p><i>Make Waste Reduction the First Priority</i> – The City’s first goal is to reduce the amount of material being generated by residents and businesses that requires management (e.g., encourage food waste avoidance, composting at home, local policies to encourage waste reduction, supporting producer responsibility and other provincial and federal programs).</p>
<p><i>Prioritize the Community’s Health and Environment</i> – The health of London’s residents and the environment is a priority in decision-making to minimize negative impacts and to maximize the benefits.</p>
<p><i>Support Development of Business (contractual) Partnerships</i> – Working together with the private sector will ensure that roles, responsibilities and skills are assigned appropriately such that municipal resources are maximized and the best opportunities for London and potential partners are created.</p>
<p><i>Support Development of Community Partnerships</i> – Working together with local community groups and organizations will help London reach its waste diversion goals and maximize resource recovery more effectively and efficiently.</p>
<p><i>Work to Mitigate Climate Change Impacts</i> – To reduce the impact on climate change London will identify, assess and implement solutions that reduce GHG emissions associated with its waste management system.</p>

1. Preliminary Review of Potential Programs, Initiatives and Technologies

Preliminary review of potential programs, initiatives and technologies to develop a long list of waste diversion programs, initiatives and technologies that required further investigation. The Internet contains numerous municipal-led and/or consultant-led waste diversion strategies including background research.

2. (Ongoing) Review of Other Ontario Municipalities

A comprehensive review of waste diversion programs/initiatives in other large Ontario municipalities, other cities in Canada and a few cities in the United States was undertaken. City staff have many direct municipal contacts in Ontario municipalities and other cities in Canada that help to obtain important details. Staff are actively involved in the following associations:

- Regional Public Works Commissioners of Ontario (RPWCO)
- Municipal Resource Recovery & Research Collaborative (M3RC) including representatives from Association of Municipalities of Ontario (AMO), Municipal Waste Association (MWA), City of Toronto and RPWCO
- Ontario Waste Management Association (OWMA)
- Canadian Biogas Association (CBA)

3. (Ongoing) Consideration of Regional Resource Recovery Opportunities

In 2017, the City canvassed nearby municipalities (Elgin County, Huron County, Lambton County, Middlesex County, Oxford County and Perth County) responsible for waste management to determine their interest in using any future resource recovery facility(ies). All municipalities expressed an interest in being included in discussions about any new resource recovery facilities and indicated they would consider using the facility depending on the cost. The potential for a regional facility may make it possible to consider technologies that require larger waste quantities in order to be economically feasible.

4. (Ongoing) Community Feedback

Residents had a number of opportunities to provide feedback on what should be included in the Action Plan (Chapter 2.0). Information and feedback has also been sought from various City advisory committees and the Waste Management Community Liaison Committee.

5. (Ongoing) Alignment with Provincial Strategies and Legislation

Development of the Action Plan aligns with the provincial *Strategy for a Waste-Free Ontario: Building the Circular Economy* as well as new provincial waste management planning initiatives including the *Proposed Food and Organic Waste Framework* and the *Amended Blue Box Program Plan*.

6. Comparative Analysis

A comparative analysis of the potential programs/initiatives was completed looking at environmental (diversion rate, greenhouse gas reduction benefits); social (public support, resident benefits/issues); financial (costs, revenue) and technical (collection/processing issues, stability of end markets, proven technology) considerations.

7. (Ongoing) Consideration of Learnings from the Mixed Waste Processing Working Group Formed in early 2017, the Region of Peel is the coordinator of a Mixed Waste Processing Working Group comprised of eight Ontario municipalities representing about half of Ontario's population. The Working Group shares updates, research results, Committee/Council reports, site visit experience and related operational experiences. Members (and estimated 2017 population) currently include:

City of London (380,000)	Region of Peel (1,400,000)	Region of Waterloo (538,000)
Region of Niagara (450,000)	County Simcoe (306,000)	Region of York (1,112,000)
County of Oxford (111,000)	City of Toronto (2,800,000)	

8. (Ongoing) Consideration of learnings from London Waste to Resources Innovation Centre

Input and advice acquired through the working relationships established as part of the Innovation Centre. The primary goals of the Innovation Centre are to:

- build on the existing foundation of traditional and innovative projects to divert waste from landfill and create value added products from residues and waste;
- create a focal point (location or locations) for the ongoing examination of innovative solutions for waste reduction, resource recovery, energy recovery and/or waste conversion into value-added materials, chemicals, heat and power;
- establish partnerships and collaborations between government, academia and businesses to synergistically build on existing strengths to create opportunities to prevent waste, to create products of value from waste, and to solve existing waste management challenges; and
- be known as an innovative centre of excellence with shared facilities and resources providing leadership, implementing best practices, undertaking leading edge research, providing knowledge and support to industry, while educating and training students, researchers and postdoctoral fellows in the various fields of resource and waste management.

Key research work that has been undertaken includes:

- Food waste avoidance research with Western University, PhD Candidate Paul van der Werf and 2cg Consulting;
- Anaerobic digestion of source separated organics (SSO) and facility separated organics (FSO) to create renewable natural gas (RNG); and
- Literature review, analysis, and site visits for new, emerging and next generation technologies (e.g., gasification, pyrolysis, mixed waste processing)

9. (Ongoing) Peer Review

GHD, an engineering, architecture, environmental and construction services firm, and specializes in waste management technologies, has been retained to conduct a peer review of portions of the Action Plan dealing with any technical analysis and newer resource recovery technologies.

10. Request for Information

The City released a Request for Information (RFI) to obtain information about resource recovery (i.e., waste processing) technologies that might be suitable for the City of London to divert waste away from the City's Landfill. It is expected that the 60% diversion could be achieved by a combination of enhanced waste reduction initiatives, increased capture of Blue Box materials, the introduction of recycling of various bulky items and the introduction of an organics management program.

Data collected as part of this RFI will be used to assist City staff in determining if there are other options for reaching 60% diversion, how likely is it to increase diversion beyond 60% diversion in the near term, and how a transition program to advanced resource recovery can be designed now. Specifically the City is looking for technology providers for Mechanical Biological Treatment (MBT) or Waste Conversion systems. MBT systems refer to systems that separate mixed garbage in two or more waste streams for further processing. Further processing can include anaerobic or aerobic processing of an organics rich stream, capture of low quality recyclables, and production of a solid refuse fuel. Waste Conversion refers to technologies such as gasification, pyrolysis, etc. that typically produce a syngas, biochar and/or other products from garbage.

2) COMMUNITY ENGAGEMENT

2.1 OVERVIEW

Engagement and feedback from the public and other stakeholders is a key component in developing the 60% Waste Diversion Action Plan. It enabled stakeholders to participate in the planning of the programs and initiatives that will be part of the action plan and enhanced the quality of the plan.

2.2 ACTIVITIES AND FEEDBACK TO DRAFT 60% WASTE DIVERSION ACTION PLAN

The approaches used to engage the public and other stakeholders in development of the Action Plan included open houses, booths at community events, interactions with City of London Advisory Committees, the Resource Recovery Strategy website, creation of the Waste Management Community Liaison Committee and newspaper and social media advertisements. These events/initiatives are summarized in Table 3 with full details presented in Appendix B.



Table 3 - Community Engagement Activities

Event	Date/Location	Description/Comments
<i>Open Houses</i>		
Open House 1	May 24 (Horton Street Goodwill, 2 – 4 p.m, 5 – 8 p.m) May 25 (Lambeth Community Centre, 2 – 4 pm, 5 – 8 pm)	Background information provided on existing diversion programs, waste composition and potential new diversion programs. Feedback opportunities provided. City staff were available to answer questions.
Open House 2	November 29 (Horton Street Goodwill, 2 – 4 p.m, 5 – 8 p.m) November 30 (Lambeth Community Centre, 2 – 4 p.m, 5 – 8 p.m)	Updated information on changes to waste management and waste diversion from the Province, potential programs and initiatives to achieve 60% diversion and key technologies to achieve advanced diversion and resource recovery. Feedback opportunities provided. City staff was available to answer questions.

Table 3 - Community Engagement Activities

Event	Date/Location	Description/Comments
<i>Community Events</i>		
Gathering on the Green	June 3, 2017	Simple display promoting the getinvolved.london.ca website, Environmental Assessment (EA) process for expanding the W12A Landfill and waste composition. City staff was available to answer questions.
The Big Leak: Water Brothers	June 5, 2017	
Sesquifest	June 29 to July 2, 2017	
Sunfest	July 6 to July 9, 2017	
Home County Folk Festival	July 15 to July 16, 2017	
Inspiration Fest	July 23, 2017	
Forest Festival	August 19, 2017	
Gathering on the Green 2	August 20, 2017	
Neighbourhood Service Days	August 28 - September 1, 2017 Northwest London Resource Centre, Glen Cairn Community Centre	
London Home Show	January 26 - 28, 2018	Visitors requested to provide feedback on proposed waste diversion activities that could be implemented to achieve 60% waste diversion. A desk-side Blue Box was given to all participants.
<i>City of London Advisory Committees</i>		
Waste Management Community Liaison Committee (CLC)	June 5, 2017 to present	The Waste Management CLC was advised on Resource Recovery changes and initiatives as new information was available. Committee feedback was provided in support of the proposed initiatives.
Advisory Committee on the Environment (ACE)	May 3, 2017 and November 1, 2017	ACE was provided with updates as the project moves forward. Committee feedback was provided in support of the proposed initiatives.

Table 3 - Community Engagement Activities

Event	Date/Location	Description/Comments
Resource Recovery Strategy website		
	Live on April 25, 2017	Information about the Resource Recovery Strategy is available online on the getinvolved.london.ca website. Feedback can be provided. To date, over 3,000 visitors have accessed the website.

Through these community engagement activities, the City was soliciting feedback on specific topics and questions as well as asking for general comments and suggestions. Feedback on the specific topics and questions is presented in Tables 4 and 5. A summary of the popular comments and ideas are listed in Table 6.

Further details on the feedback for the specific topics and questions as well as all the general comments and suggestions provided are presented in Appendix C.

It is key to understand that this is a compilation of feedback. It is not a random sample of Londoners and has no statistical validity. Section 2.3 contains the results of a public opinion poll. However, it is very important to capture comments and feedback in an understandable format.

Table 4 - Feedback on First Round of Questions¹

Question	Response	
	Is new organic management program(s) the key to reaching 60% waste diversion by 2022?	Yes
Maybe		14%
No		0%
Do you think it is acceptable to allow neighbouring municipalities to use any new waste resource recovery facilities developed by the City of London?	Yes	57%
	Maybe	14%
	No	29%
Do you think that the Resource Recovery Strategy needs to be able to accommodate transition to new technology in the future, if appropriate?	Yes	100%

Notes 1: Questions posed at Open House and online. Seven total responses.

Table 5 - Feedback on Key Second Round of Questions¹

What Level of Investment Are You Willing to Make?		Response	Summary Comment
Greater levels of waste diversion and resource recovery will require additional financial investments. On a household basis, how much more in municipal taxes and fees would you be prepared to pay per year?	\$0	17%	Over 80% of the respondents indicated they are prepared to pay more for waste diversion.
	\$1 - \$25	44%	
	\$26 - \$50	24%	
	\$51 - \$75	7%	
	\$76 - \$100	8%	
How much more in municipal taxes and fees would you be prepared to pay per year for Potential New Programs and Initiatives (including the approximate annual cost per household)		Level of Support	Summary Comment
Food Waste Avoidance	No change: \$0	16%	Almost 85% support for some kind of program.
	Moderate Program: \$1	46%	
	Significant Program: \$7	38%	
Home Composting	No change: \$0	25%	75% support for all proposed options
	Moderate Program: \$0.75	38%	
	Significant Program: \$1.20	37%	
Community Composting	No change: \$0	20%	80% support for all proposed options
	Low Tech, Private: \$0.01	25%	
	Low Tech, Public: \$0.15	28%	
	High Tech, Public: \$0.45	27%	
City Wide Organics – Curbside Program	No Change: \$0	19%	Stronger support for Green Bin. Green Bin also preferred by CLC and ACE.
	Green Bin Program: \$20	62%	
	Mixed Waste Program: \$40	19%	
City Wide Organics – Multi-Residential Program	No Change: \$0	17%	Stronger support for Green Bin
	Green Bin Program: \$7	61%	
	Mixed Waste Program: \$14	22%	

1. Questions posed at Open House 2, online, London Home Show and to the Waste Management Community Liaison Committee. The number of responses varied by question, but ranged from 615 to 956.

Table 6 - Popular Comments and Suggestions from the Community¹

Comment/Suggestion	% of Responses	City Response
Pro green bin/source separated composting program; many comments asked for immediate implementation	39%	Yes, considered in the 60% Waste Diversion Action Plan.
Pro alternative resource recovery method (incineration, mixed waste processing, landfill mining)	6%	Options considered as part of the EA process for the expansion of W12A Landfill and will be discussed in the Resource Recovery Strategy.
Support bans on packaging/manufacturers responsible	5%	In Ontario, this activity has generally occurred at the provincial government level.
Expand recycling program (Blue Box, public space, downtown)	4%	Being considered as part of extended producer responsibility (EPR) discussions.
Implement policies & by-laws (pay per bag, bag limit, clear bag)	4%	Yes, considered in the 60% Waste Diversion Action Plan.
Support home composting	4%	Yes, considered in the 60% Waste Diversion Action Plan.
London should stop taking Toronto's garbage	3%	London doesn't take Toronto's garbage.
Education on waste reduction/diversion is key	3%	Yes, considered in the 60% Waste Diversion Action Plan.
Opposed to green bins	2%	Provincial Statement requires London to implement organics management program.
Encourage reuse	2%	Yes, considered in the 60% Waste Diversion Action Plan.
Implement textile recycling	1%	Yes, considered in the 60% Waste Diversion Action Plan.

1. Written comments or suggestions provided to the City at an open house, on the getinvolved.london.ca website or on the City's Facebook page. The number of comments or suggestions were 233. Some respondents provided more than one comment.

2.3 PUBLIC OPINION SURVEY

To complement the community engagement discussed in Section 2.2, a survey of the opinions of London residents towards waste diversion was undertaken by Ipsos Public Affairs.

The survey was conducted online and the sample was drawn using Ipsos proprietary panel. To qualify for the survey, the respondent had to be a resident of the City of London and 18 years of age or older. The results of the survey are based on a total of n=301 online interviews completed between May 31 and June 4, 2018.

The precision of Ipsos online surveys is calculated via a credibility interval. According to Ipsos, the sample is considered accurate within +/- 6.4 percentage points, 19 times out of 20, had all London residents been surveyed.

Complete details of the survey are presented in Appendix D and summarized below. The survey included eight questions. Most of the questions were similar to questions asked of residents as part of the community engagement process. These questions, the results and how they compare to the feedback received during the community engagement process are presented in Table 7.

Table 7 - Results of Ipsos Public Affairs Survey

How important is waste diversion to you?		Response	Comment
Waste diversion is the process of reducing the quantity of waste landfilled and creating new materials of value. How important is waste diversion to you?	Very important	53%	Over 90% of residents think waste diversion is important.
	Somewhat important	40%	
	Not very important	5%	
	Not important at all	0%	
	Don't know	2%	
What Level of Investment Are You Willing to Make?		Response	Comment
On a per household basis, how much more would you be prepared to pay in municipal taxes and fees per year to pay for increased waste diversion?	\$0	24%	Over 75% of the respondents indicated they are prepared to pay more for waste diversion.
	\$1 - \$25	47%	
	\$26 - \$50	18%	
	\$51 - \$75	4%	
	\$76 - \$100	7%	

Table 7 - Results of Ipsos Public Affairs Survey

Potential New Programs and Initiatives (including the approximate annual cost per household)		Level of Support	Comment
Food Waste Avoidance	No change: \$0	12%	Almost 90% of the respondents are interested in seeing some kind of program implemented.
	Moderate Program: \$1	41%	
	Significant Program: \$7	57%	
City Wide Organics – Curbside Program	No Change: \$0	24%	3 of every 4 respondents want a new program. Green Bin has marginally more support than mixed waste program.
	Green Bin Program: \$20	42%	
	Mixed Waste Program: \$40	32%	
City Wide Organics – Multi-Residential Program	No Change: \$0	19%	4 of every 5 respondents want a new program. Equal support for Green Bin (essentially on-site source separated organics) and Mixed Waste.
	Green Bin Program: \$7	40%	
	Mixed Waste Program: \$14	41%	
Are you prepared to deliver more materials (e.g., old furniture, carpet, small appliances, mattresses, etc.) to drop off-depots?	Yes	65%	2 of every 3 respondents are willing to deliver more materials to the EnviroDepots.
	No	35%	
Would you support banning additional materials from garbage pickup (e.g., old furniture, carpet, small appliances, mattresses, et.) if you could drop them off at a depot for recycling?	Yes	60%	3 of every 5 respondents support banning materials that have a recycling option.
	No	40%	

2.4 COMMUNITY ENGAGEMENT ON THE 60% WASTE DIVERSION ACTION PLAN

The following community engagement is proposed for the 60% Waste Diversion Action Plan.

Table 8 - Community Engagement for 60% Waste Diversion Action Plan

Date	Event	Comments
July 17, 2018	CWC Meeting	<ul style="list-style-type: none"> Approve in principle Draft Action Plan to achieve 60% waste diversion by 2022
July 24	Council	<ul style="list-style-type: none"> Approve to circulate and receive feedback on the 60% Waste Diversion Action Plan
July 25 to September 10	Provide feedback opportunities on WhyWaste Resource Recovery Strategy website	<ul style="list-style-type: none"> Advertise in the London Free Press, The Londoner and on social media
	Circulate to Community Stakeholder Groups	<ul style="list-style-type: none"> Circulate and ask for feedback from Waste Management Community Liaison, Committee (WMCLC), W12A Landfill Public Liaison Committee, Urban League and Advisory Committee on the Environment (ACE)
	Circulate to Waste Management/ Recycling Companies	<ul style="list-style-type: none"> Circulate and ask for feedback from local companies including Emterra, Green Valley Recycling, Miller Waste, Orgaworld, StormFisher, Try Recycling, Waste Connections and Waste Management
	Community Festival	<ul style="list-style-type: none"> Attend Gathering on the Green II, Sunday August 19, 2018
	Presentations	<ul style="list-style-type: none"> Present to WMCLC in early August (TBD) Present to ACE on September 5, 2018
September 27	Public Participation Meeting	<ul style="list-style-type: none"> CWC receives comments from the public and other stakeholders
January/ February 2019	CWC Meeting	<ul style="list-style-type: none"> Approval of 60% Waste Diversion Action Plan
	Council	<ul style="list-style-type: none"> Implementation details and final cost estimates to be provided at this time

3) RESIDENTIAL GARBAGE COMPOSITION

3.1 OVERVIEW

The key to developing new programs and initiatives to achieve 60% waste diversion is understanding what currently makes up garbage and how it may change in the future.

3.2 CURRENT GARBAGE COMPOSITION

What is currently in the garbage is shown on the next pages and discussed below. A more detailed breakdown on what is in garbage is provided in Appendix E. Single families make up about 70% of London's households and generate about 61,000 tonnes of the residential garbage each year that is collected and landfilled. A large percentage of this waste could be composted or recycled.

A breakdown of what is in the typical garbage bag from a single family residence is illustrated on Figure 2 (next page). About 7% is material that should have been placed in the Blue Box. A further 13% of the garbage, including textiles, scrap metal, electronics, renovation materials and plastic bags, which could have been dropped off at a depot, taken to a store for recycling or are materials that have been identified in the province's Strategy for a Waste-Free Ontario for future diversion programs.

About 60% of landfill garbage is primarily organic matter and is compostable. The organics are made up of food scraps (36% of all waste), non-recyclable paper like paper towel & paper napkins, yard materials, pet waste and sanitary products (e.g., diapers).

About 30% of London's households live in multi-residential (apartment/condominium) buildings and generate approximately 23,000 tonnes of garbage per year. A breakdown of the garbage collected from multi-residential buildings is illustrated in Figure 3.

Garbage Collection

The City collects garbage from 124,000 single family households and 56,000 multi-residential households.

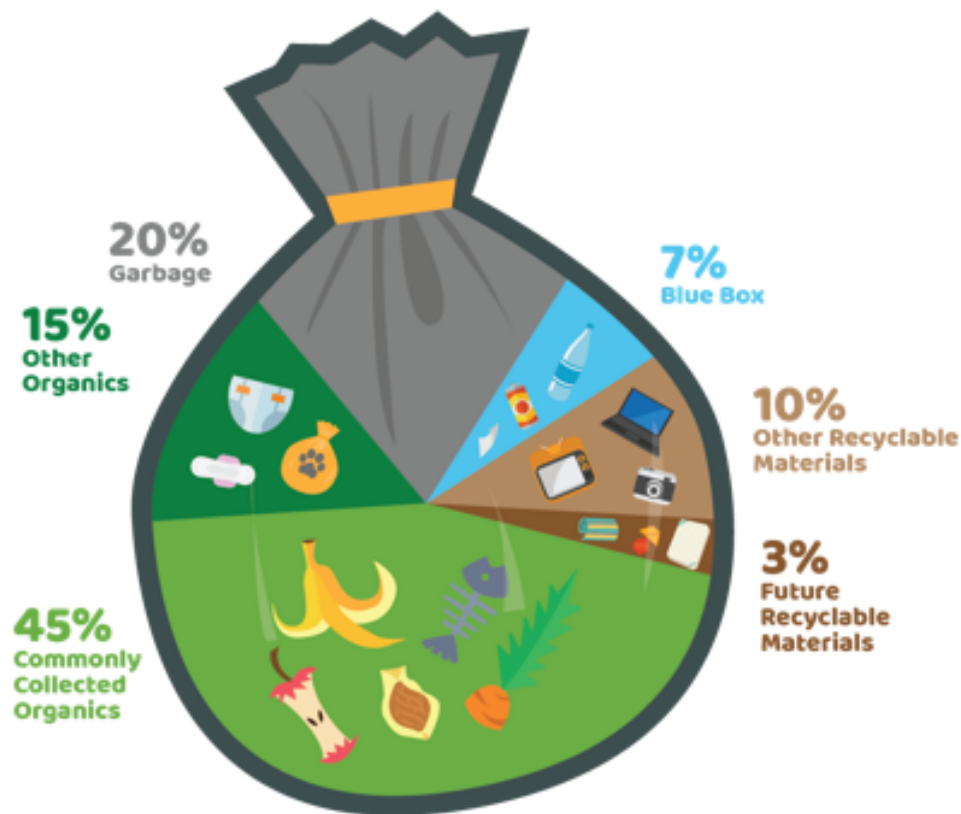
Single family households are limited to 3 containers per collection plus bulky items (e.g., couches, mattresses, etc.).



Multi-residential households do not have container restrictions. Bulky items are handled separately by tenant/owner or the building owner.



Figure 2 - What Are We Throwing Away? (single family homes)



Commonly Collected Organics

Organics that are easily composted. They include food waste and non-recyclable paper (soiled paper, tissues, paper towels).

Other Organics

Pet waste and sanitary products (e.g., diapers) which typically require pre-processing to remove the plastic bag that contains the pet waste and plastic covering of the diaper.

Blue Box

Items that were placed in the garbage but should have gone in the Blue Box.

Other Recyclable Materials

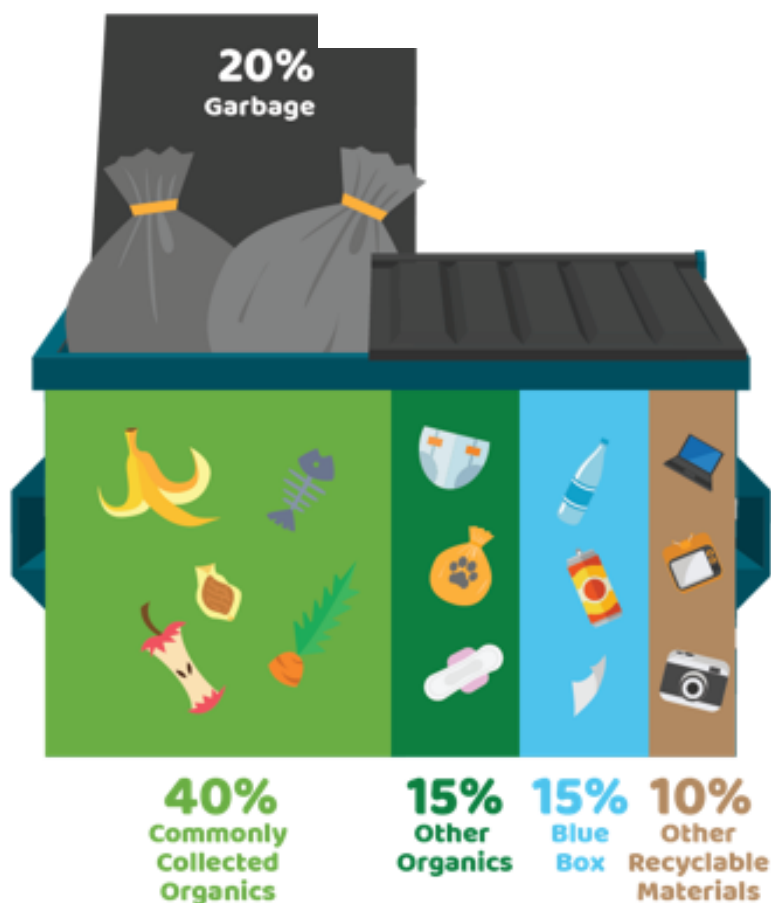
Items that were placed in the garbage but should have been dropped off at a depot or returned to retailer for recycling such as textiles, scrap metal, electronics, renovation materials and plastic bags.

Future Recyclable Materials

Items that may have local recycling options in the future such as carpets, mattresses and furniture.

The garbage composition from multi-residential buildings is similar to the garbage from single family households. The main difference is a higher percentage of recyclables in the garbage (15% versus 7% for single family) but less of the garbage is compostable (55% versus 60% for single family).

Figure 3 - What Are We Throwing Away? (multi-residential homes)



Commonly Collected Organics

Organics that are easily composted. They include food waste and non-recyclable paper (soiled paper, tissues, paper towels).

Other Organics

Pet waste and sanitary products (e.g., diapers) which typically require pre-processing to remove the plastic bag that contains the pet waste and plastic covering of the diaper.

Blue Box

Items that were placed in the garbage but should have gone in the Blue Box.

Other Recyclable Materials

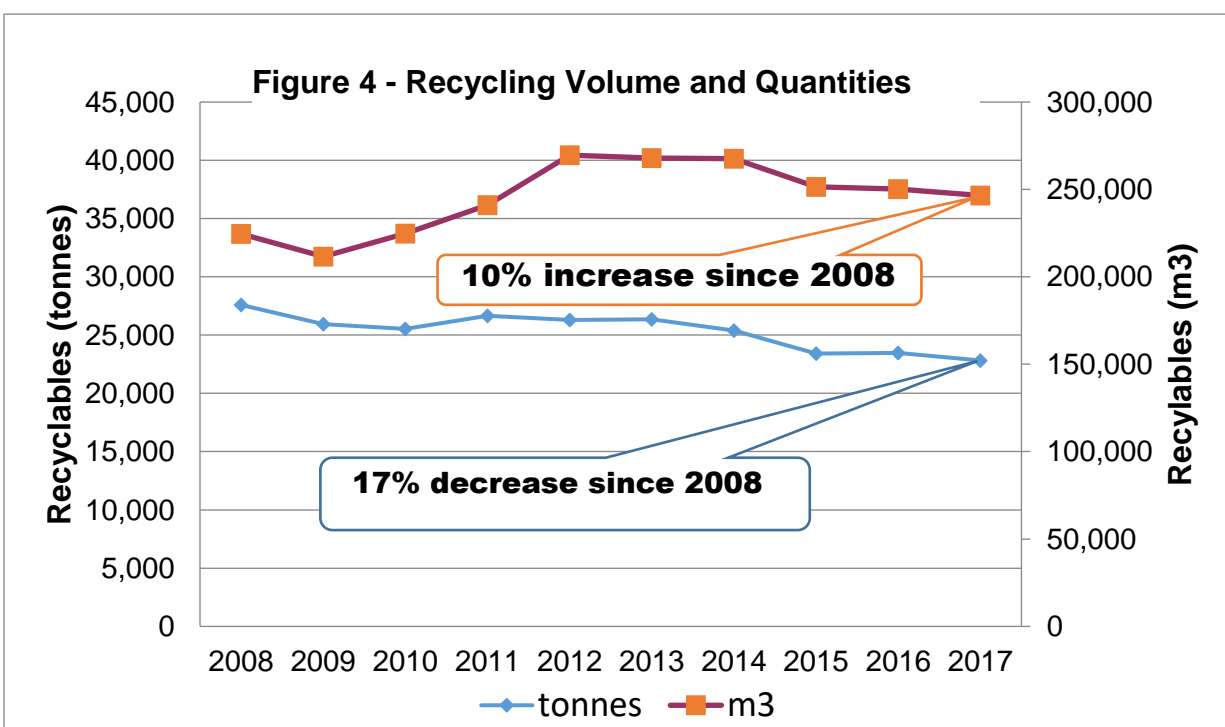
Items that were placed in the garbage but should have been dropped off at a depot or returned to retailer for recycling such as textiles, scrap metal, electronics, renovation materials and plastic bags.

3.3 FUTURE GARBAGE COMPOSITION

The waste stream is constantly changing. These changes are a result of:

- Shifting habits and behaviours - fewer people reading printed newspapers resulting in less newsprint to recycle; more people ordering online resulting in more cardboard boxes; changes in eating habits, attitudes toward cooking and busier lifestyles have resulted in a growing demand for convenience foods and ready-to-go meals.
- Light-weighting of product packaging to reduce manufacturing costs - companies find ways to reduce the weight of product packaging, to reduce their costs. Examples include; the quantity of polyethylene terephthalate (PET) plastic in beverage containers (e.g., water bottles) has decreased by 50% over the last several years; more concentrated products which use less packaging.
- Material substitution - some companies are switching packaging materials such as steel cans or glass containers to plastic or aseptic packaging.
- Composite packaging design - there is an increase in single-serve and convenience packaging which results in challenges for recycling and composting operations (e.g., coffee pods, multi-layer freezer packs).

The majority of these changes will impact Blue Box recycling and result in less “easy to recycle” materials (e.g., newspapers, steel cans, etc.) and more “difficult to recycle” materials (e.g., plastics, pouches, etc.). The changes will also reduce the weight of recyclables collected while at the same time increasing the volume of recyclables (Figure 4) and the cost of recycling.



4) ANALYSIS AND PROPOSED ACTIONS

4.1 BLUE BOX (BLUE CART) PROGRAM

Summary - Proposed Actions, Diversion and Savings

It is expected:

- the responsibility for the Blue Box program will be transferred to industry in the future (as early as 2023 based on current legislation and policy timelines);
- the province will mandate increased capture of recyclables from the current 63% (provincial average) to 75%; and
- other proposed initiatives (bi-weekly garbage collection, reduced container limits, consideration of user pay or clear bags) will encourage more use of the existing program.



These changes will increase London's diversion rate by an additional 2% to 3% and the transition of all Blue Box costs to industry will reduce the City's waste diversion costs by \$1.5 to \$1.8 million dollars per year.

Background

Existing Program

The City provides opportunities to recycle Blue Box materials through its curbside, multi-residential, depot and public space recycling programs. The City diverted approximately 23,000 tonnes of recyclables in 2017. This is approximately 14% of all residential garbage.

The City collects a wide range of materials which has increased over the years.

Most items in the Blue Box are common to municipalities, with the key differences being: plastic film (e.g., plastic bags) and expanded polystyrene (e.g., Styrofoam™). London has not added plastic film and expanded polystyrene to its program due to the high costs and limited markets.

It is expected that a common basket of materials to be recycled will be established once responsibility for the program is transferred to industry. For this reason, no changes to the materials collected are planned for London in the near future.

Why doesn't the City recycle Expanded Foam Polystyrene (EPS) and film plastic?

- ✓ EPS does not have stable markets and can contaminate other materials at the recycling facility.
- ✓ Film plastic wraps around moving equipment parts at the recycling facility and is costly to collect and process.

Information on materials collected in the City's Blue Box program can found in Appendix A.

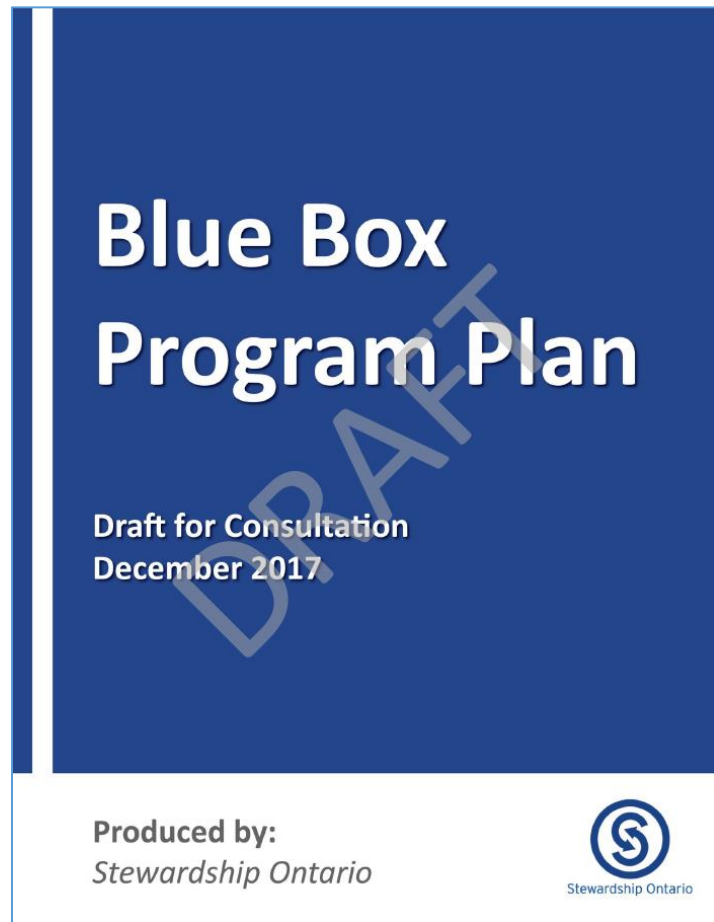
New Provincial Direction

The existing Blue Box Program Plan (2003) is based on a cost share model of 50/50 between municipal governments and the companies that produce the Paper Products and Packaging (PPP) collected in the Blue Box Program. The programs are being managed and operated by Ontario municipalities.

The new proposed model is a combination of extended producer responsibility (EPR) and eventually moving to Individual Producer Responsibility (IPR) (also commonly called full producer responsibility). It is based on individual producers being legally and fully responsible for meeting outcomes set by the government, which would include waste diversion targets, service standards, promotion and education requirements and administrative penalties. Industry would fund 100% of the recycling costs of their products and product packaging.

The current Blue Box program diverts approximately 63% of all designated recyclables. The province has indicated that a capture rate of 75% of all designated recyclables may be more appropriate under the new model.

The Strategy for a Waste-Free Ontario (2017) shows the transition of the Blue Box Program to the new model being completed by 2023. In February 2018, Resource Productivity and Recovery Authority (RPRA) announced that “In light of comments received on this consultation draft [the report cover above], Stewardship Ontario and the Authority have determined that more time is needed to address the comments received.” As of end of June 2018, no further details have been released.



4.2 NEW (OR EXPANDED) RECYCLING PROGRAMS AND INITIATIVES

Summary - Proposed Actions, Diversion and Costs

The proposed program for materials collected in the garbage that are potentially recyclable is summarized in Table 9.

Table 9 – Summary of Proposed New (or Expanded) Recycling Programs and Initiatives

Material	Proposed Actions	Implementation Schedule
Bulky Plastics	<ul style="list-style-type: none"> • Continue with existing pilot project • Consider implementation of an expanded program once long term stable markets have developed 	in progress
Clothing and Textiles	<ul style="list-style-type: none"> • Develop a textile awareness strategy • Pilot depot collection at select multi-residential buildings 	2019
Ceramics (e.g., Toilets)	• Drop-off at W12A EnviroDepot at no cost	2019
	• Ban from garbage collection	2020
Small Metal (e.g., Appliances, Electrical Tools and Scrap Metal)	• Pilot curbside collection methods	2019
	• Semi-annual collection of from single family home	2020
	• pilot depot collection at select multi-residential buildings	2020
Furniture (Wooden)	• Drop-off at W12A EnviroDepot at no cost	2019
	• Semi-annual curbside collection from single family homes	2020
	• Ban from garbage collection	2021
Carpets, Mattresses	• Wait to see if the province develops an EPR program under the <i>Waste-Free Ontario Act</i>	2018 to 2021
	• If no EPR program, implement a pilot project for voluntary recycling of materials at the EnviroDepots on a fee for service basis	2022
	• Consider implementation of ban on curbside collection with either a depot or curbside collection service	2023

It is estimated that the above programs for wooden furniture; small appliances, electrical tools and small scrap metal; large ceramics and textiles would divert approximately 0.4% to 0.8% of residential waste and cost approximately \$350,000 to \$550,000 annually.

Background

Existing Programs

There are many opportunities to recycle items in the residential waste stream in addition to materials recycled through the Blue Box program. In total approximately 13,000 tonnes of Other Recyclables were diverted from landfill in 2017. Details on these City programs are provided in Appendix A.

Waste-Free Ontario Strategy

Information on the Waste-Free Ontario Strategy was previously provided in Section 1.2. The strategy lists a number of products and materials that will be considered for recycling under a full EPR program.

“The province will designate new materials under the new producer responsibility regime. When identifying potential candidate materials for full producer responsibility, the province will consider products and packaging whose recovery helps fulfil one or more of the following three broad results:

- recovering high-volume resource streams to increase diversion*
- keeping hazardous materials out of landfills to protect our environment*
- reducing domestic and global greenhouse gas emissions to fight climate change*

...Materials will be designated through regulations made under the Resource Recovery and Circular Economy Act, 2016. Based on previous consultations, the first set of materials will include, but is not limited to

- small appliances*
- electrical tools*
- batteries*
- fluorescent bulbs and tubes*
- mattresses*
- carpets*
- clothing and other textiles*
- furniture and other bulky items”*

Potential Products/Materials

The status of programs to manage each of the materials listed in the Waste-Free Ontario Strategy as well as other potential recyclable materials are presented in Table 10.

Table 10 - Status of Potential Materials to Recycle

Product/ Materials		Status	Estimated Quantity in Garbage (tonnes/year)
Batteries		<ul style="list-style-type: none"> most batteries end up in the garbage provincial recycling program already exists 	<50
Bulky Plastics		<ul style="list-style-type: none"> Some bulky plastics are collected at the curb and from multi-residential buildings City operates a pilot recycling program 	50 to 100
Carpets		<ul style="list-style-type: none"> carpets collected at the curb for single family homes carpets not collected from multi-residential buildings No existing recycling opportunities 	600 to 800
Ceramics		<ul style="list-style-type: none"> ceramics (including toilets) are collected at the curb ceramics (excluding toilets) are collected at multi-residential buildings ceramics can be recycled at local Construction, Renovation and Demolition (CR&D) recycling companies 	500 to 600
Clothing and other textiles		<ul style="list-style-type: none"> 50% of material in garbage may have reuse potential many drop-off depot locations already exist 	2,500 to 3,000
Small Metal	Electrical tools	<ul style="list-style-type: none"> most electrical tools end up in the garbage most are recyclable as scrap metal 	<100
	Small appliances	<ul style="list-style-type: none"> most small appliances (e.g., toasters, hand mixers, etc.) end up in the garbage many of these are recyclable as scrap metal or electronics 	200 to 250
	Scrap Metal	<ul style="list-style-type: none"> many smaller pieces of scrap metal from households (e.g., frying pans, baking pans, bottle caps, etc.) end up in the garbage instead of being recycled 	600 to 700

Table 10 - Status of Potential Materials to Recycle

Product/ Materials	Status	Estimated Quantity in Garbage (tonnes/year)
Fluorescent bulbs and tubes	<ul style="list-style-type: none"> • many bulbs end up in the garbage • provincial recycling program already exists 	<50
Furniture	<ul style="list-style-type: none"> • furniture in general is primarily wood, metal, upholstered or plastic • metal furniture is banned from collection and can be recycled as scrap metal • wood and upholstered furniture is collected from single family homes but not multi-residential buildings (that have City bulk bin collection) 	300 to 500
Mattresses	<ul style="list-style-type: none"> • mattresses collected at the curb for single family homes • mattresses not collected from multi-residential buildings (that have City bulk bin collection) • no existing recycling opportunities 	600 to 800

A detailed assessment of recycling the items in Table 10 is presented in Appendix F and summarized below.

Batteries

There are over 20 retail locations, 30 businesses and schools and 4 EnviroDepots where single-use and rechargeable batteries are collected for recycling in London.

Several municipalities in Ontario have implemented semi-annual collection of batteries in conjunction with their Blue Box program. It is estimated a similar program in London would divert approximately 20 to 30 tonnes of batteries. Semi-annual collection is not recommended for London because the expected transition of the Blue Box program to industry will complicate collection. In addition the province will likely develop new provincial programs for batteries under the *Waste-Free Ontario Act*.

It is recommended not to make any changes to the current program in the City at this time.

Bulky Plastics

The City has been piloting the recycling of bulky plastics at the Manning Drive Regional Material Recovery Facility.

Recently, the scrap plastics market has increased quality requirements. Bulky plastic loads must now have no or minimal metal, fabric, paper and other contaminants or they will be rejected. This standard is difficult to achieve since many bulky plastics like toys are multi-material items and may also contain some metal or fabric components.

The pilot project could become a city-wide program by banning collection of bulky plastics at the curb coupled with accepting bulky plastics at the EnviroDepots. There are insufficient bulky plastics to warrant occasional (e.g., semi-annual) collection at the curb. The cost of collecting bulky plastics using a depot system would be approximately \$8,000 to \$16,000 per year.

It is recommended that the City not make changes to its pilot project for recycling bulky plastic recycling until long term stable markets have developed.

Carpets

It is estimated that approximately 600 to 800 tonnes of carpet are discarded by homeowners and collected curbside annually as garbage.

The City could ban the collection of carpet at the curb coupled with accepting carpet discards at the EnviroDepots. Occasional (e.g., semi-annual) collection at the curb is not recommended because of the added cost (cannot be collected with existing garbage collection vehicles) and the reduced recyclability of the carpet if it is left at the curb for an extended period prior to collection.

Bulky Plastics

- Bulky Plastics refers to all larger plastic household items that are not suitable for the Blue Box. Typical bulky plastic items includes plastic lawn furniture, large toys and 20 litre pails.
- It is estimated that 50 to 100 tonnes of bulky plastics placed in the garbage annually.



Carpet Recycling

- There is one carpet recycling facility in Ontario located in Toronto.
- There are no municipal programs for recycling carpets in Ontario.
- California has the most extensive carpet recycling program in North America:
 - Captures 11% of discards
 - 80% of captured material is diverted from landfill (equal amounts sent to reuse/recycling facilities and energy production through energy-from-waste facilities).



It is estimated that a depot service would capture at least 600 to 800 tonnes per year if collection of carpets at the curb was banned and accepted at no cost at the EnviroDepots. The cost of the program would be approximately \$220,000 to \$290,000 per year (excluding initial capital costs).

It is expected that a depot system would only collect 200 to 300 tonnes per year if a fee was charged to recover the cost of the program as some of the carpets would be taken to cheaper disposal locations within and outside of the City.

It is recommended that the City:

- Wait to see if the Province develops a provincial program for carpets under the *Waste-Free Ontario Act* as there are limited markets for recycling carpets in the province.
- If no provincial program exists by 2021, implement a pilot project for voluntary recycling of carpets discards at the City EnviroDepots at no cost while continuing to collect carpets at the curb.

Data from the pilot project would be used to confirm the costs, operational needs, and logistics of moving to a ban of carpet collection at the curb and whether to offer the program for free, on a partial recovery basis or on a full cost recovery basis. The cost of a one year pilot project is estimated to cost \$80,000 to \$100,000.

Ceramics

It is estimated that there is between 500 and 600 tonnes of ceramics in the garbage annually. Ceramics can be easily crushed and recycled as aggregate, which is how ceramics like ceramic tiles and toilets taken to local Construction, Renovation & Demolition (C,R&D) recycling companies are recycled.

Occasional (e.g., semi-annual) collection at the curb is not recommended because of the low quantities coupled with the likelihood that residents would be unwilling to hold onto ceramics (including toilets) for an extended period.

It is recommended that the City:

- Provide a drop-off location for ceramics at no cost at the City's EnviroDepots in 2019; and,
- Ban collection of toilets at the curb in 2020.

It is estimated the above measures will divert 100 to 150 tonnes of ceramics (predominately toilets) and cost \$10,000 to \$15,000 per year (excluding initial capital costs).

Clothing and Textiles

An active community-based clothing and textile program already exists in London handling about 50% of the available material. It is estimated that there is 2,500 to 3,000 tonnes of textiles in the garbage annually of which approximately 50% has potential to be reused/recycled. Approximately 70% of this material comes from single family homes and 30% from multi-residential buildings. This means there is approximately 900 to 1,050 tonnes of reusable textiles in the garbage from single family homes and 350 to 450 tonnes in the garbage from multi-residential homes.

There are many options for donating textiles in good condition. They include un-staffed drop-off bins at stores and mall parking lots, staffed drop-off depots (Goodwill, Mission Store, St. Vincent de Paul, etc.), door to door collections (Diabetes Canada's 'In The Bag' program) and picked up at your home (Diabetes Canada's reusable goods donation program).

There are no major municipalities in Ontario that offer regular curbside collection of textiles. Some large municipalities have textile drop-off bins in select multi-residential buildings or at key locations through the municipality (e.g., City of Markham).

The province may develop a new provincial program for clothing and textiles under the *Waste-Free Ontario Act* in the future but many municipalities are taking measures to increase diversion of clothing and textiles in the interim as there are markets for textile reuse and recycling.

It is recommended that the City:

- Develop a textile awareness strategy to promote existing reuse opportunities; and,
- Pilot depot collection at select multi-residential buildings beginning in 2019.

It is estimated that a textile awareness program would cost \$10,000 to \$30,000 annually and be required for 3 to 5 years followed by less investment when the practice has become the norm. A pilot depot collection project would cost between \$5,000 and \$10,000. It may be possible to generate enough textiles from multi-residential buildings to pay for the on-going cost of a permanent program. These programs are estimated to divert 150 to 400 tonnes of clothing and textiles annually.

Textile Recycling

- London has an active community-based program that reuses/recycles approximately 3,300 tonnes of clothing and textiles annually
- There are approximately 1,200 to 1,500 tonnes of useable clothing and textiles in the garbage.
- The overall diversion rate of useable clothing and textiles is approximately 70% (3,300 tonnes reused/ recycled of a total of 4,500 to 4,800 tonnes of useable clothing and textiles).



Small Metal (Small Appliances/Electrical Tools/Scrap Metal)

It is estimated that 800 to 1,000 tonnes of small appliances (e.g. toasters, hand mixers, etc.), electrical tools and small pieces of scrap metal end up in the garbage annually even though these materials can be taken to an EnviroDepot or scrap metal yard to be recycled. Approximately 75% of this material (600 to 750 tonnes) comes from single family homes and 25% (200 to 250 tonnes) from multi-residential buildings.

The province may develop a new provincial program for small appliances and electrical tools under the *Waste-Free Ontario Act* in the future but measures to increase diversion of these materials can be taken in the interim. There are strong markets for scrap material and collection can be provided at a reasonable cost.

In order to divert more of this material from the waste stream, it is recommended that the City:

- Implement semi-annual curbside collection of small metal items beginning in 2020, and;
- Pilot depot collection at select multi-residential buildings beginning in 2020.

A few Ontario municipalities allow residents to put metal cookware in their Blue Box and some offer a call-in service for the pickup of large appliances, but none offer a dedicated collection of small appliances, electrical tools and small pieces of scrap metal. Various methods of curbside collection could be piloted in 2019 prior to implementing a City-wide program.

It is estimated that a semi-annual curbside collection program would capture 250 to 400 tonnes of material, cost \$70,000 to \$80,000 to collect and generate \$40,000 to \$60,000 in revenue. It is likely much of the metal will be collected by private scrap haulers before City collection crews arrive. This will reduce potential revenue but also reduce collection costs.

Possible Curbside Collection Parameters

- Limit items to the size of a Blue Box or smaller.
- Accept all appliances, electrical tools, small electronics or other items with a cord.
- Consider use of the Blue Box or similar container to place materials at the curb.

Fluorescent bulbs and tubes

Fluorescent bulbs and tubes are accepted for recycling at several retail locations and the City's four EnviroDepots. The four EnviroDepots received 20 tonnes of fluorescent bulbs and tubes in 2017. The amount being received is expected to gradually decrease over time as most light bulbs currently being sold are LED. It is expected the province will likely develop new provincial programs for fluorescent bulbs and tubes under the *Waste-Free Ontario Act*.

It is recommended not to make any changes to the current program in the city at this time.

Furniture

Furniture is generally comprised of wood, metal, plastic and/or upholstery. Metal furniture is banned from collection and can be recycled as scrap metal. Wood, plastic and upholstered furniture is collected from single family homes for disposal but not multi-residential buildings (with bulk bin garbage collection).

Wood and upholstered furniture in poor condition is placed at the curb for disposal. It is estimated that the City collects 300 to 500 tonnes of furniture annually from single family homes and about one third is wood furniture. Wood, plastic and upholstered furniture in good condition should be donated for reuse but some is placed at the curb for disposal.

There are no recycling options for upholstered furniture in poor condition. Plastic furniture would likely be part of the bulky plastics recycling program discussed early.

The only recycling option for wood furniture, at this time, is to use as wood chips for daily cover at the landfill. The minor metal and plastic components (e.g., handles, drawer sliders, etc.) coupled with the wood being painted or stained prevents the wood chips from being used as fuel or for landscaping purposes.

The province may develop a new provincial program for furniture under the *Waste-Free Ontario Act* in the future. It is recommended by 2020 the City:

- Wait to see if the Province develops a provincial program for upholstered furniture under the *Waste-Free Ontario Act* as there are no markets for recycling upholstered furniture in the province;
- Provide a drop-off location at W12A EnviroDepot for wood furniture in 2019;
- Begin semi-annual collection of wooden furniture in 2020; and,
- Ban wooden furniture from curbside garbage collection in 2021.

It is estimated the above measures will divert 100 to 150 tonnes of waste to be used as landfill cover and cost \$70,000 to \$80,000 annually. Having all the wooden furniture collected semi-annually, instead of a call-in service, will provide an opportunity for re-use of the furniture by residents who see furniture on the street they could use.

Furniture Recycling

Metal

Several large Ontario municipalities offer a call-in service for the collection of large metal items for recycling including furniture.

Upholstered

There is no recycling of upholstered furniture by municipalities in Ontario.

Plastic Furniture

There is no recycling of plastic furniture by municipalities in Ontario.

Wood

There are no large Ontario municipalities that collect wood furniture for processing into wood chips. The Municipality of Thames Centre provides semi-annual collection of wood, including furniture and ships to Try Recycling for processing.

Mattresses

It is estimated approximately 1,000 to 1,200 tonnes of mattresses and box springs are discarded by homeowners annually or about 50,000 to 60,000 units. About 60% of these are placed at the curb for garbage collection.

The City could ban the collection of mattresses and box springs at the curb coupled with accepting them at the EnviroDepots.

Providing occasional (e.g., semi-annual) or on-request collection at the curb is not considered practical at this time due the cost of providing such a service.

It is estimated that a depot service would capture at least 600 to 800 tonnes per year if collection of mattresses and box springs at the curb was banned and accepted at no cost at the EnviroDepots. The cost of the program would be approximately \$600,000 to \$700,000 per year (excluding initial capital costs).

It is expected that a depot system would only collect 200 to 300 tonnes per year if a fee was charged to recover the cost of the program as some of the mattresses would be taken to cheaper disposal locations within and outside of the City.

It is recommended that the City:

- Wait to see if the Province develops a provincial program for mattresses under the *Waste-Free Ontario Act* as there are limited markets for recycling mattresses in the province.
- If no provincial program exists by 2021, implement a pilot project for voluntary recycling of mattresses and box springs at the City EnviroDepots at no cost while continuing to collect mattresses and box springs at the curb.

Data from the pilot project would be used to confirm the costs, operational needs and logistics of moving to a ban of mattress collection at the curb and whether to offer the program for free, on a partial recovery basis or on a full cost recovery basis. The cost of a one year pilot project is estimated to cost \$150,000 to \$250,000.

Mattress Recycling

- There are two mattress recycling facilities in Ontario (located in Barrie and Toronto).
- Over 90% of the material in mattresses and box springs can be recycled.
- The largest municipality with a recycling program is the City of North Bay. Residents must take mattress to a drop-off depot and are charged \$20 to cover costs.



4.3 CURBSIDE ORGANICS MANAGEMENT PROGRAM

Summary - Proposed Actions, Diversion and Costs

The proposed organics collection program for curbside homes is:

- Implement curbside Green Bin program
- Implement bi-weekly garbage collection

It is estimated that the proposed program will increase London's diversion rate by approximately 8% to 12% and have an annual operating cost \$3.9 to \$5.5 million.

Background

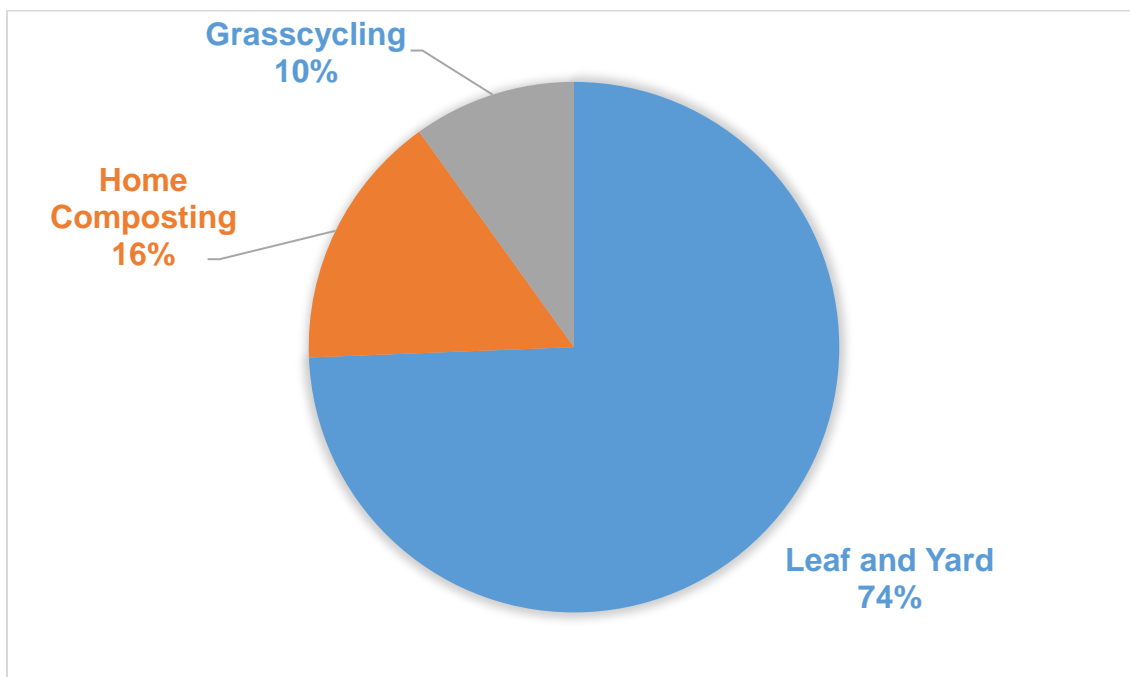
Existing Programs

The City has a number of programs in place to divert organics from single family residences; home composting, grasscycling (ban on the collection of grass trimmings and pay-per-bag to drop-off grass at EnviroDepots), curbside collection of yard waste, drop-off of yard waste at EnviroDepots and a Christmas tree collection program. The City currently diverts 36,000 tonnes of organics. This represents 50% of commonly collected organics. Commonly collected organics refers to yard waste, food scraps, soiled paper, tissues, etc. but does not include pet waste and sanitary products.

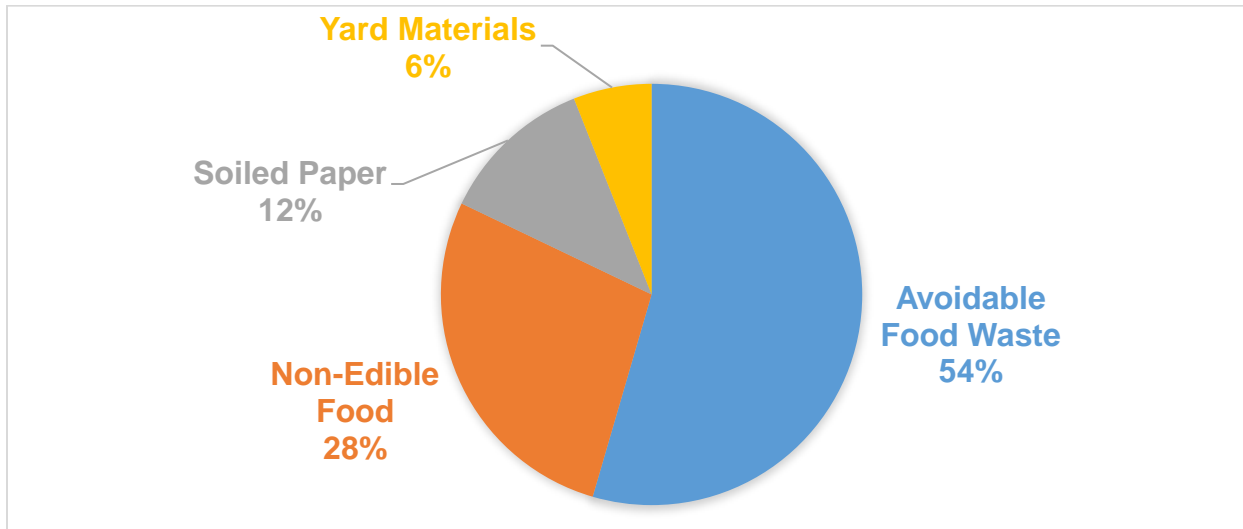
Figure 5 provides a breakdown of the various types of organics in the waste stream.

Figure 5 – Organics Breakdown

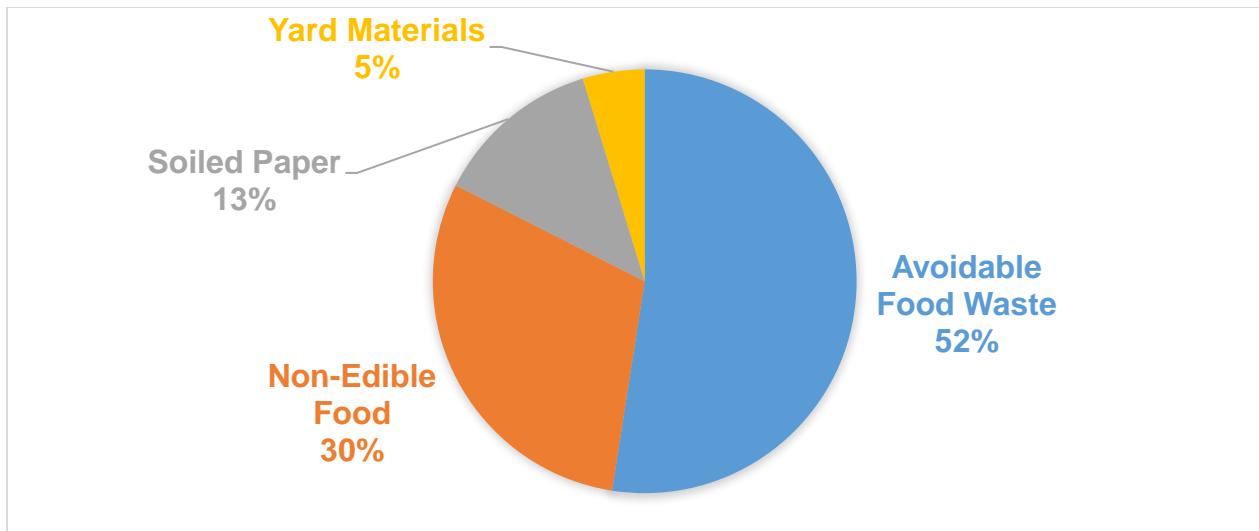
5a) Organics Diverted 36,000 tonnes



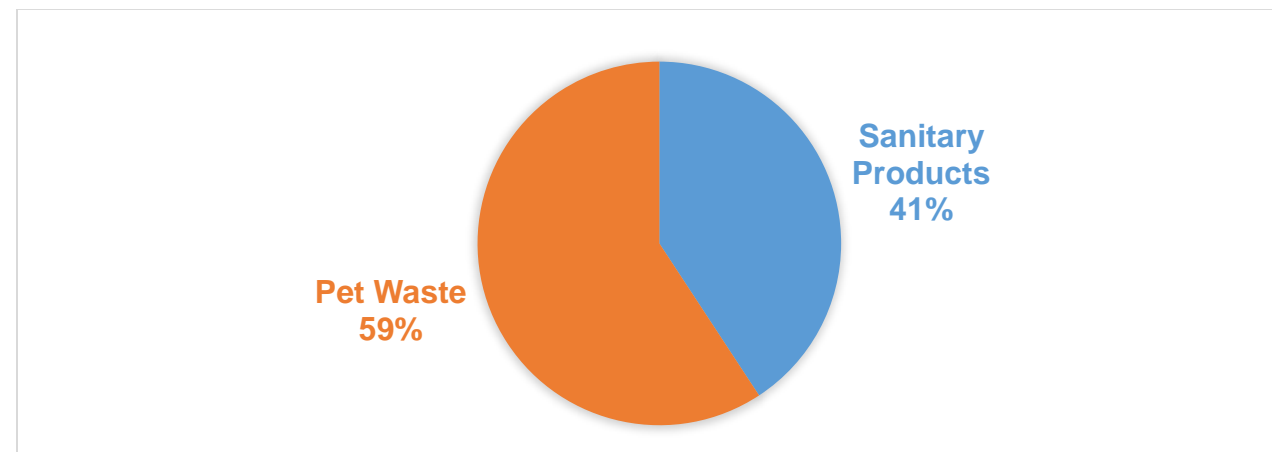
5b) Commonly Collected Organics Curbside in the garbage - 27,000 tonnes



5c) Commonly Collected Organics Multi-Residential in the garbage - 9,000 tonnes



5d) Other Organics in the garbage - 14,000 tonnes (11,000 tonnes curbside, 3,000 tonnes multi-residential)



Getting to 60% waste diversion will not be possible without an organics program because so much of the garbage currently collected is organics. As shown in Figure 5b and 5c, approximately 40% to 45% of garbage consists of “commonly collected organics” such as food waste and tissues/towelling and a further 15% of more “difficult to manage” organics like pet waste and sanitary products. Some of these organics will be reduced by proposed food waste avoidance, community composting and home composting programs (see Section 4.5) but the majority of organics will remain in the garbage without a city-wide collection program to divert this waste. Options for managing these organics are a Green Bin (source separated organics) program or a mixed waste processing program.

Green Bin Program – Homeowners place organics from their household in a “Green Bin” container which is collected separately from garbage. Green Bin programs typically capture 50% to 60% of the organics when garbage is collected bi-weekly and less if garbage is collected weekly. Details on existing programs in Ontario are presented in Appendix G.

The organics can be processed anaerobically or aerobically. Most existing processing facilities in the Province are at capacity or too far away to be practical. Available processing options for London include:

- Orgaworld (London)
- Seacliffe (Leamington, 2 hours away)
- Pre-process at Waste Management Resource Recovery Area beside the W12A Landfill site and ship to StormFisher (London) or several small farm digesters
- Build a facility in the Waste Management Resource Recovery Area beside W12A Landfill



Mixed Waste Processing – Garbage is separated into two or more waste streams for further processing. Further processing can include anaerobic or aerobic processing of an organics rich stream, capture of low quality recyclables, and production of a refuse derived fuel (RDF) or solid recovered fuel (SRF).

There are two permanent facilities in Canada (Edmonton and Halifax). There is one facility in Ontario that is piloting mixed waste processing (Canada Fibers Dongara High Diversion Facility in Toronto). It may be able to process London’s mixed waste and remove the organic fraction and other materials.



The City also has the option of building its own facility.

Food and Organic Waste Policy Statement

As discussed in Section 1.2, the Ministry of the Environment and Climate Change (now the Ministry of Environment, Conservation and Parks) issued the Food and Organic Waste Policy Statement on April 30, 2018. The document establishes the following targets and timelines:

- larger municipalities that currently do not have a Green Bin program (like the City of London) need to implement an organics management program that will achieve at least a 70 per cent waste reduction and resource recovery of food and organic waste generated by single-family dwellings by 2025.
- multi-residential buildings need to implement an organics management program that will achieve at least a 50 per cent waste reduction and resource recovery of food and organic waste by 2025.

The document states the:

“collection of source separated food and organics waste is the preferred method of servicing single family dwellings” but notes that “alternatives to the collection of source separated food and organics waste may be used if it is demonstrated that provincial waste reduction and resource recovery targets can be achieved efficiently and effectively”.

Mixed Waste Processing Pilot

In 2016, Canada Fibers bought the idle Dongara waste processing facility which previously had been used to process garbage into refuse derived fuel (RDF) pellets. The facility closed partly due to the regulatory and approval issues with using the RDF. Canada Fibers repurposed the facility and has run pilot projects using the facility as a mixed waste processing facility and as a material recovery facility. Toronto, Peel and London have all sent garbage to this facility to learn more about mixed waste processing. Details of the London pilot project are provided in Appendix H. Capture rates from the pilot project are summarized in Table 11. Estimated capture rates for a new purpose-built mixed waste processing area also provided in Table 11.

Table 11 - Summary of Mixed Waste Processing Pilot Capture Rates

Component	Canada Fibers MWP Facility	New Mixed MWP Facility
Organic Rich Fraction (including moisture loss)	25% to 30%	35% to 45%
Recyclables	3% to 5%	5% to 15%
RDF or upgraded to SRF	0% to 10%	0% to 20%
Total Percentage Captured ¹	30% to 40%	50% to 70%

Notes: 1. Cannot add maximum value for individual components. For example, facilities that maximize SRF production will have decreased organic rich fraction.

Comparison

A comparison of a Green Bin program versus a mixed waste processing program for managing curbside organics is presented in Table 12.

Table 12 - Comparison of Green Bin and Mixed Waste Processing Programs

Factor	Comment
Environmental	<ul style="list-style-type: none"> A mixed waste processing program potentially captures 25% to 80% more organics, reduces greenhouse gases (GHG) by a corresponding amount and opens up the possibility of producing solid recovered (SRF).
Financial	<ul style="list-style-type: none"> A Green Bin program costs approximately \$30 to \$45 per year to service a curbside household (about 124,000 households) compared to \$70 to \$115 per year to undertake mixed waste processing for the same households.
Social	<ul style="list-style-type: none"> Mixed waste processing program offers more convenience to residents (no change to how they manage waste).
Technical	<ul style="list-style-type: none"> The rules and regulations around mixed waste processing are evolving as current regulations do not explicitly address mixed waste processing or the products produced. There is limited experience with mixed waste processing in Canada. Past experience has not been positive in Canada and parts of North America. Facilities have either been closed (e.g., Three County (Total Recycling) System, Aylmer, Ontario; Plasco Energy Group, Ottawa, Ontario; SUBBOR, Guelph, Ontario; Dongara Pellet Plant, Vaughan, Ontario; Conporec Integrated Waste Management & Composting, Sorel-Tracy, Quebec; and several facilities in the United States) or retooled away from partially mixed waste processing or similar systems to source separated systems (e.g., City of Guelph wet/dry recycling; City of Moncton wet/dry recycling). This includes a recent decision in the City of Edmonton (March 2018) not to re-open its mixed waste processing facility in favour of progressing with a source separated organics collection program (see additional details on the next two pages). Modern mixed waste processing systems in Europe appear to have addressed many of the earlier challenges; however, the track record in North America is very limited at this time. This is expected to change in the next two to five years. Green Bin is the preferred method in the provincial Food and Organic Waste Framework and Policy Statement.

Recent information and/or decisions on mixed waste processing

[Extracts from]

Metro Vancouver, British Columbia

To: Zero Waste Committee

From: Paul Henderson, General Manager Solid Waste Services

Date: May 29, 2013 Meeting Date: June 6, 2013

Subject: **Review of Mixed Waste Material Recovery Facilities**

CONCLUSION

Staff from Metro Vancouver and the City of Vancouver visited mixed waste processing facilities in California in late April 2013 to examine their governance, operation, and performance. Mixed waste processing facilities visited were found to be high cost and recover limited recyclables. Facilitating the development of private sector MWMRFs in Metro Vancouver would be inconsistent with the ISWRMP and disadvantage local recyclers that depend on source separated materials.

[Extracts from]

THE REGIONAL MUNICIPALITY OF PEEL

WASTE MANAGEMENT STRATEGIC ADVISORY COMMITTEE AGENDA

DATE: Thursday, November 30, 2017

Mixed Waste Processing

Staff completed a feasibility study of Mixed Waste Processing to process Peel's garbage as a complement to source separation programs to help meet the Region's target of 75 percent 3Rs waste diversion.

Across North America (and within Canada) there are many examples of Mixed Waste Processing facilities that did not meet expectations. This is especially true of the low carbon fuel component but also true of the organics fraction. Removing grit and contamination from the organics fraction will not be easy but there are examples in Europe where this is done successfully, so staff believes it can be done. Producing low carbon fuel that consistently meets market specifications is even more difficult, with very few examples of this being done successfully.

- Mixed Waste Processing may not be able to successfully divert organics if the province applies new product quality requirements that preclude the use of material derived from mixed waste. The quality requirements applicable to the organic output of Mixed Waste Processing must be confirmed.
- The organic output of Mixed Waste Processing may not consistently meet product quality requirements, particularly for heavy metals, so long as items of household hazardous waste are present in the garbage. Programs or policies to eliminate household hazardous waste from the garbage should therefore be maintained and enhanced.

continued

Recent information and/or decisions on mixed waste processing

- Mixed Waste Processing may not be able to produce a marketable Low-Carbon Fuel product if the coal-burning industries are unable or unwilling to adjust their fuel quality requirements, particularly with respect to chlorine concentration.

Costs

In order to process all of its garbage, Peel would need to secure 250,000 tonnes per year of Mixed Waste Processing capacity. Options for securing Mixed Waste Processing capacity are developing a wholly Region-owned facility, partial ownership of a facility developed in partnership with other municipalities or private companies, and procuring capacity at a privately owned facility.

The capital cost of a 250,000 tonnes per year Mixed Waste Processing facility is estimated to be \$250 million, excluding land. The cost to operate and maintain the facility and manage output materials, excluding potential revenues from the sale of recyclables, Renewable Natural Gas or Low-Carbon Fuel, is estimated to be in the range of \$190 per tonne. All estimated costs are expressed in 2017 dollars.

[Extracts from]

CITY OF EDMONTON COUNCIL MINUTES

March 20, 2018 – Council Chamber

Waste Management Strategy Update

3. That Administration proceed with initial planning for a source-separated organics program for organic waste processing and collection, with planned implementation starting in Fall 2020 for the units receiving curbside collection.

Using limited cost information on mixed waste processing followed by either composting or anaerobic digestion, very preliminary estimates for London suggest the following:

- Capital costs for a 100,000 tonnes per year facility will be between \$50 and \$100 million (depending on what facilities would be new versus existing facilities); and
- Net operating costs, assuming reasonable revenues from recyclables, production of renewable natural gas and the sale of SRF, would be between \$100 and \$150 per tonne.

City are recommending that a curbside Green Bin is the best direction for London. More evidence is required on mixed waste processing in Ontario before the uncertainty around the technical and regulatory risks can be removed. For all the recent progress made in the field of mixed waste processing, there are as many if not more examples that highlight the challenges of this approach. For these reasons, City staff is recommending to proceed with a mixed waste processing pilot project in the multi-residential sector and continued monitoring of ongoing work in a few Ontario municipalities (e.g., Region of Peel, City of Toronto, Region of Durham, County of Oxford).

Previous cost estimates for a Green Bin program include: initial capital of \$12 million and on-going annual operating costs of \$3.9 million. These estimates are based on a weekly collection of organics comprised of food waste and tissues/paper towelling (diapers/sanitary products would not be included) and bi-weekly collection of garbage. It is estimated that 13,000 to 15,000 tonnes of organics would be collected per year. Almost all the material collected would be diverted.

A Green Bin program that includes pet waste and sanitary products is expected to collect 18,000 to 22,000 tonnes of material. Some of the material collected would not be diverted (e.g., plastic bags containing pet waste, portion of diapers). A preliminary estimate of costs of this type of program is approximately \$5 million annually.

It is expected that the cost of mixed waste processing may decrease in the future because of improved technology and potential revenues from producing renewable natural gas from the organics.

In the future a mixed waste processing program may be preferred if the technical and regulatory risks are addressed. For this reason, it is recommended that the City's Green Bin program be designed to offer flexibility to transition to a mixed waste processing program in the future.

Flexibility can be achieved by the City:

- not building its own processing facility for the organics from the Green Bin Program or entering into a long term contract (e.g., ten or more years) for processing capacity; and,
- having the processing contract(s) match the expected service life of the trucks (about seven years).

Garbage Collection Frequency

Nine of the 13 largest Ontario municipalities with a Green Bin program have transitioned to bi-weekly garbage collection (Table 13), and at least two of the other programs are reviewing the option to go to bi-weekly collection. Municipalities have found that the amount of organic material collected increases by 50% to 100% with the introduction of bi-weekly garbage collection. Collection of Blue Box recyclables also increases with the introduction of bi-weekly garbage collection.

It is recommended that London switch to bi-weekly, same day garbage collection and weekly recycling collection with the introduction of source separated organics collection.

Implementation Plan

If the City proceeds with a Green Bin program, an implementation plan will be developed to refine

cost estimates, determine operational requirements and finalize an implementation schedule. Decisions on operational requirements are presented in Table 14.

Table 13 - Garbage Collection Frequency for Large Municipalities with Green Bin Collection

Frequency of Garage Collection	Municipalities
Weekly	Hamilton ¹ , Niagara ¹ , Simcoe County, Kingston
Bi-weekly	Durham, Halton, Ottawa, Toronto, Peel, Waterloo, York, Guelph, Barrie

¹ Reviewing bi-weekly

Table 14 - Green Bin Operational Decisions

Operational Decisions	Options
What is collected?	<ul style="list-style-type: none"> Commonly collected organics (food waste and tissues/paper toweling) Yard waste (none or top up cart) Other organics (pet waste and sanitary products)
How it is collected?	<ul style="list-style-type: none"> Co-collected with garbage Separate collection vehicles (e.g., one person side loaders)
Who processes material?	<ul style="list-style-type: none"> Private facility (e.g., Orgaworld) Pre-process at Waste Management Resource Recovery Area and ship to anaerobic digester (e.g., StormFisher) Build City facility operated by the private sector
Bin size	<ul style="list-style-type: none"> Small (35 to 45 litre) Medium (50 to 60 litre) Large (greater than 60 litre); will require semi-automatic or automatic collection
Liners/bags	<ul style="list-style-type: none"> Paper (paper bags, paper towels, newspaper) Compostable plastics Plastics (typically only allowed if collecting pet waste and/or sanitary products)

The draft implementation schedule for a curbside Green Bin Program is identified on Table 15.

Table 15 - Draft Green Bin Implementation Schedule

Date	Task
January 2019	Finalize Operational Details
February 2019	Finalize Costs and Approval of Authorization to Spend Funds from Approved Capital Budget
Spring 2019	Request for Proposals (RFP) for Processing of Green Bin Materials
Winter 2019/2020	Award Processing Contract Release Request for Tenders (RFT) for new Waste Collection Vehicles
Spring 2020	Award Collection Vehicle Contract Release RFT for Supply and Delivery of Green Bins
Fall 2020	Award Green Bin Supply Contract
Spring/Summer 2021	Start of Major Promotion and Awareness Program Distribution of Green Bins
Fall 2021	Begin Roll-out of Program

4.4 MULTI-RESIDENTIAL ORGANICS MANAGEMENT PROGRAM

Summary - Proposed Actions, Diversion and Costs

The proposed organics collection program for multi-residential homes is a:

- Mixed waste processing pilot on a portion of the waste from multi-residential homes

It is estimated that the proposed program will increase London's diversion rate by approximately 0.5% to 0.7% and have an annual operating cost \$0.4 to \$0.7 million. The learnings from the pilot project will help the City in future decisions about whether or not to implement a full scale mixed waste processing program in multi-residential buildings and/or curbside homes.

Background

Municipal Program versus Individual Building Programs

The provincial Food and Organic Waste Policy Statement requires individual multi-residential buildings and not the municipality to provide an organics management program by 2025. This requirement is similar to the requirement for multi-residential buildings not the municipality to provide a Blue Box program.

Most municipalities, including London, do provide Blue Box programs for multi-residential buildings because of the improved service and lower program costs that are possible through “economies of scale” and having a consistent service for all citizens in the municipality. Some larger municipalities in Ontario already provide an organics management program to multi-residential buildings and are expected to continue to do so in the future.

Considering the above, it is recommended that the City provide an organics management program for multi-residential buildings.

Comparison

Just as in the curbside program, a Green Bin program is less expensive and offers less technical and regulatory risk where as a mixed waste processing program offers more convenience to residents and will capture more organics.

A multi-residential Green Bin program is much less effective in terms on increasing waste diversion, than a comparable curbside Green Bin program, (see Table 16). For this reason it is not recommended to proceed with a multi-residential Green Bin program.

Table 16 - Comparison of Typical Curbside and Multi-Residential Green Bin Programs

Consideration		Curbside	Multi-Residential
Capture Rate		50% to 60%	20% to 25%
Cost per Tonne Diverted		\$250 to \$350	\$500 to \$600
Contamination Levels	Commonly Collected Organics	2% to 5%	5% to 15%
	All Organics	5% to 15%	15% to 25%

A multi-residential mixed waste processing program is preferred but for all the recent progress made in the field of mixed waste processing, there are as many if not more examples that highlight the challenges of this approach. This is why it is recommended to proceed with a small scale one to two year pilot project in the multi-residential sector and

to continue to monitor work being undertaken in a few key Ontario municipalities (e.g., Region of Peel, City of Toronto, Region of Durham, County of Oxford).

The pilot project will allow to the City to confirm operational requirements, determine technical constraints and consult with the MOECP about regulatory requirements. The learnings from the pilot project will help City in future decisions about whether or not to implement a full scale mixed waste processing program in multi-residential buildings and/or curbside homes.

Preliminary details for a mixed waste processing pilot are presented below:

- include both low-rise and high-rise buildings;
- process approximately 15% of multi-residential waste (60 tonnes waste per week);
- cost approximately \$500,000 per year (between \$330 and \$550 per tonne diverted); and
- divert between 900 tonnes per year (30%) and 1,500 tonnes per year (50%) of the waste to beneficial uses

4.5 OTHER NEW ORGANICS MANAGEMENT PROGRAMS

Summary - Proposed Actions, Diversion and Costs

The following additional organics management programs are proposed:

- Food Waste Avoidance – Develop a food waste avoidance strategy;
- Home Composting - Reduce the cost of composters at the EnviroDepots and undertake additional sale events at select community locations; and
- Community Composting – Provide financial support to community groups or environmental organizations that want to set up a community composting program.

It is estimated that approximately 0.3% to 0.6% of residential waste will be diverted by the above measures and cost \$200,000 to \$300,000 per year.

Background

Food Waste Avoidance

On average London households throw out 105 kilograms per year of avoidable food waste (i.e., food that at one point could have been eaten). The monetary value of this wasted food is estimated to be between \$450 to \$600 per household annually which is worth between \$60 to \$100 million city-wide, per year. This food waste also represents a considerable part of our household carbon food print not to mention lost nutrition. Food waste avoidance entails better management of the food that we buy so that less of it ends up in the garbage. In short, this means optimizing household food planning, purchase, storage, preparation and serving of food.

The City in conjunction with Western University, PhD Candidate Paul van der Werf and 2cg Consulting piloted two outreach projects for reducing the amount of avoidable food waste thrown into the garbage.

Pilot Project #1 focused on reminding people of the annual value of household food waste using a 'Reduce Food Waste, Save Money' campaign. Homeowners were provided with a package of information including a fridge magnet with tips and over the pilot project study period were sent a series of email messages reinforcing the saving money theme, each highlighting a unique food waste reduction tip and directing households to the www.foodwaste.ca website for more detailed information.

Pilot Project #2 provided households with a range of containers they could use to manage their food. The kit included plastic containers, mason jars, and Ziploc bags. This included a fridge magnet with food saving tips, a grocery list note pad and freezer bag stickers. These households also had access to the www.foodwaste.ca website.

The lower cost program, Pilot Project #1, was determined to be more effective in reducing the amount of avoidable food waste thrown into the garbage.

Based on research, local data in London, community feedback and survey data, it is recommended that the City:

- develop a food waste avoidance program in 2019 based on a 'Avoid Food Waste, Save Money' campaign

For planning purposes it is estimated that a food waste avoidance program will result in a 10% reduction in food waste in 10% to 30% of London households and will cost \$150,000 to \$200,000 per year. This would divert 200 to 600 tonnes of food scraps and save residents \$900,000 to \$2,700,000.

It is noted that the food waste reduction program has the potential to reduce significantly more food waste. This would result in additional savings for residents and increased greenhouse gas reductions but have a smaller impact on increased diversion as it is expected that the food waste going to the Green Bin would decrease as food waste avoidance increased. This would however reduce the cost of the Green Bin program.

Home Composting

Home (or "backyard") composting has played an important role in waste reduction in London since the mid-1990s. Between 1995 and 1999 the city of London participated in a provincial grant program to provide subsidized home composters to residents. Through this program, the City sold approximately 53,000 subsidized composters. Since 2007 the City has sold composters at cost from the EnviroDepots. The units are sold for \$35 and approximately 400 to 800 units per year are sold. Home composting is promoted on the City's website and through information flyers.

Two pilot projects were undertaken in 2013 to learn more about the potential to increase waste diversion by increasing home composting. The pilot projects tested strategies to increase the uptake of home composting units by residents. One pilot project in Northridge involved door-to-door sales of composters at a subsidized rate (\$10 per composter). The other pilot project in Old South included the pre-order and pick up at a local community school and a higher price for the composters (\$20 per composter).

It is estimated that home composting currently diverts between 5,000 and 6,000 tonnes of material annually and approximately 40% to 50% of households do some composting.

Initial estimates suggest that an additional 500 to 1,500 tonnes per year of food scraps could be diverted (up to 1% increase in overall diversion) with an aggressive home composting program modeled on the Northridge pilot project. It is estimated that it would take 3 years to canvass the City and cost approximately \$400,000 to \$500,000. Similarly, initial estimates suggest that less than 500 additional tonnes would be diverted (less than 0.5% increase in overall diversion) with a home composting program modeled on a local community pick up location. It is estimated this program would cost approximately \$40,000 to \$100,000.



It may be possible to increase home composting by reducing the cost of the home composter at the EnviroDepots to \$20, \$10 or free and doing additional promotion and outreach. Reducing the cost of composters to \$20 per unit would cost \$10,000 to \$50,000 per year. Reducing the cost of composters to \$10 would cost \$20,000 to \$100,000 per year. It is expected that reducing the cost of composters would result in less than 500 additional tonnes being diverted (less than 0.5% increase in overall diversion).

It is recommended that the City:

- reduce the cost of composters at the EnviroDepots from \$35 to \$20 per unit for one year to determine the impact on up-take of composters and estimated waste diversion; and,
- undertake additional sale events at \$10 per unit at several community locations (e.g., community centres) and community events (e.g., Home County Music and Art Festival) for one year to determine the impact on waste diversion.

A decision on whether or not to continue the programs would be made following the first year. For planning purposes it is assumed that the above measures will continue on, result in an annual diversion of 300 tonnes and cost \$80,000 to \$100,000 per year to operate.

Community Composting

The City could consider composting operations in locations where community members can compost their garden or kitchen waste using large bin composters, small scale in-vessel composters or vermicomposting. Organic waste collection bins could be located at different participating sources, e.g., churches, community gardens, coffee shops, etc. Collected waste would be dropped off to the community composting area. Final compost could be used in community gardens or for local landscaping needs.

The City of Toronto provides funding to FoodShare, a non-profit food security organization that supports Toronto Compost Leaders, a grass roots initiative to build community composting capacity in multi-residential buildings using food waste. No other large municipality in Ontario has a formal community composting program.

Community composting may require provincial approvals depending on the location and where the food waste is coming from.

It is recommended that the City:

- set aside funding for community groups or environmental organizations that want to set up a community composting program; and
- funding would cover 100% of capital costs.

It is suggested that City set aside \$10,000 to \$20,000 per year to support community composting initiatives. For estimating purposes, it is assumed that 10 community composting sites will be established by 2022 diverting approximately 20 to 40 tonnes per year.

4.6 WASTE REDUCTION AND REUSE INITIATIVES AND POLICIES

Summary - Proposed Actions, Diversion and Costs

The following waste reduction and reuse initiatives and policies are proposed:

- create a Waste Reduction and Reuse Coordinator position within the Solid Waste Management Division;
- \$150,000 to 250,000 per year in increased funding be allotted to waste reduction and reuse initiatives;
- reduction of the container limit to 2 or 3 containers per collection when the Green Bin program with bi-weekly garbage collection is implemented;
- further explore the use of clear bags for garbage collection if London does not move to roll-out cart based garbage collection system;
- further explore a full user pay garbage system if London moves to roll-out cart based garbage collection system;

- further examine other incentive and disincentive initiatives (best practices) from other municipalities (e.g., mandatory recycling by-law, reward systems, user fees, etc.); and
- include the calculation of waste reduction in addition to waste diversion when providing waste management progress reports to Council.

In addition to the City measures, it is expected that additional province wide measures as part of their Waste-Free Ontario Strategy will be undertaken and many residents will take additional actions on their own to reduce their waste.

It is estimated that the above measures will cost the City \$150,000 to \$350,000 per year. For planning purposes, it is estimated all waste reduce and reuse initiatives and policies will divert approximately 1% to 4% of residential waste.

Background

Waste Reduction and Reuse Initiatives

There are numerous initiatives that could be introduced that focus on raising awareness and engaging citizens to make small changes in their daily life to reduce waste and increase reuse of materials. Initiatives include lending libraries, repair workshops, promotion of reuse events and increased waste reduction education and outreach.

As some of the initiatives listed above are already underway in London through other organizations, the City could explore options to build partnerships with these organizations. This could include providing financial support for new waste reduction and reuse programs and initiatives.

The most effective way of increasing diversion through waste reduction and reuse is often by increasing community engagement, education and providing feedback to residents. The impact of any one community engagement or education initiative may not be significant but together these small changes contribute to cultivating a culture of waste reduction and over time could make a significant difference to how we manage resources. To accomplish this, it is proposed to increase funding and staff resources for waste reduction and reuse initiatives.

Waste Reduction Success Story

In 2007, the Ontario government introduced a goal to reduce the number of carry-out plastic bags in the province by 50% by 2012.

A number of initiatives were introduced by industry and municipalities including promotion of reusable bags and bins, improved bagging practices at check-outs, charging for plastic bags.

By 2009 there was a 70% drop in Ontario's per-capita use of plastic bags.

It is hoped the City's initiatives coupled with any provincial and industry initiatives will reduce per capita garbage going to landfill. Currently, overall the diversion rate is reported to council on a regular basis. The diversion rates for specific programs are also provided to Council as required. It is not possible to measure the reduction/reuse achieved by individual initiatives but is possible to calculate

the overall change in per capita waste generation from year to year. Including this measure in future reports to Council will allow us to track progress being made in waste reduction and reuse and highlight their importance.

Summary

It is recommended that the City:

- create a Waste Reduction and Reuse Coordinator position within the Solid Waste Management Division;
- \$150,000 per year in increased funding be allotted to waste reduction and reuse initiatives; and
- the City include the calculation of waste reduction in addition to waste diversion when providing waste management progress reports to Council.

Waste Reduction and Reuse Policies

Although there are high levels of resident participation in City diversion programs, participation is voluntary, and does not require residents to first minimize the quantity of waste being generated in the home. There are a number of "behaviour change initiatives" that could be undertaken to encourage both waste reduction (i.e., not produced in the first place) and waste diversion of recyclables and compostables. As waste diversion programs mature and all practical programs have been implemented, behaviour change initiatives become the key tools remaining to increase diversion.

Some of these programs are not costly to implement and may generate revenue (e.g., user pay for garbage) or reduce costs (e.g., lower container limits). Other programs would require support by businesses and residents, and could range from tougher enforcement of waste by-laws (e.g., garbage container and weight limits) to City policies and by-laws that would impact how business is conducted and consumers must abide by (e.g., restricting/banning certain business transactions). Some residents and businesses may see these programs as inconvenient or "going too far".

Below are some common behaviour change/adjustment initiatives that may have a role in London in the future. Most of these initiatives will require a change to current Council policies and practices and be implemented through a by-law.

Bag Limits

Reducing the container limit encourages participation in the various waste diversion programs as well as reducing garbage generation.

The City of London currently has a 3 Container Limit (included in taxes) for garbage collection for single family households. The City's container limit takes into consideration the longer cycle times between collections which varies from 8 to 12 days throughout the year. This is equivalent to 1.8 containers per week for a 12 day cycle to 2.6 containers per week for an 8 day cycle with an average of 2.4 containers per week over the entire year.

Most large Ontario municipalities with a source separated organics program have a garbage container limit equivalent to one or two containers per week. It is recommended that the City implement a 2 or 3 Container Limit per collection if the City implements a source separated organics collection program with bi-weekly garbage collection.

Residents will still have the option of paying to dispose of extra garbage at the curb or the EnviroDepots.

Clear Bags

Some municipalities have residents use clear bags so that recyclables or compostables could be easily spotted in the garbage. This is more common in the Maritimes but the City of Markham has had a clear bag program for five years and credits this program for a significant reduction in the amount of garbage and an increase in recycling and composting. London is currently looking at garbage collection options including collection of garbage in roll-out carts. A clear bag program is not compatible with a roll-out cart program for garbage collection.

London should further explore the use of clear bags for garbage collection if London does not move to a roll-out cart based garbage collection system.

User Pay

Some smaller municipalities have gone to full user pay systems where residents pay for every container of garbage placed to the curb. Full user pay systems encourage participation in the various waste diversion programs as well as reducing one's garbage generation.

A full user pay system is typically not practical in larger municipalities unless the municipality has a cart based garbage collection system. In Toronto, residents pay an annual fee ranging from \$255 to \$487 per year per household depending on the size of cart they select.

A full user pay garbage system should be explored further if London moves to roll-out cart based garbage collection system.

Other Incentive and Disincentive Programs

The vast majority of Londoners participate in various diversion programs although there are those that refuse to participate in these voluntary programs. There are various incentive and disincentive programs that will encourage greater participation.

For example, the City could explore developing a mandatory by-law for the diversion of materials for which there are recycling or composting programs. Enforcement of the by-law may require additional staff. Mandatory diversion by-laws usually work best in conjunction with a clear garbage bag program.

Alternatively, some municipalities ban recyclables or other materials from garbage collection. The City currently has banned a number of materials from garbage collection including renovation materials, grass clippings, blue box recyclables, scrap metal, electronics, tires and yard materials. These materials were banned because reasonably convenient recycling options exist. As new programs are developed, consideration could be given to banning materials accepted by these programs.

There are incentive programs that the City could consider to encourage greater program participation like the Gold Box program in Hamilton or Recycle Bank (rewards program) in the United States.

Summary

It is recommended:

- reduction of the container limit to 2 or 3 containers per collection when the Green Bin program with bi-weekly garbage collection is operational;
- further explore the use of clear bags for garbage collection if London does not move to a roll-out cart based garbage collection system;
- further explore a full user pay garbage system if London moves to roll-out cart based garbage collection system; and
- further examine other incentive and disincentive initiatives (best practices) from other municipalities (e.g., mandatory recycling by-law, reward systems, etc.).

4.7 ENVIRONMENTAL, SOCIAL AND COST SUMMARY

In summary, this report proposes the set of actions identified on Table 17 to achieve 60% waste diversion. By taking these actions, the City and Londoners receive a number of environmental social and financial benefits which are listed below.

Environmental Benefits

1. Increased Waste Diversion

The Province's *Strategy for a Waste-Free Ontario: Building the Circular Economy* in February 2017 identifies two key aspirational long term environmental goals. One of these environmental goals is zero waste. Going from 45% to 60% waste diversion is a significant step towards this goal.

2. Reduced GHG

The other key aspirational long term environmental goal identified by the Province is zero GHG emissions from the waste sector. The measures in this Action Plan will reduce GHG emissions by 17,000 to 27,000 tonnes annually. This is equivalent to removing 4,200 to 6,800 cars from the road.

Table 17 - Proposed Actions to Achieve 60% Residential Waste Diversion

Blue Box (Blue Cart) Programs	
1.	Increase capture of recyclables from 63% to 75% (less placed in the garbage)
New (or Expanded) Recycling Programs and Initiatives	
2.	Bulky Plastics <ul style="list-style-type: none"> a) Continue with existing pilot project b) Consider implementation of an expanded program once long term stable markets have developed
3.	Carpets <ul style="list-style-type: none"> a) Wait to see if the Province develops a provincial program for carpets under the <i>Waste-Free Ontario Act</i> as there are limited markets for recycling carpets in the province b) If no provincial program exists by 2021, implement a pilot project
4.	Ceramics <ul style="list-style-type: none"> a) Provide a drop-off location for ceramics at no cost at the City's EnviroDepots b) Ban collection of toilets at the curb
5.	Clothing and Textiles <ul style="list-style-type: none"> a) develop a textile awareness strategy to promote existing reuse opportunities b) pilot depot collection at select multi-residential buildings
6.	Small Metal (Small Appliances/Electrical Tools/Scrap Metal) <ul style="list-style-type: none"> a) implement semi-annual curbside collection of small metal items b) pilot depot collection at select multi-residential buildings
7.	Furniture <ul style="list-style-type: none"> a) Begin semi-annual collection of wooden furniture b) Provide a drop-off location at W12A EnviroDepot for wooden furniture c) Ban wooden furniture from curbside garbage collection
8.	Mattresses <ul style="list-style-type: none"> a) Wait to see if the Province develops a provincial program for mattresses under the <i>Waste-Free Ontario Act</i> as there are limited markets for recycling mattresses in the province b) If no provincial program exists by 2021, implement a pilot project
Curbside Organics Management Program	
9.	Implement a curbside Green Bin program
10.	Implement bi-weekly garbage collection
Multi-Residential Organics Management Program	
11.	Implement a mixed waste processing pilot (to recover organics and other materials) on a portion of the waste from multi-residential homes

Table continues

Table 17 - Proposed Actions to Achieve 60% Residential Waste Diversion

Other New Organics Management Programs
<p>12. Develop and implement a food waste avoidance strategy</p> <p>13. Reduce the cost of composters at the EnviroDepots and undertake additional sale events at select community locations</p> <p>14. Provide financial support to community groups or environmental organizations that want to set up a community composting program</p>
Waste Reduction and Reuse Initiatives and Policies
<p>15. Create a Waste Reduction and Reuse Coordinator position within the Solid Waste Management Division</p> <p>16. Provide financial support for community waste reduction and reuse initiatives</p> <p>17. Reduce the container limit to two or three containers per collection when the Green Bin program with bi-weekly garbage collection is operational</p> <p>18. Further explore the use of clear bags for garbage collection if London does not move to a roll-out cart based garbage collection system</p> <p>19. Further explore a full user pay garbage system if London moves to a roll-out cart based garbage collection system</p> <p>20. Further examine other incentive and disincentive initiatives (best practices) from other municipalities (e.g., mandatory recycling by-law, reward systems, user fees, etc.)</p> <p>21. Provide additional feedback approaches to residents (including how waste reduction and waste diversion are calculated when providing waste management progress reports)</p>

3. *Reduced Landfill Impacts*

Reducing the amount of waste going to the W12A Landfill will reduce nuisance impacts such as traffic, litter, vermin, noise and odours; and the amount of additional land and/or height of the proposed expansion of the W12A Landfill.

4. *Better Use of Material and Resources*

Materials diverted will be turned into useful products instead of being landfilled. For example, if organics from a Green Bin program were composted, it would result in the production of approximately 350,000 to 500,000 bags of compost with a market value of \$700,000 to \$1,100,000. If the organics were anaerobically digested, it would result enough biogas to generate 1 to 1.5 million m³ of renewable natural gas.

Social Benefits

5. *Creation of Jobs*

Studies have also shown that Ontario's existing waste diversion programs can create up to 10 times more jobs than waste disposal. The MOECP estimates that for every 1,000 tonnes of waste diverted in Ontario, seven jobs are created through the existing waste diversion programs. California's Department of Resources, Recycling and Recovery estimates that up to 5 jobs every 1,000 tonnes of waste diverted. These

“rules of thumb” suggest that approximately between 125 and 170 jobs will be created (direct and indirect; within and outside London).

6. *Social Satisfaction*

Undertaking the proposed actions in this plan, will allow many residents to feel additional satisfaction or pride living in an environmentally progressive city.

Financial Benefits

7. *Short-term Landfill Savings*

Reducing the quantity of waste to the landfill reduces the capital and operating cost of the landfill.

The average capital and operating cost for the W12A Landfill is estimated to be approximately \$30 to \$40 per tonne. Some of these costs are variable costs that vary directly with the quantity of waste going to the landfill. In other words, the cost goes up the same amount for every additional tonne of waste going to the landfill. An example of this would be leachate collection system costs.

Some of the costs are fixed costs and do not change with the quantity of waste going to the landfill. An example of this would be groundwater monitoring costs.

It is estimated that the average landfill savings for each tonne of waste diverted from the landfill after accounting for fixed costs and variable costs is approximately \$15 to \$20 per tonne.

The annual landfill savings is projected to be approximately \$360,000 to \$480,000 per year. The majority of these savings would be in capital costs (about 75%) which could be used to reduce the annual contribution from general taxes required for the Sanitary Landfill Reserve Fund. City staff are recommending that W12A Landfill costs and savings be handled separately as more details become known through the environmental assessment process and current and future capital cost impacts associated with landfill operations.

8. *Avoid Increase in Long Term Disposal Costs*

The existing landfill has less than 11 years of capacity remaining and it is expected that approval of any expansion of the landfill by the MOECP would be unlikely unless the City has programs in place to achieve 60% waste diversion.

The increase in waste disposal costs will be significant if the City must export its waste to a private landfill elsewhere in Ontario. The increase in disposal costs for the City to export its waste is estimated to be approximately \$5 to \$7 million per year.

Cost Summary

The approximate cost, expected diversion and timeline for implementation for the actions listed in Table 17 are summarized in Table 18. The cost to implement the 60% Waste Diversion Action Plan is estimated to range from \$5.05 to \$7.45 million with the most likely cost being \$6.5 million.

Table 18 - Summary of Diversion, Estimated Operating Costs and Schedule

Program Category	Diversion Rate		Annual Estimated Operating Cost			Schedule
	Range	Likely	Range	Likely	\$/Hhd ^a	
Blue Box Recycling Improvements	1% - 3%	2%	\$0	\$0	\$0	Likely not under City control ^b in the future
New Recycling Programs and Initiatives	0.4% - 0.8%	0.6%	\$350,000 - \$550,000	\$450,000	\$2.00 - \$3.00	2019 ^c - 2021
Curbside Organics Management Program	8% - 12%	10%	\$3,900,000 - \$5,500,000	\$5,000,000	\$21.75 - \$30.50	2020 - 2022
Multi-Residential Organics Management Pilot Program	0.5% - 0.7%	0.6%	\$400,000 - \$700,000	\$500,000	\$2.25 - 4.00	2020
Other Organic Management Programs	0.3% - 0.6%	0.4%	\$250,000 - \$350,000	\$300,000	\$1.50 - \$2.00	2019 ^c - 2021
Waste Reduction, Reuse Initiatives and Policies	1% - 4%	1.4%	\$150,000 - \$250,000	\$150,000	\$0.50 - \$2.00	2019 ^c - 2021
Total^c	11% - 21%	15%	\$5,050,000 - \$7,450,000	\$6,500,000 (\$36.00)	\$28.00 - \$41.50	2019^c - 2022

Notes:

- Based on 180,000 households.
- The provincial Waste-Free Ontario Strategy calls for a transition from the current Blue Box program, which is municipally managed and co-funded by industry and municipalities, toward a full EPR program by 2023. The EPR program will require producers to take full financial and operational responsibility for all Ontario municipal Blue Box programs.
- 2019 Multi-year budget has \$140,000 assigned to new waste diversion initiatives.
- Totals may not add due to rounding.

Table 19 provides a comparison of waste management system costs for London and other municipalities that are part of the Municipal Benchmarking Network Canada initiative. The table also highlights London's expected costs after implementation of the 60% Diversion Action Plan.

Table 19 – 2016 Municipal Waste Management Costs^a

Municipality	Cost per Tonne		Cost per Household		
	Collection & Disposal	Diversion	Collection & Disposal	Diversion	Total
Calgary	216	346	150	89	239
Durham	324	205	127	106	232
Halton	248	201	97	106	203
Hamilton	344	151	150	69	218
Montreal	230	249	129	82	211
Niagara	195	138	90	102	192
Regina ^b	150	331	150	59	209
Sudbury (Greater)	349	181	168	92	260
Toronto	240	442	90	158	248
Waterloo	226	195	142	94	236
Windsor ^b	204	123	118	45	163
Winnipeg ^b	107	260	83	82	165
Average	236	235	124	90	215
London (existing programs) ^b	121	123	89	50	139
London (60% - likely cost) ^c	156	161	87	86	173
London (60% - high cost) ^d	156	171	87	91	178

Notes

- From Municipal Benchmarking Network Canada. Includes all costs including amortization, landfill liability costs and municipal overhead. Includes Blue Box recycling revenue but excludes all other revenue (e.g., landfill tipping fees, WDO funding, waste collection fees, EnviroDepot fees, etc.).
- No Green Bin program.
- City of London current program cost with Likely Cost from the 60% Waste Diversion Action Plan (Table 18).
- City of London current program cost using the High end of the Range from the 60% Waste Diversion Action Plan (Table 18).

Table 19 shows that if London implemented all parts of the 60% Waste Diversion Action Plan using the Likely costs estimate of \$6.5 million it would have the 3rd lowest overall waste system cost on a per household basis and lowest cost among municipalities that have a Green Bin program. It would also be one of the few municipalities to reach 60% waste diversion.

Using the High end of the Range (\$7.25 million) from the 60% Waste Diversion Action Plan (Table 18) London would still have the 3rd lowest overall waste system cost on a per household basis and lowest cost among municipalities that have a Green Bin program.

Funding 60% Waste Diversion

Potential funding sources to lower the annual cost of \$5.05 to \$7.45 million by \$1.8 to \$3 million per year are highlighted below.

Operating Costs

As shown in Table 18, annual operating costs for the 60% waste diversion action plan will range from \$5.05 million to \$7.45 million and will depend on final program design, market competition, etc. The most likely annual operating cost is estimated to be \$6.5 million.

City staff continue to examine a number of financing approaches. The change in government in Ontario has created additional uncertainty as a number of potential revenues sources for waste diversion are on hold. Besides taxes, potential sources of revenue currently include:

- Additional recycling program costs paid by industry - potential cost savings from expected transition from the current Blue Box program, which is municipally managed and co-funded by industry and municipalities, toward a full EPR program paid 100% by industry by 2023. This is expected to reduce the City's current waste diversion program costs by \$1.5 to \$1.8 million. In addition there is the potential of one time capital funding for recycling infrastructure.
- Other extended producer responsibility revenues - for items such as branded organics (e.g., diapers, soiled paper, tissues/toweling) carpets, textiles, furniture and other consumer goods. This sources could range between \$50,000 and \$150,000 per year.
- W12A Landfill levy to support diversion - a specific amount charged on every tonne of garbage that is placed in dedicated fund for waste reduction and waste diversion. The amount that could be collected is based on many factors (e.g., which garbage is it applied to, what fee, etc.). Levies between \$2 and \$20 per tonne are noted in some jurisdictions. This source could range between \$250,000 and \$1 million per year.
- Greenhouse gas offset credits associated with organics diversion - The Government of Ontario was working on introducing an emissions offset protocol for aerobic composting into Ontario's Cap & Trade program, based on an existing protocol used in Alberta (e.g., five composting projects currently listed on the Alberta Emissions Offset Registry). The

value of these offsets would have been between \$100,000 and \$500,000 per year based on an assumed value of around \$20 per tonne of GHG emissions offset (and increasing over time). It is unclear at this time how/if this funding opportunity will be replaced.

A summary of estimated operating costs and potential annual funding is identified on Table 20.

Table 20 – Summary of Estimated Costs and Potential Funding

	Low	High	Likely (Anticipated)
Costs (Table 18)	\$5,050,000	\$7,450,000	\$6,500,000
Revenues	\$1,800,000	\$2,950,000	\$2,000,000
Total Estimated Costs			\$4,500,000

Capital

Capital costs for the 60% Waste Diversion Action Plan will depend on program design, technology considerations, etc. The largest capital expenditure will be for the Green Bin Program. A capital cost of \$12 million for the Green Bin program had previously been estimated (January 2016, Multi-year Budget deliberations). Other waste diversion initiatives listed in the Action Plan may require new investment in the order of \$500,000 to \$3 million for a total of \$12.5 to \$15 million in capital expenditures.

It is expected that capital costs for the 60% Waste Diversion Action Plan will be able to be funded from the existing capital budget. The current ten-year capital program includes \$35 million in 2020 for new solid waste diversion technologies to increase diversion. After allocating up to \$15 million for the Action Plan, there would be \$20 million left for advanced waste diversion and/or resource recovery technologies.

5) RESOURCE RECOVERY STRATEGY

As referred to in this Action Plan, the City of London has three major projects underway:

1. The Resource Recovery Strategy involves the development of a plan to maximize waste reduction, reuse, recycling, resource recovery, energy recovery and/or waste conversion in an economically viable and environmentally responsible manner. Resource Recovery strategies (i.e., often known as waste diversion strategies) are developed and approved at the local government level and do not require Provincial government approval. This is the focus of this chapter.
2. The 60% Waste Diversion Action Plan, the purpose of this overall report, is both a standalone plan and part of the larger Resource Recovery Strategy. It essentially covers the period from 2018, through implementation and measurement in 2023 (when all projects and initiatives are in place as per current timelines).
3. The Residual Waste Disposal Strategy involves the development of a long-term plan to manage residual waste (waste after resource recovery) and involves completion of an Individual Environmental Assessment (EA) as prescribed by the Ministry of the Environment & Climate Change (MOECC). The Individual EA requires approval by the Minister of Environment & Climate Change and Cabinet.

Traditional Waste Diversion and Waste Management Technologies and Practices

Generally, in Ontario, waste management systems include variations on the following practices to reach higher levels of waste diversion:

- Waste avoidance/prevention/minimization (not created in the first place)
- Reuse/refurbish/repurpose (for use again)
- Source separated recyclables (to be collected, processed, marketed and re-manufactured)
- Source separated leaf and yard waste (to be collected, processed and marketed)
- Source separated organics (food and other organics wastes) (to be collected, processed and marketed). Processing technologies generally include aerobic composting and anaerobic digestion (AD) technologies
- Energy from waste (EFW) through combustion
- Landfill

To go beyond 60% waste diversion will require the use of more advanced waste diversion and resource recovery technologies and practices. The purpose of this chapter is to provide a brief update on:

- Definitions and Terminology
- Overview of Steps to Develop a Resource Recovery Strategy for London
- Current Timetable for Resource Recovery Strategy

5.1 DEFINITIONS AND TERMINOLOGY

The field of solid waste management has a plethora of definitions that fall into different categories including:

- Regulatory definitions usually defined by the Province of Ontario although some are defined at the Federal Government;
- By-law definitions usually defined by municipalities (and not always consistent from one municipality to the next); and
- Definitions created by waste management, recycling and other related organizations that have no legal foundation; however, they are often used by the members and adopted by others.

Some definitions often have a historical basis and have not been modernized; although the technologies within the definition are different than in the past. The inconsistency in legal definitions can be problematic when different provinces are compared. In addition, different technologies can be lumped together in some definitions with little understanding as to why that is the case. The remainder of this section highlights a number of terms and some different definitions.

Resource Recovery and Resource Recovery System

“Resource recovery means the extraction of useful materials or other resources from things that might otherwise be waste, including through reuse, recycling, reintegration, regeneration or other activities. This includes the collection, handling, and processing of food and organic waste for beneficial uses. Although energy from waste and alternative fuels are permitted as waste management options, these methods are not considered resource recovery. The recovery of nutrients, such as digestate from anaerobic digestion, is considered resource recovery.”

Resource recovery system means any part of a waste management system that collects, handles, transports, stores or processes waste for resource recovery purposes, but does not include disposal.”

* source – Ministry of the Environment & Climate Change, Food and Organic Waste Policy Statement, April 2018, <https://www.ontario.ca/page/food-and-organic-waste-framework>

Integrated Solid Waste Management

“Integrated Solid Waste Management (ISWM) is a comprehensive waste prevention, recycling, composting, and disposal program which works cohesively to prevent, recycle, and manage solid waste in ways that most effectively protect human health and the environment. ISWM considers local needs and conditions, and then applies the most appropriate combination of waste management approaches for that situation. The major components of ISWM activities are waste prevention, recycling and composting, resource recovery, and, disposal in properly designed, constructed, and managed landfills.”

* source - based on the EPA definition noting that determining a date of this definition is difficult because many current documents are now archived on the USEPA website.

* Environment Canada and the Ministry of the Environment & Climate Change do not have specific definitions; however, many municipalities in Ontario and across Canada have created definitions to meet their needs.

Advanced Resource Recovery Technologies and Practices

Generally, advanced resource recovery technologies and practices fall under one of these categories:

- Anaerobic Digestion (AD - Biogas)
- Mixed Waste Processing (MWP)
- Mechanical/Biological Treatment (MBT)
- Waste Conversion Technologies (WCT)
- Energy from Waste (EFW)

The literature does not contain consistent definitions for these technologies and sometimes groups of technologies may be classified under a single heading.

Anaerobic Digestion (AD - Biogas)

AD facilities can be listed under both traditional (as noted above because it is a proven technology in Ontario) and advanced in the case of Ontario as most AD experience has been associated with farm operations. With respect to AD as part of Mechanical-Biological Treatment (MBT) or as part of a mixed waste processing (MWP) system, this would be considered advanced and belongs in this section.

“Anaerobic digestion means the decomposition of organic matter by bacteria in an oxygen-limiting environment (as defined in Regulation 347 under the Environmental Protection Act). The biogas generated through anaerobic digestion can be used to fuel electrical generators, or it can be further processed into renewable natural gas. The digestate may also be used as a soil amendment that is most commonly used in agricultural operations.”

* source – Ministry of the Environment & Climate Change, Food and Organic Waste Policy Statement, April 2018, <https://www.ontario.ca/page/food-and-organic-waste-framework>

“What is Biogas? Biogas is a renewable source of methane, the main ingredient in natural gas. It can be used for heating and cooling, or to generate electricity that can be used on-site or fed into the distribution grid. It can be refined into renewable natural gas that can be injected into gas pipelines or compressed and used as a vehicle fuel. The entire system, including the energy generating components, is typically referred to as a biogas facility or a biogas plant.

Biogas is produced when organic materials — anything from municipal organic wastes or bio-solids, food processing by-products, or agricultural manure and crop residues —

break down in an oxygen-free environment. The process is called anaerobic digestion (AD) and usually occurs in a specialized tank or vessel – the anaerobic digester. AD is also the process that generates biogas or landfill gas (LFG) within landfills.

Anaerobic digesters have a number of end products, including digestate, a nutrient-rich slurry that can be applied directly on agricultural land, or material that is composted and then used for a range of purposes. Digester solids are materials from after de-watering that can be composted, and are well suited to be mixed with leaf and yard waste.”

*Source - Canadian Biogas Association, Municipal Guide to Biogas, March 2015
<https://www.biogasassociation.ca/>

Mixed Waste Processing

Mixed-waste processing involves no generator separation of waste, with all waste processed at what’s been called a “dirty” material recovery facility (MRF).¹ Recyclables are then pulled out at the MRF through a combination of manual and mechanical sorting. The sorted recyclable materials may undergo further processing required to meet technical specifications established by end-markets while the balance of the mixed waste stream is sent to a disposal facility such as a waste-to-energy facility or landfill”.²

* source(s)

¹ Waste 360 <http://www.waste360.com/mrfs/10-points-explain-mixed-waste-processing>

² Wikipedia https://en.wikipedia.org/wiki/Materials_recovery_facility

“Mixed waste processing means resource recovery processes that recover food waste or organic waste from waste streams where food and organic waste is co-mingled with other wastes.”

* source – Ministry of the Environment & Climate Change, Food and Organic Waste Policy Statement, April 2018, <https://www.ontario.ca/page/food-and-organic-waste-framework>

Mechanical/Biological Treatment (MBT)

“Mechanical Biological Treatment (MBT) technologies are pre-treatment technologies which contribute to the diversion of MSW from landfill when operated as part of a wider integrated approach involving additional treatment stages. Mechanical Biological Treatment (MBT) is a generic term for an integration of several mechanical processes commonly found in other waste management facilities such as Materials Recovery Facilities (MRFs), composting or Anaerobic Digestion plant. MBT plants can incorporate a number of different processes in a variety of combinations. MBT therefore compliments, but does not replace, other waste management technologies such as recycling and composting as part of an integrated waste management system. MBT plants include the:

- *Pre-treatment of waste going to landfill;*

- *Diversion of non-biodegradable and biodegradable MSW going to landfill through the mechanical sorting of MSW into materials for recycling and/or energy recovery as refuse derived fuel (RDF);*
- *Diversion of biodegradable MSW going to landfill by:*
- *Reducing the dry mass of MSW prior to landfill;*
- *Reducing the biodegradability of MSW prior to landfill;*
- *Stabilization into a compost-like output (CLO) for use on land;*
- *Conversion into a combustible biogas for energy recovery; and/or*
- *Drying materials to produce a high calorific organic rich fraction for use as RDF.”*

* source - Mechanical Biological Treatment of Municipal Solid Waste, February 2013, Dept. of Environment, Food and Rural Affairs, www.defra.gov.uk

Waste Conversion Technologies (WCT)

Waste Conversion Technologies (WCT) include the broad range of technologies which are applied to recover the inherent stored resource value of targeted waste feedstocks and/or MSW and to make these resources available for use rather than for disposal.

“There are a large number of technologies on the market at the moment and the use of many terms and definitions, with often different meaning. This reduces the possibility of comparing the different options. This chapter lists the most important concepts used in this field alphabetically.

- *Gasification is the thermal breakdown of waste under oxygen starved conditions (oxygen content in the conversion gas stream is lower than needed for combustion), thus creating a syngas (e.g. the conversion of coal into city gas).*
- *Plasma gasification is the treatment of waste through a very high intensity electron arc, leading to temperatures of > 2,000°C. Within such a plasma, gasifying conditions break the waste down into a vitrified slag and syngas.*
- *Pyrolysis is the thermal breakdown of waste in the absence of air, to produce char, pyrolysis oil and syngas (e.g. the conversion of wood into charcoal).”*

* source - International Solid Waste Association (ISWA), [Alternative Waste Conversion Technologies, 2013](#)

“New technologies to convert municipal and other waste streams into fuels and chemical commodities, termed conversion technologies, are rapidly developing. Conversion technologies are garnering increasing interest and demand due primarily to alternative energy initiatives. These technologies have the potential to serve multiple functions, such as diverting waste from landfills, reducing dependence on fossil fuels, and lowering the environmental footprint for waste management. Conversion technologies are particularly difficult to define because their market is in development and many of their design and operational features are not openly communicated by vendors. EPA’s Office of Research and Development conducted research to evaluate and develop a “State of Practice” report for State and local decision-makers on the suite of emerging waste conversion technologies.”

* source - USEPA State of Practice for Emerging Waste Conversion Technologies, 2012 https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=305250

Energy-from-Waste (EFW)

EFW is “A facility that generates steam and/or electricity through the combustion of municipal solid waste.”

* source – Canadian Resource Recovery Council, <http://www.resourcerecovery.ca/info/glossary/>

“Energy-from-Waste is any technology, which recovers energy from the management/processing of waste materials. This includes Anaerobic Digestion, Mass Burn, Gasification, Plasma Gasification, and Landfill Gas Recovery.

Waste Derived Fuel is any technology designed to turn waste materials into a fuel product with the recovery of recyclables materials as part of the fuel development process.”

* source – Ontario Waste Management Association, Guiding Principles Integrated Solid Waste Resource Recovery and Utilization (OWMA EFW/WDF Committee, November 2011) <https://www.owma.org/articles/guiding-principles-on-integrated-solid-waste-recovery-and-utilization>

Energy can be recovered from waste by various (very different) technologies. It is important that recyclable material is removed first, and that energy is recovered from what remains, i.e. from the residual waste. Energy from waste (EFW) technologies include:

- *Combustion in which the residual waste burns at 850°C and the energy is recovered as electricity or heat*
- *Gasification and pyrolysis, where the fuel is heated with little or no oxygen to produce “syngas” which can be used to generate energy or as a feedstock for producing methane, chemicals, biofuels, or hydrogen (see also landfill gas and sewage gas)*
- *Anaerobic digestion, which uses microorganisms to convert organic waste into a methane-rich biogas that can be combusted to generate electricity and heat or converted to biomethane. This technology is most suitable for wet organic wastes or food waste. The other output is a biofertilizer.*

* source – Renewable Energy Association, United Kingdom <https://www.r-e-a.net/renewable-technologies/energy-from-waste>

Energy recovery from waste is the conversion of non-recyclable waste materials into usable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolyzation, anaerobic digestion and landfill gas recovery. This process is often called waste to energy (WTE).

* source - US EPA website, no date provided <https://www.epa.gov/smm/energy-recovery-combustion-municipal-solid-waste-msw>

5.2 OVERVIEW OF STEPS TO DEVELOP A RESOURCE RECOVERY STRATEGY FOR LONDON

The Resource Recovery Strategy will outline the concepts, requirements, challenges, opportunities and timeframes for increasing waste diversion and resource recovery beyond 60%. Development of the Resource Recovery Strategy, as of June 2018, includes activities in the following areas:

1. Preliminary Review of Advanced Resource Recovery Initiatives and Technologies

Complete:	75%	In Progress:	25%	Not Started:	0%
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Preliminary review of initiatives and technologies to develop a long list of advanced resource recovery opportunities that require further investigation. This was undertaken through literature review, Internet search, work completed by the Institute for Chemical and Fuels from Alternative Resources (ICFAR)/Western University and several site visits.

2. Consideration of Regional Resource Recovery Opportunities

Complete:	25%	In Progress:	0%	Not Started:	75%
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In 2017, the City canvassed nearby municipalities (Elgin County, Huron County, Lambton County, Middlesex County, Oxford County and Perth County) responsible for waste management to determine their interest in using any future resource recovery facility(ies). All municipalities expressed an interest in being included in discussions about any new resource recovery facilities and indicated they would consider using the facility depending on the cost.

The potential for a regional facility may make it possible to consider technologies that require larger waste quantities in order to be economically feasible.

3. Alignment with Provincial Strategies and Legislation

Complete:	25%	In Progress:	25%	Not Started:	50%
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Development of the Resource Recovery Strategy will need to align with the provincial Strategy for a Waste-Free Ontario: Building the Circular Economy as well as the new Food and Organic Waste Framework and additional documents that are forthcoming.

4. Consideration of Learnings from the Mixed Waste Processing Working Group

Complete:	0%	In Progress:	100%	Not Started:	0%
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As noted in Section 1.5, formed in early 2017, the Region of Peel is the coordinator of a Mixed Waste Processing Working Group comprised of eight Ontario municipalities representing about half of Ontario's population. The Working Group shares updates,

research results, Committee/Council reports, site visit experience and related operational experiences.

5. Consideration of Learnings from London Waste to Resources Innovation Centre (LWRIC)

Complete:	0%	In Progress:	100%	Not Started:	0%
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The primary goals of LWRIC are noted in Section 1.5. The City of London currently has signed Memorandum of Understanding (MoUs) with the following organizations:

- University of Western Ontario (Institute of Chemicals and Fuels from Alternative Resources); approved December 2016 with a current expiry date of December 31, 2019;
- Bio-TechFar Inc; approved June 2017 with a current expiry date of December 31, 2019;
- Hawthorne Green Key Group; approved June 2017 with a current expiry date of June 30, 2020;
- Try Recycling; approved June 2017 with a current expiry date of December 31, 2019;
- Canadian Plastics Industry Association; approved March 2018 with a current expiry date of March 31, 2020; and
- Try Recycling; approved June 2017 with a current expiry date of December 31, 2019;
- Resource Energy Development of Canada Ltd.; approved March 2018 with a current expiry date of March 31, 2021.

One MoU has expired:

- Green Shields Energy; expired December 31, 2017.

The City (LWRIC), Canadian Biogas Association and Union Gas worked together in 2016/2017 to assess the economic feasibility and environmental benefits of producing biogas by anaerobically digesting the organic fraction of the London's residential waste stream, and subsequently converting the biogas to renewable natural gas (RNG) for use in compressed natural gas vehicles. Two scenarios were considered: collecting and anaerobically digesting source separated organic (SSO) materials or anaerobically digesting organic materials separated from a mixed waste stream at a processing facility (facility-separated organics - FSO). This study included sending out a Request for Information (RFI) to anaerobic digestion technology suppliers. Details of this work can be found at:

https://biogasassociation.ca/images/uploads/documents//2017/CBA_London_Report.pdf

6. Request for Information

Complete:	0%	In Progress:	50%	Not Started:	50%
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As noted in section 1.5, the City released a Request for Information (RFI) to obtain information about resource recovery (i.e., waste processing) technologies that might be suitable for the City of London to divert waste away from the City's Landfill. As noted in the 60% Waste Diversion Action Plan, it is expected that the 60% diversion could be achieved by a combination of enhanced waste reduction initiatives, increased capture of Blue Box materials, the introduction of recycling of various bulky items and the introduction of an organics management program.

About 50 technology/vendors requested/received the RFI document. Twenty-six (26) submissions were received by the City by the closing date of June 22, 2018. The review period will take place between July and September. In alphabetical order, the City received submissions from the following organizations:

1. 3Wayste North America
2. AIM Environmental Group Inc.
3. Anaergia Inc.
4. BHR Resource Recovery Inc.
5. Bradam Canada Inc.
6. Canada Fibers Ltd
7. CCI BioEnergy Inc
8. CHAR Technologies Ltd.
9. Clearblue Ltd.
10. Clorox Company of Canada
11. Corporation of the City of Stratford
12. Cole Engineering Group Ltd.
13. Eco Burn Inc.
14. Enerkem Inc.
15. Envac OPTibag AB
16. EverGreen Energy Corp
17. Fresh Technologies, Inc.
18. Green Shields Energy
19. Groupe Bioenertek Inc
20. Miller Waste Systems Inc.
21. Orgaworld Canada a division of Renewi
22. Pivotal Integrated Resource Management Inc
23. Sacyr Environment USA, LLC
24. Stormfisher
25. Tucker Engineering Associates, Inc.
26. Walker Environmental Group

7. Preliminary Analysis

Complete:	0%	In Progress:	20%	Not Started:	80%
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A preliminary analysis of the potential programs/initiatives will be completed looking at environmental (diversion rate, Greenhouse Gas benefits); social (public support, resident benefits/issues); financial (costs, revenue) and technical (collection/processing issues, stability of end markets, status of technology) considerations.

8. Peer Review

Complete:	0%	In Progress:	0%	Not Started:	100%
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A consulting firm that specializes in waste management technologies will be used to conduct a peer review of the portions of the Resource Recovery Strategy dealing with any technical analysis and newer resource recovery technologies.

5.3 CURRENT TIMETABLE AND PROPOSED DIRECTION FOR RESOURCE RECOVERY STRATEGY

The general activities and actions and timetable to complete the Resource Recovery Strategy is identified on Table 21. It is worth noting that this timeframe crosses over the existing Council (December 2014 to November 2018) and the next Council (2018 to 2022). The timetable may be adjusted to accommodate new information and/or direction.

Table 21 – Proposed Activities and Timetable to Complete Resource Recovery Strategy

Date	Event	Comments
July - December		<ul style="list-style-type: none"> Incorporate any new details that may be identified during the final stages of the Action Plan
January - March 2019	CWC Meeting	<ul style="list-style-type: none"> Present the Resource Recovery Strategy
	Council	
2 months	Provide feedback opportunities on WhyWaste Resource Recovery Strategy website	<ul style="list-style-type: none"> Advertise in the London Free Press, The Londoner and on social media
	Circulate to Community Stakeholder Groups	<ul style="list-style-type: none"> Circulate and ask for feedback from Waste Management Community Liaison, Committee (WMCLC), W12A Landfill Public Liaison Committee, Urban League and Advisory Committee on the Environment (ACE)
	Circulate to Waste Management/ Recycling Companies	<ul style="list-style-type: none"> Circulate and ask for feedback from local companies including Emterra, Green Valley Recycling, Miller Waste, Orgaworld, StormFisher, Try Recycling, Waste Connections and Waste Management
	Presentations	<ul style="list-style-type: none"> Present to WMCLC Present to ACE
1 month	Public Participation Meeting	<ul style="list-style-type: none"> CWC receives comments from the public and other stakeholders

6) SUMMARY OF KEY IMPLEMENTATION REQUIREMENTS

For the 60% Waste Diversion Action Plan to be successfully implemented, additional steps, actions and nudging/changing attitudes are required. Listed below are 15 implementation requirements that will be very helpful in moving from 45% waste diversion to the target of 60% waste diversion by the end of 2022.

The challenges, opportunities and rewards of achieving 60% waste diversion require Londoners to embrace change. At the same time, Londoners will be required to accept that new programs come with some frustration and inconvenience. However, increasing waste diversion should be considered as a long-term environmental investment opportunity in a similar light as our investments in education and health care.

These Top 15 requirements, in brief, have been developed from successful initiatives in London, a literature review of successful waste diversion programs in other communities, and successful implementation of programs in related services.

1. **Supportive elected officials and City Council.** Elected officials are key to engaging their constituents in a manner that meets their needs. Consistent information that contains easy to understand expectations for all involved is key. A common voice, whenever possible, builds confidence in decisions and direction made by Council.
2. **Sustainable program funding.** Programs must be funded to meet requirements, meet community expectations and balance other priorities in the community.
3. **The role of media.** Media play a critical role in informing the community about waste diversion initiatives and programs. It is critical that information is easily accessible and that spokespeople are available to respond to media requests for additional information. This will help the community learn about new initiatives and programs, as well as encourage them to obtain further details to help them understand how to participate.
4. **Well-developed implementation workplans.** A number of the undertakings in the 60% Waste Diversion Action Plan are significant. Workplans must address resource needs, timeframes, contractor requirements, and allow for adequate time for Londoners to adjust.
5. **Demonstrate leadership through examples.** Members of Council, City staff and community leaders must demonstrate that they are part of the change and prepared to participate in the new waste diversion programs and initiatives (“lead by example” and “practice what you preach”).
6. **Delivery of information, education and promotion on how to participate in new initiatives and programs.** There are important similarities and differences between information (e.g., how to participate), education (e.g., why should I participate) and promotion (e.g., how to increase participation). Because Londoners have been at 45% waste diversion since about 2014 and few new initiatives/programs have been added during that time, there will be an appetite for new materials. Examples of tools

and outreach programs from other communities will be key to reducing the learning curve and containing/reducing costs of production. The role and value of social media is constantly changing.

7. **Convenient, accessible and understandable services.** The more Londoners are asked to do, the more challenges can occur. It must be recognized that waste diversion and waste reduction are not priorities for many families. Services need to be considered in the context of all Londoners and be as accessible as possible.
8. **Willingness of many Londoners to embrace changes.** Londoners need to be behind these programs and embrace a culture of change.
9. **Incentives and rewards need to be considered.** Wherever possible, incentives and rewards should be considered to help with achieving the new and/or adjusted behaviours required for Londoners.
10. **Strong and enforceable by-laws also must be considered.** By-laws may be required as a backstop for certain actions (e.g., mandatory recycling, use of clear nags, etc.).
11. **Strong collaborations to deliver the new programs.** Opportunities to have shared implementation experiences and other collaborations will assist in achieving results in different communities in London.
12. **Build local capacity in the community.** Many of the initiatives will not be led by the City, rather they will be led by the community. This can be achieved by ensuring that resources are available and a collaborative approach is established at the start.
13. **Flexibility and transition capabilities.** Some initiatives and programs planned today may need to be adjusted prior to implementation or after implementation. A certain mind-set is required to allow some initiatives and programs to develop on their own. This can allow for additional creativity, innovation and fun. In addition, larger programs can be designed at the outset to have transition capabilities as new technology and techniques become available.
14. **Tracking and measurement systems.** It is imperative that understandable tracking and measurement systems are established prior to implementation. Tracking and measuring progress is essential for continually improving waste diversion programs. Successful communities will track and benchmark their waste diversion performance, including participation rates, quantity and volume of materials diverted, customer satisfaction, and programs costs, revenues and other savings.
15. **Regular feedback.** Opportunities to provide feedback and information to elected officials, residents, media, businesses, service providers, etc. will ensure that progress (or lack of progress) is being shared. An annual report on waste diversion performance in an easy-to-read format that can be widely shared (in different formats) will be key.