CITY OF HAMILTON

PUBLIC WORKS DEPARTMENT
Operations & Waste Management Division

TO: Chair and Members Public Works Committee	**WARD(S) AFFECTED:** CITY WIDE
COMMITTEE DATE: April 16, 2012	
SUBJECT/REPORT NO: Solid Waste Management Master Plan Review (PW12004a) - (City Wide)	
SUBMITTED BY: Gerry Davis, CMA General Manager Public Works Department	**PREPARED BY:** Anne Winning (905) 546-2424, Extension 5521 Adam Watson (905) 546-2424, Extension 5522 Jennifer DiDomenico (905) 546-2424, Extension 5596 Pat Parker (905) 546-2424, Extension 3916
SIGNATURE:	

RECOMMENDATION

(a) That Report PW12004a, and Appendices A, B, C, D, E, F and G attached thereto, be received;

(b) That the following guiding principles (GP1 to GP3) and recommendations (R1 to R10) from the Solid Waste Management Master Plan Steering Committee be approved as the 2012 Solid Waste Management Master Plan (SWMMP);

(i) GP1 The City of Hamilton must lead and encourage the changes necessary to adopt the principle of Waste Reduction;

(ii) GP2 The Glanbrook Landfill is a valuable resource. The City of Hamilton must minimize residual waste and optimize the use of the City's diversion and disposal facilities;

(iii) GP3 The City must maintain responsibility for the residual wastes generated within its boundaries. Inter-regional opportunities will be considered;

(iv) R1 A waste diversion target of 65% will be maintained;

(v) R2 Implement Enhanced Waste Diversion - this may include targeted education, focusing on multi-residential and the commercial

sectors, managing construction and renovation materials, adding materials to the blue box where feasible, continued lobbying for Extended Producer Responsibility (EPR), municipal and corporate opportunities and partnerships, and pursue current and pending opportunities for collection efficiencies in 2020;

(vi) R3 Undertake a feasibility study in 2013 of expanding capacity and opportunities at the Central Composting Facility;

(vii) R4 Undertake a feasibility study in 2015 of Single Stream processing and expansion of capacity at the Municipal Recycling Facility (MRF);

(viii) R5 Undertake an operational review and needs analysis in 2017 of the Transfer Stations and Community Recycling Centres;

(ix) R6 Optimize the capacity of the Glanbrook Landfill site which may include consideration of alternative disposal technologies no later than the next five (5) year review;

(x) R7 Undertake a five (5) year review of the SWMMP in 2017;

(xi) R8 The advisory roles of the SWMMP Steering Committee and the Waste Reduction Task Force be merged when appropriate;

(xii) R9 On the implementation of Recommendations 1 to 7 consideration will be given to the potential impacts on illegal dumping;

(xiii) R10 Staff will report to Council on the progress of implementing the SWMMP recommendations on an annual or as needed basis;

(xiv) R11 The 2001 SWMMP be rescinded and replaced with the 2012 SWMMP;

(c) That the SWMMP Steering Committee and Waste Reduction Task Force be disbanded and replaced with a Waste Management Advisory Committee in accordance with the Clerk's process for the establishment of advisory committees and the Terms of Reference attached as Appendix G to Report PW12004a;

(d) That the General Manager, Public Works Department, be authorized and directed to bring forward the recommended projects in future capital and operating budget deliberations at the appropriate times;

(e) That the General Manager, Public Works Department, be authorized and directed to discuss and negotiate inter-municipal opportunities and report back as required;

(f) That appropriate amendments to Solid Waste Management By-law 09-067 be enacted to implement recommendations as required (e.g. commercial green cart program).

EXECUTIVE SUMMARY

The purpose of this report is to present the 2012 Solid Waste Management Master Plan (SWMMP) Final Report, the results of the Public Consultation and recommendations on a course of action for the future to Council for consideration.

The SWMMP Review was initiated In 2010 with the assistance of a project consultant, exp Services Inc. (formerly Trow Associates Inc). The purpose of the review was to evaluate the performance of the City's integrated waste management system which was developed as a result of the 2001 SWMMP, to review the outstanding recommendations from the 2001 SWMMP and to develop a plan for the next 25 years which continues to recognize that the Glanbrook Landfill has a finite life. Critical to the review was a significant public consultation process which is well documented.

The review resulted in a set of recommendations from the project consultant. These recommendations were then reviewed and refined by the SWMMP Steering Committee which includes Councillors Pearson (chair), Powers (vice-chair) and Partridge. The Steering Committee's Recommended System includes:

1. Targeted education
2. Incentives
3. Focus on commercial sector
4. Residential construction and renovation materials
5. Focus on multi-residential
6. New materials to programs
7. Continued Extended Producer Responsibility
8. CCF capacity review
9. MRF capacity and single stream processing review
10. Transfer Station/Community Recycling Centre Review

The total 25-year cost associated with the Recommended System is $1234.8 million, compared to $1234.2 million for the Status Quo system, a system cost difference of $600,000 over the planning period.

In the short term the key differences between the Recommended System and the Status Quo are the inclusion of a review of capacity and opportunities at the Central Composting Facility (CCF), a review of the operational and locational constraints of the Transfer Stations/Community Recycling Centres and the five-year review process for the SWMMP. The review of single stream processing of recyclable materials (including the Materials Recycling Facility (MRF) and collection options) would also be undertaken and although this was in the capital budget forecast for 2017, the Steering Committee has recommended that it be brought forward to 2015. The shorter term forecast also includes the possible expansion of the CCF because of the revenue potential. These items are shown on the implementation The results of the reviews and decisions on

longer term requirements would be reported to the Public Works Committee prior to next steps. These items are identified in Table 4, the 2012 SWMMP Implementation Plan – Recommended System (Short Term). The longer term items are contained in Report PW12004a as Appendix E, 2012 SWMMP Implementation Plan – Recommended System for the 25-year planning period.

In addition, the Recommended System would extend the life of the Glanbrook landfill by eight (8) years. At the current diversion rate of 49%, there is capacity at Glanbrook to 2036. The Status Quo system is based on the maturing of the existing programs resulting in a diversion rate of 55%, extending the life of Glanbrook to 2044. Deferring the need to site a new landfill for eight years represents an estimated $64 million in avoided costs.

The detailed recommendations in this report reflect the Recommended System components listed above. Additional recommendations have been included to address the restructuring of the SWMMP Steering Committee and the Waste Reduction Task Force into one advisory committee, the need to address components of the SWMMP through future capital and operating budget deliberations, authority for the General Manager of Public Works to negotiate opportunities with other municipalities and amendments to the Solid Waste Management By-law to implement SWMMP components.

Alternatives for Consideration - See Page 13

FINANCIAL / STAFFING / LEGAL IMPLICATIONS

Financial: There are financial implications associated with the recommendations in this report. A range of options was examined as part of the review. The following tables compare the Status Quo system with the Recommended System from the SWMMP Steering Committee, based on total system costs (Table 1), capital (Table 2), and operating budget impacts (Table 3)**.**

Waste Management System Costs

A comparison of the twenty-five (25) year costs for the status quo waste management system and Recommended System is provided in Table 1. Costs are provided for both a system that is based on continued use of the Glanbrook landfill and one in which an Alternative Disposal Technology (ADT) is constructed. The costs include both operating and capital costs over the planning period.

Table 1 - System Cost Comparison Summary [(1)]

2012-2036 Costs (2010$ Net cost in millions)	**Status Quo** (1A)	**Recommended System**
a. Waste Diversion	$642.3	$733.4
b. Garbage Collection & Disposal		
b1. Disposal Glanbrook Landfill	$591.9	$501.4
b2. Disposal ADT (2027)	$684.2	$583.2

Table 1 - System Cost Comparison Summary [(1)]

2012-2036 Costs (2010$ Net cost in millions)	**Status Quo** (1A)	**Recommended System**
Total System Cost - Use of Glanbrook Landfill (a + b1)	$1234.4	$1234.8
Total System Cost - ADT & Glanbrook LF (a + b2)	$1,326.5	$1316.6
Diversion Rate	55%	65%

(1) Costs from 2012 Solid Waste Management Master Plan Final Report

The cost of the waste management system is marginally higher when alternative disposal is included however no consideration of landfill replacement costs would be required during the planning period. The cost of the Recommended System is $0.6 million higher than the Status Quo with the landfill option.

Ten Year Capital Forecast

The Recommended System is expected to increase the capital requirements from the 2012 approved budget and ten (10) year forecast by approximately $19 million as shown in Table 2.

Table 2 - Ten (10) Year Capital Forecast Comparison

2012-2021 Capital Budget	**Total** ($ millions)
2012 Approved Budget & 10 Year Forecast	$83
Revised Capital Forecast based on Recommended System	$102
Variance from 2012 Budget & Forecast	**$19**

The main drivers of this increase are automated single stream recycling collection ($11 million) and the expansion of the Central Composting Facility ($ million). These expenditures would be subject to Council approval based on completion of feasibility reviews. Other capital relates to feasibility reviews for the MRF and CCF and the addition of a Community Recycling/Reuse Centre.

Operating Budget Impacts

Most of the components of the Recommended System can be implemented within the existing waste management operating budget. Additional costs are estimated to be $615,000 on an annualized basis and are identified in Table 3.

Table 3 - Operating Budget Impacts 2012-2020

Description	**Implementation Year**	**Annualized Cost**
Commercial Green Cart Program	2012 - 2013	$140,000
Festivals & Special Events Diversion (PW08057a)	2013	$ 40,000
Construction & Renovation Materials Recycling Program	2014 - 2015	$350,000
Multi-Residential Targeted Education	2013 - 2014	$ 85,000
Total Annualized Impact of Recommended System	-	**$ 615,000**

The cost associated with the Commercial Green Cart program for eligible commercial properties has been approved by the General Issues Committee in the 2012 budget process and is pending Council approval.

The recycling program at festivals and events was proposed in Report PW08057a and brought forward as a budget enhancement in 2011 and was not approved. It is being recommended for inclusion in 2013 as a step toward Zero Waste at municipal buildings and events.

The construction and renovation materials recycling program has been considered in the past related to increasing waste diversion, however not approved. In the last two or three years, some new businesses have been established for construction and renovation materials, and a competitive process could bring more favourable pricing. This would be reviewed in 2014 and brought forward for consideration in the 2015 budget process.

The funding for targeted education for multi-residential buildings is intended to provide for educational print and promotional materials that are required on an on-going basis to help superintendents and property managers with the turnover in tenancies. This would be initiated in 2013 and would allow for on-going provision of promotional materials.

Subject to approval of Report PW112004a, the additional operating costs would be submitted for Council approval as Council Directed Enhancements as part of the 2013, 2014 and 2015 budget processes.

The Extended Producer Responsibility and the multi-municipal processing components of the Recommended System can be accommodated within the existing operating budget.

Staffing: There are no staffing implications associated with the recommendations. Enhanced diversion programs would be undertaken with existing staff resources.

Legal: There are no legal implications associated with the recommendations in Report PW12004a.

HISTORICAL BACKGROUND

Prior to amalgamation in 2001, waste management activities were carried on at both the regional and municipal levels of government in Hamilton-Wentworth. The Region operated the landfill, the Solid Waste Reduction Unit (SWARU), the Transfer Stations and recycling collection and processing under various contracts. Municipalities tended to the collection of garbage and bulk waste.

With the impending closure of SWARU and limited landfill capacity, the Region formed a Public Advisory Committee (PAC) in 2000 to develop a Solid Waste Management Master Plan (SWMMP) for a new integrated waste management system, to be operational by 2006. Following amalgamation, the new City Council reaffirmed the role of the PAC's role in developing the SWMMP and also established a political advisory committee, the SWMMP Steering Committee. The original Steering Committee

members were Councillors Andrea Horwath, David Braden, Chad Collins and Sam Merulla.

Led by the PAC and guided by the Steering Committee, the SWMMP was presented in December 2001in Committee of the Whole report TOE01013A. Council approved the original 19 recommendations of the SWMMP and directed staff to develop a detailed implementation plan. The recommendations of the 2001 SWMMP are included as Appendix F to Report PW12004a. An implementation work plan was subsequently presented during the closure process for SWARU, together with the Site Selection Methodology for waste diversion facilities.

Many of the 19 recommendations have been implemented and ten years has past representing a reasonable time to take stock of the status of implementation and the disposition of the outstanding recommendations. In addition, it has become a best practice of the Waste Diversion Ontario Blue Box program datacall for municipalities to have waste diversion strategies not more than five years old to receive maximum funding on this aspect of the blue box program.

Considerable progress has been made over the last eleven years and a complete chronology of waste management activities from 2001 to 2011 is also provided in Report PW12004a as Appendix C. A review of the historical expenditures during this period is included in Report PW12004a as Appendix D. Diversion from landfill has improved from 17% in 2001 to 49% in 2011 and landfill life has been extended to about 24 years.

Given the overall status of the implementation of the 2001 SWMMP, a review of the SWMMP was launched in 2010 to consider what has been done, what is outstanding and what continues to be appropriate. During the past year and a half staff has worked with the project consultants, exp Services Inc., to consult with the public and many community organizations, the Waste Reduction Task Force and the Steering Committee to develop the 2012 SWMMP.

Information Report PW12004 attached to Report PW12004a as Appendix B, together with the Draft Report on the 2012 Solid Waste Management Master Plan was presented to the Public Works Committee on January 16, 2012. The Draft Report was then released for the final round of public consultation.

The purpose of this report is to present the findings of the report and the recommendations from the Solid Waste Management Master Plan Steering Committee.

POLICY IMPLICATIONS

The recommendations in this report are guided by the Public Works Business Plan, “Innovate Now!” - Public Works Business Plan

As the Public Works Department strives to be recognized as the centre of environmental and innovative excellence in Canada, the vision drivers and actions of the Public Works Strategic Plan affecting the recommendations in this report are:

- Communities: Services our communities connect with and trust

- Processes: Smart processes to match our needs
- Finances: Sound financial management for the future

RELEVANT CONSULTATION

During the plan review a variety of consultation methods was employed to effectively engage residents, Council and staff in the process. Fundamental to this review was a consultation approach that attempted to gain input through public workshops, facebook ads, neighbourhood meeting and Community Councils in Ancaster, Dundas and Flamborough The record and results of the community consultation are included in Report PW12004a as Appendix A. It is estimated that the public consultation process reached over 2,000 people. The general public consensus is that there is a desire to continue with efforts to increase waste diversion and preserve the landfill capacity.

The SWMMP Steering Committee discussed the SWMMP review at several meetings, receiving information and taking positions on items. In January the Steering Committee supported the recommendation from the Waste Reduction Task Force (WRTF) on committee restructuring of the WRTF and the Steering Committee to a single combined waste sub-committee of Council with both Councillor and citizen representation. Since the main components of the waste management system have been developed, the need for extensive involvement is no longer required. The Terms of Reference for the Waste Management Advisory Committee are attached in Report PW12004a as Appendix G. This committee would generally coincide with the term of Council and would be established through the Clerk's office process although it is proposed that the committee be struck in the near future for the balance of this term of Council, followed by the normal recruitment process for the next term of Council. On March 8th and 19th, 2012, the Steering Committee reviewed the recommendations from the SWMMP Review process and passed a motion on March 19th, on the revised guiding principles and recommendations which are reflected in the recommendations in this Report PW12004a. The revisions are included in Section 2 of the Alternatives for Consideration section of this report.

The Waste Reduction Task Force (WRTF) also discussed the SWMMP review at several meetings. The WRTF generally supports continued waste minimization, reuse and continued diversion efforts. The WRTF also supports the 5 year period before further consideration is given to alternative disposal technologies. The task force also proposed that the committee structure be changed one similar to that recommended by the Steering Committee and the task force representative at the January Steering Committee meeting thought the task force would support the recommended structure.

ANALYSIS / RATIONALE FOR RECOMMENDATION

The SWMMP has guided Hamilton for more than a decade, through significant investment and program implementation to provide residents with opportunities to sort their household waste which has boosted the residential waste diversion rate from 17%

to 49%. Waste management programs have changed behavioural thinking as evidenced in the public consultation on the review process.

The recommendations of this report related to the Recommended Waste Management System (recommended by the SWMMP Steering Committee) represent a moderate but steady and positive approach to continuing on the diversion path and preserving landfill capacity as heard through the consultation. The Recommended system components are described below.

1. Targeted education - includes material or sector specific promotion and education to increase waste diversion where capture rates are low. Specific materials could include household organic waste, while a sector specific target could be the multi-residential program (in conjunction with component 5.
2. Incentives - could include the continuation of the Gold Box program and the investigation of other opportunities such as RecycleBank or tax incentives.
3. Focus on commercial sector - this program would in part see the Cityprovide the commercial properties receiving City waste collection with the full range of collection services including the green cart program. It could also include ways that the City might influence the Industrial, Commercial and Institutional (ICI) sector that receives all of its waste management services from the private sector.
4. Residential construction and renovation materials - as the private sector ventures further into the recycling of drywall and other construction waste, better markets may also be developing.
5. Focus on multi-residential - the diversion rate is currently 21%, attention to this sector could have a significant impact on waste diversion.
6. New materials to programs - consideration of additional materials that can be recycled or composted as product development and markets change.
7. Continued Extended Producer Responsibility - the lobbying of the provincial and federal governments to legislate producers to take responsibility for their products would continue in cooperation with municipal partners
8. CCF capacity and opportunity review - this would determine if there is an economic benefit to expanding the capacity considering the demand for organics processing in Ontario.
9. MRF capacity and single stream processing review - the MRF will reach the end of its useful life in 2020 and a new facility will be required whether it is single stream or two stream.
10. Transfer Station/Community Recycling Centre review - although the transfer stations have adequate approved capacity, locational and congestion concerns suggest a review of these operations.

In the recommendations concerning facilities, particularly the CCF and the MRF, the Steering Committee was interested in the City working with other municipalities related to operating and capital partnerships. To facilitate potential partnerships, It is

recommended that direction be given to the General Manager of Public Works to pursue the discussions with other municipalities and report back to Public Works Committee and Council as required.

The implementation of the components may not fully achieve the maximum potential for diversion identified in the 2012 SWMMP Final Report and expected diversion rates from the implementation of all system components may achieve additional diversion of about 10% over the next 5 years. This would reflect a residential diversion rate of 60% which would be on course to achieving 65% by 2021.

The Recommended System also includes components related to waste disposal, which is critical to ensure that there is sufficient disposal capacity within the integrated waste management system for the 25-year planning period. Based on achieving 65% diversion by 2021 the projected landfill capacity is 42 years to 2044. Two disposal scenarios have been provided, a landfill only option, and a second option that includes alternative disposal technologies (ADTs), such as Energy from Waste (incineration, gasification, pyrolysis) and mechanical and biological treatment.

In addition to the Recommended Waste Management System, there are several other recommendations in this report related to SWMMP maintenance matters. These include the establishment of an updated advisory committee, annual progress reporting on implementation, a condition relating SWMMP considerations to impacts on illegal dumping and the five (5) year review process.

It is proposed to eliminate the current SWMMP Steering Committee and Waste Reduction Task Force and create a new Waste Management Advisory Committee comprised of both Council and citizen members. The Terms of Reference for the Committee are attached in Report PW12004a as Appendix G. It is proposed that the committee be established in accordance with the Clerk's procedure and staff in the Clerk's office has reviewed the Terms of Reference and find them acceptable.

The progress report will take the form of an Information Report to Council through the Public Works Committee, or a recommendation report should Council direction be required. It is proposed that this happen not less than annually, but also as required. Measures by which the progress on the 2012 SWMMP will be gauged will continue to include resident participation, material capture, waste diverted and landfill capacity.

A recommendation has been included to create checks and balances between waste management programs and possible impacts on illegal dumping. Although the waste collection system approved for 2013 provides residents with good opportunities to better manage their waste materials, the recommendation will provide an additional consideration of possible effects.

The recommendation related to the five (5) year review of the SWMMP has been included as it relates to a best practice in the Waste Diversion Ontario Blue Box Program Plan datacall, where strategies for recycling that have been prepared in the past five (5) years result in improved funding.

The total 25-year cost associated with the Recommended System is $1234.8 million, compared to $1234.2 million for the Status Quo system, a system cost difference of $600,000 over the planning period.

An implementation plan for all of the 2012 SWMMP Recommended System is provided in Report PW12004a as Appendix E. The short term implementation plan from 2012 to 2022 is provided on Table 4.

Table 4: 2012 SWMMP Implementation Plan - Recommended System (Short Term)

Description	Completion Year										
	12	13	14	15	16	17	18	19	20	21	22
1. Additional Diversion											
a) Targeted Education	Ongoing with current system										
b) Incentives	Ongoing										
c) Focus on commercial sector	X	X	X								
d) Residential C&R materials		X									
e) Focus on multi-residential	X	X									
f) New materials to programs	Ongoing as markets develop										
g) Continued EPR	Ongoing										
h) Single Stream Recycling											
Feasibility Review				X							
Implementation							X	X	X		
2. MRF Lifecycle Replacement							X	X	X		
3. CCF Expansion											
A) FEASIBILITY STUDY		X									
B) IMPLEMENTATION			X	X							
4. Collection System Review						X	X	X			
5. Transfer Stations & CRCs											
a) Capacity/Location needs analysis						X					

Description	Completion Year										
	12	13	14	15	16	17	18	19	20	21	22
b) Updates/additions							X	X	X		
6. Continued use of Glanbrook Landfill	Ongoing during planning period										
LANDFILL SITE SELECTION											
7. Alternative Disposal Technologies											
a) Review	No later than 2017										
b) Implementation						X	X	X	X	X	X
8. SWMMP Maintenance											
a) Establish updated advisory committee	X										
b) Annual Progress Report on Implementation	X	X	X	X	X	X	X	X	X	X	X
c) Five Year Review of SWMMP						X					X

ALTERNATIVES FOR CONSIDERATION

In this section the findings of the SWMMP review and alternatives considered will be presented based on the following outline. Section 1 reviews the Final Report contents and recommendations. Section 2 presents the recommendations of the SWMMP Steering Committee and the basis for any changes.

1.0 Overview of the 2012 Solid Waste Management Master Plan Final Report, attached to Report PW12004a as Appendix A.

- 1.1 The SWMMP Review Process
- 1.2 Overview of Existing Waste Collection and Diversion Programs
- 1.3 Waste Management Facilities
- 1.4 Gap Analysis
- 1.5 Strategic Directions
- 1.6 Systems Analysis
- 1.7 Preferred System
- 1.8 Conclusion and Recommendations

2.0 Steering Committee Recommendations

- 2.1 Guiding Principles
- 2.2 Recommendations
- 2.3 Implementation Considerations

1.0 Overview of the 2012 Solid Waste Management Master Plan Final Report

1.1 The SWMMP Review Process

Initiated in 2010, the SWMMP Review was undertaken to:

- assess the progress made in the implementation of the 2001 SWMMP;
- consider the outstanding recommendations from the 2001 SWMMP;
- review guiding principles;
- review capacity of the City's waste management programs and facilities;
- evaluate options for consideration in alignment with the principles; and
- make recommendations to meet the City's waste management needs for 25 years.

In the early stage of the SWMMP Review process, it was important to review the accomplishments from the 2001 SWMMP, including:

- maintaining responsibility for the residual waste generated by the City's residents
- extending the life of the Glanbrook landfill from 15 years in 2001 to 34 years in 2010
- increasing residential waste diversion from 17% in 2001 to 49% in 2010
- upgrades to the Materials Recycling Facility (MRF), and construction of the Central Composting Facility (CCF), three Community Recycling Centres and one reuse centre
- implementation of the three-stream waste collection system for recyclables, organics and garbage
- consideration of the need for a user-pay system to encourage waste diversion
- a staged enforcement system that has become progressively rigorous through the reduction of garbage limits
- the expeditious implementation of the new waste management system
- implementing and sustaining comprehensive public education and awareness programs
- siting new waste management facilities sensitively to the community
- sharing waste diversion facilities through contracts at the CCF
- continuous improvement through research and development
- lobbying the federal and provincial governments not only on legislative matters, funding and fiscal policy, but also on extended producer responsibility; in conjunction with municipal and industry partners
- entering into public-private partnerships cautiously to protect the City's interests
- waste composition studies to measure effectiveness of programs
- establishment of a task force to assist in implementation of the SWMMP
- production of an annual report on progress of the SWMMP
- implementing some corporate recycling initiatives

At the same time it is important to note the outstanding matters, or those that could have been improved, such as:

- the capacity at the Glanbrook landfill has been extended however long term capacity is at question
- the waste diversion target of 65% was not reached in 2008 or in 2011

- the MRF is not state-of-the-art, however the upgrades have enabled the City to defer significant capital as the end of the useful life of the MRF approaches in 2020
- although alternative disposal options were investigated through two processes (the WastePlan process with the Region of Niagara, and the HUC Study of Integrating Energy from Waste with the Glanbrook Landfill), there has been no conclusion on this matter
- a user pay system has not been implemented and needs to be reconsidered

The planning process for the SWMMP Review was developed to generally follow the Environmental Assessment process, around developing the process, the public consultation process and evaluating social, environmental and economic impacts of the system options. The process includes 5 key phases including:

Phase 1 - Design of the Stakeholder Participation Process

Phase 2 - Develop Guiding Principles

Phase 3 - Determine and Evaluate Needs

Phase 4 - Identifying and Evaluating Options

Phase 5 - Prepare the SWMMP Document

The initial public workshop was held to update the guiding principles and goals and objectives of the process. The expectations of the review were intended to determine:

- if a diversion target of 65% should be retained, or changed, and if changed, what should it be?
- what would be an appropriate time frame for achieving the diversion target?
- how much landfill capacity is enough?
- why is revenue generation important?
- what is the City's role with respect to waste management?

Documentation of the public consultation activities can be found in Section 2.2 of the 2012 SWMMP Final Report in Report PW12004a as Appendix A.

The outcome of the first workshop was three (3) Guiding Principles that are contained in the following table:

Table 5: 2012 SWMMP Guiding Principles

GP1	The City of Hamilton must lead and encourage the changes necessary to adopt the principle of Waste Minimization. (new)
GP2	The Glanbrook landfill is a valuable resource. The City of Hamilton must minimize residual waste and optimize the use of the City's diversion and disposal facilities. (updated)
GP3	The City of Hamilton must maintain responsibility for the residual wastes generated within its boundaries. Inter-regional facilities will be considered (updated).

The first principle is new and reflects public concern that the 2001 SWMMP did not reflect waste reduction well. The second principle was expanded to encompass

diversion facilities as well as disposal facilities. The third principles was expanded to encompass any inter-regional facilities and not limited to diversion facilities.

The guiding principles continue to be based on a target of 65% diversion of waste from landfill.

Public input supported maintaining or increasing the waste diversion target.

1.2 Overview of Existing Waste Collection and Diversion Programs

The Final Report reflects the waste collection and diversion programs delivered by the City to 160,000 curbside households and 50,000 multi-residential households.

Collection programs are provided weekly for recycling, organics and garbage, while seasonal collection is provided for weekly bulk and bi-weekly leaf and yard waste.

Free drop of programs at Community Recycling Centres include blue box recyclable materials, leaf and yard waste, scrap metal, municipal hazardous or special waste, electronics, tires, wood and appliances. Garbage and shingles can be dropped off for a fee.

Residents are also encouraged to participate in waste reduction, backyard composting, grass cycling and public open space recycling.

The City currently handles a very small portion of the Industrial, Commercial and Institutional (ICI) waste generated within the municipality. There are approximately 4000 eligible commercial customers that receive curbside waste collection from the City. Approximately 65% of the waste generated in the City is from the ICI sector and a significant portion is managed by the private sector and not received at the City's waste management facilities. The City's SWMMP process assumes that the management of this waste will continue to be handled in this manner with only 23% of the waste coming from ICI sources for the 25-year planning period. This does however represent a potential risk to the City's disposal capacity should there be any interruptions or changes in the private disposal capacity. The City also has limited ability to influence waste diversion in the ICI sector other than from the eligible customers.

The report also speaks to this issue of illegal dumping and the concern that the one container limit for garbage has caused an increase in illegal dumping. The report suggests that new programs should consider potential impacts on illegal dumping and resources required for clean up and enforcement.

1.3 Waste Management Facilities

A review was undertaken of the capacity and capabilities of the City's waste management facilities including the Materials Recycling Facility, the Central Composting Facility, the leaf and yard waste Composting Facility (at the Glanbrook landfill site), the three (3) transfer stations/Community Recycling Centres and the Glanbrook landfill.

1.3.1 Materials Recycling Facility (MRF)

Although the design capacity of the MRF may be adequate to process the City's recyclable materials for the planning period, the facility will reach the end of its useful

life in 2020. Regardless of the processing technology – two-stream or single stream – the facility will need to be replaced by 2020.

A review of recycling processing would need to be undertaken in 2017 to consider the next generation of processing technology. Should the preferred technology be single stream, further consideration could be given to developing a facility with marketable capacity.

The timing of this review reflects the need to initiate the next waste collection system review in the latter half of 2017.

1.3.2 Central Composting Facility (CCF)

The CCF is at capacity at the present time however it is expected that the 2013 waste collection system will redirect much of the leaf and yard waste to the windrow composting facility at the Glanbrook Landfill site to allow the City to expand the green cart program to commercial properties and retain the revenues. A possible expansion of the CCF is not necessarily time sensitive relative to waste collection contracts. However organics processing capacity in Ontario is limited and if multi-year processing contracts or partnerships are to be secured, it may be advantageous to undertake a review of the potential expansion in the near future to ensure long term capacity and to continue to receive revenues.

1.3.3 Leaf and Yard Waste Composting Facility (at Glanbrook Landfill Site)

The leaf and yard waste windrow composting facility at the Glanbrook Landfill Site is located on the Stage 3 disposal area of the landfill and will need to be relocated within the next ten (10) years to make way for the landfill expansion.

1.3.4 Transfer Stations (TS)/Community Recycling Centres (CRC)

Although the TS/CRC are expected to continue to operate within their approved tonnage capacities, there will be a need to review their feasibility in the next few years. The TS facilities are now 30 years old. The ability of the CRCs to handle traffic flow, not the waste quantity, is seasonally problematic and is expected to be further reduced over time. As growth and development continue in Stoney Creek, Binbrook, Ancaster and Waterdown, consideration needs to be given to waste collection efficiencies.

In addition, the SWMMP review recognized the motion from the Public Works Committee on January 16, 2012 requesting that the final version of the SWMMP review report include a reference in the Table of Contents about tipping fees at CRCs. This has been acknowledged and the report identifies concerns about tipping fees and suggests that this could be considered a review of the TS/CRCs.

It is proposed to undertake a review of the TS/CRC system in 2017.

1.3.5 Glanbrook Landfill

Based on the amount of waste generated, diverted and landfilled in view of growth from development and improved compaction, the Glanbrook Landfill has a capacity of 24 years (2036) at the current rate of diversion. If the target of 65% is achieved by 2021, the capacity is extended to 36 years (2044).

1.4 Gap Analysis

The purpose of the Gap Analysis was to report on the waste system performance and where improvements could be made.

In 2010, the residential sector generated 216,848 tonnes of waste, of which 83% was from the curbside (single family) sector and 17% was from the multi-residential sector. Waste diversion was 49%, with curbside diversion at 55% and multi-residential at 21%.

The Gap Analysis then proceeds to determine materials where increased capture could improve waste diversion. The most significant materials are household organics and paper packaging, followed by paper, plastics, metals and waste electronics, with limited additional capture from glass, hazardous waste and other materials. Increases in the materials could result in up to 34,000 additional tonnes diverted representing an increase in waste diversion by up to 15.7%, which would raise diversion to close to 65% if these ambitious capture rates could be achieved.

1.5 Strategic Directions

With the guiding principles, program review and Gap Analysis as the basis, the development of strategic directions was undertaken. The outcome was five (5) key strategies for which the following overview is provided.

1.5.1 Education and Enforcement

The review determined that residents need information, then they need to be reminded and sometimes they need enforcement. More specific discussion items included:

- targeted education - by specific materials, topics (waste reduction) or sector (multi-residential), and through social media tools
- adopting a zero waste policy at municipal events and buildings
- incentives and recognition - Gold Box, compost giveaways, rewards programs (Recyclebank) and tax incentives
- enforcement of Solid Waste Management By-law as needed to encourage waste diversion

1.5.2 Service Level Modifications

Service level modifications may encourage waste diversion, improve efficiencies and reduce costs. The review suggests consideration could be given to:

- bi-weekly garbage collection to encourage residents to maximize the use of available diversion programs, reduce collection costs and air emissions (it is recognized that bi-weekly garbage collection could be reconsidered for the 2020 contracts, however that other collection efficiencies could be pursued)
- automated single stream recycling collection which would see a cart based system for curbside collection of recyclables as well as multi-residential (recognize that single stream MRF processing would be required)

1.5.3 Waste Minimization and Diversion Opportunities

The City should provide residents with information and opportunities to reduce and divert waste through:

- additional materials in the recycling program as processing techniques and markets become available
- additional reuse centres either at new locations or in partnership with existing organizations/charities
- improve diversion opportunities to the commercial sector serviced by the City
- construction and demolition reuse and recycling – promote and/or provide programs for reuse of wood, nails, screws, drywall, carpeting and other construction materials
- event days to provide easy access to reuse and recycling opportunities
- waste diversion in multi-residential buildings should be targeted to help residents overcome challenges and to increase waste diversion

1.5.4 Multi-Municipal Collaboration

This item relates to two (2) activities including:

- extended Producer Responsibility - continuation of the City's efforts to lobby for product stewardship
- multi-municipal processing - continue and possibly increase in partnerships with other municipalities to process materials at Hamilton's diversion facilities

1.5.5 Disposal

Based on current diversion and growth, it is estimated that the Glanbrook Landfill has a capacity for 24 years to 2036. It is noted that increased diversion would extend the life of the landfill.

Glanbrook can continue to serve the disposal needs of the City recognizing that its capacity is finite and at some time consideration of alternatives will be necessary. New technologies should be monitored to potentially replace or extent the life of the Glanbrook Landfill. These alternative disposal technologies (ADTs) may include any or combinations of:

- energy from Waste (incineration, gasification, pyrolysis)
- waste stabilization (a process to reduce leachate and landfill gas)
- mechanical separation (removal of recyclables and compostables before waste is landfilled)
- other new technologies

1.6 Systems Analysis

Possible system configurations were reviewed based on the components of the system, potential waste diversion and net environmental, social and economic effects. In addition some key assumptions were made to guide the systems analysis in a consistent manner, including:

- a planning period of 25 years to 2036

- capital amortization
- diversion of waste extends the life of the Glanbrook landfill, although the value of extending the landfill is not included in the costs
- the sitting process for any new waste disposal facility is about ten (10) years

1.6.1 Status Quo

Although maintaining the status quo means that no new programs would be added, the result is that residential waste diversion could reach 55% by 2021 as a result of maturation of current programs.

1.6.2 Enhanced Approach

The Enhanced Approach system is based on current programs and options that have the capacity to improve, combined with educational measures to maximize program use, including the following components:

1. Targeted education
2. Incentives
3. Focus on commercial sector
4. Residential construction and renovation materials
5. Focus on multi-residential
6. New materials to programs
7. Continued Extended Producer Responsibility
8. Multi-municipal processing
9. Reduced Garbage Collection Frequency

The first seven items do not reflect significant program changes, but better management of materials. Multi-municipal processing has significant impacts for the City, but not the residents, while reduced collection frequency would be a program change affecting residents. It is noted that reduced collection frequency, bi-weekly garbage collection could not be implemented before 2020. It is estimated that the maximum potential of these programs could increase diversion to 65 to 70%.

Then environmental impacts associated with Enhanced Diversion would see increased waste diversion, which would result in reduced use of raw materials to product consumer products, reduced greenhouse gases and leachate from less organic material in the landfill, and an increase in the soil end product. The possible implementation of bi-weekly garbage collection would also reduce air emissions.

There would be no social impacts associated with the siting of facilities in this system as no new facilities are proposed. As the program changes will increase diversion, there should be no impact on illegal dumping activity. If bi-weekly garbage collection was implemented in future, there may be perceived impacts of service reduction, and concerns about keeping garbage for two weeks.

Based on the 2012 SWMMP Final Report the economic impacts would be system costs of $733.4 million over 25 years, $91.1 million over the status quo option (excluding bi-weekly garbage collection). Should bi-weekly garbage be introduced in the future, there would be additional savings over the planning period.

1.6.3 Maximized Approach

The Maximized Approach system builds on the Enhanced Approach and introduces additional programs. The key additional components of the Maximized Approach are:

1. Zero waste at municipal buildings
2. Additional enforcement
3. New reuse centre
4. Automated single stream recycling

The full implementation of these components could result in increased diversion to 75 to 85%**.**

The environmental impacts for the Maximized Approach are similar to those associated with Enhanced Approach. Automated single stream recycling increases waste diversion resulting in reduced use of raw materials to produce consumer goods. If properly sited relative to the residents served, and with good planning, design and construction practices and traffic management, the introduction of new reuse/recycling centres could result in minimal environmental impact.

The social impacts associated with the Maximized Approach are varying. Enforcement methods may be viewed as over-regulation frustrating residents and businesses. Properly located, additional reuse/recycling centres would likely have a positive social impact. Automated single stream recycling is easier for residents and therefore should have a positive social impact. A zero waste program at municipal buildings would foster waste reduction and recycling at these facilities.

The 2012 SWMMP Final Report indicates the economic impacts would be system costs of $749.6 million over 25 years, $107.3 million over the status quo option, (excluding bi-weekly garbage collection). As with the Enhanced Approach, there would be additional savings if bi-weekly garbage collection was introduced.

1.6.4 Glanbrook Landfill Disposal

Disposal of residual waste at Glanbrook would continue to provide the sole disposal method. At the current diversion rate there is a capacity for 24 years to 2036. Should a diversion target of 65% be achieved by about 2021, the landfill life would be extended to 36 years in 2044.

If landfill is to continue to be the chosen method of disposal, it would be necessary to commence the estimated 10-year process of site selection, planning and approvals for a new landfill to replace Glanbrook sometime between 2026 and 2034 to ensure on-going uninterrupted disposal capacity for the future.

There would be no new environmental effects associated with the continued use of Glanbrook as the landfill currently produces air emissions and leachate, all of which require attenuating measures.

The social effects are those that currently exist for the community in the vicinity of the Glanbrook landfill including noise, dust and litter. Siting a new landfill would pose concerns associated with the siting process for the local host community.

It is estimated that the disposal costs of landfilling will be $501.4 million over the 25-year planning period if 65% diversion is reached around 2021, excluding any landfill replacement costs. In comparison, the Status Quo landfill costs over this period are $89.7 million higher at $591.9 million.

1.6.5 Mechanical/Biological Treatment (MBT)

MBT processes occur before residual waste is landfilled. They do not replace landfill, but complement and extend landfill life. The City investigated the MBT option as part of the WastePlan Environmental Assessment Study in 2007. The draft final report concluded with several options for future consideration including MBT.

MBT facilities could be located at the Resource Recovery Centre at 1579 Burlington Street or at the Glanbrook landfill site. Locating MBT facilities at the landfill site would not impact on transportation costs. The environmental effects of stabilized waste on a landfill that has received significant amounts of unstabilized municipal solid waste would not be noticeably improved in the planning period.

The implementation of MBT facilities at the landfill may have impacts on the community caused by additional noise, dust and litter.

It is estimated that MBT facilities would cost about $50 per tonne representing an increase of $124 million in disposal related costs over the 25 year planning period.

1.6.6 Alternative Disposal Technologies (ADTs)

ADT includes such technologies as incineration, gasification and pyrolysis, and variations of these technologies.

In 2008, the draft final report of Phase 1 of the WastePlan Environmental Assessment Study concluded with several options for future consideration including EFW. Subsequently, following the 2010 study with Hamilton Utilities Corporation of Integration of EFW with the Glanbrook Landfill, the matter of EFW was referred to this SWMMP Review process for information.

The HUC study assumption that a facility could be built in 3 years was based on a secured site location and a pre-determined technology. It is expected that the siting, planning and approvals process for a municipal ADT would be about 7 years and the construction and commissioning process about 3 years.

Environmental effects of ADT include the siting process and air emissions from the operation. The ash, which is more inert than municipal solid waste, would be disposed at Glanbrook. However the effects of ash on a landfill that has been receiving significant amounts of municipal solid waste would not improve noticeably in the planning period.

Social impacts associated with ADT include the siting process on the local host community, and operational impacts associated with traffic, noise, odours and air emissions. There may also be perceived effects from parties generally opposed to the concept of ADT as a disposal option.

The cost of ADT is higher than the cost of landfill, although ADT would significantly extend the life of Glanbrook, such that some of the capacity could be marketed to offset the costs. If an ADT was operational in 2027, the estimated cost of disposal would be $583.2 million. However the landfill life would be extended to 2053 assuming 65% diversion is reached around 2021

1.6.7 Summary of Systems Analysis

The following table shows the diversion rates and landfill life expectancy for the systems analysis.

Table 6: Diversion Rates and Landfill Life of Systems

Scenario	Diversion Rate (by 2021)	Expected Life of the Glanbrook Landfill
Status Quo + Landfill (Glanbrook Landfill)	55%	2040
Enhanced + Landfill	65%	2044
Enhanced + ADT by 2027	65%	2053
Maximized + Landfill	75%	2048
Maximized + ADT	75%	2060

Table 7 contains the summary of the cost comparison from the systems analysis.

Table 7: Summary of System Costs

Scenario	Diversion Component Cost	Disposal Component Cost	2012-2036 Total System Cost
Status Quo + Landfill (Glanbrook Landfill)	$642.3M	$591.9M	$1234.2M
Enhanced + Landfill	$733.4M (1)	$501.4M	$1234.8M
Enhanced + ADT by 2027	$733.4M (1)	$583.2M	$1316.6M
Maximized + Landfill	$749.6M (1)	$455.5M	$1205.1M
Maximized + ADT	$749.6M (1)	$539.2M	$1288.8M

(1) A key cost driver in additional diversion is in the capital costs for facilities.

1.7 Conclusions and Recommendations

The public consultation suggested that the Enhanced Approach to diversion could accomplish 65% diversion, although it is recognized that some components of the approach such as bi-weekly garbage collection will not be realized in the next 5 years. Similarly there are aspects of the Maximized Approach that can or should be initiated within the next 5 years such as the capacity reviews of the CCF and the MRF. The preferred system represents a combination of system components from both the Enhanced and Maximized Approaches recognizing the expressed public desire to

continue to move forward on a path toward 65% waste diversion in conjunction with the use of the Glanbrook Landfill for disposal for the next 5 years.

Therefore the study proposes that the preferred waste management system include the following components:

1. Targeted education
2. Incentives
3. Focus on commercial sector
4. Residential construction and renovation materials
5. Focus on multi-residential
6. New materials to programs
7. Continued Extended Producer Responsibility
8. CCF capacity review
9. MRF capacity and single stream processing review
10. Transfer Station/Community Recycling Centre Review

The environmental effects of the preferred system are similar to the Enhanced Approach. Waste diversion would increase resulting in reduced use of raw materials to produce consumer goods, reduced greenhouse gases and leachate from less organic material in the landfill, and an increase in the soil end product.

The social effects would also be similar to the Enhanced Approach in that no new facilities are proposed, program changes will increase diversion and there should be no impact on illegal dumping activity.

The economic effects of the preferred system are the same as the would be slightly higher than the Enhanced Approach and the Maximized Approach. The costs associated with the preferred system and the Status Quo are $1.2 billion, with a difference of $600,000 over the 25 year planning period.

The preferred waste management system is the result of the review of relevant information, the input from the public consultation process and the analysis of the alternative components for system prepared by the project consultants. The recommendations and relevant commentary for the preferred system are in Table 8.

Table 8: Recommendations on the Preferred Waste Management System from the 2012 SWMMP Final Report

R1.	**Implement Enhanced Waste Diversion - this includes targeted education, focusing on multi-residential and the commercial sectors, managing construction and renovation materials, adding materials to the blue box where feasible, continued lobbying for EPR, municipal processing partnerships, and reduced garbage collection frequency in 2020** In the last 10 years, residents of Hamilton have engaged in a shift in the culture of waste management practices. The enhanced approach will build on the momentum without significant changes associated with single stream recycling or increased enforcement. As the City's waste management programs mature, the City may opt for some of the maximized options. The next opportunity to review less frequent garbage collection will be in 2020.

R2.	**Undertake a feasibility study in 2013 of expanding capacity at CCF** In Ontario, the processing capacity for source separated organics is limited. There is an opportunity to review the feasibility for the CCF to support all of Hamilton's needs and to increase revenues.
R3.	**Undertake a feasibility study in 2017 of Single Stream processing and expansion of capacity at the MRF** The MRF will reach the end of its useful life in 2020 and the City will need to consider the next generation of processing recyclable materials. If it is feasible to change to Single Stream processing in 2020, the decision to do so needs to be made well in advance of the construction start and the waste collection system review which would be undertaken in 2018.
R4.	**Undertake an operational review and needs analysis in 2017 of Transfer Stations and Community Recycling Centres** It is estimated that the current Transfer Station and Community Recycling Centre system relative to growth in new development areas may not be providing optimal service to residents or efficient waste collection and should be reviewed relative to capacity and location.
R5.	**Utilize Glanbrook for disposal for 5 years, and consider alternative disposal capacity in next review** It is estimated that the Glanbrook landfill has a capacity to 2036, based on the estimated diversion from the Enhanced Waste Diversion option. To coincide with this timeframe, alternative waste disposal technology would have to be initiated about 2021. However if it is deemed desirable to have significant capacity at Glanbrook beyond 2036, alternative disposal technologies would need to be reviewed earlier.
R6.	**Undertake a Five Year Review of SWMMP in 2017** The funding from Waste Diversion Ontario is based on the best practice that waste strategies are reviewed every 5 years
R7.	**The advisory roles of the SWMMP Steering Committee and Waste Reduction Task Force be merged** With the significant changes that took place from 2001 to 2010, the SWMMP Steering Committee provided a sounding board for staff on the implementation of the plan. The Waste Reduction Task Force provided the public perspective as changes were made. The updated SWMMP does not foresee the same level of changes and in accordance with discussions with both Committees, there was consensus that one committee representing both Council and the public would represent a feasible approach to a continued interface with staff.
R8.	**In the implementation of Recommendations 1 to 7 consideration will be given to the potential impacts on illegal dumping.** Illegal dumping has been associated with waste collection and transfer station operations and consideration will be made in the implementation of programs impacting these operations.
R9.	**Staff will report to Council on the progress of implementing the SWMMP recommendations on an annual basis.**

R10.	**The 2001 SWMMP be rescinded and replaced with the 2012 SWMMP** It is appropriate and necessary to conclude that the 2001 SWMMP is complete for the purpose of approving a new plan. Although not all of the recommendations have been complete, the updated recommendations should replace all of the previous recommendations.

Prior to the completion of this report these recommendations were vetted through the SWMMP Steering Committee to reflect another level of community input. The results are in the following section.

2.0 SWMMP Steering Committee Recommendations

As this SWMMP Review process has been a public process reflecting input received in all Phases of the Project, it was appropriate that the SWMMP Steering Committee, representing the community bring forward the final guiding principles and recommendations for consideration. The following table includes the guiding principles from the review process and the recommended changes from the Steering Committee.

Guiding Principles from SWMMP Review Process	Recommendations from SWMMP Steering Committee
GP1. The City of Hamilton must lead and encourage the changes necessary to adopt the principle of Waste Minimization (new)	The City of Hamilton must lead and encourage the changes necessary to adopt the principle of Waste *Reduction*. (new)
GP2. The Glanbrook landfill is a valuable resource. The City of Hamilton must minimize residual waste and optimize the use of the City's diversion and disposal facilities. (updated)	No changes were proposed by the Steering Committee.
GP3. The City of Hamilton must maintain responsibility for the residual wastes generated within its boundaries. Inter-regional facilities will be considered (updated).	The City of Hamilton must maintain responsibility for the residual waste generated within its boundaries. Inter-regional *opportunities* will be considered (updated).

The Steering Committee preferred waste "reduction" to minimization in GP1 as it is easier to understand. Reduction could include source reduction and reuse.

In GP3, the reference to Inter-regional "facilities" was change to "opportunities" to consider waste management partnerships in the broadest sense.

Recommendations from SWMMP Review Process	Recommendations from SWMMP Steering Committee
(The 2012 SWMMP is based on maintaining the 65% diversion target and as a result was not a specific recommendation. Public input supported maintaining and increasing the diversion target. The SWMMP Steering Committee felt it should be a recommendation)	R1. A waste diversion target of 65% be maintained.

Recommendations from SWMMP Review Process	**Recommendations from SWMMP Steering Committee**
R2. Implement Enhanced Waste Diversion - this includes targeted education, focusing on multi-residential and the commercial sectors, managing construction and renovation materials, adding materials to the blue box where feasible, continued lobbying for EPR, municipal processing partnerships, and reduced garbage collection frequency in 2020	Implement Enhanced Waste Diversion - this *may include* targeted education, focusing on multi-residential and the commercial sectors, managing construction and renovation materials, adding materials to the blue box where feasible, continued lobbying for EPR, *municipal and corporate opportunities and partnerships, and pursue current and pending opportunities for collection efficiencies* in 2020
R3. Undertake a feasibility study in 2013 of expanding capacity at CCF	Undertake a feasibility study in 2013 of expanding capacity *and opportunities* at CCF
R4. Undertake a feasibility study in 2017 of Single Stream processing and expansion of capacity at the MRF	Undertake a feasibility study in *2015* of Single Stream processing and expansion of capacity at the MRF
R5. Undertake an operational review and needs analysis in 2017 of Transfer Stations and Community Recycling Centres	No changes were proposed by the Steering Committee.
R6. Utilize Glanbrook for disposal for 5 years, and consider alternative disposal capacity in next review	*Optimize the capacity* of the Glanbrook disposal site which may include consideration of alternative disposal technologies *no later than* the next five year review.
R7. Undertake a Five Year Review of SWMMP in 2017	No changes were proposed by the Steering Committee.
R8. The advisory roles of the SWMMP Steering Committee and Waste Reduction Task Force be merged	The advisory roles of the SWMMP Steering Committee and Waste Reduction Task Force be merged *when appropriate*.
R9. In the implementation of Recommendations 1 to 7 consideration will be given to the potential impacts on illegal dumping.	*On* the implementation of Recommendations 1 to 7 consideration will be given to the potential impacts on illegal dumping.
R10. Staff will report to Council on the progress of implementing the SWMMP recommendations on an annual basis.	Staff will report to Council on the progress of implementing the SWMMP recommendations on an annual *or as needed* basis.
R11. The 2001 SWMMP be repealed and replaced with the 2012 SWMMP	No changes were proposed by the Steering Committee.

The changes recommended by the SWMMP Steering Committee serve to clarify the SWMMP Review recommendations and constitute part of the recommendations in this report.

For R1, the 2012 SWMMP assumed that the diversion target of 65% would remain and as a result was not a recommendation from the Preferred System however the Steering Committee supported adding a recommendation to clarify that the diversion target would remain. A specific target date was removed in favour of monitoring progress at each SWMMP review period and more frequently through recommendation R10. In R2, the Steering Committee recommended that the municipal opportunities and partnerships be broad, and in view of the February 22, 2012 decision by Council on the 2013 to 2020 waste collection system, to remove references to collection frequency in favour of opportunities for collection efficiencies.

In R3, the Steering Committee recommended that not only capacity but opportunities at the CCF be reviewed.

The Steering Committee recommended that the MRF review be moved up to 2015 from 2017.

In R6, the Steering Committee preferred to "optimize the capacity of the Glanbrook Landfill site which may consideration of alternative disposal no later than the next 5-year review".

For R8, the Steering Committee recommended that the advisory committees be merged "when appropriate".

In R10, the reporting flexibility was considered appropriate by the Steering Committee with the addition of "or as needed" to the annual reporting.

Implementation considerations related to the recommendations are addressed in the Analysis/Rationale for Recommendation section of this report.

CORPORATE STRATEGIC PLAN

Focus Areas: 1. Skilled, Innovative and Respectful Organization, 2. Financial Sustainability, 3. Intergovernmental Relationships, 4. Growing Our Economy, 5. Social Development, 6. Environmental Stewardship, 7. Healthy Community

Financial Sustainability

- Delivery of municipal services and management capital assets/liabilities in a sustainable, innovative and cost effective manner
- Full life-cycle costing for capital

Intergovernmental Relationships

- Influence federal and provincial policy development to benefit Hamilton
- Maintain effective relationships with other public agencies

Environmental Stewardship

- Aspiring to the highest environmental standards

Healthy Community

- Plan and manage the built environment
- An engaged Citizenry

APPENDICES / SCHEDULES

Appendix A Final 2012 SWMMP Review Report
Appendix B Information Report PW12004
Appendix C Chronology of Waste Management Activities 2001-2011
Appendix D Historical Waste Management Expenditures
Appendix E 2012 SWMMP Implementation Plan - Recommended System (25 Years) Overview
Appendix F 2001 SWMMP
Appendix G Terms of Reference - Waste Management Advisory Committee

City of Hamilton Solid Waste Management Master Plan Review

2012 Solid Waste Management Master Plan

Final Report

March 2012

This Project has been delivered with the assistance of Waste Diversion Ontario's Continuous Improvement Fund, a fund financed by Ontario municipalities and stewards of blue box waste in Ontario. Notwithstanding this support, the views expressed are the views of the author(s), and Waste Diversion Ontario and Stewardship Ontario accept no responsibility for these views.

TABLE OF CONTENTS

List of Figures

List of Tables

GLOSSARY OF ACRONYMS

ADT	Alternative Disposal Technology
AMO	Association of Municipalities of Ontario
CCF	Central Composting Facility
CFC	Chlorofluorocarbon
CofA	Certificate of Approval
CRC	Community Recycling Centre
EFW	Energy from Waste
EPR	Extended Producer Responsibility
FCM	Federation of Canadian Municipalities
GHG	Greenhouse gas
HDPE	High-density polyethylene (a type of plastic)
HUC	Hamilton Utilities Corporation
ICI	Industrial, Commercial and Institutional
L&YW	Leaf and Yard Waste
LCA	Life Cycle Assessment
LCBO	Liquor Control Board of Ontario
LYWF	Leaf and Yard Waste Facility
MRF	Materials Recycling Facility
PET	Polyethylene terephthalate (a type of plastic)
SSO	Source separated organics
SWMMP	Solid Waste Management Master Plan
TPD	Tonnes per Day
TPY	Tonnes per Year
TS/CRC	Transfer Station/Community Recycling Centre
WEEE	Waste Electrical and Electronic Equipment
WWTP	Waste water treatment plant

EXECUTIVE SUMMARY

The City of Hamilton's review of the 2001 Solid Waste Management Master Plan (SWMMP) included consultation with stakeholders and the public on the guiding principles, goals and objectives and program options that will guide the City in managing its waste for the next 25 years.

The 2012 SWMMP Guiding Principles build upon those from the 2001 SWMMP and have been updated to include the community's philosophy and the provincial waste management value chain of reduce, reuse, diversion and disposal.

The guiding principles are:

The City of Hamilton must lead and encourage the changes necessary to adopt the principle of Waste Minimization.

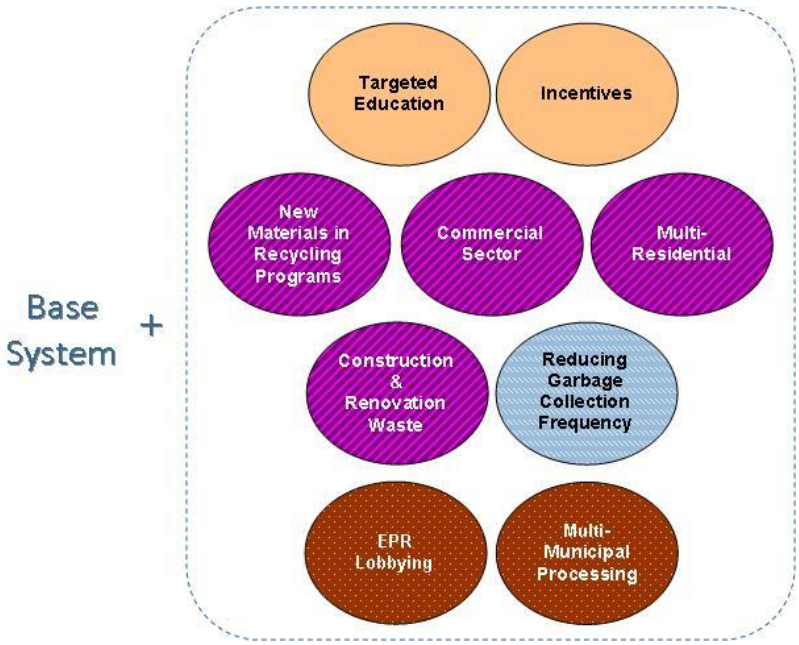
The Glanbrook Landfill is a valuable resource. The City of Hamilton must minimize residual waste and optimize the use of the City's diversion and disposal facilities.

The City of Hamilton must maintain responsibility for the residual wastes generated within its boundaries. Inter-regional facilities will be considered.

The review showed that the City of Hamilton has a robust residential solid waste management system that at status quo should achieve a 55% waste diversion rate by 2021 as existing programs mature.

To help the City meet and exceed the target of 65% waste diversion, enhancement of existing facilities and the development of new facilities will have to be considered at key points. The following recommendations form the basis of the 2011 SWMMP:

1. Implement the "enhanced approach" to waste diversion, which may include:
   - Targeted education;
   - Focusing on the multi-residential and commercial sectors;
   - Managing construction and renovation materials;
   - Adding materials to the recycling programs where feasible;



- Continued lobbying for Extended Producer Responsibility;
- Municipal processing partnerships; and
- Reduced garbage collection frequency in 2020.

2. Undertake a feasibility study in 2013 of expanding capacity at the Central Composting Facility (CCF).
3. Undertake a feasibility study in 2017 of Single Stream processing and expansion of capacity at the Materials Recycling Facility (MRF).
4. Undertake an operational review and needs analysis in 2017 of Transfer Stations and Community Recycling Centres.
5. Undertake a Five Year Review of the SWMMP in 2017.
6. Use the Glanbrook Landfill for disposal for 5 years, and consider alternative disposal capacity in the next SWMMP review in 5 years.
7. Merge the advisory roles of the SWMMP Steering Committee and the Waste Reduction Task Force.
8. In the implementation of these recommendations, consideration will be given to the potential impacts on illegal dumping.

This report documents the process followed and rationale for the 2012 SWWMP.

Thanks are extended to all those who contributed ideas and information.

1 INTRODUCTION

1.1 SOLID WASTE MANAGEMENT MASTER PLAN REVIEW

The 2001 Solid Waste Management Master Plan (SWMMP) and its recommendations provided the blueprint for the City's current residential solid waste management program, including blue box recycling, source separated (green cart) organics, yard waste, household hazardous waste, garbage, public education, and other waste management programs.

Initiated in 2010, the City of Hamilton has now completed a review of its 2001 SWMMP. The review assessed the status of the City's current (2010) waste management system and, with input from the public, identified a path forward in managing the City's residential solid waste to 2036.

This report documents the review process and the outcomes. Section 2 outlines the planning and consultation process followed, while Section 3 provides a snapshot of Hamilton's current waste management system. Section 4 documents the 2012 SWMMP guiding Principles, goals and objectives, and the recommended directions for managing Hamilton's residential solid waste into the future. Section 5 presents the conclusions and recommendations from the review.

1.2 LOOKING BACK: THE 2001 SOLID WASTE MANAGEMENT MASTER PLAN

The 2001 SWMMP included 19 recommendations, including two Guiding Principles, seven system recommendations, and 10 recommendations concerning sustainable development.

Many of the 2001 recommendations have been implemented and have contributed to Hamilton's waste diversion successes, including:

- The preservation of landfill capacity through improvements to landfill operations and increased diversion, which has increased the life expectancy of the Glanbrook Landfill from 15 years remaining in 2001 to 34 years from 2010, or a predicted 2044 closure.
- The City's residential waste diversion rate has more than doubled from 17% in 2001 to 49% in 2010.
- The establishment of the Central Composting Facility (CCF), upgrades to the Materials Recycling Facility (MRF) and the creation of three Community Recycling Centres (CRCs) (one with a reuse centre).
- 3-stream collection system, supported by a comprehensive public education program that includes annual waste collection calendars, brochures, advertising, a booklet on the City's waste management programs, and the Gold Box recognition program.
- Lobbying provincial and federal levels of government in partnership with a variety of industry organizations and municipal organizations such as the Association of Municipalities of Ontario, the Regional Public Works Commissioners of Ontario, the Municipal Waste Association, the

Ontario Waste Management Association and the Federation of Canadian Municipalities on such matters as the Waste Diversion Act and Extended Producer Responsibility (EPR).

Recommendations that are outstanding from the 2001 SWMMP include:

- Long term landfill capacity – while Hamilton has a significant amount of landfill capacity available at the Glanbrook Landfill, it faces future pressures such as tighter export regulations, diminishing landfill capacity in Ontario as a whole, difficulty with siting new disposal facilities and the higher cost of alternative disposal methods.
- 65% diversion target – Hamilton's waste diversion programs have generated positive results, but the City has not yet achieved the 65% waste diversion target, originally set for 2008 and then extended to 2011.
- State-of-the-art Materials Recycling Facility – while the City's MRF is not fully state of the art, the equipment is generally functioning well.
- Energy from Waste (EFW) - EFW has been investigated in the Hamilton-Niagara WastePlan process (2005 – 2009) and recently in the Hamilton Utilities Corporation (HUC) Integration Study (2010); however, it has also been included in this SWMMP review for consideration.
- User Pay - User pay systems have been considered as a means of increasing waste diversion but have not been implemented.

2 PLANNING PROCESS

2.1 PROCESS OVERVIEW

The review process included the following five key phases. Throughout the process, public consultation was a key component (see Section 2.2).

2.1.1 PHASE 1: DESIGN OF THE STAKEHOLDER PARTICIPATION PROCESS

The first phase of this project involved the development of the review's public consultation plan. This plan was presented to the public, proposing ways in which the public and other stakeholders would be engaged throughout the process and seeking input on how they wished to be consulted.

2.1.2 PHASE 2: DEVELOP GUIDING PRINCIPLES

During this phase, the project team consulted with the public and other stakeholders to update the guiding principles, goals and objectives from the 2001 SWMMP, with the intent of reflecting the needs, concerns and vision of the community as a whole for the next planning period.

On January 24, 2011, a public workshop was held on this topic. Those unable to attend were encouraged to view the workshop materials on the project website and submit comments by e-mail or mail. An overview of the feedback received can be found in Section 2.2. The updated guiding principles, goals and objectives are presented in Sections 4.1 and 4.2. The study report *Guiding Principles, Goals and*

Objectives: Guiding Principles, Goals and Objectives for the 2012 City of Hamilton Solid Waste Management Master Plan documents the feedback received during this phase.

2.1.3 Phase 3: Determine and Evaluate Needs

In Phase 3 of the review, the project team assessed the gap between the City's current waste management activities and the goals and objectives identified in Phase 2. This assessment included the review of the City's current facilities, services and programs provided by both the City, its contractors or organizations that help the City manage residential waste. Research was conducted to identify the City's future waste management needs. Future needs were then compared against existing and planned services, programs and facilities to determine service or processing gaps. An overview of Hamilton's waste characteristics is provided in Section 3.3 and discussed in full in the study report *Gap Analysis*.

2.1.4 Phase 4: Identifying and Evaluating Options

After assessing the City's waste management needs in Phase 3, a range of options was explored and evaluated for moving the City forward and achieving its waste management goals and objectives.

This phase was divided into two parts. In part A, the project team researched and identified a broad suite of options, approaches and technologies to manage solid waste in the future. Environmental, social and economic benefits and issues of each option were also identified. The long list of options is discussed in the study report *Brief on Waste Diversion and Disposal Options*.

A workshop was held on April 28, 2011 to present the results of the needs assessment and to discuss potential waste management options for the City of Hamilton. Feedback was also requested of stakeholders and visitors to the project website. Input received from the public is presented in Section 2.2. The results of the April 28th workshop are provided in the study report *Public Workshop #2: Gap Analysis, Needs Assessment and Preliminary Discussion on Options*.

Part B of this phase included a more detailed evaluation of the short-listed options using a Triple Bottom Line approach, which considered the environmental, economic and social effects of the various options. The options were grouped into various diversion and disposal systems, and the systems were evaluated to identify a preferred long-term waste management system for the City. The systems are identified and presented in the study report *Evaluation of Waste Systems*.

2.1.5 Phase 5: Prepare the SWMMP Document

Once the preferred directions for waste management were confirmed in Phase 4, a draft SWMMP report was prepared to document the preferred initiatives and associated capital and operating expenditures required over the planning period. The draft SWMMP was made available for public review and comment from January 17, 2012 and into March 2012.

Study reports prepared during the course of this process that contributed to the SWMMP include:

- Guiding Principles, Goals and Objectives: Guiding Principles, Goals and Objectives for the 2012 City of Hamilton Solid Waste Management Master Plan;

- Public Workshop #2: Gap Analysis, Needs Assessment and Preliminary Discussion on Options;
- Gap Analysis;
- Brief on Waste Diversion and Disposal Options;
- Evaluation of Waste Systems; and
- Online Feedback: Operational Suggestions and Web Survey Results.

2.2 SUMMARY OF CONSULTATION ACTIVITIES

2.2.1 OVERVIEW

Throughout the process, opportunities were provided to encourage the public to provide input and to comment on draft SWMMP materials. At key points, additional activities were carried out to encourage participation. Consultation activities included:

- Conducting an early stakeholder scan with key stakeholders to identify issues, opportunities and the most effective methods for engaging the public.
- Development of a project website (www.hamiltonwastereview.ca) to inform stakeholders about the project, disseminate information, and provide a means for the public to provide electronic feedback. The website included an overview of the process, a document library, advertised workshop dates, an online survey on guiding principles, and contact information.
- Meetings with neighbourhood associations in Phase 2 to introduce the groups to the process and to encourage their involvement and the involvement of their members.
- Establishment of a stakeholder contact list to distribute notices and updates about workshops, posting of materials for public review and comment, and opportunities for consultation.
- Public and stakeholder workshop in Phase 2 to identify draft guiding principles, goals and objectives for the 2012 SWMMP. Results of the workshop and draft guiding principles, goals and objectives were posted on project website for public review and comment.
- Public and stakeholder workshop in Phase 4 to review results of gap analysis and to discuss potential options for the 2012 SWMMP. The results of workshop were posted on website for review and comment.
- Workshop with Hamilton staff to review potential options for the 2012 SWMMP.
- Presentations and discussions with Waste Reduction Task Force on proposed SWMMP directions.
- Staffing a display at the Hamilton Fall Garden & Chrysanthemum Show and discussing the proposed SWMMP directions with show visitors.
- Meetings with neighbourhood associations and community groups in Phases 4 and 5 to review and obtain feedback on the proposed SWMMP directions and the draft SWMMP.
- Placing the draft SWMMP on the project website for review.
- Conducting an online survey to obtain feedback on the draft SWMMP.
- Setting up a display poster about the draft SWMMP at the February 2012 Upwind Downwind Conference.

Table 1 summarizes each consultation activity and the associated participation/metrics.

Table 1: Consultation Activities

Consultation Activity	Metrics
Stakeholder Scan	10 interviews with City staff, Waste Reduction Task Force members
Project Website www.hamiltonwastereview.ca	3,933 visits[1] 2,964 unique visitors 11,231 page views
Online survey on guiding principles	49 surveys completed
Dedicated project e-mail address	59 separate members of the public provided feedback through dedicated e-mail address
Meetings with Community Associations (Phase 2)	Met with 9 community groups, which resulted in direct outreach to approximately 115 individuals
Stakeholder Contact List	149 individuals, businesses, and community organizations 12 project update e-mails distributed
Stakeholder Workshops	Two stakeholder workshops held, engaging approximately 40 participants
Workshop with Hamilton Staff	Approximately 16 staff members
Council Committee July 6, 2011	Staff workshop held for Councillors
Display and public survey at Fall Garden & Chrysanthemum Show	Three staffed sessions Contact with approximately 45 members of the public
Meeting with Community Groups and Community Council (Phase 5)	Presentations delivered to three community groups (greater than 50 individuals) and the Community Councils of Ancaster, Flamborough and Dundas.
Environment Hamilton February 14, 2012	Project team members met with Dr. Lynda Lukasik to discuss comments from Environment Hamilton on draft SWMMP
Facebook ad promoting draft SWMMP	Ad ran from February 7 to February 24, 2012 Ad had 2,902,150 impressions, resulting in 628 clicks to project website
Online survey about draft SWMMP	Survey ran from February 3 to March 7, 2012 174 surveys started, with 138 surveys completed
Upwind Downwind Conference February 27, 2012	Staff displayed poster board to engage conference participants and raise awareness of draft SWMMP. Included direct discussions with 12 participants.

[1] Website statistics provided by Google Analytics for the period of January 12, 2011 to March 19, 2012.

2.2.2 Feedback on Guiding Principles, Goals and Objectives

In Phase 2, residents were asked if the guiding principles from the 2001 SWMMP still applied and/or if they should be changed. Guiding principles had been defined as the values and philosophy that would guide the development and operation of the City's waste management program. Feedback from the public suggested that the guiding principles should remain, although some felt that Guiding Principle #1 should be updated. Suggested changes or considerations for Guiding Principle #1 included:

- The term "residual waste" should include that from all sectors within Hamilton and not just residential waste;
- The term "responsibility" is ambiguous and should be clarified in terms of ownership of the waste and maintaining it within the City's boundaries;
- The term "diversion" should be removed from the phrase "inter-regional diversion facilities will be considered" to avoid restricting Hamilton from future opportunities.

At the workshop and through other comments received, there was general agreement with Guiding Principle #2 and that the Glanbrook landfill remains a valuable resource. There were divergent opinions regarding the consideration of Energy-from-Waste (EFW). Some felt it should be considered, while others spoke against it. It was suggested that there should be more emphasis on waste diversion and that falling short of the existing 65% waste diversion target is not a sufficient reason to adopt EFW. Alternatively, it was noted that Guiding Principle #2 should incorporate other components, including EFW that would maximize the usable life of the Glanbrook landfill.

Feedback was sought on the waste diversion target of 65%. The general response was that the 65% waste diversion target should stay, although some thought that the target should be higher.

Feedback was also sought and received on other guiding principles that should be considered for the updated SWMMP. Suggestions were grouped according to the three pillars of sustainability: Society, the Environment and the Economy. These included:

Society

- Hamilton's waste management solutions will not cause any human harm.
- The City of Hamilton will demonstrate waste management leadership and innovation by example to its residents and other jurisdictions.
- Information about Hamilton's solid waste management programs must be clear and accessible to all residents.
- A successful responsible municipal solid waste management system requires participation of the entire community.
- Waste management systems should not be viewed as a cause of illegal dumping.
- Hamilton has a diverse community with different communication and program accessibility needs.

The Environment

- Hamilton's approach to waste management should follow the waste management hierarchy: first reduce, then reuse and recycle (including compost) and then disposal.
- The SWMMP is one part of a greater environmental vision for Hamilton.
- The net environmental impacts should consider waste diversion and processing, landfill impacts and collection efficiencies.

The Economy

- Costs for solid waste management remain affordable for the planning period.
- Responsible solid waste management provides economic opportunities for Hamiltonians.
- Revenue generation is an integral part of the waste management system.

The public also provided a broad suite of suggestions on what should be included in the goals and objectives of the SWMMP. The goals and objectives were also organized according to the three pillars of sustainability: society, environment, and economy.

- Many of the social goals and objectives related to equity of access to programs and effective communications.
- Feedback about the environmental goals and objectives concerned waste generated and disposed and the environmental footprint of managing that waste.
- Suggestions regarding goals and objectives under the economic pillar were concerned with product stewardship, system efficiencies and economic opportunities.

In addition to feedback on the guiding principles, goals and objectives, participants provided additional suggestions for operational improvements.

The guiding principles, goals and objectives for the 2012 SWMMP are discussed in Sections 4.1 and 4.2. The study report *Guiding Principles, Goals and Objectives: Guiding Principles, Goals and Objectives for the 2012 City of Hamilton Solid Waste Management Master Plan* documents the feedback received from the public on this topic.

2.2.3 Feedback on Waste Options

During Phase 4, the public was asked to provide input into the types of options Hamilton should include in its waste management system. Specifically, residents were asked at a workshop and through the website:

- How can Hamilton and its residents minimize (i.e. reduce and reuse) the amount of waste created?
- How can the City divert more of the materials currently accepted in its programs?
- How can the City divert materials currently not accepted in its programs?
- What does the City do with the material that is left?

The feedback received from the public on waste minimization and diversion was organized into three key categories:

- **Increasing Waste Minimization** - Feedback on how the City could encourage waste minimization among the residents of Hamilton included:
  - Education – increased and targeted promotion of waste reduction and reuse opportunities;
  - Programs and Policies – additional reuse centres and the adoption of policies that drive waste reduction, reuse and diversion ; and
  - Producer Responsibility – influencing the practices of manufacturers.

- **Increasing Diversion in Existing Programs** - Feedback on how the City could increase diversion of materials using the City's existing programs included:
  - Education and Enforcement – Increased efforts to ensure residents understand how to participate properly in diversion programs;
  - Technical/Physical Improvements – using equipment to make source separation easier or to process waste after it has been collected; and
  - City Programs and Policies – enhancements to existing programs, material bans, and adjustments to planning/building controls.

- **Increasing Diversion of Non-Program Materials** - Feedback on how to increase the diversion of those materials for which no diversion program is currently available included:
  - Promotion and Education – increased promotion of alternatives; and
  - New Municipal Programs - such as diaper recycling or the recycling and reuse of construction and renovation waste.

There was no consensus on what should be done with the waste remaining after diversion for disposal, but suggested options included continuing to landfill, Energy-from-Waste and using private landfills.

Feedback received from the public during the Phase 4 workshop is provided in the study report *Public Workshop #2: Gap Analysis, Needs Assessment and Preliminary Discussion on Options*.

2.2.4 FEEDBACK ON SWMMP DIRECTIONS

A consultation document describing the proposed SWMMP directions was prepared to inform the public on the proposed directions and to encourage public feedback. The consultation document was distributed to stakeholder groups and resident associations and made available on the project website. Presentations were also given at meetings for three neighbourhood associations. The feedback received on the proposed directions indicated that they are a positive step forward to manage solid waste in Hamilton. A common point of positive feedback was that waste minimization has been included in the guiding principles and directions. There were concerns expressed about how the options would be implemented, whether the potential for illegal dumping would increase if garbage collection was reduced to every other week, and how enforcement of the waste management bylaw would be conducted.

2.2.5 FEEDBACK ON DRAFT SWMMP

PW Information Report PW12004, containing the 2012 SWMMP Draft Report, was posted on the project website for public review. A facebook advertisement and notices distributed to stakeholders (including community groups and residential associations) encouraged the public and other stakeholders to review the draft and provide comment. In addition to receiving comments through e-mail or mail, an online survey was also posted to collect feedback from residents. The survey sought confirmation on the guiding principles and the proposed waste diversion directions, the preferred "enhanced" approach to waste management as recommended in the draft SWMMP, and the recommended approach to disposal.

2.2.5.1 Guiding Principles

The majority of survey respondents agreed with the following statements regarding the guiding principles:

a) These guiding principles will help guide the future management of Hamilton's residential solid waste in a way that is environmentally, socially and economically sustainable (79% agree, 10% disagree).
b) The guiding principles will help Hamilton reach its waste diversion target (58% agree, 19% disagree).
c) The guiding principles will help to maximize the disposal capacity of the Glanbrook landfill site (69% agree, 15% disagree).
d) The guiding principles are consistent with my own principles on how residential solid waste should be managed (72% agree, 17% disagree).
e) The guiding principles provide flexibility for Hamilton's residential solid waste management system to adapt potential regulatory changes (59% agree, 16% disagree).

It is important to note that, while respondents said they agreed with statements "b" and "e" less than the other statements, those statements also received higher responses for "don't know/no opinion" than the others (23% replied "don't know/no opinion" for statement "b", while 25% responded same for statement "e").

Overall, the majority of respondents generally agreed with the statements on the guiding principles, as 71% of respondents agreed with three or more of the statements, while 13% disagreed.

2.2.5.2 Proposed Directions

The majority of survey respondents agreed with the following statements about the proposed waste diversion directions:

a) The directions move Hamilton in the right direction in regards to waste management (72% agree, 15% disagree).
b) The directions will help the residents of Hamilton recycle and compost more and send less waste for disposal (69% agree, 21% disagree).

c) The directions will help Hamilton reach its waste diversion target of 65% (52% agree, 22% disagree).
d) The directions will help Hamilton deliver its waste management programs in a way that is equitable for its residents (64% agree, 18% disagree).
e) The directions will help to foster more environmentally sustainable lifestyles in Hamilton (65% agree, 22% disagree).

While statement "c" had the lowest number of respondents who agreed with that statement, it also had the highest number of responses for "don't know/no opinion" (26%).

Overall, the majority of respondents generally agreed with the statements on the proposed directions, as 63% of respondents agreed with three or more of the statements, while 19% disagreed.

2.2.5.3 Recommended Approach

While the majority (77%) of respondents indicated that they wish to see the City of Hamilton expand its efforts on waste diversion, almost half (47%) of the respondents said that they would prefer the City adopt the maximized approach, while 30% said they agreed with the recommended enhanced approach. About 15% said the City should continue with the S*tatus Quo*.

2.2.5.4 Disposal

The majority of respondents agreed with the draft SWMMP proposed approach on waste disposal:

- 76% agreed that Hamilton should continue to use the Glanbrook landfill for the disposal of the City's garbage, while 13% disagreed.
- 85% agreed that the City should re-examine alternative disposal capacity/methods in the next SWMMP review in 2016, while 8% disagreed.

2.2.5.5 General Comments

The survey also invited respondents to provide an open-ended comment. A total of 68 comments were submitted. The comments consisted of the following types:

- Support for additional enforcement (15%)[2];
- Support for use of alternative disposal technologies (15%);
- Support for additional promotion and education (12%);
- Against the use of alternative disposal technologies (9%);
- Support for increased diversion among the business sector (9%);
- General comments on the survey itself (7%);
- General support for the SWMMP and changes to the waste management system (6%);
- Support for increased waste diversion in the multi-residential sector (4%);
- Support of introduction of bag tags (4%);
- Support for bi-weekly garbage collection (4%);

[2] Percentages are of the 68 comments received, not of all respondents who participated in the survey.

- Support for the maximized approach (4%); and
- Concern that the Glanbrook landfill would be accepting garbage from other municipalities (3%).

In addition to comments on the SWMMP, 13% of the comments were addressing Council's discussions on the solid waste management collections contract that was voted on in February 2012.

Although operational issues were not a part of this review, a number of comments were received on operational issues and these have been documented in the study summary document *Online Feedback: Operational Suggestions and Web Survey Results*.

3 LOOKING FORWARD: WASTE MANAGEMENT IN HAMILTON 2010

3.1 OVERVIEW OF AVAILABLE WASTE COLLECTION AND DIVERSION PROGRAMS IN HAMILTON

In 2010, the City of Hamilton's population was 504,559. The City provides waste collection and diversion programs to 207,349 households, of which 159,392 are single family homes and 47,957 are multi-residential units. The City provides garbage, blue box, organics, leaf and yard waste, and bulk goods curbside collection services for its residents. The City also has three Community Recycling Centres (CRCs) where residents can drop off household hazardous materials, recyclables, leaf and yard waste, scrap metal, electronics, tires, wood and appliances. Residents are also encouraged to use backyard composting, grass cycling, and public space recycling receptacles for further diversion. Curbside collection is provided once weekly for garbage, blue box materials and organics, with leaf and yard waste collection in the spring and fall.

3.1.1 RECYCLING PROGRAM

The curbside Blue Box and multi-residential cart collection for recycling is contracted to Green for Life Environmental Corporation East, while BFI is contracted to collect recyclable material at the City's three CRCs. Hamilton has a two-stream recycling system, whereby recyclables are source-separated into a fibres stream and a containers stream. These items are collected weekly for single family units and on designated days for multi-residential units. Curbside collection participants are allowed to use blue boxes, comparably-sized containers and/or clear bags to set out their recyclables. There is no limit on the quantity of recycling material that can be set out for collection, although there is a maximum weight of 13.6 kgs per container. Residents in multi-residential buildings collect their recyclables in reusable blue bags and take them to their designated recycling areas, where they then empty their recyclables into large bins typically provided by the building manager. The multi-residential recycling program is also two-stream and residents must separate their recyclables into fibres and container streams.

Hamilton's current recycling program accepts the following materials:

- Fibre: newspaper (dailies, weeklies, other), mixed fine paper, telephone books and directories, magazines and catalogues, books, corrugated cardboard, boxboard, molded pulp.
- Containers: composite cans, gable top cartons, aseptic containers, PET, HDPE, polystyrene packaging, wide mouth tubs and lids, PE plastic bags and film, aluminum (food and beverage cans, foil, trays), steel (food and beverage cans, aerosol cans, paint cans) and glass (LCBO clear, LCBO coloured, clear and coloured).

3.1.2 ORGANIC WASTE (FOOD AND KITCHEN WASTE)

The City of Hamilton launched its full organics (i.e., food and kitchen waste) collection program in 2006, first for single-family residential units and in more recent years for multi-residential complexes (by 2010, 98% of multi-residential buildings in Hamilton had access to the organics diversion program). Organics (food/kitchen waste and some yard waste) is contracted for weekly collection by Green for Life

Environmental Corporation East in the City's "B-Zones" for collection, while City crews collect from the "A-Zones".

Green carts have been provided to all residents and residents can set out one green cart and up to two containers of leaf and yard waste. Residents are not allowed to use plastic bags to hold organic material and are encouraged to use compostable bags and/or paper as a liner. The collected materials are processed at the City's Central Composting Facility (CCF), where an aerobic process is used to convert the materials into compost.

3.1.3 LEAF AND YARD WASTE

Leaf and yard waste collection is contracted for seasonal bi-weekly collection by Green for Life Environmental Corporation East in the City's "B-Zones" for collection, while City crews collect from the "A-Zones".

Leaf and yard waste consists of branches, twigs, brush, house and garden plants, leaves and Christmas trees. The City provides a separate seasonal bi-weekly collection during the spring and fall of unlimited leaf and yard waste. Leaf and yard waste will only be collected in certain containers, such as paper bags (available at local retail stores at a cost to the resident) and well labelled, rigid reusable containers. Plastic bags, cardboard boxes and blue boxes are not acceptable containers. Residents are also encouraged to use backyard composters to divert organic waste (including both food and kitchen waste and leaf and yard waste). Residents can drop off L&YW at the three CRCs free of charge. Flamborough residents can also drop off L&YW at the Carlisle Depot during certain days of the year.

Leaf and yard waste collected in the program is processed at an open windrow composting facility located at the Glanbrook Landfill site.

The City holds compost sales and giveaways to raise funds for charity and to provide residents with an opportunity to retrieve compost from their efforts of diverting L&YW.

3.1.4 MUNICIPAL HOUSEHOLD SPECIAL WASTE AND ELECTRONIC EQUIPMENT

Hazardous materials and electronic equipment are only accepted by the City at CRCs. This service is provided free of charge for residents of Hamilton. There is a limit of 40 kgs for hazardous waste, 40 litres for liquid hazardous waste, eight fluorescent tubes and one thermostat per visit. Needles and syringes must be placed in plastic or metal containers with a lid. This service is not available to commercial, industrial and institutional properties.

3.1.5 BULK GOODS

The collection of bulk goods is contracted for seasonal bi-weekly collection by Green for Life Environmental Corporation East in the City's "B-Zones" for collection, while City crews collect from the "A-Zones".

Collection takes place weekly and seasonally in the summer and winter when leaf and yard waste is not collected.

Items such as mattresses and box springs, couches, long pieces of carpet and other similar materials are too large for and not compatible with standard garbage trucks. For these items, residents are encouraged to try and reuse the items, donate them or recycle them. If this is not possible and the items need to be disposed, the City provides a bulk goods collection service during certain months of the year. Residents must call at least one week in advance to schedule a pickup. There is a limit of four items per pickup and the weight of each item must be less than 90 kgs. All bulk goods are sent to landfill.

3.1.6 White Goods (Appliances) and Scrap Metal

Scrap metal and appliances are not picked up at the curb by the City of Hamilton. Because some appliances contain chlorofluorocarbons (CFCs), which are harmful to the environment, they must be collected and disposed of separately. Residents are encouraged to make arrangements with local charitable organizations if the appliance is serviceable or try and sell the item before considering disposal. A number of businesses offer pickup of such items for a small fee. Alternatively, residents can drop these items off at any of the three CRCs free of charge. Residents with scrap metal follow the same procedure.

3.1.7 Garbage

The City provides weekly curbside garbage collection for single family units and garbage bin collection for multi-residential complexes. All garbage collected is sent to the Glanbrook Landfill Site, where the operation is contracted to Waste Management Inc. Single residential units are provided with garbage collection weekly, with a one container limit that must be under 23kgs. Some grace periods exist for seasonal holidays allowing residents to put out up to three containers of garbage. Residents can drop off excess waste at their local recycling centre/ transfer station for a fee based on weight.

A special consideration policy has been developed for those with special medical circumstances, families with three children or more under the age of five, agricultural businesses and registered home day care centres. After applying and being approved for special consideration, these households are eligible to set-out up to three containers of garbage at the curb every week.

3.1.8 Industrial, Commercial and Institutional (ICI) Waste

Certain businesses, defined as ‘eligible properties’ under the City’s Solid Waste Management By-Law 09-067, are qualified to receive waste collection services by the City and are required to comply with a six container limit for garbage, unless they obtain special policy approval. There are no limits on the amount of recycling or organics containers they can set out. All other businesses and institutions contract services with the private sector, although they are mandated by provincial law to establish recycling programs.

The vast majority of ICI waste generated in the City of Hamilton (about 60%) is not managed by the City, but by private contractors using private facilities. Many of these private facilities are located outside of the City, and some are in the United States. Although this practice is expected to continue through the SWMMP planning period, municipalities fortunate enough to have their own landfills need to be

cognizant of the potential for the border to close to the export of waste from Ontario and the significant impacts this may have on all landfills and alternative disposal facilities in Ontario.

3.1.9 *Illegal Dumping*

Illegal dumping is an undesirable activity that has been associated with the City's waste collection program and more particularly the one container limit for garbage. However, the materials collected from illegal dumping are a mix of bulk waste, construction and demolition waste, leaf and yard waste, litter and escaped debris and household garbage.

Illegal dumping can occur when new waste management programs are introduced. Past experiences in municipal programs have shown that this behaviour is usually temporary as individuals adapt to the program changes. Hamilton's recent experiences with illegal dumping are unusual in this regard, and future program changes should be monitored to assess their impact on illegal dumping. As new programs are introduced, it will be important to continue considering their potential effect on illegal dumping and to allow for additional resources as required to address any clean-up or enforcement issues.

A number of initiatives are being implemented to curb illegal dumping, including:

- An initial spring clean-up of areas difficult to access;
- Integration of efforts to address illegal dumping into the Clean City Strategy;
- An increase of 12 amnesty days for 2012-13;
- Adjustments to garbage collection services for 2013-20;
- Instituting a fee for habitual offenders of curbside waste collection programs;
- Improvements to how illegal dumping is monitored and tracked.

Although it is recognized that illegal dumping is a behavioural issue, and that these activities are carried out by a few individuals with disregard for the community and the environment, it is preferable that waste management programs including diversion programs be undertaken in a way that does not aggravate the situation.

3.2 Hamilton's Waste Management Facilities

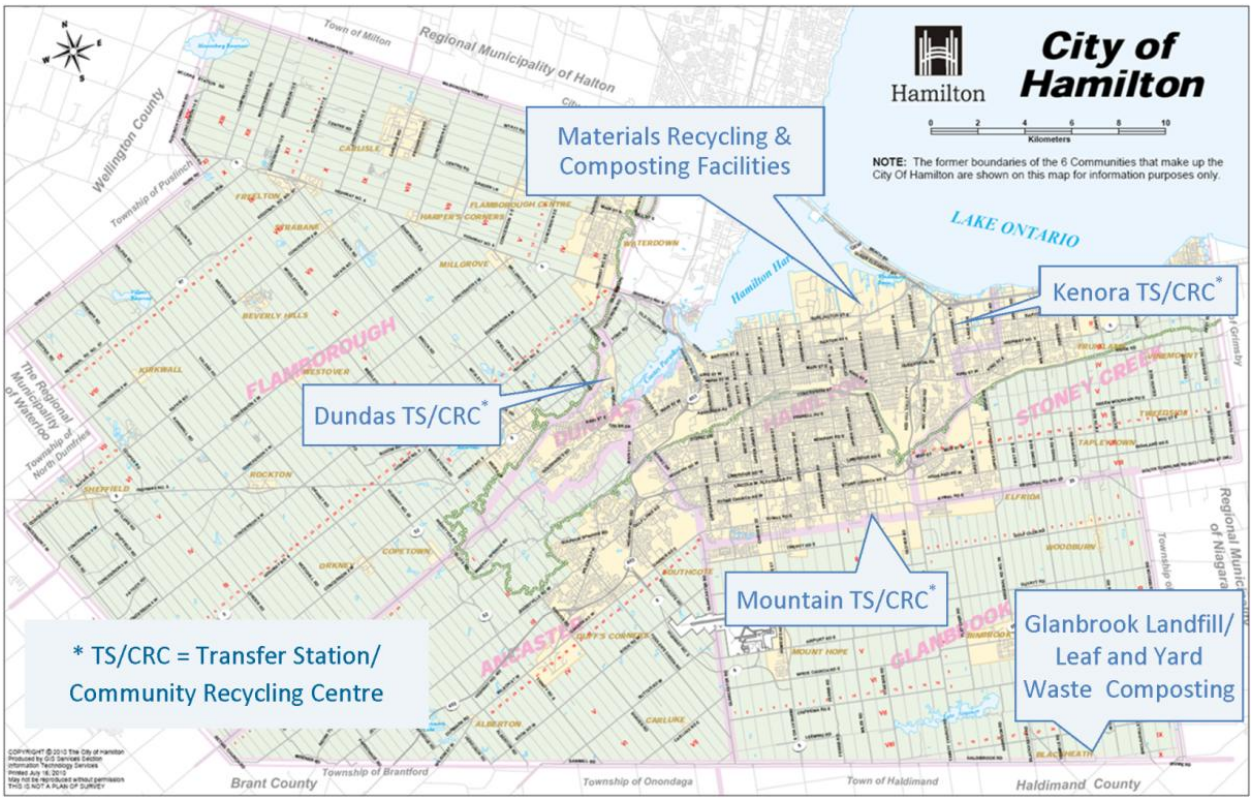
The City has a number of facilities in its waste management system, including:

- Materials Recycling Facility (MRF);
- Central Composting Facility (CCF);
- Leaf and Yard Waste Composting Facility (LYWF)[3];
- Three Transfer Stations/Community Recycling Centres (TS/CRC); and
- Glanbrook Landfill.

[3] Located at the Glanbrook Landfill site

The locations of these facilities are illustrated in Figure 1, followed by a brief description of the facilities and their available capacity.

Figure 1: Hamilton's Solid Waste Management Facilities

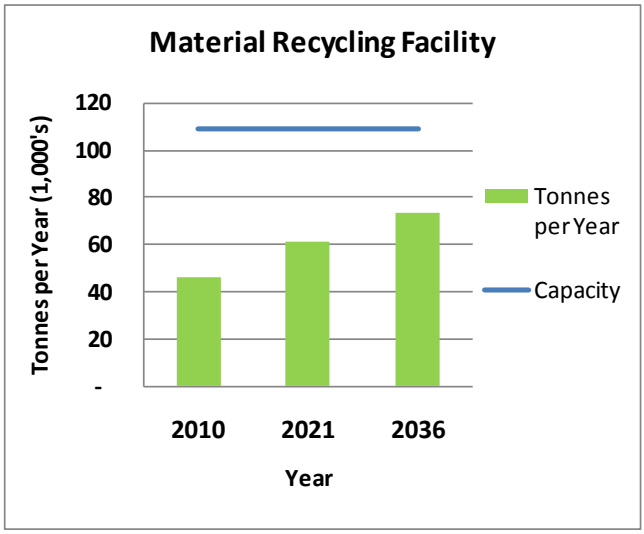


3.2.1 Materials Recycling Facility

Hamilton's MRF (located on Burlington Street) is a two-stream processing facility. Based on its Certificate of Approval (CofA), it is approved for a maximum capacity of 299 tonnes per day (TPD) or 109,000 tonnes per year (TPY). Assuming that the City of Hamilton achieves 65% waste diversion by 2021, it is estimated that by 2036 the City will be processing approximately 74,000 TPY, approximately 68% of its approved capacity (see Figure 2). Therefore, the City will have sufficient processing capacity for recyclables at its MRF for the duration of this planning period.

The building that the MRF is housed in was constructed in the late 1950's, and converted into a MRF in 1989. Equipment at the MRF was updated in 2008, but it is anticipated that the MRF will reach the end of its useful life by 2020.

Figure 2: Projected MRF Processing Tonnage (2010 – 2036)

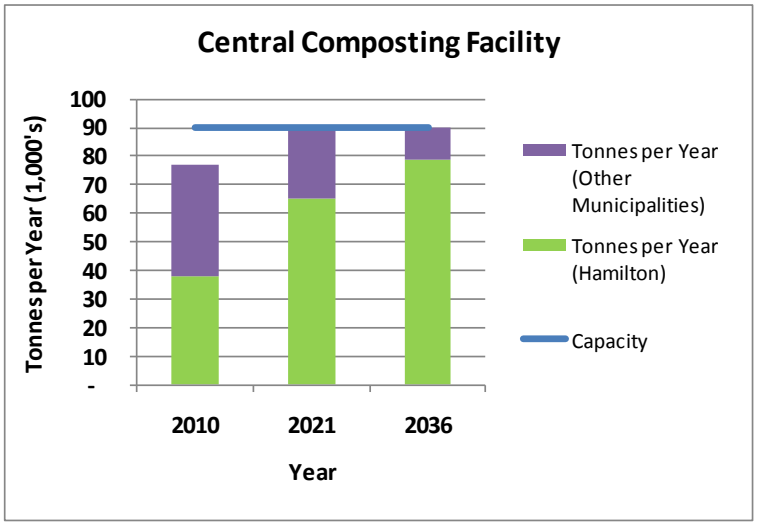


3.2.2 CENTRAL COMPOSTING FACILITY

Hamilton's CCF (located on Burlington Street) is used to process both the City's green cart organics, as well as organics from other municipalities. The facility's CofA approves it to process 90,000 TPY.

In 2010, the facility processed approximately 38,000 tonnes of green cart organics from Hamilton plus another 39,000 tonnes from Simcoe County and Halton Region. As Hamilton's organics program matures, the amount of processing capacity required will increase. Based on 65% waste diversion by 2021, it is estimated that by 2036 the City's organics program will divert about 79,000 TPY, which would exceed the CCF's approved processing capacity. The waste collection system approved for 2013 to 2020 will divert a significant amount of the leaf and yard from the CCF to the composting facility at the Glanbrook landfill. Alternatively with the shortage of capacity for processing organics in Ontario, an option would be to consider expansion as a means of ensuring capacity and maintaining revenues (see Figure 3).

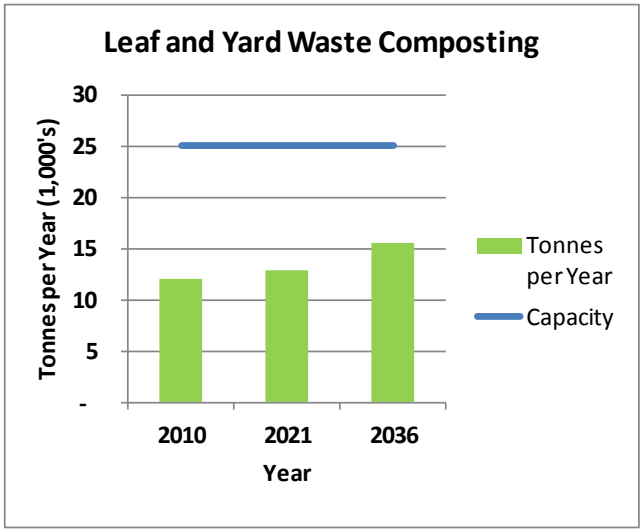
Figure 3: Projected CCF Processing Tonnage (2010 – 2036)



3.2.3 *Leaf and Yard Waste Composting Facility*

Hamilton's Leaf and Yard Waste Composting Facility is located at the Glanbrook Landfill Site and has an approximate capacity of 25,000 TPY. In 2010, the facility processed 13,254 tonnes of leaf and yard waste. Assuming the City achieves 65% waste diversion by 2021, the Leaf and Yard Waste Composting Facility will be processing an estimated 15,500 TPY by 2036, or 62% of the facility's capacity (see Figure 4). However, the compost pad will need to be relocated within next 10 years, as it is currently located in the Stage 3 Disposal Area of the Glanbrook Landfill Site which will need to be utilized eventually for disposal.

Figure 4: Projected L&YW Processing Tonnage (2010 – 2036)



3.2.4 TRANSFER STATIONS/COMMUNITY RECYCLING CENTRES AND TIPPING FEES

Hamilton's waste management system has three TS/CRC facilities, each of varying capacities:

- Mountain TS/CRC: CofA approves the facility to receive 770 TPD of material, including L&YW.
- Dundas TS/CRC: CofA approves the City to receive 650 TPD of municipal solid waste plus 120 TPD of L&YW. The facility has storage capacity for a total of 830 tonnes of material.
- Kenora TS/CRC: CofA approves the facility to receive 1,420 TPD of municipal solid waste plus 120 TPD of L&YW. The facility has storage capacity for a total of 1,530 tonnes[4].

The combined total approved capacity of the three facilities is approximately 1.01 Million TPY (based on the daily capacities). All curbside collected waste and self-hauled (i.e., drop-off) waste goes through TS/CRC facilities. In 2010, the facilities handled about 37,000 tonnes. Assuming the City achieves 65% waste diversion by 2021, the TS/CRC facilities will be handling an estimated 53,000 TPY by 2036, or about 5% of their collective capacity.

While the sites have sufficient approved capacity for handling the waste material, space constraints have been noted by staff relating to the logistics of how waste is dropped off and managed at the TS/CRC's. For example staff has reported that on busy days police are required to direct traffic in and out of the facilities. Also, when staff previously considered introducing drywall recycling only one TS/CRC had sufficient space available to accept drywall. As part of its regular operations, City staff are considering a review of the TS/CRC's, which would include an assessment on appropriate locations for potential future CRC's[5].

In January and February 2012, staff reports PW11030d and PW11030e provided information on tipping fees and the potential cost impacts of reducing them relative to concerns about illegal dumping. It was determined that the budget impacts were significant and that this would not be pursued further at the present time. Reduced tipping fees would also likely add to the congestion occurring at the CRCs. However, a further review of tipping fees could be undertaken as part of an operational review of the TS/CRCs.

3.2.5 GLANBROOK LANDFILL

At the start of 2011, the Glanbrook Landfill had an estimated 5,038,900 tonnes of capacity remaining, based on current compaction rates. The rate at which this capacity will be used is a function of the total amount of waste generated in Hamilton and the City's residential waste diversion rate. Using the current waste generation rate and assuming population growth consistent with the City's Growth Related Integrated Development Strategy, GRIDS, the Glanbrook Landfill should have enough capacity to

[4] Based on Certificate of Approvals.

[5] City of Hamilton Public Works Department. *Budget Report on Follow-up to Options for Increasing Diversion and Landfill Capacity -Additional Diversion Options to Reach 65% Waste Diversion (PW07151d)*. February 7, 2011.

last until between 2036 (no increase in diversion) and 2044 (65% waste diversion by 2021)[6]. For more discussion on potential diversion rates and their effect on the landfill's lifespan, please see Section 4.4.

3.3 Results of Gap Analysis

3.3.1 Waste System Performance

In 2010, the City of Hamilton's residential sector generated 216,848 tonnes of solid waste. The Gap Analysis[7] showed that 83% of this waste was generated by Hamilton's single-family sector and 17% by the multi-residential sector. The analysis also showed that the single-family residential sector diverted an estimated 55% of its waste from disposal in 2010, while the multi-residential sector diverted 21%. Combined, the total residential sector diverted an estimated 49% of its waste from disposal. Table 2 summarizes the diversion rates for each waste stream category by residential sector.

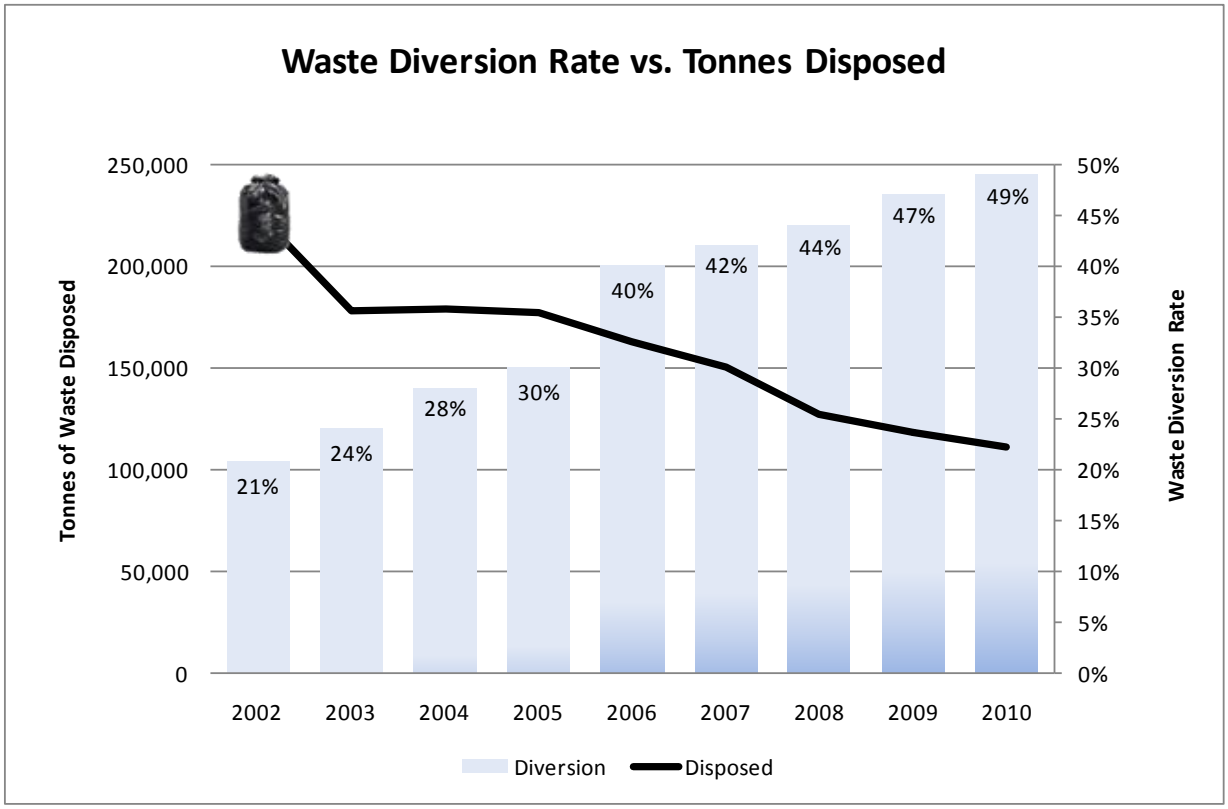
Table 2: Diversion of Waste Stream Categories

Waste Stream Category	Diversion Rate (2010)		
	Total Residential Sector (Single-Family + Multi-Residential)	**Single Family**	**Multi-Residential**
Paper	83.4%	88.6%	56.3%
Paper Packaging	51.2%	56.1%	29.8%
Plastics	29.1%	33.6%	12.1%
Metals	50.9%	53.8%	37.5%
Glass	74.2%	78.0%	61.2%
Household Special Waste	48.4%	47.7%	51.1%
Organics	67.9%	75.3%	12.5%
Other Materials	4.1%	4.6%	2.4%
Waste Electrical and Electronic Equipment	18.9%	15.3%	29.7%
Total	**49.0%**	**54.5%**	**21.3%**

Compared to 2002, the City of Hamilton has significantly increased the percentage of waste it diverts and decreased the amount of residential solid waste it disposes. As Figure 5 illustrates, the City's residential solid waste diversion rate has more than doubled since 2002, while the amount of waste being sent for disposal has been more than halved (down from 225,599 tonnes in 2002 to 110,666 tonnes in 2010).

[6] Currently, most of the business sector waste in Hamilton is managed by the private sector and disposed of in private sector landfill sites. See Section 3.1.8.
[7] Presented in the study report *Gap Analysis*.

Figure 5: Hamilton's Waste Diversion Rate and Disposal Tonnage (2002 – 2010)



3.3.2 *Waste Characterization*

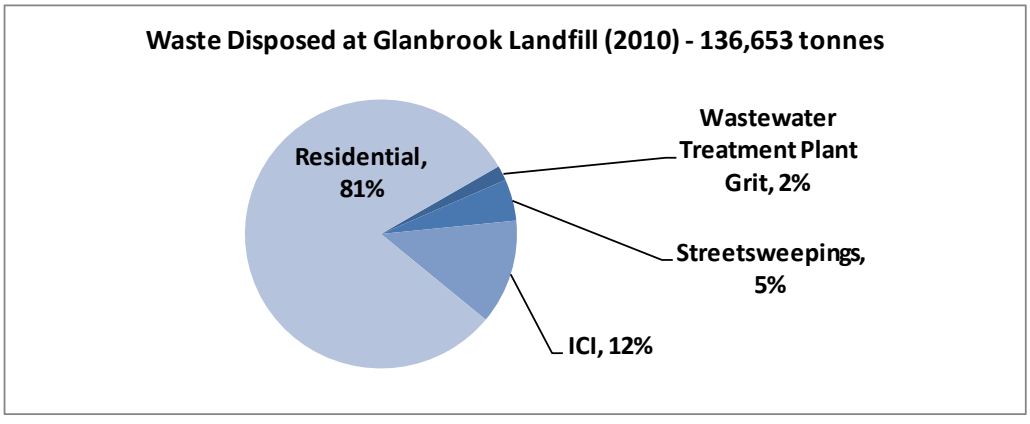
Table 3 shows a summary of waste characterization for Hamilton's 2010 waste stream, including both single-family and multi-residential sectors. The largest categories in the residential waste stream in 2010 were organics (36.2%), other materials (22.6%), paper (11.9%) and paper packaging (10.3%).

Table 3: Waste Characterization (2010)

Waste Category	Total Residential Sector		Single Family	Multi-Residential
	Total Waste Generated for Each Waste Category (tonnes)	% of Total Waste Stream (for each waste category)	% of Total Waste Stream (for each waste category)	% of Total Waste Stream (for each waste category)
Paper	25,702	11.9%	11.9%	11.5%
Paper Packaging	22,238	10.3%	10.0%	11.5%
Plastics	18,726	8.6%	8.2%	10.8%
Metals	8,244	3.8%	3.7%	4.1%
Glass	9,131	4.2%	3.9%	5.7%
Household Special Waste	1,929	0.9%	0.9%	1.1%
Organics	78,551	36.2%	38.4%	25.3%
Other Materials	48,921	22.6%	21.5%	27.6%
Waste Electronics and Electrical Equipment (WEEE)	3,406	1.6%	1.4%	2.3%
Total	**216,848**			

As noted, the focus of the SWMMP Review is on Hamilton's residential solid waste stream, which makes up 81% of the solid waste going into the Glanbrook Landfill. The landfill also receives waste from Hamilton's Industrial, Commercial and Institutional (ICI) sector (most of the waste from this sector in Hamilton is managed by private disposal facilities), as well as grit from the Waste Water Treatment Plant, and street sweepings. The proportions of these materials disposed in the Glanbrook Landfill for 2010 are illustrated in Figure 6.

Figure 6: Waste Disposed at Glanbrook Landfill



3.3.3 *Potential for Additional Diversion*

In the Gap Analysis, an assessment was completed of how much additional material could be diverted if under-performing materials were captured more fully over the existing capture rate (i.e. system

optimization). Target capture rates (which refer to how much of a specific waste material that could be captured for diversion) were assigned for blue box recyclables, organics, and other divertible materials [8]. The materials already achieving greater than the target capture rates were assumed to maintain the same level of diversion in the future. Through the assessment, it was found that (based on 2010 tonnages) optimization of Hamilton's existing waste management programs and achievement of the target capture rates could potentially:

- Divert approximately 21,400 more tonnes of material in the single-family residential sector and contribute an additional 9.85 percentage points to the City's overall diversion rate;
- Divert approximately 12,700 more tonnes of material in the multi-family residential sector and contribute an additional 5.85 percentage points to the City's overall diversion rate;
- For the residential sector overall, divert approximately 34,100 more tonnes of material and contribute an additional 15.70 percentage points to the City's overall diversion rate, raising it to about 65%.

This does not include the potential diversion of materials for which City diversion programs do not currently exist (e.g., carpeting, durable plastic products, construction and renovation waste, etc).

Table 4 summarizes the amount of additional diversion estimated to be available through program optimization (note that this does not include potential diversion of materials for which there is currently no City program, such as drywall, shingles or diapers).

Table 4: Potential Additional Diversion of Waste Categories

	Total Residential Sector		Single Family		Multi Family	
Waste Stream Category	**Possible Additional Tonnage**	**Increased Diversion Above Existing Diversion Rate** (Percentage Points)	**Corre-sponding Additional Tonnage**	**Increased Diversion Above Existing Diversion Rate** (Percentage Points)	**Corre-sponding Additional Tonnage**	**Increased Diversion Above Existing Diversion Rate** (Percentage Points)
Paper	2,212	1.02%	1,049	0.48%	1,163	0.54%
Paper Packaging	7,370	3.40%	5,124	2.36%	2,246	1.04%
Plastics	3,389	1.56%	2,224	1.03%	1,145	0.53%
Metals	2,850	1.31%	2,134	0.98%	715	0.33%
Glass	280	0.13%	0	0	280	0.13%
Household Special Waste	229	0.11%	200	0.09%	29	0.01%
Organics	15,741	7.26%	9,059	4.18%	6,683	3.08%
Other Materials	71	0.03%	32	0.01%	40	0.02%
WEEE	1,910	0.88%	1,524	0.70%	386	0.18%
Total	**34,052**	**15.70%**	**21,365**	**9.85%**	**12,687**	**5.85%**

[8] Under-performing materials are considered those with current diversion options available and which are achieving a capture rate less than either 85% in the blue box program, 85% in organics and 75% in other diversion programs. The 85% blue box target was selected to match the Waste Diversion Ontario recommended blue box material capture rate target for large urban municipalities.

4 2012 Solid Waste Management Master Plan

The SWMMP is intended to provide the City of Hamilton with a roadmap for how it should manage the City's residential solid waste over the next 25 years. This section begins with the updated principles that will be used to guide how the City manages its waste, followed by goals and the objectives that will help to measure success. Finally, the strategic directions that the City will use to achieve these goals and objectives are then discussed, including how they can work together as a system.

During the planning process for this SWMMP, it was suggested that the City of Hamilton should consider the principle of Zero Waste. For a community to achieve Zero Waste, a number of conditions are required, particularly:

- Waste generators (i.e., residents/consumers) make consumer decisions about products that minimize product packaging waste and waste from the product's end-of-life;
- Programs are in place to receive and divert unwanted products and packaging from disposal (e.g., municipal recycling and composting programs, industry stewardship programs, opportunities for the reuse of durable goods[9], etc); and
- Product manufacturers design products and packaging to minimize packaging waste and to make sure the products can be easily recycled at the end of their useful life.

The adoption of a policy of Zero waste is viewed as a goal, recognizing that there are many factors outside of the City's control. This SWMMP has, however, been designed to help the City and its partners in solid waste management[10] move Hamilton closer to this philosophy.

The SWMMP and Vision 2020

The SWMMP is one aspect of the overall structure that allows Hamilton to function as a thriving City. The other components (including other municipal services) operate under the umbrella of Vision 2020, which presents a view of a Hamilton that is strong, healthy and sustainable. It contains the principle of sustainability, and it states that consideration of the economic, social, and environmental effects on our decisions is critical, as a decision in one area (or pillar) can affect the progress of other areas. As the SWMMP falls under the Vision 2020 umbrella, the principle of sustainability is understood to be inherent, and this is reflected through the 2012 SWMMP's goals and objectives. For more information on Vision 2020, visit www.hamilton.ca/ProjectsInitiatives/V2020.

4.1 Guiding Principles

In 2001, the City of Hamilton and the SWMMP Public Advisory Committee prepared two guiding principles for the 2001 SWMMP. As described in Section 2.2, the public was asked in this current process if the 2001 SWMMP guiding principles still applied today, if they need to be changed and what they would be. In general, the public response has been that

[9] "Durable goods" are those materials that are long lasting and can be reused once the original purchaser no longer wants the item.

[10] The City of Hamilton's partners in solid waste management includes its contractors, and the residents of Hamilton, other tiers of government, product producers, and Hamilton's ICI community.

the original guiding principles from the 2001 SWMMP are still applicable and should be kept, with some updating.

Feedback from the public also indicated that the waste management hierarchy should be reflected in the guiding principles. The waste management hierarchy organizes the main waste strategies in order of importance or desirability, placing waste reduction and reuse as preferred waste management strategies before recycling. To reflect this, the public suggested a third Guiding Principle based on the understanding that the City's current waste management program incorporates all major waste diversion activities, and therefore the next major step is to also place emphasis on waste minimization. The Guiding Principles for the City of Hamilton's 2012 SWMMP are provided in Table 5.

Table 5: Guiding Principles for Hamilton's 2012 Solid Waste Management Master Plan

1. **The City of Hamilton must lead and encourage the changes necessary to adopt the principle of Waste Minimization.**

   The need for the City of Hamilton to place more emphasis on waste minimization (i.e., waste reduction and reuse) was commonly heard from process participants. While it is important to have programs in place that can divert solid waste from disposal, it is also important to shift the public mindset to one that seeks to avoid generating waste in the first place.

2. **The Glanbrook Landfill is a valuable resource. The City of Hamilton must minimize residual waste and optimize the use of the City's diversion and disposal facilities.**

   The second guiding principle continues to recognize that the Glanbrook Landfill is a valuable resource for the City and its residents. It has been updated to reflect the community's desire to minimize the amount of residual waste requiring disposal, as well as to optimize how the City uses both its diversion and disposal facilities. Optimization of the facilities includes not just their overall capacity to manage Hamilton's waste, but also economic optimization as well.

3. **The City of Hamilton must maintain responsibility for the residual wastes generated within its boundaries. Inter-regional facilities will be considered.**

   While the third guiding principle continues to recognize that the City must maintain responsibility for the residual wastes generated by Hamiltonians, it acknowledges that opportunities may arise in the future that provide Hamilton with responsible alternatives to managing either its divertible material or residual wastes with partners possibly outside of Hamilton's borders.

4.2 GOALS AND OBJECTIVES

During the review, the public contributed to the goals and objectives of the 2012 SWMMP. The SWMMP goals and objectives are organized according to the three pillars of sustainability - society, the environment, and the economy.

Goals
Broad, high level statements that outline what the program is trying to achieve.

Objectives
Measureable, defined statements that describe specific, tangible outcomes.

4.2.1 THE SOCIETY PILLAR

The 2012 SWMMP goals within the society pillar include three broad, over-reaching goals:

1. The City of Hamilton presents a consistent *message* to increase awareness and understanding.
2. The City of Hamilton provides convenient *access* to programs to ensure everyone is able to participate.
3. The residents of Hamilton consistently *participate* in the City's solid waste management programs.

Subsequent goals drawn from the themes of these over-reaching goals include:

Message

4. Information about Hamilton's programs is clear and accessible to its diverse community.
5. The City of Hamilton provides a consistent message regarding waste minimization through its various sustainability-related initiatives (e.g., Vision 2020, etc).
6. The residents of Hamilton have a high awareness of waste management issues (in particular, its cost and value) and available programs.

Access

7. Components of the SWMMP are adaptable enough to accommodate Hamilton's various local geographical and sociological characteristics.
8. Hamiltonians have access to waste diversion programs regardless of where they are - at home[11], at work or at play.
9. There is access to a consistent level of waste diversion services available across Hamilton.

Participation

10. Participation in waste minimization and diversion activities among other sectors (e.g., business, education, community events, etc) is maximized.
11. Participation in waste minimization and diversion activities/programs is maximized for both single-family and multi-family households.

[11] Including both single-family and multi-residential (e.g., apartments and condominiums) households.

The ultimate outcome of these goals is:

12. Attaining a culture of waste minimization and diversion that is commonplace and mainstream throughout Hamilton.

Objectives to help measure these goals include:

a. There is an earned Gold Box in front of every curbside household in Hamilton.
b. Accesses to communication materials about Hamilton's waste management programs are available in all of the City's main languages.
c. Participation in the City's main waste diversion programs is maintained at 90%.
d. 100% of Hamilton's eligible businesses have a waste diversion plan in place as required under Ontario Regulation 103/94.
e. The number of people reached through the City's waste management education and outreach activities expands year over year from 2010 levels.

4.2.2 *The Environment Pillar*

Goals within the environment pillar include:

1. Illegal dumping and litter is reduced.
2. Hamilton's waste management system will reduce the City's overall per capita environmental footprint on air, water and land.
3. The total amount of waste generated by the residents of Hamilton is reduced.
4. The diversion of solid waste generated is maximized.

Objectives to help measure these goals include:

a. A waste diversion target of 65%.
b. Capture rates of recyclable material meet or exceed Waste Diversion Ontario's capture rate standards.
c. A 50% reduction in the amount of residuals (e.g., contamination) collected through the waste diversion programs.
d. Waste generated is reduced through awareness of waste minimization practices.

4.2.3 *The Economy Pillar*

Goals within the economy pillar include:

1. Lobby efforts encourage greater adoption of less wasteful product packaging.
2. There is an increase of Extended Producer Responsibility within the City of Hamilton.
3. Energy recovery options are explored at the Glanbrook Landfill.
4. Existing markets for recyclable materials are expanded and diversified.
5. Hamilton's waste management resources are used efficiently, costs are being contained, and economies of scale are being realized where possible.
6. Revenues from the City's diversion facilities are maximized.

7. All of the City's inter-regional partnerships provide economic benefits to all partners.

Objectives to help measure these goals include:

a. Additional materials are included for diversion.
b. Costs are reduced, diversion revenues are increased, and efficiency and effectiveness are increased.

4.3 Overview of Strategic Directions

This section describes the five key strategic directions for Hamilton's 2012 SWMMP. The directions address all facets of Hamilton's waste management system, build on the input that was received throughout the process, and are consistent with the Ministry of the Environment's (MOE) Waste Value Chain (i.e. the hierarchy of waste management – reduce, reuse, recycle, dispose). Section 4.4 describes how the directions could be integrated and their potential for diversion, estimated costs, and effect on the estimated lifespan of the Glanbrook Landfill.

4.3.1 Education and Enforcement

Promotion and education are key components of any successful waste management program. Not only must program users be made aware of the programs and how to use them, but they must also be reminded and motivated to do so. The most effective kind of promotion and education works in two directions, in effect forming a dialogue between the municipality and those using its waste management programs. Not only would residents be receiving information on programs, but they are also communicating back what works well and is understood, as well as what does not work well and areas of confusion.

While promotion and education can be effective at encouraging participation, some residents will continue to place their divertible waste in the garbage. Currently, the City's Solid Waste By-Law 09-067 prescribes acceptable and unacceptable garbage. If promotion and education is found not to work in some cases, enforcement of these by-laws may be used to encourage participation.

Examples of options that would fall under this direction include:

- **Targeted Educational Materials and Initiatives:** The City's existing education and outreach program is well established for targeting specific materials, diversion programs, specific behaviour or attitude changes, or geographic areas. Emphasis could be placed on topics such as waste minimization (i.e., waste reduction and reuse), illegal dumping, and on the use of social media (such as Facebook and Twitter).
- **Adopt Zero Waste Policy at Municipal Events and Buildings:** A zero-waste policy could be encouraged at municipal events and buildings, such as libraries, civic centres, city hall, fire stations and community centres.
- **Incentives and Recognition for Good Diversion Behaviour:** In addition to the "Gold Box" program, other incentives or rewards could include diversion credits (e.g.,

www.recyclebank.com), tax incentives or compost giveaways could be used to motivate greater participation.

- **Enforcement of Solid Waste By-laws:** The City of Hamilton has a municipal solid waste by-law that prohibits placing recyclable materials in with regular garbage. Enforcement of the by-law could be considered as needed (in conjunction with education) to ensure recyclable, compostable and hazardous materials are kept out of landfill and that illegal dumping is reduced.

4.3.2 *Service Level Modifications*

Over time, the waste management needs of residents and the dynamics of how waste is diverted can change. In response to these changes, the City may need to modify how it delivers waste management services (e.g., collection of recyclables, organics and garbage) to its customers, the residents of Hamilton. Modifications to how the City delivers these services can help to encourage diversion, increase cost-effectiveness, or both.

Two examples of options that would fall under this direction include:

- **Bi-weekly Garbage Collection:** With recycling and organics collection occurring weekly, the frequency of garbage collection could be reduced from weekly to every other week (bi-weekly). This would encourage residents to maximize use of available diversion programs. It would also reduce collection costs and air emissions. It is recognized that the waste collection system for 2013 to 2020 is based on weekly collection of garbage and bi-weekly garbage collection could only be considered in the next collection period.
- **Automated Single Stream Recycling Collection:** Currently, the City collects recyclable fibres and containers in separate recycling streams. Switching to automated single-stream collection of recyclables would make recycling easier and could improve collection efficiency and increase the amount of recyclables collected. This may involve the use of larger containers such as wheeled carts and a collection truck equipped with a mechanical tipper. Materials collected at curbside would then be sorted at a City facility. This would require the City's MRF to include equipment able to accept single-stream recyclables. There is an opportunity to review single stream processing and collection during the recycling review scheduled to take place before the 2020 waste collection contracts and the expiration of the current MRF processing contract.

4.3.3 *Waste Minimization and Diversion Opportunities*

Currently, the City has a wide variety of waste diversion programs available to residents and provides information resources for waste reduction and reuse (i.e. waste minimization) on its website. In moving forward, the City will work to foster a wider culture of waste minimization and to provide more opportunities for diverting the waste that is generated.

Examples of options that would fall under this direction include:

- **Addition of New Materials to Existing Recycling Programs:** New material (e.g., mixed plastics, carpet, etc.) could be added to the City's recycling programs as it becomes economically feasible

to do so (e.g., if the City can process them and if markets are available). Opportunities for diversion may arise as new processing techniques are developed and markets are established for materials currently difficult to recycle.

- **Additional Re-use Centres:** Currently, the City operates a re-use centre at its Mountain CRC. The City could consider the feasibility of additional re-use centres at CRCs, other locations or partnering with other existing organizations/ charities that reuse materials.
- **Commercial Sector Recycling and Composting:** The City collects some waste from small businesses. The City could work with these small businesses to encourage greater diversion from the City's small business sector, such as through green cart composting or educational support. The educational support could also be extended to businesses that are not customers of Hamilton's waste management services.
- **Construction and Demolition Re-use and Recycling:** The City could promote and/or provide for the re-use and recycling of residential construction and renovation materials such as wood, nails, screws, drywall, carpeting, and general construction material.
- **Event Days:** Event Days in communities across Hamilton could encourage residents without easy access to a CRC or reuse organization to donate or obtain materials suitable for reuse.
- **Waste Diversion in Multi-Residential Buildings:** A targeted emphasis on recycling and composting in multi-residential buildings could help to overcome residents' waste diversion challenges and increase diversion.

4.3.4 Multi-Municipal Collaboration

While Hamilton has control over how it manages waste generated within its borders, influencing how manufacturers and producers design their products and packaging is more difficult. However, the City can continue its efforts to work with other municipalities, other levels of government, community groups and other stakeholders to encourage greater producer stewardship and more waste conscious product design.

Hamilton can also work with its neighbours to make waste diversion more cost-efficient. Processing recyclables and organics could be done on a regional scale instead of by municipality. This can reduce costs by increasing economies of scale through sharing of facilities, which can be very expensive to build and operate. This allows some municipalities to find less expensive ways to process their materials, while providing others with a source of revenue, all of which benefits taxpayers.

Examples of options that would fall under this direction include:

- **Extended Producer Responsibility:** The City could continue its efforts to lobby for greater producer stewardship. The City could also consider establishing and promoting retail "Take it Back" initiatives, where manufacturers and suppliers take back products after their use.
- **Multi-Municipal Processing:** Hamilton's recycling and composting facilities could be used to process materials from other municipalities. This type of partnership allows other municipalities to increase their diversion rate while providing revenue for Hamilton. This may require future studies to assess material processing capabilities and capacity issues.

4.3.5 *DISPOSAL*

After Hamilton's residential solid waste has been reused, recycled and composted to the extent possible, a portion of waste will remain that requires disposal. Currently, the City of Hamilton uses the Glanbrook Landfill for the disposal of this waste. Based on 2010 disposal rates, the Glanbrook Landfill has enough capacity to remain in operation until about 2036, although this lifespan will extend as diversion is increased (see next section).

It is anticipated that the life of the Glanbrook Landfill will extend beyond the end of this Review's planning period (i.e. 2036). As such, it is recommended that the Glanbrook Landfill continue to be used as the City's means for disposing of its waste. However, it is acknowledged that the landfill is a finite resource that will someday close and so another means of disposing the City's residual waste will be required. It is therefore also recommended that the City consider alternative disposal capacity no later than in the next SWMMP review. Staff should also continue to monitor emerging alternative disposal technologies. The options for alternative disposal capacity could be either a replacement for the Glanbrook Landfill or as a means of complementing and extending the useful life of Glanbrook. As time progresses, the following technologies amongst other new processes will continue to improve:

- Energy from waste (e.g. incineration, gasification, pyrolysis, etc.);
- Waste stabilization (a process where the waste sent for disposal is run through a process similar to composting and made inert, which reduces leachate and minimizes landfill gas);
- Mechanical separation (where waste sent for disposal is sorted before going into to landfill, so that recyclable and compostable materials can be extracted); and
- Other technologies, processes and opportunities that may arise before the next review period.

4.4 SYSTEM ANALYSIS SUMMARY

The amount of waste diverted and the cost of programs arising from the 2012 SWMMP will depend on the directions implemented and the level of waste diversion they achieve. The assessment of the directions examined the current system (Status Quo) as a baseline and then considered the results of both moderate (an enhanced approach over Status Quo) and an aggressive (maximized approach) implementation of the directions.

Table 6 summarizes the estimated change to costs for implementing the various waste management scenarios, which are discussed in greater detail in the sections that follow.

Table 6: Summary of Approaches to SWMMP Directions

Scenario	Diversion Rate (by 2021)	Estimated Change Relative to Status Quo Annual Waste Management Operations Budget	Estimated Glanbrook Landfill Closure Date	Total Cost	25-Year Net Present Value
Diversion					
Status Quo	55%	-	2040	$642 M	$425 M
Enhanced	65%	Savings of $2.4 Million	2044	$733 M	$483 M [(a)]
Maximized	75%	Savings of $4.5 Million	2048	$749 M	$496 M [(a)]
Disposal					
ADT by 2027	Assumed 65% by 2021	-	2053	$583 M	$390 M
Status Quo (Glanbrook Landfill)	Assumed 65% by 2021	-	2044	$501 M	$344 M

[(a)] While the enhanced and maximized scenarios provide operational savings, the overall system costs will increase as diversion increases because the cost to process diverted waste is greater than the cost for disposal.

4.4.1 Approach to Waste Diversion

4.4.1.1 Status Quo

In assessing the Status Quo, the project team considered Hamilton's current waste management system and projected its results over the planning period. In 2010, the City's residential diversion rate was 49%. Experience with other waste management systems in Ontario show that systems tend to mature over time, as residents better understand and more fully participate in programs. For example, the organics program is expected to mature in Ontario municipalities over the next decade just as the blue box program did in the 1990's.

In 2010, the capture rate in the City of Hamilton for food waste was 58.3%, leaf and yard waste was 94.8% and tissue/towelling was 16.7%, for an overall organics capture rate of 63.6%. This rate is quite high compared to other municipalities in Ontario, especially for a relatively new curbside organics collection and composting program. Most organics programs experience capture rates of 30% to 50% upon program initiation. Comparatively, established Blue Box recycling programs in Ontario experience capture rates of 80% to 90%. It is expected that Hamilton's residential diversion rate could rise from the current 49% to 55% by 2021 as the organics program continues to mature, without any major modifications to the current system (i.e. maintaining the status quo).

In this scenario, the Glanbrook Landfill would reach capacity by 2040 and another means of disposing of the City's garbage would be required at that time. The total estimated cost of the Status Quo system over 25 years (including diversion and disposal) is $1.234 B (with a Net Present Value of $826 M). This includes current operating costs and planned capital costs and studies, which include among other items:

- Expansions of the CRC/TS's in 2018 – 2020[12];
- Equipment upgrades to the MRF in 2012 and 2029[13], and its lifecycle replacement in 2019 – 2020;
- Lifecycle replacement of the CCF in 2026 – 2027;
- Relocation of the leaf and yard waste composting facility (at the Glanbrook Landfill) in 2015; and
- Other on-going capital expenditures.

There is a large gap between the single-family sector and multi-residential sector diversion rates. The residential diversion rate is currently 54.5% for the single family sector and 21.3% for the multi-residential sector. Table 7 lists the materials in the multi-residential sector that have the potential to increase the overall residential diversion rate the greatest amount. Table 8 lists the materials in the single-family sector with the greatest potential to increase diversion. Overall, food waste, tissue/ towelling, boxboard and mixed fine paper have the greatest potential to raise the City's residential diversion rate.

Table 7: Materials in Multi-Residential Sector with Highest Potential to Increase Diversion Rate

Material	Waste Diversion Stream	Potential Diversion Increase from 2010 Waste Diversion Rate*	Cumulative 2021 Diversion Target (Running Total)*
Food Waste	Organics	2.34% - 3.56%	51.34% - 52.56%
Tissue/Towelling	Organics	0.36% - 0.43%	51.70% - 52.99%
Boxboard/Cores	Blue Box, Organics, CRC	0.32% - 0.4 1%	52.02% - 53.40%
Mixed Fine Paper	Blue Box, Organics, CRC	0.26% - 0.33%	52.28% - 53.73%

* Ranges dependent on capture rates of materials. Lower range represents capture rates of 85% for recyclables and organics and 75% for other materials. The higher range represents all of the available material being captured.

[12] Years are current estimates.
[13] The 2029 upgrade would be for the future MRF that replaces the existing MRF.

Table 8: Materials in Single-Family Residential Sector with Highest Potential to Increase Diversion Rate

Material	Waste Diversion Stream	Potential Diversion Increase from 2010 Waste Diversion Rate*	Cumulative 2021 Diversion Target (Running Total)*
Food Waste	Organics	4.18% - 7.57%	53.18% - 56.57%
Tissue/Towelling	Organics	1.90% - 2.32%	55.08% - 58.89%
Other Metal	CRC	0.83% -1.09%	*55.9* 1% - 59.98%
Polyethylene Plastic Bags & Film - Packaging	Blue Box	0.65% - 0,83%	56.56% - 60.8 1%
Mixed Fine Paper	Blue Box, Organics, CRC	0.39% - 0.61%	56.95% - 61.42%
Boxboard/Cores	Blue Box, Organics, CRC	0.15% - 0.47%	57.10% - 61.89%
Other Electronics	WEEE	0.34% - 0.45%	57.44% - 62.34%

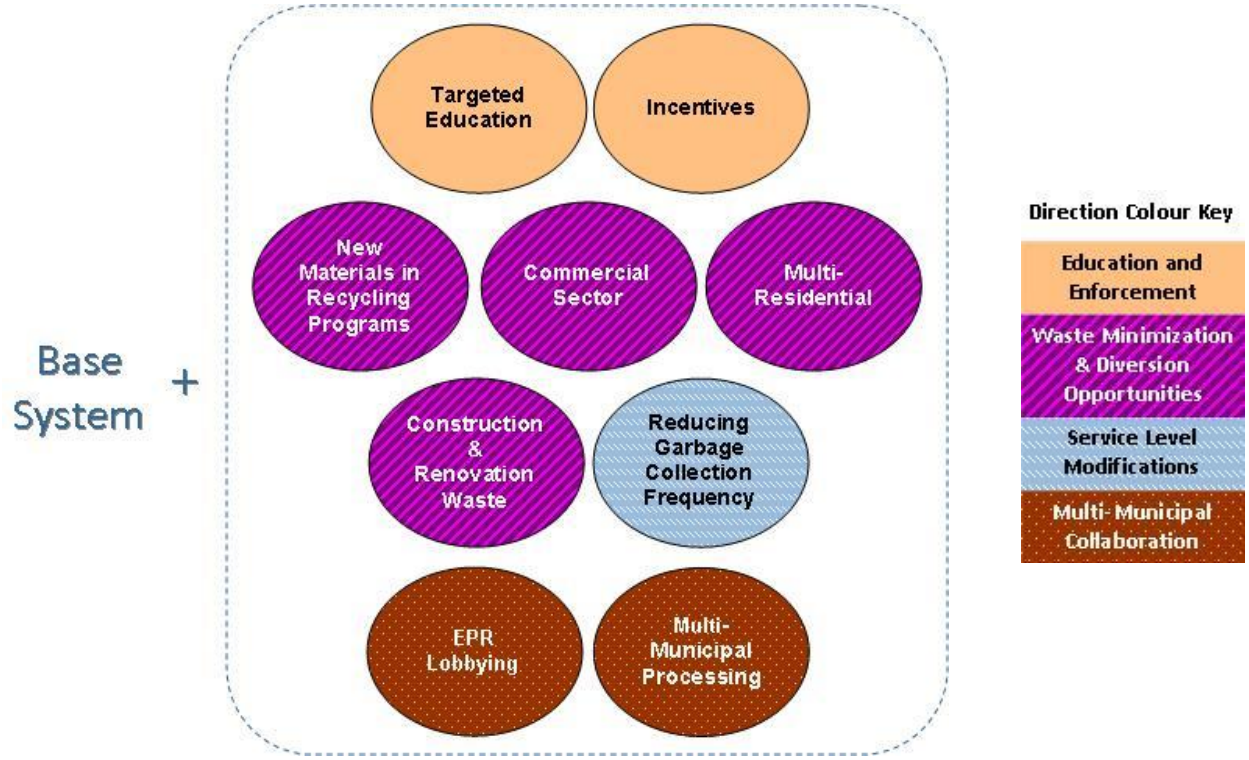
* Ranges dependent on capture rates of materials. Lower range represents capture rates of 85% for recyclables and organics and 75% for other materials. The higher range represents all of the available material being captured.

4.4.1.2 Enhanced Approach

An enhanced solid waste management system for Hamilton would include a moderate adoption of the proposed SWMMP principles. The Enhanced Approach focuses on current programs and education measures to get more out of them. It implements options that have the most capacity for improvement.

For the purpose of this assessment, the following options were added to the City's current system as an enhanced system: targeted education, use of incentives, an emphasis on the commercial sector and multi-residential buildings, diversion of residential construction and renovation waste, adding new materials to the City's diversion programs, continued encouragement of EPR, multi-municipal processing, and reducing garbage collection frequency to bi-weekly (see Figure 7).

Figure 7: Enhanced Approach to Implementation of Directions



For the most part, all of the options noted above, except for reducing garbage collection frequency to bi-weekly and multi-municipal processing, do not involve any major changes or additions to the current system but are generally related to education and promotion. Furthermore, two of the program options in this scenario do not directly impact the ability to increase the residential diversion rate, which is the primary measure of the success of increased diversion. For example, additional focus on the City's commercial sector can increase the overall diversion rate and reduce disposal requirements but would not be included as a measure of the residential diversion rate. However, it would be considered in the City's overall diversion rate and increase landfill life. Expanding the City's MRF or CCF to attract and process recyclables or organic materials from other municipalities will also not increase the City's residential or overall diversion rate. In fact, there will likely be a small negative impact on site life at the Glanbrook Landfill, as the residuals from processing these materials will likely be disposed in the landfill; however, the impact of this would very small. Although it is recognized that consideration of bi-weekly garbage collection cannot be considered for implementation before 2020, it would represent the most significant potential increase in diversion.

Environmental Net Effects

In general, the components of the Enhanced Diversion scenario are related to enhanced education and promotion. No new facilities are proposed that could have negative impacts on the environment. The focus of the education programs results in a net positive impact to the environment by increasing the amount of waste diverted. This reduces the negative impacts associated with obtaining the raw materials for new products. Increasing the amount of organic material diverted from disposal to

composting reduces greenhouse gas (GHG) emissions, reduces impacts of landfills by removing organics that increase leachate strength and returns a beneficial product to the soil.

One option in the enhanced approach - reducing the frequency of garbage collection to bi-weekly - has a positive net environmental benefit from a number of aspects. A direct positive enhancement is that there are less collection vehicles on the City road system. This net decrease in vehicles decreases GHG emissions. Indirectly, reducing garbage collection frequency to bi-weekly would results in increased use of Blue Box and SSO collection due to convenience, as the collection of these materials remain weekly. Experience of other municipalities that have implemented bi-weekly garbage collection is that diversion of SSO and Blue Box materials increases, which results in increased benefits to the environment as organic material and recyclables are diverted from the landfill. Impacts on landfills are reduced by removing organics that increase leachate strength, a beneficial product is returned to the soil and GHG emissions are reduced because of reduced production of new materials.

Social Net Effects

Similar to the natural environment, the social net effects of the Enhanced Diversion scenario are generally positive. As no new facilities are proposed, there are no negative social effects related to siting and facility operation. One negative social impact may be the reaction to bi-weekly garbage collection. Although many municipalities in Ontario have implemented bi-weekly garbage collection to increase Blue Box and organic collection program participation rates and reduce costs, many municipalities have experienced an initial negative reaction to the idea from residents due to perceived reduction in service and concerns such as keeping garbage for two weeks (especially in the summer months), large families and families with children or adults using disposable diapers, and the potential for increased illegal dumping. The negative public reaction to bi-weekly garbage collection is often received by the municipal staff and politicians, which can then negatively impact/raise questions of whether or not such a program should be implemented.

Economic Net Effects

Considering that there could be a negative reaction to bi-weekly garbage collection, the economic impact of the enhanced scenario has been considered with and without this option.

The total cost to implement the Enhanced Diversion scenario *without* bi-weekly garbage collection over the 25-year planning period is $733 M (with a net present value of $483 M). This is an increase of $91 M over the Status Quo costs. Of this increase over the 25-year planning period, $15 M (or $615,000 per year) is attributed to implementation of the various diversion options (not including bi-weekly garbage collection) and the remainder is attributable to the increase in diversion and managing those materials. These costs include the planned capital costs described in Section 4.4.1.1 plus a review of the CCF's capacity and (if feasible) expansion of the CCF.

In considering an Enhanced Diversion scenario *with* bi-weekly garbage collection in 2020, it is estimated that moving to bi-weekly garbage collection could reduce the City's overall annual collection costs by 10% to 15%. Therefore, including bi-weekly garbage collection in the enhanced approach would result in

potential overall savings of $2,400,000 per year. The total cost to implement the Enhanced Diversion scenario with bi-weekly garbage collection over the 25-year planning period is $710 M (with a net present value of $469 M). This is an increase of $67 M over the Status Quo system (which does not have bi-weekly garbage collection). This is a significantly lower increase compared to not implementing bi-weekly garbage collection, as bi-weekly garbage collection will result in savings of $24 M over the 25 year planning period[14].

One of the options in the enhanced scenario is to accept recyclable and organic material from other municipalities to process at the City's waste diversion facilities (i.e., multi-municipal processing). To accomplish this may require upgrades/expansions to the MRF and/or the CCF. This will not increase the City's diversion rate but could be used as a source of revenue generation for the City. For example, with the shortage of organics processing capacity currently in the Province, the potential that excess compost processing capacity could be marketable immediately is high. As noted in Section 3.2.2, the CCF is would require additional capacity to accommodate new municipal customers. With respect to the recycling, if upgrades were required to the MRF to process materials from another municipality (e.g., a municipality with single-stream collection), those upgrades could possibly be included in the specifications of a new MRF in advance of the end of life of the existing facility and the current waste collection and MRF processing contracts end (in 2020).

Diversion Implications

For the purpose of this study, the effect on diversion from adopting an enhanced approach is projected to reach 65% diversion by 2021. This would extend the life of the landfill until about the year 2044. As noted, some options provide greater opportunity to increase diversion than other options. An important consideration in determining the impact on diversion of implementing the options in the enhanced scenario is that the range of diversion impacts is not cumulative. As one option is implemented, it can affect the diversion potential of another option by managing part or the entire waste stream that the subsequent option was to address.

[14] While the Enhanced approach provides average annual savings of approximately $2,400,000, the planning period system costs are higher than Status Quo because more recyclable and organic material are being processed, which have higher costs than disposal.

Table 9: Potential Diversion Rates from Enhanced Approach Options (Mature System)

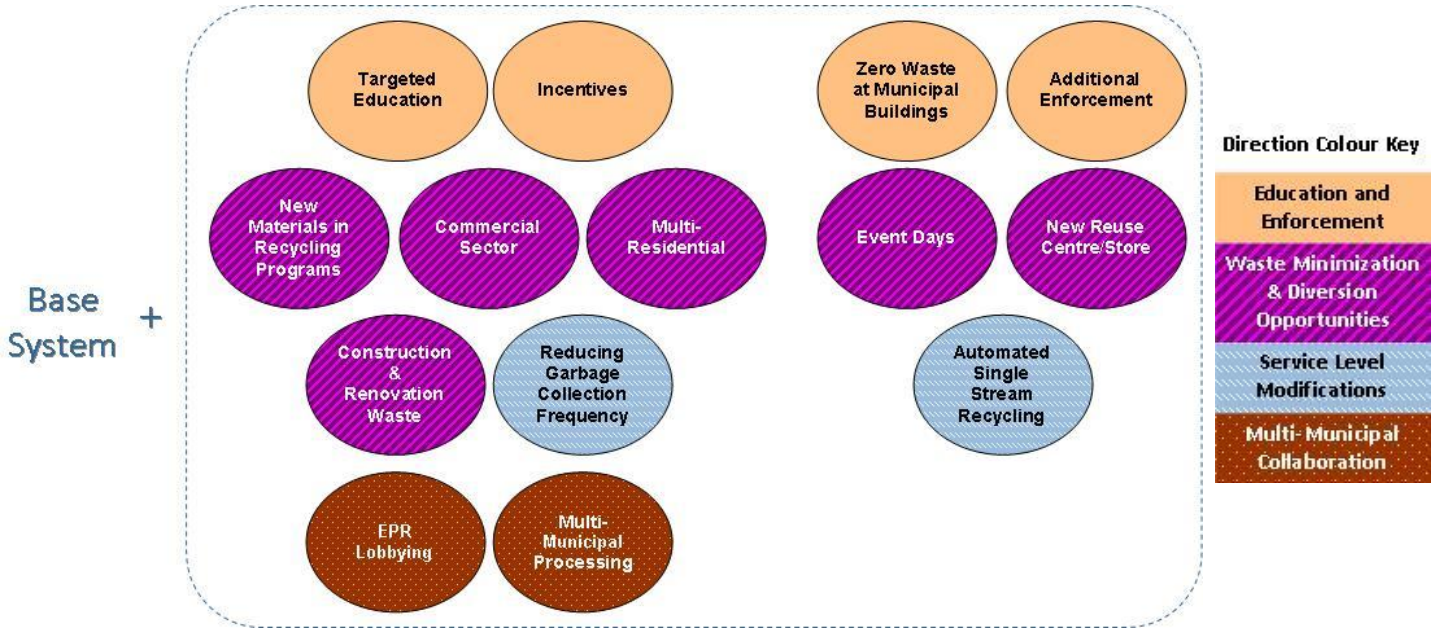
Program Option	Range of Residential Diversion Impact*
Targeted education	12.0% to 17.6%
Incentives	Unknown
Focus on commercial sector	2% to 3%
Residential C&R materials	0.02% to 3.9%
Focus on multi-residential	5.8% to 8.1%
New materials to programs	5.4% to 16.4%
Continued EPR	Minimal
Multi-municipal processing	N/A
Reduced Collection Frequency	4.0% to 6.0%
Resulting Maximum Diversion Rate	**65% - 70%**

* Ranges dependent on capture rates of materials. Lower range represents capture rates of 85% for recyclables and organics and 75% for other materials. The higher range represents all of the available material being captured.

4.4.1.3 Maximized Approach

Alternatively, the City could take a more aggressive approach to implementing the proposed SWMMP directions. For the purpose of this assessment, a maximized system would consist of implementing all of the options listed under the proposed SWMMP directions (see Figure 8).

Figure 8: Maximized Approach to Implementation of Directions



In addition to the continuation and expansion of the existing waste diversion system, the maximized scenario involves major additions to the current system that could further increase diversion. The three

components of the maximized scenario that will have a direct impact on increasing the residential diversion rate would be automated single stream collection, enforcement of waste management by-laws and providing greater opportunities for the public to divert their waste from disposal. The effect of the Zero Waste policy at municipal buildings in the Maximized scenario will not be measured in the residential diversion rate, but will increase the City's overall diversion rate and reduce waste being disposed.

Environmental Net Effects

Where the options that would be implemented using an Enhanced Approach are generally expansions of existing programs, those included in the Maximized Approach are generally new programs that would require greater resources to implement. With mitigative measures, no negative impacts on the environment would be expected.

All of the options would increase the amount of waste recycled, which would therefore reduce the negative impacts associated with obtaining raw resources for new products. Increasing the amount of organic material diverted (i.e., composting instead of landfilling) reduces GHG emissions, reduces impacts on the landfill by removing organics that increase leachate strength, and returns a beneficial product to the soil. One option in the Maximized Approach scenario (the new reuse centre) could have some potential negative effects on the environment, depending on siting requirements and location availability. However, through mitigation techniques and proper planning, design, construction best practices and traffic management, a new reuse centre could result in a low or no net environmental effect.

The automated single-stream recycling option has a positive net environmental benefit from a number of aspects. Experience in Ontario municipalities has shown that single-stream recycling increases program participation and in turn increases waste diverted from landfills. This leads to increased environmental benefits by reducing the negative impacts associated with obtaining the raw materials for new products and increasing landfill capacity.

Social Net Effects

Depending on the options selected, the social net effects can be either positive, neutral or negative for the Maximized scenario.

- The additional enforcement of disposal regulations could have negative social net effects as residents and businesses may perceive this as over-regulation and potentially an invasion of privacy, depending on the enforcement method used and the consequences applied. Alternatively, it could also demonstrate positive effects by curbing illegal dumping and promoting responsibility for managing one's own waste.

- The establishment of a new reuse center/store would have a positive social net effect as it would increase the level of waste management service for residents, especially if located in an area currently under-serviced. A potential negative social net effect could be applied to

residents who are located in the immediate vicinity of such a facility, especially if it is perceived as a "waste management" facility in its usual negative context. However, it is assumed this could be mitigated by locating the facility in an area zoned for such a use, and then properly sited, designed and built.

- Automated single-stream recycling should have a positive social net effect, as it would make recycling even easier for residents by not requiring them to separate recyclables into two streams, as currently required.

- Implementing programs to achieve zero waste at municipal buildings would also have positive social net effects, as it would also be an educational process applied to municipal employees and users of the municipal facility, who could then transfer this knowledge and changed behaviour to their own homes and businesses, thus fostering waste minimization and increasing diversion.

Economic Net Effects

Similar to the Enhanced Diversion scenario, the economic impact of the Maximized Diversion scenario has been considered with and without bi-weekly garbage collection. The total cost to implement the Maximized Diversion scenario *without* bi-weekly garbage collection over the 25-year planning period is $750 M (with a net present value of $496 M). This is a $107 M increase over the Status Quo. These costs include the operating and capital costs included in the Status Quo and Enhanced scenarios, plus capital costs for:

- Implementing a zero waste policy at municipal buildings;
- Establishing an additional CRC/Reuse centre; and
- Upgrading the replacement MRF for single-stream recycling.

There may be a small increase in cost for disposal as single-stream recycling programs generally generate higher amounts of process residual (8% to 10%) compared to two-stream approaches (3% to 5%). The total cost to implement the Maximized Diversion scenario *with* bi-weekly garbage collection over the 25-year planning period is $726 M (with a net present value of $482 M). This is an $83 M increase over the Status Quo.

Diversion Implications

For the purpose of this study, the effect on diversion from implementing the maximized scenario is projected to reach 75% diversion by 2021. This would help extend the life of the Glanbrook Landfill until about 2048. As noted, some options provide greater opportunity to increase diversion than other options. Similar to the enhanced scenario, the range of options are not necessarily cumulative. For example, increased diversion by implementing automated single-stream recycling, could result in less diversion realized through additional enforcement because it is captured in the automated single-stream recycling process.

Table 10: Diversion Rates from Maximized Approach Options (Mature System)

Program Option	Range of Residential Diversion Impact*
Zero waste at municipal buildings	N/A
Additional enforcement	3% - 5%
New reuse centre	0.1%
Automated single-stream recycling	8% - 10%
Resulting Maximum Diversion Rate	**75% - 85%**

* Ranges dependent on capture rates of materials. Lower range represents capture rates of 85% for recyclables and organics and 75% for other materials. The higher range represents all of the available material being captured.

4.4.1.4 Preferred Approach to Waste Diversion

Based on the evaluation of the three approaches for waste diversion (i.e. status quo, enhanced and maximized), it is recommended that the City proceed with implementing the enhanced diversion scenario. The enhanced scenario will assist the City to achieve its 65% diversion target (likely by 2021), with the lowest potential environmental, social and economic net effects.

It is recommended that the City focus first on those options that target education/promotion, especially in the multi-residential sector. The option of expanding the City's waste diversion facilities to market recyclables or process organics from other municipalities requires further detailed financial feasibility assessment including discussion with other municipalities. As noted, expanding the MRF or CCF for other municipalities use will provide no increase in diversion for the City as it is simply a potential revenue generating option. However, this does support the Provincial direction to have fewer, but larger and more centrally located MRF and CCF facilities, which have lower net operating costs due to economies of scale.

Reducing the frequency of garbage collection to bi-weekly can have a very immediate, substantial and positive impact on increasing diversion. This option is being implemented in many Ontario municipalities with supporting organic collection programs. Although not an option available in the short-term, the City of Hamilton could reassess bi-weekly garbage collection during the next SWMMP review and again leading into the next waste management collection contract in 2020. As this option could have potential negative social net effects, assessment of this option may require future public and stakeholder consultation.

4.4.2 Approach to Waste Disposal

Two disposal scenarios were developed for review: 1) the continued use of the Glanbrook Landfill and 2) implementing an EFW facility/conversion technology. The estimated amount of residual waste requiring disposal over the planning period was based on successfully achieving 65% diversion through implementation of the preferred Enhanced Diversion scenario. It is estimated that, during the 25-year

planning period (2012 to 2036), 3,573,000 tonnes of waste will require management by a disposal method based on the Enhanced Diversion scenario. This waste includes:

- Residential Waste: 2,481,000 tonnes
- lCl Waste: 825,000 tonnes; and
- Grit and Street Sweepings: 267,000 tonnes.

It is noted that the life of the Glanbrook Landfill is based on the ICI waste generated in the City of Hamilton continuing to be managed by the private sector throughout the planning period. If circumstances arose (such as a border closure to export of waste from Ontario) that caused the ICI sector to lose its sources of disposal at private facilities, thereby putting pressure on municipal disposal facilities, then the capacity at the landfill could be in jeopardy. In the event of these circumstances, the City could consider measures to minimize an influx of business waste into the Glanbrook landfill (e.g., raising tipping fees for business waste or requiring waste streams to be properly separated).

4.4.2.1 Glanbrook Landfill Disposal Scenario

Under this scenario, the City would continue to dispose of waste at the Glanbrook Landfill. The City estimated that, at the beginning of 2011, approximately 5,039,000 tonnes of disposal capacity remained at the Glanbrook Landfill. By achieving the 65% diversion target through implementation of the Enhanced Diversion scenario, the Glanbrook Landfill could provide disposal capacity for the next 33 years to 2044. This would meet the requirements of the current planning period with an additional 8 year capacity remaining beyond 2036. However, one of the objectives of the City Is to ensure that new capacity is investigated while there is still adequate time (i.e. there is at least 10 years or more disposal capacity left at the Glanbrook Landfill). In consideration of a 10-year planning process to establish new landfill capacity, the City will need to start the process to replace the existing landfill with new landfill capacity by 2024.

Environmental Net Effects

Since the continued use of the Glanbrook Landfill is the current means of disposing of waste, it in effect represents the “status quo” disposal scenario. Therefore, the environmental net effects are predictable and are those as currently known through operation of the existing landfill site. The Glanbrook Landfill will provide for disposal capacity beyond the current planning period, and therefore, no new environmental effects would be experienced by having to open a new disposal facility during the planning period based on this scenario.

Social Net Effects

Similar to the environmental net effects, the social net effects are those currently experienced by the operation of the Glanbrook Landfill. The site would continue as designed and operated. Although the Glanbrook Landfill will provide for disposal capacity beyond the current planning period, social net effects will be experienced as the City begins the process to site a new landfill facility, beginning in 2024, which is within the current 25-year planning period.

Economic/Financial Net Effect

The City of Hamilton 2010 Budget (Actual) indicates that the cost for garbage collection (including the City's administration costs) was approximately $98/tonne. Similarly, the cost for garbage transfer and disposal was approximately $58/tonne, for a total of about $156/tonne. The total cost for garbage collection and transfer and to continue landfilling at the Glanbrook Landfill for the 25-year planning period while implementing the Enhanced Diversion scenario (i.e. diverting 65% of waste by 2021) is approximately $501 M (with a net present value of $344 M).

When the cost of disposal is combined with the preferred diversion scenario (enhanced with bi-weekly collection), the total waste management system cost over the 25-year planning period is about $1.211 Billion, with a net present value of approximately $813 M.

Mechanical/Biological Treatment

One alternative for the Glanbrook landfill operations could be the inclusion of Mechanical/Biological Treatment (MBT) prior to placement of the waste in the landfill. The MBT process leads to the stabilization of waste prior to disposal. Stabilizing waste essentially involves a 'composting' like process which results in much lower levels of TOC (Total Organic Carbon), COD (Chemical Oxygen Demand) and nitrogen content, lower levels of organic matter and less landfill gas production. The City of Hamilton, in conjunction with Niagara Region and the City of Toronto, undertook a study on landfill stabilization (March 2007). The study examined stabilized landfills in Europe and Canada.

With respect to incorporating MBT into the current Glanbrook Landfill operations:

- Additional Stabilization "processing capacity" will be required. This could be at the current Hamilton CCF or a new facility at the Glanbrook Landfill site. Establishing a new facility at the landfill would reduce transportation/haul costs.
- A significant amount of un-stabilized waste already exists at the Glanbrook Landfill from the many years of operation. The environmental benefits of implementing MBT/stabilization in the remaining disposal area would not be realized because of the amount of un-stabilized waste already in the site.
- Cost estimates from other MBT stabilization/disposal facilities are in the order of $50/tonne. This would represent a significant increase compared to the cost to currently operate the Glanbrook Landfill. This could represent an additional $124,000,000 in landfill disposal costs over the 25-year planning period.

4.4.2.2 Alternative Disposal Technology Scenario

In recent years, the City of Hamilton has undertaken a number of studies to consider the establishment of an EFW type facility. This has included in the Hamilton-Niagara WastePlan process (2005 to 2009), as well as most recently, the Hamilton Utilities Corporation (HUC) proposal (2010) to establish an EFW facility in conjunction with the use of the Glanbrook Landfill. The HUC study has been used as the basis for determining the net effects of an EFW facility for this disposal scenario, as it was a very recent and comprehensive report with detailed financial information. A number of different scenarios were

evaluated in the HUC study that considered facility size, use of ash for landfill cover and aggregate and for different diversion scenarios. For the purposes of this evaluation, the base case scenario of a 100,000 tonne/year facility with 65% diversion was used, and the evaluation includes a broader range of waste conversion or Alternative Disposal Technologies (ADT) than simply incineration.

Environmental Net Effects

Net environmental effects would mostly be related to the siting of an ADT facility and potential air impacts from the facility operation. The Glanbrook Landfill would be used as the disposal site for ash, as well as process residuals, non-combustibles, street sweepings and waste water treatment plant (WWTP) grit, material received beyond the ADT facility capacity and for disposal during times of facility shutdown. The use of the Glanbrook Landfill for the disposal component of the ADT scenario is considered neutral compared to the status quo disposal scenario of using only the Glanbrook Landfill.

Social Net Effects

One of the major effects from the establishment of an ADT facility/conversion technology is the potential negative social net effects related to the siting of the facility. The siting of any new waste management facility can be very controversial and very divisive in the community. There are both real and perceived negative social net effects through the establishment of an ADT facility. The real effects can be experienced by residents and businesses in the vicinity of where the facility is proposed and the introduction of traffic to that facility.

The perceived impacts can be experienced by stakeholders who, although not living/working in the immediate vicinity of the proposed ADT facility, may be fundamentally opposed to ADT facilities and will express this during the required planning, approvals and consultation process. Those stakeholders would also be joined by residents and business owners who may be directly impacted through the siting process of where a facility may be located.

Economic Net Effects

The HUC study concluded that establishing an EFW facility in conjunction with the continued use of the Glanbrook Landfill was financially a better option than continuing to use the Glanbrook Landfill only for disposal. Some of the major conclusions from the HUC study relevant to this system analysis were that:

- The estimated cost to establish and operate a 100,000 tonne/year EFW facility and utilize the Glanbrook Landfill for ash and other disposal was approximately $168/tonne. However, significant revenues were identified from greenhouse gas emission credits, energy sales and metal recovery that decreased the cost to approximately $100/tonne. Relative to the cost for operating the Glanbrook Landfill, the EFW scenario has a higher net cost.
- The HUC report also identified a significant value in the remaining capacity of the Glanbrook Landfill. By reducing the volume of material requiring disposal through the incineration process, the Glanbrook Landfill would last significantly longer. (i.e., more than 100 years capacity). The HUC report concluded that the economics of the EFW scenario could be further enhanced by

marketing the excess capacity available beyond that required by the City of Hamilton beyond 2074.

In undertaking this systems analysis, the financial evaluation was revised to consider changes compared to the HUC study. The HUC study was completed in 2010, yet assumed a facility could be built over 3 years (2011 to 2013) and be operational by 2014. This assumption had a significant bearing on the feasibility of the HUC proposal because of the assumed remaining disposal capacity that could be available to market and the value of that capacity. This assumption was based on a site having already been secured. For the systems evaluation, the following assumptions on timing were considered:

- The planning and approvals process for an ADT would take a minimum seven years to complete. York-Durham reports that it began its planning process in 1999 and is not expect to have its EFW facility operational until 2013 (i.e. 14 years).
- The design and construction process will be at least three years.
- It was considered that this process would not begin for five years, until the next SWMMP update to allow the City to observe how the York-Durham facility was completed, how it is operating for a few years, and actual cost to construct and operate.

Therefore, for the purposes of this systems evaluation, it was assumed that an ADT facility for Hamilton could be operational about 2027. This has a significant impact on the value of the remaining capacity of the Glanbrook Landfill as 13 more years of waste would have been disposed at the site compared to the HUC study assumptions. The HUC study estimated that 4,600,000 m^3 of airspace would remain at the Glanbrook Landfill at the end of the planning period (i.e. 2036). However, by estimating a date of 2027 for an ADT facility to be operational, the remaining airspace at 2036 is reduced to 1,570,000 m^3.

Most of this remaining airspace would be required for the City's disposal needs for ash, non-combustible waste, street sweepings and WWTP grit, disposal during ADT facility shutdown/maintenance periods and for waste requiring disposal beyond the capacity of the ADT facility. The ability to market the excess Glanbrook Landfill capacity would be eliminated. The estimated cost for the ADT scenario over the planning period is approximately $583 M (with a net present value of $390 M). This is approximately $82M higher than the Glanbrook Landfill scenario for the planning period.

When the cost of incorporating an ADT facility into Hamilton's disposal system (with continued use of Glanbrook Landfill for ash disposal and non-combustibles) is combined with the preferred diversion scenario (including bi-weekly garbage collection implemented in 2020), the total waste management system cost over the 25-year planning period is about $1.293 B (with a net present value of approximately $859 M).

4.4.2.3 Identification of Preferred Disposal Scenario

The evaluation of the disposal scenarios determined that there were greater net effects from the ADT scenario than the Glanbrook Landfill scenario. However, the Glanbrook Landfill is a finite resource that will eventually reach capacity whether it is used with or without an ADT facility. Therefore, the City will eventually need to consider establishing additional long-term disposal capacity and this process will

need to begin within the 25-year planning period. By implementing the enhanced diversion scenario, remaining landfill capacity is in the order of 33 years. Therefore, the immediate 'need' for additional capacity has not been established, especially in the context of Environmental Assessment Act approval requirements. The preferred disposal scenario resulting from this analysis is only recommended for the short term (i.e. the next five years) until the next SWMMP update is undertaken.

4.5 Preferred Waste Management System

The preferred waste management system recognizes the expressed public desire to continue to move forward on a path that supports waste diversion and includes the Enhanced waste diversion scenario in conjunction with the use of the Glanbrook Landfill for disposal for the next 5 years. The public consultation suggested that the Enhanced Approach to diversion could accomplish this, although it is recognized that some components of the approach such as bi-weekly garbage collection will not be realized in the next 5 years. Similarly there are aspects of the Maximized Approach (which received public support) that could be initiated within the next 5 years. For example, assessing the feasibility of single-stream recycling could be included in the planned MRF lifecycle replacement process.

Therefore, the study proposes that the Preferred Waste Management System include the components in the Table 11 [15].

Table 11: Preferred Waste Management System

Program Option	Range of Residential Diversion Impact
Targeted education	12.0% to 17.6%
Incentives	Unknown
Focus on commercial sector	2 to 3%
Residential C&R materials	0.02% to 3.9%
Focus on multi-residential	5.6% to 8.1%
New materials to programs	5.4% to 16.4%
Continued EPR	Unknown
Multi-municipal processing (requires CCF capacity review)	N/A
Assessment of MRF capacity and single stream processing	N/A
Resulting Maximum Diversion Rate	**65% - 70%**

Consideration to expanding the MRF and CCF and attracting recyclable/SSO material from other municipalities as a revenue generating source requires further evaluation and discussion to determine the feasibility of this option.

[15] It is acknowledged that there are other capital or study initiatives planned by Public Works that will contribute to the Guiding Principles, Goals and Objectives of the SWMMP, such as a review of the Transfer Station/Community Recycling Centres.

The preferred disposal option is to continue to use the Glanbrook Landfill for the next five-year period. This recognizes the significant remaining disposal capacity at the site, but also recognizes that this is a finite resource, and the City will need to plan for future disposal capacity in the near future given the time it takes to complete the planning and approvals process.

Table 12 outlines the estimated cost to implement the preferred enhanced diversion program (with bi-weekly garbage collection implemented in 2020) in conjunction with either continuing with the Glanbrook Landfill for long-term disposal or implementing an ADT facility.

Table 12: Waste Management System Costs for the 25-Year Planning Period (2012 – 2036)

System Component	Total Cost	Net Present Value Cost
Enhanced System with Glanbrook Landfill		
Enhanced Diversion	$733 M	$483 M
Glanbrook Landfill	$501 M	$344 M
Total	**$1.211 B**	**$813 M**
Enhanced System with ADT		
Enhanced Diversion	$733 M	$483 M
ADT	$583 M	$390 M
Total	**$1.293 B**	**$859 M**

4.5.1 Life Cycle Observations

A life cycle assessment (LCA) is an analytical tool for the evaluation of impacts over the entire life cycle of a product or process and on the environment as a whole. The following identifies the life cycle observations relative to the preferred system.

4.5.1.1 Diversion

Broad life cycle impact reductions/improvements can be seen as a result of the Enhanced Diversion scenario. Recycling and composting materials are better approaches than waste disposal at mitigating the life cycle environmental impacts associated with products and materials in the waste stream. Recycling and composting have life cycle benefits such as using less landfill space and decreasing the production of new materials using raw materials. Recycling and composting also reduce greenhouse gas emissions (GHGs) and energy consumption resulting from landfill operations and the production of new materials. Life cycle impacts generally reduce as diversion and capture rates increase. Implementing bi-weekly garbage collection also reduces overall life cycle impacts by reducing the overall number of collection vehicles used in the waste collection system.

4.5.1.2 Disposal

Generally, ADT facilities have fewer life cycle impacts than landfills including impacts from GHGs, generation of energy and emissions to water. These impact reductions are described below.

4.5.1.2.1 Greenhouse Gas Emissions

In comparison to the Glanbrook Landfill scenario, an ADT facility scenario would produce less net GHGs. This is because fewer raw materials would be disposed of at the Glanbrook Landfill if ADT were in place, which could lead to a decrease in the amount of GHG emissions (specifically methane) produced through anaerobic decomposition of waste within the landfill, even when considering the gas collection system. In addition, if the ADT were capable of generating energy, GHG reductions would result from displacing electrical energy production from other sources as well as from the recovery and recycling of metals salvaged from the bottom ash.

4.5.1.2.2 Generation of Energy

Depending on the technology selected, an ADT facility could potentially produce enough energy to meet its own internal energy needs and still have additional energy to be able to export energy off-site. This would also offset the need for energy production from other sources. In addition, some types of ADT allow for the recovery and recycling of metals salvaged from processing residues (e.g., bottom ash from waste conversions, recoveries from mechanical waste separators, etc), which would also save the energy that would otherwise be used in the mining and production processes of new raw materials.

4.5.1.2.3 Emissions to Water

Depending on the technology selected, an ADT facility could potentially reduce the amount of emissions to water, and would reduce the amount of untreated municipal waste being disposed of via landfill. This would reduce the likelihood that leachate containing contaminants would be released from the landfill site. The type of waste residue from the ADT facility would depend on the type of ADT facility used.

5 CONCLUSION AND RECOMMENDATIONS

The City of Hamilton's review of the 2001 SWMMP was an 18 month process that included consultation with stakeholders and the public on the guiding principles, goals and objectives and program options that will guide how the City manages its waste for the next 25 years. The 2012 SWMMP Guiding Principles build upon those from the 2001 SWMMP and have been updated to include the community's philosophy and the provincial waste management value chain of reduce, reuse, diversion and disposal.

The review showed that the City of Hamilton has a robust residential solid waste management system that currently diverts 49% of waste and at status quo should achieve a 55% waste diversion rate by 2021 as its existing programs mature.

In addition to providing direction on moving the City beyond 65% waste diversion, feedback from the public and results from the gap analysis will provide City staff with grass-roots suggestions and data to assist with implementation of the new directions. The goals and objectives developed through this process will help to ensure that the directions align with the pillars of sustainability (social,

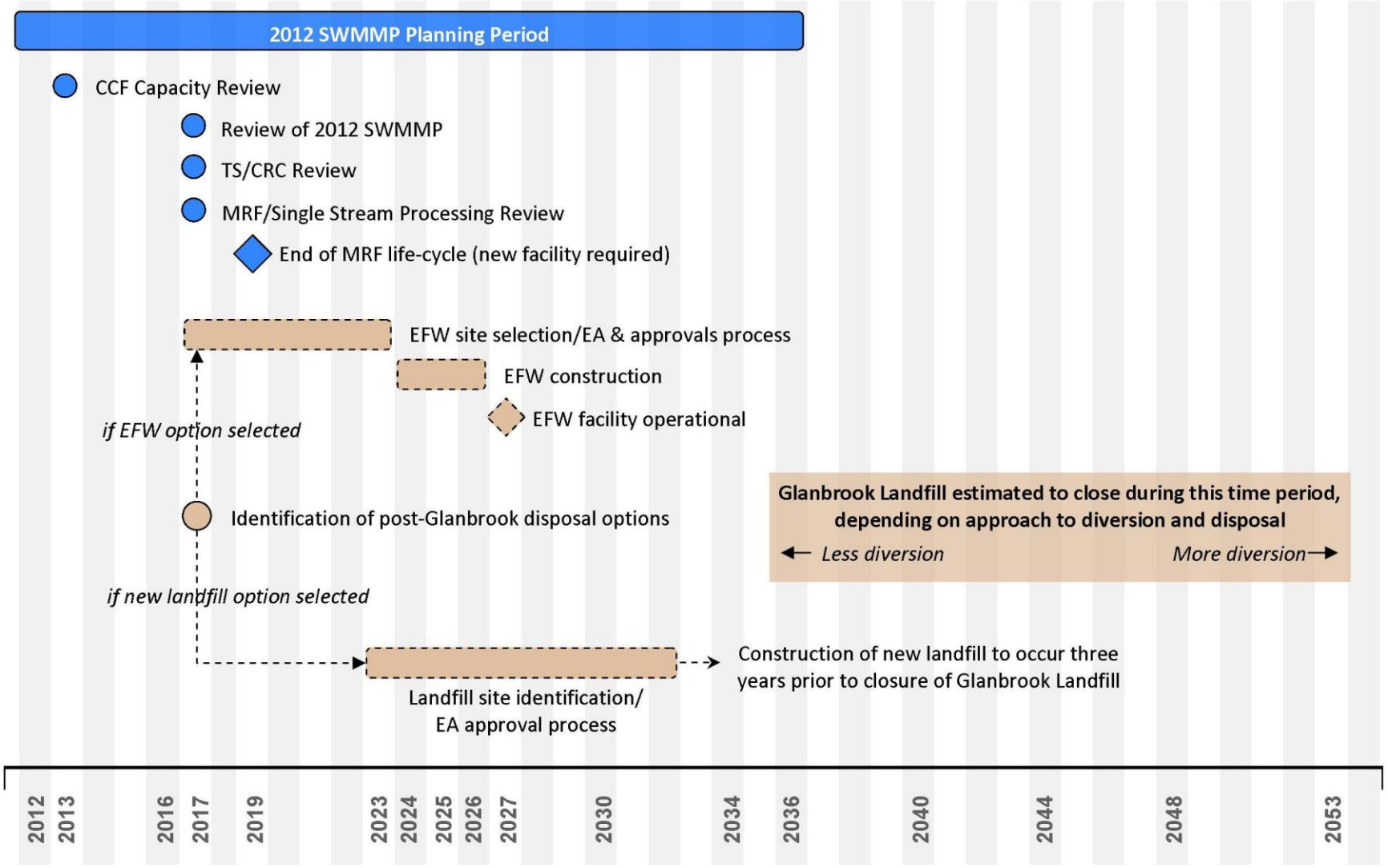
environmental and economic). They reflect the community's desire for a waste management system that is accessible to all Hamiltonians, including how promotion is carried out and how the program is delivered to households. The goals and objectives also reflect the need for Hamilton's waste management system to optimize its economic opportunities and efficiencies.

To help the City meet and exceed the target of 65% waste diversion, enhancement of existing facilities and the development of new facilities will have to be considered at key points. The following recommendations form the basis of the 2012 SWMMP:

1. Implement the "enhanced approach" to waste diversion, which may include:
    - Targeted education;
    - Focusing on the multi-residential and commercial sectors;
    - Managing construction and renovation materials;
    - Adding materials to the recycling programs where feasible;
    - Continued lobbying for Extended Producer Responsibility;
    - Municipal processing partnerships; and
    - Reduced garbage collection frequency in 2020.
2. Undertake a feasibility study in 2013 of expanding capacity at the Central Composting Facility (CCF).
3. Undertake a feasibility study in 2017 of Single Stream processing and expansion of capacity at the Materials Recycling Facility (MRF).
4. Undertake an operational review and needs analysis in 2017 of Transfer Stations and Community Recycling Centres.
5. Undertake a Five Year Review of the SWMMP in 2017.
6. Use the Glanbrook Landfill for disposal for 5 years, and consider alternative disposal capacity in the next SWMMP review in 5 years.
7. Merge the advisory roles of the SWMMP Steering Committee and the Waste Reduction Task Force.
8. In the implementation of these recommendations, consideration will be given to the potential impacts on illegal dumping.

The proposed timeline for implementing a number of these recommendations is contained in Figure 9.

Figure 9: Timeline for Facility Review and Development



Note: This Appendix does not include the originally appended Draft Final Report

Hamilton

INFORMATION REPORT

TO: Chair and Members Public Works Committee	**WARD(S) AFFECTED:** CITY WIDE
COMMITTEE DATE: January 16, 2012	
SUBJECT/REPORT NO: Solid Waste Management Master Plan Review - Draft Final Report (PW12004) - (City Wide)	
SUBMITTED BY: Gerry Davis, CMA General Manager Public Works Department **SIGNATURE:** Original signed by Gerry Davis, CMA	**PREPARED BY:** Adam Watson (905) 546-2424, Extension 5522

Council Direction:

At the July 6th General Issues Committee meeting, staff provided Council an update on the SWMMP Review and indicated that once the system options were costed and evaluated, the preferred option and Draft 2011 SWMMP document would be presented.

Information:

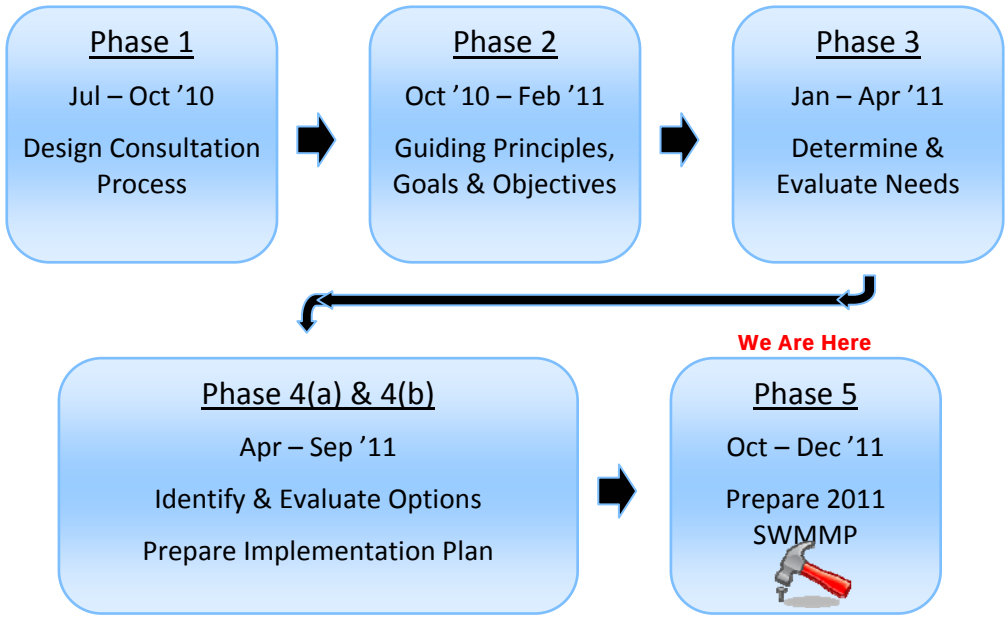
This Information Report is being provided to Committee as an update on the Solid Waste Management Master Plan (SWMMP) Review and to present the Draft Final Report attached to Report PW12004 as Appendix A. The report is being presented as a "Draft" to enable further community input into the finalization of the updated Plan.

In 2010, the Operations & Waste Management Division initiated the Solid Waste Management Master Plan Review. The purpose of the review was to:

- Assess the progress made in the development of the City's integrated waste management system since the approval of the SWMMP in 2001;
- Consider the outstanding items in the 19 recommendations of the SWMMP;
- Review the guiding principles;
- Determine the status of the capacity of the City's waste management facilities and programs;
- Evaluate options for consideration in alignment with the principles; and
- Recommend a path forward to meet the City's waste management needs for the next twenty-five (25) years to 2036.

The Solid Waste Management Master Plan (SWMMP) Review Process

The following flow chart outlines the five phases of the review process. We are currently in Phase 5, which will result in the updated SWMMP.



Throughout the review process the project team has undertaken approximately twenty (20) public consultation events through public workshops, Waste Reduction Task Force meetings and sessions with various Community Councils and community groups in the City. In addition, through the project website, the review documents have been distributed to approximately 130 stakeholders who have signed up to participate and provide feedback at the various phases of the review.

The public discussion confirmed that continuing with a diversion target of 65% was reasonable although it might take another ten (10) years to achieve this goal.

The Results of the SWMMP Review

Guiding Principles

Following the initial public workshop and online survey and workbooks, the guiding principles for the remaining phases of the review emerged as provided in Table 1.

TABLE 1: GUIDING PRINCIPLES FOR THE 2011 SWMMP
1. The City of Hamilton must lead and encourage the changes necessary to adopt the principle of Waste Minimization.
2. The Glanbrook landfill is a valuable resource. The City of Hamilton must minimize residual waste and optimize the use of the City's diversion and disposal facilities.
3. The City of Hamilton must maintain responsibility for the residual wastes generated within its boundaries. Inter-regional facilities will be considered.

The first guiding principle is new and relates to waste minimization. For several years residents have commented that the current Master Plan was lacking emphasis on waste minimization, or waste reduction. Municipalities can promote waste minimization and, either individually or collectively through industry and municipal organizations, lobby senior governments to enact appropriate legislation/regulations around Extended Producer Responsibility (EPR). In recent years, staff has taken the opportunity to promote waste reduction with residents through the waste management handbook and the website.

The second guiding principle has been changed from optimizing disposal capacity ensuring a disposal site for residual material to minimizing residual waste and optimizing the use of both diversion and disposal facilities.

The third guiding principle has been changed so that the reference is to inter-regional disposal facilities and not just inter-regional diversion facilities.

Gap Analysis

A Gap Analysis was undertaken to review waste tonnages to:

- see how waste diversion programs are performing
- evaluate the capture of divertible materials and materials remaining to be captured
- to analyze the ability of the facilities to manage future waste materials
- to determine the capacity of the Glanbrook Landfill.

Key Directions

The outcome of this work is four key strategic directions for moving the City forward toward its target of 65% waste diversion. The strategic directions, broad in scope, will follow the updated guiding principles and be used to help the City achieve the SWMMP goals and objectives. The four strategic diversion directions are depicted here graphically.

Concurrent with the determination of the four strategic directions, a review of long-term waste disposal needs and options was also completed and the results of this, along with the strategic directions, were used to undertake the systems options review. The systems options review assessed the financial, waste diversion and disposal implications of five main systems. These systems were:

1) Status Quo - no change to the existing waste management system

2) Enhanced Diversion - the implementation of diversion enhancing programs that were determined to be most cost-effective
3) Maximized Diversion - the implementation of the full range of diversion programs available to the City at this time
4) Glanbrook Landfill - the continued use of the existing landfill as the City's disposal option
5) Considering Alternative Disposal Technologies - the introduction of disposal technologies that reduce the overall tonnage of waste sent to Glanbrook Landfill.

Further information on these systems scenarios can be found in Section 4.4 of the attached Draft Final Report.

Within systems 2) and 3) for diversion, the option of bi-weekly collection of garbage was also analyzed.

The results of the systems scenarios review provide many of the key findings of the SWMMP Review process and form the basis for the revised SWMMP Recommendations. The final 2011 SWMMP will incorporate any feedback received on the draft plan through the consultation period in the development of these revised Recommendations. Most significantly, it was determined that although the status quo option resulted in the lowest systems costs, it also resulted in the earliest closure date of the Glanbrook Landfill.

The estimated systems cost for the various system option scenarios is provided in Table 1. The enhanced (2A) and maximized (3A) diversion scenarios required higher costs than the status quo, however, this extended the existing landfill life by 4 and 8 years respectively. The introduction of biweekly garbage collection for both of the options (Scenarios 2B & 3B) resulted in significant cost-savings compared to maintaining weekly garbage collection in these scenarios. The results of the review of disposal scenarios showed that the introduction of an alternative disposal facility would result in both increased cost savings as well as a greater extension of landfill life compared to the landfill replacement scenario.

Table 1: Cost Comparisons Summary - Net Cost (Millions)

System Option Scenario	**2012-2036 Total Cost**	**Estimated Glanbrook Landfill Closure Date**
Diversion & Collection Programs		
1. Status Quo	$756 M	2040
2A. Enhanced Diversion	$886 M	2044
2B. Enhanced Diversion & Every Other Week Garbage Collection	$814 M	2044
3A. Maximized Diversion	$941 M	2048
3B. Maximized Diversion & Every Other Week Garbage Collection	$869 M	2048

Disposal		
4. Glanbrook Landfill	$391 M	2044
5. Alternative Disposal Technology	$435 M	2053

One of the key findings is that system costs are similar for all of the options reviewed. The range in the costs for the operating scenarios mostly vary due to the implementation of bi-weekly garbage collection and the cost of introducing an alternative disposal facility is similar to the option of continuing to utilize the Glanbrook Landfill. However, the implementation of an alternative disposal facility will extend the life of the Glanbrook Landfill from 2044 to 2053 (when implemented in conjunction with Enhanced Diversion), due to the significant volume reduction of the waste when treated through an alternative method.

The preferred waste management system combines Enhanced Diversion (2B) and Glanbrook Landfill (4), from Table 1. The total costs for the preferred system are in the order of $1.2 billion over the 2012 to 2036 planning period.

The Draft Final SWMMP Report is attached to Report PW12004 as Appendix "A". This report outlines the process followed, information and findings that came out of each of the phases of the Review, and summarizes the preferred system conclusions and recommendations.

The report does not include any recommendations regarding the future of the SWMMP Steering Committee or the Waste Reduction Task Force. This is currently being reviewed by staff with those committees, although it is expected that some form of advisory committee will continue to benefit waste management practices in the City.

It is intended that the release of the draft document will provide time for additional public input on the finalization of the updated SWMMP. The Draft Final Report is currently posted on the review website for public consultation. In addition, community meetings with neighbourhood organizations and community council groups are underway to garner further public input. Several meetings have been held and others are scheduled for early in 2012.

The Public Works Committee may also wish to request a special GIC be convened to fully discuss the options presented in the Draft Final Report.

The review period will conclude on February 24th. A staff report will be presented to General Issues Committee in April to present the Final Report of the SWMMP Review and to recommend a course of action for the future.

All project documents and information on upcoming events will be made available on the project website at www.hamiltonwastereview.ca.

Hamilton
Public Works

Operations & Waste Management Division

Chronology of Activities 2001-2011

Date	Milestone
	2011
November 2011	Council approved (through Report PW11030b) an Extension to Canada Fibers Limited for the Recycling Contract for the period of 2013-2020 for the operations and maintenance of the MRF, as well as the marketing of Hamilton's container and fibre materials.
September 2011	Pilot program for organics collection in 30 schools of the Hamilton Wentworth Catholic District School Board is launched
	2010
November 2010	Completion of Multi-residential Waste Diversion Program Implementation. 1000 buildings including 45,000 units provided with full organics and recycling programs.
September 2010	Commencement of the SWMMP Review
April 2010	Hamilton's One Container Limit program implemented.
	2009
March 2009	Hamilton's 'One Plus One' program (one container of waste plus one clear bag) implemented on the way to a one container garbage limit for April 2010.
	2008
December 2008	Roll-out of organics collection from multi-residential facilities continued. Phase 2 of the implementation plan completed, 578 buildings and 8,285 units currently receiving weekly organics collection.
December 2008	Transfer & Disposal Review completed with Council approval of contracts (Report PW08123/FCS08101) for January 1, 2010.
December 2008	Glanbrook Gas-to-Energy project commissioned
April 2008	A new recycling contract with National Waste Services Inc. began.
April 2008	Appropriate certified compostable liners are accepted in the City's Green Cart Program.
March 2008	White Goods and Scrap Metal curbside collection program ended. Spiral cardboard cans accepted in the Blue Box Program. Transition period for one (1) container limit began allowing a maximum of three (3) containers of garbage weekly.
March 2008	Residents have access to three (3) Community Recycling Centres for this service six (6) days a week. The Household Special Waste depot located at 239 Lottridge Street North in Hamilton

Date	Milestone
	was closed.
2007	
November 2007	Hamilton City Council supported Report PW07151 *"The Status of Solid Waste Management Master Plan, Options for Increasing Diversion and Landfill Capacity"* which states that a one (1) container limit/household/week of garbage be established on March 31, 2008. The container limit will be phased-in over two (2) years and will offer grace periods and special considerations for medical circumstances and families with three (3) or more children under the age of five (5)and legitimate farm properties.
November 2007	Staff developed an implementation plan for the roll-out of organics to multi-residential buildings and received Council approval to accelerate the program in 2008 for completion by the end of 2009.
September 2007	Transfer and Disposal Review initiated to plan for new contracts required for January 1, 2010 for the operation of the Community Recycling Centres (CRCs), Reuse Store, Transfer Stations, Glanbrook Landfill Site and Leaf & Yard Waste Composting Facility
May 2007	The third and final Community Recycling Centre (CRC) opened on Kenora Avenue.
April 2007	Recycling Program Review completed and Council approved continuation of two stream collection and processing system, award of new collection contract and installation of a new container line for the Materials Recycling facility (PW07057/FCS07052)
April 2007	Two (2) containers/bundles of leaf and yard waste could be set out with Green Carts every week.
March 2007	Recycling program review was completed to evaluate options for service delivery, resulting in a new service provider and continuation of two stream recycling system.
2006	
September 2006	Recycling Program Review initiated after Council approved Report PW06064a/FCS060 to end the contract with Halton Recycling Ltd. in March 2008
June 2006	The Central Composting Facility (CCF) began operation.
April 2006	The Dundas Community Recycling Centre (CRC) opened.
April 2006	City wide roll-out of the Green Cart Program to eligible curbside collection properties.
2005	
September 2005	Mountain Community Recycling Centre and Re-use store opened.
July 2005	SWARU facility was decommissioned and demolished.
June 2005	Award of Waste Collection Contract for new Three Stream Collection System (Report PW04114b)
April 2005	The Municipal Recycling Facility (MRF) underwent upgrades to accommodate polystyrene and plastic film recycling.
February 2005	Composting Facility ground breaking and commencement of construction
February 2005	Minister of Environment approved Niagara-Hamilton WastePlan Environment Assessment (EA) Study Terms of Reference.

Date	Milestone
2004	
November 2004	Approval of a new Three Stream Collection system for 2006. The new collection system includes: Weekly Organics Collection in Green Carts; Weekly Waste Collection, co-collected with Organics; Weekly Two Stream Recycling Collection; Seasonal Leaf & Yard Waste Collection in the spring and fall; and Call in Bulk Collection (Report PW04114a)
November 2004	Approval to construct the City's first Community Recycling Centre (Report PW04119)
November 2004	Approval to undertake an $8.1 Million Materials Recycling Facility Retrofit (Report PW0476b/FCS04097b)
July 2004	Award of Composting Facility RFP (Report PW0476/FCS04097)
May 2004	Organics Demonstration Project Expanded
March 2004	Request for Proposals (RFP) Process for the Design, Construction and Operation of a new Recycling and Composting Facility completed
February 2004	Diversion Facility Site Selection Process & Preferred Municipal Site Approved (Report PW04017)
2003-2004	Recycling Program Improvements (Interim Recycling Program launched, Multi-Residential facility roll-out, increased outreach and additional materials added to the blue box)
2003	
September 2003	Approval to partner with Niagara on Alternative Disposal Technologies
August 2003	Request for Proposals (RFP) Process for the Design, Construction and Operation of a new Recycling and Composting Facility initiated
2002	
December 2002	Approval of SWMMP Implementation Plan, Diversion Facility Site Selection Criteria and SWARU Closure (TOE02220/FCS02146)
September 2002	Organics Demonstration Project Launched in 2300 homes
April 2002	Harmonization of Waste Collection Services
2001	
December 2001	SWMMP Approval by Council of 19 Recommendations (TOE01210 & TOE01013A)
September 2001	Council approved harmonized collection service levels for the new boundaries of the City of Hamilton (Report TOE01118a)
Spring 2001	Council approved Leaf & Yard Waste Program Changes

As at: December 2011

Historical Waste Management Expenditures

The following presents a review of the City's waste management system costs for both operating and capital expenditures.

Operating Expenditures

A 10 year review of net operating expenditures for the waste management system, excluding capital financing is provided in Table D-1. Notes have been provided to correlate the expenditures with the various program changes that were made during this period. Recycling Program revenues also had a significant impact on the budget in 2009 when the commodity markets crashed at the end of 2008. The industry composite index[1] for recycling commodities fell from a record high of $150 per tonne in 2008 to a record low of $80 per tonne in 2009. Prices have gradually rebounded from that time and were at $131/tonne as of February 2012. The reduction in revenues also affected funding from Waste Diversion Ontario for the Blue Box Program.

Table D-1 – Waste Management System Operating Costs (2002-2011)

Year	Actual ($ millions)	% Change	Diversion Rate	Notes
2002	$24.09	n/a	21%	Harmonization of Waste Collection services, SWARU Closure
2003	$23.63	(2%)	24%	Recycling Program improvements
2004	$21.57	(9%)	28%	Increase in recycling commodity markets
2005	$22.11	2%	30%	Opening of 1st Community Recycling Centre (CRC)
2006	$26.58	20%	40%	Green Cart Program implemented
2007	$28.69	8%	42%	Continued increase in diversion, contractual increases
2008	$31.02	8%	44%	Continued increase in diversion, new recycling collection contract implemented, all three CRCs in operation, contractual increases
2009	$29.95	(3%)	47%	Drop in recycling commodity prices, Glanbrook Gas To Energy plant in operation
2010	$31.02	4%	49%	One container limit fully implemented, roll-out of Multi-residential diversion program completed, new disposal contracts
2011	$31.41	1%	49%	Rebound of recycling commodity markets offset contractual increases

[1]The Price Sheet (for Ontario recycling commodities) from: http://stewardedge.ca/pricesheet/ StewardEdge, Toronto, Ontario, 2012

Capital Expenditures

A review of the capital expenditures from 2001 to 2012 is provided in Table D-2. The budget column includes the 2012 approved budget and the actual column reflects actual expenditures to December 31, 2011. The total gross expenditures to the end of 2011 were $155.6 million. Of these costs, 52% were related to the implementation of the Solid Waste Management Master Plan, 42% for disposal (15% for current operations and 27% for closed landfills) and the remaining 6% on capital requirements to support other aspects of the waste management system.

A total of $67.06 million in subsidy funding was received during this period, resulting in a net capital expenditure of $88.91 million. The funding sources included: Provincial Millennium Funding, Federal Gas Tax funding and two grants from the Federation of Canadian Municipalities (FCM).

Table D-2 - Waste Management System Capital (2001 to 2011, all $s in millions)
Actual as of December 31, 2011 and Budget includes 2012 Approved Capital

	BUDGET	ACTUAL	VARIANCE	% of GROSS COSTS (Actuals)
SWMMP Implementation				52%
Planning & Approvals, Studies, R & D	$ 6.56	$ 5.74	($0.82)	
Community Recycling Centres (CRC)	$ 9.46	$ 9.47	$0.01	
Central Composting Facility (CCF)	$ 35.01	$ 34.59	($0.42)	
Material Recycling Facility (MRF)	$ 16.37	$ 12.75	($3.62)	
Green Cart Implementation	$ 17.80	$ 16.20	($1.60)	
Multi-Residential Recycling	$ 1.43	$ 1.43	$0.00	
Sub-total: Gross Implementation Costs	**$ 86.63**	**$ 80.18**	($6.45)	
Less Subsidy Funding		$ 51.42		
Total: Net SWMMP Implementation Costs		**$ 28.76**		

	BUDGET	ACTUAL	VARIANCE	% of GROSS COSTS (Actuals)
Operations				6%
Container Replacement	$ 3.58	$ 2.31	($1.27)	
Resource Recovery Centre (RRC)	$ 0.90	$ 0.21	($0.69)	
Transfer Stations	$ 3.26	$ 3.17	($0.09)	
Collection Operations Relocation	$ 2.23	$ 2.20	($0.03)	
Other Capital	$ 2.23	$ 1.88	($0.35)	
Total: Operations Capital Costs	**$ 12.20**	**$ 9.77**	($2.43)	

	BUDGET	ACTUAL	VARIANCE	% of GROSS COSTS (Actuals)
Disposal				15%
Glanbrook Landfill	$ 24.05	$ 19.67	($4.38)	
SWARU	$ 4.88	$ 4.36	($0.52)	
Sub-total: Gross Disposal Costs	**$ 28.93**	**$ 24.03**	($4.90)	
Less Subsidy Funding for SWARU Decommissioning		$ 0.36	$0.36	
Total: Net Disposal Costs		**$ 24.03**	$24.03	

	BUDGET	ACTUAL	VARIANCE	% of GROSS COSTS (Actuals)
Closed Landfills				27%
Closed Landfill Remediation	$ 45.24	$ 41.62	($3.62)	
Less Subsidy Funding		$ 15.27		
Total: Net Closed Landfill Costs		**$ 26.35**		

	BUDGET	ACTUAL	VARIANCE
Total Waste Management System Costs (Gross)	**$ 173.00**	**$ 155.60**	($17.40)
Total Waste Management System Costs (Net of Subsidies)		**$ 88.91**	

2012 SWMMP Implementation Plan - Recommended System

Description	Completion Year																								
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1. ADDITIONAL DIVERSION																									
a) Targeted Education	Ongoing with current system																								
b) Incentives	Ongoing																								
c) Focus on commercial sector	X	X	X																						
d) Residential C&R materials		X																							
e) Focus on multi-residential	X	X																							
f) New materials to programs	Ongoing as markets develop																								
g) Continued EPR	Ongoing																								
h) Single Stream Recycling																									
Feasibility Review				X																					
Implementation							X	X	X																
2. MRF LIFECYCLE REPLACEMENT							X	X	X																
3. CCF EXPANSION																									
a) Feasibility Study		X																							
b) Implementation			X	X																					

2012 SWMMP Implementation Plan - Recommended System

Description	Completion Year																							
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
4. COLLECTION SYSTEM REVIEW						X	X	X					X	X	X					X	X	X			
5. TRANSFER STATIONS & CRCS																									
a) Capacity/Location needs analysis						X																			
b) Updates/additions							X	X	X																
6. CONTINUED USE OF GLANBROOK LANDFILL	Ongoing during planning period																								
Landfill site selection															X	X	X	X	X	X	X	X	X	X	X
7. ALTERNATIVE DISPOSAL TECHNOLOGIES																									
a) Review	No later than 2017																								
b) Implementation						X	X	X	X	X	X	X	X	X	X										
8. SWMMP MAINTENANCE																									
a) Establish updated advisory committee	X																								
b) Annual Progress Report on Implementation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
c) Five Year Review of SWMMP						X					X					X					X				

Solid Waste Management Master Plan Recommendations	
Guiding Principles	
1	The City of Hamilton must maintain responsibility for the residual wastes generated within its boundaries. Inter-regional diversion facilities will be considered.
2	The Glanbrook landfill is a valuable resource, and the City of Hamilton must optimize the use of its disposal capacity to ensure that there is a disposal site for Hamilton's residual materials that cannot be otherwise diverted.
System Recommendations	
3	The City of Hamilton must set an aggressive objective of 65% waste diversion by the end of 2008, based upon 2000 waste generation rates.
4	The City of Hamilton must develop a waste management system that contains the following waste diversion components: • State-of-the-art Material Recycling Facility (MRF) to divert conventional "dry" recyclable materials • A centralized composting facility capable of managing household organic and leaf and yard wastes • Community Recycling & Reuse Centres
5	A new state-of-the-art Energy From Waste (EFW) facility may form part of the City of Hamilton's waste management system so the need for the EFW facility must be revisited in 2006 to determine if such a facility is needed to optimize the disposal capacity at the Glanbrook landfill site. Our diversion rates will be continuously monitored in order to determine the likelihood of success of achieving our 2006 diversion target.
6	The City of Hamilton should adopt a three-stream waste collection system (recyclables, organics and residual garbage), commencing with a pilot test in 2002 to identify and resolve operational and implementation considerations.
7	The City of Hamilton will consider the potential need for a user-pay system to encourage waste diversion and fund the waste management activities.
8	The City of Hamilton should adopt flexible enforcement systems that become progressively rigorous as waste diversion systems come into operation, recognizing the socio-economic and cultural diversity of the City.
9	The City of Hamilton should implement the components of the new waste management system as soon as possible based upon their diversion potential and operational viability.

Solid Waste Management Master Plan Recommendations	
Sustainable Development	
10	The City of Hamilton must implement, sustain and support a comprehensive public education, awareness and marketing program in all areas of the city outlining the benefits and encouraging participation in waste reduction, re-use, and recycling programs.
11	The siting of any new waste management facilities must consider neighbourhood issues, equity for its communities and the location and concentration of existing waste facilities.
12	The City of Hamilton should seek opportunities to share waste diversion (recycling or organics) facilities with neighbouring municipalities.
13	The City of Hamilton is committed to continually improving its waste management system and will support annual investment in research and development.
14	The City of Hamilton should continue to lobby the federal and provincial governments to do everything in their power to support municipalities with waste management programs with appropriate legislation, funding and fiscal policy. In the short term the City of Hamilton should request the Province to enact and implement Bill 90 as soon as possible.
15	The City of Hamilton should enter any Public-Private partnerships with caution. If pursued, the City should ensure it retains sufficient control and financial protection, to allow the City to continue to deliver the service should the private partner be unable or unwilling to fulfil its obligations.
16	The City of Hamilton should monitor the waste composition regularly to provide feedback on the effectiveness of the overall waste management system and public communication program.
17	The City of Hamilton should establish a waste management implementation task force to help staff and politicians implement and monitor the new waste management system.
18	The City of Hamilton should produce an annual report card to document progress toward its waste diversion objectives and the implications of that progress.
19	That the General Managers review and report back on how their respective department's policies, by-laws and operations can be enhanced to implement and support the Solid Waste Management Master Plan.

Waste Management Advisory Committee
TERMS OF REFERENCE

1. INTRODUCTION

1.1 Committee Name

Waste Management Advisory Committee (WMAC)

1.2 Statement of Purpose

To assist the City of Hamilton with the development and implementation of the 2012 Solid Waste Management Master Plan.

1.3 Committee Mandate

The mandate of the Waste Management Advisory Committee shall be to:

a) give overall guidance and direction during the preparation of the City's long-term Solid Waste Management Master Plan;
b) advise Council through the Public Works Committee of the study progress and to receive feedback, advice and direction, as appropriate; and

1.4 Accountability

a) WMAC is a Volunteer Committee that advises Council through the Public Works Committee.
b) Members of the WMAC are responsible for complying with the Procedural By-law and the Advisory Committee Handbook.

2. COMMITTEE STRUCTURE

2.1 Membership

The Waste Management Advisory Committee shall be comprised four (4) members, as follows:

a) Up to three members of City Council;
b) Two citizen members

2.2 Attendance and Vacancies

If a member is absent for three (3) meetings in a calendar year without approval from the WMAC, the member may be subject to replacement.

2.3 Term of Office

The membership term will coincide with the term of Council or until such time as successors are appointed by Council.

2.4 Representation

Quorum shall be 50% plus one, of the appointed Committee membership.

3. SUPPORT SERVICES

3.1 The City's Operations & Waste Management Division shall provide for the administrative costs of operating the Waste Management Advisory Committee, including the cost of meeting places and clerical support services.

3.2 The City's Operations & Waste Management Division shall provide the Waste Management Advisory Committee with reasonable access to the City's consultants and facility operators.

4. MEETINGS

4.1 The Waste Management Advisory Committee shall meet quarterly.

4.2 The meetings will be scheduled at the call of the Chairperson.