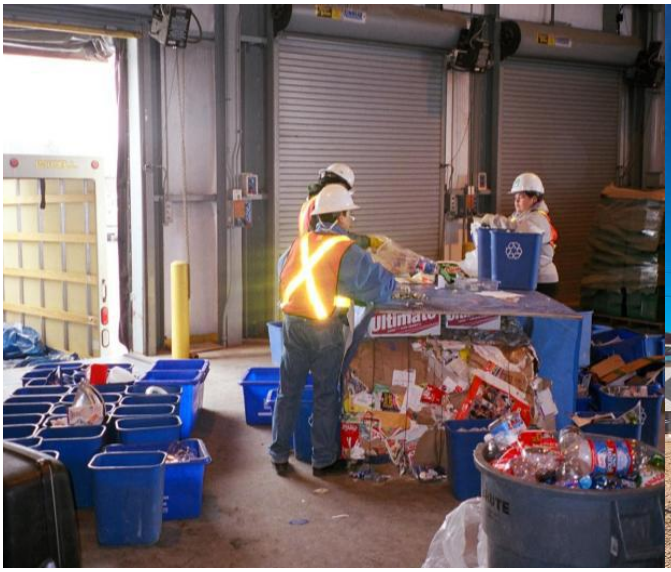
Appendix C – Comprehensive Integrated Waste Management Plan




Comprehensive Integrated Waste Management Plan

Prepared for: The City of Winnipeg

Final Project Report, September 2011



File # 11141000

Executive Summary

BACKGROUND

The City of Winnipeg (the City) has retained Stantec Consulting Ltd. (Stantec) to work with the City Staff, the Stakeholder Advisory Committee, and other stakeholders, to develop a Comprehensive Integrated Waste Management Plan (CIWMP) that will establish a long-term approach to manage the City's waste.

The purpose of the CIWMP will be to provide direction for the City's waste management system through recommendations to improve current waste diversion programs, to make progress towards zero waste and to address waste processing and disposal needs for the next twenty years. The goals and objectives for the CIWMP are discussed in Appendix A.

This report documents the recommended waste management system for the near term (implemented within the first 5 years) and longer term (in effect within 10 years). The twenty year planning timeline for the CIWMP covers the period from 2011 (Year 1) to 2031 (Year 20).

The CIWMP builds upon the current waste management system in the City (described in detail in Appendix B), which includes:

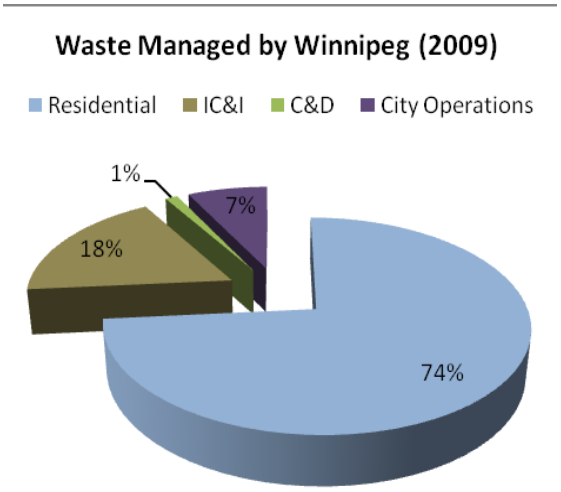
- Promotion and education for current City programs.
- Single stream recycling collection through curbside blue boxes, apartment recycling carts, depot collection and open space recycling containers.
- Leaf & yard waste collection and composting (including four (4) special collections for northwest Winnipeg residents and drop-off depots).
- Other diversion efforts such as Christmas tree chipping, promotion of backyard composting, grass-cycling, and 'Giveaway Weekends' for reusable items.
- A depot for scrap metal, automotive batteries, bicycles, tires, propane tanks, and appliances at the Brady Road landfill.
- Collection of garbage through a variety of methods across Winnipeg including automated carts, manual collection of garbage bags, Autobin or communal bin collection in back-lane collection areas, bin collection for multifamily dwellings, bulky waste collection and abandoned waste collection.
- Disposal of waste collected by the City and waste that is hauled to the landfill by city residents or commercial generators at the Brady Road Landfill.

The primary focus of the CIWMP is the residential waste management system, as residential waste makes up the majority of waste material managed by the City. City programs and facilities also manage some waste generated by the Industrial, Commercial, and Institutional (IC&I) sector, Construction and Demolition (C&D) sector and waste generated by City Operations.

The following table and chart, summarizes the current (2009) breakdown of the waste streams managed by the City. Information available regarding 2009 tonnages, indicates that the City was achieving 15% diversion of residential waste considering all residential waste streams (curbside and non-curbside) managed by the City. It should be noted however that the non-curbside materials managed at Brady Road are estimated and may include non-residential tonnages.

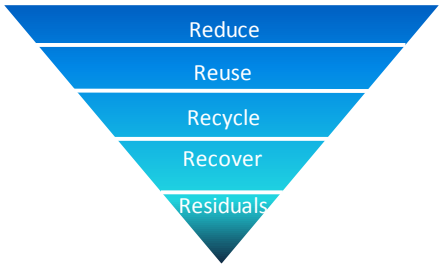
Summary of Waste Managed by Winnipeg in 2009 (tonnes)	
Residential	341,542
IC&I	83,099
C&D	5,310
City Operations	34,369
Total Tonnes of Waste Managed in 2009	**464,320**

2009 Tonnage Records indicate that the City diverted 53,800 tonnes of residential waste, achieving approximately 15% residential diversion through all programs (collection and depots).



FORMULATION OF THE INTEGRATED WASTE MANAGEMENT SYSTEM

The enhanced integrated waste management system developed for the City of Winnipeg reflects input from public involvement, the general principles of zero waste[1] and a waste hierarchy that encourages and promotes efficient use of resources and waste minimization, so that the primary waste management emphasis in Winnipeg switches from disposal to diversion. The components of the enhanced integrated waste management system as discussed in this section were presented and discussed in detail within the "Draft Task E Report, Identification of Waste Management Options" (Appendix C).



[1] The Federation of Canadian Municipalities, defined 'Zero Waste Communities' as:
A community that "has made a long-term commitment to reducing waste through measures such as extended producer responsibility programs, economic instruments to encourage waste reduction, green procurement and product design that includes end-of-life-management.

The enhanced integrated waste management system:

- Will improve Winnipeg's diversion rate by improving existing programs or adding new programs that address gaps in the existing waste management system;
- Uses a sequential approach which focuses on programs that offer cost effective improvements to the diversion rate in the near-term, while programs to be implemented in the longer term concentrate on restricting garbage and targeting additional materials for diversion such as source separated organics.
- Integrates a robust communications and education program to support overall program change and to encourage continuous dialogue with residents of Winnipeg. Program success is contingent upon the combined efforts of the City in providing service and the residents in effectively using these services.
- Strives for a balance between: a) environmental protection through increased diversion, decreased burial of waste and decreased GHG emissions; b) program costs understanding that City residents are affected by the costs associated with all program changes; and c) social considerations understanding that waste management is a service fundamental to the needs of the community.

THE RECOMMENDED RESIDENTIAL WASTE MANAGEMENT SYSTEM

The following summary tables present the recommended near and longer term residential waste management system. Programs referred to as 'near term' would be implemented and in effect within the first five years of approval of the Strategy. Programs referred to as 'longer term' will take more time to implement and would generally be in effect within 10 years.

The cost assumptions for most components of the system discussed below are conservative trending to the higher end of potential cost ranges presented in the Task E Options Report (Appendix C).

The recommended near term residential system was developed by:

- Considering the initiatives supporting increased diversion that are possible for the City to implement within the next five years, given that for many of these initiatives additional infrastructure is required (e.g. composting, Community Resource Recovery Centres (CRRCs));
- Identifying how best to address the key problems/opportunities identified during the development of the goals and objectives for the CIWMP (e.g. need for a uniform system of collection from single family households);
- Considering program changes which would be accepted by the community, reflecting the dialogue with the public through the consultation process that has taken place since November 2010.

Comparative evaluation during development of the near and longer term residential system was only undertaken for system components where there were clear options such as

alternative methods of collecting recyclables or garbage. In all other cases, the formulation of systems was based upon considering the most reasonable timeframe for implementation of the key initiatives.

Near Term Residential Waste Management System (Over Next Five Years)

1. Reduction and Reuse

Prevents waste generation through behavioural change. Required to 're-think' wasteful behaviour.

Recommendations:	
Expanded Promotion & Education:	• Increase scope of activities and program expenditures on a per household basis to support new programs. • Is the primary means of addressing reduction and reuse program elements. • Includes support for school programs developed by the Province.
Backyard and Community Composting	• Support and promote backyard and community composting.
Re-use Initiatives	• Work with existing community stakeholders and organizations • Develop City of Winnipeg 'Re-use' Guide, including 'take it back' options • Support Community Re-use Events • Develop drop-off locations for re-usable items at CRRCs, pending interest from community organizations to manage the material.
Per Capita Waste Reduction Target	• Set initial target: recommend a minimum of 1% per annum decrease in per capita waste generation (around 5 kg per person per year) • Promote the Per Capita waste reduction target. • Implement bi-annual residential audits to measure progress towards target and progress with other diversion plan components.
Grass-cycling	• Expand current promotion of grass-cycling. Share information on cost and environmental impacts of grass disposal with residents.
Community Based Social Marketing	• Use Community Based Social Marketing approach to support any desired changes in behaviour. This would include the implementation of significant program components such as the: - Transition to Uniform Garbage Collection - City-wide Leaf and Yard Waste Collection - Implementation of Community Resource Recovery Centre(s) (CRRC)
Support/Promotion of Waste Minimization Legislation/Programs	• Cooperate with the Province and Producers, supporting the development of Extended Producer Responsibility to other material streams

Potential Costs: **Capital:** Cost for re-use areas included in CRRC costs. **Net Annual Operating:** average $700,000 Increase	**Additional Staff Requirements:** • 2 Promotion & Education Staff
General Timelines: • Largely in effect by the end of 2013.	**Environmental Benefits compared to Status Quo:** • Diverts up to 7,000 additional tpy (2% Increase in Diversion) • Reduces GHG emissions and saves landfill capacity

Near Term Residential Waste Management System (Over Next Five Years)

2. Resource Recovery

Focus on recovery of materials through non-curbside programs.

Recommendations:

Community Resource Recovery Centres (CRRCs)	• Develop two facilities, one at Brady Road and another in the northern portion of Winnipeg. Focus: to manage and divert materials not normally managed at the curb. • Develop drop-off locations for re-usable items, pending interest from community organizations to manage the material. • Cooperate with stewards of provincial programs to potentially provide a location for depots to manage various materials (e.g. HHW and electronic waste) at the CRRC's. Responsibility for funding and management would rest with Stewards.
Encourage Private Sector Initiatives	• Engage local marketplace to market materials recovered by CRRCs
Recycling in Public Spaces	• Engage in discussions with CBCRA and MMSM regarding implementation of program. • Continue work to audit garbage composition to determine potential range of material types and quantities for diversion. • Assess best types of containers and location in conjunction with other City departments. • Implement program in coordination with CBCRA.
Special Events Recycling Program	• Engage in discussions with CBCRA and potentially MMSM regarding implementation of program. • Undertake a pilot study to assess collection methods and City specific messaging in partnership with the organizers of one or more major events, CBCRA and MMSM.

Potential Costs: **Capital:** $2.7 million Brady Road CRRC (mid-2013) $3.4 million Northern CRRC (late 2014) **Total: $6.1 million** **Net Annual Operating Costs (including revenues and amortized capital) (as of 2015):** **Total: $1.7 million Increase**	**Additional Staff Requirements:** • Brady Road CRRC: Up to 7.5 FTE included under Brady Road staff noted in the following section on implementation. • Northern CRRC: Up to 11 FTE, including both operating staff and drivers
General Timelines: • Brady Road CRRC, operating by mid-2013 • Northern CRRC, operating by late 2014	**Environmental Benefits compared to Status Quo:** • Diverts up to 17,000 tpy (5% Increase in Diversion) • Reduces GHG emissions and saves landfill capacity

3. Recycling

Builds on current program, by focusing on the capture and recycling of more materials.

Recommendations:

Recycling Collection Program	• Move to automated curbside collection of Blue Carts for Single Family Dwellings (SFD). • Replace containers at existing seven recycling depots to facilitate continued operation. • Pilot program for improvements in Multi Family Dwelling (MFD) recycling.
Increase Processing Capacity	• Address short-term requirements for increased processing capacity. • Develop new longer term capacity for increased tonnes of materials before 2017.

Near Term Residential Waste Management System (Over Next Five Years)

Potential Costs (as of 2012, 2014): **Capital:** Recycling Carts: $9.35 million Recycling Depots: $353,000 Processing: potentially $20.7 million for new MRF (2014) **Annual Operating (as of 2013):** Collection: $4.7 million Depot: $63,000 Annual Cost of Carts: $1.5 million Total Projected Collection Cost: $6.3 million Less 2011 Collection Cost: $5.5 million Change in Collection Costs from 2011: $800,000 Processing: $8 million Revenues: ($7.2 million) Total Projected Net Processing Cost: $750,000 Less 2011 Net Processing Cost: $390,000 Plus Est. Change in MMSM Funding: ($290,000) Change in Processing Costs from 2011: $70,000 **Total: approximately $870,000 increase**	**Additional Staff Requirements:** • Supported by existing recycling administration staff.
General Timelines: • Cart Collection program phased in starting mid 2012 • Short-term additional processing capacity secured by mid 2012 • Long-term processing capacity secured before 2017	**Environmental Benefits compared to Status Quo:** • Diverts up to 30,000 tpy (8% Increase in Diversion) • Reduces GHG emissions and saves landfill capacity

4. Organics Diversion

Expands upon current leaf & yard diversion program, focusing on a material stream that is easy to manage and that should be diverted from disposal.

Recommendations:	
Expand Leaf & Yard Collection	• Provide bi-weekly leaf and yard waste collection across Winnipeg from April to November. Materials would be set out in paper bags or approved hard wall containers.
Enhance Composting Area at Brady Road	• Develop upgraded leaf and yard waste composting facility at Brady Road, capable of managing up to 21,000 tpy of material.
Curbside Organics – Pilot Program	• Implement a trial curbside collection program (e.g. Green Bin) for household kitchen organics.

Potential Costs (as of 2012): **Capital (LYW Composting):** $2.2 million **Annual Operating (as of 2013):** LYW Collection: $2.8 million LYW Composting: $1.1 million Amortized Capital: $0.2 million SSO Pilot: $0.4 million **Total: $4.5 million Increase**	**Additional Staff Requirements:** • Collection support: included under garbage collection below. • 1 Technologist III LYW Compost

Near Term Residential Waste Management System (Over Next Five Years)

General Timelines:	**Environmental Benefits compared to Status Quo:**
• Expanded leaf & yard collection in place by mid-2012 • Leaf and yard composting site operational by mid-2012 • Curbside SSO pilot in place by mid-2013	• Diverts up to 21,000 additional tpy (6% Increase in Diversion) • Reduces GHG emissions and saves landfill capacity

5. Garbage Collection

Transition to uniform collection program for single family households, phasing out Autobin and manual garbage collection.

Recommendations:	
Consistent level of single family garbage collection City-wide	• Run automated cart demonstration in a group of Autobin zones, to test communication plan to support roll-out across Winnipeg. • Phase in automated cart collection of garbage for remaining areas of Winnipeg.
Consistent level of bulky collection	• Implement a minimum charge per bulky item (e.g. $5 per item) and for excess set-outs.
Examine collection system efficiencies	• Rationalize collection cycle and areas as part of new collection contract(s)

Potential Costs:	**Additional Staff Requirements:**
Capital (automated carts, as of 2012): $7.2 million **Annual Operating:** Collection: $6.5 million Annual Cost of Carts: $1.1 million Total Projected Cost: $7.6 million Less Collection cost (2011 Budget): $7.5 million Net Change in Collection Costs: Increase of $100,000 Plus Increase in fees from Bulky Collection: ($700,000) **Total: ($600,000) decrease**	Collection Support: • 1 Technologist III Collection • 4.5 Technical Assistants - Temporary
General Timelines:	**Environmental Benefits compared to Status Quo:**
• Pilot in Autobin areas fall 2011 • Uniform service for garbage and bulky collection phased starting in mid-2012	• Supports increased diversion for above programs. • Supports GHG emission reductions for above programs. • Proposed collection approach has most efficient fleet compared to other SFD collection options, reducing fleet emissions.

6. Brady Road

Transition Brady Road Landfill to a resource management facility where emphasis is moved from burial to diversion.

Recommendations:	
Design and operational improvements	• Redirection of residential traffic from tipping face to CRRC. • Operational improvements to active tipping face.

Near Term Residential Waste Management System (Over Next Five Years)	
	• Improvements in leachate and landfill gas management.
New diversion infrastructure	• Rebrand Brady Road as being a "Resource Management Centre" • Develop CRRC as discussed above. • LYW composting discussed above. • Potential site for new Materials Recovery Facility (MRF) and Centralized Compost Facility. • "Green Park" for private enterprise which would encourage the development of industrial and/or commercial enterprises to establish diversion efforts on site to focus on recovering value from various waste streams.
Potential Costs: **Capital: noted above** **Annual Operating: noted above**	**Additional Staff Requirements (including CRRC and LYW facility):** • 7.5 FTE for CRRC • 1 FTE for LYW Composting
General Timelines: • LYW facility in place by 2012 • CRRC in place by 2013 • Other facilities potentially by 2016/2017	**Environmental Benefits:** • Supports increased diversion for above programs • Reduces GHG emissions and saves landfill capacity

Near-Term Residential System Summary

Total New Capital:	Approximately $45.9 million
Total Additional Annual Operating Cost (including amortised capital, net of known revenues, including all potential permanent staff and compared to 2011 budget):	Up to $7.3 million
Additional Diversion (Compared to Status Quo):	75,000 tpy
Increase in Residential Diversion rate:	Increase of 20%

Program	Component	Capital Cost	Change in Net Annual Operating Cost (Compared to 2011 Budget)	Diversion increase
Reduction and Reuse		Included in CRRC costs	Average of $700,000	2%
Resource Recovery		$6.1 million	Up to $1.7 million	5%
Recycling	Collection	$9.35 million	$700,000	8%
	Depots	$350,000	$100,000	
	Processing	$20.7 million	$70,000	
Organics Recovery	Collection	$0	$2.8 million	6%
	Processing	$2.2 million	$1.7 million (includes SSO pilot)	
Garbage		$7.2 million	($600,000)	Supports increased diversion
Additional Staff (not included in above totals) and external implementation support			Up to $630,000	Supports program implementation
Total		**$45.9 million**	**Up to $7.3 million**	**20%**

Note: numbers may not add correctly due to rounding.

The following figure illustrates the proposed implementation schedule for the near term residential system and the correlation between program implementation and increases in diversion.

Proposed Implementation Schedule for the Near Term Residential System

Longer-Term Residential Waste Management System

The longer term residential system expands upon the near term system through program improvements and targeting additional material streams. Incremental program improvements are proposed to build on the success of the near term programs and to encourage further progress in diversion. New programs are identified that target additional material streams for diversion (e.g. source separated organics) within a reasonable timeframe that allows for the success of the near term programs to be assessed (e.g. success in collecting and processing LYW) and new infrastructure to be developed (e.g. processing capacity for organics).

Longer-Term Residential Waste Management System (in place within 10 years)

1. Reduction and Reuse

Prevents waste generation through behavioural change. Required to 're-think' wasteful behaviour.

Recommendations:

Continue with approach applied in the near term implemented largely through expanded promotion and education including:

- Promotion of backyard and community composting,
- Re-use initiatives,
- Per capita waste reduction target,
- Encouraging grasscycling, potential implementation of a grass ban,
- Implementing community based social marketing approaches, and,
- Promotion of waste minimization.

Potential Costs:

- Annual Operating: $700,000 continues, increasing over time based on increase in households served

General Timelines:	**Environmental Benefits compared to Status Quo:**
• On-going	• Diverts up to 12,000 additional tpy (3% Increase in Diversion) • Reduces GHG emissions and saves landfill capacity

2. Resource Recovery

Identify additional sources of material for diversion.

Recommendations:

Durable (Bulky) Goods Processing	• Conduct audits of bulky items at curb and CRRCs. • Determine potential for local partnerships for operations and local markets for recovered materials. • Consider processing centre at Brady Road and possible other CCRCs or direct bulky material for shredding/grinding and recovery of materials.
Two New Community Resource Recovery Centre(s)	• Pending performance of first CRRC's and community demand, develop two additional CRRCs in the eastern and western areas of Winnipeg.

Potential Costs:
Capital: $3.4 million or more per additional CRRC.
Net Annual Operating Costs (incl. revenues and amortized capital) per CRRC: $750,000 per additional CRRC
Costs for Durable (bulky goods) processing to be determined.

General Timelines:	**Environmental Benefits compared to Status Quo:**
• Both new CRRCs operational by end 2019.	• Diverts up to 43,000 additional tpy (10% Increase in Diversion) • Reduces GHG emissions and saves landfill capacity

Longer-Term Residential Waste Management System (in place within 10 years)

3. Recycling

Further expand recycling program.

Recommendations:

Expand range of recyclable materials collected.	• Continue to assess markets for potential expanded material streams. Dialogue with MMSM regarding potential additional material types. • Ensure sufficient capacity to manage additional materials at longer-term MRF.

Potential Costs:
Cost to collect and process expanded range of recyclable materials is to be determined.

General Timelines:	Environmental Benefits compared to Status Quo:
• Ongoing: assess changes in potential materials markets • By 2017, sufficient processing capacity available	• Diverts up to 40,000 additional tpy (9% Increase in Diversion) compared to the current Status Quo • Reduces GHG emissions and saves landfill capacity

4. Organics

Confirm implementation of a City-wide source separated organics (SSO) collection and processing program.

Recommendations:

Develop and implement organics collection and processing system	• Pending outcome of Near Term pilot, implement weekly organics collection, using a 'Green Bin' for single family residential households. • Collection approaches for multi-family dwellings are to be determined.

Potential Costs:
Capital:

- Organics Processing: Ranges from $45 million to $65 million depending on technology. Could be included in per tonne operating contract cost.
- Organics Carts: in the order of $11 million based on current pricing.

Annual Operating:

- Collection cost: in the order of $4.2 million annually for single family households. $1.7 million annually for organic carts.
- Processing cost: in range of $130 per tonne for SSO (contract cost including capital). $10 million annually

Note: allocation of tonnages between LYW and SSO programs will affect overall processing costs.

General Timelines:	Environmental Benefits compared to Status Quo:
• 2014: organics pilot 2017: earliest date for organics program implementation	• Diverts up to 97,000 additional tpy (22% Increase in Diversion) • Reduces GHG emissions and saves landfill capacity

5. Garbage Collection

As new diversion programs are implemented (e.g. organics diversion), implement further restrictions on garbage collection.

Recommendations:

Examine collection system efficiencies	• Coordinate and optimize collection to enable co-collection of materials and/or other collection system efficiencies.
Implement garbage restrictions	• Consider bi-weekly garbage collection or other measures to encourage use of diversion programs.

Longer-Term Residential Waste Management System (in place within 10 years)	
Potential Costs: Potential to decrease single family garbage collection costs by $1.7 million per year through bi-weekly garbage collection compared to current collection costs.	
General Timelines: • Implement concurrently with SSO collection (2017 earliest date for implementation)	**Environmental Benefits compared to Status Quo:** • Supports increased diversion for above programs.

6. Brady Road

Continue to shift focus of Brady Road from Disposal to Resource Management.

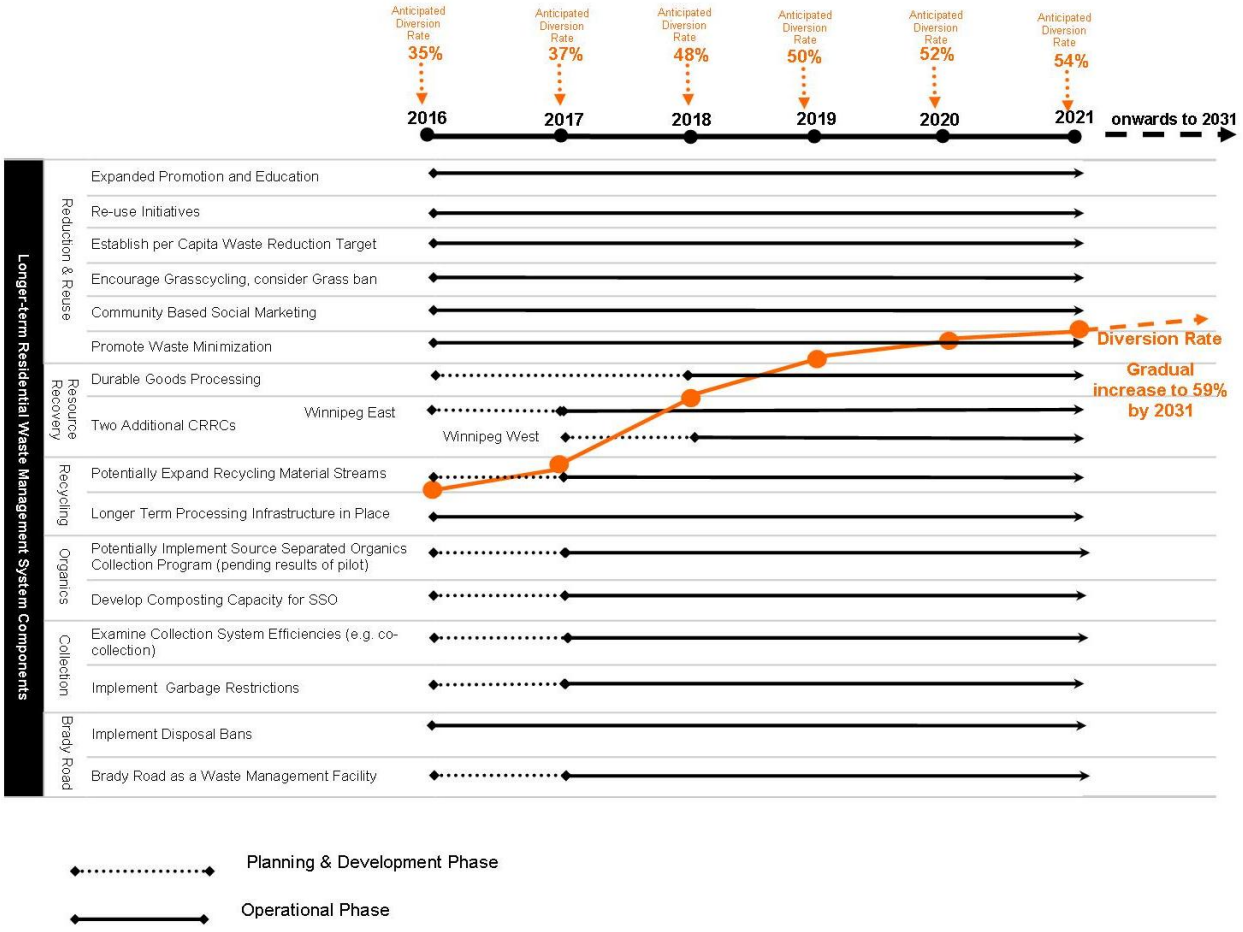
Recommendations:	
Implement Disposal 'Bans'	• As programs are implemented to divert materials, ban them from disposal at Brady Road. 'Ban' implemented through punitive tipping fees.
Brady Road as a Regional Waste Management Facility	• Dialogue with the Province, Capital Region Rural Municipalities, Towns and Cities interested in sharing services offered at Brady Road (both diversion and disposal).
Potential Costs: **Capital:** Some capital expense may be incurred – to be determined. Should be financed on cost recovery model. **Annual Operating:** Additional labour required to implement ban – cost recovery through tipping fees.	
General Timelines: • Implement Disposal Bans for materials when mature diversion plans are in effect • Pursue Regional role for Brady Road facilities when diversion infrastructure is in place	**Environmental Benefits:** • Supports diversion through other programs

Longer Term Residential System Summary

Total New Capital:	Full range to be determined
Total Additional Annual Operating Cost (including amortised capital, net of known revenues, including potential change in staffing complement and compared to 2011 budget):	Up to $23 million
Additional Diversion (compared to Status Quo):	192,000 tpy
Increase in Residential Diversion rate:	Up to 59%

The following figure illustrates of the proposed implementation schedule for the longer term residential system. It also shows the correlation between program implementation and projected increases in diversion.

Proposed Implementation of the Longer Term Residential System



The recommended residential system does not include options that either do not fit within the system based on other recommended components, or where the viability of pursuit of the option was uncertain.

Certain disincentives applicable to garbage collection, such as bag limits or a transition to clear bags, were not considered as reasonable longer term system components given the near term recommendation to transition the residential sector to automated carts. Once an automated cart system is in effect, it would be difficult to change back to a bag-based collection system. There are other disincentives related to garbage collection that are viable with a cart based system as included in the longer term system recommendations noted above.

Alternative technologies such as conventional and emerging waste to energy approaches were not carried into the residential system. The Brady Road landfill has significant remaining capacity, and the life of the landfill would be extended through implementation of the recommended diversion programs. There is also a significant difference in waste disposal costs between continued operation of Brady Road and the reported costs for alternative technologies. Reported capital costs for alternative technologies that are used to recover energy and materials from the solid waste stream that remains after diversion, range from $775 to $1,300 per annual design tonne. Reported net operating costs (costs less revenues) for these technologies range from $75 to well over $100 per annual design tonne. The potential role of alternative technologies can be reassessed over the longer term through the CIWMP review process, which would allow for new developments or concepts to be reviewed.

CONCEPTUAL IC&I AND C&D SYSTEM

The City provides curbside collection services to a small portion of the IC&I sector and accepts IC&I and C&D waste at the Brady Road Landfill. In addition, waste generated by City operations is also managed at the Brady Road Landfill.

It is estimated that in total, 350,000 tonnes of IC&I waste and 125,000 tonnes of C&D waste is generated each year within Winnipeg. C&D material quantities are difficult to estimate as they are often generated periodically based on construction starts and as much of this material is not tracked. The majority of the IC&I and C&D materials are managed at private sector facilities and operations outside of the City's system. It is estimated that the City manages around 20% of the IC&I and C&D waste generated. The options considered for diversion of IC&I and C&D materials acknowledge that the majority of these materials are managed outside the City's system. The City can encourage and support diversion but is not in the position to control the level of diversion by these sectors.

The potential near and longer term IC&I and C&D system components that have been identified below form the basis of a diversion concept that would be complementary to the residential system, and would support the transition of Brady Road from a disposal to a resource management facility. These program components would not compete with the private sector system that manages the majority of IC&I and C&D materials, rather they would serve to complete the IC&I and C&D system by providing equivalent support for waste avoidance and resource recovery as is planned for the residential sector.

Potential Near Term IC&I and C&D Waste Management System (Over Next Five Years)	
Conceptual Programs:	
Development of Green Procurement Guide	• Develop a Green Procurement Guide specific to the IC&I and C&D sectors.
Support for Commercial Re-use Programs	• Develop a waste exchange website.
On-going Diversion	• On-going dialogue with the IC&I sector concerning waste diversion.

Potential Near Term IC&I and C&D Waste Management System (Over Next Five Years)	
Dialogue with IC&I Sector	• Voluntary certification program for businesses that meet specific waste reduction and diversion standards set by the City.
Encourage LEED ® Standards	• In the near term, encourage new facilities built within City boundaries over a certain size to achieve LEED® certification.
Strategic Partnerships	• Provide assistance to and support for entrepreneurs by providing a location for developing new diversion facilities.
IC&I and C&D Materials Depot at Brady Road Landfill	• Develop an area for the diversion of IC&I and C&D materials at Brady Road Landfill; could be in the form of a re-use area (specifically for C&D materials) and a recycling station for divertible materials. Could be integrated with the Brady Road CRRC.
Research Partnerships with Post-Secondary Institutions	• Research partnerships with local post-secondary institutions to investigate different methods to re-use different materials and establish end markets for hard to recycle materials.
Expand IC&I Curbside Recycling	• Expand curbside recycling collection eligibility for small businesses.
Support and/or Expand School Recycling and Curriculum	• Support in-school recycling. • Cooperate with both Multi Material Stewardship Manitoba (MMSM) and the School Boards to develop appropriate curriculum for students.
Differential Tipping Fees	• Variable tipping fees on incoming IC&I and C&D loads depending upon the type of acceptable recyclable material in the load and whether materials are separated or mixed.

Conceptual Near Term IC&I and C&D System Summary

Total Additional Capital:	up to $4.5 million
Annual Operating Cost (some additional costs and revenues to be determined, should aim for full cost recovery from system users, initiatives designed on cost-recovery basis):	up to $2.5 million
Potential Diversion (if just targeting current generators using the City's system):	24,000 tpy
Increase in IC&I Diversion rate (compared to Status Quo):	Up to 31% of IC&I managed by the City
Increase in C&D Diversion rate (compared to Status Quo):	Up to 25% of C&D managed by the City

The concept for the longer term IC&I and C&D system expands upon the near term system, including additional measures to discourage waste disposal.

Potential Longer Term IC&I and C&D Waste Management System	
Conceptual Programs:	
Incentives and Social Marketing	• Expansion of P&E and social marketing to the IC&I and C&D sectors as appropriate.
City Advocates for IC&I Diversion Regulations/Policies	• Dialogue with Province regarding potential IC&I diversion regulations/policies
Mandatory Diversion By-law	• Implement a mandatory diversion by-law for IC&I and C&D generators that use the City's system for collection, processing, or disposal. • Could see changes to building code that would require diversion of C&D materials coupled with LEED
Process Commercial Food Waste	• Provide capacity to process and divert commercial food waste provided there is a residential SSO program.
Disposal Ban	• Prohibit the disposal of designated materials at the point of disposal at Brady Road Landfill. Loads of material exceeding permitted levels of banned material would be rejected or subject to a surcharge ▪ Would require change in operation of Brady Road Landfill including load inspections and additional area for diverting banned materials.
Expand "Green Park" for Private Enterprise	• The City should actively seek opportunities to engage the private sector in order to expand the Green Park.

Conceptual Longer Term IC&I and C&D System Summary

Full Costs: :	To be determined – Programs to operate on a cost recovery basis
Potential Diversion from Current Generators using the City's system:	Up to 76,000 tpy of IC&I and C&D waste currently managed by the City
Increase in IC&I and C&D Diversion rate (compared to Status Quo):	Up to 80%

DIVERSION PERFORMANCE AND PROJECTIONS – RESIDENTIAL DIVERSION

Based on the recommended system, it is expected that in the near term the City's residential diversion rate can be increased from 15% to approximately 35%. Note: these diversion rates reflect the full system used to manage residential materials (curbside and non-curbside programs). The following table summarizes the increase in tonnage recovered for each major component of the recommended near term residential system.

Near-Term Increase in Residential Tonnes Recovered

Component	Estimated Increase in Diversion (compared to 2009)	Estimated Increase in Tonnage Recovered (rounded)
Reduction & Reuse	2%	7,000
Resource Recovery	5%	17,000
Recycling	8%	30,000
Organics	6%	21,000
Collection	Supports Above Programs	n/a
Brady Road	Supports Above Programs	n/a
Total	**20%**	**75,000**

Note: numbers may not add correctly due to rounding.

Based on the recommended system, it is expected that in the longer term the City's residential diversion rate can be increased to approximately 59%. This projected diversion rate assumes full implementation of all of the recommended system components.

Municipalities that are currently achieving similar diversion rates (including the Halifax Regional Municipality, and the Region's of Halton and York), have implemented waste management systems very similar to that proposed for Winnipeg.

The following table summarizes the estimated increase in tonnage recovered for each major component of the longer term residential system.

Longer Term Increase in Residential Tonnes Recovered

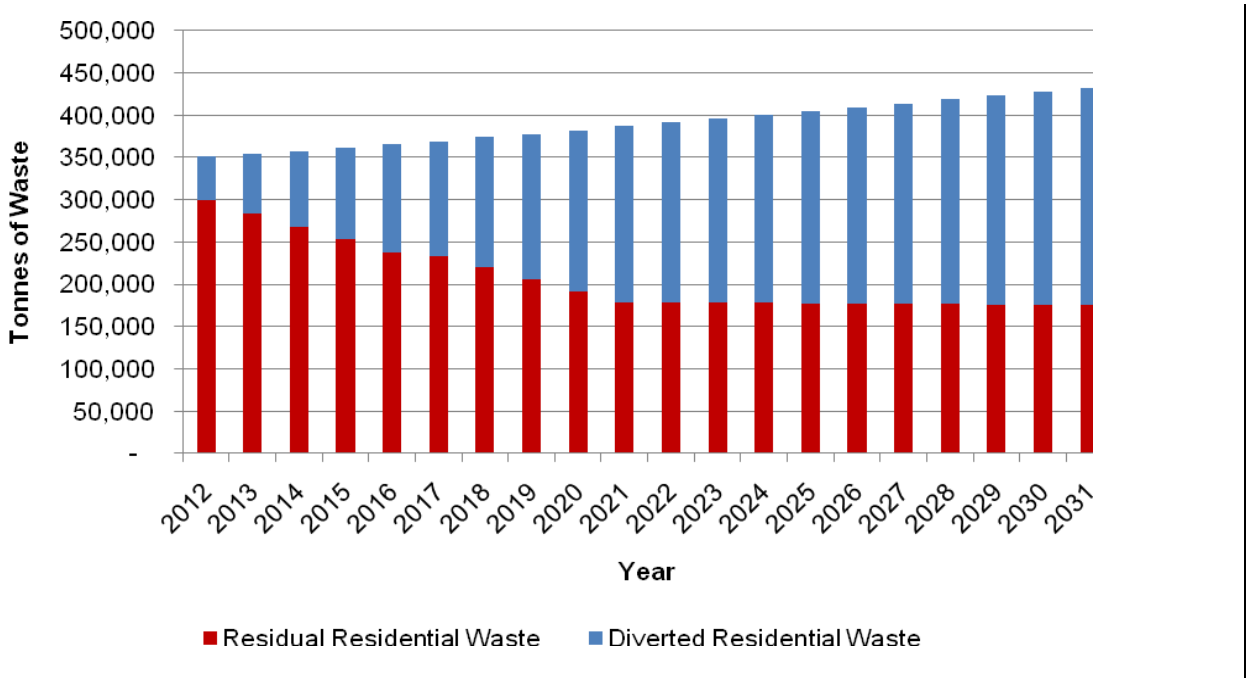
Component	Estimated Increase in Diversion (compared to 2009)	Estimated Increase in Tonnage Recovered (rounded)
Reduction & Reuse	3%	12,000
Resource Recovery	10%	43,000
Recycling	9%	40,000
Organics	22%	97,000
Collection	Supports Above Programs	n/a
Brady Road	Supports Above Programs	n/a
Total	**44%**	**192,000**

Several environmental benefits will be realized at Brady Road Landfill due to the implementation of the recommended options over the planning period, including:

- Less GHG emissions, odour, and nuisance effects will occur because less biodegradable material will be landfilled.
- The potential for harmful leachate production will be reduced.
- One tipping face will be able to be closed, reducing various impacts from landfill operations (odour, litter etc.).
- Brady Road will be more stable as less biodegradable material will be landfilled.
- The life of Brady Road will be extended as less airspace will be consumed. It is estimated that landfill airspace consumption could be reduced by 50% by 2031.

Overall, the recommended system would result in a substantial increase in residential diversion over the 20 year planning period, as demonstrated in the figure below.

Estimated Residential Residual Waste Disposed and Waste Diverted Year-by-Year over the Planning Period (2012-2031)



FINANCING THE CIWMP

Changes in Solid Waste Costs

The following table summarizes the total expenditures and revenues identified in the 2011 solid waste budget. Major revenue sources within the solid waste budget include tipping fees, sale of recyclables and recycling program support funding through MMSM.

The net cost for waste management services ($18 million after other revenue sources) is funded through the levy (property taxes). Based on the 2011 budget and allocation of the budget based on the tax rates, the portion allocated to the various sectors in Winnipeg, and average SFD property values, the 2011 waste services levy per SFD was on average $59 per SFD.

Total 2011 Budget Expenditures	$ 45 million
Total 2011 Budget Revenues	($27) million
Net System Cost	$18 million
2011 Solid Waste Portion of the Levy per Average Single Family Dwelling	$59

On a preliminary basis, it is anticipated that implementation of the recommended residential system could increase program costs in the near term by up to $24 per residential household (both single and multi-family) as of 2015 if all of the additional costs were allocated to the residential sector in Winnipeg. If the increase in program costs were allocated just to the SFD sector which would be the prime beneficiary of the changes in service, the cost increase would be $37 per SFD.

Residential program costs could increase by up to $73 per residential household (both single and multi-family) or up to $113 per SFD in the longer term (year 2019), if the increase in longer term system costs were allocated only to the residential sector in Winnipeg. Potential changes in program costs to reflect the recommended IC&I and C&D diversion initiatives are not included in this analysis as the preferred approach would be to seek full cost recovery from the users of the IC&I and C&D components of the system.

The potential change in residential program costs over the near and longer term, are summarized briefly below. The changes in costs are discussed in terms of allocation to single family dwellings, in that the majority of new program components affect the programs offered to SFDs. The near term costs identified are those for 2014, as 2012 and 2013 represent transition years; many of recommended program components would be phased-in beginning mid-2012 through to mid-2013. 2014 represents the first full year in which the majority of the recommended near term system would be in effect.

	Potential Increase in Net Expenditures	Increase if allocated only to Single Family Residential Dwellings	Total Net Expenditures (if increase allocated to Single Family Residential Dwellings)
Current (2011)	2011 Solid Waste Portion of the Levy per Average SFD		$59
Near Term (2014)	$7 Million	$37	$96
Longer Term (2021)	$23 Million	$113	$172

This cost per household analysis presented above, does not reflect a financing approach, rather it simply reflects the allocation of the additional net program costs across the estimated number of single family households in the City.

Financing the System

Two options for recovery of net system costs have been assessed as part of the planning process. Others were initially considered (e.g. charge per bag of waste), however, they were not reasonable to carry forward given that it is recommended that the City move to a uniform residential collection system that collects garbage in automated carts. The remaining options are discussed below.

Development of a Solid Waste Reserve Fund

In addition to examining mechanisms to recover net system costs as discussed below, the potential for reserve fund development was also examined. A solid waste reserve fund could be established through a number of mechanisms, for the purpose of funding future capital costs for waste management. This would reduce the year–to-year fluctuation in taxes and could reduce the overall costs of implementing the recommended system through reducing borrowing costs.

Examining the potential capital budgets identified to support the transition to an enhanced waste management system, indicates that there are a number of periodic capital investments that could be financed through reserves. A reserve fund of in the order of $20 million, would finance the cost of organic carts or replacement of the kitchen. For both options for net cost recovery, there are means of setting aside reserves these are also discussed below.

The Solid Waste Reserve Fund should be set up as a reserve dedicated to the funding of solid waste infrastructure, to allow the City to self-finance at least a portion of new capital investment required for the CIWMP. Funds directed to the Solid Waste Reserve, could include both the amount specifically identified in the annual budget or ‘flat rate’ as discussed below, and potentially any annual revenue surpluses from sources such as landfill tipping fees or others.

Concept 1: Continue to Finance Net Costs (after all other revenues) through the Solid Waste Portion of the Levy. Additional tax support of up to $7.3 million (year 2015) annually in the near term.

Currently, the net costs of waste management (i.e. the net cost of $18 million in the 2011 budget), is recovered through municipal taxes (otherwise referred to as the levy). Based on review of the 2011 short-form taxation information provided by the City, in the order of 59% of the overall amount levied in 2011 will be recovered from the single family residential portion of the tax base. In regards to the allocation of the 2011 net waste management costs, this would involve recovery of $10.6 million from single family residential property owners.

The following table briefly summarizes the allocation of 2011 waste costs to the residential tax base, and the estimated proportion of 2011 costs included within the solid waste portion of the levy for an average single family dwelling including an annual contribution to reserves of approximately $1.9 million annually (resulting in a cumulative reserves of $20 million as of 2021). Assuming that there is no change in the mill rate or portioned assessment, it is estimated that the potential change in the levy for a typical single family dwelling to recover waste management costs as of 2014 would increase by approximately $29, a 2% increase in the overall levy for a typical household.

Concept 1: Waste Management Costs Allocated per Typical SFD

Average Home Assessment (2010)	$207,548
Portioned at 45%	$93,396.60
Calculated Levy 2011	$1,429
Solid Waste Portion of the Levy (2011)	**$59**
Calculated tax impact - Increase in Waste Management Costs (2014)	**$29**
Waste Management Cost per Typical SFD (2014)	**$89**
Percent Increase in overall Levy	2%

Should the City choose to recover the net costs of the recommended system from the solid waste portion of the levy, this would:

- Recover the net costs of the system from the entire tax base, from all sectors, such that the single family residential sector would be levied in the order of 60% of the net change in program costs.
- Not be directly reflective of the costs of providing services to each sector, as this would allocate a portion of the additional program costs to the multi-family sector, institutions and other portions of the property tax base.
- Allocate the program costs to the residential sector using a process that is reflective of property value, not the cost of providing service to each residential property. Thus, residents in a higher value property would generally pay more than the actual cost of providing service to that property, while residents in lower value properties would generally pay less than the cost of providing waste services to that property.
- Result in an increase in the solid waste portion of the levy of up $7.3 million as of 2016, an increase of 50% in the waste portion of the levy compared to 2011. Overall,

the increase in waste management expenditures is estimated to increase the overall levy by 2% compared to 2011.

- Would involve setting aside approximately $1.9 million to reserves, resulting in an accumulation after 10 years of approximately $20 million, which could be used to fund future capital investment.

Concept 2: Applying a "Flat Rate" per Single Family Residential Household to recover a portion of system costs. Charge each single-family dwelling a flat rate reflective of the cost of garbage collection, including provisions for reserve fund development.

Another approach would be to recover the majority of the change in program costs directly from the residential sector, through the application of a 'flat rate'.

In most jurisdictions that use a "Flat Rate", it is used to recover a portion of the solid waste system costs. Generally it is used to recover costs for garbage collection and disposal from the residential sector, so that the residential sector pays a cost that is reflective of the cost of providing garbage collection service and disposing of the waste.

In many jurisdictions this "Flat Rate" is presented as a 'pay as you throw' approach for cart collection, as it reflects the annual cost for collection of a standard-sized cart for garbage. Households that choose additional carts or larger sized carts than the standard, would pay a higher rate for garbage collection.

In regards to implementation of a "Flat Rate" in the City of Winnipeg to finance the CIWMP:

- The projected cost of garbage collection for the single family sector would reach up to $7.6 million during the near-term period. If a flat rate were used to recover the cost of garbage collection from this sector, it would be in the order of $40 per household.
- The projected cost of garbage collection for the multi-family residential sector would be in the order of $3.4 million during the near-term period, and would be allocated to that sector based on portioned assessment.
- The cost for diversion would remain on the tax supported portion of the budget. The philosophy is that all sectors of the City benefit from increased diversion, through the savings of avoided impacts to the environment and landfill capacity.
- If a flat rate were set to recover the cost of single family residential garbage collection, there would be no increase in the Levy as a result of implementing the recommended CIWMP in the near term.
- Setting the rate at an amount higher than the projected cost of garbage collection, would provide an alternative means of generating reserve funds that would be used to finance future changes to the waste management system.

  Setting the rate at $50 per household for the first five years of the implementation period and an escalated rate in the next five years (2017 to 2021) to reflect implementation of organics collection, could generate reserves of approximately $20 million over the first 10 years of implementing the plan.

The following table briefly summarizes the allocation of projected waste costs to the residential tax base, and the estimated proportion of 2014 costs included within the levy for an average single family dwelling, assuming that there is no change in the mill rate or portioned assessment. It is estimated that the potential change in waste management costs for a typical single family dwelling to recover waste management costs as of 2014 would increase by approximately $37, a 3% increase in the overall levy for a typical SFD. Under this scenario, the solid waste portion of the levy would decrease, as the levy would not be used to recover the cost of collection from SFD and as the cost of collection from multi-family households would be allocated just to that sector.

Concept 2: Waste Management Costs Allocated per Typical SFD

Average Home Assessment (2010)	$207,548
Portioned at 45%	$93,396.60
Calculated Levy 2011	$1,429
Solid Waste Portion of the Levy (2011)	**$59**
Estimated Solid Waste Portion of the Levy (2014) (net expenditures for all services except for garbage collection)	$46
Flat Rate: Annual Waste Management Charge for Collection (2014)	$50
Waste Management Cost per Typical SFD (2014)	**$96**
Percent Increase in cost per Household (Levy plus Flat Rate)	3%

Financing the CIWMP through a “Flat Rate” offers the following advantages, and thus is recommended as the most reasonable financing approach for the City:

- It allocates the costs for garbage collection services provided to the residential sector, to this sector of the tax base which received and benefits the most from this service.
- It allocates the costs for diversion services to the full tax base, which all benefit from the reduced consumption of airspace at the Brady Road landfill and avoided impacts to the environment.
- It would result in an increase of approximately $37 annually for a typical residential household (around 10 cents per day), while financing significant improvements in service offered to the residential sector including provision of two new collection carts to the majority of residential households as well as two new diversion facilities.
- Based on setting the rate at $50 in the near term and increasing over the longer term, it would generate reserve funds of around $20 million, which would be used to finance new infrastructure such as new composting or recycling facilities.

IMPLEMENTATION OF THE CIWMP

Organization and Staffing Complement

The current staffing complement of the Solid Waste Services at the City of Winnipeg includes in the order of 48 full time equivalents (FTEs), and is reflective of the current status of the waste management system. The current staffing complement, particularly in regards to

administration, promotion & education and operational program support is low for a City of this size in Canada and is considerably less than the staff complement fulfilling these roles in municipalities with programs similar to those proposed for the City. The difference in staffing complement is primarily because these jurisdictions have a larger complement of planning & implementation staff allocated to assessing current program performance and supporting change, and dedicated communications specialists to support the promotion and education programs.

In order to implement the recommended system in the near term the City will require additional resources including:

- A dedicated implementation team that includes Solid Waste administrative and program management staff. Given the complexity and scope of the plan, external support through consultation services is recommended. This will be of critical importance to support the bid opportunities for the potential new MRF and composting facility, where detailed technical specifications will be required.
- Operational staff to manage and operate a number of the new facilities included in the system. Note: the estimates below do not include a full staff complement for City management of any new MRF or centralized composting facility, as it is more likely that the City would contract the operation of these facilities.
- Administrative staff and by-law enforcement staff, to administer and support the new programs.
- Dedicated communications resources, to support the proposed promotion and education and community based social marketing components.

The permanent staffing increase would be in the order of 24.5 positions. Four and a half (4.5) temporary positions have been identified to support implementation of new programs in 2012 / 2013. Any longer term staffing needs would be reported on separately prior to completion of near term projects and after detailed planning for the longer term projects is completed.

Administration:	**Brady Road and New Facilities at the landfill (CRRC, LYW composting etc.):**
• 2 Promotion and Education staff • 1 By-law Constable dedicated to Solid Waste Services Division. • 1 Project Coordinator	• 1 Technologist III – LYW composting • 1 Technologist III – CRRC • 1 Technologist II - CRRC • 3 Operator IV - CRRC • 2.5 Technical Assistant - CRRC
Stand-alone CRRC (per facility):	**Collection:**
• 1 Technologist III – CRRC • 1 Technologist II - CRRC • 3 Operator IV - CRRC • 6 Technical Assistant - CRRC	• 1 Technologist III • 4.5 Technical Assistants - Temporary

Monitoring and Reporting

The monitoring of system performance is an important aspect of ensuring the proper functioning of the overall waste management system and ensuring CIWMP goals are achieved. The CIWMP recommends that the City monitor system performance through regular waste auditing (i.e. residential, bulky waste, material brought to CRRCs, City operations waste).In addition to auditing there are a number of other indicators that can be measured and tracked.

It is recommended that the results of monitoring initiatives be reported on a regular basis internally within the City and externally to outside stakeholders. Primarily, this would take the form of an annual report on the CIWMP. This annual report should provide an overview of the applicable objectives for that year and documentation on how the City reached these goals. It should also include a list of issues that arose during the year and how these issues were mitigated. Finally, the report should include a section regarding the planned CIMWP implementation activities for the following year.

It is also recommended that City conduct periodic reviews and updates to the CIWMP at various times throughout the planning period (2011-2031). The recommended schedule for the review of the CIWMP is based on accommodating a reasonable cycle of contracts and the election cycle of Council as follows: Review 1, 2016; Review 2, 2020; Review 3, 2024; Review 4, 2028; Review 5, 2031.

Communications, Promotion & Education

Communications are a vital component of the CIWMP implementation plan. A communications plan will ensure a coordinated approach for the implementation of the reduction, diversion and disposal initiatives. Without a communications plan, messages may be released to the public in a piecemeal fashion, which will not have as great of an effect as a coordinated outreach program. Effective communications plans contain four primary elements: design, funding, deployment, and monitoring and evaluation.[2] Once a campaign is designed and funded, its deployment should use a mix of media including strategies such as radio or TV, calendars, websites, public relations, and other interactive methods including social marketing approaches. Sustained programs, with year-round exposure are identified as a best practice and are preferable to one-time blitz campaigns.

SUMMARY OF RECOMMENDATIONS

The recommendations identified in the CIWMP can be summarized as follows:

1. Implement improvements to the residential waste management system in the near-term to increase diversion to 35% with an increase in net waste management costs of up to $7.3 million that includes: expanded promotion and education programs; CRRCs that can recover resources from the waste stream; improvements to recycling collection; expanded leaf &

[2] KPMG, R.W. Beck. 2007. *Blue Box Program Enhancement and Best Practices Assessment Project – Volume 1*.

yard waste collection and processing; a uniform approach to collecting garbage; and, improvements at the Brady Road landfill.

2. Consider further expansion of the residential diversion program in the longer-term to increase diversion to 59%, with an increase in net waste management costs of up to $23 million, which includes additional CRRCs and diversion of kitchen organics.
3. Consider near and longer term IC&I and C&D diversion programs that are complementary to the residential system, and support the transition of Brady Road from a disposal to a resource management facility.
4. Finance the CIWMP through a 'Flat Rate' per single family residential household set at $50 annually for the first few years of implementation, which would be sufficient to cover the net change in waste management costs in the near term and would be used to set aside a dedicated solid waste reserve fund, to fund future capital needs of the CIWMP.
5. Adjust the staffing complement for solid waste services to administer, support and operate the programs included in the CIWMP.
6. Regularly report on progress in implementing the CIWMP and review the plan at least every five (5) years.
7. Support implementation of the CIWMP with a comprehensive approach for communications, promotion and education that includes social marketing.

Table of Contents

Table of Contents

Table of Contents

Table of Contents

Table of Contents

List of Figures

Table of Contents

List of Tables

Table of Contents

Table of Contents

Table of Contents

List of Appendices

1.0 Introduction and Background

The City of Winnipeg (the City) retained Stantec Consulting Ltd. (Stantec) to work with the City Staff, the Stakeholder Advisory Committee, and other stakeholders, to develop a Comprehensive Integrated Waste Management Plan (CIWMP) that will establish a long-term approach to manage Winnipeg's waste.

The purpose of the CIWMP will be to provide direction for the City's waste management system through recommendations to improve current waste diversion programs, to make progress towards zero waste and to address waste collection, processing, and disposal needs for the next twenty years.

The CIWMP builds upon the current waste management system for the City, which includes:

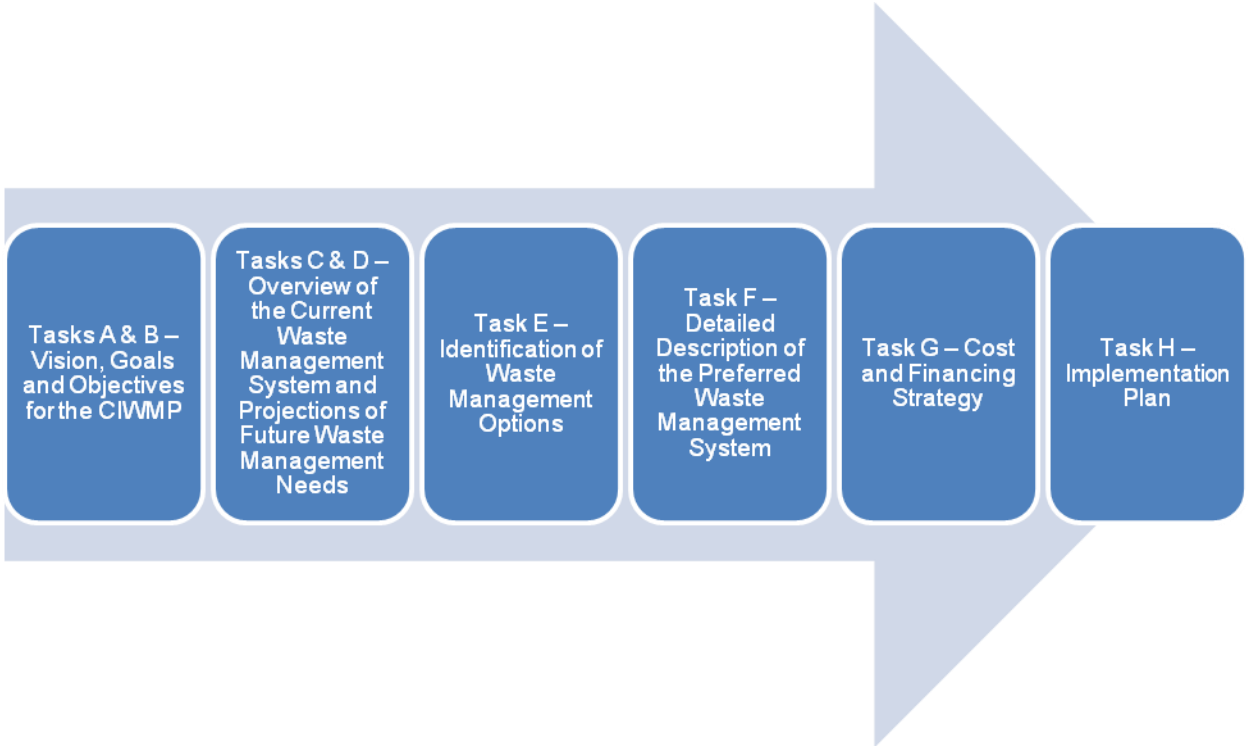
- Promotion and education for current City programs.
- Single stream recycling collection through curbside blue boxes, apartment recycling carts, depot collection and open space recycling containers. Overall up to 45,000 tonnes of Winnipeg recyclables are processed each year at the current recycling plant.
- Leaf & yard waste collection and composting including seasonal bi-weekly collection for northwest Winnipeg residents. Drop-off depots are available in the community during the spring and fall and year-round at the Brady Road Landfill where the material is composted.
- Other diversion efforts such as Christmas tree chipping, promotion of backyard composting, grass-cycling, and 'Giveaway Weekends' for reusable items.
- A depot for scrap metal, automotive batteries, bicycles, tires, propane tanks, and appliances at the Brady Road landfill.
- Collection of garbage through a variety of methods across Winnipeg including automated carts, manual collection of garbage bags, Autobin or communal bin collection in back-lane collection areas, bin collection for multifamily dwellings, bulky waste collection and abandoned waste collection.
- Disposal of waste collected by the City and waste that is hauled to the landfill by City residents or commercial generators at the Brady Road Landfill. There is some use of the landfill as a Regional Site (e.g. the transfer of waste from Provincial Parks to Brady Road) and some entrepreneurship is undertaken at the site (Wood e.g. processing waste elm wood into flooring).

Although the primary focus of the CIWMP is the residential waste management system, as residential waste makes up the majority of waste material managed by the City, City programs and facilities also manage waste generated by the Industrial, Commercial, and Institutional (IC&I) sector, Construction and Demolition (C&D) sector and waste generated by City Operations.

It should be noted that the diversion of IC&I and C&D materials considered for the CIWMP reflects that the majority of these materials are managed outside the City's system. The City can encourage and support diversion from IC&I and C&D generators but is not in the position to control the level of diversion by these sectors.

1.1 STUDY PROCESS

The Study was undertaken as a series of eight (8) tasks as shown below:



Tasks A&B, C&D, and E were all completed and documented via separate technical memos or reports over the course of the Study and are appended to this report as appendices A, B and C respectively. The content of these documents was updated based on discussions with City Staff the Stakeholder Advisory Committee, and other stakeholders throughout the project. Key information from the Task A&B, C&D, and E documents are included in this report. Tasks F, G, and H were completed later in the planning process and results of which are presented in this final report. Detailed analysis completed to support Tasks F, G and H as appropriate, are included in the appendices to this document.

This report has been prepared to document the results of the Study and is intended to guide the City's waste management system for the near (over the next 5 years), and longer term.

1.2 STATED PROBLEM

Review of the City's current waste management system indicated the following key areas that reflect the 'problems' associated with the current solid waste management system, or in other words the factors that drove the need to review the current waste management system. These 'problems' were framed as a set of needs that were addressed through development of the CIWMP as follows:

- Need for equivalent levels of service for regular garbage and bulky material collection, that balance the requirement to encourage additional diversion with the concept of ensuring that residents have the type of garbage collection program that serves their individual and community requirements;
- Need for improvements to the scope, effectiveness and efficiency of the City's overall waste diversion system, in order to achieve and sustain higher diversion rates over the short and longer term;
- Need to secure sufficient and reliable recycling processing capacity that will be capable of effectively processing higher quantities of recyclables over the short and longer term;
- Need to increase awareness of waste management programs and the effect of waste management on the local and broader environment across all sectors of Winnipeg;
- Need to obtain the required license for the Brady Road Landfill, and to put into place operating measures that will effectively manage use of existing approved disposal capacity. The capacity at the Brady Road landfill is a resource that has value to the broader community in the long-term.
- Need to manage the short and long-term liability associated with landfill disposal and operations.

The following problem statement was formulated to describe the waste management issues that the Strategy addresses:

The residents of Winnipeg do not have access to an equal level of waste collection service. Residents do not have access to and awareness of expanded diversion services. Many waste materials that could be diverted are disposed of at the Brady Road Landfill. The City's current design and operating plan for the landfill is outdated. The landfill operates under a permit but must be licensed under the current Environment Act.

1.3 VISION STATEMENT

The Study Team undertook a "visioning" exercise which considered input from City Staff and City residents. Based on these discussions, the vision for the waste management system that would arise from implementing the recommended Plan is a system where:

a) The potential negative environmental effects of waste management are reduced;

b) All residents have access to a level of garbage (and bulky) collection service that reasonably meets their needs and the needs of the community;

c) Waste is regarded and managed as a resource, switching the focus from disposal of garbage to reduction, reuse and diversion and commodification of materials;

d) The City is a demonstrated leader in diversion performance;

e) The City has secure, cost effective processing capacity in order to support increased diversion performance;

f) Residents, businesses and institutions in Winnipeg are aware of and participate effectively in the City's waste management programs;

g) The City makes best use of its available, fully permitted and licensed landfill capacity at the Brady Road landfill.

h) Best practice measures are implemented at Brady Road site to divert and manage materials, through City and private sector initiatives.

1.4 GOALS AND OBJECTIVES

In addition to striving to reach beyond the overall Provincial target of 50% diversion, other preliminary goals and objectives were based on the adoption of the following guiding principles:

- Current Provincial policy and programs related to solid waste management;
- A 'triple bottom line'/sustainable approach which refers to the consideration of environmental, economic and social factors in the decision making process. This will assist in addressing the goals of protecting public health and environmental stewardship, and is consistent with the Provincial principles and guidelines for sustainable development;
- A waste management hierarchy (otherwise referred to as the "Waste Value Chain") aligned with that adopted by other progressive jurisdictions; and,
- The general principles of "Zero Waste".

1.4.1 Provincial Policy

Current provincial policy and programs related to solid waste management that have been reflected in the development of the goals and objectives for the CIWMP are summarized briefly below:

1.4.1.1 Waste Reduction and Prevention Act (WRAP)

WRAP was passed in 1990 and forms the basis of Manitoba's strategy of achieving a 50% reduction in waste by the year 2000. Regulations under The WRAP Act were developed to support multi-material recycling, tire recycling and used oil management. The purpose of this Act is to reduce and prevent the production and disposal of waste in the province consistent with the principles of sustainable development,

a) to encourage consumers, manufacturers, distributors, retailers, governments, government agencies and other persons to develop and adopt practices and programs for the reduction and prevention of waste;

b) to enhance public awareness of the detrimental effect of waste on the environment and the natural resources of the province; and

c) to ensure the use of resources and the environment today meet the needs of the present without compromising the ability of future generations to meet their own needs.

Under WRAP, various initiatives have been developed and implemented through various funding and/or organizing bodies including the Packaging and Printed Paper Stewardship Regulation, the Manitoba Association for Resource Recovery Corporation, the Tire Stewardship Regulation, Green Manitoba, and Multi-Material Stewardship Manitoba.

The CIWMP reflects and acknowledges the various stewardship and funding initiatives developed under WRAP and associated programs.

1.4.1.2 Waste Reduction and Pollution Prevention Fund

The WRAPP fund addresses activities such as organic waste management and processing, C&D waste management, pollution prevention, and integrated waste management systems. Projects supported under this priority area will demonstrate the benefit of integrated waste management planning and local government partnerships to maximize the diversion of waste from landfill. Funded projects should have the potential to meet or exceed 50% diversion of waste from landfill, involve systems and plans that may be adopted by other local governments, and involve funding partnerships with the private sector, stewardship agencies, or other levels of government.

The CIWMP is intended to allow the City to meet or exceed 50% diversion of waste from landfill, through City managed programs, and will use a regional focus as appropriate for aspects of the new waste management system where involvement of other local governments could be mutually beneficial. The City could be eligible to apply for WRAPP funding during implementation of the CIWMP. Further investigation of funding should be investigated by the City.

1.4.1.3 Principles and Guidelines of Sustainable Development

The Province has adopted principles and guidelines of sustainable development. These principles include:

1) Integration of Environmental and Economic Decisions

2) Stewardship

3) Shared Responsibility and Understanding

4) Prevention

5) Conservation and Enhancement

6) Rehabilitation and Reclamation

7) Global Responsibility

The adopted guidelines that are the most directly related to the principles and approach applicable for the CIWMP include:

1) Efficient Use of Resources – which means

    a) Encouraging and facilitating development and application of systems for proper resource pricing, demand management and resource allocation together with incentives to encourage efficient use of resources; and

    b) Employing full-cost accounting to provide better information for decision makers.

2) Public Participation – which means

    a) Establishing forums which encourage and provide opportunity for consultation and meaningful participation in decision making processes by Winnipeggers;

    b) Endeavoring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions; and

    c) Striving to achieve consensus amongst citizens with regard to decisions affecting them.

3) Waste Minimization and Substitution – which means

a) Encouraging and promoting the development and use of substitutes for scarce resources where such substitutes are both environmentally sound and economically viable; and

b) Reducing, reusing, recycling and recovering the products of society.

Two of the fundamental guiding principles for the CIWMP as discussed below, include the application of a sustainable approach including the adoption of a waste hierarchy that encourages and promotes efficient use of resources and waste minimization. The process used in the development of the CIWMP includes meaningful public participation, recognizing that the decisions made in the course of the plan will affect all residents of Winnipeg.

1.4.2 Sustainability

The principle of sustainability, or more appropriately 'sustainable development' is often integrated in some fashion into the general principles applied to waste management planning.

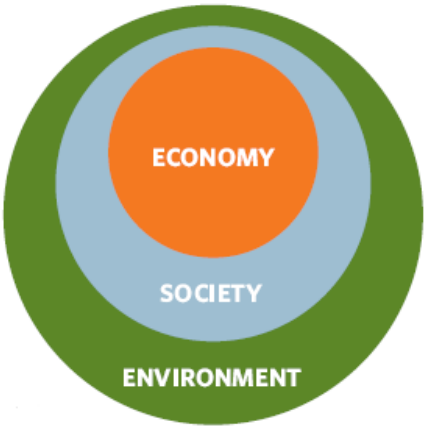
The definition of sustainable development that is most commonly used is based on that adopted by the World Commission on Environment and Development (WCED) in 1987, commonly referred to as the Brundtland definition:

> ***Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.***

Sustainable development generally means ensuring that well-being is at least maintained over time. The principle of fairness within and between present and future generations should be taken into account in the use of environmental, economic, and social resources. Putting these needs into practice requires living within the limits of the natural environment.

There is a strong relationship between meeting human needs now and into the future, and living within the limits of the environment. Figure 1.1 represents society and economic activity, which are constructs of people, at the centre of concern for sustainable development. Both are constrained by the natural systems of the Earth.

Figure 1.1: The Relationship between the Environment, Society and the Economy[3]



The generation of waste is generally counterintuitive to the concept of environmental responsibility, which acknowledges the importance of living within the limits of Earth's resources.

By adopting the general principles of Zero Waste and by taking into account the use of environmental, economic and social resources, the Plan will generally address the principle of Sustainable Development.

OurWinnipeg, the City's development plan (August 17, 2011) is required by the City of Winnipeg Charter to set out the city's long-term plans and policies regarding sustainable land use and development (224, a, iii).

The policies in OurWinnipeg relevant to the CWIMP include:

- Sustainably manage and reduce solid waste (01-1b).
- Invest strategically in new water, waste and transportation infrastructure (01-1b).
- Set long range goals for solid waste diversion (02-2).

Further directions on sustainable solid waste management are outlined in Chapter 5 of the Sustainable Water and Waste Direction Strategy, which was endorsed by Council July 21, 2010.

1.4.3 The Waste Hierarchy

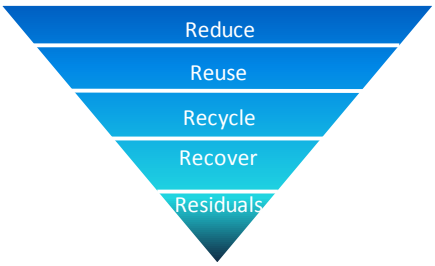
The waste hierarchy or value chain places priority on preventing waste generation, maximizing diversion of the waste that is generated and minimizing disposal with preference to disposal methods that allow for recovery of energy.

[3] City of Winnipeg. 2010. A Sustainable Winnipeg: An Our Winnipeg Direction Strategy.

There are many versions of the waste hierarchy in general circulation as set out in governmental and non-governmental policy statements developed for jurisdictions world-wide. Generally, each version presents certain nuances that reflect certain regional or national differences. The hierarchy generally appears as set out in

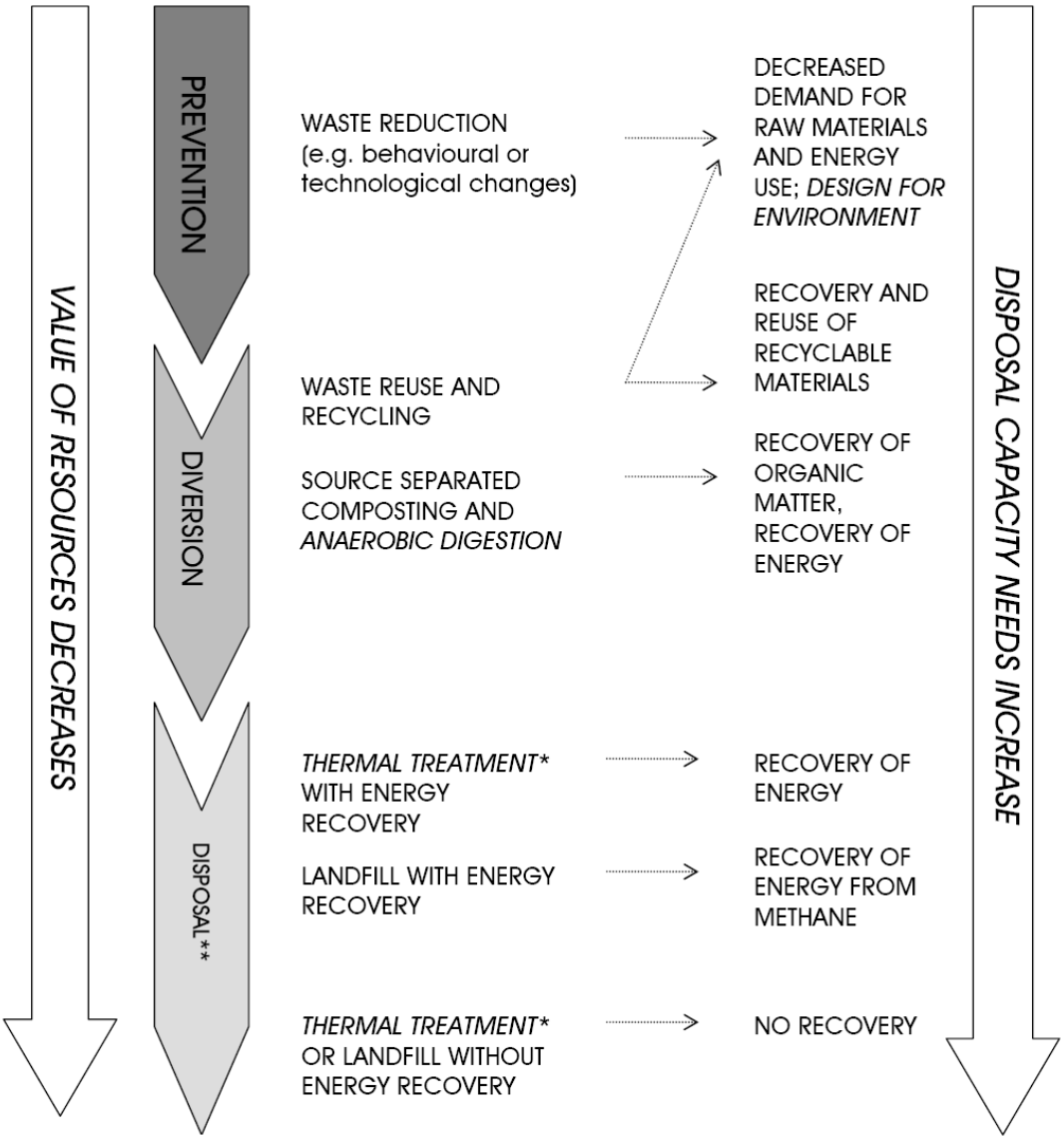
Figure 1.2.

Figure 1.2: The Waste Hierarchy



The waste value chain set out by the Province of Ontario as part of the "*Policy Statement on Waste Management Planning (June 2007)"* as set out in Figure 1.3 below, reflects the European model for integrated waste management known as Lansink's Ladder. The hierarchy prioritizes methods of managing waste depending on its characteristics and acknowledges the Zero Waste philosophy of environmentally conscious product design.

Figure 1.3: The Waste Value Chain or 'Lansink's Ladder'[4]



* With potential use of ash or recovery of metals.
**Waste managers should consider waste reduction as first priority, followed by diversion. All disposal options have unique environmental concerns and should only be considered as a last option. Where disposal is necessary, waste managers should carefully reflect on these environmental concerns in light of their local circumstances. Recovering energy from landfill or thermal treatment should be considered prior to thermal treatment or landfill without energy recovery.

[4] Ontario Ministry of the Environment. 2007. Policy Statement on Waste Management Planning: Best Practices for Waste Managers.

The Plan will take into account the general waste hierarchy, placing priority on the development of reasonable measures to prevent and divert waste from disposal, and to recover value from the remainder of the waste stream.

1.4.4 Zero Waste

Just as with Sustainability and the waste hierarchy, there are variations in the description as to what Zero Waste is. Some descriptions of Zero Waste clearly incorporate the principles of sustainability and the waste hierarchy as described above, and others are primarily focused on the concept of extended producer responsibility and waste avoidance.

The Federation of Canadian Municipalities, defines ”Zero Waste Communities" as:

> ***A community that “has made a long-term commitment to reducing waste through measures such as extended producer responsibility programs, economic instruments to encourage waste reduction, green procurement and product design that includes end-of-life management.***

The Zero Waste International Alliance defines zero waste as:

> ***A goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. Zero waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing zero waste will eliminate all discharges to land, water and air that may be a threat to planetary, human, animal or plant health.***

Municipalities that have adopted Zero Waste, such as many communities in British Columbia, have defined the specific behavior shifts that are required for Zero Waste. For example, the Regional District of Kootenay Boundary has defined the necessary shifts in behavior as follows:

> ***1. It asks consumers, taxpayers and local governments to stop thinking of resources as garbage for which they have to pay to landfill, but to maximize reuse, repair, recycling and composting instead.***
>
> ***2. It asks business to seek out materials efficiencies; redesign products and packaging the community cannot reuse, repair, recycle or compost so that they can be handled that way; and extend their responsibility for the product and its packaging by establishing take-back, reuse and remanufacturing systems.***
>
> ***3. It asks senior levels of government to shift economic incentives for the use of virgin resources to renewable and secondary resources and to facilitate the growth of Zero Waste initiatives.***

All descriptions of the philosophy of Zero Waste generally have in common the following:

a) Recognition of the need to shift to Extended Producer Responsibility (EPR) where the manufacturers of products and packaging become responsible for the full life-cycle of their products.

b) Recognition that municipal governments have a role to play, but cannot be wholly responsible for achieving Zero Waste, given that EPR is largely in the hands of the producers of materials and Federal and/or Provincial regulators.

c) That the ultimate goal of a Zero Waste approach is to reduce and eventually eliminate the need for waste disposal. The long-term objective of a Zero Waste approach is to eliminate materials from the waste stream.

d) Recognition that both landfills and Waste-To-Energy (WTE) facilities will continue to play a role in residuals management while Zero Waste practices work towards decreasing the amount of residuals requiring disposal.

Many Zero Waste policy documents, take the approach that Zero Waste is a path or a road, along which society can progress towards a goal of minimizing the waste requiring disposal. Actual progress made along this path by communities that have adopted Zero Waste has varied, and in many cases the means used to measure progress have also varied.

The following table (Table 1.1) provides a brief summary of various Zero Waste jurisdictions, goals that have been set and progress made towards these goals. Note: to the extent possible, progress towards diversion is noted based on the definition used in the Plan, being the proportion of total waste generated (and managed by the municipality) that is diverted from disposal.

Table 1.1: Zero Waste Goals from Various Jurisdictions

Jurisdiction	Waste Diversion Goal	Date Set	Current Achievement
City of Toronto	60% by 2006 80% by 2008 100% by 2010	Initially set in 2001. Reset goal to 70% in 2007	Has not yet achieved 2006 goal. Currently expanding diversion infrastructure to include durable goods processing and other initiatives to target key areas of the waste stream that are not addressed by the blue box or organics programs. As of 2010, single family residential sector had a reported diversion rate of 63%, and multi-family sector had a reported rate of 18%.
City of Calgary	80% by 2020	2004	Achieved 23% diversion in 2010.
Greater Vancouver	Zero Waste in the Long Term	2006	Have updated Diversion Plans and are integrating energy from waste within the context of a new solid waste management plan.
Regional District of Nanaimo	Zero Waste in the Long Term	No Date	64% IC&I and Residential Diversion in 2008
Capital Regional District (Victoria)	60% by 2012 80% by 2020	No Date	Working towards region-wide source separated organics program (has yet to be implemented).
Province of Nova Scotia	50% Diversion from Landfill	1996	40.7 % diversion reported by Stats Can for 2006
Halifax Regional	82% Diversion	1997	Achieved 59% diversion in 2006.

Table 1.1: Zero Waste Goals from Various Jurisdictions			
Jurisdiction	**Waste Diversion Goal**	**Date Set**	**Current Achievement**
Municipality			
Seattle	100%	1998, updated in 2004 and 2007	Diverted 52% of residential waste in 2004.
Portland, Oregon	75% by 2015	2006	61.5% of waste stream in 2008.
City of Edmonton	90% diversion from landfill by 2012	2007	Approx. 60% as of 2009/2010
City of Regina	40% by 2015, 65% by 2020	2010	16% diversion as of 2009. Implementation of Enhanced System as of 2011.

This is just a brief overview of the progress that has been made by some communities, but it is evident that significant additional progress needs to be made over the longer term to achieve zero waste targets.

Municipal waste management programs can only achieve a certain level of result, based on participation and use of municipal diversion programs. Provincial and Federal governments have a regulatory role to fill that can affect the generation of waste materials that enter the marketplace. Industry and consumers have a significant role to play in the avoidance of waste, industry in providing options to avoid waste and consumers in making wise choices that decrease overall waste generation. It is the combination of these four elements (municipal programs, effective regulations, industry initiatives and consumer behavior) that is required to make significant progress towards Zero Waste.

1.4.5 Solid Waste Management Goals and Objectives

Based on discussions with City Staff and the Stakeholder Advisory Committee goals and objectives were developed for the CIWMP (see the CIWMP Vision, Goals and Objectives paper in **Appendix A** for further details). The following table outlines the CIWMP goals and objectives:

Table 1.2: CIWMP Goals and Objectives	
CIWMP GOALS	**OBJECTIVES**
#1 Minimize the generation of waste in Winnipeg	• Implement policies and programs that encourage a decrease in the per capita residential waste generation rate. • Determine reasonable approaches that the City can implement within its own operations to avoid waste generation (e.g. green procurement etc.). • Support the concept of Extended Producer Responsibility, understanding that this moves the responsibility for waste at least partially away from Winnipeg.
#2 Improve and Sustain Performance of the City's Diversion System	• Significantly increase diversion within the first 5 years of the Plan by adding key programs that will divert major material streams in a cost effective fashion. • In the longer term, achieve incremental diversion improvements sufficient to keep pace with population growth in Winnipeg over the planning period. • Secure effective long-term capacity for processing recyclables and other materials.
#3 Increase participation in the City's waste management plan and engage residents in diversion initiatives	• The City has a consistent, enhanced promotion and education program, using targeted social marketing approaches and reaching out through electronic media, the school system, community organizations and other means. • Diversion should become the number one priority for residential waste management, with participation in all diversion programs reaching in the order of 80% or higher through a combination of incentives and penalties. • The public and the City would consider the Brady Road landfill as a centre for diversion and commodification of materials, and not a 'dump'.
#4 Optimize management of the Brady Road landfill property	• Increase awareness of the value of the landfill site as a key City resource and asset. • Design and construct on and off-site CRRCs to remove various materials from the self-hauled waste stream, directing them to beneficial uses. • Optimize use of the property, by encouraging the development of public and/or private sector facilities to process materials (e.g. organics, biosolids, bulky materials etc.) • Reconfigure the landfill, to minimize the potential environmental impacts of the site and make best use of the current footprint. • Effectively manage landfill odours and reduce the potential for off-site landfill gas migration. • Effectively manage landfill leachate and reduce the potential for impacts on surface water and groundwater. • Protect the ability to continue activities on the landfill property, by minimizing the potential for incompatible adjacent land uses (e.g. land use controls on adjacent properties).

Table 1.2: CIWMP Goals and Objectives	
CIWMP GOALS	**OBJECTIVES**
	• Protect the ability to continue compatible adjacent land uses, by minimizing the potential for off-site impacts from the landfill.
#5 Reduce the negative environmental effects of managing the waste generated in the City	• From a Life Cycle Analysis perspective, considering the direct and indirect effects of managing waste (including greenhouse gases, other emissions to air, emissions to water, energy and resource consumption) reduce the environmental footprint of the waste management system • Reduce the consumption of landfill airspace over the planning period, through a combination of decreased waste generation, increased diversion and other programs/practices that result in increasing the density of the residual waste disposed
#6 Implement a sustainable waste management system that balances the social, environmental and financial considerations of waste management while addressing the long-term needs of City residents. (triple bottom line)	• Ensure that an acceptable balance of social, financial and environmental considerations is achieved. • Pursue diversion system options in which the incremental increase in diversion performance is balanced with the potential increase in system costs.

1.5 DESCRIPTION OF THE CITY AND ITS CURRENT WASTE MANAGEMENT SYSTEM

The following section provides an overview of key information considered in the development of the CIWMP. Detailed background information regarding the current waste management system in the City is provided in the Draft Task C&D Report (**Appendix B**). This information was required in order to anticipate the quantity and types of waste that will be generated in the future and to identify areas for program improvements.

1.5.1 Geographic Description

Winnipeg is located in the Red River valley and has an extremely flat topography. There are no substantial hills in Winnipeg or its vicinity. Winnipeg is relatively isolated; the closest metropolitan area with a similar population (Minneapolis-Saint Paul), is approximately 700 km (435 mi) southeast; the closest city with a metro population of over 100,000 (Fargo) is approximately 358 km (222 mi) south.

Of particular interest in the development of the CIWMP is the relative geographic isolation of Winnipeg. As a result, there are fewer options for the movement of materials outside Winnipeg for processing/marketing as compared to other comparable urban centres elsewhere in Canada. It also lends to the concept that Winnipeg and new City facilities could serve as regional hubs/centres for materials management, as Winnipeg is the urban centre of the province.

1.5.2 Demographics

Winnipeg is the largest urban area in the Province of Manitoba, serving as an administrative and economic hub. After limited growth for 15 years, Winnipeg's population is rapidly increasing, outpacing previous forecasts. Winnipeg's population has grown by over 44,000 people; 9,200 in 2009 alone.[5] In 2009, the population of Winnipeg was estimated at 672,000.[6]

The recent increase in population is driven primarily by increased levels of immigration and a combination of fewer people leaving and more people coming from other parts of the country. The Conference Board of Canada is projecting even stronger population growth for Winnipeg in the coming years. 180,000 new people are anticipated to make Winnipeg their home by 2031 increasing the population to an estimated 837,000.

The recent increase in immigration now places Winnipeg's immigration level in the fifth spot among major Canadian cities, after Toronto, Montreal, Vancouver and Calgary.[7] It is expected that Winnipeg's immigration will further increase to more than 10,000 immigrants per year by 2020.[8] The increase in immigration presents Winnipeg with new cultural differences with newcomers coming from a wide variety of countries of origin.

Winnipeg's Aboriginal communities are also growing. Aboriginal people currently make up approximately 10 per cent of its population, a figure that is expected to increase.[9] The population of people in Winnipeg identifying as Aboriginal grew by more than 20,000 in the 10 years between 1996 and 2006. The number of Aboriginal people in Winnipeg is growing at a faster rate than that of the non-Aboriginal population.[10] The Aboriginal population living in Winnipeg is also much younger than the non-Aboriginal population. In 2006, the median age of the Aboriginal population in Winnipeg was 26 years, compared to 40 years for the non-Aboriginal population.[11]

When considering program changes, both the potential growth within Winnipeg must be considered, along with demographic changes related to the population serviced by the new programs. Of particular interest in the CIWMP is the need to ensure that the planned components of the system have sufficient capacity to serve a growing population and that program design and communications use an approach that encourages participation by all sectors of the population.

[5] Statistics Canada, 2009.
[6] Obtained from http://www.winnipeg.ca/cao/pdfs/AdjustedPopulationForecast2009To2031.pdf
[7] Conference Board of Canada, 2007.
[8] Conference Board of Canada, 2007.
[9] Statistics Canada, 2006.
[10] Statistics Canada, 2006 Census, Aboriginal persons based on identity.
[11] Statistics Canada, 2006.

1.5.3 City Economy

Winnipeg's economy is one of Canada's most diversified covering finance, manufacturing, transportation, food and beverage production, industry, culture, government, retail, and tourism. Of the 13 larger Canadian cities, Winnipeg's average economic growth (between 2007 and 2009) is the third strongest after Saskatoon and Regina. Going forward, Winnipeg's economic growth is expected to average a healthy 2.8 per cent growth per year.[12]

Overall annual job growth over the last three years averaged 1.8 per cent per year – similar to Canada's. During the economic slowdown, employment in Winnipeg actually rose a 0.5 per cent in 2009, the fourth straight annual advance. The four-year forecast averages 1.3 per cent annual growth. The unemployment rate is expected to remain low, averaging 5.1 per cent through the forecast period 2011 to 2014. Winnipeg can expect an additional 21,000 jobs over the next five years – the majority of which will be in the service sector. The construction sector is also expected to do well with 2,600 additional jobs – an 11 per cent increase.[13]

Of interest in the CIWMP is that with such growth, comes potential demand for management of additional IC&I and C&D materials. Winnipeg's system could play a role in addressing this demand, along with the private sector system that manages the majority of the IC&I and C&D waste generated within the City.

1.5.4 General Overview of the Existing Solid Waste Management System

The City is directly responsible for the collection and management of waste generated by residential premises (including multi-family residential buildings). The City is also directly responsible for the management of waste generated from City operations (e.g., municipal buildings, municipal construction & demolition projects etc.).

In addition to residential and City operations waste, the City also manages a portion of Industrial, Commercial, and Institutional (IC&I) waste produced within Winnipeg. Garbage and recycling collection is provided to some eligible small commercial establishments (who chose to participate in the program) and IC&I entities are also permitted to utilize the City's landfill (Brady Road Landfill) for a fee. However, the direct management of IC&I material is largely undertaken by the private sector.

Table 1.3 provides a brief summary of the City's current waste management system.

[12] Conference Board, Metropolitan Outlook Data, Nov 2009.
[13] Conference Board, Metropolitan Outlook Data, Nov 2009.

Table 1.3: Overview of the City's Waste Management System (Programs and Facilities that manage City Materials)

	Waste Management System Overview	2009
Facilities	Operating Landfill Sites:	1
	Landfill Sites under Development:	0
	Inactive Landfill Sites:	34
	Transfer Stations:	0
	Material Recycling Facilities:	2 – (Privately Owned)
	Composting Facilities:	1 – Leaf & Yard Outdoor Windrow Composting
	Number of Leaf & Yard Waste Depots	11 – Operated Seasonally
	Number of Recycling Depots	7
Major Programs and Tonnes Managed	Total Residential Garbage Collected Curbside (tonnes)	227,929
	Total Residential Recycling Collected Curbside (tonnes)	41,660
	Total Residential Leaf & Yard Waste Collected Curbside (tonnes)	698
	Total Curbside Special Collections (tonnes) (i.e., bulky wastes, appliances etc.)	(included in garbage)
	Total Residential Recycling Brought to Depots (tonnes)	2,528
	Total Residential Leaf & Yard Waste Brought to Depots (tonnes)	4,062
	Total Residential Garbage Brought to Brady Road Landfill (Small Loads) (tonnes)*	63,366 (estimated)

*Mix of residential and ICI/C&D loads in small vehicles.

1.5.4.1 Waste Management Services

The City currently provides the residential sector (including multi-family residential buildings) with collection of garbage, single-stream recycling, leaf & yard waste (single family northwest Winnipeg residents only), and bulky wastes (on a call-in basis). The City also collects garbage and recycling from some eligible small commercial establishments and institutions who choose to participate in the curbside programs.

Residents are also able to:

- Drop-off small loads of garbage at the Brady Road Landfill (for a fee),
- Drop-off divertible materials such as scrap metal, automotive batteries, bicycles, tires, propane tanks, and appliances at Brady Road Landfill;
- Drop-off recyclables at recycling depots (7 located City-wide) (free of charge);

- Drop-off seasonal leaf & yard waste depots (11 located City-wide) (free of charge); and,
- Drop-off Christmas tree depots (11) (free of charge).

In regards to residential collection services, there is considerable variation in the type of service provided across the City. Table 1.4 provides an overview of the distribution of residential households by type of curbside collection provided.

Table 1.4: Distribution of Residential Households Serviced by the City, 2010

Household Collection Approach	Estimated Number of Household Served (2010)
Individual Curbside Manual Collection	**108,000**
Back Lane Autobin or Carts	**24,000**
Individual Curbside Automated Carts	**43,000**
Apartment/Condo Bin Service	**103,000**
Total	**278,000**

1.5.4.2 Waste Management Facilities

The City currently operates one landfill (Brady Road Landfill), 7 recycling depots, and 11 seasonal leaf & yard depots. Emterra Group owns and operates the material recycling facility (MRF) which processes the City's recyclable material returning revenue from sales to the City. Versatech processes paper from the City's depot program and retains revenue from sales of material.

1.5.4.3 Results of Initial System Review

The outcome of the initial review of the current waste management system, as discussed in Appendix A and B, resulted in the identification of a set of needs that should be addressed through the CIWMP as follows:

- Need for equivalent levels of service for regular garbage and bulky material collection, that balance the requirement to encourage additional diversion with the concept of ensuring that residents have the type of garbage collection program that serves their individual and community requirements;
- Need for improvements to the scope, effectiveness and efficiency of the City's overall waste diversion system, in order to achieve and sustain higher diversion rates over the short and longer term;
- Need to secure sufficient and reliable recycling processing capacity that will be capable of effectively processing higher quantities of recyclables over the short and longer term;
- Need to increase awareness of waste management programs and the effect of waste management on the local and broader environment across all sectors of Winnipeg;

- Need to obtain required license for the Brady Road Landfill, and to put into place operating measures that will effectively use of existing approved disposal capacity. The capacity at the Brady Road landfill is a resource that has value to the broader community in the long-term.
- Need to manage the short and long-term liability associated with landfill disposal and operations.

Further assessment was undertaken of current diversion performance for the various sectors within Winnipeg, as discussed below.

1.6 CURRENT DIVERSION PERFORMANCE

This section provides details regarding the current performance of the system. Performance takes into the account the amount of waste generated, diverted, and the quantity of waste disposed of in the Brady Road landfill. Understanding the performance of the current system was critical in identifying the gaps and areas which can be improved upon in the recommended system.

1.6.1 Residential Waste

Waste generation refers to the weight of materials and products that enter the waste stream before recycling, composting, landfilling, or combustion takes place. In 2009, it was estimated that the residential sector of Winnipeg generated approximately 341,542 tonnes of solid waste.[14] This takes into account:

- Residential waste collected (i.e., garbage, single-stream recycling, leaf & yard waste) from single family dwellings (SFDs) and multi-family dwellings (MFDs); and,
- Residential waste brought to City drop-off depots and Brady Road Landfill.

It should be noted that the estimated residential waste brought to the Brady Road Landfill is a calculated estimate — not a measured value, as the residential loads are generally not weighed. Some recent assessment of the weights of residential loads indicates that the current assumption of 500kg per load, may be an overestimate. It is also understood that some small commercial generators are handled as residential customers. As a result, the quantity of residential material in the depot/Brady Road stream is likely an overestimate.

Table 1.5 presents the quantities of residential waste managed by Winnipeg's current waste management system via the collection and drop-off depot programs. As noted in Table 1.5, it is estimated that approximately 79% of the residential waste managed by the City is collected through City programs while 21% is dropped off at City depots and the Brady Road Landfill.

[14] Based on data provided by the City.

Table 1.5: Quantities of Residential Waste Managed through Winnipeg's Waste Management System via Collection and at Drop-off Depots (2009)

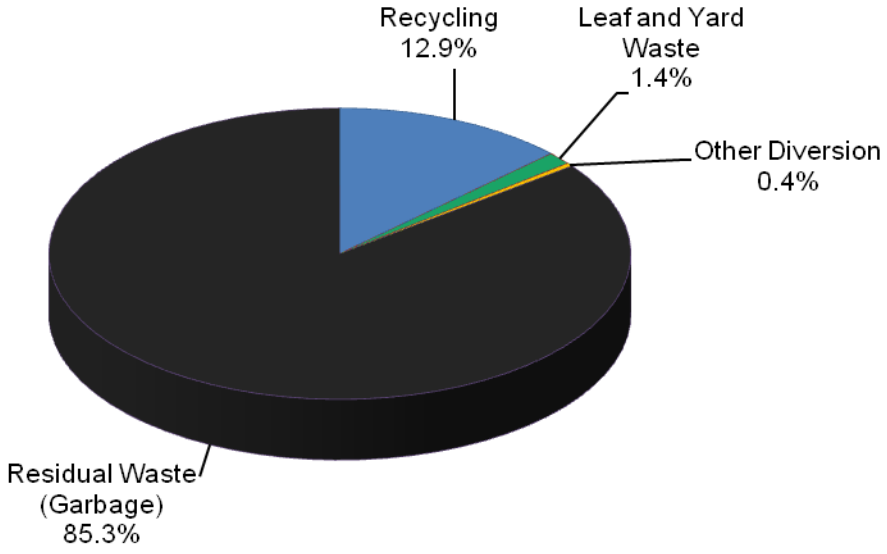
Program Element	Single-Family Collected (tonnes)	Multi-Family Collected (tonnes)	Dropped Off at Depots/Brady Landfill	Total
Recycling	34,654	7,006	2,528	44,187
Leaf and Yard Waste	698	-	4,062	4,759
Other Diversion	-	-	1,301	1,301
Residual Waste (Garbage)	185,587	42,342	63,366	291,295
Total Quantity	220,938	49,348	71,256	341,542
Total % of Waste	65%	14%	21%	100%

Notes: Other Diversion includes scrap metal and tires

Figure 1.4 presents the relative composition of total residential waste managed via collection (single family and multi-family) and depot/landfill programs. This includes both materials disposed and diverted. Other diversion includes scrap metal and tires at Brady Road. Residual waste includes garbage collected from single family and multi-family homes (including bulky waste) and loads of self-hauled waste brought to Brady Road Landfill by residents.

A GAP (General Accounting Practice) diversion rate has not been calculated for the City of Winnipeg, however, the diversion estimates discussed in this section of the report are relatively equivalent, with the exception being that on-site diversion through programs such as current promotion of grass-cycling and use of backyard composters, is not accounted for.

Figure 1.4: Breakdown of Total Residential Waste Managed by the City via Collection and at Drop-Off Depots (2009)



The composition of the total residential waste stream was determined in the following manner.

- The composition of residential waste collected was based the 2009 City of Winnipeg Residential Waste Composition Study completed in 2009 by StewardEdge[15] and commissioned by Multi Material Stewardship Manitoba. The waste composition study consisted of two separate two-week audits; one was completed in June 2008 and one was completed in February 2009. Each audit consisted of collecting all waste material (both garbage and single-stream recycling) generated from a sample of 100 SFDs (located in 10 distinct areas to reflect City demographics) and 3 MFDs over the two week period and sorting the material into 87 distinct material categories. The composition of the total waste stream observed in the 2009 waste composition study for both the SFDs and MFDs was applied to the total tonnes of residential waste collected in 2009 to determine the total composition of waste collected in 2009.

- For residential waste received at City drop-off depots and the Brady Road Landfill, total waste composition was determined in a different manner.

    - For leaf & yard waste, scrap metal, and tires, tonnage information was taken directly from City records.
    - The composition of recyclables dropped off at depots is not known and had to be estimated. The composition of recyclables was calculated by taking recyclable material composition data from pre-sort waste audits completed at the MRF in 2010 and applying this percentage composition to the total amount of recycling dropped off at depots.
    - The composition of self-hauled garbage dropped off at Brady Road Landfill is not known and also had to be estimated. The composition of residential garbage dropped off was determined by assuming that it would be of similar composition to the waste materials brought by Simcoe County residents to their drop-off depots/transfer stations in 2009. This was deemed reasonable as the composition of materials being brought to landfills as small loads, tend to meet a similar general profile. The Simcoe County data represented the most recent dataset available to the consulting team. The main difference between the two systems is what happens to these materials: in Winnipeg much of the material is currently landfilled, while in Simcoe County the majority of the material is diverted. The percentage composition of waste materials brought to Simcoe County drop-off depots was applied to the tonnage of garbage brought by Winnipeg residents to the Brady Road Landfill to determine an approximate composition for this stream.

[15] StewardEdge. 2009. City of Winnipeg Residential Waste Composition Study. Prepared for Multi-Material Stewardship Manitoba (MMSM), Province of Manitoba, Manitoba Product Stewardship Corporations (MPSC).

1.6.1.1 Estimated Residential Waste Diverted

1.6.1.1.1 Material Collected from Single Family Dwellings (SFD)

As illustrated in Table 1.3, 220,938 tonnes of residential solid waste was collected from SFDs in 2009. Of this waste, 35,351 tonnes, or 16.0% was diverted from disposal via recycling and leaf & yard waste (LYW) collection programs.

Figure 1.5 presents the composition of diverted materials collected from SFDs. Paper made up the largest proportion of diverted materials (45%) followed closely by paper packaging (25%).

Figure 1.5: Composition of Residential Waste Diverted via SFD Collection Programs (2009)

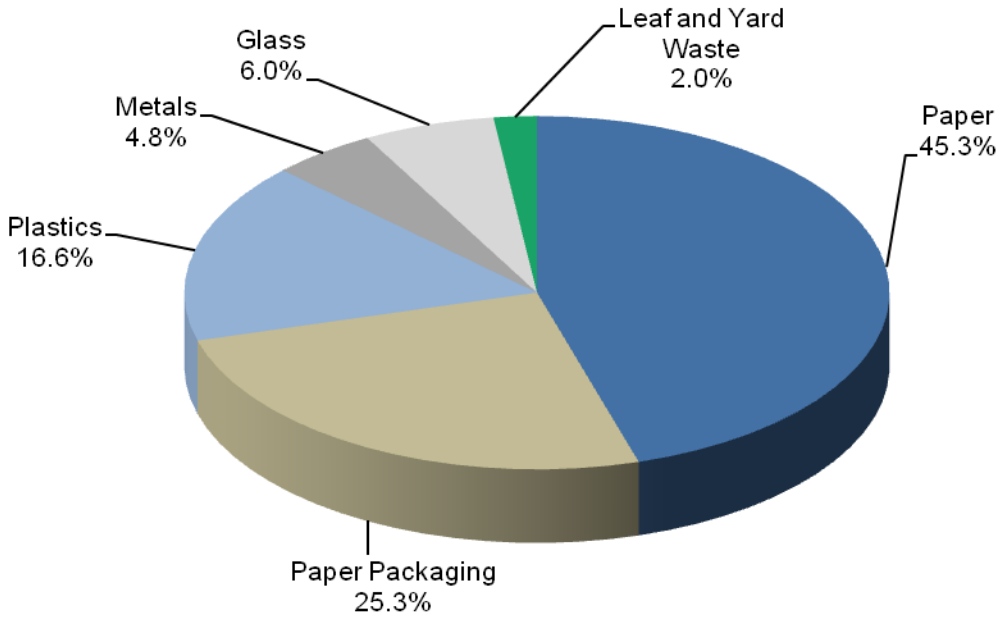


Table 1.6 presents estimated recovery rates for the major material type's collected from SFDs. Recovery rates are measured across all materials in a category including those materials that are not recycled (e.g. plastic film, broken window glass etc.). The recovery rate (otherwise known as the recycling rate or diversion rate) is the proportion of a material that is recycled or recovered for some other purpose out of the total available quantity of material generated. The recovery rate across all material streams that can be diverted currently is relatively low. There is considerable room for improvement and diversion of materials.

Table 1.6: Residential Tonnage Produced, Diverted and Recovery Rates for Materials Collected from SFDs (2009)

Material Type	Tonnes Generated	Tonnes Diverted	Recovery Rate
Paper	31,291	16,029	51.2%
Paper Packaging	27,798	8,935	32.1%
Plastics	20,758	5,855	28.2%
Metals	7,228	1,704	23.6%
Glass	12,423	2,131	17.2%
Food Waste	59,741	-	0.0%
Leaf and Yard Waste	8,351*	698	8.4%
Total	**167,590**	**35,351**	**21.1%**

* Note: The tonnes of leaf and yard waste generated for single family households were estimated based on the curbside audit results reported for 2009 and other data provided by the City. This is a low generation rate and the projections for leaf and yard waste were later adjusted to reflect generation rates demonstrated in other similar urban communities.

The following table presents the estimated capture rates for SFD recyclable and LYW material collected curbside. The capture rate is the proportion of the divertible material collected out of the total amount of material available for collection (produced or generated).

As actual capture rates for a large proportion of material types were not available for 2009 (capture rates were not determined during the 2009 City of Winnipeg Residential Waste Composition Study), capture rates had to be estimated based on composition of recyclable material coming into the MRF. The percentage composition of recyclable material coming into the MRF was applied to the total tonnes of recycling collected from SFDs, and capture rates were estimated.

Although this methodology does have its drawbacks as it does not produce “actual” capture rates it did allow for determination of estimated capture rates for 2009 that can be used to identify material types that the City should target to increase waste diversion.

In comparison with other municipal programs offered in major urban centres, these estimated capture rates are quite low. For example, capture rates in 2009 for the single family residential recycling programs offered in the City of Ottawa and the City of Hamilton were over 75% for newspaper and corrugated cardboard, and were over 55% for aluminum and steel.

Table 1.7: Estimated Capture Rates for SFD Collected Materials (2009)	
Material Category	**Estimated Capture Rate (%)**
PAPER	
Newspaper	60%
Telephone Books / Directories	39%
Magazines & Catalogues	38%
Mixed Fine Paper	31%
PAPER PACKAGING	
Corrugated Cardboard	46%
Boxboard / Cores	47%
Gable Top Cartons	35%
Aseptic Containers	54%
PLASTICS	
PET	58%
HDPE	87%
Plastics (#3-7)	40%
METALS	
Aluminum	19%
Steel	42%
GLASS	
Glass	19%
ORGANICS	
Leaf & Yard Waste	8%

1.6.1.1.2 Material Collected from Multi-Family Dwellings (MFDs)

As displayed in Table 1.3, 49,348 tonnes of residential solid waste was collected from MFDs in 2009. Of this waste, 7,006 tonnes, or 14.2% was diverted from disposal via the recycling collection program.

Figure 1.6 presents the composition of diverted materials collected from MFDs. Paper makes up the largest proportion of diverted materials (46%) followed closely by paper packaging (26%).

Figure 1.6: Composition of Residential Waste Diverted via the MFD Collection Program (2009)

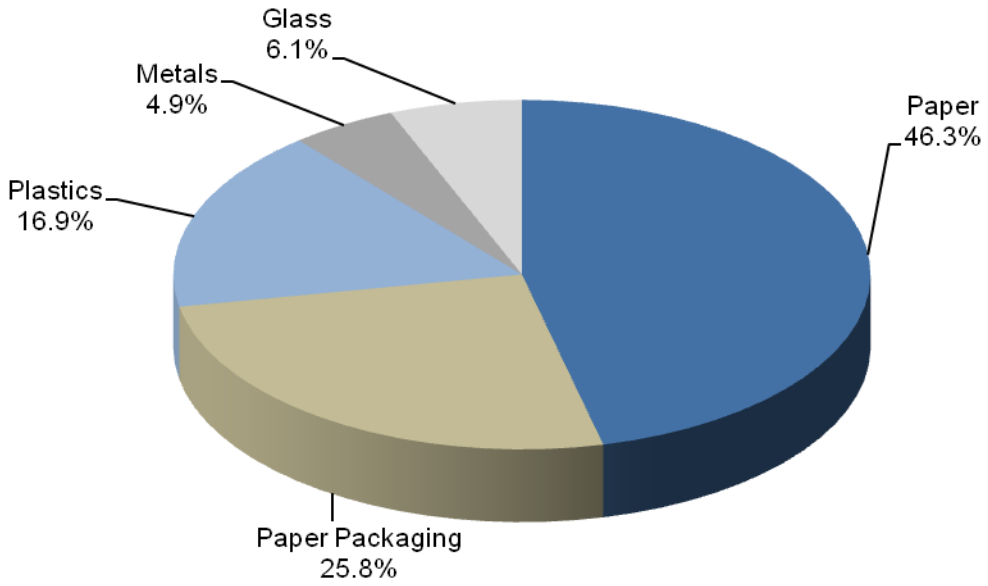


Table 1.8 presents estimated recovery rates for the major material type's collected from MFDs. Recovery rates are measured across all materials in a category including those materials that are not recycled (e.g. plastic film, broken window glass etc.). The recovery rate (otherwise known as the recycling rate or diversion rate) is the proportion of a material that is recycled or recovered for some other purpose out of the total available quantity of material generated. Recovery rates for the MFD sector indicate significant quantities of materials that could still be recovered from the waste stream through the current MFD recycling program.

Table 1.8: Residential Tonnage Produced, Diverted and Recovery Rates for Materials Collected from MFDs (2009)

Material Type	Tonnes Generated	Tonnes Diverted	Recovery Rate
Paper	9,764	3,241	33.2%
Paper Packaging	6,741	1,806	26.8%
Plastics	4,935	1,184	24.0%
Metals	1,778	345	19.4%
Glass	2,927	431	14.7%
Food Waste	12,706	-	0.0%
Total	**38,852**	**7,006**	**18.0%**

Table 1.9 presents the estimated capture rates for MFD recyclable material collected through the City's program. The capture rate is the proportion of the divertible material collected out of the total amount of material available for collection (produced or generated).

Capture rates were determined using the same methodology used when calculating capture rates for SFDs.

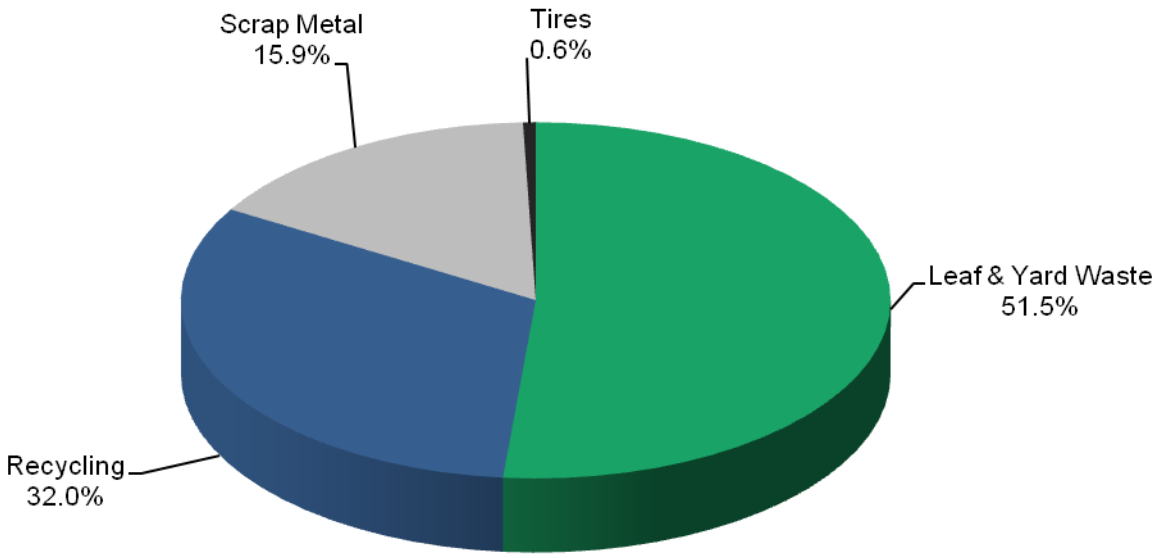
Table 1.9: Estimated Capture Rates for MFD Collected Materials (2009)

Material Category	Estimated Capture Rate (%)
PAPER	
Newspaper	37%
Telephone Books / Directories	40%
Magazines & Catalogues	32%
Mixed Fine Paper	21%
PAPER PACKAGING	
Corrugated Cardboard	46%
Boxboard / Cores	44%
Gable Top Cartons	20%
Aseptic Containers	26%
PLASTICS	
PET	54%
HDPE	89%
Plastics (#3-7)	33%
METALS	
Aluminum	19%
Steel	42%
GLASS	
Glass	17%

1.6.1.1.3 Residential Material Brought to Drop-Off Depots and Brady Road Landfill

As indicated in Table 1.3, 71,256 tonnes of solid waste was delivered by City residents to City depots and the Brady Road Landfill in 2009. Of this waste, 7,891 tonnes, or 11.1%, was diverted from disposal. Materials diverted from disposal included recyclables, leaf & yard waste, scrap metal, and tires. Figure 1.7 presents the composition of residential diverted materials received at depots and Brady Road Landfill in 2009.

Figure 1.7: Relative Composition of Residential Waste Diverted at Depots and the Brady Road Landfill (2009)



1.6.1.1.4 Summary of Residential Waste Diverted Through City Programs

Overall, it is estimated that the City diverted 50,248 tonnes of residential solid waste in 2009 resulting in an overall residential at-source waste diversion rate of approximately 14.7% for all residential programs and sectors.

1.6.1.2 Residential Waste Disposed

In 2009, the City of Winnipeg disposed of a total of 291,295 tonnes of residential waste (or approximately 85.3% of the total residential waste managed via collection and drop-off depot programs), at the Brady Road Landfill. The estimated composition of the post-diversion residual waste (i.e. garbage) was determined to identify the types of materials currently being lost to disposal, so as to determine material types that could potentially be captured by future diversion initiatives.

The composition of the overall SFD and MFD collected waste stream was determined based on the results of the 2009 City of Winnipeg Residential Waste Composition Study. The capture rates calculated in Section 1.6.1.1 were applied to the total material generated curbside to determine the estimated amount of each material diverted from disposal. This amount of material diverted was then subtracted from the total material generated to establish the approximate amount of each material type currently being sent to disposal.

The methodology for determining the composition of the residential garbage brought to drop-off depots was based on the methodology described in **Appendix B**. Figure 1.8 presents the

estimated composition of the post-diversion waste (garbage) requiring disposal (collected from both SFD and MFD, and drop-off depots) in 2009.

Figure 1.8: Estimated Composition of Residential Waste Sent to Landfill (2009)

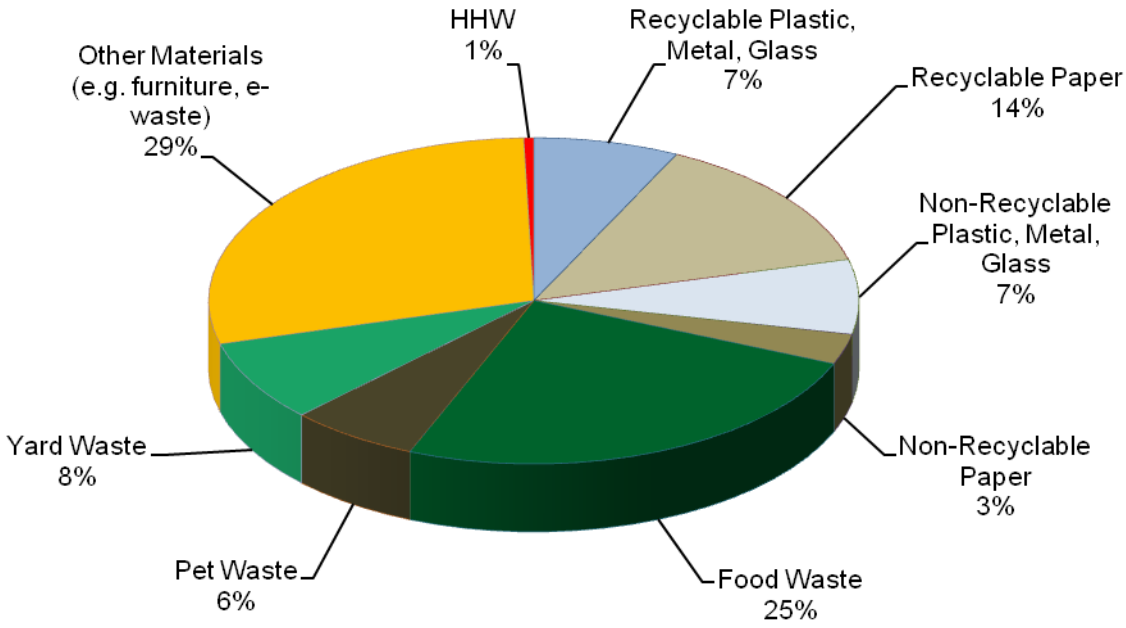


Table 1.10 identifies the estimated composition of post-diversion residential waste disposed by tonnage.

Table 1.10: Estimated Composition of Post-Diversion Residential Waste Disposed by Tonnage (2009)

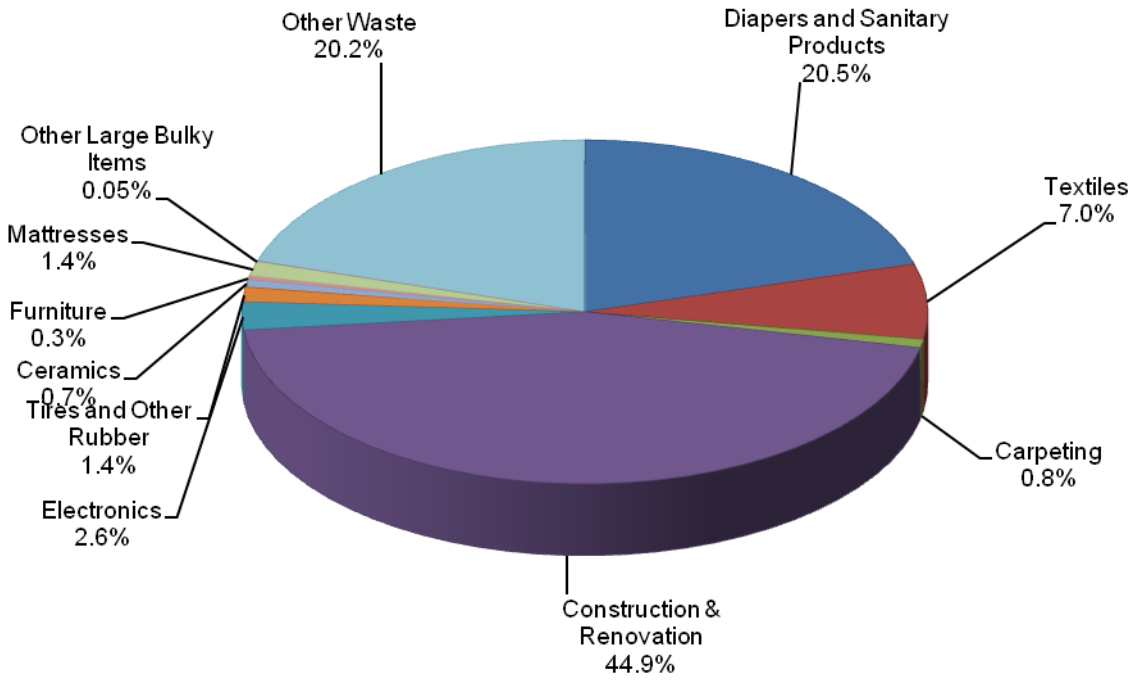
Material Type	Estimated Tonnes
Recyclable Plastic, Metal, Glass	21,000
Recyclable Paper	40,000
Non-Recyclable Plastic, Metal, Glass	21,500
Non-Recyclable Paper	9,000
Food Waste	72,000
Pet Waste	19,000
Yard Waste	24,000
Other Materials (e.g. furniture, e-waste etc.)	84,000
HHW	1,500
Total	**292,000**

As illustrated in the figure and table above, there is a significant quantity of recyclable and organic materials in the residential waste stream that is currently being landfilled by the City.

A significant portion of the residential materials disposed in the City falls under the 'Other Materials' category. The 'Other Materials' category includes materials such as diapers and sanitary products, textiles, carpeting, furniture, mattresses, and other large bulky items. It also includes 'Unclassified Waste' that doesn't fall into any other material category. Figure 1.9 presents an estimated breakdown of the material types that make up the 'Other Materials' category.

There are a number of materials within the 'other' materials category that could also be targeted and diverted through the enhanced residential system including textiles and construction waste.

Figure 1.9: Estimated Composition of Residential 'Other Materials' Category Sent to Landfill (2009)



1.6.2 Industrial, Commercial, and Institutional (IC&I) Waste

In addition to residential waste, the City manages a small proportion of the IC&I waste produced within the City. Curbside collection of waste materials is provided to a small number of commercial businesses. The majority of IC&I properties are not serviced curbside by the City, and are assumed to receive waste management services from private contractors. In addition to curbside collection, IC&I generators are also permitted to haul waste materials to the Brady Road Landfill.

In 2009, the City of Winnipeg managed approximately 83,099 tonnes of IC&I waste, the majority of which was landfilled.[16] This tonnage of waste is assumed to be a small fraction of the total amount of waste produced by the IC&I sectors as the majority of these waste producers utilize private contractors to manage their waste. That being said, it is a useful exercise to estimate the total amount of waste produced by the IC&I sector to assess the amount of waste potentially available to be managed by the City's system in the future.

The Task C&D Report (**Appendix B**) discusses the methodology used to estimate the total quantity of IC&I waste generated within Winnipeg. Table 1.11 presents the estimated IC&I waste generated per industry sector

Table 1.11: Estimated Tonnes of Waste Produced by Various Industry Sectors in Winnipeg

Industry Sector	Estimated Tonnes of IC&I Waste Generated per Industry Sector
Agriculture and other resource-based industries	3,500
Construction	Unknown
Manufacturing	38,000
Wholesale trade	20,000
Retail trade	95,000
Finance and real estate	10,000
Health care and social services	36,000
Educational services	17,000
Business services	36,000
Other services	92,500
Total	**348,000**

It is estimated that the IC&I sector produces approximately 348,000 tonnes of waste per annum, while the City managed 83,000 tonnes (approximately 24% of the total available material) in 2009. Data provided by the City indicates that the City generally manages only a small proportion of IC&I waste. That being said, over the 20 year planning period it is possible that larger amounts of the available IC&I material may need to be managed by the City (e.g., if a larger proportion of IC&I material is hauled to the Brady Road Landfill rather than being managed by the private sector).

The following table provides a breakdown of the composition of waste currently disposed at the Brady Road Landfill by the IC&I Sector.

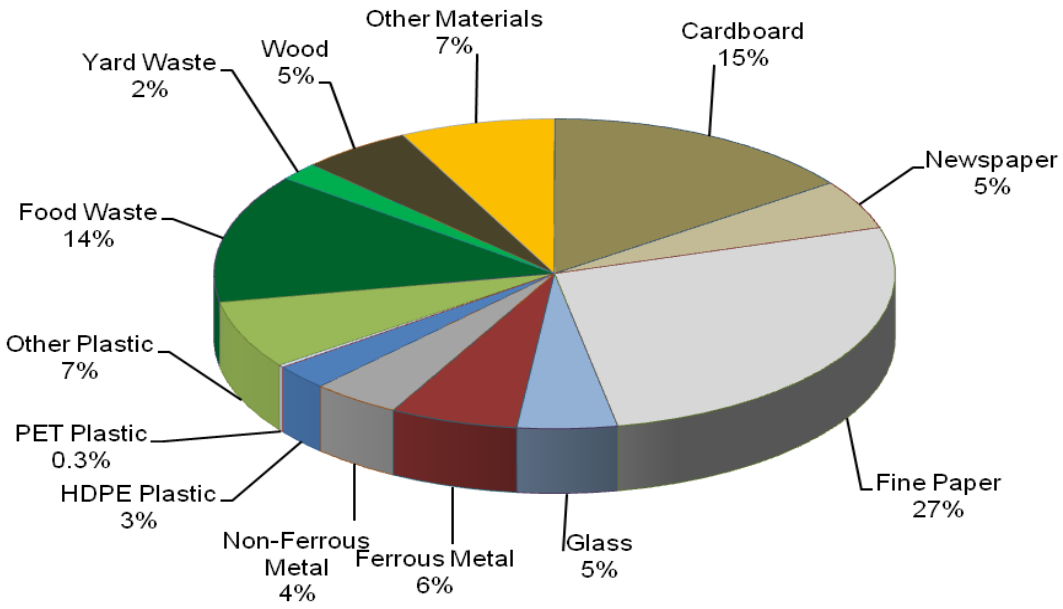
[16] This does not include a small portion of IC&I material received at Brady Road Landfill from other municipalities: 8,994.3 tonnes.

Table 1.12: Tonnes of IC&I Waste by Material Type Managed by the City (2009)

Material Category	IC&I Tonnes Managed by City at Brady Road Landfill
Garbage	68,932
Landscaping Material (e.g., Trees)	55
Dead Animals	13,118
Asbestos	52
Soil	942
Total Waste	**83,099**

The composition of IC&I garbage brought to Brady Road Landfill was estimated to determine how much potentially divertible material is currently being disposed. The estimated composition of IC&I waste was determined by referencing two recent studies which discussed IC&I sector waste management in Ontario municipalities and another study that estimated the composition of IC&I waste produced within Ontario.[17] The composition of IC&I waste outlined in these three data sources was averaged to determined the estimated composition of the IC&I garbage stream being managed at Brady Road Landfill. The following figure (Figure 1.10) illustrates the estimated composition of the IC&I garbage stream being managed at Brady Road Landfill. As the figure illustrates, much of the IC&I material currently being landfilled is potentially divertible

Figure 1.10: Estimated Composition of IC&I Garbage Disposed at the Brady Road Landfill



[17] "IC&I Waste Characterization Report IC&I 3Rs Strategy Project", June 5, 2007, City of Ottawa, Genivar and Jacques Whitford and "Analysis of City of Owen Sound Waste Audit/Recycling Plan for IC&I Premises", City of Owen Sound, Kelleher Environmental, MOE, OWMA, November 24, 2008

1.6.3 Construction and Demolition (C&D) Waste

The City currently accepts C&D waste for disposal at the Brady Road Landfill; in 2009, a total of 5,310 tonnes of C&D waste was disposed. Similar to IC&I waste, the tonnage of C&D waste managed by the City is assumed to be a small fraction of the total amount of waste produced by the C&D sector. The majority of C&D sector utilizes private contractors to manage their waste.

Although the exact amount and composition of C&D waste produced is not known, values were estimated in order to understand the potential quantity and type of C&D waste being produced by Winnipeg. This was accomplished by referencing a study completed in 2007 by Genivar and Jacques Whitford on behalf of the City of Ottawa, as discussed in **Appendix B**.[18] The estimated quantity and composition of C&D waste is presented below.

Table 1.13: Estimated Tonnes of C&D Waste by Material Type Generated in Winnipeg

Material Category	Tonnes
Concrete	11,000
Drywall	12,000
Wood	33,000
Metals	11,000
Asphalt Paving	5,600
Asphalt Roofing	14,000
Brick	4,000
Paper	17,400
Other	16,000
Total Waste	**124,000**

As the table above indicates, the estimated tonnage of C&D waste produced in Winnipeg is significantly higher than the amount actually managed by the City. It is estimated that the City only manages about 4% of the total C&D material generated. This does not account for the C&D materials that are currently identified as residential, and included in the residential 'depot' estimates identified in Section 1.6.1.1.

Over the 20 year planning period it is possible that larger amounts of the available C&D material may need to be managed by the City (e.g., if a larger proportion of C&D material is dropped off at Brady Road Landfill rather than being managed by the private sector).

[18] "IC&I Waste Characterization Report IC&I 3Rs Strategy Project", June 5, 2007, City of Ottawa, Genivar and Jacques Whitford

1.6.4 Waste from City Operations

In addition to managing residential waste and a portion of the IC&I and C&D waste generated within the City, Winnipeg also manages waste generated by City operations at Brady Road Landfill. In 2009, the City managed a total of 34,369 tonnes of City operations waste, the majority resulting from outside operations (wastewater, transportation). It should be noted that the estimated tonnage does not include any waste diverted from City Operations as records of the current quantities of material diverted by internal programs were not available. The City does have recycling areas within municipal buildings, diverting blue box materials and paper from the waste stream. The estimated composition of waste from City operations is presented below.

Table 1.14: Tonnes of City Operations Waste by Material Type Managed by Winnipeg (2009)

Material Category	City Operations Waste Disposed at Brady Road Landfill
Garbage	5,991
Construction and Demolition Waste (City Only)	896
Landscaping Material (e.g., Trees)	498
Wastewater Sludge/Grit (street sweepings)	26,984
Total Waste	**34,369**

1.7 AREAS FOR PROGRAM IMPROVEMENTS

Review of the current waste management system and program performance indicates that:

- There are a number of key areas where program improvements are needed including the need for equivalent levels of service for regular garbage and bulky material collection, and the need for improvements to the scope, effectiveness and efficiency of the City's overall waste diversion system, in order to achieve and sustain higher diversion rates over the short and longer term;
- Current materials capture and recovery rates are low, reflecting a need to increase awareness of current waste management programs;
- There is a considerable quantity of material in the residential waste stream that can be targeted for enhanced diversion programs; and,
- There are a number of streams of IC&I and C&D materials that could be targeted by an enhanced waste management system.

Improvements in diversion rates will require implementation of a number of new diversion programs, with appropriate disincentives to discourage waste generation and placement of materials in the garbage, coupled with promotion and incentives to encourage diversion.

As an illustration, following table presents a summary of large urban municipalities in Ontario that have implemented integrated systems that include mature recycling programs, collection

and processing of source separated organics, other diversion facilities (such as community recycling centres) and disincentives for garbage generation. This table illustrates the type of diversion performance that can be anticipated with the implementation of an expanded residential diversion system along with garbage disincentives.

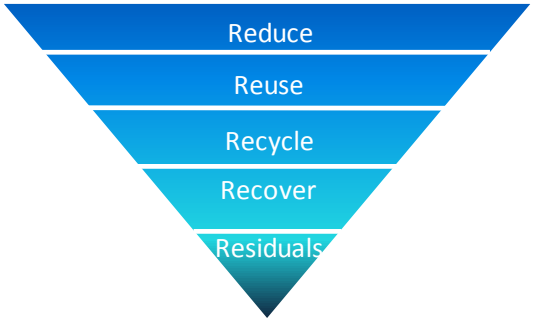
Table 1.15: Municipal Diversion Performance (Ontario Municipalities)

Municipality	Garbage Collection Frequency	Garbage Limit and Residential Diversion Programs	Reported Diversion Rates (2008 to 2009)
Toronto	Bi-weekly	Size of cart chosen limits amount of garbage. Residential Diversion: single stream recycling carts, green bin organics, LYW collection, HHW and Electronics collection, diversion depots	44% no change Note: proportionately more multi-family households.
York (Collection at Local Municipal Level, Processing by Region)	Bi-weekly	Varies depending on local municipality from one to three containers, additional bags allowed with tags Residential Diversion: single stream blue box, green bin organics, LYW collection, community recycling centres	Increase from 53 to 57% Note: after change to bi-weekly garbage, organics make up proportionately more of all materials diverted.
Guelph	Bi-weekly	None noted Residential Diversion: single stream bags(switching to carts), green bin organics, LYW collection, community recycling centre	Increase from 40 to 44 %
Durham	Bi-weekly	4 bag limit, additional bags allowed with tags Residential Diversion: two stream blue box, green bin organics, LYW collection, HHW and electronics depots	Increase from 49 to 51 % Note: after change to bi-weekly garbage, organics make up proportionately more of all materials diverted.
Halton	Bi-weekly	Six bag/can limit Residential Diversion: single stream blue box, green bin organics, LYW collection, HHW and electronics depots	Increase from 51 to 57 % Note: after change to bi-weekly garbage, organics make up proportionately more of all materials diverted. Organic tonnages increased by 34% from 2008 to 2009.
Waterloo	Weekly	Varies by lower tier municipality from 3 to 10 bags Residential Diversion: two stream blue box, green bin organics, LYW collection, HHW and electronics depots	Increase from 47 to 51%
Peel	Weekly	2 bag limit, additional bags allowed with tags Residential Diversion: single stream blue box, green bin	Increase from 49 to 50%

Table 1.15: Municipal Diversion Performance (Ontario Municipalities)			
Municipality	**Garbage Collection Frequency**	**Garbage Limit and Residential Diversion Programs**	**Reported Diversion Rates (2008 to 2009)**
		organics, LYW collection, HHW and electronics depots, community recycling centres	
Hamilton	Weekly	1 bag limit (no tags allowed) Residential Diversion: two stream blue box, green bin organics, LYW collection, community recycling centres	Increase from 44 to 46%
Niagara	Weekly	1 bag week, additional bags allowed with tags Residential Diversion: two stream blue box, green bin organics, LYW collection, community recycling centres	Increase from 43 to 44%

2.0 The Enhanced Integrated Waste Management System

The enhanced integrated waste management system developed for the City of Winnipeg reflects:



- The review of current program performance as discussed in Section 1.6 above;
- Consideration of input from public involvement through the consultation process undertaken by the City;
- Goals and Objectives developed to guide the CIWMP (as discussed in Section 1.4), considering the general principles of zero waste[19] and a waste hierarchy that encourages and promotes efficient use of resources and waste minimization, so that the primary waste management emphasis in the City transitions from disposal to diversion.

The components of the recommended enhanced integrated waste management system identified in this section are discussed in greater detail within the "Draft Task E Report, Identification of Waste Management Options" included as **Appendix C**.

The enhanced integrated waste management system as described in the following sections:

- Will improve the City's diversion rate by improving existing programs or adding new programs that address gaps in the existing waste management system;
- Uses a sequential approach which focuses on programs that offer cost effective improvements to the diversion rate in the near-term, while programs recommended for the longer term concentrate on restricting garbage and implementing programs that target additional material streams (e.g. a source separated organics program).
- Integrates a robust communications and education program to support overall program change and to encourage continuous dialogue with residents of Winnipeg. Program success will be contingent upon the combined efforts of the City in providing waste management services and the residents in effectively participating in these programs.
- Strives for a balance between:

  a) environmental protection through increased diversion and decreased GHG emissions;

[19] The Federation of Canadian Municipalities, defined 'Zero Waste Communities' as:
A community that "has made a long-term commitment to reducing waste through measures such as extended producer responsibility programs, economic instruments to encourage waste reduction, green procurement and product design that includes end-of-life-management.

b) program costs, understanding that City residents are affected by the costs associated with all program changes; and

c) social considerations, understanding that waste management is a service fundamental to the needs of the community.

The enhanced integrated residential waste management system described in Section 2.1 and the recommendations for other sectors of Winnipeg discussed in Section 2.2 of this report differentiates between:

- Programs provided to the residential and the Industrial, Commercial, and Institutional (IC&I) sectors, with the understanding that the primary focus of the CIWMP is the residential sector, but that the City also can play a role in supporting diversion and management of IC&I waste; and,
- Programs that can be reasonably implemented in the 'near term', within the first five years of the CIWMP (i.e. by 2016) and 'longer term' programs that would take additional time to implement and would likely be in place before year 10 of the CIWMP (i.e. in effect by 2021). Discussion is included in the sections below regarding the general implementation requirements and timelines, in order to provide a general idea as to the level of effort and timing associated with each system component. Further details regarding implementation of these programs are provided in Section 5 of this report.

Discussion regarding the assumptions and methodologies used to develop the diversion estimates, capital and operating cost estimates and environmental impacts/benefits of the recommended system components are provided in **Appendix F** of this report or in some cases within separate sections of this document (e.g. Section 3 generally describes the method used to determine potential diversion rates).

2.1 THE RECOMMENDED RESIDENTIAL SYSTEM

The residential system discussed in this section, includes components that apply to both single-family and multi-family dwellings throughout the City (e.g. waste reduction and reuse programs) or in some cases only to the single family sector (e.g. transition to a uniform collection approach for single family homes across Winnipeg). Programs that are identified and discussed as part of the 'Near Term" system would be implemented within the first five years of approval of the CIWMP; programs referred to as "Longer Term" will take more time to implement and would generally be in effect by year 10 of the CIWMP.

2.1.1 The Near-Term Residential System

2.1.1.1 Waste Reduction and Reuse

Programs that focus on reduction and reuse of waste are essential for "re-thinking" wasteful behaviour. Reduction and reuse activities are placed at the top of the waste hierarchy as they

prevent waste generation through behavioural change (e.g. use of re-usable shopping bags) or through finding means of extending the useful life of a material. This results in a decrease in the demand for raw materials and the energy demand for manufacturing, resulting in a number of environmental benefits including reduction in GHG emissions.

This section presents a summary of the recommended reduction and reuse initiatives for the near-term. Additional details regarding these initiatives are provided in **Appendix C** (Draft Task E Report: Identification of Waste Management Options, Section 4.1).

2.1.1.1.1 Promotion and Education (P&E)

A key area for improvement in the City's waste management program falls within the sphere of promotion and education (P&E). The public and other stakeholders have highlighted the need to provide more robust P&E programs to increase awareness and participation in the current waste management system. In addition, to be effective, all of the proposed waste diversion initiatives need to be supported by a P&E campaign that is appropriately designed and funded, and incorporates specific audiences, defined messages and media, planned frequency of communication, and monitoring of results.

An effective P&E program is required to:

- Increase waste reduction and diversion rates;
- Establish and maintain new positive behaviours;
- Increase community involvement in diversion programs;
- Encourage proper sets outs of materials at the curb leading to increased collection efficiencies and decreased operator safety issues;
- Lower residue rates at processing facilities, resulting in higher recovery rates and lower costs.[20]

The P&E program will be the primary method used to implement the waste reduction and reuse initiatives described in the following sections. These initiatives require a comprehensive communications approach to ensure that City residents are aware of opportunities to divert materials (e.g. reuse opportunities, availability of backyard composters) and that method of avoiding waste generation are communicated (e.g. grass-cycling). Without a comprehensive P&E program, many of these initiatives will not achieve the anticipated level of diversion performance.

As of 2009, the City spent approximately $56,000 per year on P&E (specifically advertising for the recycling program). Based on the estimated number of single family households in Winnipeg (175,000), this amounts to spending approximately 32 cents per household. Best practices and experience from other municipalities indicate that spending approximately $1 to

[20] Adapted from: KPMG, 2007. Blue Box Program Enhancement and Best Practices Assessment Project (Final Report Volume I – July 31, 2007).

$2 per household per year on P&E related activities is necessary for effective diversion programs.[21]

Table 2.1 provides an overview of the recommended P&E components of the CIWMP. Further details regarding the recommended public awareness and education strategy to support implementation of the CIWMP are provided in Section 5.5 of this report.

Table 2.1: Near-Term Promotion and Education

Recommendations:	▪ Promotion and education initiatives should be integrated into the implementation plan for the near term CIWMP. ▪ Spending on these programs for the near-term should average up to $2 per household to reflect the significant number of planned program changes. ▪ A broad spectrum of techniques and approaches should be used, including both traditional and electronic media, and that are designed to reach the broader audience in the community. The program should build on the success of the promotion and education campaign undertaken during the course of the CIWMP development which has been successful in engaging the community across Winnipeg. ▪ Key components: o Social marketing (see below and Section 5.5 for more details); o Promotion of backyard composting, grass-cycling, use of re-usable containers and other initiatives that support waste avoidance; and, o Specific campaigns to support the roll-out and appropriate use of CIWMP components; o In-school diversion program, which includes curriculum support, hand's on educational tools such as mobile or fixed educational centre(s), facility tours and support for green school initiatives. ▪ A 'permanent' communications support team should be integrated within the Solid Waste Division to support the development and implementation of these initiatives.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector
Staffing Implications	▪ Two promotion and education staff positions
Estimated Annual Operating Cost (2011$)	▪ $190,000 in staffing support (2 promotion and education staff). ▪ $440,000 ($1.50 per HHD) in direct program costs annually (advertisements, promotional items, retention of services for annual surveys). This will increase as the number of households served increases over time.
Increase in Diversion	▪ Essential component in the success of other diversion initiatives (such as implementation of an expanded leaf and yard waste diversion program). ▪ Increase in diversion of approximately 5,000 tpy (1% increase in diversion through P&E)
Environmental and Social Benefits	▪ Reduced use of natural resources ▪ Reduced GHG emissions and use of landfill capacity, reducing direct emissions to air (methane) and to water (leachate) ▪ Supports positive behaviour change in the community

[21] KPMG, 2007. Blue Box Program Enhancement and Best Practices Assessment Project (Final Report Volume I – July 31, 2007).

Table 2.1: Near-Term Promotion and Education	
Overview of Implementation Plan and Timelines	▪ 2011: Approval by Council in September for permanent staff ▪ Q1 2012 additional permanent promotion and education Staff integrated into the Solid Waste Division. ▪ Q4 2011: Review current P&E initiatives, identify components with proven history of success in Winnipeg ▪ Q4 2011: Develop Year 1 Communications Plan (internal development – no contracting of services) ▪ Q1 2012: Implement CIWMP P&E campaign, including branding and other materials to support roll-out of CIWMP

2.1.1.1.2 Backyard and Community Composting

Currently, the City encourages residents to use backyard composters through its website and by offering subsidized composters to residents. The City also encourages residents to attend free composting workshops facilitated by the Green Action Centre, a non-profit organization which promotes green living. There may be an opportunity to increase diversion through this program with a renewed P&E campaign to further promote the benefits of backyard composting to residents. The City's current method of educating the public about composting through the City's website and advertisement in the Yellow pages may not be effectively reaching all audiences. A renewed P&E campaign should refocus the program and further promote the use of backyard composters.

The City should also encourage neighbourhood composting programs such as the program initiated by residents of West Broadway and Spence. Twenty composters are available at six sites throughout the West Broadway and Spence area. Residents are now working on a Neighbourhood Composting Strategy. Based on this successful model, the City should work with other neighbourhood groups to establish additional community composting programs. The City could offer composting locations (e.g., in an area of park or on the grounds of municipal buildings) as well as composters and instructional seminars.

Table 2.2: Near-Term Backyard and Community Composting	
Recommendations:	▪ Should be collaboratively developed with other promotion and education initiatives.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector
Staffing Implications	▪ See Near Term Promotion and Education above.
Estimated Annual Operating Costs (2011$)	▪ Only incremental changes to the P&E budget would occur with the integration of waste reduction P&E into existing materials (e.g., existing brochures or the Calendar). ▪ Potential increase in cost for subsidized composters as more residents request them.

Table 2.2: Near-Term Backyard and Community Composting	
Increase in Diversion	▪ Backyard composting diverts approximately 1.13 kg/household/week22 ▪ No substantial nor quantifiable impact on processing or disposal capacity requirements
Environmental and Social Benefits	▪ Reduced use of natural resources ▪ Reduced use of landfill capacity, reducing direct emissions to air (methane) and to water (leachate) ▪ Supports positive behaviour change in the community
Overview of Implementation Plan and Timelines	▪ 2012: Implement as part of overall P&E campaign

2.1.1.1.3 Re-use Initiatives

In the near-term, the focus of the re-use program will be on the effective use of existing community resources. The program would involve:

- Identification of specific community stakeholders that are currently involved in the re-use of various items within the community.
- Development of a "Re-use Guide' to link households to the most appropriate locations/options for donations-based re-use. The guide would provide information regarding the companies / organizations that accept donated materials for re-use or recycling. An on-line guide would likely be the most effective; however, it is recommended that the City dialogue with the charitable sector and other community organizations along with the public to determine the best vehicle for the guide.
- Some form of community event, such as continuation of 'Giveaway Weekends' held at least once a year in Winnipeg. The concept would be to use such events as a means of directly promoting the concept of re-use. With an event such as a 'Giveaway Weekend' it may be most appropriate to organize events for separate quadrants of Winnipeg (North-west, North-east, South-west and South-east) on different days. Holding these events on different days will reduce short-term staffing requirements (i.e., the same staff can be used for each event).
- Determination of any direct program support that the City could provide to key community organizations that provide an outlet for re-use. For example, the proposed Community Resource Recovery Centre (CRRC) at Brady Road could provide a location for an enclosed trailer for residents to drop off usable building supplies that could be made available to organizations such as Habitat for Humanity.

In regards to the development of a Re-use Centre(s) as a part of any City infrastructure (e.g. CRRC), it is recommended that:

- The City discusses the need for any additional re-use infrastructure with existing community organizations.

[22] JG Press Inc. 1999. Backyard Composting Evaluated in New York City. Available: http://www.environmental-expert.com/resulteacharticle.aspx?cid=6042&codi=217

- It is possible that one or more organizations may seek to work with the City to provide a suitable outlet for certain materials that are more difficult to source. For example, as noted above, it may be reasonable to provide access to a drop-off location at any City CRRC for usable building materials that may otherwise not be directed to appropriate re-use. One of the fundamentals of CRRC design, is to design such facilities as a 'full service' location where individuals can drop-off all of the materials that they generate including both garbage and divertible materials. Residents are less likely to make a separate trip to drop off items such as re-usable fixtures from a renovation job, when it is easier to make one trip and include those items in the renovation waste they drop off for disposal.

Table 2.3: Near-Term Reuse Initiatives

Recommendations:	▪ Initiate dialogue with community organizations currently involved in re-use initiatives. ▪ Develop a City of Winnipeg Re-use Guide. Integrate a variety of 'Take it Back' options reflecting businesses and other locations within Winnipeg that accept a variety of materials whether for re-use, recycling or appropriate disposal. ▪ Continue with community 're-use' events. Use as a supporting vehicle to promote the re-use guide and the concept of best use of materials. ▪ Integrate supporting infrastructure as part of CRRC development (e.g. offer space for drop-off area) for reusable materials, pending interest by community organizations.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector.
Staffing Implications	▪ Addressed through communication support (see above). ▪ Some support also required by existing administration support and collection team within the Solid Waste Division.
Estimated Annual Operating Cost (2011$)	▪ No significant costs outside of proposed Promotion & Education budget or current Solid Waste Budget. ▪ Any Re-use Depot/Centre would be integrated with CRRC and supported through Community Organization(s).
Estimated Capital Cost (2011$)	▪ Minimal Cost for enclosed area (e.g. trailer, small Quonset): $75,000 per CRRC. This capital cost is included in the capital costs for CRRCs.
Increase in Diversion	▪ Essential for promotion of best use of resources, with positive community impacts. ▪ Potential to divert up to 1,000 tonnes.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Improves landfill compaction and contributes to reduced use of landfill airspace. ▪ Supports existing network of services in the community that redirects goods (and services) to those in need.
Overview of Implementation Plan and Timelines	▪ Q4 2012: Gather information on current best practices in the community related to re-use. Hold meetings with existing community organizations. ▪ Q1 2013: Develop Re-use Guide. ▪ Q2 2013: Roll-out of Re-use campaign. ▪ 2013: Promotional Campaign and first series of community re-use events. ▪ 2013: Determine if Re-use components (supported by community organizations) would be integrated with the Brady Road CRRC. ▪ 2014: Determine if Re-use components to be integrated with a 'Winnipeg North' CRRC.

2.1.1.1.4 Establish a Per Capita Residential Waste Reduction Target

It has become more widely accepted that waste reduction targets should be set, monitored and used as an indicator of overall waste management system performance. Establishing a per capita residential waste reduction target involves a shift in thinking toward to adopting the principles of the "Waste Value Chain" in that a specific, measurable waste reduction target would be set, monitored and appropriately supported.

Beyond the environmental and social benefits of this initiative, it would serve as a means to help offset the trend of increased per capita waste generation across Manitoba. In four years, from 2002 to 2006, the quantity of waste reported as being disposed in Manitoba increased by 12.4%[23], while the province's population only increased by 2.3%.[24] Implementing a waste reduction target will allow the City to demonstrate progress towards the provincial target of 50% reduction in the per capita quantity of solid waste sent to landfill compared to 1998.

For the City of Winnipeg, tonnage records indicate that the residential per capita waste generation rate is approximately 510 kg per person. This is close to the Canadian average of approximately 517 per person, but much higher than the per capita waste generation rates in other jurisdictions.

Note: the "Options Paper" in **Appendix C**, originally identified the concept of establishing a per capita waste reduction target as a potential mid to long-term system component. However, upon consideration of the above points, and given that the concept of reduction is fundamental to the waste hierarchy adopted by the CIWMP the CIWMP includes a recommended target for consideration by the City for immediate implementation. Many jurisdictions around the world have identified per capita waste reduction targets as a component of their diversion strategies (e.g. Metro Vancouver has a target of 10% per capita waste reduction by 2020) but progress towards these targets is still being determined.

It is recommended that a waste reduction target of a minimum of 1% per annum be adopted. A target of a minimum of 1% per waste reduction is the equivalent of requesting Winnipeg residents to decrease waste generation by at least 5 kg per year.

The primary supporting activity related to setting and tracking progress towards such a target would be regular residential waste auditing. Regular residential waste auditing is also recommended as a key performance monitoring measure in Section 5.4, as it provides the means of directly measuring residential behaviours and use of the City's services. An audit undertaken approximately every second year during the first 10 years of the CIWMP implementation, for a representative set of households, and preferably over four seasons, would

[23] Statistics Canada, CANSIM table 153-0041, Catalogue no. 16F0023X.
Last modified: 2010-03-02. Available at: http://www40.statcan.gc.ca/l01/cst01/envir25b-eng.htm.
[24] City of Winnipeg, 2010. Population of Winnipeg. Available at: http://www.winnipeg.ca/cao/pdfs/population.pdf

establish a firm understanding of the residential per capita generation rates and can be used to identify and target key materials that could be 'avoided'.

Waste avoidance is currently promoted through a few initiatives at the City and Provincial levels (e.g. programs to avoid film plastic bags). Enhancement of waste avoidance programs would include an assessment of the existing P&E program with the goal of recommending components that focus on changing behaviours that result in waste generation. Recommendations would be aimed at modified consumer attitudes, behaviour and modified curbside set-out practices. Target audiences would be identified and would include residents, community groups, schools and other stakeholders. An enhanced waste avoidance campaign would tie into the proposed per capita waste reduction target.

Table 2.4: Near Term Per Capita Waste Reduction Target	
Recommendations:	▪ Adopt a waste reduction target: decrease in residential waste generation of a minimum of 1% per annum. ▪ Promote Per Capita Waste Reduction Target. ▪ Implement bi-annual waste audit program (2012, 2014, 2016 etc.)
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector.
Staffing Implications	▪ Addressed through communication support (see above). ▪ Some support also required by existing administration support for waste auditing function, and to identify target materials and behaviours.
Estimated Annual Operating Cost (2011$)	▪ Audit cost of up to $85,000 every two years.
Increase in Diversion	▪ Essential for promotion of waste reduction as a waste system priority. ▪ Currently the residential sector produces approximately 341,542 tonnes of waste per year (291,295 tonnes of which is disposed as garbage). ▪ Current per capita waste generation rate is 510 kg/capita. A 1% decrease would decrease annual waste generation rates by 5 kg per person, or just under 7,000 tonnes per year.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ 2011: Set per capita waste diversion target, tie into target material streams (e.g. PET water bottles, disposable utensils and dishes, film plastic bags). ▪ 2011: Review current disposal profile, identify on a preliminary basis some target materials and/or waste generating behaviours. ▪ 2011: Review 2010 tonnages and 2011 year-to-date tonnages. Update per capita waste generation rate estimates. ▪ Q4 2011: RFP for consulting services, 2012 waste audits (possible earlier in 2011) ▪ Q1 2012: Initiate seasonal residential waste audit (possibly move up to start the summer of 2011. Report trends and progress towards target. ▪ Q4 2012: Roll-out of campaign for per Capita Waste Reduction (monitoring indicator is per capita waste reduction rate).

2.1.1.1.5 Grasscycling

Grasscycling refers to leaving grass clippings on the lawn when mowing. Grasscycling eliminates the time and effort required to collect grass clippings and fill bags and also reduces the amount of waste that needs to be collected and processed. It also re-fertilizes the lawn as clippings decompose and release nutrients back into the soil.

The City currently encourages its residents to grasscycle; an informational brochure detailing what grasscycling is, why an individual should grasscycle, how it is done, and why grasscycling promotes a healthy lawn is available on the City's website. It is recommended that promotion of grasscycling be expanded. Among other promotional methods, the City may want to showcase a City-owned property that has used the grasscycling principles in order to demonstrate to residents that it is an easy process that forms the basis of a good lawn care program.

Table 2.5: Near Term Grasscycling

Recommendations:	▪ Expand current promotion of grasscycling. ▪ Share cost and environmental impacts of grass disposal with residents. ▪ Identify environmental cost related to potential methane gas and leachate emissions from the landfill.
Residential Sector Served	▪ Single-family residential sector.
Staffing Implications	▪ Addressed through communication support (see above).
Estimated Annual Operating Cost (2011$)	▪ Included within promotion and education budget.
Increase in Diversion	▪ Very minor increase in diversion associated with promotion and voluntary compliance.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ 2011: Review current grasscycling materials. ▪ 2012: Roll-out new campaign to correspond to the new growing season.

2.1.1.1.6 Community Based Social Marketing

Social marketing is the systematic application of marketing, along with other concepts and techniques, to achieve specific behavioural goals for a social good. Community-based social marketing emphasizes direct, personal contact among community members and the removal of barriers (i.e., "roadblocks" to more sustainable actions and behaviours).

Community-based social marketing involves:

- Identifying the barriers and benefits to a behaviour;
- Developing and piloting a program to overcome these barriers and enhance benefits;
- Implementing the program across a community; and

- Evaluating the effectiveness of the program. [25]

One of the key areas where the use of community-based social marketing will be essential (rather than a traditional promotion and education approach) will be the implementation of uniform garbage collection services. Barriers, such as the current 'take all' approach to the use of Autobins, inappropriate disposal of bulky items in Autobin areas and reduced use of the blue box program in these areas have all been identified as issues that must be addressed. A pilot program providing automated cart services in some Autobin areas during 2011/2012 will be useful to identify the most appropriate means of overcoming these barriers and to test communications approaches to see which are more likely to result in positive behaviour change.

The use of social marketing tools to support the proposed changes to the residential collection system is recommended including:

- Appealing to norms (e.g. using a cart for garbage and diverting through the blue box is normal);
- Prompts (e.g. the use of stickers, visual aids, special items);
- Commitments (e.g. diversion pledges, zero waste pledges); and
- Maintaining behaviour change (e.g. finding means of communicating the positive aspects of the change and to track how the community is doing).

While appealing to norms, prompts, and commitments are useful to encourage change, it is crucial to maintain the change in behaviour. Residents need to receive feedback on how well they are doing with their change in behaviour; change in behaviour also has to be acknowledged and the difference it is making to waste management must be recognized. This information should be shared with residents and celebrated. Media events, notices on the front page of the municipal website, regular reporting through graphics on the waste management webpage would all be useful means of providing this feedback.

Several social marketing tools have been developed to assist communities in developing community-based social marketing material. *Tools of Change* (http://www.toolsofchange.com) is a website developed through a partnership between Environment Canada and several supporting sponsors to provide communities with resources regarding community-based social marketing. The website offers tools and case studies in areas such as the environment (including waste management), health promotion, and safety.

[25] http://oee.nrcan.gc.ca/communities-government/transportation/municipal-communities/what_you_can_do/socialmarketing.cfm?attr=28

Table 2.6: Near Term Community Based Social Marketing	
Recommendations:	▪ Use Community Based Social Marketing approach to support the implementation of significant program components including (but not limited to): o Transition to Uniform Garbage Collection o City-wide Leaf and Yard Waste Collection o Implementation of CRRC(s)
Residential Sector Served	▪ Single-family residential sector for most programs above. ▪ Multi-family residential sector also served by some program components.
Staffing Implications	▪ Addressed through communication support (see above).
Estimated Annual Operating Cost (2011$)	▪ Generally included within promotion and education budget. ▪ Some components (e.g. direct cost to support pilot programs) are integrated with other CIWMP components such as collection and organics diversion.
Increase in Diversion	▪ Increase in diversion associated with promotion and education and significant program components noted above.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road. ▪ Reduced contamination of recycling stream. ▪ Collection efficiencies through appropriate material set-outs.
Overview of Implementation Plan and Timelines	▪ 2011: Identify all near-term CIWMP components to be supported by social marketing campaign. ▪ 2012: Roll-out of campaign to support transition to uniform collection service and other program changes (e.g. LYW collection, CRRCs).

2.1.1.1.7 Promote Waste Minimization Legislation & Programs

Beyond the other reduction and reuse options discussed above, over which the City could have direct control, the City should support further efforts to prevent and minimize waste through support of waste minimization legislation and programs at the federal and provincial levels.

Including this as part of the CIWMP will indicate to City residents and the Province, that the residents of Winnipeg are not the only parties responsible for waste generation and that through Provincial (and Federal) action the manufacturers of products should have increased responsibility for waste reduction.

Other jurisdictions have been successful in implementing legislation that places the onus on manufacturers. For example, starting July 1, 2011, British Columbia will be moving towards full extended producer responsibility for packaging and printed paper; that is producers of these materials will be fully responsible for the costs of managing these materials. The City of Winnipeg could lobby the province of Manitoba to adopt a similar policy, thereby lessening the burden on the municipal waste management program.

Target areas for City support and dialogue with the Province include:

- Expanding the programs implemented under the WRAP to include other material streams (e.g. construction and demolition waste);
- Establishing an updated provincial per capita waste reduction target, reflecting provincial initiatives as well as local waste plans;
- Supporting a strong agenda for waste reduction, focusing on waste avoidance rather than simply management of materials.

Table 2.7: Near Term Promotion of Waste Minimization Legislation and Programs	
Recommendations:	▪ Cooperate with the Province and Producers, supporting the development of Extended Producer Responsibility to other material streams.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector.
Staffing Implications	▪ Addressed through existing administrative support.
Estimated Annual Operating Cost (2011$)	▪ Generally included within administrative support budget.
Increase in Diversion	▪ Will support/supplement per capita waste reduction target as noted above.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ 2012: Dialogue with the Province. ▪ Ongoing participation at provincial/federal levels – boards, workshops on policy and regulatory change.

2.1.1.2 Near Term Resource Recovery

Resource recovery options typically recover value from the waste stream. They are essential to increase diversion from landfill and assist in switching the focus from managing ‘garbage’ to managing ‘materials’.

Currently, there are few options for resource recovery in Winnipeg. The Province is responsible through the WRAP and associated regulations for the HHW and Electronic diversion programs, and there are a few private sector initiatives in Winnipeg that recover certain material streams (wood waste, concrete, shingles). However, the majority of residential materials that could be targeted for resource recovery appear to be included in the garbage stream sent to landfill. A brief visual scan of the residential working face at the Brady Road landfill in November 2010 indicated that in the order of 80% or more of some of the residential loads of material had the potential to be diverted through resource recovery if facilities existed for separation of these materials.

2.1.1.2.1 Community Resource Recovery Centres (CRRCs)

The City currently provides several areas for the diversion of various recyclable materials including leaf & yard waste, scrap metal, automotive batteries, bicycles, tires, propane tanks and appliances at the Brady Road Landfill.

Issues related to the current depot area and residential access to the Brady Road landfill include:

- Staff are not always present at the depot to direct residents and to ensure appropriate material separation;
- Residents can by-pass the current location of the depot at the landfill on their way to the landfill tipping face. There is no requirement to stop and separate materials at the depot area.
- The current signage directing residents to separate materials could use improvement;
- There is no incentive for residents to use the depot versus the landfill working face, i.e. there are no potential savings for residents if they separate out various materials for diversion;
- Residents access a dedicated working face at Brady Road. Access to the working face is not ideal for residents (road conditions) and management of the landfill working face requires significant allocation of City resources and equipment.

It is recommended that the City develop two community resource recovery centres (CRRCs) in the near-term, and to determine over time if additional facilities are required. This would allow for reasonable access to a convenient depot area for all City residents to haul bulky items and construction & demolition waste. Providing for a CRRC in the Southern end of Winnipeg at Brady Road, and at another location in the Northern end of the city, would provide for a depot located within around 20 km of any City resident. In principle, this should facilitate use of the CRRCs and diversion of various materials from disposal. Development of a CRRC at Brady Road will likely result in high public traffic at the centre. Studies in other communities (e.g. York, Hamilton) indicate that development of a CRRC (or community environmental centre) at an area already associated with waste management activities, generally results in higher traffic and use of services.

Implementation of a CRRC at Brady Road would provide a number of potential environmental benefits:

- It will allow for closure of the residential working face at Brady Road, reducing potential for odours from that area, reducing blowing litter from the residential materials, reducing infiltration of moisture into the landfill which contributes to leachate and allowing for reallocation of the resources used to operate this working face to other areas of the site.
- It will provide residents with improved access to the site, reducing impacts from poor road conditions.
- It can allow for substantial diversion of various material streams that would be separated by residents.

The design concept for the CRRC at Brady Road would be as follows:

- Access to the CRRC through the existing landfill scales;
- Access roads to the CRRC would be paved;
- The 'front-end' of the facility (i.e. that area accessed first by residents) would be dedicated to diversion of materials. For as many materials as possible, the tipping fee would be set at a minimal fee that is lower than the fee applied to regular garbage to encourage diversion (pending confirmation of management costs). The general principle for the fees is that diversion through the CRRC should cost less than disposal.
- High volume materials (such as brush) would be managed on gravel pads, built at ground level, separated by concrete block barriers (more for visual purposes, not as push walls).
- Lower volume materials would be managed via 40 yard bins (or smaller if appropriate), placed below grade through a conventional 'saw tooth' design, where the bins are set up below-grade and the public drops materials in from an above-grade off-loading area. This would include any materials that would be hauled off-site for management (e.g. shingles, drywall) and garbage hauled up to the landfill tipping face.
- Clear and appropriate signage would be placed throughout the site to direct facility users.
- At the 'front-end' of the facility, the following materials would be separated for diversion in the near term:
    - Blue box recyclables (co-mingled containers (20 yard bin), corrugated cardboard (40 yard bin), other paper fibre (40 yard bin);
    - Brush (gravel pad at grade, access required to grind and move materials);
    - Leaf & yard waste (paper bags only, or debagged) (gravel pad at grade, access required to grind and move materials);
    - Clean wood waste (40 yard bin);
    - Drywall (40 yard bin);
    - Asphalt shingles (40 yard bin);
    - Used Tires (40 yard bin); scrap metal and white goods (gravel pad at grade).
- Near the 'diversion' area, space could be provided for a household hazardous waste depot and/or electronics depot that could be developed and managed by the stewards of the provincial programs for these materials.
- A separate 'zone' of the CRRC would be used for separation of other material types that the City may want to manage separately as they could be marketed in the longer term for beneficial use or managed differently from regular garbage. Provisions for management of regular garbage would also be made. Material streams would include:
    - Dirty wood waste (gravel pad at grade);
    - Furniture/mattresses (40 yard bin);

- Non-divertible Construction and Demolition Waste (40 yard bin X 2):
- Mixed garbage (40 yard bin X3).

- Access to the disposal zone could be across a separate set of scales. This would allow residents to split loads between divertible and disposable items, allowing them to 'save' on tipping fees. This would also reduce traffic at the main scales.

An example of a CRRC developed and operated in the City of Hamilton is noted in the figure below. The area to the right includes twelve (12) bays where various material streams are separated for diversion. Residents pay no fee for materials dropped off in this area.

The area to the left includes four bays for garbage drop-off. Residents must pay a fee for dropping off material in this area. The total reported capital cost for this facility (2006) was $2.4 million.

The primary difference in design between the Brady Road facility and the proposed facility located in Winnipeg-north, would be that all of the materials managed at a 'Winnipeg-north' facility would have to be managed via 40-yard bins, using a conventional saw-tooth design.

The capital costs to develop such facilities can vary significantly based on:

- The existing infrastructure at the site. For example, at Brady Road there are already scales and an access road.
- The amount of grading and material required to develop the appropriate facility configuration.
- The type and potential quantity of materials that would be managed, which will determine the facility footprint and resources required for construction. Geotechnical

analysis will be required to determine the suitability of soils and potential earth moving requirements.

- The purchase of land, which would likely be required for the 'Winnipeg-north' CRRC.

Preliminary cost estimates for the Brady Road CRRC are as follows. Note: in regards to the purchase of the 40 yard bins and roll-off truck as noted, the City may choose to fully contract the removal of the bins, at which point the cost of the equipment would be rolled into the operating cost for the facility.

Table 2.8: Estimated Capital Cost Brady Road CRRC (+/- 30%)	
Design & engineering	$189,000
Scales	$180,000
Gravel pad	$400,000
Saw tooth & paved access roads	$1,306,000
Contingency	$207,500
Total	**$2,282,500**
Equipment (+/- 25%)	
40 yard bins	$105,000
Roll-off Truck	$325,000
Total	**$430,000**
Total Cost	**$2.7 million**

Preliminary cost estimates for the Northern CRRC (not including property purchase) are as follows. As noted above, the City may choose to fully contract out the operation of the facility and may not directly incur the noted equipment cost.

Table 2.9: Estimated Capital Cost Northern CRRC (+/- 30%)	
Design & engineering	$240,000
Scales	$180,000
Saw tooth & paved access roads	$2,220,000
Contingency	$264,000
Total	**$2,904,000**
Equipment (+/- 25%)	
40 yard bins (additional bins required)	$160,000
Roll-off Truck	$325,000
Total	**$485,000**
Total Cost	**$3.4 million**

The operating costs to run such facilities can also vary significantly based on:

- The types and quantities of material managed. Some materials such as wood waste may have a net cost to divert from landfill, for example if diversion of these materials involved shredding/chipping of wood wastes once or more a year. Other materials such as scrap metals may generate net revenues from the sale of these commodities.
- The method used to manage the materials. For materials which are placed in 40 yard roll-off bins there is a cost associated with removing these bins and hauling them to the location where the material would be used. Should the City fully contract out the management of the materials at the CRRCs (i.e. an operating contract to supply bins and haul materials as needed), the operating costs would be as indicated in the summary below. However, should the City choose to use City staff to haul and move some or all of these materials, the cost for operations of the facilities would be lower.
- The staffing and monitoring of the CRRCs. Generally, facilities with more successful diversion rates have at least one dedicated staff on-site at any one time, to direct residents to the appropriate areas and to ensure that residents are source separating their materials at the facility.

Research indicates that there are markets in the vicinity of Winnipeg for all of the targeted material types for diversion. However, unit costs for management of these materials including tipping fees/management fees per material type were not available at the time the following operating cost estimates were being developed. The estimates below represent a range of known unit operating costs for similar CRRCs in other municipal jurisdictions, for the movement and management of materials (including any processing requirements such as grinding). The unit cost estimates for Brady Road reflect that many of the materials would likely be managed on-site (e.g. grinding of brush for use at the LYW or as wood chips elsewhere on the landfill property). The unit cost estimates for a Northern Winnipeg facility reflect that all of the materials managed at the CRRC would have to be hauled to another facility for processing or disposal. Note also that the unit operating cost estimates for the Northern Winnipeg facility, assume some economies of scale should the facility handle larger volumes of material. The City staff assumed in the estimates below includes two operating staff/attendants, two driver/operators and a supervisor for the Brady Road CRRC, and the same staff complement plus a scalehouse attendant at the northern facility. Revenue estimates are conservative, reflecting materials revenue of approximately $54/tonne for scrap metal and tires. The estimates below do not include revenue estimates for facility tipping fees. These fees will be estimated as part of the system financing exercise discussed in Section 4.5 of this report. In principle, the fees would be set to cover a reasonable portion of the facility costs, with the fees for divertible materials being set lower than those for materials sent for disposal.

Table 2.10: Estimated Operating Cost (+/- 25%) Brady Road and Northern Winnipeg CRRCs

	Brady Road		Northern Winnipeg	
	low	high	low	high
Range of Potential Divertible Materials Management Costs	$381,000	$688,000	$381,000	$688,000
Annual Cost to Operate Roll-off Truck	$112,000	$112,000	$224,000	$224,000
Operational Staff (includes Drivers for Waste Haul)	$553,000	$553,000	$776,000	$776,000
Sub- Total	$934,000	$1,241,000	$1,157,000	$1,464,000
Estimated Revenue (sale of materials)	($85,000)	($128,000)	($85,000)	($128,000)
Net Operating Cost (+/- 25%)	$849,000	$1,113,000	$1,072,000	$1,336,000

HHW is not currently managed at the Brady Road Landfill, however the City could provide a permanent HHW depot at Brady Road as part of the development of a CRRC. The current HHW program operating within Winnipeg is funded through the Provincial program and managed through Miller Environmental Corporation (Miller). A HHW depot is located at Miller's facility at 1803 Hekla Avenue. Responsibility for the development and management of such a depot would rest with those responsible for the provincial program.

Currently, no electronic materials are directly managed by the City although it is likely that such materials are disposed within the residential garbage stream. As with HHW, the City could provide a location for a permanent electronics depot in conjunction with the CRRC. Like Manitoba's other stewardship programs the *Electrical and Electronic Equipment Stewardship Regulation (EEESR)* requires the implementation of a stewardship plan by April 1, 2011. Combining the CRRCs with the HHW and electronics diversion programs operated by the stewards would facilitate diversion of these items.

Table 2.11: Near Term CRRC System

Recommendations:	▪ The City should develop CRRCs based on a staged approach, first by developing a CRRC at Brady Road, and then a subsequent facility in the northern portion of the City. ▪ The design of the CRRCs should emphasize diversion, and provide ease of access to diversion options for materials. ▪ The City should engage the local marketplace, which offers options for marketing of shingles, drywall, concrete and waste wood, to confirm markets for recovered material. ▪ Residential traffic to Brady Road, would be directed to the CRRC and access to the landfill working face should cease. ▪ The City should make provisions to keep certain material streams (such as bulky materials) separate to facilitate processing of these materials should options become available. ▪ Management of HHW rests with stewards, in accordance with the HHMPM. ▪ The City could provide a location for an HHW depot at the Brady Road landfill, in conjunction with the development of the CRRC. ▪ Management of electronics rests with stewards, in accordance with the EEESR.

Table 2.11: Near Term CRRC System	
	▪ The City could provide a location for an electronics depot at the Brady Road landfill in conjunction with the CRRC. ▪ The City would have no direct involvement with the management of the HHW and electronics depots.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector
Staffing Implications	▪ Brady Road CRRC: Up to 7.5 Full Time Equivalents (Supervisor, attendants, driver/operators). ▪ Northern CRRC: Up to 11 Full Time Equivalents (Supervisor, attendants, scale house operator, driver/operators).
Estimated Annual Operating Cost (2011$)	▪ Operating (including staff for both facilities): $2.7 million ▪ Amortized Capital: $531,000 ▪ Revenue (tipping fees, sale of materials): ($1.6 million) ▪ Total: $1.67 million
Estimated Capital Cost (2011$)	▪ $2.7 million Brady Road CRRC (+/- 30%) ▪ $3.4 million Northern CRRC (+/- 30%) ▪ Total: $6.1 million (+/- 30%)
Increase in Diversion	▪ Divert in the order of 12,000 tonnes per year of material in near term.
Environmental and Social Benefits	▪ Significant reduction in landfill disposal, saving landfill capacity at Brady Road and reducing potential impacts of landfill disposal. ▪ Reduction in potential health and safety implications associated with public access to working face of Brady Road landfill. ▪ Provides more convenient access for management of bulky goods and construction and demolition material, providing an alternative to illegal dumping. ▪ Reduces risk associated with collecting HHW materials in the garbage. ▪ Reduces the amount of explosive, corrosive, poisonous, or reactive products being sent to landfill. These items can pose elevated risks to people who work with waste. ▪ Metals used in the circuitry of computers and in televisions – including lead, mercury, and cadmium – can be an environmental hazard in landfills. If decomposed over long periods of time and leaked into groundwater, these metals could contaminate water supplies. A CRRC system will reduce the quantity of these materials being sent to landfill. ▪ Reduction in the number of needles ending up in the garbage stream. Needles that have not been properly prepared for disposal can be unsafe for garbage and recycling workers.
Overview of Implementation Plan and Timelines	▪ Q3 2012: Issue and award RFP for design and engineering of Brady Road CRRC. ▪ Q4 2012: Consultant to engage local marketplace to confirm materials handling options. ▪ Q4 2012: Design of Brady Road CRRC, development of specifications. ▪ Q1 2013: Issue tenders for construction of Brady Road CRRC. Issue tender for equipment supply (bins, truck). ▪ Q1 2013: Develop tipping fee structure, reflecting cost of service but providing incentive for diversion VS disposal. ▪ Q2 2013: First phase of Brady Road CRRC is operational. ▪ Q3 2013: Review Brady Road CRRC operations, make any necessary design

Table 2.11: Near Term CRRC System	
	modifications for Northern CRRC. ▪ Q1 2014: Siting process for Northern CRRC. ▪ Q2 2014: RFP for design and engineering services for Northern CRRC. ▪ Q3 2014: Design of Northern CRRC, development of technical specifications ▪ Q4 2014: Issue tenders for construction of Northern CRRC. Issue tenders for equipment supply (bins, truck). ▪ Q1 2015: first phase of Northern CRRC is operational.

2.1.1.2.2 Encourage Private Sector Initiatives

In Winnipeg there are already several private sector companies involved in waste diversion initiatives including:

- Palliser Furniture Ltd. accepts wood waste at its furniture manufacturing plant. Publicly posted information indicates that it uses the wood waste (75% of which is from urban sources), to manufacture particle board.[26]
- Wood Anchor is a reclaimed wood flooring company that specializes in diverting wood from landfills; Wood Anchor uses Elm trees cut down by the City due to Dutch Elm disease as well as other species of trees to create word flooring.
- Rocky Road Recycling Ltd. accepts various forms of concrete and glass and recycles the material into granular base for concrete and asphalt applications.[27]
- Greensite Recycling accepts and recycles used roofing shingles into a product that can be used in asphalt paving.[28]

During the development of a new CRRC at Brady Road Landfill, the City should investigate the options for partnerships and/or service arrangements with various private sector companies to process/recycle material recovered from the Brady Road CRRC and future Northern CRRC either at Brady Road or somewhere off-site.

Table 2.12: Near Term Private Sector Initiatives	
Recommendations:	▪ The City should engage the local marketplace, which offers options for marketing of shingles, drywall, concrete and waste wood, to confirm markets and/or beneficial uses for recovered material. ▪ The City should make provisions to keep certain material streams such as bulky materials separate (e.g. mattresses), to facilitate processing of these materials should options become available.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector
Staffing Implications	▪ Included in CRRC estimates above
Estimated Annual Operating Cost (2011$)	▪ Included in CRRC estimates above

[26] http://www.forestnet.com/archives/April_01/mill_profile_1.htm
[27] http://www.rockyroadrecycling.ca/material/
[28] http://www.greensiterecycling.com/

Estimated Capital Cost	▪ Included in CRRC estimates above
Increase in Diversion	▪ Included in CRRC estimates above
Environmental and Social Benefits	▪ Finding beneficial uses of recovered materials from the CRRC's will decrease consumption of raw materials and energy.
Overview of Implementation Plan and Timelines	▪ 2012: Engage local marketplace to confirm materials handling options. ▪ 2013 to 2015: Expand recovered material streams should markets/partnerships to recover additional materials become available.

2.1.1.2.3 Recycling in Public Spaces

Public space recycling programs seek to capture additional recyclable materials from residential sources that are typically lost to disposal. Stantec has identified various best practices that could help overcome these obstacles including the use of clear and consistent signage, proper bin design and placement and good communications between collectors and facility managers.[29] The *Open Space Recycling Better Practices Review* also noted the importance of placing recycling containers and garbage containers side-by-side. A copy of this report is included as **Appendix D**.

Portage la Prairie was recently (October 2010) selected to become the model community for Recycle Everywhere, a program which encourages recycling in Portage la Prairie's public spaces.[30] This program was implemented in conjunction with the Canadian Beverage Container Recycling Association and Multi-Material Stewardship Manitoba and required an investment of $150,000 for over 200 bins, advertising and Recycle Everywhere decals. The recycling bins were placed throughout Portage la Prairie's parks, public buildings, shopping centres, community facilities and other public spaces in Winnipeg. Recycle Everywhere is reported to be the first permanent away-from-home recycling program in Canada. Winnipeg should carefully monitor the results of Portage la Prairie's program and select the most successful aspects of the program to implement in Winnipeg's public spaces.

It is recommended that the City of Winnipeg engage in discussion with MMSM regarding the implementation of a similar program within Winnipeg.

Table 2.13: Near Term Public Open Space Recycling Program	
Recommendations:	▪ Engage in discussions with CBCRA and MMSM regarding implementation of a program in Winnipeg ▪ Undertake an assessment of current litter bin and public garbage container composition, to determine potential range of material types and quantities ▪ Most communities should undertake a pilot study to assess the best containers to use, collection methods and City specific messaging (consistent with their own curbside program). For example, York Region (in Ontario) piloted numerous containers in two parks (in the summer of 2009) and also surveyed

[29] Stantec, Open Space Recycling Better Practices Review, 2009.
[30] http://cbcra-acrcb.org/RecycleEverywhere/pdf/recycle_everywhere_pr_oct22_2010.pdf

Table 2.13: Near Term Public Open Space Recycling Program	
	the public to get their feedback about the different types of containers. ▪ Complete assessment of key public locations suitable for containers, in discussion with other City departments ▪ Develop program, including capital and operating cost estimates
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector
Staffing Implications	▪ Would require coordination between City staff (waste and parks). ▪ Would require time from current Administrative staff
Annual Operating Cost (2011$)	▪ Pilot program: costs in the range of $75,000 to $100,000 ▪ Cost for full program implementation to be determined
Capital Cost (2011$)	▪ To be determined
Increase in Diversion	▪ Audit of current litter bins/garbage containers is needed. ▪ Open space dependent (total number of parks, size of each and use). ▪ Minor increase in recycling tonnage to MRF.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ 2011: Pilot in public spaces. ▪ Q4 2011: Discussions with CBCRA and MMSM. ▪ Q2 2012: Audits of current litter bins/containers. ▪ Q2 to Q4 2012: Program design. ▪ Q2 2013: Potential program roll-out.

2.1.1.2.4 Near Term Special Events Recycling Program

Special events recycling programs target vendors or organizations (typically those who use municipal facilities like parks and arenas for festivals or special localized events) and ensure that appropriate recycling initiatives are in place at these events (e.g., recycling and composting). In Winnipeg, event organizers are required to get a permit for these types of events and this permitting process provides an opportunity for the City to ensure that event organizers approach waste management in a fashion consistent with the municipal waste management system.

Currently, the Winnipeg permitting process only requires event organizers have garbage disposal receptacles at their event.[31] Permitting could require that recycling and composting are mandated; if this is done it should be supported with P&E materials designed for event planners and facility users. Various mechanisms for collection could be explored and employed but in all cases weights of material diverted should be recorded.

The City should consider implementing a special events recycling program in partnership with the Canadian Beverage Container Recycling Association who could provide funding for the

[31] http://winnipeg.ca/cms/ehs/pdfs/tempfsespecialeventsguidlines.pdf

initiative. The initial focus of the program should be to capture beverage containers and other easy to recycle materials during special events.

Table 2.14: Near Term Special Events Recycling	
Recommendations:	▪ Engage in discussions with CBCRA and MMSM regarding implementation of a program in Winnipeg ▪ Undertake a pilot study to assess collection methods and City specific messaging (consistent with their own curbside program) in partnership with the organizers of one or more major events. ▪ Develop program, including capital and operating cost estimates
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector
Staffing Implications	▪ Would require time from current Administrative staff
Estimated Annual Operating Cost (2011$)	▪ Pilot program: costs in the range of $75,000 to $100,000 ▪ Cost for full program implementation to be determined
Estimated Capital Cost (2011$)	▪ To be determined
Increase in Diversion	▪ Assessment/audit of tonnages and composition of event waste is needed. ▪ Depends on number and scale of events, and on key aspects of event design (e.g. some events like the Niagara Food and Wine festival provide reusable glassware to reduce waste, cutting total waste volumes in half) ▪ Minor increase in recycling tonnage to MRF.
Environmental and Social Benefits	▪ Reduced use of natural resources ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ 2012: Assess potential waste streams and volumes generated – discussion with CBCRA ▪ 2011/2012: Meet with major event organizers, determine participants for pilot program. ▪ 2013/2014: Undertake pilot programs, complete program design ▪ 2014/2015: Roll-out program, potentially amend permitting process to mandate recycling (and composting if desirable) at all events.

2.1.1.3 Recycling

Single stream recyclables are currently collected at the curb from single family homes, through recycling carts and bins at apartment buildings and through a network of seven (7) recycling depots. The existing Materials Recycling Facility (MRF) processes around 45,000 tonnes per year of recyclable material collected by the City and is currently at operating at maximum capacity.

Recommendations for changes to the recycling program as discussed below focus on changes related to collection from the single family sector, and provision of additional recycling processing capacity. For the near term, no significant change to the collection of recyclables from multi-family dwellings is proposed. The existing network of seven (7) recycling depots is

functioning reasonably well and provides a supplementary option to the public when they have larger volumes of materials for management that cannot be managed through the curbside program. It is recommended that the existing network of depots be maintained. However, as a result of technological changes, the City has identified a need to amend the set-up of these depots to continue operations at these locations.

2.1.1.3.1 Increase Recycling Container Capacity and Adjust Collection

The City currently operates a blue box based curbside single stream recycling system. In order to increase diversion via the curbside recycling program, the City could consider increasing the capacity of recycling containers by switching from the current blue boxes to either:

- Larger blue boxes;
- Recycling carts; or
- Blue transparent bags.

There is no one approach used for recycling collection that is preferable across the spectrum of municipalities. A variety of approaches are used in larger municipal jurisdictions across Canada, as noted below in Table 2.15.

Table 2.15: Recycling Containers Used in Communities Across Canada

Container Type	Municipal Program
Blue Bag only	Edmonton, Charlottetown, Halifax, Guelph
Blue Bag, Blue Box or Both	Peel, Niagara, Muskoka, London
Blue Box Only	York, Durham, Waterloo, Windsor, Ottawa
Automated Cart Only	Calgary, Toronto, Kelowna

The concept behind increasing recycling container capacity is that providing more space for additional recyclables, reduces the chances that recyclables will be placed in the garbage (due to overflow issues with recycling containers).

On-line market research undertaken in November 2009 and recent research in 2011 indicate that there is a need for the City to provide increased capacity for recycling and that there is community interest in the use of recycling carts:

- 73% of respondents who currently recycle anticipate liking the use of a new cart (2009);
- 36% of respondents indicated that they would likely recycle more if they had a new cart(2009);
- 59% of recycling households currently use two or more blue boxes (2011):

- 63% of respondents surveyed would prefer to replace the blue box with larger recycling cars (2011).

The provision of additional recycling capacity is critically linked to two other system components:

a) When the City transitions to a uniform level of collection service for garbage, including the phase-out of Autobins, this transition would be more positive if it is linked to an enhancement of recycling collection service, such as provision of a new recycling container; and,

b) This change is expected to increase recycling capture rates, increasing the tonnes of material that will require processing. The quantity of material currently processed at the existing MRF from City sources, exceeds the minimum contracted amount by almost 20,000 tpy. As discussed in the Options Report (**Appendix C**) the existing MRF is reaching capacity in regards to the performance of the processing line and storage of materials. Any change to the program that would increase the quantity of recyclables processed, should be timed to allow for processing options to be available. Further discussion regarding the need for recycling processing capacity is provided below.

The following table provides a comparison of key parameters considered in the development of a recommended approach to increase the capacity of the recycling containers used by City residents.

The comparative evaluation presented in this table, identifies the relative advantages and disadvantages for each of the collection approaches for recycling in comparison with one another and considering key criteria related to the social, environmental and economic aspects of the recycling collection service.

Table 2.16: Comparative Evaluation of Box-Based, Cart-Based, and Bag-Based Recycling

Criteria	Blue Box- Based	Cart-Based	Blue Bag-Based
Residential Familiarity and Acceptance	▪ Residents are familiar with system – would not require a behavioural shift and associated P&E campaign costs. ▪ Recent surveys indicate that 74% of residents strongly or somewhat support provision of another blue box. **MAJOR ADVANTAGE**	▪ Residents are less familiar with cart based collection over the majority of Winnipeg. Residents in the north-west would likely adapt quickly. ▪ Would require a behavioural shift and associated P&E campaign costs. ▪ Recent surveys indicate that 54% of residents strongly or somewhat support provision of blue automated carts. **ADVANTAGE**	▪ Residents are not familiar with bag based collection over the majority of Winnipeg. ▪ Would require a significant behavioural shift and associated P&E campaign costs. ▪ Recent surveys did not solicit input on blue bag based collection. ▪ Residents would be required to purchase bags (additional costs). **DISADVANTAGE**
Resident Ease of Use and Storage	a) Easy to use b) Requires covered storage area c) Easily stolen. Residents responsible to sourcing new box and may become discouraged to recycle. **NEUTRAL**	d) Many residents will find them easy to use e) Does not require covered storage area f) Is not easily stolen g) Some residents will likely find carts difficult to store and manoeuvre (especially in the snow). **NEUTRAL**	▪ Easy to use ▪ Residents must purchase bags, which could discourage participation in the program ▪ Less storage issues as bags are less bulky than boxes or carts. Bags provide a flexible storage option for all types of residential accommodations. **ADVANTAGE**
Potential to Remove Contamination – Implications Related to Material Quality	h) Box-based system allows collection crews to easily inspect recycling contamination and sticker non-compliant residents. i) Recyclable material is 'open to the elements' which at times can significantly increase the weight of the material and/or degrade the value of paper. **NEUTRAL**	▪ Very difficult for drivers to screen and remove any contaminants, thus residual waste quantities and material contamination likely to increase. ▪ Protects recyclable material from the elements. Less snow and water would be present in the materials sent to the MRF and to market. **NEUTRAL**	▪ May lead to increased contamination rates. It is more difficult for collection crews to inspect recyclables in bags as compared with blue boxes. May be perceived as adding additional waste to the recycling stream (unless the bags can be recycled in the process). ▪ Would protect recyclable material from the elements. Less snow and water would be present in the materials sent to the MRF and to market. **NEUTRAL**

Table 2.16: Comparative Evaluation of Box-Based, Cart-Based, and Bag-Based Recycling

Criteria	Blue Box- Based	Cart-Based	Blue Bag-Based
Collection Ergonomics	j) Blue boxes are not ergonomically ideal. It can be difficult for some residents and collection crews to manage (especially heavy) materials. **DISADVANTAGE**	▪ Automated Collection has ergonomic benefits, reducing lost time for contractors and increasing collection efficiency. **ADVANTAGE**	▪ Ergonomically preferable for both residents and collection crews. **ADVANTAGE**
Litter and Visual Impacts in the Community	k) Blue boxes tend to lead to increased litter levels in comparison to carts or bags which can be sealed. **DISADVANTAGE**	▪ Would reduce potential for litter in comparison to a blue box based system. **ADVANTAGE**	▪ Would reduce potential for litter in comparison to a blue box based system. **AD VANTAGE**
Potential for Scavenging and Material Loss	l) Blue boxes allow scavengers to easily steal valuable recyclable material. A move to bags or carts would likely reduce scavenging. **DISADVANTAGE**	▪ Would reduce scavenging of valuable recyclable materials which could increase revenues received for the City. **ADVANTAGE**	▪ Would reduce scavenging of valuable recyclable materials which could increase revenues received for the City. **AD VANTAGE**
Collection Cost Implications	▪ Projected to cost **$1.8 million per annum more** in collection contract costs than Cart-based System (based on 2-man side loader) ▪ Annual container costs of $204,000 per annum (amortized cost of purchase of boxes for full City, additional 2% boxes per year for new households). ▪ **Net cost implication: $6.7 million.** **DISADVANTAGE**	▪ Projected to cost **$1.8 million per annum less** in collection contract costs than Blue Box-based System (based on 1-man automated side loader). ▪ Annual container costs of $1.5 million per annum (amortized cost of purchase of carts for full City, additional 2% boxes per year for new households). ▪ **Net cost implication: $6.1 million** **ADVANTAGE**	▪ Projected to cost **$1.0 million per annum less** in collection contract costs than Blue Box-based System (based on 1-man manual side loader, as it is easy for one loader operator to handle bags). ▪ No City Container Costs. Household container costs. Direct cost to householders of $15 per annum, or $ 2.9 million per year. ▪ **Net cost implication (direct City cost and indirect cost to householder): $8.4 million** **DISADVANTAGE**
Processing Cost Implications	▪ Facility would continue to have difficulty processing wet materials in	▪ No negative processing cost implications ▪ Increase capture and quality of materials	▪ Would require major capital investment at MRF to accommodate bag breaker.

Table 2.16: Comparative Evaluation of Box-Based, Cart-Based, and Bag-Based Recycling			
Criteria	**Blue Box- Based**	**Cart-Based**	**Blue Bag-Based**
	winter, affecting processing efficiency and revenues. **DISADVANTAGE**	should increase material revenues. **ADVANTAGE**	▪ Would also increase operating and processing costs at the MRF (additional labour). ▪ Additional cost in the order of $12 to $15 per tonne. **MAJOR DISADVANTAGE**

Based on the evaluation presented above, the preferred approach to providing additional recycling container capacity would be the provision of recycling carts to single family residences across the City. Comparative evaluation of the options above indicates that transition to a cart based system has a preferred combination of advantages. Continued use of the blue box, or a transition to blue bag collection are comparatively disadvantaged.

Table 2.17: Near Term Increase in Recycling Container Capacity	
Recommendations:	▪ For the next contract for collection of recyclables, the City should seek pricing for collection using Automated Carts. ▪ During 2011/early 2012 the City should consider implementing a pilot cart based program in the areas of Winnipeg that will be affected by the transition from Autobin garbage collection service, to determine the level of support required and if there are any community implications in these areas related to the transition. ▪ The City should issue a bid opportunity for the purchase of sufficient carts (in the order of 195,000) for initial roll-out of the cart based program, and supply of carts to additional households resulting from population growth.. ▪ Transition to cart based recycling should be supported by a comprehensive promotion and education campaign.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector is not significantly affected by this program change. However, increased promotion and education relative to recycling in general should improve participation by this sector.
Staffing Implications	▪ Addressed within the staffing for the Collection Support Group.
Estimated Annual Operating Cost (2011$)	▪ Annual Collection Cost: $4.7 million ▪ Annual Cost of Carts (amortized over 10 years): $1.5 million ▪ Annual Cost of Carts for new households: $187,000
Estimated Capital Cost (2011$)	▪ $9,350,000 (+/- 30%) for purchase and delivery of carts.
Increase in Diversion	▪ Included within general impacts to collection system for improving recycling service and changing garbage collection. ▪ Estimated increase in recycling in Near-Term of 30,000 tpy associated with recycling program improvements. Note: other programs as discussed above will increase capture of recyclables. Potential increases in recycling processing costs as noted above, factor in the overall increase in tonnes of recyclables.
Environmental and Social Benefits	▪ Additional diversion will reduce consumption of landfill capacity, extending the operating life of the Brady Road landfill. ▪ The difference in the number of recycling collection vehicles between the projected blue box collection approach and cart based collection, could reduce the collection fleet by four collection trucks, reducing GHG emissions by 542 tonnes of CO2e annually.
Overview of Implementation Plan and Timelines	▪ Q3/Q42011: Take appropriate measures to extend current recycling collection contract. Also work on any necessary extensions of garbage collection contracts. ▪ Q3 2011: Issue RFP for Consulting Support services (bid specifications for cart supply and collection contract) – need integrated team including consulting support and internal resources. ▪ Q2 2011: Issue RFQ for short term recyclables processing as early as possible (over summer 2011). Make decision regarding longer term capacity at Brady Road. ▪ Q3 2011 – Review and update baseline dataset for program roll-out in 2012. ▪ Early Q4 2011 – Issue RFP for collection for all collection services provided to SFDs. Award by Q1 2012. ▪ Early Q4 2011: Issue RFP for provision of carts (garbage, recycling). Secure City warehousing to support program/City inventory system. ▪ Q1/Q2 2012: Develop Promotion and Education Campaign. ▪ Q3 2012: Cart-based collection phased in across City. Ensure lag between cart delivery and start date of new service is short.

2.1.1.3.2 Replace and Improve Recycling Depots

There are seven (7) recycling depots located throughout Winnipeg. These depots are located as follow:

- Garden City Shopping Centre
- St. James Civic Centre
- Magnus Eliason Recreation Centre
- Transcona
- Pan Am Pool
- Southdale Shopping Centre
- 1539 Waverley Street

The recycling depots are open 24 hours a day, 7 days a week and are operated on a self-serve basis and consist of approximately fifteen (15) Autobins (600 gallon) for separation of papers (newspaper, cardboard, magazines etc.) from containers (aluminum, plastics, steel food cans etc.). There are roughly nine (9) paper bins and six (6) container bins at each of the seven (7) locations. The City currently utilizes a side-load truck to collect papers and containers on a daily basis. The bins are designed such that the paper bins have "slots" to fit paper and the container bins have 'holes' to fit container materials. This reduces contamination in the bins, that is, general use of the bins for garbage disposal. Two trips are made each day and containers are taken to the MRF and paper products are taken to Versatech.

In 2009, approximately, 2,528 tonnes of recyclables were collected at the depots. The City's depots are well used and they provide a convenient alternative complimentary to the City's curbside and cart based recycling collection programs. Approximately 1,775 tonnes of paper is collected and approximately 750 tonnes of containers are collected each year through this depot program[32].

There are a few options that the City may consider in regards to recycling depot programming and each has its advantages and disadvantages. This section assumes that the "status quo" recycling depot system will continue, that is, there will be a continued split of papers and containers at the depots. Further, it is assumed that the City's current equipment used at the depots is in need of replacement.

The City could choose to move forward with the recycling depots using City-owned bins and collection vehicles or the City could choose to move to a contracted service (i.e., roll the capital cost of news bins and new vehicle into contracted collection service.) These two options are discussed below:

[32] *2010 Pre-Sort Data from MRF – City of Winnipeg, Winnipeg Waste Composition Data, Waste Audit, December, 2010*

City-Owned Bins and Collection Vehicle, City Collection (Status Quo)

The existing collection vehicle and bin collection system is quite old and may be difficult to replace cost effectively. Manufacturing of the same type of collection vehicle now utilized for side-load of 600 gallon bins may be difficult as this system is now rarely employed. One benefit of the existing system is that bins are located parallel to the side-load truck which allows the truck to move down the "bin line" and to avoid the need to back up and generally avoid several truck movements in an area potentially high with residential pedestrian and vehicular traffic. Further investigation of the business case to continue with status quo system is required.

The City could consider replacing the current bins with a front-end system whereby bins collected by a front-end truck are still lined up side-by-side but require more truck movement including vehicle back up and a larger depot footprint. This system, however, mandatorily employs back up beeper systems and mirroring on trucks for safety reasons. These bins can also be fitted for 'slots' and 'holes' (the bins currently used are akin to the four (4) cubic yard bin available in front-end systems). Larger front-end bins could be used instead e.g. an eight (8) yard bin and should be able to be fitted the same way[33] or with a 'door' for deposit of appropriate recyclable materials. The use of eight (8) yard bins is recommended as it reduces truck movements/truck back up which maintains a higher level of safety in a public access area. Further, front-end service is easily guaranteed by a contractor (e.g. their spare trucks) as a contingency if the City has a collection issue (e.g. truck break-down).

The City could also employ a roll-off system which is comprised of a much larger bin (e.g. 40 cubic yard) for each of paper and containers. The benefit of that system is that fewer lifts are required e.g. 1-1.5 times week for containers and 1-1.5 times per week for papers as opposed to the current once per day collection. One drawback is that this system requires a 'switch bin', to be dropped off when the full bin is removed so that service is continually available. Another drawback is that the area utilized for roll-off containers, by virtue of how they are loaded and unloaded onto the truck may require a concrete pad area. Currently the bins are on asphalt. A more significant drawback to a roll-off system is that residential zones/high residential use areas are not amenable to stored recyclable materials (containers) that tend to attract insects and create odour, particularly in hot summer months. For that reason, although potentially more economical, a roll-off system is not highly recommended.

From an "ownership" standpoint, assuming preference for a front-end truck and bins, a new front-end truck for the City would cost in the order of $280,000. The typical useful life of a front-end truck is about seven (7) years. The City would require approximately three (3) container bins and four to five (4-5) paper bins at each of the seven (7) depots. These bins cost in the order of $1,300.00 each for a total estimated cost in the order of $73,000.

[33] Should be confirmed with various bin manufacturers.

Contracted Bins, Vehicle and Collection

The City has the opportunity with its next collection contract to incorporate recycling depot (front-end) collection with its current front-end multi-residential recycling program. As opposed to a 'designated' depot collection program (status quo) this offers the opportunity for cost-savings associated with routing to these locations in conjunction with existing (and new) multi-family bin recycling locations in the City. Depot bins for paper would have to be managed separately in this scenario under the "status quo" system.

Cost savings could also be realized even if depot collection is not combined with multi-family bin recycling collection in that the City under 'status quo' would likely dedicate a new front-end truck to their recycling depot program only whereas a private contractor undertaking only the depot collection could potentially have other dedicated uses for the truck that could off-set the City's costs. Again in this scenario the service is easily backed up (e.g. loss of the primary truck) as contractors have spare trucks to manage these downtime incidents.

It is difficult to predict the costs associated with provision of the 'status quo' depot collection service by a contractor. Given the nature of the existing service it is estimated that it would be in the order of $125.00-$150.00/hour but the length of time to provide the service would need to be confirmed.

2.1.1.3.3 Increase Recycling Processing Capacity (Material Recovery Facilities)

The City has an existing contract with Emterra Environmental for recyclable materials processing at the Emterra owned and operated material recovery facility (MRF) that runs until September 2017. The MRF is currently processing approximately 48,500 tonnes/year, with approximately 45,000 tonnes/year received from City sources (in 2009), in the order of 500 tonnes/year per year from commercial recycling programs and approximately 3,750 tonnes/year from the City of Brandon. Materials received at the MRF include but are not necessarily limited to corrugated cardboard, newsprint, household paper, magazines, shredded paper, phone books, boxboard, aluminum beverage cans, glass jars and bottles, steel food cans, aseptic and gable top containers and #1, #2, #5, #7 plastics including bottles, tubs, pails and jugs.

A facility assessment completed in January 2011 indicated that the existing facility is operating close to current design capacity, and that certain components are undersized (tipping/receiving floor, storage areas for sorted materials) or require upgrades (e.g. upgrade of processing capabilities from 18 to 30 tonnes per hour) in order to process more than the 45,000 tonnes of City materials that are currently processed. Current recycling processing costs (gross cost) are in the order of $4.5 million, or approximately $100 per tonne (2011 budget). Revenue estimates are in the order of $4 million or $91 per tonne (2011 budget).

Based on population projections over the planning period (2011-2031) recycling tonnages will increase by 12,000 tonnes/year, to approximately 57,000 tonnes/year (by 2031) without any program changes (simply based on population growth.) It is estimated however that if various programs are implemented to provide incentives for increased program participation (e.g. larger

blue boxes/blue carts/bags, garbage restrictions) that an additional 40,000 tonnes/year of recyclables could be recovered in the near to mid-term bring the total quantity of recyclables managed up to 85,000 tonnes by 2016. The City has three options to address these future processing capacity requirements;

1. Expand existing MRF operating hours and general configuration or modify equipment to accommodate additional recyclable materials.

2. Issue a bid opportunity for additional processing capacity to meet near term needs.

3. Construct a new MRF to accommodate additional recyclable materials.

The relative advantages and disadvantages of each are described in 2.11 below. Review of the options, indicates that to meet the short term needs a combination of MRF expansion and procurement of surplus capacity should be considered.

Table 2.18: Advantages and Disadvantages Associated with Acquiring New Processing Capacity

Scenario	Advantages	Disadvantages
Expansion of Existing MRF:	▪ Capital costs lower than for construction of a new MRF ▪ Operating costs/cost per tonne can be estimated with greater certainty	▪ Requires negotiation with contractor and capital costs need to be amortized over the life of the remaining contract (to 2017) or the contract extended ▪ Doesn't allow for the same redundancies/contingencies for processing as with a second MRF ▪ Existing equipment would need to be replaced with more robust equipment for higher per hour through-put. ▪ The City has no alternate processor within reasonable distance for a shut-down period during facility upgrades or shut-downs. ▪ The current property and buildings are constrained in regards to supporting a facility expansion.
Procure additional processing capacity	▪ Could provide flexible processing capacity ▪ Private sector could respond quickly to the city's need with spare processing capacity	▪ Multiple contracts will increase administration ▪ Local MRFs may not be equiped to process the single stream material
Construct a New MRF	▪ Unlimited potential for added processing capacity/diversion that could include opportunities to increase diversion in the IC&I sector ▪ Opportunity for greater control over marketing of materials/revenues ▪ Provides contingency	▪ Capital costs higher than existing MRF expansion option, including costs for siting, approvals and permitting ▪ The timeframe to building a new MRF is likely to take longer than when the short term needs take effect

Table 2.18: Advantages and Disadvantages Associated with Acquiring New Processing Capacity		
Scenario	**Advantages**	**Disadvantages**
	capacity/redundancies in the system to accommodate unanticipated events e.g. equipment failure or in the worst case scenario, complete existing facility closure. ▪ Can create greater control of material flow e.g. during peak flow periods. ▪ Could allow for processing and marketing of capacity to other municipal users and/or the private sector	

The City should assess the benefits associated with the range of contractual options available for the development of additional processing capacity, including facility ownership and capital financing. Experience in other jurisdictions (e.g. Ontario), indicates that a preferred model is for DBO, with the municipality owning/financing a facility developed and operated by the private sector. However, in the context of Winnipeg, the other options may also present some advantages. The contractual options present various advantages and disadvantages that would need to be assessed more thoroughly if the City were to entertain a move from the existing model. Consideration would need to be given to a number of factors including but not limited to the cost of borrowing, opportunities for innovative financing approaches, public perception, degree of control over operations and maintenance, marketing, control over facility environmental performance and approvals, City staff administration requirements, bidding competition and whether efficiencies are in fact gained through the bundling of services (design/build/finance/own/operate). The City should consider undertaking a business case to determine the appropriate ownership model and approach to developing a new MRF.

In regards to the potential size of the MRF, the City should consider:

- The advantages of splitting the recycling tonnes collected by the City between two facilities. They include system redundancy, potential increases in collection efficiency;
- The age and lifespan of the Emterra MRF.
- Ability of the City to find a facility location.
- Capital costs, for which there are some economies of scale.

For construction of a new MRF, an estimate (order of magnitude) capital and operating costs for each of a 50,000 and 75,000 tonne facility are provided in Table 2.19 below.[34]

Table 2.19: Estimated Single Stream MRF Costs

Summary of	Single Stream MRF Costs			
Tonnes/yr	**75,000**		**50,000**	
Days/Year	250		250	
Days/Week	5		5	
Shifts/Day	2		2	
Hrs/Shift	8		8	
Productive Hours	14		14	
Tonnes/day	300		200	
Effective tonnes/hr	21		14	
Design tonnes/hr	26		17	
	CAPITAL	**ANNUAL**	**CAPITAL**	**ANNUAL**
EQUIPMENT COSTS				
Equipment Costs	$8,089,110	$832,877	$4,619,376	$475,624
Mobile Equipment Costs:	$317,322	$56,843	$260,100	$46,593
Other Equipment Related Costs:	$4,367,599	$593,417	$3,134,725	$425,909
Contingency (10%):	$1,277,403	$303,251	$801,420	$190,254
TOTAL EQUIPMENT COST:	**$14,051,434**	**$1,786,388**	**$8,815,621**	**$1,138,380**
BUILDING SIZE (m2):	7,081		5,815	
BUILDING COST:	**$6,630,381**	**$578,067**	**$5,445,034**	**$474,723**
TOTAL LABOUR COST	**47**	**$2,086,345**	**41**	**$1,830,012**
TOTAL VARIABLE OPERATING COSTS		**$2,080,727**		**$1,355,392**
TOTAL ANNUAL COST		**$6,531,528**		**$4,798,506**
COST/TONNE PROCESSED				
CAPITAL		**$32**		**$32**
OPERATING		**$56**		**$64**
TOTAL		**$87**		**$96**
PROJECTED PER TONNE REVENUE		**$85**		**$85**

[34] Revenue estimates were developed using estimated recovery rates for individual recyclable materials and per tonne market prices for grades of materials to be produced in the MRF. Per tonne revenues were developed using the CSR Price Sheet and actual current per tonne revenues from a number of MRFs (from other in-house projects) for 2009. The year 2009 CSR composite index was used for the sake of calculation because it represents the most conservative revenue generation per tonne for the period 2000 to 2011 (noting the average over those years was $135.00/tonne).

Note the current contract costs for processing (not including shipping costs) are lower than the projected gross facility operating cost of $96/tonne identified above for a 50,000 tpy MRF, indicating that on a gross cost basis, the current contract is reasonable. Revenue projections noted above are very conservative, and run a little less than the projected revenues per tonne in the 2011 budget.

It is projected that by 2016, the total quantity of recyclable material requiring processing will be in the order of 85,000 to 87,000 tonnes per year for materials recovered through the curbside program and through recycling depots. Note: this projection includes the increase in capture rates of recyclables associated with all curbside system components. Assuming that the City chooses to send a portion of its recyclable materials to the Emterra MRF of between 26,000 (contractual minimum) to 45,000 (current material supply), the City would require in the order of 42,000 to 61,000 tpy of additional processing capacity in the near term and up to 75,000 tpy of additional capacity in the longer term.

The most reasonable approach to developing new capacity would be to develop a 75,000 tpy MRF in the near to mid-term, as this would provide sufficient capacity to manage near-term materials as well as a further increase in tonnes over the longer term. As the table above shows, the capital costs associated with a 75,000 tonne per year MRF includes about $14 million for equipment and $6.6 million for buildings costs. Although representative MRF building costs have been included, site location and associated site development timing and costs have not been identified and could be substantial. The City could investigate the potential to site a new MRF at the Brady Road landfill site. There are advantages to this location in that: facility development costs could be lower as there is some existing infrastructure; it would provide a location in the south of the City providing a 'local' location for haul of recyclables that could improve collection efficiency; land purchase could be avoided.

However, it should be noted that with the phase-in of recycling carts in 2012, coupled with the phase in of automated garbage cart collection across the City also in 2012, it is expected that there would be an immediate need for some additional processing capacity. In order to ensure that sufficient capacity is available as of mid-2012, it is recommended that the City discuss expansion with Emterra and/ or issue a bid-opportunity to secure optional pricing for processing for the period from 2012 to 2017. This would provide an option for processing to allow for development of a new permanent capacity by the City or private sector, and an outlet should there be any issues with availability of capacity in the current system.

Table 2.20: Near Term Increase in Recycling Processing Capacity	
Recommendations:	▪ The City should negotiate with Emterra, to discuss the most reasonable approach to addressing additional processing capacity at the current MRF. ▪ The City should issue a bid opportunity for the development of a new MRF within the near term, to ensure that expanded long-term processing capacity is available on or before 2017. ▪ The City should seek processing capacity for in the order of 75,000 tpy, requiring a design that would provide longer-term capacity.

Table 2.20: Near Term Increase in Recycling Processing Capacity	
	▪ The City should seek pricing for at least two different ownership models, and should use the results of the bid opportunity to determine the most appropriate approach that will suit the City's needs. Either: o Design, Build, Operate: Where the City contracts out the development of the facility and operations of the new MRF over a reasonable contract term (e.g. 10 years or more), where the City finances and owns the MRF; or, o Design, Build, Own, Operate: where the City seeks pricing for recyclables processing under arrangements similar to those currently with Emterra. Generally, a longer term contract of 10 years or more would be appropriate. ▪ The City should consider the outcome of this process, in determining the best approach to addressing the expiry of the current Emterra contract in 2017.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector
Staffing Implications	▪ Addressed within the staffing for the Diversion Support Group.
Estimated Annual Operating Cost (2011$)	▪ Unit cost for processing of between $87 and $96 per tonne. ▪ Annual processing costs would increase from $4.5 million to approximately $8 million reflecting the increase in tonnes processed. ▪ Annual revenues for the sale of recyclables would also increase to over $7.2 million. ▪ Change in Net Operating Cost (Before Funding from MMSM): $358,000 increase. ▪ Increase in funding from MMSM: ($286,000)
Estimated Capital Cost (2011$)	▪ $20.7 million (+/- 30%) in facility development and equipment costs, not including site purchase and site development costs. ▪ Amortized capital cost included in operating cost noted above.
Increase in Diversion	▪ Included within general impacts to collection system for improving recycling service and changing garbage collection.
Environmental and Social Benefits	▪ Additional diversion will reduce consumption of landfill capacity, extending the operating life of the Brady Road landfill. ▪ Development of a new MRF would provide local employment opportunities for the construction and operation of the facility. ▪ A new MRF option if constructed at Brady Road could provide an opportunity for co-collection of garbage and recyclable materials, as it would increase the efficiency of such an approach.

Table 2.20: Near Term Increase in Recycling Processing Capacity	
Overview of Implementation Plan and Timelines	▪ Q3 2011: Negotiate with Emterra for processing expansion and upgrades. ▪ Q4 2011: Issue bid opportunity for short-term processing capacity, to be available as of mid-2012. ▪ Q1 2014: Issue RFP for consulting support services for new longer term MRF capacity. ▪ Q3 2014: Issue bid opportunity for new permanent MRF capacity. Award by Q1 2015. ▪ Q2 2015: Begin facility development. ▪ 2016: Potential facility commissioning. ▪ 2016: Review operating scenario, determine longer-term approach for managing recyclables (role of two MRF system) ▪ 2017: Potentially issue Bid Opportunity or otherwise negotiate in support of preferred system.

2.1.1.4 Near Term Organics

Organic materials like leaf & yard waste (LYW) and food waste make up approximately 30% of the residential waste stream. Other organic materials that are currently being placed in the garbage include compostable paper (e.g. paper towels), pet waste and diapers. Organic materials are also generated by businesses and institutions in Winnipeg. Presently, the majority of these organic materials are landfilled at Brady Road.

2.1.1.4.1 Leaf & Yard Waste (LYW) Composting

Currently, the City's LYW waste program is quite limited. LYW is collected four times a year to residences in the northwest portion of Winnipeg that have automated cart based garbage collection. Residents in other areas of Winnipeg can deliver their LYW waste to the Brady Road Landfill or to one of ten "Leaf it with Us" depots which are operated in the spring, summer, and fall months. Due to the limited availability of LYW collection, much of the LYW produced by residents is likely ending up in the curbside garbage stream.

This section discusses recommendations for the potential expansion of the LYW collection program to other areas of Winnipeg as well as an extended collection program (i.e., offering more collection days). Recommendations regarding expansion of the LYW composting capabilities at the Brady Road Landfill are also discussed.

Expand LYW Collection Program

In order to improve the participation rate in the LYW program, at minimum the City should consider extending collection services City-wide to provide four pick-ups a year across Winnipeg. This could divert another 3,000 tonnes or more of LYW each year. The annual cost to pick up leaf and yard waste four times a year across Winnipeg is estimated as $1.4 million based on the current cost for the program in the northwest portion of Winnipeg.

More frequent collection of LYW (bi-weekly from April to November) and year-round access to a permanent drop-off location for LYW (e.g., a new CRRC) is expected to divert an additional 21,000 tonnes from disposal every year (adding around 6% to the current residential diversion rate). Modeling of the potential collection system in Winnipeg indicates that providing bi-weekly LYW collection from April to November each year to all households eligible for curbside service would cost in the order of $2.8 million annually.

The following table discusses the advantages and disadvantages of the two options for expanding LYW collection. In both cases, it is assumed that the City would allow the use of paper bags or hard-wall containers for set out of LYW materials, prohibiting plastic bags.

Table 2.21: Advantages and Disadvantages Associated with Expansion of Leaf & Yard Collection

Scenario	Advantages	Disadvantages
Four LYW pick-ups annually, City-wide	▪ Lower annual cost for collection of $1.4 million ▪ Lower annual processing costs for LYW as fewer tonnes diverted (see below) ▪ Support for this option (73%) by those residents surveyed in the spring of 2011.	▪ Lower diversion potential (additional 3,000 tpy) ▪ Significant portion of LYW sent to landfill disposal, occupying landfill airspace and generating methane emissions. ▪ Results in very high short-term draw on resources to collect and process materials. ▪ Should residents miss one collection day, they've cut their curbside access to seasonal collection in half. Will encourage continued disposal of LYW in the waste stream. ▪ City would continue to operate the "Leaf it with us" system of depots across the city to provide back-up capacity, at a cost of over $600,000 annually (2011 budget).
LYW collection from April to November, City-wide	▪ Increased diversion potential (additional 21,000 tpy) ▪ Significant reduction in consumption of landfill capacity, reducing potential impacts of LYW disposal such as methane emissions. ▪ Provides reasonable access to curbside diversion of LYW year road. ▪ City would have option to discontinue the "Leaf it with us" depot system. ▪ Support for this option (73%) by those residents surveyed in the spring of 2011.	▪ Higher annual cost for collection of $2.8 million. ▪ May be offset in part should the City elect to close some or all of the "Leaf it with us" depots in the community, pending assessment of community demand. ▪ Higher annual processing costs for LYW as this approach would result in a significant increase in tonnes managed.

On balance, expanding LYW collection across Winnipeg over the growing season from April to November has greater advantages to the City and its residents. Expansion of this program, if

undertaken concurrently with the implementation changes to garbage collection, would help off-set concerns of residents who may find the changes to garbage restrictive, and who desire convenient access to service to divert organic materials.

Table 2.22: Near Term Expansion of LYW Collection Services	
Recommendations:	▪ Concurrent to, or as part of the bid opportunity for changes to recycling collection and/or garbage collection, the City should seek services for the bi-weekly curbside collection of LYW across the city from April to November each year. ▪ Implementation of an expanded LYW collection service should be supported by a comprehensive promotion and education campaign. Key area of focus would be the collection schedule (likely one ½ city on week 1 and the other on week 2) and acceptable set-out parameters (allowed container types, bundling of branches etc.).
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector is not significantly affected by this program change.
Staffing Implications	▪ Addressed within the staffing for the Collection Support Group.
Estimated Annual Operating Cost (2011$)	▪ Annual Collection Cost: $2.8 million. ▪ May be offset by some savings in operation of the “Leaf it with us” network of depots if demand decreases.
Estimated Capital Cost (2011$)	▪ No capital costs to the City for collection, capital costs noted below for processing.
Increase in Diversion	▪ Estimated increase in organic materials diverted in near-term of 21,000 tpy.
Environmental and Social Benefits	▪ Additional diversion will reduce consumption of landfill capacity, extending the operating life of the Brady Road landfill. ▪ Would reduce the amount of LYW in the garbage stream likely leading to increased garbage collection efficiencies due to decreases in waste volumes.
Overview of Implementation Plan and Timelines	▪ Fall 2011: Issue Bid Opportunity for LYW collection beginning April 2012, likely as part of RFP for overall collection service. Award by Q1 of 2012. ▪ 2012: Promotion and Education Campaign. ▪ April 2012: Program implemented across Winnipeg either as separate collection program.

Develop and Operate a New LYW Processing Facility at Brady Road

In 2009, 4,759 tonnes of LYW was collected from residents of northwest Winnipeg or dropped off at the Brady Road Landfill and “Leaf it with Us” depots. In addition to the LYW, approximately six tonnes of food waste was collected daily at the landfill from a private commercial organics operator. The current method of processing compostable material at Brady Road Landfill is via a compost pile which is turned over once per year. The small quantity of food waste collected from the private sector is mixed in with LYW in the pile. After being processed, the compost is eventually used as landfill cover.

Considering the tonnage of LYW waste (as well as food waste) received and the additional tonnages that could be realized if curbside collection of LWY is expanded City-wide (up to 21,000 tonnes, see previous section), the City should expand the LYW processing capabilities at the Brady Road landfill.

Expansion of the composting area at Brady Road Landfill should be based on developing an updated windrow-based LYW processing system. The new facility would include:

- Paved access roads (or granular as an alternative);
- Development of a new asphalt compost pad for 'high rate' composting of up to 2 hectares; Alternatively granular material could be used but is not preferred;
- Management of stormwater run-off (potentially develop stormwater pond 0.8 ha, 17000 m3 capacity, pyramid shape, 3H:1V gravel covered slopes). The pond could be used as source of process water should moisture be needed for the windrows.

Updated capital cost estimates for a LYW indicate that costs would be in the order of $2.2 million (+/- 30%), pending the outcome of geotechnical investigations on soil quality in the potential expansion area at Brady road, and the consequent site development requirements.

Additional equipment will likely be needed as follows:

- Front-end loader or alternative, for stacking windrows and turning materials.
- Possibly mechanical turner, however they have limitations and generally restrict the height of the windrows in order to effectively turn the material.
- Horizontal grinder for processing branches and other woody materials. A grinder could either be purchased or most likely rented to meet the City's needs.
- A trommel screen to be used to process finished compost material. Generally, the City would likely rent a screening plant when necessary to process the finished material.

Overall, it could cost in the order of $50 per tonne or up to $1.1 million each year to operate the LYW facility including the cost of one full time operating staff. It may be possible to earn some revenue from the sale of the compost however, this has not been included in the cost estimates.

Table 2.23: Near Term Expansion of LYW Processing Facility at Brady Road

Recommendations:	▪ To support the expansion of the LYW collection program, the City should develop a new LYW processing facility at Brady Road. ▪ This facility would compost materials received at existing or new depots, and materials collected at curbside.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector is not significantly affected by this program change. However, access to processing capacity affects the City as a whole.
Staffing Implications	▪ One Technologist III Compost

Estimated Annual Operating Cost (2011$)	▪ Annual Operating Cost: $1.1 million ($50 per tonne) for additional LYW ▪ May be offset by some revenues from the sale of compost.
Estimated Capital Cost (2011$)	▪ $2.2 million (+/- 30%).
Increase in Diversion	▪ Estimated increase in organic materials diverted in Near-Term of 21,000 tpy.
Environmental and Social Benefits	▪ Additional diversion will reduce consumption of landfill capacity, extending the operating life of the Brady Road landfill. ▪ Would reduce the amount of LYW in the garbage stream likely leading to increased garbage collection efficiencies due to decreases in waste volumes.
Overview of Implementation Plan and Timelines	▪ Q1 2012: Issue RFP for consultant services for design & engineering. ▪ Early Q2 2012: issue and award tender for construction of LYW facility. Issue and aware tender for equipment supply. ▪ By end of Q1 2012: Hire operating staff – training of staff to happen in Q2 2012. ▪ End of Q2 2012: construct LYW facility.

2.1.1.5 Near Term Garbage and Bulky Collection

Improvements to the collection system are needed to address unequal service associated with differences in collection types in Winnipeg and to support increased diversion.

2.1.1.5.1 Single Family Residential Garbage Collection

In the near-term, the focus will be on moving to a consistent curbside collection approach across Winnipeg with a move away from unlimited garbage collection. In addition, potential collection efficiencies will be examined as new collection RFPs are developed, in order to ensure cost effective service delivery to Winnipeg residents.

The City currently collects garbage from the residential sector via five different collection methods:

- Automated carts for residents living in the northwest portion of Winnipeg;
- Manual collection in cans and/or bags (no limit);
- Autobins;
- Communal bins/carts; and,
- Multi-family residential bins.

The City has experienced significant issues with Autobins and communal bins. The bins are subject to fires and vandalism. Some bins are up to 20 years old and require a significant amount of maintenance. Moreover, Autobins will become increasingly difficult to replace as there is now only one manufacturer of Autobins and the vehicles necessary to remove and empty autobins left in North America. Finally, the bins do not encourage residents to divert their waste, as each resident is not limited to a specific amount of garbage each week. Recent surveys indicate that there is 64% support for the phase out of Autobins. Winnipeg's experience

is similar to that of other communities (Regina, Brandon) which have also made the choice to phase out Autobins.

In order to create a uniform garbage collection service across Winnipeg and encourage diversion, the City must move to one type of container for garbage for single family residences. The types of garbage containers considered for the near-term include the use of bags (manually collected) or automated carts such as those that are used in the northwest portion of the city.

In a bag-based garbage collection system, residents would be responsible for purchasing bags. Manual collection of bags can be very efficient and provides flexible garbage capacity to residents within any limits that are set (e.g., three bags a week which is equal to the capacity of a cart). Bag limits have been effective in other communities, increasing diversion by 2% or more.

The City could also decide to move to a City-wide automated cart garbage collection system. The City of Brandon currently provides black carts to all single family residences and provides collection on a weekly basis; Winnipeg could follow suit. There would be a significant cost associated with a switch to City-wide automated cart garbage collection. Limiting the volume of garbage collection to the volume that can be placed in a cart has been effective in other communities, increasing diversion by 2% or more.

The following table discusses the advantages and disadvantages associated with bag-based or automated cart based garbage collection approaches. Based on this analysis, cart-based collection is recommended for the City of Winnipeg, particularly when considering the transition in some areas from Autobin service.

Table 2.24: Advantages and Disadvantages of Bag or Cart Based Garbage Collection

Criteria	Bag- Based	Cart-Based
Residential Familiarity and Acceptance	▪ Residents are familiar with the use of bags for manual collection in one area of the City. They are also familiar with the use of bags in the Autobin areas as a means of containing and moving household garbage. A bag-based system would not require a behavioural shift in the current manual collection area. ▪ There would be P&E campaign costs and effort required to shift behaviour in the Autobin areas. ▪ There would be issues with modifying the cart-based collection approach in the northwest portion of the City. ▪ Recent surveys indicate the opinion of residents is somewhat 'split' on the concept of cart-based collection, however no strong opinions were expressed supporting bag-based	▪ Residents are less familiar with cart based collection over the majority of the city. ▪ Residents in the northwest of the City are familiar with and have adapted to this approach. ▪ Would require a behavioural shift and associated P&E campaign costs. ▪ Recent surveys indicate the opinion of residents is somewhat 'split' on the concept of cart-based collection. In the order of two thirds of residents are supportive of Automated Cart collection (Phase 2 Phone Survey). ▪ Cart-based collection may offer an easier transition for resident in Autobin areas as the City moves to implement uniform garbage collection.

Table 2.24: Advantages and Disadvantages of Bag or Cart Based Garbage Collection		
Criteria	**Bag- Based**	**Cart-Based**
	collection **NEUTRAL (some advantages and disadvantages)**	**NEUTRAL (some advantages and disadvantages)**
Resident Ease of Use and Storage	▪ Easy to use ▪ Requires secure location for storage of bags (in hardwall container, and/or in garage) ▪ Less storage issues as bags are less bulky than carts. Bags provide a flexible storage option for all types of residential accommodations. **NEUTRAL**	▪ Some residents will likely find carts difficult to store and manoeuvre (especially in the snow). ▪ Provides alternative storage for garbage for those residents without a garage or shed. **NEUTRAL**
Collection Ergonomics	▪ Heavy bags are not ergonomically ideal. It can be difficult for some residents and collection crews to manage (especially heavy) materials. **DISADVANTAGE**	▪ Automated Collection has ergonomic benefits, reducing lost time for contractors and increasing collection efficiency. **ADVANTAGE**
Litter and Visual Impacts in the Community	▪ Bag based garbage collection can lead to higher litter levels in comparison to carts, based on access to bags by scavengers. **DISADVANTAGE**	▪ Would reduce potential for litter. ▪ Reduced impacts related to vermin and insects **ADVANTAGE**
Collection Cost Implications	▪ Projected to cost **$4.**0 **million per annum** more in collection contract costs than Cart-based System ▪ Net cost implication**:$10.6 million** **DISADVANTAGE**	▪ Projected to cost **$4.0 million per annum less** in collection contract costs than Bag-based System ▪ Annual container costs of $1.1 million per annum (amortized cost of purchase of carts for remainder of City, additional 2% boxes per year for new households). ▪ Net cost implication: **$7.6 million** **ADVANTAGE**
Diversion and Disposal Implications	▪ Unless firm bag limits are set, use of bags does not restrict the volume of weekly waste set-out, discouraging diversion and resulting in landfill disposal of various materials. ▪ Some additional administrative costs would be incurred to monitor and maintain a garbage tag system or a system with firm container limits. **DISADVANTAGE**	▪ Use of carts restricts the volume of weekly waste set-out, encouraging diversion and avoiding landfill disposal of various materials. **ADVANTAGE**

In regards to collection system efficiencies, as documented in the Task C and Task D Draft Report (Appendix B), the collection system in the City is quite complex. The system currently has:

- Five collection service areas (northwest, northeast, east, southwest, and south)
- Twelve separate collection contracts (for garbage, recycling and other services)
- In the order of 26 collection 'areas' representing areas of the City collected on specific days - a 'hodgepodge' of collection areas not necessarily reflecting most efficient collection approach
- "No charge" zone for bulky collection – contiguous with Autobin areas – two tiered bulky service that lends itself to illegal dumping (see next section for discussion on bulky waste)
- In most collection zones, different contractors collect different materials (garbage, recyclables, LYW)
- Collection for MFD is entirely separate from collection for SFD
- Option for larger or multiple carts in the northwest
- "Walk Up" collection service for garbage and recyclables
- Garbage collection from charitable organizations and Houses of Worship
- Free small commercial garbage collection service to those generating less than 0.5 cubic metres of waste per year, and fee for service for volumes between 0.5 and 3 cubic metres.

As part of the process of securing a new garbage collection contract(s) for single family residential properties, it is recommended that Winnipeg consider options for greater collection system efficiencies as follows:

a) Adjusting the Service Areas, such that there would be four areas located in the City (northwest, northeast, southwest, southeast), corresponding to major features (e.g. river systems) that provide 'boundaries' between collection areas. This would be coupled with reducing the number of Collection Areas to 20 (one for each collection day in each Service Area). This would have the following advantages:

- Increased collection efficiency and lower collection costs.
- Decreased administrative burden.
- Increased clarity for the community, making it easier to communicate where and how collection services are delivered.

b) Consolidating the majority of collection services (in particular single family services) within one RFP, such that the same contractor provides all collection services to the single family sector in each contract area. This would have the following advantages:

- City is moving to an integrated waste management system approach – improvements in one program (e.g. recycling) have potential effects on other aspects of the system (e.g. garbage collection – garbage volumes, frequency of set-outs)

- Preferred approach for collection would include:
    - Same day collection of all target material streams
    - Adjustments to collection day for many areas of the City
    - Move to automated collection of garbage and recyclables
- A combined collection RFP would allow the City to award these linked collection services to a single service provider (for one or more zones)
- Awarding the combined collection services could potentially result in better bid prices as:
    - Only one maintenance yard and management support team would be needed;
    - The proponents could be allowed to propose alternative means of service provision – that could be more efficient than collection of each material as a single stream (e.g. co-collection)
    - The proponents would be able to reallocate resources as needed to provide service e.g. one fleet of spare vehicles, equipped to serve as garbage/recycling or LYW trucks

Table 2.25: Near Term Implementation of Uniform Garbage Collection Services	
Recommendations:	▪ Replace the existing older garbage collection contracts (2011, 2012, 2013) with a contract(s) based on cart-based garbage collection service. This would replace the use of Autobins and manual collection. ▪ Given the timeline required to order and distribute carts and for the new contractors to order collection trucks, it would be reasonable to extend the above noted contracts to a common termination date as of late 2012, which would allow for uniform service to be implemented as soon as is reasonably possible. ▪ That the next collection RFP, be a consolidated RFP that includes all collection services provided to residents in the City, allowing for increased collection efficiencies and effectiveness of service. ▪ Further it is recommended that the City scope the terms of the next garbage collection contracts, so that they may all expire in the same year (e.g. 2018). This would facilitate future roll-out of the green bin program. ▪ During 2011 the City should consider implementing a pilot cart based program in the areas of Winnipeg that will be affected by the transition from Autobin garbage collection service, to determine the level of City support services required and to better assess the community implications in these areas related to the transition. This will be particularly critical to test the approaches that would be used to address the overall shift in collection services including the shift in how bulky materials would be collected. ▪ The City should issue a bid opportunity for the purchase of sufficient carts (in the order of 195,000) for initial roll-out of the cart based program, and supply of carts to additional households resulting from population growth. ▪ Transition to cart based garbage collection should be supported by a comprehensive promotion and education campaign. ▪ Excess garbage set outs can be addressed through the option for residents to purchase a second cart (and incur the applicable charges) and through the proposed changes to the bulk waste collection approach. ▪ The City should work with community organizations to determine the best means of ensuring that a cart based approach will work for all members of the community, and have alternative approaches available for those residents that may not be able to use the carts.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector is not significantly affected by this program change. However, increased promotion and education on diversion in general should improve participation by this sector.
Staffing Implications	▪ 1 Technologist III Collection ▪ 4.5 Technical Assistants - Temporary
Estimated Annual Operating Cost (2011$)	▪ Annual Collection Cost: $6.5 million (compared to 2011 budgeted cost of $7.5 million for garbage collection to single family households) ▪ Annual Cost of Carts (amortized over 10 years): $1.1 million ▪ Annual Cart for new households: $144,000
Estimated Capital Cost (2011$)	▪ $7.2 million for purchase and delivery of carts. (+/- 30%)
Increase in Diversion	▪ Included within general impacts to collection system for improving recycling service and changing garbage collection.
Environmental and Social Benefits	▪ Additional diversion will reduce consumption of landfill capacity, extending the operating life of the Brady Road landfill.

	▪ The difference in the number of collection vehicles between the projected bag based collection approach and cart based collection, could reduce the collection fleet by eight collection trucks.
Overview of Implementation Plan and Timelines	▪ 2011: Take appropriate measures to extend existing contracts as needed (extend current garbage collection contracts to January 31, 2013 to allow for coordinated roll-out of the new program). ▪ Sept 2011: Issue Bid Opportunity for Cart Based garbage collection for award by Q1 2012, as part of consolidated Collection RFP ▪ Starting Q3/Q4 2011: Undertake pilot automated cart based collection service in a group of Autobin areas. ▪ Early Q4 2011: Issue Bid Opportunity for provision of 195,000 garbage carts. ▪ Q1/Q2 2012: Promotion and Education Campaign ▪ Mid-2012: Phase in Cart-based collection across Winnipeg.

2.1.1.5.2 Consistent Level of Bulky Waste Collection

Currently, the City provides collection of bulky wastes and household appliances to all residents on a call-in basis. Bulky items eligible for collection include items such as household furniture, mattresses, box springs, and appliances such as stoves, dishwashers, washing machines, and dryers. Residents may request up to six items (any combination of bulky waste and large household appliances) be collected during each scheduled pick-up. A $20.00 fee is applied in the majority of the City for the collection of bulky waste depending (up to six items can be collected per pickup). There are also 'no-charge' zones, where residents can call-in for service but no charge is applied. Appliances that contain ozone depleting substances (refrigerators, freezers, air conditioners) can also be collected as part of this program. There is a $20.00 fee per item per pickup for any waste containing ozone depleting substances.

Recent surveys (Phase 2 Phone Survey) indicate that:

- Just over half of respondents were aware that the City provides this service.
- Around 25%of respondents had actually used the service;
- More respondents supported cost recovery for bulky collection through a City-wide user fee (56%), versus providing a tax-supported service (46%).

It is recommended that the City move to a more "restrictive" bulky waste collection program, that includes a reasonable 'per item' charge of for example, $5 per item. Care has to be used in setting the fee to set it at an 'acceptable' level. A $5 per item service, would allow residents the freedom of setting out only one or two items at a cost lower than the current service ($20 flat rate). The over-volume waste that residents may generate (volume over that which can be placed in the automated carts) can be treated as 'bulky' waste, and collected at a cost of $5 per container (each additional container being considered as an item).

By combining a more "restrictive" bulky waste collection program with enhanced diversion options such as the proposed CRRC, the City will move towards encouraging diversion and discouraging disposal of these items.

The proposed change to bulky waste collection should not be interpreted the means of addressing pick-up of all bulky materials such as those illegally dumped by Autobins or elsewhere in Winnipeg. Illegal dumping will continue to be a matter that is addressed by the City through by-law enforcement and removal of materials by the City as required. This is a separate matter, and would not be financed through the $5 per item fee. Promotion and education will be required to make it clear to City residents that there will no longer be a "no charge" zone, and that residents have options to properly manage and dispose of bulky materials. In the short-term, should be expected that there may be some issues with continued illegal dumping in the former 'no charge' zones and also in Autobin areas, however in the longer term this should improve as residents become accustomed to the new system. In regards to the actions of tenants in rental housing and the management of volumes of bulk waste that can be generated in many circumstances, the City could look at options in dialogue with property owners, to address management and removal of these materials.

Table 2.26: Near Term Changes to Bulky Collection Services

Recommendations:	▪ The City should implement a minimum charge per bulky item (e.g. $5 per item) to discourage disposal and encourage diversion of bulky materials through reuse or recovery of materials. ▪ The implementation of the fee should be coordinated with the proposed changes to garbage collection as discussed above. ▪ Transition in bulky collection services should be supported by a comprehensive promotion and education campaign. ▪ Collection of bulky items and materials that are illegally dumped will continue to be handled separately by the City. It is recommended that the City have continued dialogue with property managers in the existing 'no-charge' zones, to determine the best approach to address issues with bulk material volumes that can result from various tenant issues.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector.
Staffing Implications	▪ Addressed within the staffing for the Collection Support Group.
Estimated Annual Operating Cost (2011$)	▪ Addressed within garbage collection costs. ▪ Potential revenues from the $5 per item fee: ($844,000) compared to current revenues of ($120,000)
Estimated Capital Cost (2011$)	▪ None
Increase in Diversion	▪ Included within general impacts to collection system for improving recycling service and changing garbage collection.
Environmental and Social Benefits	▪ Additional diversion will reduce consumption of landfill capacity, extending the operating life of the Brady Road landfill.
Overview of Implementation Plan and Timelines	▪ 2011: Set per item fee ▪ Sept 2011: Integrate bulky collection service within the consolidated bid opportunity for collection services ▪ 2012: Promotion and Education Campaign ▪ Mid-2012: Fees come into effect.

2.1.1.6 Disposal (Brady Road Landfill)

The Brady Road Landfill is a 790-ha Class I facility that opened in 1973. It is currently operating under an Operating Permit from the Province issued in 1993. A licensing process is currently underway. The Brady Road landfill currently contains approximately 8.5 million metric tonnes of waste. The site has capacity for at least 100 more years, assuming the current disposal rate of 400,000 tonnes per year.

Over the course of the CIWMP there would be a shift in use of the Brady Road Landfill site from being primarily a "disposal facility" to a resource management facility. This will include developing new areas for waste diversion at the site (e.g. proposed CRRC) and potentially developing additional processing capacity at the Landfill for organics and recyclables.

Recent surveys indicate that this concept is broadly supported, with 79% of respondents either strongly or somewhat supporting the shift in focus for the landfill. Over 80% support has been expressed regarding development of composting capacity and an industrial 'Green Park' at Brady Road.

2.1.1.6.1 Design and Operational Improvements

Over the near-term, a number of key areas of potential operating and design improvements have been identified for Brady Road Landfill. These will be addressed in detail in a new operating plan for the site. Some key examples of potential design and operational improvements to Brady Road include:

- Directing all residential traffic to a new Community Resource Recovery Centre (CRRC) which would reduce the amount of residential waste disposed at the site and/or would allow for closure of the residential tipping face.
- Operational improvements to the active tipping face.
- Improvements in leachate and landfill gas management.
- Expanded compost operation which will divert additional organics with extended benefits e.g. less GHG, leachate, odour.

2.1.1.6.2 New Diversion Infrastructure

Over the near-term, new diversion infrastructure that is proposed for development on the site includes:

- A CRRC for residents to separate and drop off materials, many of which can be diverted from the landfill.

- The CRRC could provide a location for drop off of HHW and electronics under the Provincial program, should there be a desire from both program stewards and the City to do so.
- Enhanced LYW processing facility.
- A new MRF to process recyclables, potentially developed at the site towards the end of the near term period.
- A "Green Park" for private enterprise which would encourage the development of industrial and/or commercial enterprises to establish diversion efforts on site to focus on recovering value from various waste streams.

"Green Park" for Private Enterprise

A "Green Park" would focus on encouraging industrial and/or commercial companies to establish enterprises at Brady Road Landfill that would focus on recovering value from various waste streams. It would build upon the resource recovery option discussed in regards to promoting private sector initiatives, but would specifically deal with establishing these initiatives at the Brady Road Landfill site.

The "Green Park" would consist of an area at Brady Road Landfill in which private enterprises could establish diversion initiatives. The City would act as a host to these companies while the private sector entities would be responsible for the operation of the processing initiatives.

The City currently encourages this type of entrepreneurship. For example, Wood Anchor is a reclaimed wood flooring company that specializes in diverting wood from landfills such as the Brady Road Landfill. Wood Anchor uses Elm trees cut down by the City due to Dutch Elm disease as well as other species of trees to create word flooring. Additional waste streams that could be targeted include shingles, drywall, scrap metal, and concrete etc. The "Green Park" could accept waste from the residential, IC&I, and construction and demolition sectors either independently and/or it could accept material that is deposited at the CRRC.

Table 2.27: Near Term Development of 'Green Park' at Brady Road

Recommendations:	▪ The City should endorse the concept of developing a 'Green Park' at Brady Road. ▪ The City should enter into dialogue with the private sector to determine the level of interest in pursuing this concept. ▪ Should there be interest; reasonable contractual and financing mechanisms would be required to support development of any supporting infrastructure (e.g. roads).
Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector ▪ Industrial and Commercial sectors
Staffing Implications	▪ Addressed within Disposal group.
Estimated Annual Operating Cost (2011$)	▪ Not applicable. The City would facilitate the private sector but would not incur any direct operating costs.

Table 2.27: Near Term Development of 'Green Park' at Brady Road	
Estimated Capital Cost (2011$)	▪ To be determined, based on level of interest.
Increase in Diversion	▪ Diversion rates would increase but difficult to quantify; depends on material type and sector served.
Environmental and Social Benefits	▪ Could provide a local market for specific materials, reducing hauling costs and potentially increasing revenues. ▪ Additional diversion will reduce consumption of landfill capacity, extending the operating life of the Brady Road landfill.
Overview of Implementation Plan and Timelines	▪ 2012: Dialogue with Private Sector ▪ 2013: Pending interest, proceed with design concept for Green Park and other supporting activities ▪ 2014: Bid Opportunity to develop Green Park ▪ Facilities potentially in place by 2016/2017

2.1.1.7 Summary: Near-Term Residential Waste Management System

The following table (Table 2.28) outlines the recommended near-term residential waste management system as discussed. Figure 2.1 provides an illustrative overview of the implementation of the proposed Near-Term Residential Waste Management System and the corresponding increase in the diversion rate as various initiatives are implemented

Table 2.28: Recommended Near-term Residential System (First Five Years)		
Conceptual Near-term System (First Five Years)		
Component	**Additional Cost (compared to 2011 Budget)**	**Additional Diversion (compared to 2009)**

Reduction & Reuse:
• Expanded Promotion and Education
  ○ Backyard and Community Composting
  ○ Re-use Initiatives
  ○ Establish per Capita Waste Reduction Target
  ○ Encourage Grasscycling
  ○ Implement Community Based Social Marketing approaches
  ○ Promote Waste Minimization
	Capital: included in CRRC costs
	Annual Operating: average of $700,000
		7,000 tpy
		
		2% Increase in Diversion

Resource Recovery: • Two New Community Resource Recovery Centre(s) • Encourage Private Sector Initiatives • Recycling in Public Spaces • Special Events Recycling Program	**Capital:** **$2.7 million Brady Road** **$3.4 million Northern Site** **Total $6.1 million** **Annual Operating:** Operating (including staff): $2.7 million Amortized Capital: $531,000 Revenue increase (materials):($256,000) Revenues increase (tip fees): ($1.3	**17,000 tpy** **Up to 6% Increase in Diversion.**

Table 2.28: Recommended Near-term Residential System (First Five Years)		
Conceptual Near-term System (First Five Years)		
Component	**Additional Cost (compared to 2011 Budget)**	**Additional Diversion (compared to 2009)**
	million) **Total: Up to $1.7 million Increase**	
Recycling: • Increase Recycling Container Capacity and implement new Cart based collection program • Increase Recycling Processing Capacity (for short-term and new permanent capacity)	**Capital:** Recycling Carts: $9.35 million Recycling Depots: $353,000 Processing: potentially $20.7 million for new MRF towards the end of the near term period. **Annual Operating (as of 2013):** Collection: $4.7 million Depot: $63,000 Annual Cost of Carts: $1.5 million Total Projected Collection Cost: $6.3 million Less 2011 Collection Cost: $5.5 million Change in Collection Costs from 2011: $800,000 Processing: $8 million Revenues: ($7.2 million) Total Projected Net Processing Cost: $750,000 Less 2011 Net Processing Cost: $390,000 Plus Est. Change in MMSM Funding: ($290,000) Change in Processing Costs from 2011: $70,000 **Total: approximately $870,000 increase**	**30,000 tpy** **Up to 8% Diversion**
Organics: • Expand leaf & yard waste collection City-wide, bi-weekly from April to November • Enhance Composting Area at Brady Road • Curbside Organics – Pilot Program	**Capital (LYW Composting):** $2.2 million **Annual Operating:** LYW Collection: $2.8 million LYW Composting: $1.1 million Amortized Capital: $0.2 million SSO Pilot: $0.4 million **Total: $4.5 million Increase**	**21,000 tpy** **Up to 6% Diversion**
Garbage Collection: • Consistent single family residential garbage collection through automated carts. • Consistent level of bulky collection, call in service with per item charge	**Capital (automated carts):** $7.2million **Annual Operating:** Collection: $6.5 million Annual Cost of Carts: $1.1 million Total Projected Cost: $7.6 million Less Collection cost (2011 Budget):	**Supports increased diversion for above programs.**

Table 2.28: Recommended Near-term Residential System (First Five Years)		
Conceptual Near-term System (First Five Years)		
Component	**Additional Cost (compared to 2011 Budget)**	**Additional Diversion (compared to 2009)**
	$7.5 million Net Change in Collection Costs: Increase of $100,000 Plus Increase in fees from Bulky Collection: ($700,000) **Total: ($600,000) decrease**	
Brady Road: • Design and operational improvements • New diversion infrastructure (New CRRC, enhanced LYW, new MRF by 2016/2017, "Green Park" for Private enterprise)	**Capital: noted above** **Annual Operating: noted above**	**Brady Road shifts from 'Disposal' to Resource Management Facility**
In Summary	**Total New Capital: up to $45.9 million** **Total Additional Annual Operating Cost (including amortised capital, net of known revenues and including additional staffing complement): up to $7.3 million** **Increase per single family dwelling: up to $37**	**75,000 tpy** **Increase residential diversion rate from 15 to 35%**

Figure 2.1: Proposed Implementation Schedule for the Near Term Residential System

2.1.2 Longer-Term Residential Waste Management Programs

The longer term residential system expands upon the near term system, taking it to a logical next level. The focus of the longer term system includes both incremental improvements and programs that target additional material streams for diversion (e.g. source separated organics).

2.1.2.1 Waste Reduction and Reuse

The Waste Reduction and Reuse Programs for the longer-term include the continuation of those approaches applied in the near term which are primarily implemented through expanded promotion and education. These initiatives include:

- Continued promotion of backyard and community composting,
- Re-use initiatives,
- Per capita waste reduction target,
- Encourage grasscycling, potential implementation of a grass ban,
- Implement community based social marketing approaches, and,
- Promote waste minimization.

In addition, there is some potential to apply an overall grass ban in the longer-term. A grass ban would further reinforce the benefits of allowing grass to remain on the lawn as well as avoiding the difficulties that can be associated with trying to compost grass. Although grass decomposes easily, it generates large amounts of methane which can lead to odour issues at a composting facility. A grass ban would reduce collection costs and would reduce the possibility of the City experiencing odour issues at the Brady Road Landfill outdoor windrow facility. In Ontario, several municipalities such as Toronto, the Region of the Waterloo, and the Region of Niagara have implemented grass bans.

2.1.2.2 Resource Recovery

2.1.2.2.1 Durable (Bulky) Goods Processing

Within the total bulky waste stream, some of which would be collected at the curb and others that would be managed at the CRRCs, are a stream of materials such as mattresses, furniture, carpet and other household goods that are a composite of a number of materials (textiles, wood, metal, plastics). In some jurisdictions these materials are physically processed to separate the materials into recoverable material streams.

An example is mattress recycling. Mattress recyclers rip apart the mattresses and separate the materials for re-use or recycling; mattresses are composed of foam, wood, metal, filler, matting and plastic and almost all of these materials can be re-purposed. The Capital Regional District (British Columbia) is currently operating a mattress and boxspring recycling project at their landfill. Mattresses are manually dismantled using hand tools and wood and steel are reclaimed

for recycling.[35] Winnipeg could consider implementing a similar pilot project at the Brady Road Landfill. The City of Toronto is currently establishing three durable goods processing facilities at selected locations across the City. These facilities will deconstruct and recover materials from mattresses, furniture and other bulky goods.

In regards to Winnipeg, there is a lack of current information regarding the proportion of the waste stream that could be targeted for recovery of materials. However, once the CRRC is developed at Brady Road, it should be more viable to monitor and collect data regarding the quantity and characteristics of these items in the waste stream.

Winnipeg could establish a processing facility at the Brady Road landfill or locate a private company interested in processing durable goods. Processing would likely be limited to products such as furniture, mattresses or wood products.

At this time, it is difficult to determine the total potential capital and operating cost of a processing facility, without better data on the total quantity of materials that could be managed and without understanding potential future local markets.

Should there be no viable market for materials recovered and/or no interest from private companies in undertaking such processing, an alternative that would reduce the consumption of airspace within the Brady Road landfill, would be to shred/grind bulky items, and to recover metals from the shredded materials. This would offer operational advantages at the Brady Road landfill.

Table 2.29: Longer Term Durable (Bulky) Goods Processing	
Recommendations:	▪ Complete audits of bulky items collected at the curb and managed at the CRRCs to assess potential range in material quantities and types. ▪ Determine potential local markets for materials recovered through durable goods processing. ▪ Determine potential for local partnerships for operations. ▪ Consider durable goods processing centre at Brady Road and possibly at other CRRCs (i.e. Northern CRRC). ▪ Alternatively, direct the bulky material stream for shredding/grinding and recovery of metals from the shredded materials.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector.
Staffing Implications	▪ Could increase staffing complement
Estimated Annual Operating Cost (2011$)	▪ Potential range in operating cost to be determined.
Estimated Capital Cost (2011$)	▪ To be determined.
Increase in Diversion	▪ Not likely to have a significant impact on diversion but more material would be

[35] http://www.crd.bc.ca/waste/hartland/mattressboxspring.htm

Table 2.29: Longer Term Durable (Bulky) Goods Processing	
	reclaimed from disposal.
Environmental and Social Benefits	▪ Reduced use of natural resources ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ 2014: Review of municipal best practices in material processing and possible end-markets for recovered material. ▪ 2015: Cost-benefit assessment for each material type to be processed. ▪ 2016: Decision on durable goods processing or materials grinding ▪ 2017: Development of durable goods processing facility and/or bulky materials grinding.

2.1.2.2.2 Two New Community Resource Recovery Centre(s)

Pending performance of first CRRCs and community demand, two additional CRRCs in the eastern and western portions of Winnipeg could be developed to improve the convenience for residents in these areas of Winnipeg to divert materials. Development, costs and operations of these two CRRCs would be very similar to those of the Northern CRRC described in Section 2.1.1.2.

The conceptual design of the eastern and western facilities is based on the management of most materials via 40-yard bins using a conventional saw-tooth design, given that it is uncertain if the City can find sites with sufficient space for larger 'piles' of materials like wood waste. The total capital cost per new CRRC would be approximately $3.4 million (excluding property purchase). The breakdown of costs would be as follows (Table 2.30).

Table 2.30: Capital Cost for Each Additional CRRC (+/- 30%)	
Design & engineering	$240,000
Scales	$180,000
Saw tooth & paved access roads	$2,220,000
Contingency	$264,000
Total	$2,904,000
Equipment (+/- 25%)	
40 yard bins (additional bins required)	$160,000
Roll-off Truck	$325,000
Total	$485,000
Total	$3.4 million

Table 2.31: Longer Term CRRC System	
Recommendations:	▪ The design of the CRRCs should emphasize diversion, and provide ease of access to diversion options for materials. ▪ The City should engage the local marketplace, which offers options for marketing of shingles, drywall, concrete and waste wood, to confirm markets for recovered material. ▪ The City should make provisions to keep certain material streams (such as

Table 2.31: Longer Term CRRC System	
	bulky materials) separate to facilitate processing of these materials should options become available. ▪ Management of HHW rests with stewards, under the provincial program. The City could provide space for an HHW depot at the CRRC, managed by the program stewards. ▪ Management of electronics rests with stewards, under the provincial program. The City could provide space for an electronics depot the CRRC, managed by the program stewards. ▪ The City would have no direct involvement with the management of the HHW and electronics depots.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector.
Staffing Implications	▪ Both new CRRCs: 11 Full Time Equivalents
Estimated Annual Operating Cost (2011$)	▪ Operating: $1.5 million per additional CRRC. ▪ Revenues of ($1.0 million) per additional CRRC.
Estimated Capital Cost (2011$)	▪ $3.4 million or more per additional CRRC. (+/- 30%)
Increase in Diversion	▪ Diverts up to 43,000 additional tonnes per year (10% increase in diversion)
Environmental and Social Benefits	▪ Significant reduction in landfill disposal, saving landfill capacity at Brady Road and reducing potential impacts of landfill disposal. ▪ Reduction in potential health and safety implications associated with public access to working face of Brady Road landfill. ▪ Provides more convenient access for management of bulky goods and construction and demolition material, providing an alternative to illegal dumping. ▪ Reduces risk associated with collecting HHW materials in the garbage. ▪ Reduces the amount of explosive, corrosive, poisonous, or reactive products being sent to landfill. These items can pose elevated risks to people who work with waste. ▪ Metals used in the circuitry of computers and in televisions – including lead, mercury, and cadmium – can be an environmental hazard in landfills. If decomposed over long periods of time and leaked into groundwater, these metals could contaminate water supplies. A CRRC system will reduce the quantity of these materials being sent to landfill.
Overview of Implementation Plan and Timelines	▪ 2016: Site process for one new CRRC. ▪ 2017: Engage services for design and engineering of new CRRC. ▪ 2017: New CRRC is operational. ▪ 2017: Site process for final CRRC. ▪ 2018: Engage services for design and engineering of final CRRC. ▪ 2018: Final CRRC is operational.

2.1.2.3 Recycling

2.1.2.3.1 Expand Range of Recyclable Materials Collected

The City currently accepts mixed paper fibre (old newsprint, old boxboard, magazines, phone books, flyers, cardboard egg cartons, paper tubes and residential mixed paper), old corrugated cardboard, aluminum and steel cans, all plastic containers with a recycling triangle on the bottom, milk and juice cartons, juice boxes, and clear and coloured glass in its recycling program.

There are numerous other products that can potentially be recycled, including:

- Empty steel paint cans;
- Empty aerosol cans;
- Aluminum pie plates and foil;
- Books;
- Frozen food cartons;
- Wax and plastic coated paper cups;
- Greeting cards; and,
- Gift wrap.

Markets for most of these items are not stable at this time and these materials would be difficult to process at the MRF currently used by the City. Therefore, there is some risk that if these materials are collected they may not be able to be processed properly or marketed or could be marketed at a loss.

It is recommended that over the near term that the City continues to assess the markets for a potential expanded stream of materials. Within the design of the new MRF recommended for the near term, it is critical that additional space be provided in the storage areas and on the sorting lines, to accommodate additional material sorts. This would facilitate the separation of additional materials at the MRF as markets become available. Should the City continue to contract out a portion of their recycling processing capacity to Emterra or another processor, the capability of these facilities to process an expanded stream of materials would need to be assessed.

Table 2.32: Longer Term Expand Range of Recyclable Materials Collected

Recommendations:	▪ Continue to assess potential markets for expanded material streams ▪ Include capacity to manage additional materials in new MRF design ▪ Expand range of materials collected and processed, should markets become available.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector.

Table 2.32: Longer Term Expand Range of Recyclable Materials Collected	
Staffing Implications	▪ Staff time from Recycling Group
Estimated Annual Operating Cost (2011$)	▪ To be determined, potential increased processing fees with increased recyclable tonnage. ▪ Potential increased P&E costs.
Estimated Capital Cost (2011$)	▪ No additional capital costs to the City, if capacity to sort and manage additional materials is included in new MRF design
Increase in Diversion	▪ No specific data available but diversion increases with increased recycling material types.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Minor increase in recycling tonnage to MRF. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ Ongoing: assess changes in potential materials markets and dialogue with MMSM. ▪ 2016/2017: sufficient processing capacity available.

2.1.2.4 Organics

2.1.2.4.1 Source Separated Organic (SSO) Program

Diversion of source-separated organics is the most significant recommended component of the long-term system. Implementation of a City-wide source separated organics collection and processing program in Winnipeg would result in the most significant change to the City's waste management system. A City-wide SSO program would:

- Shift a significant quantity of waste from the curbside waste stream to a Green Bin. In the order of 75,000 tonnes of organic material could be diverted;
- Decrease the consumption of disposal capacity at the Brady Road Landfill;
- Reduce the potential environmental effects of the landfill by reducing odour, leachate generation and methane generation.

It is recommended that the City undertake a SSO pilot study to determine how to best implement the program on a City-wide basis. Based on the pilot, the appropriate type and size of container, collection scheduling, residential interest and anticipated participation in the program, successes and challenges associated with a full-scale SSO program would be assessed.

The study area selected for the pilot study should be reflective of a broad cross-section of demographics and should include multi-family dwellings. The duration of the pilot program should be approximately six months which is an adequate amount to time to gauge the effectiveness of P&E materials, willingness of residents to participate; logistical issues will collection, etc. The City should undertake pre- and post-pilot survey to examine successes and failures of the pilot so issues can be identified and resolved before a City-wide program is

implemented. A waste audit should also be undertaken to assess participation, capture rates and contamination levels and general understanding of the program by those participating in the pilot study.

During the pilot study, it should be possible to process the SSO at the proposed LYW composting facility at the Brady Road landfill, as many jurisdictions have processed small quantities of SSO as a comingled stream with LYW.

In regards to organics collection, on a preliminary basis it is recommended that:

- Collection of organics should be on a weekly basis. This encourages the highest participation rates and reduces issues related to odours in the household;
- Green bins should be sized to allow for ease of use and to accommodate household organic (food waste, compostable fibres), generally through the use of smaller sized carts (e.g. 80 litre carts).
- There are operational efficiencies associated with keeping SSO separate from LYW. SSO processing is more complex and has higher potential for odours, and thus is more expensive on a per tonne basis than LYW processing. By keeping the bulk of the LYW separate, the City would incur lower overall processing costs for organic materials.
- The program design should allow for the use of biodegradable liners (biodegradable film or paper) as this has been shown to increase householder participation. Current program experience indicates that a broad range of composting technologies can handle these materials.
- The City determines the feasibility of providing the program to multi-family dwellings, based on the outcome of studies currently being undertaken in other jurisdictions.

In order to support full program implementation, the City needs to secure long-term SSO processing capacity. The potential approaches that the City could use to secure capacity include:

- Fully contract out processing capacity, such that the private sector would finance, design, build, own and operate any new processing facility; or
- Establish a City-owned facility, where the City would own and finance the plant, which would be designed, built and operated by the private sector; or,
- A combination of the above, should the City desire a system that includes more than one processing facility, similar to the proposed approach for recycling.

Details regarding the approaches that could be used to secure processing capacity are provided in **Appendix C**.

In order to secure composting capacity it is recommended that the City:

- Issue a Request for Qualifications to identify the range of technology vendors that would be interested in developing composting capacity for the City. The RFQ should request information that would allow the City to determine the viability of the vendor, and also information regarding their interest in a DBOOF or DBO approach as discussed above.
- Based on the outcome of the RFQ process, the City should issue an RFP for processing capacity. At this time, it is recommended that the RFP allow for proposals for:
    - a range of potential facility types;
    - both DBOOF and DBO approaches; and,
    - A range of sizes, including at minimum 40,000 tpy and 80,000 tpy options.

This would allow the City to choose the type of facility, implementation approach and processing system that best suits its needs, based on actual proposed capital and operating costs.

In selecting an organics processor, the City should consider the following elements:

- Form of processing (outdoor windrow, aerated static pile, enclosed agitated bed, in-vessel, anaerobic digestion);
- Designated organics processed and other requirements (e.g., bags, loose);
- Average residue percentage;
- Available processing capacity for organics (tonnes/yr);
- Restrictions of material delivery (hours, vehicle type);
- Earliest contract start date;
- Length of contract term;
- Range of processing costs;
- Finished compost markets/end users;
- Finished product sharing potential; and,
- Other conditions (residue disposal costs, contamination audit requirements, etc).

In determining the facility sizing, consideration should be given to managing both residential material and also providing capacity to process Industrial, Commercial & Institutional (IC&I) and/or other municipal tonnage to determine the benefit, in any, of that to the City. Capacity requirements should also be estimated for the neighbouring municipalities who may contribute SSO to the facility.

Representative capital and operating costs would be determined as would new facility design parameters (appropriate technology, short-term and long-term design capacity requirements[36], site location etc.) approvals requirements, timelines for design, construction and approvals.

Table 2.33: Develop Organic Waste Processing Capacity in the City of Winnipeg	
Recommendations:	▪ That the City undertake an Organics Pilot program to determine the most appropriate model for program design and implementation in the City. ▪ That at minimum, the City should consider weekly organics collection, using a 'Green Bin' for single family residential households. Collection approaches for multi-family household are to be determined. The single family collection system would be automated. ▪ The City should use a two-step bid opportunity process (RFQ, RFP) to determine the most appropriate processing system for the City. ▪ Once the processing model has been determined, and the schedule for facility development is set, then develop and issue RFP for organics collection reflecting outcome of pilot study and preferred approach for collection.
Residential Sector Served	▪ Single-family residential sector ▪ Multi-family residential sector, pending determination of implementation model
Staffing Implications	▪ To be determined
Estimated Annual Operating Cost (2011$)	▪ Processing cost: in range of $130 per tonne for SSO (contract cost including capital). $10 million annually ▪ Potential increased P&E costs. ▪ Collection cost: in the order of $4.2 million annually for single family households. $1.7 million annually for organic carts.
Estimated Capital Cost (2011$)	▪ Ranges from $45 million to $65 million depending on technology. ▪ $10.9 million for SSO carts.
Increase in Diversion	▪ Could divert up to 97,000 tonnes or more from disposal each year, adding around 22% to the current residential diversion rate.
Environmental and Social Benefits	▪ Reduced use of natural resources ▪ Reduced waste volumes will extend the operating life of Brady Road. ▪ Reduces the potential for effects at Brady road as less organic waste will be deposited at the site (e.g., less vermin, birds, less leachate, less odour etc.).
Overview of Implementation Plan and Timelines	▪ 2013/2014: Organics pilot. ▪ 2013: Issue RFQ for processing capacity, determine qualified vendors. ▪ 2014: Issue and award RFP for processing capacity. ▪ 2015/2016: Processing facility development. ▪ 2015/2016: Issue and award RFP for organics collection. ▪ 2016: Issue and award bid opportunity for green cart provision and roll-out. ▪ 2017: Earliest date for organics program implementation. Implement simultaneously with new garbage collection contract.

[36] Note that most composting technologies can accommodate construction in a modular fashion, that is, they add channels, tunnels, to meet capacity needs as required.

2.1.2.5 Garbage Collection

2.1.2.5.1 Collection System Efficiencies

Over the mid to long-term, the City should consider methods to optimize the collection system. With the implementation of the proposed source separated organics program, there will be opportunities to increase collection efficiencies through options such as material co-collection of waste and SSO. An alternative co-collection scenario is the co-collection of recyclables and SSO. This system would facilitate the separate bi-weekly collection of garbage which would act to increase diversion of recyclables and organics. This option is only reasonable to consider if recyclables and SSO can be dropped off at the same site for processing (i.e., Brady Road Landfill).

The City could also consider moving to an entirely automated collection system. This would include a black cart automated garbage collection system; a blue cart automated single stream recycling collection system; and a green bin/cart automated organics collection system. There are several jurisdictions that operate completely automated waste collection systems including the City of Toronto. In Toronto, weekly collection is provided for organics and recycling, while bi-weekly collection is provided for garbage.

Table 2.34: Longer Term Collection System Efficiencies

Recommendations:	▪ With the implementation of new programs and expansion of collection service to the IC&I sector, there will be opportunities to increase collection efficiencies through options such as material co-collection and automated collection.
Residential Sector Served	▪ Single-family residential sector.
Staffing Implications	▪ None
Estimated Annual Operating Cost (2011$)	▪ Potential savings in collection costs: e.g. savings of $1.7 million (compared to 2011 collection) for the transition to bi-weekly garbage collection.
Estimated Capital Cost (2011$)	▪ None
Increase in Diversion	▪ Would support other programs which could increase diversion.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ Collection of various streams would have to be coordinated. ▪ Collection scenarios would have to be assessed in light of collection contracts and location of processing facilities. ▪ Research best practices in collection system methodologies. ▪ 2017: earliest possible date for implementing change within next collection contract(s).

2.1.2.5.2 Garbage Restrictions (Disincentives)

Municipalities have different reasons for implementing programs which restrict or control the amount of garbage allowed in curbside collection programs. The majority of municipalities have

implemented garbage restrictions to encourage increased diversion, particularly to drive materials into new programs such as enhanced recycling or new organics collection services. A variety of options exist for restricting waste quantities including bag limits, partial and full user pay programs, bi-weekly garbage collection and clear bags. However, as it is recommended that the City move towards a cart based system for garbage collection, bag limits/partial user pay and clear bags will no longer be options. Full user-pay could take the form of a transition from the recommended flat-rate charge approach identified and discussed in Section 4.4 (combined with the proposed change to bulky collection where overflow waste would be subject to a $5 fee per item) to an approach where residents could choose between various sizes or number of automated carts. The City could still implement bi-weekly garbage collection while using a cart based system.

Bi-weekly Garbage Collection

Residents are more likely to properly sort organics and recycling for collection if they have the most frequent and convenient collection cycle available (particularly effective with organics). Reducing the frequency of garbage collection and/or increasing the frequency of blue box collection have been demonstrated to have a positive effect on recovery rates for recyclable material.

The most effective program in Ontario with respect to tonnage diversion provides weekly collection of recyclables and household organics, with bi-weekly collection of garbage (and an effective refuse bag limit) KPMG Report, 2007.

Table 2.35: Longer Term Bi-Weekly Garbage Collection	
Recommendations:	▪ After the City moves forward with an organics collection program then bi-weekly collection of garbage is viable.
Residential Sector Served	▪ Single-family residential sector
Staffing Implications	▪ Supported by updated Collections Group
Estimated Annual Operating Cost (2011$)	▪ Associated P&E campaign. ▪ Could save in the order of $1.7 million in collection costs compared to 2011
Estimated Capital Cost (2011$)	▪ NA
Increase in Diversion	▪ 3 to 4% based on other municipal experience. ▪ Potential impact to MRF with increased blue box materials. ▪ Potential impact to organic waste processing with increased organic materials (if implemented).
Environmental and Social Benefits	▪ Reduced use of natural resources ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ P&E material development and distribution/notification. ▪ By-law amendment to support the program. ▪ Adequate notification of program change to residents/calendar development and distribution.

Table 2.35: Longer Term Bi-Weekly Garbage Collection	
	▪ 2017: earliest possible date for implementing change within next collection contract(s).

2.1.2.6 Disposal (Brady Road Landfill)

Over the mid to long-term, further changes at Brady Road are recommended including:

- Developing a processing facility for SSO at the Brady Road Landfill site. This option is discussed further in section 2.1.2.4.1 of this report.
- Establishing 'bans' on disposal for certain materials hauled to the landfill by residents and the IC&I sector, assuming that options are in place to divert drywall, shingles, organics, wood, cardboard and other materials, coupled with incentives (e.g. reduced tipping fees) for segregated loads. This option is discussed further below in section 2.1.2.6.1.
- Using Brady Road Landfill as a Regional Disposal Facility; accepting additional materials from surrounding rural municipalities for diversion and/or disposal. This option is discussed further below.

2.1.2.6.1 Disposal 'Bans'

A disposal 'ban' consists of prohibiting the disposal of designated materials at the point of disposal (i.e., at Brady Road Landfill) by the residential and IC&I sectors that haul materials directly to the landfill. Loads of material would be inspected before being dropped off at the landfill and loads exceeding permitted levels of banned material would be rejected or subject to a surcharge. The surcharge should be a prohibitive fee (e.g., 10 times the normal cost for disposal) for loads with greater than 5% of a banned material. Potential mandatory materials for recycling applicable in Winnipeg could include concrete, drywall, shingles, organics, wood, cardboard, and other materials. Disposal bans would be put in effect for materials for which mature diversion options are in place.

As described above, to implement a 'ban' the City would simply place a higher tipping fee on any incoming loads in which designated materials are mixed with other wastes for disposal. The City would gain revenue from these fees. This is a practical means of applying a ban, where the City would accept the waste (mitigating the potential for illegal dumping) but would apply a prohibitive tipping fee to haulers trying to exit from the landfill.

There are a number of advantages associated with establishing a 'ban', including:

- Many waste materials have a good potential to be diverted from landfill disposal and the ban would help promote diversion.
- The operating life for existing landfill capacity would be extended.
- Natural resource consumption would be reduced through the reuse and recycling of a greater portion of the waste stream.

That being said, there are also several disadvantages which must also be taken into account:

- A ban would require the development of programs for diverting waste materials, amendments to the City's Waste Management by-law, and policies for non-compliance.
- The effectiveness of the program will depend on defining a use or market for the waste materials that are diverted from the landfill. Some options for use exist at the landfill itself; others may require identification of markets within the municipality.
- Enforcing a mandatory ban could be somewhat controversial. Less overall flexibility is provided in such a system for waste generators. However, exemptions for small loads, a grace period and other options such as staging from a differential tipping fee approach to a full ban, could be considered to ease the transition to the new policy.

The City would incur some capital cost to set up designated diversion areas at the landfill, and operating costs for staffing and grinding material. Some of these costs would be offset by tipping fee revenues.

Table 2.36: Longer Term Disposal Bans	
Recommendations:	▪ Implement disposal bans for materials for which 'mature' diversion programs exist (e.g. could ban LYW and recyclables from disposal by 2014) concurrently with an incentive (e.g. lower tipping fee) for source separated materials.
Residential Sector Served	▪ Single-family residential sector. ▪ Multi-family residential sector. ▪ IC&I Sector
Staffing Implications	▪ Landfill attendant/By-law enforcement.
Estimated Annual Operating Cost (2011$)	▪ Potential to increase revenues from tipping fees of loads of waste are not source separated. ▪ Operating costs associated with new inspection staff.
Estimated Capital Cost (2011$)	▪ Capital costs associated with establishing designated diversion areas, developing inspection stations. Approximately $300,000
Increase in Diversion	▪ Supports diversion through other programs.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ Establish inspection protocol. ▪ Establish designated diversion areas at landfill. ▪ 2016: Bans in place for materials targeted by short-term diversion ▪ 2017/2018: Could have full ban in place for majority of divertible streams

2.1.2.6.2 Brady Road as a Regional Waste Management Facility

Considering the estimated remaining capacity of the Brady Road Landfill and role of the City as an urban hub, the City could offer neighbouring municipalities the option of using facilities at the Brady Road landfill for diversion and disposal.

Regional service sharing is supported by OurWinnipeg (01-1c – Key Directions for City Specific Areas, Capital Region):

Acknowledging that mutual success will come from thinking and acting as a region, the City of Winnipeg will collaborate with the municipalities comprising the Capital Region to plan for a sustainable, vibrant and growing region.

The most likely candidate municipalities would be those within the Winnipeg census metropolitan area (or Capital Region), including: West St. Paul, East St. Paul, Headingley, MacDonald, Ritchot, Taché, Springfield, Rosser, St. François Xavier, St. Clements, and Brokenhead First Nation. A preliminary investigation of these municipalities showed that West St. Paul, East St. Paul, Headingley, and Springfield do not have their own landfills.

The City may consider initiating discussions with these municipalities to see if any show an interest in using services at the Brady Road Landfill, when their current waste disposal contracts expire. Headingly may be particularly interested in this concept as they passed a by-law (By-Law 12-2006)[37] with a policy (12.3.3) stating:

"Headingley will work in cooperation with the surrounding municipalities to develop a regional landfill site to handle solid waste disposal".

In order to continue to promote diversion not only within Winnipeg, but to surrounding municipalities as well, the City could allow other municipalities to dispose of waste at Brady Road Landfill provided they have similar diversion programs to the City's in place. Ensuring the other municipalities have similar diversion programs would continue to prolong the capacity of Brady Road Landfill and would further promote the importance of diversion to City residents; residents may be offended that outside municipalities are allowed to dispose of divertible materials in the landfill, while they are pursuing greater diversion rates. By establishing Brady Road as a regional disposal facility, the City could increase revenues from tipping fees and use these funds to help offset the costs of implementing new diversion initiatives in the City. In addition, other municipalities may be interested in using City-owned diversion infrastructure (e.g., MRF, Central Composting Facility). Based on economies of scale, having larger quantities of divertible materials may increase marketability and profitability.

Table 2.37: Longer Term Brady Road as a Regional Disposal Facility	
Recommendations:	▪ The City will collaborate with the Province, Capital Region Rural Municipalities, Towns and Cities interested in service sharing.
Residential Sector Served	▪ Residential sector in other communities. ▪ Select commercial sector from within the Capital Region, for various target material streams (e.g. organics).

[37] http://www.rmofheadingley.ca/govt/by_laws/Headingley%20Plan%20Amendment%20Bylaw%2012-%202006-3rd%20Reading-December%2007.pdf

Table 2.37: Longer Term Brady Road as a Regional Disposal Facility	
Staffing Implications	▪ To be determined.
Estimated Annual Operating Cost (2011$)	▪ Capital and operating costs for additional waste at landfill to be determined based on volume of materials managed. ▪ Tipping fees for use of disposal capacity could be set higher than current fees/costs incurred by the City. ▪ Costs should be offset by tipping fee revenues. ▪ Potential economies of scale for some facilities may off-set/reduce costs incurred by the City.
Estimated Capital Cost (2011$)	▪ To be determined
Increase in Diversion	▪ Supports diversion in other communities.
Environmental and Social Benefits	▪ Reduced use of natural resources. ▪ Reduced waste volumes will extend the operating life of Brady Road.
Overview of Implementation Plan and Timelines	▪ Negotiate a contract for waste disposal capacity user(s). ▪ 2017: Potential date where could have regional use of Brady Road as an integrated waste management centre.

2.1.2.7 Alternative Disposal Technologies

Alternative technologies such as conventional and emerging waste to energy approaches were not carried into the near or longer term residential system. The Brady Road landfill has significant remaining capacity, and the life of the landfill would be extended through implementation of the recommended diversion programs. There is also a significant difference in waste disposal costs between continued operation of Brady Road and the reported costs for alternative technologies.

The reported capital costs for alternative technologies that are used to recover energy and materials from the solid waste stream that remains after diversion range from between $775 to $1,300 per annual design tonne. Reported operating costs for such technologies range from $75 to well over $100 per annual design tonne. Additional details regarding these technologies are provided in **Appendix C.**

The potential role of alternative technologies can be reassessed over the longer term through the CIWMP review process, which would allow for new developments or concepts to be reviewed.

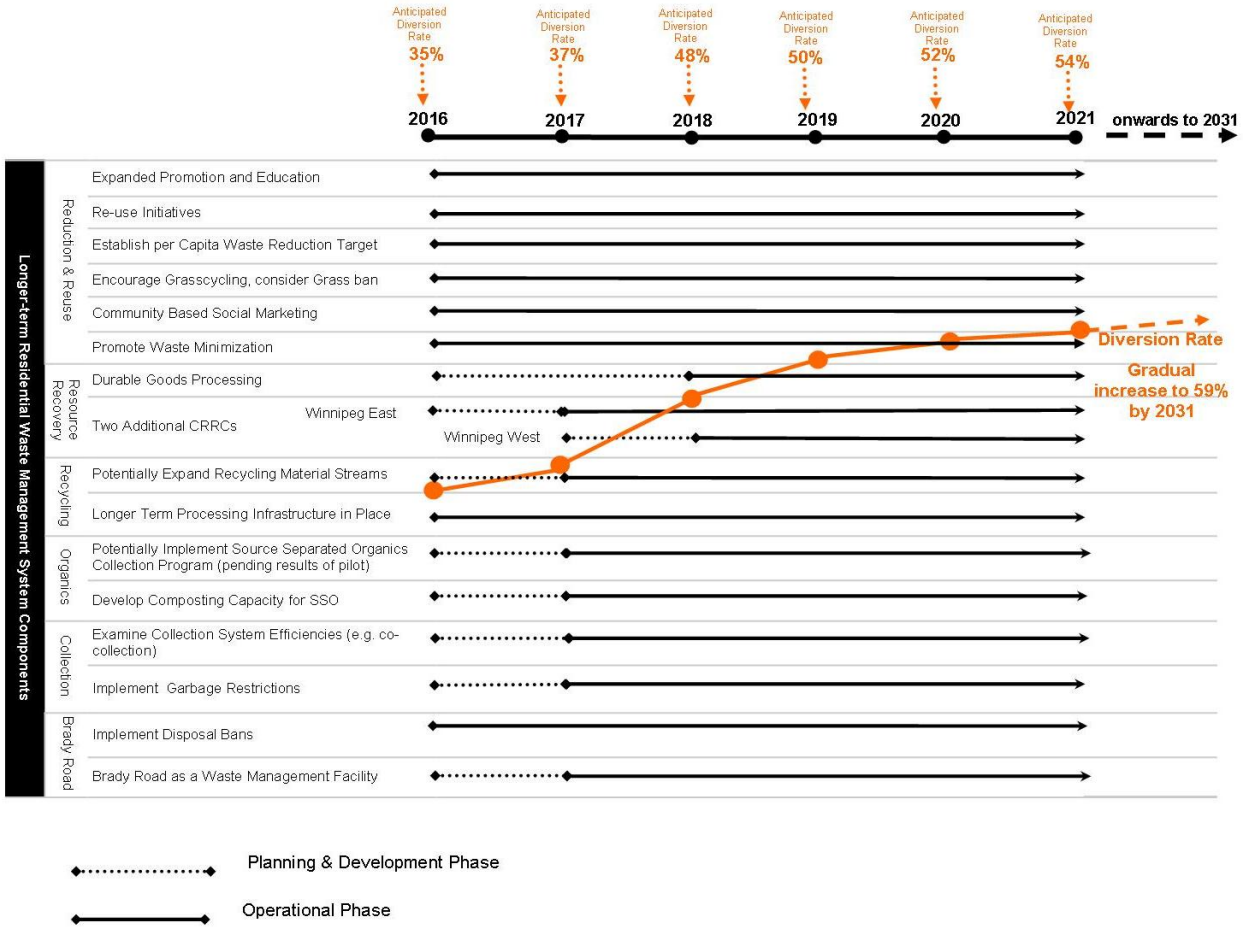
2.1.3 Summary of Longer-Term Residential Waste Management System

The following table (Table 2.38) outlines the recommended longer-term residential waste management system as discussed. Figure 2.2 provides an illustrative overview of the implementation of the proposed Longer-Term Residential Waste Management System and the corresponding increase in the diversion rate as various initiatives are implemented.

Table 2.38: Recommended Longer-Term Residential System (in place within 10 years)		
Conceptual Near-term System (First Five Years)		
Component	**Additional Cost (compared to 2011 Budget)**	**Additional Diversion (compared to 2009)**
Reduction & Reuse: Continue • Expanded Promotion and Education • Re-use Initiatives • Establish per Capita Waste Reduction Target • Encourage Grasscycling, potential implementation of a Grass Ban • Implement Community Based Social Marketing approaches • Promote Waste Minimization	**Annual Operating: $700,000 continues**	**12,000 tpy** **3% Increase in Diversion**
Resource Recovery: • Durable (Bulky) Goods Processing • Two New Community Resource Recovery Centre(s)	**Capital:** $3.4 million per additional CRRC. **Net Annual Operating Costs (incl. revenues and amortized capital) per CRRC:** $750,000 per additional CRRC Costs for Durable (bulky goods) processing to be determined.	**43,000 tpy** **Up to 10% Increase in Diversion.**
Recycling: • Expand Range of Recyclable Materials Collected	Cost to collection and process an expanded range of recyclable materials is to be determined.	**40,000 tpy** **Up to 9% Diversion**
Organics: • Develop organic waste processing capacity	**Capital:** • Organics Processing: Ranges from $45 million to $65 million depending on technology. Could be included in per tonne operating contract cost. • Organics Carts: in the order of $11 million based on current pricing. **Annual Operating:** • Collection cost: in the order of $4.2 million annually for single family households. $1.7 million annually for organic carts. • Processing cost: in range of $130 per tonne for SSO (contract cost including capital). $10 million annually	**97,000 tpy** **Up to 22% Diversion**
Collection: • Collection system efficiencies • Garbage restrictions like bi-weekly collection	Potential to decrease single family garbage collection costs by $1.7 million per year through bi-weekly garbage collection.	**Supports increased diversion for above programs.**
Brady Road: • Disposal Bans	**Capital:** noted above Annual Operating: noted above	**Brady Road shifts from 'Disposal' to Resource**

Table 2.38: Recommended Longer-Term Residential System (in place within 10 years)		
Conceptual Near-term System (First Five Years)		
Component	**Additional Cost (compared to 2011 Budget)**	**Additional Diversion (compared to 2009)**
• Brady Road as Regional Waste Management Facility		**Management Facility**
In Summary	**Total New Capital: full range to be determined** **Total Additional Annual Operating Cost (including amortised capital, net of known revenues and compared to 2011 budget): up to $23 million** **Increase (from near to longer term) per single family dwelling: of up to $113**	**Increase residential diversion rate from 15 (2009) to 59%**

Figure 2.2 : Proposed Implementation of the Longer Term Residential System



2.2 THE CONCEPTUAL IC&I AND C&D WASTE MANAGEMENT SYSTEM

Although the primary focus of the CIWMP is the residential waste management system, City programs and facilities also manage waste generated by other sectors. This includes waste generated by the Industrial, Commercial, & Institutional (IC&I) sector, Construction & Demolition (C&D) sector, and waste generated by City Operations.

The following table lists the total tonnes of waste managed by the City in 2009 by sector. The IC&I, C&D, and City Operations waste make up 26% of the total waste managed by the City.

Table 2.39: Total Tonnes of Waste Managed in 2009

Sector	Tonnes of Waste
Residential	341,542
IC&I	83,099
C&D	5,310
City Operations	34,369
Total	**464,320**

While the City manages a portion of the waste generated by the IC&I and C&D sectors, it is estimated that these sectors produce significantly more waste, the balance of which is managed at private sector facilities. It is estimated that in total, 350,000 tonnes of IC&I waste and 125,000 tonnes of C&D waste is generated each year within Winnipeg.[38] It is estimated that 20% of the waste generated by IC&I and C&D entities is actually managed by the City.

The options for diversion of IC&I and C&D materials considered for the CIWMP acknowledge that the majority of these materials are managed outside the City's system. The City can encourage and support diversion but is not in the position to control the level of diversion by these sectors.

In circumstances where there are few options for IC&I and C&D disposal other than municipal facilities (e.g. the City of Owen Sound in Ontario), the municipality has taken the lead on developing and promoting IC&I and C&D diversion activities which include a mandatory diversion by-law and regulations on the amount of divertible materials that are permitted in the waste stream sent for disposal. In other jurisdictions where most of the IC&I and C&D waste is managed by the private sector (e.g. City of Ottawa), the municipalities have developed a strategy to encourage diversion in general. Winnipeg is similar to the City of Ottawa, in that there are private sector facilities sufficient to manage the majority of the non-residential waste stream.

[38] It should be noted that C&D waste generated within the City is difficult to estimate as it varies year to year (depending on the number of construction starts etc.) and as much of the material is not tracked.

Overall given how this waste is managed, in order to maximize IC&I and C&D diversion, the Province should regulate this activity. Regulations could include requirements for generators to develop and implement diversion plans (e.g. similar to Ontario Regulation 102 and 103/94) and/or to ban materials from landfill disposal (e.g. Nova Scotia bans organics disposal in landfill). It would be reasonable for Winnipeg to encourage and support the Province in developing initiatives that support IC&I and C&D diversion.

The potential near and longer term IC&I and C&D system components that have been identified below form the basis of a diversion concept that would be complementary to the residential system, and would support the transition of Brady Road from a disposal to a resource management facility. As the City has yet to enter into dialogue with the generating sectors, the plan is a concept only.

The program components would not compete with the private sector system that manages the majority of IC&I and C&D materials, rather they would serve to complete the IC&I and C&D system by providing equivalent support for waste avoidance and resource recovery as is planned for the residential sector. The potential near and longer term IC&I and C&D waste management programs, discussed in the following sections, provide an overall concept regarding the types of programs that the City could encourage and support through dialogue with the Province and the generating sectors and perhaps through accommodation of programs at the City's facilities.

2.2.1 Potential Near-Term IC&I and C&D Waste Management Programs

2.2.1.1 Waste Reduction and Reuse

2.2.1.1.1 Development of Green Procurement Guide

This option would have the City develop a Green Procurement Guide specific to the IC&I and C&D sectors operating in Winnipeg. The guide would educate IC&I and C&D generators about Green Procurement and would provide resources to these sectors on selecting products that are environmentally preferable. Although this initiative would not contribute significantly to increasing the City's waste diversion rate, it would show that the City is willing to take on a leadership role in environmental stewardship.

For the IC&I sector, green procurement options could include encouraging the purchase of paper products that are made of post-consumer recycled fibres and using cleaning products that contain less hazardous ingredients. For the C&D sector, options could include encouraging the purchase of building materials made of recyclables material or materials that are less hazardous in nature (e.g., low VOC paint).

The City could also provide technical assistance services to companies that implement waste reduction programs; for example, the City could train companies in how to properly complete waste audits and develop waste reduction work plans. This type of program would not be

mandatory; it would be a voluntary initiative that IC&I or C&D entities could participate in if interested.

Table 2.40: Near Term IC&I Green Procurement	
Recommendations:	▪ The development of a green procurement guide for the IC&I and C&D sectors should be integrated into the implementation plan for the near term CIWMP. ▪ Could be developed together with the Green Procurement Guide for City Operations waste.
Sector(s) Served	▪ IC&I ▪ C&D ▪ Potentially City Operations
Staffing Implications	▪ Staff time to research, develop procurement guide, and design P&E dependent on methods of promotion.
Estimated Annual Operating Cost (2011$)	▪ For IC&I and C&D entities, it would be likely that a 5% to 15% premium would be paid for environmentally preferable products.
Increase in Diversion	▪ Could divert an additional 1% to 3% of the IC&I and C&D waste streams.
Environmental and Social Benefits	▪ Consistent with zero waste principles.
Overview of Implementation Plan and Timelines	▪ Research options for IC&I and C&D sectors and develop policy and promote the program on a long-term basis. ▪ Release Guidebook.

2.2.1.1.2 Support for Commercial Re-use Programs

This option would see the City support re-use by the commercial sector. One way that the City could encourage commercial re-use is through the development of a waste exchange website. The website would link businesses and allow them to “trade”, “buy” or “sell” waste materials to one another. Such a program would:

- Promote re-use which is higher on the waste hierarchy than recycling.
- Be useful especially for smaller institutions and businesses that operate on limited budgets.
- Lower disposal costs for businesses.
- Provide an opportunity for businesses to improve their environmental image.

There would be some difficulties with this option as not all businesses could be targeted; a lot of effort would be required to maintain the website to ensure it stays up-to-date, and depending on the materials being exchanged, special transportation permits may be required which could act as a disincentive to participate in the program. Alternatively, the City could partner with an existing web-based “buy” and “sell” site so that they would not be directly responsible for managing its content.

Table 2.41: Near Term Commercial Re-Use Programs	
Recommendations:	▪ The development of a waste exchange website in the near-term will support re-use in the commercial sector. ▪ The City could design and maintain the website, or could alternatively partner with an existing web-based "buy" and "sell" site.
Sector(s) Served	▪ IC&I. ▪ C&D.
Staffing Implications	▪ If the City does not maintain the website, staffing requirements would be minimal.
Estimated Annual Operating Cost (2011$)	▪ Costs would be associated with developing and maintaining the website or paying a partner to develop the website on the City's behalf. ▪ P&E costs.
Increase in Diversion	▪ Minimal in terms of overall contribution to diversion (<1%).
Environmental and Social Benefits	▪ Would promote waste re-use across all sectors in the City.
Overview of Implementation Plan and Timelines	▪ Research best practices in website design. ▪ Construct website and maintain.

2.2.1.1.3 On-going Diversion Dialogue with IC&I Sector

The City should encourage the IC&I sector to increase waste diversion through regular communication with key stakeholders from the sector. For example, the City could facilitate regular round-table discussions amongst specific sector representatives to discuss/resolve common waste reduction challenges (e.g. school boards, government, retailers, hospitals, waste haulers, and recyclers). Such discussions would promote the exchange of successful waste diversion ideas, processing options, and lessons learned.

Such discussions could lead to the identification of new diversion and market development opportunities and best practices which would further encourage waste reduction and diversion within the IC&I sector. The main issue with this type of program would be that only a limited number of businesses could participate in discussions at any one time.

As part of this option, a voluntary certification program could be established for businesses that meet specific waste reduction and diversion standards set by the City. For example businesses that are able to meet a certain level of diversion (say 70%) could be allowed to use recognizable logos and signs to recognize their achievement. The certification would act as a positive public relations tool for businesses and would act as an incentive for businesses to participate in waste reduction/diversion initiatives.

Table 2.42: Near Term On-Going Diversion Dialogue with IC&I Sector	
Recommendations:	▪ On-going dialogue with the IC&I sector concerning waste diversion should be implemented in the near term. ▪ The City could consider implementing a voluntary certification program for businesses that meet specific waste reduction and diversion standards set by the City.

Table 2.42: Near Term On-Going Diversion Dialogue with IC&I Sector	
Sector(s) Served	▪ IC&I
Staffing Implications	▪ Would likely require staff resources to sustain and facilitate discussion.
Estimated Annual Operating Cost (2011$)	▪ Staffing costs ▪ Awards, profiling, communications, media relations costs.
Increase in Diversion	▪ Minimal in terms of overall contribution to diversion.
Environmental and Social Benefits	▪ Would support waste diversion initiatives in the IC&I sector.
Overview of Implementation Plan and Timelines	▪ Research businesses on which to focus dialogue. ▪ Develop communications material and awards program.

2.2.1.1.4 Encourage Green Building Standards (e.g. LEED®)

Leadership in Energy & Environmental Design (LEED®) is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies intended to improve performance in metrics such as energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

LEED® certification has several waste diversion benefits as it encourages the development of waste recycling programs for tenants of buildings. LEED® certification extends best building practices which will help reduce waste as points are received for implementing diversion programs. The City could require new facilities built within its boundaries over a certain size (say over 500 m^2) to achieve LEED® certification. Within this program they could include specific targets for waste minimization and diversion.

The City could provide incentives such as free consultations and fee discounts and grants for builders and developers to build “green” buildings.

Table 2.43: Near Term Encourage LEED® Standards	
Recommendations:	▪ In the near term, the City should consider requiring new facility built within its boundaries over a certain size achieve LEED® certification. ▪ Could require the City and/or the private sector to invest in additional processing infrastructure for divertible materials.
Sector(s) Served	▪ C&D
Staffing Implications	▪ At lead one full-time education/program officer.
Estimated Annual Operating Cost (2011$)	▪ $100,000 per year. ▪ Extensive P&E campaign through media, website, presentations etc.
Increase in Diversion	▪ Could increase diversion of C&D materials by 1% to 5%. Would likely target C&D materials not currently being managed by the City.
Environmental and Social Benefits	▪ Would reduce landfill consumption by increasing waste diversion rates for the City.
Overview of Implementation Plan and Timelines	▪ Research and develop appropriate policy. ▪ Develop P&E material.

2.2.1.2 Resource Recovery Options

2.2.1.2.1 Strategic Partnerships

This option would see the City providing assistance to and support for entrepreneurs by providing a location for developing new diversion facilities (e.g. “Green Park” at Brady Road Landfill) and promoting the use of existing and new facilities to divert IC&I and C&D materials. A description of the “Green Park” option is provided in 2.1.1.6.2 of this report.

This option would include promotion of existing diversion opportunities for concrete, shingles, drywall, and wood, as well as blue box materials.

Table 2.44: Near Term Strategic Partnerships

Recommendations:	▪ Over the near-term, the City should provide assistance to and support for entrepreneurs for developing new diversion initiatives and promoting the use of existing facilities to divert IC&I and C&D materials.
Sector(s) Served	▪ IC&I ▪ C&D
Staffing Implications	▪ Would require some staff time to facilitate regular communication.
Estimated Annual Operating Cost (2011$)	▪ Minimal – set up such that the City would have full cost recovery
Increase in Diversion	▪ Difficult to quantify; depends on partnerships and materials being diverted.
Environmental and Social Benefits	▪ Enables diversion by supporting development of ‘beneficial’ uses of materials.
Overview of Implementation Plan and Timelines	▪ Discuss concept with targeted businesses ▪ Determine if sufficient interest to pursue development

2.2.1.2.2 IC&I and C&D Materials Depot at Brady Road Landfill

In addition to promoting re-use initiatives in the IC&I and C&D sectors, over the near-term the City could consider developing an area for the diversion of IC&I and C&D materials at Brady Road Landfill. The depot could take the form of a re-use area (specifically for C&D materials) and a recycling station for divertible materials. The depot could also be combined with the CRRC to be developed in the near term for the residential sector.

The City could choose to develop a facility itself or in partnership with a private entity interested in participating in the effort. Alternatively, a private sector entity may be interested in developing such as depot with the “Green Park” that may be developed at the Brady Road Landfill site in the near term. See 2.1.1.6.2 for further discussion of the “Green Park” option.

There are several advantages to such a program, including:

- Promoting the reuse and recycling of waste as opposed to disposal.

- Lowers disposal costs for contractors.
- May offer the opportunity to recycle difficult-to-divert waste streams such as shingles, and plastic wrap, etc.

Similar to the CRRC's discussed in Section 2.1.1.2.1, the capital costs to develop an IC&I and C&D materials recovery depot can vary significantly based on:

- The existing infrastructure at the site. For example, at Brady Road there are already scales and an access road.
- The amount of grading and material required to develop the appropriate facility configuration.
- The type and potential quantity of materials that would be managed, which will determine the facility footprint and resources required for construction.

A preliminary estimate from $2 to $4 million has been identified. More detailed cost estimates would be developed if there is a future decision to implement such a recovery depot.

The operating costs to run such a depot can also vary significantly based on:

- The types and quantities of material managed. Some materials such as wood waste may have a net cost to divert from landfill, for example if diversion of these materials involved shredding/chipping of wood wastes once or more a year. Other materials such as scrap metals may generate net revenues from the sale of these commodities.
- The method used to manage the materials. If materials are placed in 40 yard roll-off bins and hauled a distance for recycling and/or recovery, then there would be a cost associated with removing these bins and hauling them to the location where the material would be used.
- The staffing and monitoring of the depot. Generally, facilities with more successful diversion rates would have at least one dedicated staff on-site at any one time, to direct residents to the appropriate areas and to ensure that residents are source separating their materials at the facility.
- A preliminary estimate of operating costs between $1 and $2 million annually has been identified for a depot, based on the known unit costs incurred to operate similar facilities. Note: the low end of the cost estimates would support development of a facility that manages around 10% of the current IC&I and C&D waste managed by the City, but no additional materials (up to 9,000 tonnes per year). Should demand be higher, with increased volume of materials managed the costs would escalate. Cost recovery mechanisms also have to be investigated. As the costs can vary significantly, more detailed cost estimates will be developed for the preferred system which will also reflect the current market in Winnipeg and the surrounding area for many of the materials that could be diverted. The City will need to ensure that there are end markets available for the IC&I and C&D materials collected through these depots prior to developing them.

Table 2.45: Near Term IC&I and C&D Materials Depot at Brady Road Landfill	
Recommendations:	▪ Over the near term, the City could consider developing an IC&I and C&D materials depot at Brady Road Landfill (following implementation of the residential CRRC). ▪ Existing contracts/arrangements for materials handling: collection and recovery could be evaluated relative to any identified/recommended program change/expansion. ▪ The City will need to ensure that there are end markets available for the IC&I and C&D materials collected through these depots prior to developing them.
Sector(s) Served	▪ IC&I ▪ C&D
Staffing Implications	▪ Dependant on whether the City manages the depot or if it is managed by the private sector.
Estimated Annual Operating Cost (2011$)	▪ The annual operating cost will vary based on the type and volume of materials managed, varying between $1 and $2 million per year. ▪ Some of the operating costs could be offset through revenues received through sale of recovered material. The rest could be recovered through tipping fees.
Estimated Annual Capital Cost (2011$)	▪ Cost to develop a depot depends on the design and volume of materials managed, varying between $2 and $4 million.
Increase in Diversion	▪ It is difficult to quantify the actual diversion that could be achieved. Users may consist only of the IC&I and C&D sector that currently use the City's facilities in which case the program may only divert up to 9,000 tpy. However, the program and facilities may appeal to the broader IC&I and C&D sector, which could theoretically divert up to 10% of their materials or 47,500 tonnes.
Environmental and Social Benefits	▪ Would improve level of service to IC&I and C&D sectors.
Overview of Implementation Plan and Timelines	▪ Review of municipal best practices in handling, transportation and end-markets. ▪ Cost-benefit assessment of enhanced programming for each material type. ▪ Existing contract/arrangement dependent, dependent on existing infrastructure capacity.

2.2.1.2.3 Research Partnerships with Post-Secondary Institutions

Over the near-term the City could consider forming research partnerships with post-secondary institutions such as the University of Manitoba or the University of Winnipeg and Red River College . Research could focus on investigating different methods to re-use different materials and establish end markets for hard to recycle materials.

Other communities have had success in forming partnerships. The City of Calgary developed its Biocell project with support from the University of Calgary. The Biocell promotes sustainable solid waste management and extends the landfill bioreactor concept to include principles of sustainable development. The Biocell project has the potential to greatly decrease the environmental impact of operating a solid waste landfill.

Winnipeg could consider establishing similar partnership with local post-secondary institutions which could place it on the cutting edge of new waste management practices.

Table 2.46: Near Term Research Partnerships with Post-Secondary Institutions	
Recommendations:	▪ Over the near term, the City should form research partnerships with local post-secondary institutions.
Sector(s) Served	▪ All sectors
Staffing Implications	▪ Minimal; some staff time.
Estimated Annual Operating Cost (2011$)	▪ Minimal; some staff time.
Increase in Diversion	▪ Some potential for increased diversion in the long-term.
Environmental and Social Benefits	▪ Facilitates the development of best practices for materials management in support of future diversion
Overview of Implementation Plan and Timelines	▪ Determine which institutions to approach and develop possible research ideas. ▪ Maintain consistent communication with institution over the course of the CIWMP.

2.2.1.3 Recycling Options

Over the near-term, the City may consider several options that would promote recycling in the IC&I sector. These include:

- Developing and implementing special event recycling. This was discussed previously in Section 2.1.1.2.4 of the report.
- Expanding the curbside collection of single stream recycling to all small businesses within Winnipeg. This option is discussed below in Section 2.2.1.3.1.
- Working with Multi Material Stewardship Manitoba (MMSM) and the public school board to support and/or expand in-school recycling and curriculum. This option is discussed below in Section 2.2.1.3.2.

2.2.1.3.1 Expand IC&I Curbside Recycling

Currently, the City provides for the curbside collection of single stream recycling from a small number of businesses within Winnipeg. Small businesses that produce between 0.5 and 3.0 cubic metres of garbage per week and use the City's garbage collection service are eligible to participate in the curbside recycling collection program. The City provides recycling containers to participating businesses at no charge.

Over the near-term, the City could consider expanding curbside recycling collection to all small businesses within Winnipeg by advertising the service with a more directed P&E campaign. This increase in level of service would allow the City to track the diversion efforts of these businesses and also get a handle on participation rates in diversion initiatives in the small

commercial IC&I sector. This expansion could coincide with the phased-in implementation of the near-term residential program change to recycling cart collection.

With this initiative, the City could also consider establishing garbage disincentives to promote increased capture of recyclable material. These types of disincentives are discussed in Section 2.1.2.5.2 of this report.

Table 2.47: Near Term IC&I Curbside Recycling	
Recommendations:	▪ Over the near term, the City should consider expanding curbside recycling collection to all small businesses within the City. ▪ This initiative will have to be coordinated with existing curbside collection contracts.
Sector(s) Served	▪ IC&I
Staffing Implications	▪ Estimated cost of $500,000 for recycling containers.
Estimated Annual Operating Cost (2011$)	▪ Potential increased processing and collection fees with increased recyclable tonnage. ▪ Increased P&E costs. ▪ Likely financed through some form of cost recovery.
Increase in Diversion	▪ Could increase diversion by the IC&I sector that uses the City's programs by up to 5%. This would be equivalent to diverting approximately 4,500 tpy.
Environmental and Social Benefits	▪ Increased diversion ▪ Reduced need for disposal capacity.
Overview of Implementation Plan and Timelines	▪ P&E for program. ▪ Renegotiation / of collection and processing contracts.

2.2.1.3.2 Support and/or Expand School Recycling and Curriculum

Over the near-term the City should consider supporting in-school recycling. The City could cooperate with both Multi Material Stewardship Manitoba (MMSM) and the Public School Board to develop appropriate curriculum for students. The school-based program can also be used as a conduit for broader community education programs on diversion.

Table 2.48: Near Term Support and/or Expand School Recycling and Curriculum	
Recommendations:	▪ The City should consider supporting in-school recycling. ▪ The City could cooperate with both Multi Material Stewardship Manitoba (MMSM) and the Public School Board to develop appropriate curriculum for students.
Sector(s) Served	▪ IC&I
Staffing Implications	▪ Staff time to support provincial programs as reasonable.
Estimated Annual Operating Cost (2011$)	▪ Mainly just staff time.
Increase in Diversion	▪ Minimal change in overall waste diversion.
Environmental and Social Benefits	▪ Will further encourage waste reduction and recycling in the City's institutional sector. ▪ Can translate into improved diversion at home – reinforcing use of current

Table 2.48: Near Term Support and/or Expand School Recycling and Curriculum	
	program
Overview of Implementation Plan and Timelines	▪ Liaise with MMSM and local school boards.

2.2.1.4 Organics Options

Over the near term, no organics options that are applicable to the IC&I and C&D sectors are being considered.

2.2.1.5 Disposal Options (Brady Road Landfill)

Over the near-term, the City can implement several options to increase IC&I and C&D diversion from disposal at Brady Road Landfill. These include:

- Developing new drop-off areas for IC&I and C&D materials. This option is discussed further in Section 2.2.1.2.2 of this report.
- Implementing differential tipping fees at the Brady Road Landfill (this option is discussed below in Section 2.2.1.5.1 below).

2.2.1.5.1 Differential Tipping Fees

It is proposed that the City charge variable tipping fees on incoming IC&I and C&D loads depending upon the type of acceptable recyclable material is in the load and whether materials are separated into individual material streams or arrive as mixed loads. Most communities charge at least double to five times the tipping fee for mixed loads containing divertible material. This acts as a financial incentive for businesses to source separate material. The environmental benefit comes through increased diversion and reduction in the use of non-renewable resources (e.g., metals, etc.).

The City would have to ensure that the appropriate diversion infrastructure is in place for the materials that would be designated at being recyclable. For example, markets are currently available for recyclables, scrap metal and clean wood. A differential tipping fee could be set as early as 2012 for mixed loads including these materials. In the future, robust markets would have to be available for materials such as food waste (e.g. composting site) prior to targeting this material stream through a differential fee.

Table 2.49: Near Term Differential Tipping Fees	
Recommendations:	▪ Would require change in operation of Brady Road Landfill including load inspections and additional area for diverting targeted materials.
Sector(s) Served	▪ IC&I ▪ C&D
Staffing Implications	▪ New staff would be required to assist with inspections.

Table 2.49: Near Term Differential Tipping Fees	
Estimated Annual Operating Cost (2011$)	▪ Operating costs associated with new inspection staff. ▪ Fees would be set for full cost recovery of any additional costs.
Estimated Capital Cost (2011$)	▪ Capital costs associated with establishing designated diversion areas, developing inspection stations. ▪ Potential to increase revenues from tipping fees of loads of waste are not source separated.
Increase in Diversion	▪ Between 5 and 7% of IC&I and C&D material managed by the City could be diverted, or between 4,500 and 6.300 tonnes depending on which materials are targeted.
Environmental and Social Benefits	▪ Reduction in waste being disposed in City landfill.
Overview of Implementation Plan and Timelines	▪ Determine target items and schedule for implementation. ▪ Establish inspection protocol. ▪ Establish designated inspection area at landfill.

2.2.1.6 Summary: Conceptual Near-Term IC&I and C&D Waste Management System

The following table outlines some of the options to be considered for the IC&I and C&D sectors for the near-term waste management system.

Table 2.50: Conceptual Near-term IC&I and C&D System (First Five Years)		
Conceptual Near-term System (First Five Years)		
Component	**Additional Cost**	**IC&I Diversion**
Reduction, Reuse: • Promotion and Education • Development of Green Procurement Guide • Support for Commercial Reuse Programs, Organize an on-line Waste-Exchange • Ongoing IC&I Diversion Dialogue, with increased interaction between the City, generators and private sector operators • Determine if the City has the ability to require C&D diversion as part of site plan approvals • Encourage use of LEED standards in commercial development to avoid and divert waste during construction and demolition	**Annual Operating: $300,000 to $500,000** (design for full cost recovery for any direct costs incurred)	**Part of total diversion estimate** **Targets all IC&I and C&D waste generators**
Resource Recovery: • Strategic Partnerships – Support for Entrepreneurs by providing location for developing new facilities (e.g. Green Industry Park at Brady Road) and promoting use of existing and new facilities to divert IC&I and C&D materials. This would include promotion of existing opportunities to divert concrete, shingles, drywall and wood pallets as well as blue box materials. • IC&I and C&D Materials Depot (at Brady Road) for materials where there may be strong demand for alternatives.	**Capital: $2 to $4 million or more** **Annual Operating: $1,000,000 to $2 million,** Design for full cost recovery through direct fees	**Part of total diversion estimate** **Targets mainly generators currently using City's system**

Table 2.50: Conceptual Near-term IC&I and C&D System (First Five Years)		
Conceptual Near-term System (First Five Years)		
Component	**Additional Cost**	**IC&I Diversion**
• Research Partnerships with Post-Secondary Institutions such as U of M (e.g. Calgary Biocell project developed with support from U of C).		
Recycling: • The City only serves a small number of IC&I locations with curbside recycling. Could expand curbside recycling for small business. • Establish disincentives to increase use of program (e.g. commercial bag limits) • Work with MMSM and the Public School system to support and/or expand in-school recycling and curriculum. Schools can be used as conduit for broader community education programs on diversion. • Develop and implement Special Event Recycling in conjunction with CBCRA. Use funding from "away from home" program to focus on capturing beverage containers and other easy to recycle materials from public events.	**Capital:** $500,000 (recycling containers) **Annual Operating:** Design for full cost recovery.	**Part of total diversion estimate** **Targets mainly generators currently using City's system**
Brady Road: • Implement Differential Tipping Fees, charging up to five times the normal fee for mixed loads that contain targeted divertible material • IC&I loads of divertible material directed to new drop-off areas at the landfill • C&D loads of divertible material (wood, soil etc.) directed to new drop-off areas at the landfill • IC&I loads of Leaf & Yard and wood waste, directed to composting • "Green Park" for Private Enterprise. Ensure that land use planning for Brady Road landfill will allow for use of landfill property and surrounding area for green enterprise.	**Capital: noted above** **Annual Operating: noted above** (design for full cost recovery through differential tipping fees)	**Part of total diversion estimate** **Targets mainly generators currently using City's system** **Brady Road shifts from 'Disposal' to Resource Management Facility**
In Summary	**Capital: up to $4.5 million** **Annual Operating: up to $2.5 million** (some additional costs and revenues to be determined, should aim for full cost recovery from system users, initiatives designed on cost-recovery basis)	**Increase IC&I diversion rate up to 31%** **Increase C&D diversion rate up to 24%** **Potential to divert 24,000 tpy if just targeting current generators using the City's system.** **May divert materials from other generators.**

2.2.2 Potential Longer-Term IC&I and C&D Waste Management Programs

2.2.2.1 Waste Reduction and Reuse

2.2.2.1.1 Incentives and Social Marketing

As discussed in Section 2.1.1.1.1 in the residential waste management system section, effective P&E and social marketing is vital to encouraging and maintaining waste reduction and reuse initiatives. The same concept applies to the IC&I and C&D sectors as well. Over the mid to long-term, the City should consider expanding its P&E campaign to provide information to the IC&I and C&D sectors through additional incentives and social marketing.

Table 2.51: Longer Term Diversion Incentives and Social Marketing

Recommendations:	▪ In the longer term, the City should consider further expanding P&E and social marketing to the IC&I and C&D sectors. ▪ All existing and new program initiatives (like waste reduction) should be integrated together as much as possible for cost-saving purposes and as the result of a newly developed broad-based comprehensive communications plan (post CIMWP).
Sector(s) Served	▪ IC&I ▪ C&D
Staffing Implications	▪ Would require staff; could be combined with staff preparing P&E material for the residential sector.
Estimated Annual Operating Cost (2011$)	▪ Staff costs to develop programs and program material. ▪ On-going costs for continual communication.
Increase in Diversion	▪ Up to 1% of the IC&I and C&D waste managed by the City (approximately 1,000 tonnes).
Environmental and Social Benefits	▪ Minimal. ▪ Will reduce disposal capacity requirements slightly.
Overview of Implementation Plan and Timelines	▪ Through dialogue with stakeholders, identify key target areas where the City could develop incentives for diversion and social marketing campaigns

2.2.2.1.2 City Advocates for IC&I Diversion Regulations/Policies

This option would see the City lobby the provincial government to take action on a number of waste related issues and support businesses and institutions in evaluating their waste generation practices and to develop reduction, reuse, and recycling initiatives.

In Ontario, IC&I entities of certain types and sizes are subject to 3Rs regulations which require these entities to conduct waste audits and implement waste reduction work plans on an annual basis (Ontario Regulation 102/94), and source separate certain materials generated by the entity (Ontario Regulation 103/94). The waste reduction work plans (which must be updated on an annual basis) must include:

- Reasonable ways to reduce, reuse and recycle waste;
- Responsibilities for implementation;

- Timing; and,
- Expected results.

Source separation programs must be implemented for recyclable materials that are generated by the institution or facility. Collection, handling and storage facilities must be provided for these materials. The generator must make reasonable efforts to ensure the program is in full use and that source separated materials are reused or recycled.[39]

By lobbying for the development of 3Rs regulations, the City will further encourage waste reduction and diversion in the IC&I sector. The City should also promote the adoption of effective federal packaging legislation (EPR) to minimize waste generation. The City could work alone or in partnership with other municipalities in their lobbying efforts.

Table 2.52: Longer Term IC&I Diversion Regulation/Waste Policies	
Recommendations:	▪ City advocate the development of IC&I diversion regulation or policy with the province.
Sector(s) Served	▪ IC&I ▪ C&D
Staffing Implications	▪ Staff and/or Council member time.
Estimated Annual Operating Cost (2011$)	▪ Staff and/or Council member time.
Increase in Diversion	▪ Over the long-term, could lead to a significant increase in diversion rates within the IC&I sector.
Environmental and Social Benefits	▪ Policy would result in increased diversion from landfill
Overview of Implementation Plan and Timelines	▪ Participate at provincial/federal levels – boards, workshops, through comment on proposed policy/regulatory change.

2.2.2.2 Resource Recovery Options

2.2.2.2.1 Mandatory Diversion By-law

In the longer-term, the City could consider implementing a mandatory diversion by-law for IC&I and C&D generators that use the City's system for collection, processing, or disposal. This diversion bylaw could work in conjunction with the landfill ban, which was discussed in Section 2.1.2.6.1 of this report and should be coupled with reduced tipping fees for source separated loads of material that can be diverted through the programs available at that time. However, for mandatory diversion to truly be effective, it would be best implemented by the Province as a consistent means of encouraging IC&I diversion across the province.

In the near term, the option of mandatory diversion for the C&D sector was put forward (using site plan approvals and/or fines to enforce). The mandatory diversion by-law would go further

[39] http://www.on.ec.gc.ca/epb/fpd/cpb/3009-e.html

and ensure that certain materials are diverted from all IC&I and C&D related streams, should this waste be received and managed at any City facilities. This option would present a great opportunity to increase waste diversion rates in both sectors; however, it would require a significant amount of effort to enforce (i.e., landfill staff / by-law officers dedicated to enforcing the by-law).

Before implementing a mandatory diversion by-law the City must ensure that the appropriate infrastructure to handle the flux of diverted materials is in place. It may be best for the City to use a phased-in approach to developing the program to ensure that the markets can handle the additional material.

Table 2.53: Longer Term Mandatory Diversion By-Law

Recommendations:	▪ Implement reduced tipping fees for source separated loads of material that can be diverted. ▪ Over the longer-term the City should consider implementing a mandatory diversion by-law. This option would present a great opportunity to increase waste diversion rates in both sectors; however, it would require a significant amount of effort to enforce (i.e., landfill staff / by-law officers dedicated to enforcing the by-law). ▪ Could require the City to invest in additional processing infrastructure for divertible materials or ensure that processing infrastructure has been established by the private sector.
Sector(s) Served	▪ IC&I ▪ C&D
Staffing Implications	▪ Would require an additional staff.
Estimated Annual Operating Cost (2011$)	▪ Would require effort to enforce including by-law officers, education/program officers, and clerical staff at a cost of between $200,000 and $400,000. ▪ Cost recovery through set fines.
Increase in Diversion	▪ Works in conjunction with a local or preferably a Provincial landfill ban. ▪ Could divert up to 15% of IC&I waste and 25% of C&D waste managed by the City's programs. The actual diversion impact will vary. If the proportion of IC&I and C&D waste managed by the City remains the same as current, then this program could target for diversion around 40,000 tpy of material. Should the City manage more of the IC&I and C&D waste stream, then additional tonnes could be diverted. ▪ Material diverted should be tracked via waste audits etc so the City can document success.
Environmental and Social Benefits	▪ An effective means of promoting diversion from landfill disposal
Overview of Implementation Plan and Timelines	▪ Research best practices from other jurisdictions (e.g. Ontario). ▪ Develop by-law, hire appropriate staff.

2.2.2.3 Recycling Options

Over the longer-term, the City should focus on encouraging IC&I and C&D companies to participate in the various recycling diversion initiatives available to these sectors. This can be accomplished through various methods including

- Incentives and social marketing (as discussed in Section 2.1.1.1.6),
- Establishing a mandatory waste diversion by-law (as discussed in Section 2.2.2.2.1),
- Establishing disposal bans (as discussed in Section 2.1.2.6.1), and,
- Advocating for IC&I waste regulations/policies (as discussed in Section 2.2.2.1.2.

In addition, over the longer-term additional recyclables processing capacity may be required. As discussed in Section 2.1.1.3.3, the City has two options to address these future processing capacity requirements;

1. Expand existing MRF operating hours and general configuration or modify equipment to accommodate additional recyclable materials.

2. Construct a new MRF to accommodate additional recyclable materials.

If a new MRF was constructed, the City could consider various ownership and operating models including the same design, build, own and operate model as the existing model with Emterra; a City-owned scenario with design, build, and operate contract; or a design, build contract for a City owned and operated facility. All of these scenarios would involve the private sector in some capacity (i.e., to design, construct, operate, etc.). The City could determine if it was willing to finance the development of recycling processing capacity for the management of commercial materials or if this function would be left to the private sector service providers.

2.2.2.4 Organics Options

2.2.2.4.1 Process Commercial Food Waste

As discussed in Section 2.1.2.4.1, over longer-term, the City will establish a source separated organics (SSO) program for the residential sector. As part of this initiative, the City could consider accepting commercial food waste at its processing facility that would be developed to handle the SSO material. By accepting commercial food waste at the City's processing facility, the City could offset some of its costs through tipping fees while promoting the diversion of SSO in the IC&I sector.

This option should be assessed in the context of capital and operating costs over the life-cycle of the facility. It should be noted that there is the potential for increased risk to the City in the consideration of providing organics processing capacity to the IC&I sector as it would have little control over the sector's activities.

As discussed in Section 2.1.2.4.1, the organics processing facility could be built at the Brady Road Landfill.

Table 2.54: Longer Term Processing of Commercial Food Waste	
Recommendations:	▪ Over the longer-term, the City should consider accepting commercial food waste at its processing facility. ▪ This option should be assessed in the context of capital and operating costs over the life-cycle of the facility.
Sector(s) Served	▪ IC&I
Staffing Implications	▪ None
Estimated Annual Operating Cost (2011$)	▪ Organic waste processing costs ranges up to $130 per tonne. ▪ Tipping fees charged to commercial customers should offset processing costs. ▪ City could benefit from economies of scale associated with the construction of additional capacity to receive IC&I organics and/or other municipal organic waste streams at its facility.
Estimated Capital Cost (2011$)	▪ No additional capital
Increase in Diversion	▪ Could divert a substantial amount of organic waste from the commercial sector (up to 6% or 30,000 tonnes per year of all IC&I waste based on current estimated amount of SSO produced by sector).
Environmental and Social Benefits	▪ Reduction in the amount waste sent for disposal.
Overview of Implementation Plan and Timelines	▪ 2015/2016: Processing facility development. ▪ 2017: earliest date for organics program implementation. ▪ Develop contracts to provide service to the commercial sector.

2.2.2.5 Disposal Options (Brady Road Landfill)

Over the longer term, there are two main options that the City can consider to further increase the environmental performance of its waste management system as it pertains to the IC&I and C&D sectors. These two options are:

- Expanding the “Green Park” for private enterprise (discussed previously in Section 2.1.1.6.2 of the report).
- Establishing a disposal ban on certain materials. This option is discussed further below in Section 2.2.2.5.1.

2.2.2.5.1 Disposal Bans

As mentioned previously in Section 2.1.2.6.1, disposal bans consists of prohibiting the disposal of designated materials at the point of disposal (i.e., at Brady Road Landfill). Loads of material exceeding permitted levels of banned material would be rejected or subject to a surcharge. The surcharge should be a prohibitive fee (e.g., ten times the normal cost for disposal) for loads with greater than 5% of a banned material.

For the IC&I sector, typical banned materials include corrugated cardboard, electronic waste, easy to divert recyclables, easy to divert food waste, and yard waste. For the C&D sector typical banned materials include concrete, drywall, wood, metal, asphalt, corrugated cardboard, brick/stone.

By establishing a disposal ban for certain materials at Brady Road Landfill, the City is sending a message to the community and province that it is serious about waste diversion. The success of such a program depends on a combination of processing infrastructure (which must be established prior to implementing a ban), markets for divertible materials, and the enforcement of the ban by inspection staff.

Table 2.55: Longer Term Disposal Bans (IC&I and C&D)

Recommendations:	▪ Would require change in operation of Brady Road Landfill including load inspections and additional area for diverting banned materials.
Sector(s) Served	▪ IC&I ▪ C&D
Staffing Implications	▪ Potential need for additional inspection staff
Estimated Annual Operating Cost (2011$)	▪ Operating costs associated with new inspection staff in the order of $300,000 to $500,000. Cost recovery through fines and fees.
Estimated Capital Cost (2011$)	▪ Capital costs associated with establishing designated diversion areas, developing inspection stations in the order of $500,000.
Increase in Diversion	▪ The effect of a landfill ban would be similar to the mandatory diversion by-law. It could divert up to 15% of IC&I waste and 25% of C&D waste managed by the City's programs. The actual diversion impact will vary. If the proportion of IC&I and C&D waste managed by the City remains the same as current, then this program could target for diversion around 40,000 tpy of material. Should the City manage more of the IC&I and C&D waste stream, then additional tonnes could be diverted.
Environmental and Social Benefits	▪ Significant reduction in IC&I and C&D waste being disposed in City landfill.
Overview of Implementation Plan and Timelines	▪ Research best practices literature to determine which items should be included in ban. ▪ Establish inspection protocol. ▪ Establish designated diversion areas at landfill.

2.2.2.6 Summary of Conceptual Longer-Term IC&I and C&D Waste Management System

Over the 20-year planning period, the system could evolve to include additional diversion initiatives like diversion of IC&I food wastes. A balance of incentives for diversion and disincentives for IC&I and C&D waste disposal would have to be developed (lower tipping fees for source separated loads, and a move to landfill bans), to encourage source separation while recognizing that the IC&I and C&D sectors have the option to manage their material outside of the City's system. Further infrastructure would be developed to support the transition to a system where the majority of the waste is managed as a resource, not disposed. Table 2.49 provides an illustrative overview of the implementation of the proposed Longer-Term IC&I and

C&D Waste Management System and the corresponding increase in the diversion rate for these sectors as various initiatives are implemented.

Table 2.56: Conceptual Longer-Term IC&I and C&D System (Ten to Twenty Years)

Conceptual Longer-Term System (Ten to Twenty Years)		
Component	**Additional Cost**	**IC&I Diversion**
Reduction & Reuse: • Incentives and social marketing • Advocate for IC&I diversion regulations/waste policies.	**Capital: no new capital** **Annual Operating: no new operating**	**Part of total diversion estimate** **Targets all IC&I and C&D waste generators**
Resource Recovery: • Reduced tipping fees for source separated loads • Mandatory Diversion By-law (for IC&I and C&D generators that use the City's system for collection, processing or disposal)	**Capital: minimal** **Annual Operating: $200,000 to $400,000** (by-law enforcement, would have some cost recovery)	**Part of total diversion estimate** **Targets mainly generators currently using City's system**
Recycling: • Further Incentives to participate • Long-term Processing capacity (additional MRF)	**Annual Operating:** (to be determined, may 'break-even')	**Part of total diversion estimate** **Targets mainly generators currently using City's system**
Organics: • Process commercial food wastes	**Annual Operating (processing):** (likely to 'break-even' based on tipping fees)	**Part of total diversion estimate** **Targets all IC&I generators**
Brady Road: • Disposal Ban, apply prohibitive fee (10X normal) for loads with greater than 5% of a banned material • Expand "Green Park" for Private Enterprise	**Capital: $500,000 to $1,000,000** **Annual Operating: $300,000 to $500,000** (cost recovery through fees)	**Part of total diversion estimate** **Targets all IC&I and C&D waste generators** **Brady Road shifts from 'Disposal' to Resource Management Facility**
In Summary	**Full costs to be determined – Programs to operate on cost recovery basis**	**Could divert up to 81% of IC&I waste currently managed by the City (71,000 tpy)** **Could divert up to 78% of C&D waste currently managed by the City (5,200 tpy)**

3.0 Projected Waste Management System Performance

With the planned program changes over the near and longer-terms, the performance of the City's waste management system is expected to substantially improve.

Several different parameters can be used to assess the performance of a waste management system; this section of the CIWMP report describes changes in waste management system performance over both the near and longer- terms with regards to increases in waste diversion, decreases in greenhouse gas (GHG) emissions associated with increases in waste diversion, and decreases in the environmental impacts associated with the operation of Brady Road Landfill (i.e., decreased landfill airspace consumption and increased landfill stability).

3.1 WASTE DIVERSION

Current waste diversion performance was initially assessed and presented in the Task C & D report (attached as **Appendix B**). The methodology used to initially assess waste diversion performance was described in detail in the Task C & D report. This section of the CIWMP report presents updated assumptions regarding potential increases waste diversion that could be achieved through the recommended system changes over both the near and longer-terms Near and longer-term diversion performance for Residential, IC&I, C&D and City operations sectors are outlined below.

Reductions in greenhouse gas (GHG) emissions associated with increases in waste diversion over both the near and longer-terms are also described in this section of the report to illustrate one of the quantifiable environmental benefits of diverting waste from landfill. Increased waste diversion leads to decreased GHG emissions in several ways including through reducing landfill gas production (because less material is being landfilled) and reducing emissions associated with the manufacturing of products from raw materials etc... For example, the amount of GHG emissions associated with manufacturing an aluminum can from raw materials is significantly higher than the quantity of GHG emissions associated with recycling an aluminum can. By increasing the capture rate of aluminum cans, the City will decrease the net GHG emissions by reducing the need to manufacture cans from raw material.

3.1.1 Methodology

3.1.1.1 Waste Diversion

Estimated waste diversion performance for the residential sector was based on professional experience and documented experiences in other municipalities as part of waste management system changes. Based on this experience, it was possible to anticipate changes in capture rates for various material types that would result from the implementation of new programs over both the near and longer-term.

For the commercial sector, it was more difficult to estimate the potential diversion because it is uncertain if the programs will actually be used by the commercial sector. As discussed in Section 2.2, the private sector has other alternatives for the disposal of material outside of the programs offered by the City. For this reason, low and high estimates have been projected for the IC&I and C&D diversion rates have to reflect the range of potential participation rates in the City's system.

Projections were calculated for the status quo, residential diversion based on the implementation of the proposed initiatives for both the near and long-term for residential waste, IC&I, C&D and City Operation waste.

3.1.1.2 GHG Emissions

There are a number of life-cycle analysis (LCA) models in active use to estimate the GHG emissions associated with waste management systems. For the purpose of the Winnipeg CIWMP, overall GHG emissions were not modeled for the system as a whole, rather, published values for GHG emission reductions associated with various diversion activities were used as a surrogate, to provide a general sense of the GHG emissions reductions that could result through the proposed system changes.

Two life-cycle analysis (LCA) models and one comprehensive study were used as the source of the GHG emission factor estimates, in order to estimate the tonnes of GHG emissions (i.e., carbon dioxide equivalents (CO_2e)) that could be avoided if various materials were diverted from landfill. These sources are discussed further below.

The Integrated Waste Management (IWM) LCA model is a life cycle analysis tool developed for municipalities to evaluate the life cycle environmental and economic effects of waste management decisions. This model was developed through a partnership between the Environment and Plastics Industry Council (EPIC), Corporations Supporting Recycling (CSR), and Environment Canada. The IWM model was used to determine the quantity of CO_2e avoided by diverting mixed paper, mixed plastic and aluminum.

ICF International developed a model on behalf of Environment Canada to quantify various GHG emissions rates associated with waste management activities. The ICF model was used as the source of emission factors used to determine the quantity of CO_2e avoided by diverting food waste, yard waste, newspaper, corrugated cardboard, steel, electronics, and white goods.

The study used to estimate GHG emissions reductions associated with C&D waste is entitled Let's Climb Another Molehill: An Examination of Construction, Demolition and Renovation (CRD) Waste Diversion in Canada and Associated Greenhouse Gas Emission Impacts, prepared by the Recycling Council of Ontario (RCO) with funding support from the Region of Peel, Canada Mortgage and Housing Corporation, the Government of Canada, New West Gypsum Recycling, and Walker Environmental Services. This study was used to determine the

quantity of CO_2e avoided by diverting C&D materials such as concrete, wood waste, scrap metal, drywall, and asphalt.

3.1.2 Residential Waste Program Performance

3.1.2.1 Near-Term Diversion and GHG Emissions Performance

Over the near-term, several new components are recommended to be included in the City's waste management system. The focus of these components will be to build upon the City's current programs to increase waste diversion rates.

Based on the addition of these components, it is expected that the City's residential waste diversion rate can be increased from 15% to approximately 35% in 2016. The following table (Table 3.1) provides an overview of the tonnage of material expected to be produced in year five of the CIWMP (2016) and shows a comparison between the recovery rates in 2009 and 2016 as well as the avoided GHG emissions associated with the increased waste diversion. These estimates include materials such as HHW and electronic materials, as though they are managed through the provincial program, the City has an interest in ensuring that these materials are directed to appropriate diversion avenues.

Note: the per capita waste reduction target, recommended as part of the Near term residential system, would reduce the quantity of waste generated and thus the overall amount of materials managed in the system through either diversion or disposal. Thus, the materials 'avoided' as part of this aspect of the system are not factored into the diversion tonnages or the GHG emissions reduction estimates.

Table 3.1: Residential Waste Generated and Recovered in the Near Term (2016)

Material Type	Tonnes Generated (rounded)	Recovery Rate (2009)	Recovery Rate (2016)	Estimated Total Tonnes Recovered (2016, rounded)	Estimate of Avoided Annual GHG Emissions (CO_2e)
Printed Paper	47,400	46%	73%	34,800	-59,000
Paper Packaging	38,900	31%	56%	21,800	-37,000
Plastics	28,800	28%	38%	10,900	-49,000
Metals	14,600	25%	55%	8,100	-37,000
Glass	16,900	17%	72%	12,100	unknown
HHW	1,600	0%	30%	500	unknown
Organics	127,900	4%	20%	25,800	-12,000
Other Materials	89,900	0%	17%	15,400	-56,000
Total	**365,700**	**15%**	**35%**	**129,100**	**-250,000**

The following table (Table 3.2) shows the increase in tonnage associated with the increase in diversion with the implementation of each major component of the near term system. It should be noted that although there are no direct increases in diversion associated with the proposed changes to garbage collection and changes at Brady Road, the increases in diversion for the other components reflect these changes. It should also be understood, that over the period from 2009 to 2016, there would be some increase in the tonnes recovered by the current system, based on population growth. The estimated total tonnes recovered in the table above of 129,100, reflects the current (2009) residential tonnes diverted of 54,000, plus the 75,000 additional tonnes diverted noted in the table below, plus an expected increase in tonnes diverted through the current programs of just under 4,000 tonnes reflecting population growth.

Table 3.2: Residential Diversion and Tonnes Recovered by Program Component in the Near-Term (2016)

Component	Increase in Diversion Resulting from New Programs (compared to 2009)	Increase in Tonnage Recovered (rounded)
Reduction & Reuse	2%	7,000
Resource Recovery	5%	17,000
Recycling	8%	30,000
Organics	6%	21,000
Collection	Supports Above Programs	n/a
Brady Road	Supports Above Programs	n/a
Total	**20%**	**75,000**

3.1.2.2 Longer-Term Residential Diversion and GHG Emissions Performance

Over the longer-term, it is recommended that the City's waste management system evolve to include additional diversion initiatives like collection and diversion of kitchen organics. Further infrastructure would be developed to support the transition to a system where the majority of the waste is managed as a resource, not disposed.

Based on the addition of these components, it is expected that the City's residential diversion rate could increase to approximately 59%. The following table (Table 3.3) provides an overview of the tonnage of material expected to be produced in year twenty of the CIWMP (2031), compares the recovery rates estimated for 2009 and 2031 and includes an estimate of the avoided GHG emissions associated with the increased waste diversion.

Table 3.3: Residential Waste Generated and Recovered in the Longer-Term (2031)

Material Type	Tonnes Generated (2031) (rounded)	Recovery Rate (2009)	Recovery Rate (2031)	Estimated Tonnes Recovered Annually (2031) (rounded)	Estimate of Avoided GHG Emissions (Annual CO_2e) (rounded)
Printed Paper	55,900	46%	84%	47,200	-80,000
Paper Packaging	45,900	31%	62%	28,400	-48,000
Plastics	34,000	28%	54%	18,500	-83,000
Metals	17,300	25%	74%	12,900	-59,000
Glass	20,000	17%	80%	16,100	unknown
HHW	1,900	0%	20%	400	unknown
Organics	151,000	4%	68%	102,600	-49,000
Other Materials (wood, textiles, tires, appliances, electronics etc.)	106,000	0%	29%	30,900	-112,000
Total	**431,600**	**15%**	**59%**	**256,600**	**-432,000**

The following table identifies the increase in tonnage associated with each major component of the longer term residential system.

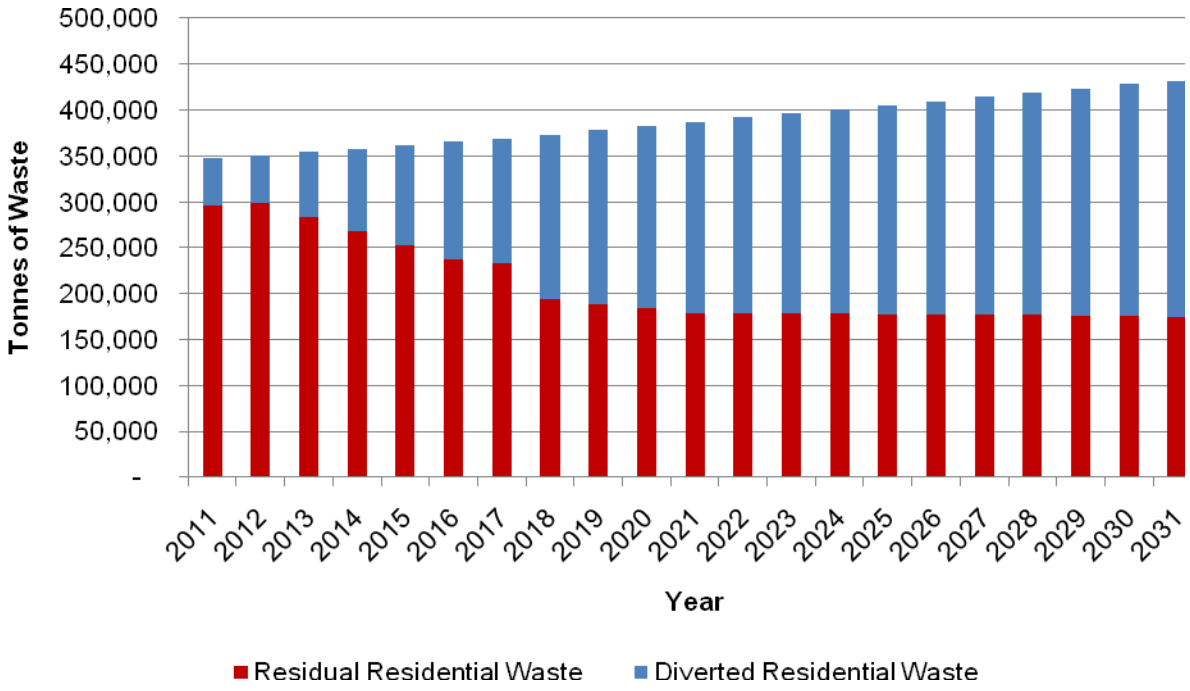
Table 3.4: Residential Diversion and Tonnes Recovered by Program Component in the Longer-Term (2031)

Component	Increase in Diversion Resulting from New Programs (compared to 2009)	Increase in Tonnage Recovered (rounded)
Reduction & Reuse	3%	12,000
Resource Recovery	10%	43,000
Recycling	9%	40,000
Organics	22%	97,000
Collection	Supports Above Programs	n/a
Brady Road	Supports Above Programs	n/a
Total	**44%**	**192,000**

3.1.2.3 Projected Quantity of Residential Waste Disposed and Diverted over the Planning Period

Figure 3.1 illustrates the estimated tonnage of waste that is estimated to be diverted and disposed over the planning period. Based on the proposed timeframes for new program implementation, it is expected that the amount of waste disposed will decline until about 2018 as the amount of diverted waste steadily increases. At that point, the organics program should be implemented which will be a major factor leading to a spike in waste diversion. Following 2018 there would be a modest increase of diversion annually until the end of the planning period, representing incremental improvements in capture and recovery rates.

Figure 3.1: Estimated Residential Residual Waste Disposed and Waste Diverted Year-by-Year over the Planning Period (2011-2031)



3.1.3 Potential IC&I and C&D Waste Program Performance

The following sections provide information regarding the potential amount of IC&I and C&D waste generated and diverted over the near and longer-terms, based on the concepts identified for IC&I and C&D diversion. As the City has yet to enter into dialogue with the generating sectors, the plan is a concept only, and the diversion and the decrease in GHG emissions noted, are primarily provided as an illustration of the potential system performance should the programs discussed be put into effect by the City, the Province and/or the IC&I generating sector.

It should be noted that the material targeted by the IC&I programs is the regular garbage produced by the IC&I sector which is currently managed by the City. The IC&I sector also generates animal waste, asbestos and contaminated soil which are currently managed at Brady Road, but are not discussed below as the management of these materials as a separate material stream sent for disposal is expected to continue in some fashion at Brady Road. Regular garbage comprises about 85% of the IC&I waste managed by the City.

As discussed previously, for the IC&I sector, it was more difficult to estimate the potential for diversion because it is uncertain if the City-run programs will actually be used by the commercial sector. For this reason, the IC&I diversion rates discussed below are presented as low and high estimates to reflect a range of possible participation in the City's system.

In regards to the estimates of potential IC&I waste diverted, the breakdowns provided below identify the major material types, recovery rates and tonnages for the group of IC&I programs which have been identified for near and longer-term implementation. The tables do not break out diversion by program (as was done for residential waste) as the diversion rate achieved will be contingent on the success of the group of programs as opposed to any individual program components.

3.1.3.1 Potential Near-Term IC&I Diversion and GHG Emissions Performance

Assuming that the current IC&I diversion rate is fairly minimal; in the near-term (by 2016), the addition of the proposed components to the waste management system are expected to increase the IC&I diversion rate by approximately 15% - 30%. The following table (Table 3.5) provides an overview of the tonnage of waste by material type expected to be recovered in 2016 and shows a comparison between the low and high estimates of increased diversion rates. The table also indicates the avoided GHG emissions associated with the estimated increase in IC&I waste diversion.

Table 3.5: IC&I Tonnes Low and High Recovery Estimates (2016)

	Low Estimates			High Estimates		
Material Type	**Tonnes Recovered (rounded) (2016)**	**Recovery Rate (2016)**	**Avoided GHG Emissions (CO2e) (rounded)**	**Tonnes Recovered (rounded) (2016)**	**Recovery Rate (2016)**	**Avoided GHG Emissions (CO2e) (rounded)**
Printed Paper	3,700	16%	-6,290	7,800	35%	-13,260
Paper Packaging	2,500	23%	-4,250	4,600	44%	-7,820
Plastics	1,500	20%	-6,750	2,800	39%	-12,600
Metals	1,000	13%	-4,575	2,000	28%	-9,150
Glass	500	12%	unknown	1,000	28%	unknown
Wood	500	13%	-34	1,100	28%	-75
Organics	1,100	10%	-528	2,500	23%	-1,200

	Low Estimates			High Estimates		
Material Type	**Tonnes Recovered (rounded) (2016)**	**Recovery Rate (2016)**	**Avoided GHG Emissions (CO2e) (rounded)**	**Tonnes Recovered (rounded) (2016)**	**Recovery Rate (2016)**	**Avoided GHG Emissions (CO2e) (rounded)**
Other Materials	600	11%	-2,175	1,200	23%	-4,350
Total	**10,900**	**15%**	**-24,602**	**22,600**	**31%**	**-48,455**

3.1.3.2 Potential Longer-Term IC&I Diversion and GHG Emissions Performance

In the longer-term, it is expected that up to 81% of the IC&I waste currently being disposed at Brady Road could potentially be diverted. The following table (Table 3.6) provides an overview of the tonnage of material expected to be produced in year twenty of the CIWMP (2031) and indicates the difference in recovery for the low and high estimates. The table also indicates the avoided GHG emissions associated with the estimated increase in waste diversion.

Table 3.6: IC&I Tonnes Low and High Recovery Estimates (2031)

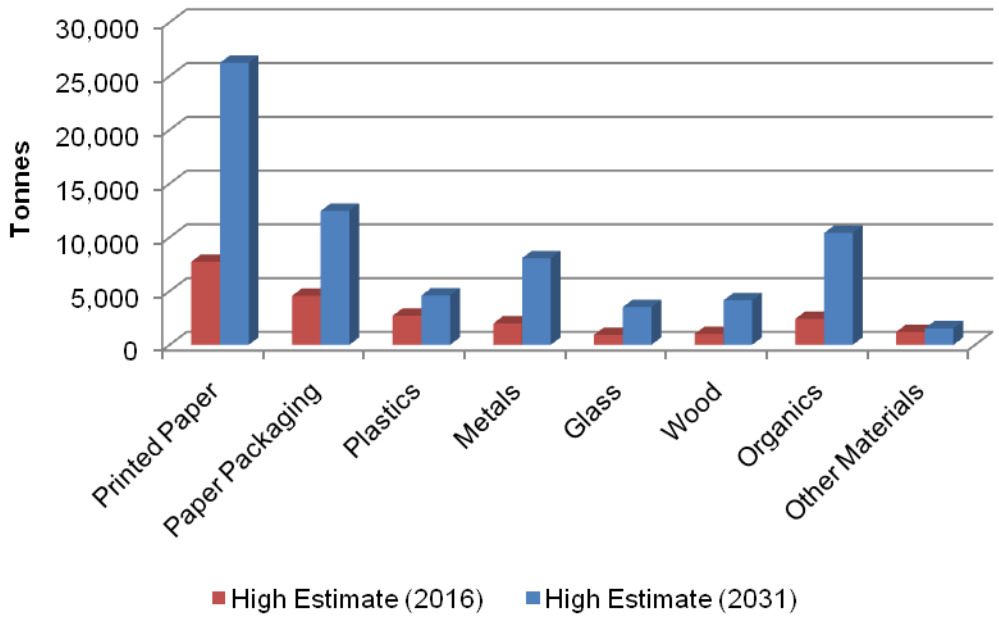
	Low Estimates			High Estimates		
Material Type	**Tonnes Recovered (rounded) (2031)**	**Recovery Rate (2031)**	**Avoided GHG Emissions (CO2e) (rounded)**	**Tonnes Recovered (rounded) (2031)**	**Recovery Rate (2031)**	**Avoided GHG Emissions (CO2e) (rounded)**
Printed Paper	12,900	46%	-21,930	26,300	94%	-44,710
Paper Packaging	12,200	93%	-20,740	12,500	95%	-21,250
Plastics	1,800	20%	-8,100	4,600	53%	-20,700
Metals	3,900	43%	-17,843	8,100	90%	-37,058
Glass	1,800	43%	unknown	3,600	85%	unknown
Wood	2,000	43%	-136	4,200	90%	-286
Organics	8,600	64%	-4,128	10,500	78%	-5,040
Other Materials	700	11%	-2,538	1,600	24%	-5,800
Total	**43,700**	**50%**	**-75,414**	**71,000**	**81%**	**-134,843**

3.1.3.3 Comparison of Near and Longer-Term Diversion Estimates for IC&I Sector

Figure 3.2 illustrates the high estimates for the amount of IC&I waste which could be diverted in 2016 and 2031 for the major material categories. It is evident that some materials are more likely to be diverted (e.g. paper) compared to glass or wood. The greatest increases in recovery rates are predicted for easily recovered materials such as printed paper and metal. The estimated recovery rates for printed paper are expected to increase from 35% in 2016 to 94% in 2031 (high estimates) and for metal, recovery rates are expected to increase from 28% to 90% (high estimates). The overall diversion rate associated with the potential IC&I program is

expected to increase from 31% in the near term (using high estimates) to 81% in the longer term (using high estimates).

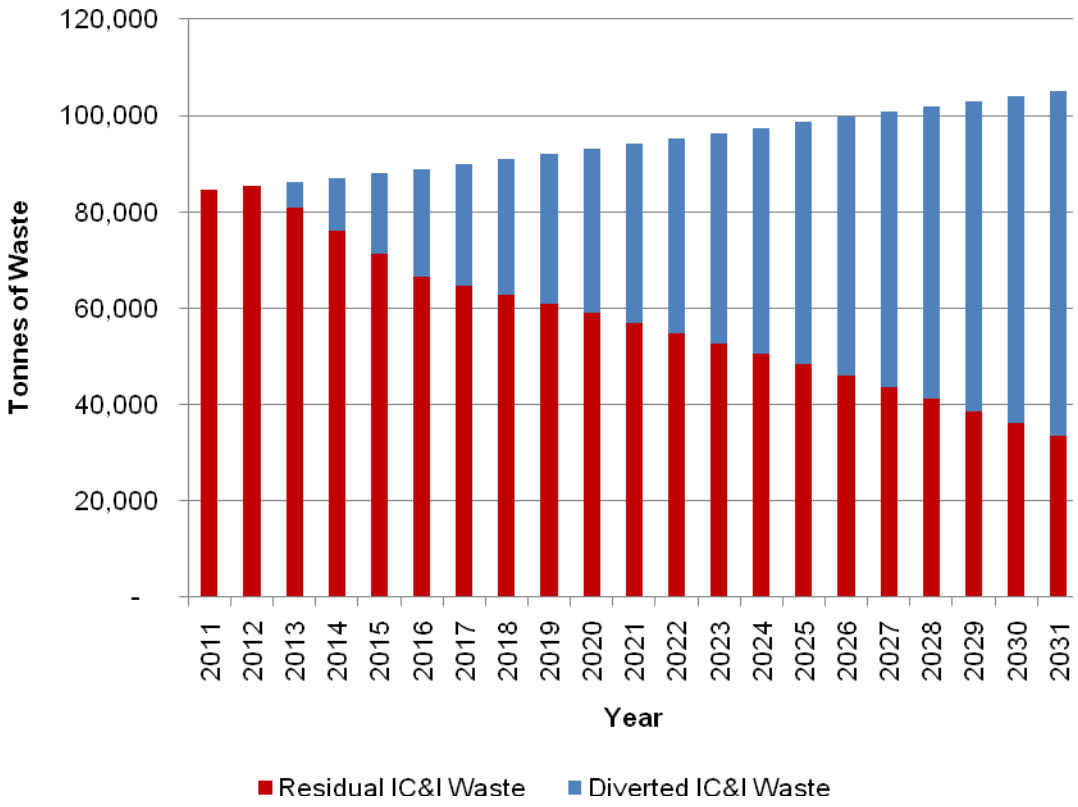
Figure 3.2: Comparison of Near and Long Term IC&I Diversion (High Estimates)



3.1.3.4 Projected Potential Quantity of IC&I Waste Disposed and Diverted over the Planning Period

Figure 3.3 illustrates the projected quantity of IC&I waste that could be diverted and disposed by the City over the planning period based on the potential programs identified for the CIWMP, assuming that the high diversion estimates as presented above are achieved. The graph shows a fairly steady increase in diversion over the course of the planning period, reflecting the fact that there are no major strategies that are expected to cause a large “spike” in diversion.

Figure 3.3: Estimated IC&I Residual Waste Disposed and Waste Diverted Year-by-Year over the Planning Period (2011-2031) (High Estimates)



3.1.3.5 Potential C&D Program Performance

Potential Near-Term C&D Diversion and GHG Emissions Performance

The following table (Table 3.7) provides a breakdown of the low and high estimates for the tonnages of major C&D material types that are expected to be diverted in the near-term. The table also indicates the avoided GHG emissions associated with the potential increase in waste diversion. These estimates have been generated based on the potential effect of implementing the recommendations as discussed in Section 2.2 of this report. It should be noted that quantifying C&D waste is very difficult, there have been very few studies done that have been able to provide estimates of potential C&D generation rates. As a result, the potential diversion rates and GHG emissions reductions should simply be regarded as an indicator of program performance in general.

It should also be noted, that the residential depot materials currently managed by the City include C&D materials, much of which is suspected of being generated by small commercial generators. The potential for diversion of this material is addressed in the residential system assumptions.

Table 3.7: C&D Tonnes Low and High Recovery Estimates (2016)

Material Type	Low Estimates			High Estimates		
	Tonnes Recovered (rounded) (2016)	Recovery Rate (2016)	Avoided GHG Emissions (CO2e) (rounded)	Tonnes Recovered (rounded) (2016)	Recovery Rate (2016)	Avoided GHG Emissions (CO2e) (rounded)
Concrete	200	36%	-34	300	47%	-51
Drywall	200	23%	-5	200	36%	-5
Wood	600	37%	-41	700	49%	-48
Metals	0	0%	0	100	4%	-154
Asphalt Paving	100	13%	-11	100	22%	-11
Asphalt Roofing	100	2%	-11	100	7%	-11
Brick	0	0%	0	100	7%	0
Paper	100	1%	-170	100	7%	-170
Other	100	6%	0	200	17%	-1
Total	**900**	**16%**	**-272**	**1400**	**24%**	**-451**

Potential Longer-Term C&D Diversion and GHG Emissions Performance

The table below (Table 3.8) indicates the low and high estimates for the longer-term scenario. It also indicates the avoided GHG emissions associated with the increase in waste diversion. In the longer-term, it could be possible to achieve 78% recovery of the C&D waste managed by the City.

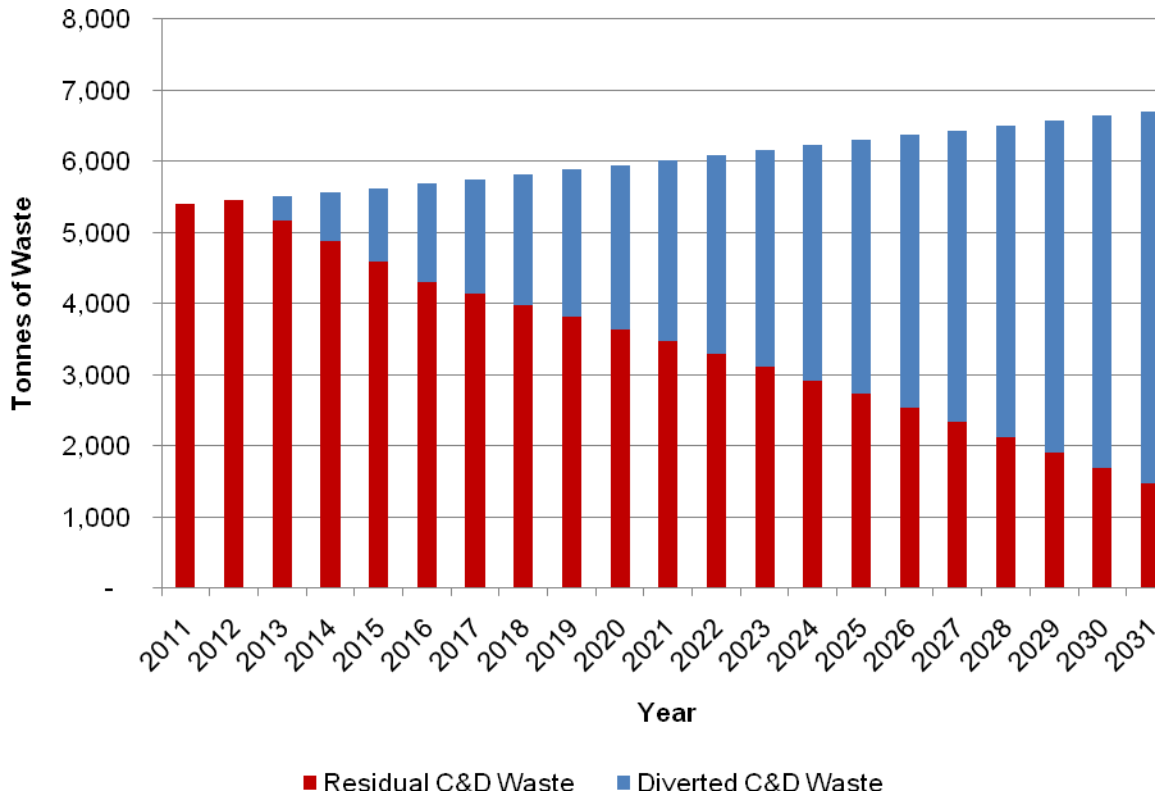
Table 3.8: C&D Tonnes Low and High Recovery Estimates (2031)

Material Type	Low Estimates			High Estimates		
	Tonnes Recovered (rounded) (2031)	Recovery Rate (2031)	Avoided GHG Emissions (CO2e) (rounded)	Tonnes Recovered (rounded) (2031)	Recovery Rate (2031)	Avoided GHG Emissions (CO2e) (rounded)
Concrete	600	84%	-102	600	95%	-102
Drywall	500	71%	-12	600	80%	-14
Wood	1500	84%	-102	1700	95%	-116
Metals	400	50%	-617	600	95%	-926
Asphalt Paving	200	63%	-22	300	95%	-33
Asphalt Roofing	500	52%	-56	600	75%	-67
Brick	200	50%	-1	200	75%	-1
Paper	500	51%	-850	800	75%	-1,360
Other	100	6%	0	200	20%	-1
Total	**4000**	**59%**	**-1,762**	**5300**	**78%**	**-2,620**

Projected Potential Quantity of C&D Waste Disposed and Diverted over the Planning Period

Figure 3.4 indicates the amount of C&D waste which could be diverted and disposed by the City over the planning period assuming that the high diversion estimates as presented above are achieved. The amount of waste disposed shows a gradual decline over the planning period resulting from the implementation of the recommended programs to reduce or divert C&D waste.

Figure 3.4: Estimated C&D Residual Waste Disposed and Waste Diverted Year-by-Year over the Planning Period (2011-2031) (High Estimates)



3.2 ENVIRONMENTAL IMPACTS AT THE BRADY ROAD LANDFILL

3.2.1 Reduction in GHG Emissions

As discussed in Section 3.1.1.2, there are a number of life-cycle analysis (LCA) models in active use to estimate the GHG emissions associated with waste management systems. For the purpose of the Winnipeg CIWMP, overall GHG emissions were not modeled for the system as a whole, rather, published values for GHG emission reductions associated with various diversion activities were used as a surrogate, to provide a general sense of the GHG emissions reductions that could result through the proposed system changes. The previous sections presented information regarding avoided landfill emissions, which largely are based on the energy savings associated with using recovered versus raw materials in manufacturing.

The exception was the estimate of avoided GHG emissions associated with composting of organics and leaf & yard waste. These avoided emissions, in the order of 12,000 tonnes per year of carbon dioxide equivalents in the near term, and up to 49,000 tonnes per year in the longer term, represent avoided landfill emissions through the diversion of organics from landfill disposal (around 0.15 tonnes per year of GHG equivalents avoided per tonne of organics diverted).

3.2.2 Operational Benefits

Reducing the amount of regular waste deposited at Brady Road, will result in a number of operational and environmental benefits, including:

- Reduction in odour at the tipping face, particular with the implementation of a kitchen organics program;
- Reduced bird (and vermin) nuisance issues, as there would be less materials openly available at the working face to attract birds and vermin;
- Potential increase in service life of leachate collection systems, resulting from the reduced generation of leachate and/or changes in leachate strength;
- Smaller total and differential settlement of the waste mass, which facilitates final cover construction and after-use implementation.
- The closure of the residential tipping face at Brady Road, and adjustment to operations to have only one operating tipping face should also assist in reducing odour emissions, blowing litter, reduced bird and vermin nuisance issues and leachate generation.
- Implementation of the CRRC will separate residential users of the site from the landfill operations and provide safe and secure access for residential vehicles and individuals. This will improve overall operational safety for the residential users, City staff and for other users (commercial haulers) accessing Brady Road.

3.2.3 Landfill Stability[40]

In addition to a substantial reduction in landfill airspace consumption as discussed below, the overall stability of the waste disposed at the Brady Road Landfill is expected to increase if the recommended waste management system is implemented. This is because less biodegradable organic materials will be deposited at Brady Road with the implementation of enhanced leaf & yard waste programs in the near-term and the introduction of a kitchen organics diversion program in the longer term.

The properties of more stabilized waste can vary significantly from conventional municipal solid waste. Stabilized waste typically has much lower organic matter content, as well as lower levels of leachable total organic carbon (TOC), chemical oxygen demand (COD), and total nitrogen (N). In addition, landfill gas production from more stabilized landfills tends to be much lower than for landfills that accept regular garbage.

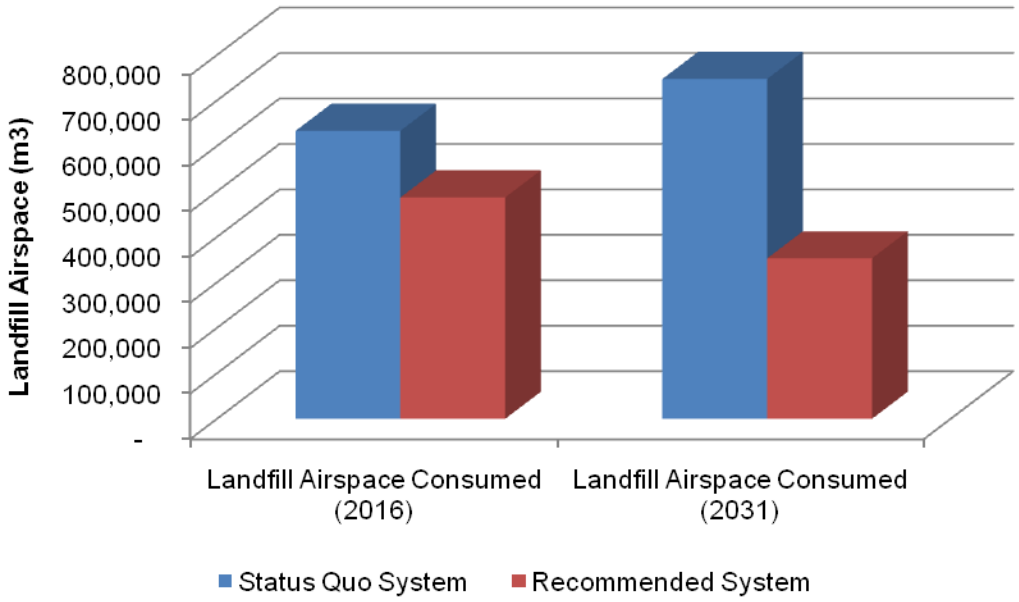
3.2.4 Landfill Airspace Consumption

As a result of the increase in waste diversion associated with the implementation of new programs for all sectors of the City, the consumption of airspace at the Brady Road Landfill is expected to decrease substantially over the 20 year planning period. The following figure compares the amount of landfill airspace that could be consumed in the years 2016 and 2031 assuming that no new diversion initiatives are introduced (status-quo system) with the potential airspace consumed if the initiatives recommended in the CIWMP are implemented.

As the figure illustrates, savings in landfill airspace associated with the implementation of the new waste management system could be quite substantial with the use of airspace being reduced by approximately 50% by 2031.[41]

[40] The majority of the information used in this section was obtained from the "Study of Stabilized Landfill Final Report", completed by Gartner Lee Limited in March 2007, which included a compendium of data related to the impacts of diversion and changes in waste streams on landfill performance.
[41] It was assumed that for regular waste, landfill airspace consumption would be based on an assumed in-place density of 700 kg/m^3.

Figure 3.5: Comparison of Estimated Landfill Airspace Consumed at Brady Road under Status Quo and Recommended Waste Management Systems



4.0 System Costs and Financing Strategy

This section presents an overview of the projected operating and capital costs for the recommended residential waste management system as discussed in Section 2.1. Financing options are also identified along with their related advantages and disadvantages in regards to recovery of the projected waste management system costs.

This section does not discuss the potential shift in system costs associated with the potential programs discussed in Section 2.2 regarding IC&I and C&D waste, as the City has yet to finalize any recommended initiatives and as any new initiatives developed to manage waste from that sector will be designed for full cost recovery directly from those sectors. Thus, it is assumed that implementation of the initiatives identified in Section 2.2 would have no 'net' effect on the City's waste management system costs.

4.1 CURRENT WASTE MANAGEMENT COSTS

4.1.1 Summary of Current Costs (2011 Budget)

Table 4.1 below, presents a summary of the 2011 operating budget for solid waste services, as approved by Council. The solid waste budget is consolidated into two main cost centres:

a) A consolidated budget identified as the Solid Waste Utilities forecast that includes all costs and revenues for the portion of solid waste services that is largely funded through non-tax (i.e. non-levy) revenue sources such as tipping fee revenues, sale of recyclables and recycling program funding (from MMSM). This portion of the budget includes: all operations at Brady Road, recycling processing, recycling collection, leaf and yard waste management and diversion in City operations. The principle is that these portions of the solid waste system are largely self funded.

b) A consolidated budget identified as Tax Supported Operations, Refuse Collection forecast, which includes all costs and revenues for the portion of solid waste services that is largely funded through the municipal levy. This portion of the budget includes all garbage and bulky collection services.

The 2011 budget was used as the basis of comparison to determine the potential change in waste management costs associated with the implementation of the recommended system.

Table 4.1: Summary: City of Winnipeg Solid Waste Operations Budget 2011

	2011 Approved Budget
Solid Waste Utilities Forecast	
Expenditures	$23,994,833

Table 4.1: Summary: City of Winnipeg Solid Waste Operations Budget 2011	
Revenues	($23,922,373)
Net Utilities Forecast	$72,460
Tax Supported Operations	
Expenditures	$20,829,527
Revenues	($2,970,000)
Net Tax Supported Forecast	$17,859,527
Total Budget Recovered from the Levy	$17,931,987

In regards to determining the potential effect of the recommended residential waste management system, individual cost components of the recommended system were compared to the appropriate existing expenditures or revenues in the 2011 budget and the difference was calculated. In this fashion the total net change associated with implementing the near and longer term residential system was determined.

Further discussion regarding the determination of the net change in the solid waste budget, is provided in Section 4.3.

4.2 RECOMMENDED SYSTEM COST COMPONENTS

Section 2.1 provides details regarding the estimated capital and operating costs, and potential revenues associated with each of the recommended components of the residential waste management system.

In all cases, the estimates provided in Section 2.1 represent the potential change in waste system costs associated with the first full year of implementation in the near-term, which for most of the system components is 2014, and the costs associated with the longer term system being those projected for 2021 once all of the near and longer term residential system components are in effect.

The following sections provide a summary of the projected costs and revenues, and the key assumptions used to develop these estimates. The cost and revenue estimates are generally very conservative, reflecting some uncertainty regarding the market when the City issues bid opportunities for this infrastructure, as well as maximum tonnage assumptions.

4.2.1 Estimated Costs for Administrative and Implementation Support

The estimated costs for administrative and implementation support are based on the projected increase in permanent and temporary staffing complement as discussed in Section 5.1 of this

report. It is assumed that there would be 4 new permanent positions with at an average annual cost (salary and payroll burden) of $67,500 per position, and in the order of 4.5 temporary positions in effect during 2012 and 2013, at an average annual cost (salary and payroll burden) of $47,250 per position.

In addition to these internal costs, it is also estimated that approximately $400,000 per year for 2012 and 2013 would be required to fund external administrative and implementation support positions.

4.2.2 Estimated Costs for Reduction and Reuse

As discussed in Section 2.1.1.1 of this report, the primary means of implementing the reduction and reuse components of the recommended residential system is through promotion and education.

The operating cost estimates for promotion and education assumed:

- Two new staff positions would be created (total of $190,000 per annum, depending on the level of the positions created).
- Direct costs for promotion and education would be approximately $1.50 per household.
- Household projections based on 2010 baseline, escalated at the same rate as population growth.

4.2.3 Estimated Costs for Resource Recovery

As discussed in Section 2.1.1.2 of this report, the primary costs associated with Resource Recovery pertain to the development and operation of the proposed community recycling centres (CRRCs), including two near-term facilities and two longer-term facilities.

The capital cost assumptions for these facilities were developed based on:

- The design assumptions for each CRRC as discussed in Section 2 of this report, specifically the materials management assumptions that determine the number of bins required.
- Reported capital costs for the primary physical components (pads, roads, scales) and reasonable engineering and design assumptions.
- Reported capital costs for the CRRC equipment (40 yard bins and roll-off trucks).

As noted in Section 2.1.1.2, the capital cost for the Brady Road CRRC was assumed to be less than those in other areas as there is some infrastructure on-site that reduces capital requirements.

The operating cost assumptions for the CRRCs, were developed considering:

- The potential tonnes of materials that could be handled by each facility, considering the estimated spectrum of self-haul materials generated and reasonable capture rates;
- Staffing at the CRRCs (7.5 positions at Brady Road, 11 proposed positions at the Northern CRRC). The proposed staffing is similar to that on-site at similar facilities in other jurisdictions. Assumed pay rates for appropriate union positions at 35% payroll burden.
- The potential annual costs to haul bins to the landfill working face or other location.
- A cost per tonne to manage each material stream as appropriate. It was assumed that for materials like recyclables and LYW, that these would form part of the total tonnes processed, assumed for other system components. Materials such as wood waste, shingles and furniture were assumed to be subject to management fees ranging from $50 to $120 per tonne respectively.

Revenue assumptions were based on:

- 2011 operating budget assumptions of $54/tonne revenue from scrap metal and tires; and
- An increase in the tipping fee charged to residential customers for mixed garbage to $33.50 per tonne, similar to the fee applied to commercial customers. It was assumed that a lower fee would be applied to materials that were appropriately sorted at the CRRC for diversion. A $5 fee for all loads delivered to the CRRC would be applied.
- The net change in revenues was determined by comparing the estimates noted above, with the fees assumed in the 2011 budget.

4.2.4 Estimated Costs for Recycling

Collection

Cost estimates were developed initially through developing a collection system model, to compare the alternative methods of collecting recyclable materials at the curb. The model was used to develop costs for collection across the City using blue boxes (the current approach) and using recycling carts. The outcome of the modeling exercise was that collection using recycling carts was identified to have lower overall collection costs compared to collection using blue boxes, based on increased curbside efficiencies.

The following table briefly summarizes and compares the modeled recycling collection costs for both the blue box and recycling carts as compared to the 2011 budget. The total annual collection cost for recycling cart collection was determined to be $1.8 million less than the modeled blue box collection cost and around $833,000 less than the current 2011 blue box collection cost. In regards to container costs the estimated cost of purchasing 187,000 carts at $50 each was amortized over 10 years at 6% interest. Annual replacement and provision of new carts each year was estimated based on assuming that 2% of the total households served would require replacement/new carts each year.

Table 4.2: Modeled and Current Recycling Collection Costs

	Modeled Annual Cost for Blue Box Collection	Modeled Annual Cost for Recycling Cart Collection	Current Blue Box Collection: 2011 Budget
Annual Collection Cost	$6,482,879	$4,680,616	$5,513,864
Annual Container Cost (amortized cost and replacements)	$204,031	$1,457,365	$0
Total	$6,686,910	$6,137,982	$5,513,864

Processing

As discussed in Section 2.1, the current MRF is near capacity, and additional capacity will be required both to provide for interim increases in tonnages when recycling carts are phased in as of mid-2012, and for the longer term as capture rates increase and quantities of all recyclable material types escalate based on planned programs.

For the purpose of estimating changes in waste system costs, it was assumed that the City would continue to use 45,000 tpy of processing capacity at the Emterra facility at 2011 budgeted costs (approximately $100 per tonne). Tonnage projections were developed based on the estimated capture rates, reflecting reasonable assumptions for increased diversion performance. Over the near term, it is expected that population growth and program changes will result in an increase in the total quantity of recyclables captured and processed of 40,000 tpy. The cost for each tonne of additional processing capacity was estimated based on an assumed cost of $87 per tonne, reflecting conservative modeled estimate for development and operations of a new MRF capable of processing up to 75,000 tpy (additional capacity was assumed to accommodate future tonnage increases.

In regards to revenue, estimates were based on an assumed ‘basket of goods’ value of $85 per tonne. This is a conservative estimate, given that the 2011 basket of good market value assumed in the 2011 budget was $91 per tonne.

The City currently receives funding from MMSM, at 80% of net costs incurred. The revenue estimates included an estimate of 80% of the difference in the net processing costs incurred by the City.

4.2.5 Estimated Costs for Organics

The recommended residential system includes expansion of LYW collection and processing in the near term and consideration of SSO collection and processing in the longer term. The following sections discuss the cost estimates for both program components.

LYW Collection and Processing

LYW collection costs, for bi-weekly seasonal collection across the City, were developed based on application of the same model used to project recycling collection costs. The model determined that the annual cost for this collection service would be approximately $2.8 million, considering the capital and operating costs to run a fleet of nine(9) 32 yard rear-packer trucks from April through to the end of November.

LYW processing costs were determined based on:

- Amortized capital costs (6%, 20 years) for development of an upgraded LYW composting area at Brady Road, $1.9 million for the pad and stormwater pond and $0.3 million for a wheeled loader.
- The labour costs for a dedicated compost operator.
- An assumed operating cost of $50 per tonne, being the current market cost for LYW processing in Ontario. This operating cost would cover the costs to operate and maintain the LYW equipment, costs for services to grind incoming feedstock and to screen finished compost product, and all other incidental costs (such as lab fees etc.).
- An assumption that the City would not earn any revenue from the sale of compost, rather that the City would use this material for beneficial use in City projects.

SSO Collection and Processing

As with the LYW collection costs, the potential cost for SSO collection via green carts was determined through applying the collection model. The model determined that the annual cost for green cart collection would be in the order of $4.2 Million. It was assumed that the City would purchase the smaller 80L wheeled green carts with a locking lid at a cost of $55/unit, for the total number of SFD as of 2017. The total cost for green cart purchase was estimated as $10.9 million, or $1.7 million annually for amortized cart costs plus replacement costs.

SSO processing costs were determined first by estimating the potential tonnage available as of 2017, assuming reasonable recovery rates for a range of organic materials. Overall, it was assumed that in the longer term, the City could capture and process up to 78,000 additional tonnes of organic material at a suitable SSO processing facility, while up to 25,000 tpy of LYW would be composted separately at Brady Road. It was assumed that the new processing facility would process SSO at a cost of $130 per tonne which is a high-estimate of annual processing costs per tonne including amortized capital costs, labour and all other costs incurred to manage this material stream.

4.2.6 Garbage and Bulky Collection

Garbage Collection

Cost estimates were developed through applying the collection system model, to compare the alternative methods of collecting garbage from SFD within a uniform system. The model was used to develop costs for garbage collection across the City using:

a) The automated carts that are already in effect in the north-western portion of the City and manual garbage collection across the rest of the City (a modification of the current approach); and,
b) Using automated carts for all SFD in the City.

The outcome of the modeling exercise was that collection using automated carts was identified to have lower overall collection costs compared to a collection system largely based on manual garbage collection, based on increased curbside efficiencies.

The following table briefly summarizes and compares the modeled garbage collection costs for both the system using largely manual garbage collection and the modeled system using automated carts as compared to the 2011 budget. The total annual collection cost for automated cart collection was determined to be $3.0 million less than the modeled 'manual' garbage collection cost and around $100,000 more than the current 2011 garbage collection cost when the both the annual collection and container costs are taken into account.

Table 4.3: Modeled Manual, Automated Cart and Current Garbage Collection Costs

	Modeled Annual Cost for Largely Manual Garbage Collection	Modeled Annual Cost for Automated Cart Collection	Current Garbage Collection (carts, manual, Autobin): 2011 Budget
Annual Collection Cost	$10,597,622	$6,486,026	$7,472,476
Annual Container Cost (amortized cost and replacements)	$0	$1,122,249	0
Total	$10,597,622	$7,608,275	$7,472,476

In regards to container costs the estimated cost of purchasing 144,000 carts at $50 each was amortized over 10 years at 6% interest. Annual replacement and provision of new carts each year was estimated based on assuming that 2% of the total households served would require replacement/new carts each year.

For the longer-term, additional collection system changes were modeled, to reflect the potential to change garbage collection services should an SSO diversion program be implemented as of 2017. The most significant change would be to transition to a collection system where garbage

was collected bi-weekly while SSO was collected weekly. This is an approach that has been successfully used in other jurisdictions that have implemented SSO programs.

The following table summarizes the potential shift in annual garbage collection costs should the City implement a system of bi-weekly garbage collection as of 2017. A shift to bi-weekly automated cart collection is estimated to decrease annual garbage collection costs by $1.7 million compared to weekly cart collection.

Table 4.4: Modeled Bi-weekly and Weekly Automated Cart Collection Costs

	Modeled Annual Cost for Bi-weekly Automated Cart Collection	Modeled Annual Cost for Weekly Automated Cart Collection	Current Garbage Collection (carts, manual, Autobin): 2011 Budget
Annual Collection Cost	$4,680,616	$6,486,026	$7,472,476
Annual Container Cost (amortized cost and replacements)	$1,122,249	$1,122,249	0
Total	$5,802,866	$7,608,275	$7,472,476

Bulky Collection

In regards to bulky collection, it is recommended that the City continue to provide a call-in service for collection of these items, and that the City transition from the current approach where residents pay $20 for collection of up to 6 items, to an approach where residents are charged $5 per item. It is also anticipated that the impact of moving to automated cart collection, would include increased use of the curbside service, particularly given the phase-out of Autobin service. Overall, it was estimated that the number of potential bulky stops each year would be in the order of 42,000, and that in the order of 169,000 items could be collected annually. At a fee of $5 per item, this could increase the fees collected for bulky goods up to $844,000 annually.

4.2.7 Disposal

No specific changes in waste disposal costs have been estimated for the near or longer term residential programs, other than the additional system components noted and accounted for above (LYW processing, Brady Road CRRC, potential MRF and composting facilities). It is possible that closure of the residential tipping face may result in savings in landfill operating costs through reduced requirements for equipment and labour, however, these resources may be directed elsewhere at the Brady Road site. While the total quantity of residential waste disposed is expected to decrease with the increase in diversion, this generally does not have a significant impact on the resources used to operate the working face of the landfill, as generally the same equipment and operators are required.

The increased diversion of residential waste will decrease consumption of landfill airspace. There is a value associated with each cubic metre of airspace that is 'saved' through diversion.

4.3 RESIDENTIAL SYSTEM COST PROJECTIONS

In order to develop projections for the waste management system costs, 2011 was treated as a 'base year' for comparative purposes and in regards to the current value for the estimated program costs. For each of the recommended system cost components as discussed in Sections 2.1 and 4.2, the potential change in expenditures (new operating costs, amortized capital costs) and potential change in revenues were estimated.

The following table presents a summary of the capital cost projections for implementation of the near and longer term residential waste management system. As discussed in Section 2.1 and 4.2, these capital cost estimates are conservative, trending to the upper end of reported facility costs, particularly in regards to the major new infrastructure components being a new recycling processing and organics processing facility.

In development of the annual operating cost estimates, these capital costs were amortized at a conservative interest rate of 6% over an appropriate period; 10 years for equipment such as carts for collection, 20 years for more permanent infrastructure such as buildings and facilities.

Table 4.5: Summary of Capital Cost Projections - Recommended Residential Waste Management System

	Year 1	Year 2	Year 3	Year 4	Year 5
all estimates in 2011$	**2012**	**2013**	**2014**	**2015**	**2016**
Reuse					
Drop-off Area for Reusable Items					
Recovery					
Brady CRRC		$2,712,500			
Northern CRRC			$3,389,000		
Recycling					
Carts	$9,350,000				
Recycling Depots	$353,000				
Materials Recycling Facility			$20,682,000		
Organics Diversion					
LYW Processing	$2,194,000				
SSO Carts					
Garbage Collection					
Automated Carts	$7,200,000				
Total New Capital	$19,097,000	$2,712,500	$24,071,000	$0	$0
Subtotal Near Term					**$45,880,500**

	Year 6	Year 7	Year 8	Year 9	Year 10
all estimates in 2011$	**2017**	**2018**	**2019**	**2020**	**2021**
Recovery					
Eastern CRRC		$3,389,000			
Western CRRC			$3,389,000		
Organics Diversion					
SSO Carts	$10,923,000				
SSO Processing	$65,000,000				
Total New Capital	$75,923,000	$3,389,000	$3,389,000	$0	$0
Subtotal Longer Term					$82,701,000

Table 4.6 and Table 4.7 present the projected operating cost estimates for the recommended residential waste management system, accounting for the amortized capital costs, new or adjusted operating costs and projected revenues for each component of the system. The total potential change in waste management system costs is summarized and presented on a per household basis, considering the projected number of single family and overall total of residential households in the City over the first ten years of the planning period.

Table 4.6: Summary of Operating Cost Projections - Recommended Near Term Residential Waste Management System (Years 1 to 5)

all estimates in 2011$ Program Component	Year 1 2012*	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016
Administrative and Operational Support					
New Staffing Support (4 permanent, not included in components below)	$270,000	$270,000	$270,000	$270,000	$270,000
Staffing Support for collection transition (4.5 Temporary Positions)	$212,625	$212,625	$0	$0	$0
External Support for Implementation	$400,000	$400,000			
sub-total	$882,625	$882,625	$270,000	$270,000	$270,000
Reduction and Reuse					
Promotion and Education Staff (2)	$189,000	$189,000	$189,000	$189,000	$189,000
Direct Promotion & Education Program Costs (assume $1.50 per HHD)	$439,000	$444,000	$449,000	$454,000	$459,000
Bi-annual Waste Audits	$85,000		$85,000		$85,000
sub-total	$713,000	$633,000	$723,000	$643,000	$733,000
Resource Recovery					
Brady CRRC (operating costs including staff complement)		$620,500	$1,241,000	$1,241,000	$1,241,000
Revenue (sale of scrap metal, tire management fee)		($64,000)	($128,000)	($128,000)	($128,000)
Northern CRRC (operating costs including staff complement)			$732,000	$1,464,000	$1,464,000
Revenue (sale of scrap metal, tire management fee)			($64,000)	($128,000)	($128,000)
Amortized Capital Cost for CRRCs		$118,000	$383,500	$531,000	$531,000
Public Space Recycling Pilot Program (TBD)					
CRRC Tipping Fees (difference from 2011 projections, garbage fee set at $33.50/tonne,)		($655,000)	($857,500)	($1,310,000)	($1,310,000)
sub-total	$0	$19,500	$1,307,000	$1,670,000	$1,670,000

all estimates in 2011$ Program Component	Year 1 2012*	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016
Recycling					
Collection (Change in SFD Residential Collection Cost compared to 2011 budget, transition to carts)	($416,500)	($833,000)	($833,000)	($833,000)	($833,000)
Recycling Depots (bins and truck)	$63,000	$63,000	$63,000	$63,000	$63,000
Annual Cost for Carts (amortized capital plus carts for new households)	$728,500	$1,457,000	$1,457,000	$1,457,000	$1,457,000
Change in Processing cost (reflects increased tonnes of material recovered, projected cost for new MRF)	$1,739,500	$3,479,000	$3,479,000	$3,479,000	$3,479,000
Change in Revenues (sale of recyclables, at 2011$ basket of goods)	($1,560,500)	($3,121,000)	($3,121,000)	($3,121,000)	($3,121,000)
Change in MMSM Funding (assume 80% of change in net processing costs)	($143,200)	($286,400)	($286,400)	($286,400)	($286,400)
sub-total	$410,800	$758,600	$758,600	$758,600	$758,600
Organics Diversion					
LYW Collection (change in annual LYW Collection Cost)	$1,412,000	$2,824,000	$2,824,000	$2,824,000	$2,824,000
LYW Processing ($50 per tonne, plus Staff)	$549,500	$1,099,000	$1,099,000	$1,099,000	$1,099,000
SSO Pilot	$0	$0	$364,000	$364,000	$364,000
SSO Processing (assumes $130/tonne including capital)	$0	$0	$0	$0	$0
SSO Collection (assumes separate green cart collection)	$0	$0	$0	$0	$0
Annual Cost for Containers	$0	$0	$0	$0	$0
Amortized cost of LYW Facility	$191,000	$191,000	$191,000	$191,000	$191,000
sub-total	$2,152,500	$4,478,000	$4,478,000	$4,478,000	$4,478,000
Garbage Collection					
Collection (Change in SFD residential collection cost, transition to automated carts compared to 2011)	($493,000)	($986,000)	($986,000)	($986,000)	($986,000)
Annual Cost for Carts (amortized capital plus carts for new households)	$561,000	$1,122,000	$1,122,000	$1,122,000	$1,122,000
Change in Fees from Bulky Goods (move to $5 per item)	($302,000)	($724,000)	($724,000)	($724,000)	($724,000)

all estimates in 2011$ Program Component	Year 1 2012*	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016
sub-total	($234,000)	($588,000)	($588,000)	($588,000)	($588,000)
Total Change in Expenditures	$5,931,000	$11,034,000	$12,130,000	$12,929,000	$13,019,000
Total Change in Revenues	($2,006,000)	($4,850,000)	($5,181,000)	($5,697,000)	($5,697,000)
Total Net Change in Program Costs	$3,925,000	$6,184,000	$6,949,000	$7,232,000	$7,322,000
Total Change per Single Family HHD	$20.83	$32.50	$36.15	$37.22	$37.28
Total Change per Residential HHD (single and multi-family)	$13.38	$20.88	$23.22	$23.91	$23.95

Table 4.7: Summary of Operating Cost Projections - Recommended Longer Term Residential Waste Management System (Years 6 to 10)

all estimates in 2011$ Program Component	Year 6 2017	Year 7 2018	Year 8 2019	Year 9 2020	Year 10 2021
Administrative and Operational Support					
New Staffing Support (4 permanent, not included in components below)	$270,000	$270,000	$270,000	$270,000	$270,000
Staffing Support for collection transition (4.5 Temporary Positions)	$0	$0	$0	$0	$0
External Support for Implementation					
sub-total	$270,000	$270,000	$270,000	$270,000	$270,000
Reduction and Reuse					
Promotion and Education Staff (2)	$189,000	$189,000	$189,000	$189,000	$189,000
Direct Promotion & Education Program Costs (assume $1.50 per HHD)	$464,000	$469,000	$474,000	$480,000	$486,000
Bi-annual Waste Audits		$85,000		$85,000	
sub-total	$653,000	$743,000	$663,000	$754,000	$675,000
Resource Recovery					
Brady CRRC (operating costs including staff complement)	$1,241,000	$1,241,000	$1,241,000	$1,241,000	$1,241,000
revenue (sale of scrap metal, tire management fee)	($128,000)	($128,000)	($128,000)	($128,000)	($128,000)

all estimates in 2011$ Program Component	Year 6 2017	Year 7 2018	Year 8 2019	Year 9 2020	Year 10 2021
Northern CRRC (operating costs including staff complement)	$1,464,000	$1,464,000	$1,464,000	$1,464,000	$1,464,000
revenue (sale of scrap metal, tire management fee)	($128,000)	($128,000)	($128,000)	($128,000)	($128,000)
Additional CRRCs (East and West)		$1,464,000	$2,928,000	$2,928,000	$2,928,000
revenue (sale of scrap metal, tire management fee)		($128,000)	($256,000)	($256,000)	($256,000)
Amortized Capital Cost for CRRCs	$531,000	$827,000	$1,122,000	$1,122,000	$1,122,000
Public Space Recycling Pilot Program (TBD)	$0	$0	$0	$0	$0
Public Event Recycling Pilot Program (TBD)	$0	$0	$0	$0	$0
CRRC Tipping Fees (difference from 2011 projections, garbage fee set at $33.50/tonne, fee for other materials at $0)	($1,310,000)	($2,215,000)	($3,120,000)	($3,120,000)	($3,120,000)
sub-total	$1,670,000	$2,397,000	$3,123,000	$3,123,000	$3,123,000
Recycling					
Collection (Change in SFD Residential Collection Cost compared to 2011 budget, transition to carts)	($833,000)	($833,000)	($833,000)	($833,000)	($833,000)
Recycling Depots (bins and truck)	$63,000	$63,000	$63,000	$63,000	$63,000
Annual Cost for Carts (amortized capital plus carts for new households)	$1,457,000	$1,457,000	$1,457,000	$1,457,000	$1,457,000
Change in Processing cost (reflects increased tonnes of material recovered, projected cost for new MRF)	$6,373,000	$6,373,000	$6,373,000	$6,373,000	$6,373,000
Change in Revenues (sale of recyclables, at 2011$ basket of goods)	($10,045,000)	($10,045,000)	($10,045,000)	($10,045,000)	($10,045,000)
Change in MMSM Funding (assume 80% of change in net processing costs)	$2,937,600	$2,937,600	$2,937,600	$2,937,600	$2,937,600
sub-total	($47,400)	($47,400)	($47,400)	($47,400)	($47,400)
Organics Diversion					
LYW Collection (change in annual LYW Collection Cost)	$2,824,000	$2,824,000	$2,824,000	$2,824,000	$2,824,000
LYW Processing ($50 per tonne, plus Staff)	$1,099,000	$1,099,000	$1,099,000	$1,099,000	$1,099,000

all estimates in 2011$ Program Component	Year 6 2017	Year 7 2018	Year 8 2019	Year 9 2020	Year 10 2021
SSO Pilot	$0	$0	$0	$0	$0
SSO Processing (assumes $130/tonne including capital)	$9,993,000	$9,993,000	$9,993,000	$9,993,000	$9,993,000
SSO Collection (assumes separate green cart collection)	$4,241,000	$4,241,000	$4,241,000	$4,241,000	$4,241,000
Annual Cost for Containers	$1,703,000	$1,703,000	$1,703,000	$1,703,000	$1,703,000
Amortized cost of LYW Facility	$191,000	$191,000	$191,000	$191,000	$191,000
sub-total	$20,051,000	$20,051,000	$20,051,000	$20,051,000	$20,051,000
Garbage Collection					
Collection (Change in SFD residential collection cost, transition to automated carts compared to 2011)	$0	$0	$0	$0	$0
Collection (Change in SFD residential collection cost, transition to bi-weekly garbage collection compared to 2011)	($1,669,610)	($1,669,610)	($1,669,610)	($1,669,610)	($1,669,610)
Annual Cost for Carts (amortized capital plus carts for new households)	$1,122,000	$1,122,000	$1,122,000	$1,122,000	$1,122,000
Change in Fees from Bulky Goods (move to $5 per item)	($724,000)	($724,000)	($724,000)	($724,000)	($724,000)
sub-total	($1,271,610)	($1,271,610)	($1,271,610)	($1,271,610)	($1,271,610)
Total Change in Expenditures	$30,722,000	$32,572,000	$34,251,000	$34,342,000	$34,263,000
Total Change in Revenues	($9,397,000)	($10,430,000)	($11,463,000)	($11,463,000)	($11,463,000)
Total Net Change in Program Costs	$21,325,000	$22,142,000	$22,788,000	$22,879,000	$22,800,000
Total Change per Single Family HHD	$107.38	$110.23	$112.15	$111.32	$109.65
Total Change per Residential HHD (single and multi-family)	$68.98	$70.81	$72.04	$71.51	$70.44

As indicated in Table 4.6, in the near term the net cost for solid waste management is estimated to increase by up to $7.3 million annually. Overall the potential shift in net system costs can be summarized as follows:

- An increase in administrative cost of around $900,000 annually in the first couple of year, declining to around $300,000 from 2014 onwards.
- An increase in net costs related to waste reduction and reuse, primarily for promotion and education, of up to $733,000 annually.
- An increase in net costs related to resource recovery of around $1.7 million annually, primarily for the operation of two new community resource recovery centres.
- An increase in the net costs associated with recycling of around $800,000 mostly due to increased costs associated with automated carts and increased processing costs. Note: this is likely an overestimate, given that MMSM funding for the City would be adjusted.
- An increase of $4.5 million annually for the collection and composting of leaf and yard waste.
- A decrease in net garbage and bulky waste collection costs of around $600,000 annually.

Overall in the near term, the net change per residential household (all single and multi-family households) is estimated to be approximately $23 per household. If the net change was allocated to single family dwellings only the net change per SFD is estimated to range from $36 to $37 per SFD (2014).

As indicated in Table 4-7, over the longer term, two new program elements are expected to increase net system costs:

- The development of two additional CRRC's is expected to add another $1.5 million annually to the net cost for resource recovery.
- Implementation of a source separated organics program is expected to increase net costs by up to $15.5 million annually. It should be noted however, that this is a very conservative estimate.

Some further savings are expected in longer term garbage collection costs and it is expected that the net cost of recycling will continue to improve.

Overall in the longer term, the net change per residential household (all single and multi-family households) is estimated to be approximately $73 per household. If the net change was allocated to single family dwellings only the net change per SFD is estimated to be approximately $113 per SFD (2021).

4.4 FINANCING THE RECOMMENDED SYSTEM

4.4.1 Current Financing Approach (2011 Budget)

In regards to the current financing approach, as noted in Section 4.1, the net solid waste costs after all other revenues sources are recovered through the levy. Table 4.8 below, provides an overview of the property classifications, portioned assessment, overall 2011 levy per property classification and allocation of the waste portion of the levy in 2011. It is followed by a summary of the cost of waste management recovered from an 'average' single family residential property.

Table 4.8: 2011 Levy and Solid Waste Levy Apportionment

Property Classification	Class Code	Portioned Assessment	Amount of Levy	Percentage of Levy	Net 2011 Waste Budget - Apportioned
Residential 1 (SFD)	10	16,565,316,850	$253,366,521	58.83%	$10,550,258
Residential 2	20	2,095,002,040	$32,043,056	7.44%	$1,334,283
Residential 3	80	1,176,160,635	$17,989,377	4.18%	$749,083
Farm	30	24,001,833	$367,108	0.09%	$15,286
Institutional	40	621,219,841	$9,501,557	2.21%	$395,648
Designated Higher Education	41	-		0.00%	$0
Pipelines	51	12,678,000	$193,910	0.05%	$8,074
Railways	52	43,148,313	$659,953	0.15%	$27,481
Designated Recreational Property	70	8,441,560	$129,114	0.03%	$5,376
Other	60	6,844,230,474	$104,682,506	24.31%	$4,359,011
Legislative Buildings	60	8,064,335	$123,344	0.03%	$5,136
		27,398,263,881	$419,056,446		
City Owned Properties and Hydro Lines			$11,583,725	2.69%	$482,350
		Total	$430,640,171		$17,931,987

Table Note 1: Summary of Municipal Taxes and Payments in Lieu of Taxes 2011

Table Note 2: Adapted from Page 7, 2011 Short-term Taxation Information

Table Note 3: City budget adopted March 22. Estimated assessment roll as at January 4, 2011 used to calculate the rate to meet the 2011 budget requirements.

Table 4.9: Municipal Taxes Allocated per Typical (average) Single Family Household	
2011 Reported Levy	$1,429
Average Home Assessment (2010)	$207,548
Portioned at 45%	$93,396.60
Waste Portion of Levy 2011	$59

As indicated above, the property taxes for an average household in 2011 include approximately $59 annually for solid waste management services.

As 2011 was treated as the 'base year' for waste management expenditures, the potential effect of implementing the recommended waste management system in regards to the potential change in the levy, was determined for a 'typical' single family household, assuming that the net change in waste management costs would be apportioned similar to 2011, and that the portion allocated to a typical household would remain as presented in Table 4.9.

The potential change in residential program costs over the near and longer term, are summarized briefly below in Table 4.10. The changes in costs are discussed in terms of allocation to single family households, in that the majority of new program components affect the programs offered to single family households. The near term costs identified are those for 2014, as 2012 and 2013 represent transition years. 2014 represents the first full year in which the recommended near term system would be in effect.

Table 4.10: Increase in Expenditures per Single Family Household: Residential Waste Management System

	Potential Increase in Net Expenditures	Increase if allocated only to Single Family Residential Dwellings	Total Net Expenditures (if increase allocated to Single Family Residential Dwellings)
Current (2011)	2011 Solid Waste Portion of the Levy per Average SFD		**$59**
Near Term (2014)	$7 Million	$37	$96
Longer Term (2021)	$23 Million	$113	$172

This cost per household analysis presented above, does not reflect a financing approach, rather it simply reflects the allocation of the additional net program costs across the estimated number of single family households in the City.

4.4.2 Development of a Solid Waste Reserve Fund

In addition to examining mechanisms to recover net system costs as discussed below, the potential for reserve fund development was also examined. A solid waste reserve fund could be established through a number of mechanisms, for the purpose of funding future capital costs for waste management. This would reduce the year–to-year fluctuation in taxes and could reduce the overall costs of implementing the recommended system through reducing borrowing costs.

Examining the potential capital budgets identified to support the transition to an enhanced waste management system, indicates that there are a number of periodic capital investments that could be financed through reserves. A reserve fund of in the order of $20 million, would finance the cost of organic carts or replacement of the kitchen. For both options for net cost recovery, there are means of setting aside reserves these are also discussed below.

The Solid Waste Reserve Fund should be set up as a reserve dedicated to the funding of solid waste infrastructure, to allow the City to self-finance at least a portion of new capital investment required for the CIWMP. Funds directed to the Solid Waste Reserve, could include both the amount specifically identified in the annual budget or 'flat rate' as discussed below, and potentially any annual revenue surpluses from sources such as landfill tipping fees or others.

4.4.3 Financing Options – For Recovery of Net System Costs

Two options for recovery of net system costs have been assessed as part of the planning process:

- **Option 1:** continuation of the current approach to funding the system, where the net costs of waste management are recovered through the Levy. Additional tax support of up to $7 million annually, plus the funding allocation for reserve fund development would be required in the near term.
- **Option 2:** Applying a "Flat Rate" per Single Family Residential Household to recover a portion of the system costs. Under this approach, the City could consider developing a charge for each single-family residential premise based on a flat rate reflective of the cost of single family residential garbage collection and including provisions for reserve fund development.

Other financing options were initially considered (e.g. direct charge per bag of waste), however, they were not reasonable to carry forward given that it is recommended that the City move to a uniform residential collection system that collects garbage in automated carts.

The two financing options are discussed below.

4.4.4 Option 1: Continue Current Financing Approach (recovery of all net costs through the Levy)

Currently, the net costs of waste management (i.e. the net cost of $18 million in the 2011 budget), is recovered through municipal taxes (otherwise referred to as the levy). Based on review of the 2011 short-form taxation information provided by the City, in the order of 59% of the overall amount levied in 2011 will be recovered from the single family residential portion of the tax base. In regards to the allocation of the 2011 net waste management costs, this would involve recovery of $10.6 million from single family residential property owners.

Table 4-11 below, provides an overview of the allocation of baseline solid waste costs across the tax base, and the allocation of 2014 net program cost increase along with a reserve fund contribution in the order of $1.9 million annually, assuming that there is no change in the mill rate or portioned assessment. A reserve fund contribution of $1.9 million annually would be required to develop a solid waste reserve fund in the order of $20 million as of 2021.

In the order of $5.2 million of the increase in net waste management costs would be allocated to the single family residential sector.

Table 4.11: Allocation of 2014 Waste Management Costs Under Option 1

Property Classification	Class Code	Percentage of Levy	Net Baseline Waste Budget - Apportioned	Net Waste Cost Increase (2014) - Apportioned	Total Waste Budget Apportioned
Residential 1 (SFD)	10	58.83%	$10,550,258	$5,206,296	$15,756,555
Residential 2	20	7.44%	$1,334,283	$658,436	$1,992,719
Residential 3	80	4.18%	$749,083	$369,654	$1,118,737
Farm	30	0.09%	$15,286	$7,544	$22,830
Institutional	40	2.21%	$395,648	$195,243	$590,890
Designated Higher Education	41	0.00%	$0	$0	$0
Pipelines	51	0.05%	$8,074	$3,985	$12,059
Railways	52	0.15%	$27,481	$13,561	$41,042
Designated Recreational Property	70	0.03%	$5,376	$2,653	$8,029
Other	60	24.31%	$4,359,011	$2,151,066	$6,510,077
Legislative Buildings	60	0.03%	$5,136	$2,535	$7,671
				$0	0
City Owned Properties and Hydro Lines		2.69%	$482,350	$238,028	$720,378
		Total	$17,931,987	$8,849,000	$26,780,987

Assuming that there is no change in the mill rate or portioned assessment, it is estimated that the potential change in the levy for a typical single family household, once the net costs of $8.85 million are proportionately allocated across the tax base (59% to the single family residential sector), would be approximately $29, or a 2% increase in the overall Levy as indicated in the Table below.

Table 4.12: Allocation of 2011 and Projected 2014 Waste Costs to the Single Family Residential Tax Base (Financing through Option 1)

Municipal Taxes Allocated per Typical Household	
Average Home Assessment (2010)	$207,548
Portioned at 45%	$93,396.60
Calculated Levy 2011	$1,429
Waste Portion of the Levy (2011)	$59
Calculated tax impact - Increase in Waste Management Costs (2014)	$29
Total per Household Charge	**$89**
Percent Increase in overall charge to a typical Single Family Household	2%

Should the City choose to recover the net costs of the recommended system from the Levy, this would:

- Recover the net costs of the system from the entire tax base, from all sectors, such that the single family residential sector would be levied just under 60% of the net change in program costs.
- Not be directly reflective of the costs of providing services to each sector, as this would allocate a portion of the additional program costs to the multi-family sector, institutions and other portions of the property tax base. While some of the additional programs identified in the recommended residential system, would directly benefit the entire residential sector in the City (e.g. $3 to $4 million of the additional net system costs reflective of increased promotion and education and development of the proposed CRRCs), other programs such as the leaf & yard diversion program provide direct benefit largely to the single family sector.
- Allocate the program costs to the residential sector using a process that is reflective of property value, not the cost of providing service to each residential property. Thus, residents in a higher value property would generally pay more than the actual cost of providing service to that property, while residents in lower value properties would generally pay less than the cost of providing waste services to that property.
- Result in an increase in the portion of the levy associated with waste services of up to $7.3 million as of 2014, an increase of 39% in the waste portion of the levy compared to 2011. Overall, the increase in waste management expenditures is estimated to increase the levy by 2% compared to 2011.
- Not generate any specific reserves that could be used to offset future capital cost requirements, particularly for expansion of the residential system.

There is merit in considering an option (Option 2 below) where some of the direct cost of service provision to the single family residential sector, is directly recovered from that sector.

4.4.5 Option 2: Applying a “Flat Rate” per Single Family Residential Household to Recover a Portion of System Costs

An alternative approach would be to recover a portion of the waste management system costs that are directly applicable to the single family residential sector from that sector, through the application of a ‘Flat Rate’.

In most jurisdictions that use a “Flat Rate”, it is used to recover a portion of the solid waste system costs. Generally it is used to recover costs for garbage collection and disposal from the residential sector, so that the residential sector pays a cost that is reflective of the cost of providing garbage collection service to residential homes and for the disposal of this waste.

In the near term, the projected cost of garbage collection for the single family sector is in the order of $7.6 million annually. If a flat rate were used to recover the cost of garbage collection from this sector, considering the current and projected number of household in the City, it would

be in the order of $40 per household. A flat rate of $50 per household would recover the cost of garbage collection and would provide for development of a reserve fund in the order of $20 million by 2021, to cover longer term capital costs such as the cost of implementing organics collection (e.g. cost of providing organics carts).

Under this scenario, the cost for diversion would remain on the tax supported portion of the budget. The philosophy is that all sectors of the City benefit from increased diversion, through the savings of landfill capacity and the avoided impacts to the environment.

If a flat rate were set to recover the cost of single family residential garbage collection ($50 per household), then the expenditures recovered through the Levy are estimated to remain at $19 million. No increase in the Levy would be required to support implementation of the recommended CIWMP in the near term.

Should this option be implemented by the City, consideration should also be given to recovering the cost of garbage collection from the Multi Family sector directly from that sector, as it would be unreasonable for other sectors of the tax base to be responsible for funding a portion of that cost. The 2011 budget identifies the cost for garbage collection for the Multi Family sector to be in the order of $3.4 million. In calculating the apportionment of solid waste division costs to the Levy, this amount could be pulled out of the net amount allocated across all sectors of the tax base, and allocated specifically to the Residential 2 and Residential 3 sectors.

Table 4-13 below, provides an overview of how waste management costs would be allocated under Option 2, should the cost of garbage collection be allocated to the Single Family residential sector under a flat rate and the cost of garbage collection from multi-family homes be allocated to those residential sectors.

Table 4.13: Allocation of 2014 Waste Management Costs Under Option 2

Property Classification	Class Code	Percentage of Levy	2014 Waste Budget - Apportioned through Levy	2014 Allocated Garbage Collection Costs (SFD Flat Rate, MFD Allocation)	Total Waste Budget Apportioned
Residential 1 (SFD)	10	58.83%	$8,217,834	$7,472,476	$15,690,310
Residential 2	20	7.44%	$1,039,303	$2,203,698	$3,243,001
Residential 3	80	4.18%	$583,478	$1,237,184	$1,820,662
Farm	30	0.09%	$11,907	$0	$11,907
Institutional	40	2.21%	$308,179	$0	$308,179
Designated Higher Education	41	0.00%	$0	$0	$0
Pipelines	51	0.05%	$6,289	$0	$6,289
Railways	52	0.15%	$21,405	$0	$21,405

Designated Recreational Property	70	0.03%	$4,188	$0	$4,188
Other	60	24.31%	$3,395,332	$0	$3,395,332
Legislative Buildings	60	0.03%	$4,001	$0	$4,001
				$0	$0
City Owned Properties and Hydro Lines		2.69%	$375,713	$0	$375,713
			$13,967,629	$10,913,358	$24,880,987

Assuming that there is no change in the mill rate or portioned assessment, it is estimated that the recovery of waste management costs through the levy would decrease from $59 (2011) to $46 per household. Combined with a Flat Rate of $50 per household, the total annual charge per single family household would be approximately $96 annually.

Table 4.14: Allocation of Projected 2014 Waste Costs to the Single Family Residential Tax Base (Financing through Option 2)

Municipal Taxes Allocated per Typical Household	
Average Home Assessment (2010)	$207,548
Portioned at 45%	$93,396.60
Calculated Levy 2011	$1,429
Waste Portion of Levy 2014	$46
Flat Rate: Increase in Annual Waste Management Charges (2014)	$50
Total per Household Charge	**$96**
Percent Increase in overall charge for a typical Single Family Household	3%

On an annual basis, when compared with financing through Option 1, this is only $7 more annually for a typical single family household, for a financing approach that is more equitable for the entire tax base and that includes provisions for developing reserve funds.

Under the ‘Flat Rate’ concept, the City would have the option of developing a rate structure, where a portion of the rate is set to recover direct program costs for single family residential garbage collection and a portion of the rate is allocated to reserve fund development. These reserves could be dedicated to fund future programs offered to the single family sector such as implementation of source separated organics collection.

5.0 Implementation Plan

5.1 STAFF SUPPORT FOR IMPLEMENTATION

The current staffing complement of the Solid Waste Services at the City of Winnipeg includes in the order of 48 full time equivalents (FTEs), and is reflective of the current status of the waste management system, which includes administration of garbage and recycling collection, administration of the current recycling contract and operations at Brady Road.

The current staffing complement, particularly in regards to administration, promotion & education and operational program support is low for a City of this size in Canada and is considerably less than the staff complement fulfilling these roles in municipalities with programs similar to those proposed for the City (e.g. the City of Hamilton, Region of Niagara, Region of Peel). The difference in staffing complement is primarily in that these jurisdictions have a larger complement of planning & administrative staff allocated to assessing current program performance and supporting implementation of new programs, as well as dedicated communications specialists to support their respective promotion and education programs.

Table 5.1 presents an overview of the current staff positions within the Solid Waste Services division, as well as the proposed staffing changes as discussed in Section 2 of this report and as discussed below in regards to administrative support staff.

Table 5.1: Overview of Current and Proposed Staff

Staff Positions 2011	Proposed Near-Term Staff Positions
ADMINISTRATION	
Manager of Solid Waste	Manager of Solid Waste
Solid Waste Process Coordinator	Solid Waste Process Coordinator
Engineer Designate	Engineer Designate
Secretary / Receptionist	Secretary / Receptionist
Yard Clerk / Invoice Processing Clerk	Yard Clerk / Invoice Processing Clerk
	Promotion and Education Specialists - 2 total permanent
	Project Coordinators (2 temporary)
	Administrative Support (1.5 temporary)
	Process Coordinator (WAPSO IV, 1 temporary)
BY-LAW ENFORCEMENT	
By-law Officer	By-law Officer (2) – add a 2nd permanent position
GARBAGE COLLECTION CONTRACTS	
Garbage Collection Supervisor	Garbage Collection Supervisor
Contracts Foreman – 3 total	Technologist III (1 permanent)

Staff Positions 2011	Proposed Near-Term Staff Positions
Garbage Helper	Garbage Helper
PLANNING & ENVIRONMENTAL	
Planning & Environmental Engineer – 2 total	Planning & Environmental Engineer – 2 total
Environmental Technologist II – 2 total	Environmental Technologist II – 2 total
	Project Coordinator
WASTE DIVERSION	
Supervisor of Waste Diversion	Supervisor of Waste Diversion
Recycling Contracts Foreman -Blue Box/Carts/Bins	Recycling Contracts Foreman -Blue Box/Carts/Bins
Recycling Operator III – 5 total	Recycling Operator III – 5 total
Recycling Helper – 3 total	Recycling Helper – 3 total
Waste Diversion Technologist III	Waste Diversion Technologist III
	Technologist III – LYW Composting
DISPOSAL	
Supervisor of Disposal	Supervisor of Disposal
Disposal Technologist III – 3 total	Disposal Technologist III – 3 total
Landfill Foreman – 2 total	Landfill Foreman – 2 total
Operator IV – 3 total	Operator IV – 3 total
Traffic Director / Landfill Helper – 7 total	Traffic Director / Landfill Helper – 7 total
Operator IV – 2 total	Operator IV – 2 total
	Operator IV - (6 new positions for CRRCs)
	Disposal Technologist III (2 new position for CRRCs)
	Disposal Technologist II (2 new positions for CRRCs)
	Technical Assistant (8.5 new positions for CRRCs)
FINANCE & ADMINISTRATION	
Financial Analyst	Financial Analyst
Landfill Billing Clerk	Landfill Billing Clerk
Clerk B – 5 total	Clerk B – 5 total
CUSTOMER SERVICE	
Customer Service – 2 total	Customer Service – 2 total

In order to implement the recommended system in the near-term it is recommended that the City increase the staffing complement to include additional resources as follows:

- A dedicated implementation team that includes Solid Waste administrative and program management staff. As noted above, four and a half (4.5) temporary positions and one (1) permanent positions have been identified to provide support for implementation of the near-term programs in 2012 and 2013.

- Given the complexity and scope of the plan, external support through consultation services is also recommended. This will be of critical importance to support the bid opportunities for the potential new MRF and composting facility, where detailed technical specifications will be required. This will also allow for the City to seek advice and support for innovative procurement approaches and to implement best practices for critical system components such as the new collection contracts.
- A combination of one new permanent and four and a half (4.5) temporary staff to provide support for the implementation of the four new curbside programs that would be phased in through 2012 including: bi-weekly LYW collection, automated garbage cart collection, recycling cart collection and the $5/item bulky collection service.
- 19.5 operational staff to manage and operate the CRRCs and LYW composting facility included in the near-term system. Note: the estimates do not include a full staff complement for City management of any new MRF or a centralized composting facility for composting food residuals, as it is more likely that the City would contract for these services at some future date when this capacity is developed.
- One new administrative staff and one additional by-law enforcement staff, to administer and support the new programs.
- Dedicated promotion and education resources (2 positions), to support the proposed promotion and education, and community based social marketing components. The allocation of dedicated communications resources will be critical to the success of the proposed initiatives.

The permanent staffing increase would be in the order of 24.5 positions, increasing the department to 72.5 staff in the near term. In the order of 4.5 temporary staff positions have been identified to support implementation of new programs in 2012/2013.

Any longer term staffing needs would be reported on separately prior to completion of near term projects and after detailed planning for the longer term projects is completed.

5.2 IMPLEMENTATION SCHEDULE FOR THE RECOMMENDED SYSTEM

Section 2.1 of this report presents the recommended residential integrated waste management system for the City for the next 20 years. As discussed in Section 2.1, some program components are slated to be implemented in the near-term within the first five years of approval of the CIWMP and some in the longer-term such that they would be in effect within 10 years of approval of the CIWMP. The following two subsections of this report present the implementation timelines for the near term system (2011 to 2016) and for the longer-term system (implemented by 2021).

5.2.1 Implementation Schedule for the Recommended Near-Term Residential System: 2011-2016

As described in detail in Section 2.1 of this report, many of the recommended programs are scheduled for implementation in the first few years of the planning period (2011, 2012, 2013

etc.). During this period, a significant level of effort will be required and hence more staff including a number of temporary positions will be required (as discussed in Section 5.1). The successful implementation of the near-term initiatives will be vital to the City achieving its waste diversion goals while also laying the foundation for program components that will be introduced over the longer-term.

Figure 5.1 provides a high level overview of the implementation schedule for the near-term residential waste management system. As the figure illustrates, the vast majority of near-term programs will be in operation before the end of 2013.

Figure 5.1 also illustrates the expected increase in diversion that will accompany the implementation of new programs. By 2016, it is expected that the City's residential waste diversion rate will have increased from 15% to 35%.

Table 5.2 lays out the detailed implementation schedule for each program that makes up the near-term residential system.

Figure 5.1: Proposed Implementation Schedule for the Near-Term Residential System

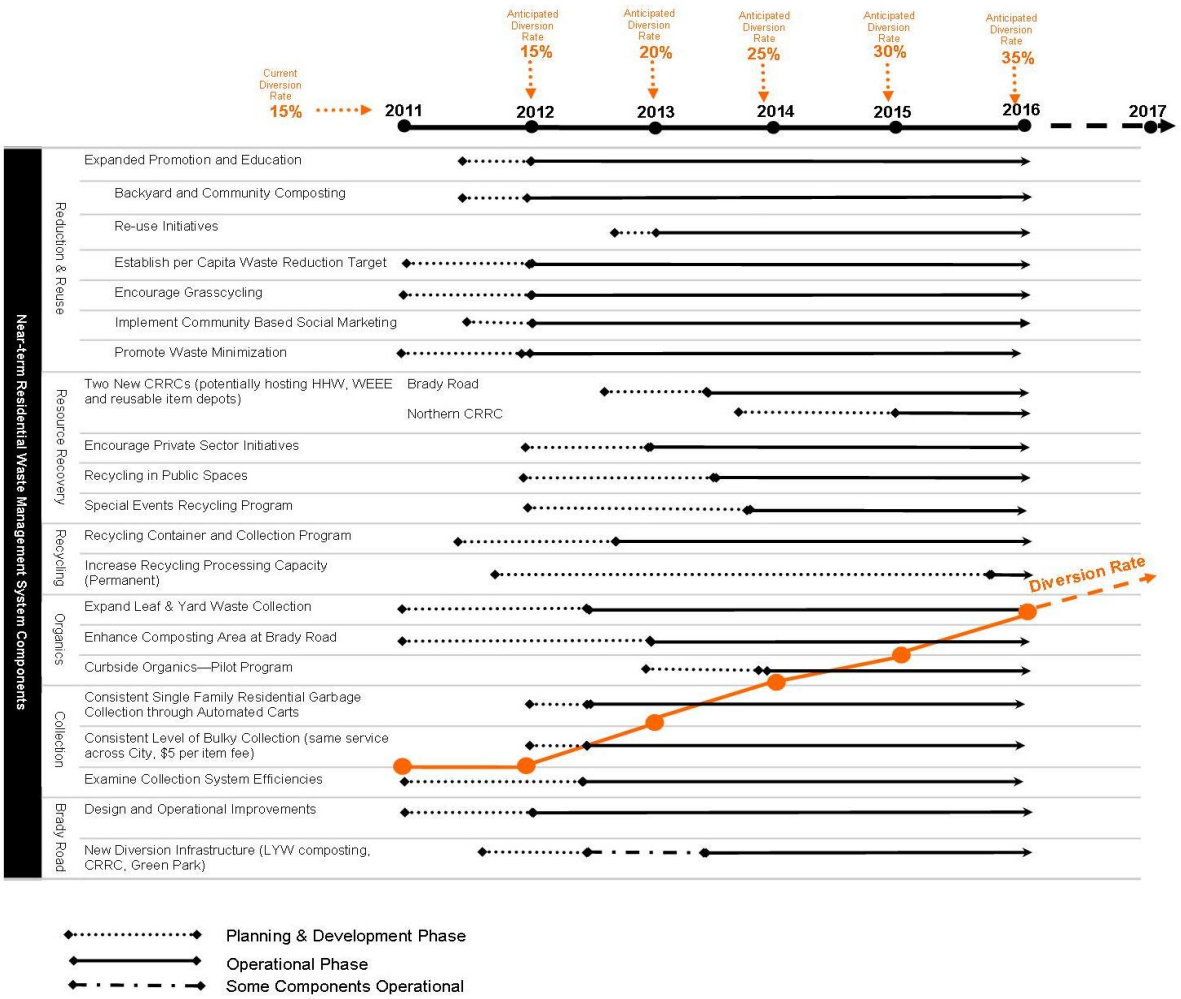


Table 5.2: Implementation Schedule for the Recommended Near-Term Residential System: 2011-2016

Program	Year					
	2011	2012	2013	2014	2015	2016
Waste Reduction and Reuse						
Expanded Promotion and Education	▪2011: Approval by Council by September for permanent staff ▪Q1 2012 additional permanent Staff (communications), integrated into Solid Waste Division. ▪Q4: Review current P&E initiatives, identify components with proven history of success in Winnipeg ▪Q4: Develop Year 1 Communications Plan (internal development – no contracting of services)	▪Q1: Implement CIWMP P&E campaign, including branding and other materials to support roll-out of CIWMP ▪Develop Year 2 Communications Plan	▪Q1: Implement Year 2 P&E campaign, including branding and other materials to support roll-out of CIWMP ▪Develop Year 3 Communications Plan	▪Q1: Implement Year 3 P&E campaign, including branding and other materials to support roll-out of CIWMP ▪Develop Year 4 Communications Plan	▪Q1: Implement Year 4 P&E campaign, including branding and other materials to support roll-out of CIWMP ▪Develop Year 5 Communications Plan	▪Q1: Implement Year 5 P&E campaign, including branding and other materials to support roll-out of CIWMP ▪Develop Year 6 Communications Plan
Backyard and Community Composting		▪Promote as part of overall P&E campaign.	▪Promote as part of overall P&E campaign.	▪Promote as part of overall P&E campaign.	▪Promote as part of overall P&E campaign.	▪Promote as part of overall P&E campaign.
Re-use Initiatives		▪Q4: Gather information on current best practices in the community related to re-use. Hold meetings with existing community organizations.	▪Q1: Develop Re-use Guide. ▪Q2: Roll-out of Promotional Campaign and first series of community re-use events. ▪Determine if Re-use components would be included at Brady Road CRRC (e.g. reuse drop-off area)	▪Continue to promote reuse ▪Determine if Re-use components to be included at a 'Winnipeg North' CRRC (e.g. reuse drop-off area)	▪Continue to promote reuse	▪Continue to promote reuse
Establish a Per Capita Residential Waste Reduction Target	▪Set per capita waste diversion target of 1% per capita waste reduction per annum (i.e. generate 1% less waste each year) ▪Tie into target material streams (e.g. PET water bottles, disposable utensils and dishes, film plastic bags). ▪Review current disposal profile, identify on a preliminary basis some target materials and/or waste generating behaviours. ▪Review 2010 tonnages and 2011 year-to-date tonnages. Update per capita waste generation rate estimates. ▪Q4: RFP for consulting services, 2012 waste audits (possible earlier in 2011)	▪Q1: Initiate seasonal residential waste audit (possibly move up to start the fall of 2011). Report trends and progress towards target. This audit will serve as the baseline to which residential diversion progress can be compared. ▪Q4: Roll-out of campaign for per Capita Waste Reduction (monitoring indicator is per capita waste reduction rate).	▪Promote per capita waste reduction target and target behaviours & materials	▪Promote per capita waste reduction target and target behaviours & materials ▪Second series of seasonal residential waste audits. Report trends and progress towards target.	▪Promote per capita waste reduction target and target behaviours & materials	▪Promote per capita waste reduction target and target behaviours & materials ▪Third series of seasonal residential waste audits. Report trends and progress towards target.
Encourage Grasscycling	▪Review current grasscycling materials.	▪Roll-out new campaign to correspond to the new growing season.	▪Continue grasscycling campaign	▪Continue grasscycling campaign	▪Continue grasscycling campaign	▪Continue grasscycling campaign
Implement Community Based Social Marketing	▪Identify all near-term CIWMP components to be supported by social marketing campaign. ▪Test social marketing approaches through collection pilot program undertaken in Autobin area	▪Roll-out of campaign to support transition to uniform collection service and other program changes (LYW collection, CRRCs).				
Promote Waste Minimization		▪Ongoing: dialogue with the Province. ▪Participate at provincial/federal level – boards, workshops on policy & regulatory change.	▪Ongoing: dialogue with the Province. ▪Participate at provincial/federal level – boards, workshops on policy & regulatory change.	▪Ongoing: dialogue with the Province. ▪Participate at provincial/federal level – boards, workshops on policy & regulatory change.	▪Ongoing: dialogue with the Province. ▪Participate at provincial/federal level – boards, workshops on policy & regulatory change.	▪Ongoing: dialogue with the Province. ▪Participate at provincial/federal level – boards, workshops on policy & regulatory change.

Program	Year					
	2011	2012	2013	2014	2015	2016
Resource Recovery						
Two New CRRCs (potentially providing a location for depots to also manage HHW, WEEE, and reusable items)		▪ Q3: Issue and award RFP for design and engineering of Brady Road CRRC. ▪ Q4: Consultant to engage local marketplace to confirm materials handling options. ▪ Q4: Design of Brady Road CRRC, development of specifications.	▪ Q1: Issue and award tenders for construction of Brady Road CRRC. Issue and award tenders for equipment supply (roll-off bins, truck). ▪ Q1: Develop tipping fee structure, reflecting cost of service but providing incentive for diversion VS disposal. ▪ Q2: First phase of Brady Road CRRC is operational. ▪ Q3: Review Brady Road CRRC operations, make any necessary design modifications for Northern CRRC.	▪ Q1: Siting process for Northern CRRC. ▪ Q2: RFP for design and engineering services for Northern CRRC. ▪ Q3: Design of Northern CRRC, development of technical specifications ▪ Q4: Issue tenders for construction of Northern CRRC. Issue tenders for equipment supply (bins, truck).	▪ Q2: first phase of Northern CRRC is operational.	
Encourage Private Sector Initiatives		▪ Engage local marketplace to confirm materials handling options.	▪ Expand recovered material streams should markets/partnerships to recover additional materials become available.			
Recycling in Public Spaces	▪ Pilot in public spaces. ▪ Q4: Discussions with CBCRA and MMSM regarding development and implementation of program in Winnipeg.	▪ Q2: Audits of current litter bins/containers. ▪ Q2 to Q4: Program design.	▪ Q2: Potential program roll-out.			
Special Events Recycling Program	▪ 2011/12: Meet with major event organizers, determine participants for pilot program.	▪ Assess potential waste streams and volumes generated – discussions with CBCRA	▪ Undertake pilot programs, complete program design	▪ Roll-out program, potentially amend permitting process to mandate recycling (and composting if desirable) at all events.		
Recycling						
Increase Recycling Container Capacity and Adjust Collection Program	▪ Q3/Q4: Take appropriate measures to extend current recycling collection contract. Also work on any necessary extensions of garbage collection contracts. ▪ Q3: Issue RFP for Consulting Support services (bid specifications for cart supply and collection contract) – need integrated team including consulting support and internal resources. ▪ Q2 1: Issue RFQ for short term recyclables processing as early as possible (over summer 2011). Make decision regarding development of longer term processing capacity at Brady Road. ▪ Q3: Review and update baseline dataset for program roll-out in 2012. ▪ Early Q4: Issue RFP for all collection services provided to SFDs. Award by Q1 2012. ▪ Early Q4: Issue RFP for provision of carts (garbage, recycling). Secure City warehousing to support program/City inventory system.	▪ Q1 2012: Award new Contract for SFD collection services (recycling, garbage, LYW and bulky waste) ▪ Q1 2012: Award contract for provision of carts for garbage and recycling ▪ Q1/Q2: Develop and implement Promotion and Education Campaign. ▪ Q3: Cart-based collection phased in across City. Ensure lag between cart delivery and start date of new service is short.				

Program	Year					
	2011	2012	2013	2014	2015	2016
Recycling Depots and Processing (Material Recovery Facilities)	▪ Q3: Facility siting – determine if Brady Road is best host site for long-term processing. ▪ Q4: Issue bid opportunity for short-term processing capacity, to be available as of mid-2012. ▪ Q3/Q4: Decide if depots will be operated by the City or under contract. Decide if current arrangement for fibre management will remain.	▪ Q1: tender for depot equipment (bins, front-end truck) ▪ Q1: Decide if include depot operation within next collection contract for multi-residential recycling		▪ Q1: Issue RFP for consulting support services for new longer term MRF capacity. ▪ Q3: Issue bid opportunity for new permanent MRF capacity. Award by Q1 2015.	▪ Q1: Award contract for development of new MRF capacity ▪ Q2: Begin facility development.	▪ Potential facility commissioning. ▪ Review operating scenario, determine longer-term approach for managing recyclables (role of two MRF system)
Organics						
Expand Leaf & Yard Waste Collection	▪ Early Q4: Include LYW collection in RFP for all collection services provided to SFDs. Award byQ1 2012. – See above	▪ Q1 2012: Award new Contract for SFD collection services (recycling, garbage, LYW and bulky waste) ▪ Q1/Q2: Develop and implement Promotion and Education Campaign. ▪ April 2012: Program implemented across the City.				
Enhance Composting Area at Brady Road		▪ Q1: Issue RFP for consultant services for design & engineering. ▪ Early Q2: issue and award tender for construction of LYW facility. Issue and award tender for equipment supply. ▪ By end of Q1: Hire operating staff – training of staff to happen in Q2 2012. ▪ End of Q2: construct LYW facility.				
Collection and Processing of Source Separated Organics			▪ Issue RFQ for SSO processing capacity, determine qualified vendors.	▪ Operate Organics Pilot. ▪ Issue and award RFP for SSO processing capacity.	▪ Operate Organics Pilot. ▪ SSO Processing facility development.	▪ Operate Organics Pilot. ▪ SSO Processing facility development. ▪ Issue and award RFP for SSO collection, as part of RFP for new Collection contract to start as of mid-2017 ▪ Issue and award bid opportunity for green cart provision and roll-out in 2017.
Collection						
Consistent Single-Family Residential Garbage Collection Through Automated Carts	▪ Take appropriate measures to extend existing contracts as needed (extend current garbage collection contracts to January 31, 2013 to allow for coordinated roll-out of the new program). ▪ Early Q4: Include Cart Based garbage collection in RFP for all collection services provided to SFDs. Award by Q1 2012 – See above. ▪ Early Q4: Issue RFP for provision of carts (garbage, recycling). Secure City warehousing to support	▪ Q1 2012: Award new Contract for SFD collection services (recycling, garbage, LYW and bulky waste) ▪ Q1 2012: Award contract for provision of carts for garbage and recycling ▪ Q1/Q2: Develop and implement Promotion and Education Campaign. ▪ Mid-2012: Phase in Cart-based collection across the City.				

Program	Year					
	2011	2012	2013	2014	2015	2016
	program/City inventory system. ▪ Undertake pilot automated cart based collection service in a group of Autobin areas. ▪ Sept 2011: Issue Bid Opportunity for provision of 195,000 garbage carts.					
Consistent Level of Bulky Collection (same service across City, $5 per item fee)	▪ Set per item fee ▪ Early Q4: Include Bulky collection in RFP for all collection services provided to SFDs. Award by Q1 2012 – See above.	▪ Q1 2012: Award new Contract for SFD collection services (recycling, garbage, LYW and bulky waste) ▪ Q1/Q2: Develop and implement Promotion and Education Campaign. ▪ Mid-2012: New Bulky Fees come into effect.				
Brady Road						
New Diversion Infrastructure (Green Park)		▪ Dialogue with Private Sector regarding interest in development of Green Park	▪ Pending interest, proceed with design concept for Green Park and other supporting activities	▪ Issue and award Bid Opportunity to develop Green Park. ▪ Begin first phase of Green Park development ▪ Develop agreements with potential Green Park occupants	▪ Subsequent phases of Green Park development as appropriate ▪ Develop agreements with potential Green Park occupants	▪ Subsequent phases of Green Park development as appropriate ▪ Develop agreements with potential Green Park occupants

5.2.2 Implementation Schedule for the Recommended Longer-Term Residential System: 2016 onwards

In the longer-term, the residential system will continue to expand, building upon the near-term system. The focus of the longer-term system includes both incremental improvements in programs and new programs that target additional material streams for diversion (e.g. source separated organics). The implementation schedule presented for the longer-term system is only 'conceptual' at this time, as adjustments may be required to reflect the success in implementing the 'near term' programs and to reflect currently unforeseen issues that may arise. Section 5.3.3 below discusses the need to review the CIWMP periodically and update the implementation schedule appropriately.

Figure 5.2 provides a high level overview of the implementation schedule for the longer-term residential waste management system. As the figure illustrates, by 2019 all recommended residential system components should be implemented in Winnipeg, assisting the City in reaching approximately 54% diversion by 2021, followed by a gradual increase to 59% diversion by 2031.

Table 5.3 lays out the detailed implementation schedule for each program that makes up the longer-term residential system. As mentioned above, this schedule will likely be adjusted/updated as a result of periodic CIWMP review.

-Figure 5.2: Proposed Implementation of the Longer-Term Residential System

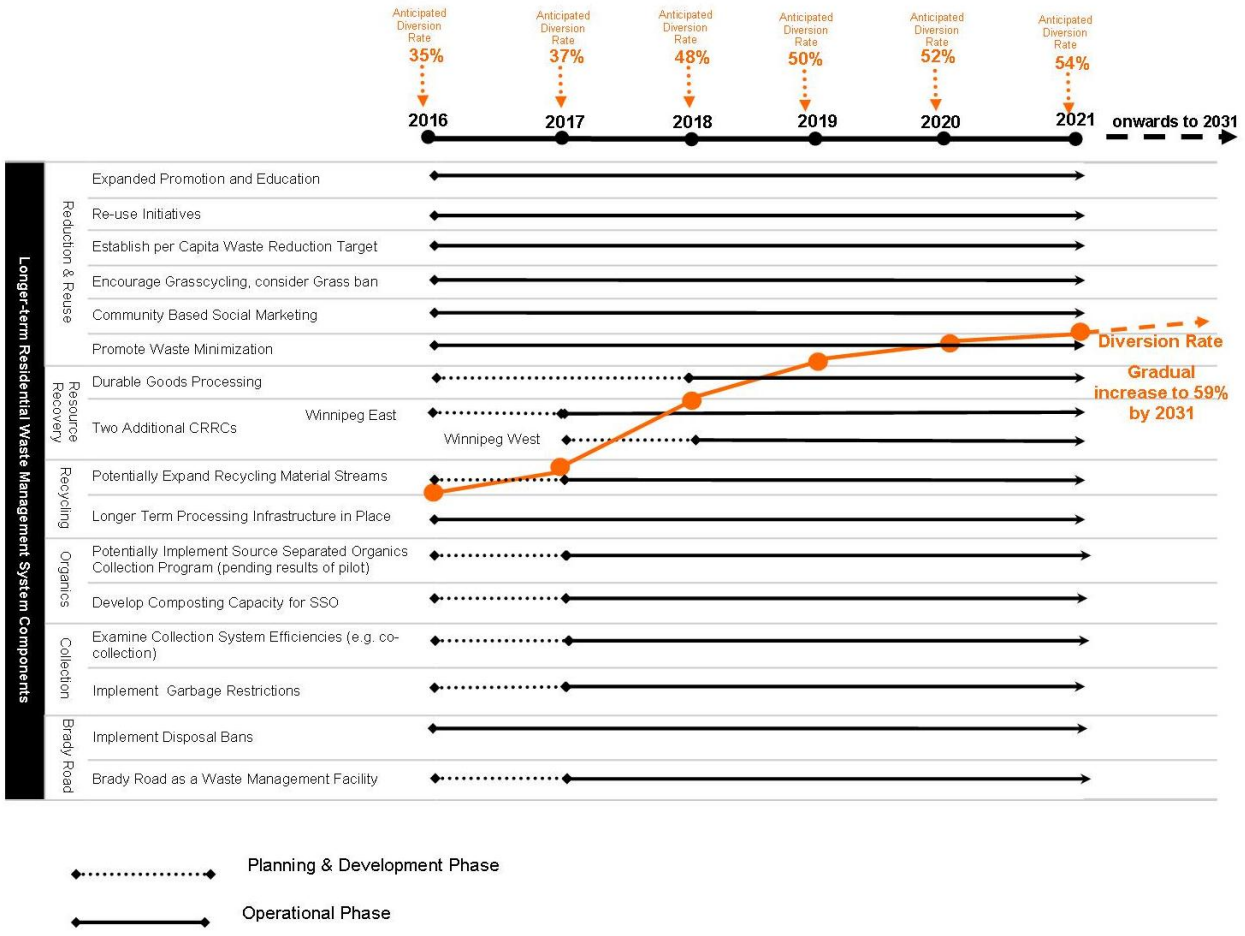


Table 5.3: Implementation Schedule for the Recommended Longer-Term Residential System: 2016 onwards

Program	Year			
	2017	2018	2019	2020
Waste Reduction and Reuse				
Expanded Promotion and Education	Continue to promote and expand programs developed as part of the near-term system which are primarily implemented through expanded promotion and education. Potentially implement Grass Ban as of 2017.			
Re-use Initiatives				
Per Capita Residential Waste Reduction Target				
Encourage Grasscycling, Consider Grass Ban				
Community Based Social Marketing				
Promote Waste Minimization				
Resource Recovery				
Durable Goods Processing	▪ Continue from near-term: o Review of municipal best practices in material processing and possible end-markets for recovered material. o Cost-benefit assessment for each material type to be processed. ▪ Based on diversion performance, and management of materials through CRRCs decide if implement program for durable goods processing or materials grinding.	▪ Potentially initiate process for development of durable goods processing facility and/or bulky materials grinding including: o Retention of consulting support services to develop specifications for design and operation o Procurement of services to implement program		
Two Additional CRRCs	▪ Siting process for Eastern CRRC. ▪ Design of Eastern CRRC, development of technical specifications ▪ Issue tenders for construction of Eastern CRRC. ▪ Issue tenders for equipment supply (bins, truck). ▪ Eastern CRRC is operational.	▪ Siting process for Western CRRC. ▪ Design of Western CRRC, development of technical specifications ▪ Issue tenders for construction of Western CRRC. ▪ Issue tenders for equipment supply (bins, truck). ▪ Western CRRC is operational.		
Recycling				
Expand Recycling Material Streams	▪ Ongoing: assess changes in potential materials markets and dialogue with MMSM.			
Processing Infrastructure	▪ Long-term processing capacity should be in effect at either one or two MRFs			
Organics				
Collection and Processing of Source Separated Organics	▪ Earliest date for organics program implementation. Implement organics collection as part of new contract for SFD collection services.			
Collection				
Collection System Efficiencies (e.g. co-collection)	▪ Collection of various streams would have to be coordinated. ▪ Collection scenarios would have to be assessed in light of collection contracts and location of processing facilities. ▪ Research best practices in collection system methodologies. ▪ Earliest date for implementation of collection system improvements. Implement as part of new contract for SFD collection services.			
Implement Garbage Restrictions	▪ P&E material development and distribution/notification. ▪ By-law amendment to support the program. ▪ Adequate notification of program change to residents/calendar development and distribution.			
Brady Road				
Implement Disposal Bans	▪ Establish inspection protocol. ▪ Establish designated diversion areas at landfill. ▪ Bans in place for materials targeted by short-term diversion	▪ Full bans in place for majority of divertible streams		
Brady Road as a Regional Waste Management Facility	▪ Negotiate contracts for waste disposal capacity user(s). ▪ Potential date where could have regional use of Brady Road as an integrated waste management centre.			

5.3 MONITORING AND REPORTING MEASURES

Proper monitoring and measuring of waste management system performance serves a number of functions, including the ability to:

- Adhere to currently accepted best practices;
- Identify issues with the system and effectively mitigate these issues;
- Adjust the CIWMP implementation schedules if issues arise;
- Assist in the selection and development of appropriate promotion and education initiatives to support CIWMP implementation; and,
- Identify opportunities for cost savings and increased effectiveness of the system.

The monitoring of system performance is an important aspect of ensuring the proper functioning of the overall waste management system and ensuring strategy goals are achieved.

5.3.1 Monitoring

5.3.1.1 Waste Audits

The City has not undertaken any waste audits of the curbside collection system. To-date, the City has relied upon auditing undertaken by MMSM and MPSC. Regular auditing of waste program performance, through observations of curbside behavior (e.g. number of set-outs) and the collection and sorting of a representative sample of waste material, is the primary means of determining waste generation rates, participation in the municipal programs and the actual capture rate for diversion of various material streams.

It is recommended that a residential audit be conducted by the City at a minimum of once every two years. The areas chosen for an audit should reflect a variety of types of neighbourhoods and areas (e.g. detached single-family households, rural areas, townhouses), socio-economic areas, and waste generation characteristics. These same households would be audited four times over the course of year (winter, spring, summer and fall) in order to capture the variations in seasonal generation of different waste streams. Garbage and recycling streams would be collected, weighed and sorted. The number and type of items in streams such as bulky items or leaf and yard waste may be recorded, weighed if possible (or weight estimated) and left at the curb.

Multi-residential buildings can also be audited; however, auditing of such buildings requires slightly different procedures due to the volume of materials. Since Winnipeg has a large segment of population living in multi-residential buildings (approximately 31%)[42], it would be worthwhile to

[42] Statistics Canada. 2007. *Winnipeg, Manitoba (Code4611040)* (table). *2006 Community Profiles*. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007. http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E (accessed May 16, 2011).

include these types of properties in the full waste audit in order to better quantify waste quantities and composition as well as issues with capture rates and program performance that may be encountered in that sector.

A full waste audit will provide the City with:

- Participation and set-out data that can be used to support program decisions (e.g. user-pay, bag limits);
- Generation rates and capture rates used for planning purposes;
- Information which may be used to target specific education campaigns; and,
- Baseline data to monitor pilot programs and other system changes.

The information acquired during a waste audit is essential to support many of the planning, and policy decisions that would be required during CIWMP implementation.

The City could also undertake a bulky waste collection audit. Considering that residents are required to call-in to request a bulky item pick-up, recording this information at the time of the call could provide an inventory of the number and types of bulky items to be collected. By recording the bulky item at the time of the call, the onus is removed from the collection truck drivers to undertake this task. Although residents may place items other than what was noted during the initial call-in at the curb for collection, it is anticipated that the number and type of items will not vary significantly.

Once a CRRC is established, a visual audit of in-coming materials could be undertaken to provide an indication of the types and quantities of materials residents have brought to the facilities for diversion or disposal. It is recommended that sufficient staff be available at the CRRCs in order to facilitate normal operations and data collection. For loads that do not contain mixed materials, tonnages could be recorded at the scalehouse. For loads of mixed materials, the scalehouse attendant could record the weight of the vehicles and provide an estimation of the percentage of each material type. An annual report of the amount of materials diverted at the CRRC could be produced. Further discussion on reporting requirements for the CIWMP is provided in Section 0.

Materials diverted by the IC&I and C&D sectors should also be tracked. Should a Mandatory Diversion By-Law be approved for implementation in the longer term (see Section 2.2.2.2.1), it will be important to track the IC&I and C&D material diverted to ensure that the program is effective.

Instituting an audit program in corporate facilities could help identify areas in which City staff could improve diversion and re-use initiatives.

5.3.1.2 Monitoring Indicators

In addition to audits, there are a number of other indicators that can be measured and tracked as they relate the initiatives identified throughout this report. The following table (Table 5.4) correlates

the CIWMP components identified in Section 2 with the types of data that could be gathered and included in an annual report on performance of the CIWMP (See Section 0 below for additional information on reporting).

Table 5.4: Monitoring Indicators

Program	Measurable Indicators
RESIDENTIAL PROGRAMS	
Promotion and Education and Social Marketing	▪ Spending per household on P&E related activities.
Re-use Initiatives	▪ Number of visitors to Winnipeg Re-use Guide website. ▪ Number of Giveaway Weekends and approximate number of participants. ▪ Donations (number, type, approximate value, etc.) of reusable materials at the CRRCs.
Establish a per Capita Residential Waste Reduction Target	▪ Per capita waste generation based on annual tonnes and estimated population ▪ Per capita waste generation based on annual audits and waste generation rates
Grasscycling	▪ Survey to determine percentage of residents participating in grasscycling.
CRRC(s)	▪ Quantity and type of materials received and managed at the CRRCs.
Private Sector Initiatives	▪ Number of companies with diversion initiatives and approximately quantity of waste diverted.
Increase Recycling Container Capacity	▪ Capture rate for recyclables before and after change to cart-based collection. Best measured through curbside waste audit. Can also be estimated based on reported tonnage received for processing.
Increase Recycling Processing Capacity	▪ Tonnes per day processed.
Leaf and Yard Waste Composting	▪ Number of residential collections per year. ▪ Quantity of leaf and yard waste collected and processed.
Consistent Residential Garbage Collection	▪ Increase in diversion rate post implementation of automated carts. ▪ Increase in capture rates for divertible materials. Best measured through curbside waste audit.
Consistent Level of Bulky Waste Collection	▪ Number of items & fees collected.
Disposal Options (Brady Road Landfill)	▪ Quantity of residential waste disposed. ▪ Number and type of “Green Park” initiatives. ▪ Quantity of materials managed through “Green Park”.
Durable (Bulky) Goods Processing	▪ Increase in diversion of bulky goods.
Recycling in Public Spaces	▪ Number of public spaces with recycling containers.
Special Events Recycling Program	▪ Number of special events with diversion services.
Expand Range of Recyclable Materials Collected	▪ Number of materials collected in recycling program. ▪ Increase in diversion rate.
SSO Program / Commercial Food Waste	▪ Quantity of SSO diverted. ▪ Increase in diversion rate.

Program	Measurable Indicators
	▪ Capture rate for SSO. Best determined through curbside audits.
Collection System Efficiencies	▪ Collection system statistics (e.g. average collection route size, operating hours per day) ▪ Time and motion statistics (e.g. time per stop)
Garbage Restrictions	▪ Increase in diversion rate. ▪ Capture rates for divertible materials. Best determined through curbside audits.
Disposal Bans	▪ Increase in diversion rate for banned materials.
Brady Road as a Regional Disposal Facility	▪ Number of Regional customers, range of services used. ▪ Revenues from tipping fees.
IC&I AND C&D PROGRAMS	
Green Procurement Guide	▪ Number of visitors to Green Procurement Guide website. ▪ Number of training sessions provided by City.
Commercial Re-use Programs	▪ Number of visitors to waste exchange website.
On-going Diversion Dialogue with IC&I Sector	▪ Number of companies certified through the voluntary certification program.
Mandatory C&D Diversion	▪ Increase in diversion rate.
Encourage LEED® Standards	▪ Number of LEED® buildings.
Strategic Partnerships	▪ Number of “Green Park” initiatives. ▪ Quantity of waste diverted through “Green Park”.
IC&I and C&D Materials Depot at Brady Road Landfill	▪ Increase in diversion rate.
Research Partnerships with Post-Secondary Institutions	▪ Number of projects underway/completed in partnership with post-secondary institutions.
Expand IC&I Curbside Recycling	▪ Number of small business receiving curbside recycling collection. ▪ Increase in diversion rate.
Support and /or Expand School Recycling Curriculum	▪ Number of schools using recycling curriculum.
Differential Tipping Fees	▪ Revenues from tipping fees. ▪ Increase in diversion rate.
IC&I Diversion Regulations/Policies	▪ Number of events (meetings, workshops, etc.) staff attended regarding 3Rs regulations.
Mandatory Diversion By-law	▪ Increase in diversion rate.

5.3.2 Reporting

It is recommended that the results of monitoring initiatives be reported on a regular basis internally within the City and externally to outside stakeholders.

Primarily, this would take the form of an annual report on the CIWMP. This annual report should provide an overview of the applicable objectives for that year and documentation on how the City reached these goals. It should also include a list of issues that arose during the year and how these issues were mitigated. Finally, the report should include a section on the plan for CIMWP implementation for the following year.

The annual reporting cycle should be viewed as an opportunity to communicate the success of CIMWP implementation not just with Council, but also with City residents and other stakeholders in the City. The annual report should be in a succinct form that clearly identifies successes over the previous year, general performance and also areas where collectively the City and residents may need to improve performance.

In addition to an annual report, the City should also ensure that all waste management related reports produced for Committee and Council, include a section on how the report contents relate to the implementation of the CIWMP. This should apply to reports that relate directly and those that relate indirectly to the CIWMP. This will assist City staff in adhering to the vision of the CIMWP and also guarantee that all interested parties understand how each waste management activity relates back to the strategic vision for waste management in the City.

This will be particularly critical when key decisions will be required during CIWMP implementation. When recommendations are brought back to Council for example, on the award of a contract to develop a new CRRC at in the northern area of Winnipeg, it will be essential to make the connection between the need for the facility, and the CIMWP approved by Council.

As an example, the City of Hamilton currently includes a section in all waste management reports that discusses how the subject of the report and the report recommendations, fits into their overall approved solid waste management master plan. This arrangement has assisted the City of Hamilton in ensuring the goals and objectives are met and provide a constant reminder to stakeholders of the waste management vision for the community.

Opportunities for Stakeholder Involvement during CIWMP Implementation

Given the proposed promotion and education program presented in Section 5.4, reasonable options to provide opportunities for ongoing citizen feedback regarding the CIWMP would include:

- Ensuring that the Annual Report provides a visually interesting and useful overview of the status of the CIWMP including progress in achieving diversion targets. The report and key findings should be posted prominently on the City's website, and mechanisms for on-line comment and suggestions can be provided;
- Providing a brief summary of the Annual Report at public venues and sessions that will be taking place in overall support of the CIWMP;
- Using various media to highlight the most important achievements in each year; and,

- Identifying key issues that arise, seeking comments and suggestions through personal contact and electronic media.

5.3.3 CIWMP Review

It is recommended that City conduct periodic reviews and updates to the CIWMP at various times throughout the planning period (2011-2031).

It is recommended that in 2016, (year five of the CIWMP) the City complete a comprehensive review and update to the recommended CIWMP. This review should outline the goals and objectives met in the previous years and also outline issues that arose over that period that may have hindered the implementation of the CIWMP. The CIWMP document should then be updated to reflect the review completed and provide a detailed implementation timeline for the next four years of the planning period. The recommended schedule for the review of the CIWMP is based on accommodating a reasonable cycle of contracts and the election cycle of council as follows:

- Review 1, 2016,
- Review 2, 2020,
- Review 3, 2024,
- Review 4, 2028,
- Review 5, 2031.

As part of the CIWMP review, some the key targets that could be adjusted would be:

a) Per capita waste reduction targets could be adjusted to reflect the trends in waste generation observed through both annual tonnage records and curbside waste audits. They could also be adjusted to reflect Provincial/National trends, new initiatives planned to assist City residents with waste reduction and reuse, and any reasonably understood trends in packaging such as shifts away from certain packaging approaches.

b) Waste diversion targets would likely be adjusted based on program performance in the preceding years and planned diversion initiatives at the City and Provincial levels. Diversion targets will also have to be adjusted to reflect overall trends in material generation, such as a shift away from various types of recyclable packaging materials.

The review process will ensure that the CIWMP remains relevant and evolves with the City's needs over time.

5.4 PUBLIC AWARENESS AND EDUCATION STRATEGY

As of 2009, the City spent approximately $56,000 per year on P&E (specifically advertising for the recycling program). Based on the estimated number of single family households in Winnipeg (175,000), this amounts to spending approximately 32 cents per household. Best practices and experience from other municipalities indicate that spending approximately $1 to $2 per household per year on P&E related activities is necessary for effective diversion programs.[43]

Currently, the City relies mainly upon the yellow pages in the phonebook and its website to disseminate information regarding its waste programs. A number of pages in the phonebook and on-line provide information regarding recycling, backyard composting, grasscycling, other diversion programs, garbage collection, and some waste management statistics. The cost to the City for placing information in the phonebook is approximately $50,000 per year. As every household receives a phonebook, this has been the preferred means of disseminating program information.

The annual recycling and garbage collection calendar is also available for download from the City's website or in the phonebook. In comparison to collection calendars from other municipalities, the City's calendar is very basic. A waste services calendar is an excellent way to advise citizens of acceptable items for the blue box program, and other pertinent information. It can serve as a year-round reminder to residents and should be produced in a practical format that is colourful and that provides information in plain-language.

While the City provides sufficient information to residents through their current P&E activities, information alone will not encourage residents to change their behaviour and increase diversion rates. In order to effectively implement the initiatives set out in the recommended CIWMP, a new P&E strategy is required which will focus on motivating behavioural changes.

5.4.1 Media and Approaches

Typically, there are six key media types that are used in P&E programs, namely print, hotlines, websites (and other electronic media), radio/television, presentations, and other products and tools. In addition to these six media types, it is also recommended that the City use social marketing as a key tool as part of its P&E strategy. The following subsections describe the different media and approaches in more detail.

5.4.1.1 Print Media

Print media can be one of the most cost effective means of promoting waste management plans. Large quantities of print materials can be produced quickly and disseminated in a variety of ways. Most commonly, print media includes waste collection calendars, various brochures and pamphlets,

[43] KPMG, 2007. Blue Box Program Enhancement and Best Practices Assessment Project (Final Report Volume I – July 31, 2007).

newsletters, door hangers, oops stickers, stickers/posters/magnets, progress reports, and inserts into water/tax bills.

Although P&E should be focused on encouraging behavioural changes, some aspects of waste management are complex and P&E materials will need to be information based to provide details as to how to divert waste properly. In this instance, brochures, pamphlets, and the waste calendar can be useful tools. Door-to-door distribution of information for targeted promotional campaigns, are also beneficial as these documents will not be mixed up with "junk mail" and it also provides an opportunity for direct contact with residents. Inserts of brochures or pamphlets into water/tax bills may signify the importance of waste management and that there is a cost to providing the service.

Oops stickers are those that are left behind by collection staff when a resident has not complied with waste set out instructions. Oops stickers are an effective method of informing the resident as to why their materials where left behind rather than simply leaving waste on the curbside with no indication of why it was not collected. Stickers are generally low-cost but provide an opportunity to increase the effectiveness of diversion programs.

Advertisements in widely read newspapers are also a cost effective means of informing a large number of people about new program launches or reminders of how to sort waste properly. For example, newspaper ads can be focused and specifically target a material with a low capture rate. In addition to advertisements, staff can offer to be interviewed by reporters to have waste management issues highlighted in an article. An article in a newspaper can be an effective way of introducing new programs to a community. Effective media relations include press releases, editorial board sessions and provision of photo-opportunities. Consistent, regular and positive media attention is an excellent and lower cost means of attracting the interest of residents in the County's programs.

A newsletter or progress report is also a useful tool to provide updates on programs and initiatives. Informing residents of their accomplishments may encourage even further diversion. A newsletter/progress report also provides an opportunity to target problem materials. The newsletter need not be dedicated specifically to waste; local municipalities and other community groups (e.g., service clubs, churches, associations, etc.) may already have newsletters and be open to allowing articles regarding waste management in their publication.

Stickers/magnets/posters are promotional items that are most often used to support a primary campaign. The messages are generally short and catchy and grab an individual's attention. However, if not done properly these items will be recycled or thrown out. Although these types of promotional items are not the main focus of P&E programs, they do form an integral part of any campaign. Best practices literature identifies consistent and repetitive messages as a key approach toward changing behaviours and habits.

5.4.1.2 Hotlines

A hotline is the phone number that residents can call if they have questions or concerns regarding waste management. There are some key training measures that can be undertaken to ensure the caller is satisfied with the information provided. These measures include[44]:

- Provide training for hotline staff, particularly on how to deal with difficult situations.
- Randomly testing staff to determine the currency and accuracy of the information they provide and their general attitude towards the caller (i.e., friendly).
- Keep staff current with all program developments.
- Prior to implementing a new program, the hotline staff should be asked to provide comment on promotional materials as the questions that they ask and issues they note may be more reflective of the types of issues that could be raised in the community.
- Provide staff with a list of frequently asked questions and answers (Q&A) that can easily be searched through to locate the caller's question. Ask for feedback on the Q&A, both for common questions that need to be anticipated, and also on the usefulness of the answers.
- Continue to update the list of frequently asked questions by having hotline staff provide a list of questions asked.
- Communicate key messages with hotline staff.
- Track the questions asked to determine if there is a lack of information regarding a particular aspect of a program.

5.4.1.3 Website

Websites are a critical point of contact with the public, as the majority of households have access to a computer. When visiting a website, users want to be able to locate information quickly. If an email address for additional information is provided, users will also expect a timely response. A key point is that a website is a different tool than the brochures, pamphlets, and other print items that are distributed to the public[44]. There are many features available on a website that can make for an interactive experience. It is recommended that the City continue to use measures that were used during the CIWMP process, such as posted instructional videos, questionnaires and surveys to interact with the public.

Other on-line social media are available that are suitable for educating the public regarding waste management some of which are currently used by the City such as Facebook. Myspace, Facebook, podcasts, various on-line forums, and blogs can be excellent tools for communication and are especially applicable to the younger demographic who are likely to access information on-line. Generally, social media are free or low cost and only require staff time for regular updates and to provide responses. An example of the use of social media for waste management comes from

[44] These measures were taken from: Association of Municipal Recycling Coordinators. 2007. *Recycling Program Promotion and Education Workbook.* Available on-line at: http://www.stewardshipontario.ca/bluebox/pdf/eefund/reports/68/PE_Workbook.pdf.

the City of Houston, Texas. Houston uses Facebook to provide waste management information and also to answer residents' questions and comments.[45]

Social marketing will be discussed further below.

5.4.1.4 Radio and Television

Local radio and television stations can be a valuable source of information for the public. To be effective, radio and television ads need to be repeated often and have enough impact to encourage people to view them in their entirety. In a study completed for the City of Hamilton, residents recalled seeing television ads (52%) more than any other form of P&E[46]. Survey participants recalled radio ads at 7% (the third highest recall rate).

5.4.1.5 Presentations

Another effective method of communication is to have staff or other "program champions" deliver presentations to community groups and organizations and educational institutions in order to discuss waste management programs with people where and when they are already gathered rather than holding special meetings at a time and place when people may not attend. By meeting with smaller groups of residents, presenters can specifically tailor the presentation to meet the audience's needs. Any concerns and questions can be answered during the discussion period of the presentation.

"Program champions" can include individuals who are already active in promoting waste management within Winnipeg, including volunteers, or even co-op students. By learning from other City residents, presentation attendees may be more receptive to key messages than if they were delivered by City staff.

5.4.1.6 Other Products and Tools

There are many opportunities to interact with the public that do not involve formal mail-outs or presentations. For example, displays can be set-up at malls, fairs, community centres, or in other areas that are frequented by residents. Staff available at the display could answer any questions, and promotional items could be distributed to garner public attention. This is particularly helpful in providing a visual demonstration of key program changes such as the proposed changes to the single-family collection programs for garbage, recyclables, LYW and bulky waste.

[45] The City of Houston's Facebook page is available at: http://www.facebook.com/pages/City-of-Houston-Solid-Waste-Management/140786392131
[46] Informa and Ehl Harrison Consulting Inc. 2006. *Blue Box Recycling Public Opinion Survey: Benchmark Report.* Available on-line at: http://www.stewardshipontario.ca/bluebox/pdf/eefund/reports/125/125_phase1_report.pdf.

Parades show community spirit and involvement of a municipality would show that the waste program is part of the community. Creating waste diversion "characters" would help grab the attention of younger residents and portray waste management as "fun".

5.4.1.7 Social Marketing

To best communicate with residents and encourage them to participate in new programs, it is recommended that the City use various methods of social marketing. Social marketing is primarily about having a conversation (two-way communication) as opposed to trying to disseminate information (one-way communication). Social marketing can help improve residents' understanding of a particular waste program, direct them to legitimate forms of information, mitigate against misinformation, and generally better engage the public.

A number of new programs identified in Section 2.1 would be appropriate programs where a social marketing approach is recommended, including but not limited to: the transition to Uniform Garbage Collection; implementation of City-wide Leaf and Yard Waste Collection; and implementation of CRRC(s).

As noted in Section 2.1, community-based social marketing involves four stages:

- Identifying barriers and benefits to a behavior;
- Developing and piloting a program to overcome these barriers and enhance benefits;
- Implementing the program across a community; and,
- Evaluating the effectiveness of the program.

This section will focus on identifying barriers and identifying marketing ideas and programs to help overcome the barriers. Implementation of the CIWMP is discussed in Section 5.2 and monitoring and reporting are discussed in Section 5.3.

Application of Social Marketing to Uniform Garbage Collection

The City currently collects garbage via five different collection systems. The CIWMP recommends the City move towards automated cart based collection for the single family residential sector across the City. Educating the public and changing their behavior in regards to this change in garbage collection method will require that a social marketing campaign be developed and implemented well in advance of the change to carts. As noted in Table 2.20, a Promotion and Education Campaign should begin in early 2012 prior to the phase-in of the program beginning mid-2012.

Table 5.5 below provides an indication of the types of barriers that the City may face when implementing uniform garbage collection as well as social marketing tools that can be used to overcome the barriers.

Table 5.5: Uniform Garbage Collection Social Marketing Plan

Barriers	Use of Social Marketing to Overcome Barriers
▪ Carts are too large/heavy. ▪ Carts will tip over in the wind and create a litter problem. ▪ Automated collection will result in more litter as not all garbage will fit in the carts ▪ Carts will crack/break during winter. ▪ Garbage will get stuck in the bottom of the cart and will not tip out. ▪ Carts will get stolen. ▪ Carts are hard to use in winter.	▪ Monitor comments written in response to newspaper articles. ▪ Provide resources (i.e., website link) to correct misinformation posted on-line. ▪ Post online videos illustrating the durability of carts. ▪ Post online videos illustrating how automatic collection works. ▪ Use Social Media to monitor and respond to residents' concerns. ▪ Visit community centres, senior centres, church groups, etc., to provide information on the carts before the roll-out begins. ▪ Allow residents to sign-up for a City staff member to come to their homes, to hear their concerns and offer advice

City-wide Leaf and Yard Waste Collection

The City currently only collects leaf and yard waste at the curb in the northwest area that is currently served with automated cart collection. As noted in Section 2.1, it is recommended that the City implement bi-weekly curbside collection of leaf and yard waste across Winnipeg from April to November of each year. In order to successfully implement the program and ensure residential participation, the City would need a comprehensive promotion and education campaign in regards to the change in the collection schedule and acceptable set-out parameters. It is anticipated that this campaign would begin in early 2012 with leaf and yard waste collection across Winnipeg beginning in the spring of 2012.

The table below provides an indication of the types of barriers that the City may face when implementing City-wide Leaf and Yard waste collection as well as social marketing tools that can be used to overcome these barriers.

Table 5.6: City-wide Leaf and Yard Waste Collection Social Marketing Plan

Barriers	Use of Social Marketing to Overcome Barriers
▪ Cost of bags. ▪ No incentive to separate L&Y waste from garbage. ▪ Too difficult to remember scheduled pick-up days. ▪ Residents will continue to use plastic bags	▪ Offer several free paper bags to residents during program initiation. ▪ Creation of a "Block Leader" program – an individual who can offer information to other residents on the program as well as place reminder signs in their yards the day before L&Y waste collection days. ▪ Place door hangers on residences indicating how much leaf and yard waste has been diverted from the landfill. ▪ Distribute "organics" stickers that can be placed on containers so residents do not have to purchase bags. ▪ Provide information through various media on how the City will process the L&Y waste, discussing how important it is that plastic is not present in the material so that a useful compost product can be generated.

Implementation of CRRC(s)

With the implementation of the proposed CRRC(s), the City would need to advise residents of the new opportunity to divert various types of waste. Table 5.7 below provides an indication of the types of barriers that the City may face when implementing the CRRCs as well as social marketing tools that can be used to overcome these barriers.

Table 5.7: Implementation of CRRC(s) Social Marketing Plan

Barriers	Use of Social Marketing to Overcome Barriers
▪ No vehicle to transport waste to CRRC. ▪ Hours of operation too restrictive. ▪ Residents unaware of CRRC and its function. ▪ Too far to travel. ▪ Unsure of what materials accepted at CRRC.	▪ Use of on-line function whereby a resident inputs the material to be disposed and the proper disposal location is generated. ▪ Advertise on Social Media websites, newspaper advertisements, etc. extended hours several times a month to allow more residents to properly dispose of waste. ▪ Use Social Media to create a site where residents can offer to collect other residents materials for disposal at CRRC (e.g., similar to a car-pooling website).

5.4.2 Communications Plan

Development and implementation of annual communications plans is a vital component of the CIWMP. The communications plans will ensure a coordinated approach for the implementation of the reduction, diversion and disposal initiatives. Without a communications plan, messages may be released to the public in a piecemeal fashion, which will not have as great of an effect as a coordinated outreach program. Effective communications plans contain four primary elements: design, funding, deployment, and monitoring and evaluation.[47]

The design of any promotional campaign should be based on the overall communications plan. Goals and objectives should be identified to ensure the approach taken is in concordance with the CIWMP. Since each audience may have different requirements, it is important to consider the target audience. For example, adults and children may require very different messages with different formats for communicating the message. It is also important to consider who should be

[47] KPMG, R.W. Beck. 2007. *Blue Box Program Enhancement and Best Practices Assessment Project – Volume 1*.

targeted. Studies have identified women as the main recyclers within a household[5,4849] and therefore, women should be one of the main targets for key messages.

Not only is it important to target individuals to whom key messages should be directed, it's also important to consider targeting campaigns to specific areas of a house. The same studies identified above found that most recyclables were generated in the kitchen where there is easy access to recycling receptacles. Few recyclables are collected in other areas of a home, in part due to fact that recycling containers are generally not placed in bathrooms, bedrooms, living rooms, etc. Tactics, timing and plans for monitoring and evaluating the success of the promotional campaign should also be considered during the design phase.

Once a campaign is designed and funded, its deployment should use a mix of media including strategies such as radio or TV, calendars, websites, public relations, and other interactive methods. Sustained programs, with year-round exposure are identified as a best practice and are preferable to campaigns that are a one-time blitz.

Following deployment of the campaign, the monitoring and evaluation plan developed in the design stage should be implemented. Assessing the success or failure of a campaign can lead to improvements in the next campaign and elimination of those elements that were not conducive to P&E. For example, to monitor the success of P&E programs spikes in recovery or overall annual tonnages of recyclables collected should be examined.

The CIWMP proposes a number of initiatives to be implemented during the first five years of the Strategy. Using the various P&E methods described above, suggested P&E approaches for the implementation of each initiative are described below in Table 5.8.

These suggested approaches would be confirmed through the development of communications plan(s) by the City on an annual or campaign specific basis. Generally the City could consider developing an annual Communications Plan in discussion with internal experts within the City, the timing of which would coincide with budget development i.e. planning in the third quarter of each year for the plan applicable in the next. This would set the stage for the implementation of various promotion and education initiatives throughout the following year. In some cases, a specific communications plan for specific significant initiatives should be developed.

[48] Informa and Ehl Harrison Consulting Inc. 2006. *Blue Box Recycling Public Opinion Survey: Benchmark Report.* Available on-line at: http://www.stewardshipontario.ca/bluebox/pdf/eefund/reports/125/125_phase1_report.pdf.
[49] McConnell Weaver Communication Management. 2006. *Stewardship Ontario Effectiveness and Efficiency Fund Project 105: Enhanced Blue Box Recovery Strategy Communication Pla*n.

Table 5.8: Overall Communications Plan

Recommendation	Year Program is Implemented	Year of P&E Program	Target Audience of P&E	Suggested Promotional Activities																								
				Newspaper Articles	Brochures	Oops Stickers	Newsletters	Annual Calendar	Hotline	Stickers/Magnets/Posters	Door Hanger	Speaking Engagements	Public Service Announcements	Mobile Education Unit	Information Meetings	Progress Reports	Website/Social Media	Door-to-door Delivery of Brochure	Tax and Water Bill Inserts	Personal Contact with Residents	Event Displays	Parades	Media Advertisements	Outdoor Signs	Promotional Items	Media Releases	Mascot
Waste Reduction and Reuse																												
Expanded Promotion and Education	2011	2012, ongoing	General	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Backyard and Community Composting	2011	2012, ongoing	General	✓	✓			✓		✓					✓						✓		✓		✓		
Re-use Initiatives	2013	2013, ongoing	General	✓		✓	✓	✓		✓			✓				✓			✓	✓		✓	✓			
Establish a Per Capita Residential Waste Reduction Target	2012	2012, ongoing	General				✓	✓		✓						✓	✓						✓				
Encourage Grasscycling	2012	2012, ongoing	General	✓	✓			✓					✓				✓						✓		✓		
Implement Community Based Social Marketing	2012	2012, ongoing	General	✓			✓	✓					✓				✓										
Promote Waste Minimization	2013	2013, ongoing	General	✓								✓		✓		✓	✓				✓				✓		
Resource Recovery																												
Two New CRRCs (potentially providing a location for HHW, WEEE, and reusable items depots)	2013 and 2015	2013, ongoing	General	✓			✓						✓		✓		✓						✓	✓		✓	
Encourage Private Sector Initiatives	2013	2013, ongoing	IC&I and C&D	✓											✓	✓							✓			✓	
Recycling in Public Spaces	2013	2013, ongoing	General	✓				✓				✓	✓		✓	✓	✓				✓		✓	✓		✓	
Special Events Recycling Program	2014	2014, ongoing	Community Organizations, General	✓				✓				✓	✓		✓	✓	✓				✓		✓	✓		✓	
Recycling																												
Increase Recycling Container Capacity and Adjust Collection	Mid-2012	Early 2012	Single Family Residential	✓		✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
Organics																												
Expand Leaf & Yard Waste Collection	Mid-2012	Early 2012	Single Family Residential	✓		✓	✓	✓	✓	✓		✓	✓			✓	✓	✓	✓		✓		✓	✓	✓	✓	
Curbside Organics – Pilot Program	2012/2013	2012	Pilot Area	✓			✓			✓		✓	✓			✓	✓	✓	✓		✓		✓		✓	✓	

Recommendation	Year Program is Implemented	Year of P&E Program	Target Audience of P&E	Suggested Promotional Activities																							
				Newspaper Articles	Brochures	Oops Stickers	Newsletters	Annual Calendar	Hotline	Stickers/Magnets/Postcards	Door Hanger	Speaking Engagements	Public Service Announcements	Mobile Education Unit	Information Meetings	Progress Reports	Website/Social Media	Door-to-door Delivery of Brochure	Tax and Water Bill Inserts	Personal Contact with Residents	Event Displays	Parades	Media Advertisements	Outdoor Signs	Promotional Items	Media Releases	Mascot
Collection																											
Change Single-Family Residential Garbage Collection to Automated Carts	Mid-2012	Early 2012	Single Family Residential	✓		✓	✓	✓	✓	✓		✓	✓			✓	✓	✓	✓		✓		✓	✓	✓	✓	
Consistent Level of Bulky Collection (same service across City, $5 per item fee)	Mid-2012	Early 2012	Single Family Residential	✓			✓		✓	✓		✓	✓			✓	✓	✓	✓		✓		✓		✓	✓	
Brady Road																											
New Diversion Infrastructure (LYW composting, CCRC, Green Park)	2012, 2013	2013	IC&I and C&D Waste Generators	✓											✓											✓	

6.0 Summary and Conclusions

The current waste management system operated by the City of Winnipeg services primarily the residential sector of the City, with some services provided to IC&I and C&D sectors. As of 2009, the City's residential programs were achieving approximately 15% diversion of waste from disposal, indicating that the City could make considerable progress to improve diversion through a variety of initiatives.

An enhanced integrated waste management system has been developed for the City of Winnipeg, as documented in this report that reflects input from public involvement, the general principles of zero waste and a waste hierarchy that encourages and promotes efficient use of resources and waste minimization. Implementation of the recommended system would result in the primary emphasis for waste management in Winnipeg switching from disposal to diversion.

An implementation plan for the recommended system has been identified, which addresses the CIWMP financing, the organization and staffing complement required to support implementation, the monitoring programs and reporting requirements and supporting communications approaches.

The recommendations identified in the CIWMP can be summarized as follows:

1. Implement improvements to the residential waste management system in the near-term to increase diversion to 35% with an increase in net waste management costs of up to $7.3 million that includes: expanded promotion and education programs; CRRCs that can recover resources from the waste stream; improvements to recycling collection; expanded leaf & yard waste collection and processing; a uniform approach to collecting garbage; and, improvements at the Brady Road landfill.
2. Consider further expansion of the residential diversion program in the longer-term to increase diversion to 59%, with an increase in net waste management costs of up to $23 million, which includes additional CRRCs and diversion of kitchen organics.
3. Consider near and longer term IC&I and C&D diversion programs that are complementary to the residential system, and support the transition of Brady Road from a disposal to a resource management facility.
4. Finance the CIWMP through a 'Flat Rate' per single family residential household set at $50 annually for the first few years of implementation, which would be sufficient to cover the net change in waste management costs in the near term and would be used to set aside a dedicated solid waste reserve fund, to fund future capital needs of the CIWMP.
5. Adjust the staffing complement for solid waste services to administer, support and operate the programs included in the CIWMP.

6. Regularly report on progress in implementing the CIWMP and review the plan at least every five (5) years.
7. Support implementation of the CIWMP with a comprehensive approach for communications, promotion and education that includes social marketing.

Implementation of the CIWMP is expected to increase residential diversion rates, potentially up to 59% pending the decisions that are made by the City in regards to the longer term program components. A significant portion of the proposed diversion infrastructure for the CIWMP would be located at the Brady Road landfill, such that the Brady Road site would in effect become a resource management facility.

7.0 Closure

This report has been prepared for the benefit of the City of Winnipeg. The report may not be used by any other person or entity without the express written consent of the City of Winnipeg and Stantec. Any use of this report by a third party, or any reliance on decisions made based on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

The information and conclusions contained in this report are based on work undertaken by trained professional and technical staff in accordance with generally accepted practices at the time the work was performed.

Respectfully Submitted,

STANTEC CONSULTING LTD.

Original signed by

Janine Ralph
Senior Associate
Tel: (905) 631-3921
Janine.ralph@stantec.com

Appendix A
Technical Memo: CIWMP Vision, Goals and Objectives

Appendix B
Draft Report: Description of Current Waste Management System (Task C) and Projection of Waste Management Needs (Task D)

Appendix C
Draft Task E Report: Identification of Waste Management Options

Appendix D
Open Space Recycling Better Practices Review

ERROR! REFERENCE SOURCE NOT FOUND.

Appendix E
Reports Documenting Community Engagement During CIWMP Development

Appendix F
Summary of Assumptions and Data Sources